

## **Annotated Bibliography: The Ecosystem Approach**

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## Glossary

### System

A system is a collection of parts unified to accomplish an overall goal. If one part of the system is removed, the nature of the system is changed as well. A system can be looked at as having inputs, processes, outputs and outcomes. Systems share feedback among each of these four aspects of the system.

From: *Systems theory* (a/o: [http://www.geocities.com/hafeez\\_teaching/mgmt/management\\_intro.htm](http://www.geocities.com/hafeez_teaching/mgmt/management_intro.htm))

### Ecosystem

An **ecosystem** is a dynamic complex of plant, animal and micro-organism communities and the non-living environment interacting as a functional unit. Humans form an integral part of ecosystems.

From: *CBD*: <http://www.biodiv.org/programmes/cross-cutting/ecosystem/description.asp>

### Management

The process of controlling human activities; usually based on a coordinated system of planning, implementation and evaluation.

### Ecosystem Management

**Ecosystem management** is a process that integrates ecological, socio-economic, and institutional factors into a comprehensive strategy in order to sustain and enhance the quality of the ecosystem to meet current and future needs.

From: <http://www.ics.harvard.edu/ecology/brownlow.html>: *Definitions Ecosystem Management*

Ecosystem Management is management driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem composition, structure, and function.

From: *ESA* <http://www.esa.org/science/PositionPapers/ppDocuments/CommitteeOnScientificBasis.html>

### Ecosystem Approach

The **Ecosystem Approach** is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. It was endorsed at the CBD CoP 5 in Nairobi, Kenya (May 2000) as the primary framework for action under the Convention.

From *CBD*: <http://www.biodiv.org/programmes/cross-cutting/ecosystem/>

### Ecosystem goods and services

**Ecosystem services** (e.g. purification of air and water) and **goods** (such as food, drinks) are the benefits that human society directly or indirectly derive from **ecosystem functions**. Goods refer often to items given monetary value in the market place, whereas the services from ecosystems are valued, but rarely bought or sold.

*Modified from Ehrlich and Ehrlich 1991, Lubchenco et al. 1993, and Richardson 1994*

**Ecosystem functions** are defined as the capacity of natural processes and components of natural or semi-natural systems to provide goods and services that satisfy human needs. Four types of ecosystem functions are considered:

- Regulation functions
- Carrier functions
- Production functions
- Information functions

**Ecosystem function** depends on its **structure, diversity and integrity**.

From: <http://esa.sdsc.edu/ecmtext.htm>

**Ecosystem Integrity**

There are several definitions of **Ecosystem Integrity**, and they all reflect the capability of a system to support services of value to humans. According to Noss in De Leo, G. and Levin, S., it is: "the capability of supporting and maintaining a balanced, integrated, adaptive, community of organisms having species composition, diversity, and functional organisation comparable to that of natural habitats of the region."

**Source:** *The multifaceted aspects of ecosystem integrity*, *Conservation Ecology* 1(1)3,  
<http://www.consecol.org/vol1/iss1/art3>

**Ecosystem Structure**

The physical arrangement or spatial patterns of the components of an ecosystem, especially the plant life. It includes growthforms, number of canopy layers, degree of cover, distribution patterns of species within the ecosystem (patches, for example). Structure may also refer to the organization of the ecosystem in terms of trophic levels.

*Radford University:* <http://www.radford.edu/~swoodwar/CLASSES/GEOG235/glossary.html>

**Biological Diversity**

**Biological diversity** is the variety of life and its processes, including the variety of living organisms and the genetic differences among them, as well as the variety of habitats, communities, ecosystems and landscapes in which they occur.

*From CBD:* [http://biodiversity-chm.eea.eu.int/CHMIndexTerms/Glossary/B/biological\\_diversity](http://biodiversity-chm.eea.eu.int/CHMIndexTerms/Glossary/B/biological_diversity)

# 1. Introduction

## 1.1 The Ecosystem Approach

The Ecosystem Approach, consisting of 12 Principles and 5 points of Operational Guidance is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (Convention on Biological Diversity 2000, see also Annex I).

IUCN's Commission on Ecosystem Management (CEM) aims to enhance the understanding and to promote the application of the Ecosystem Approach with the implementation of the Netherlands' funded project "Promoting Application of the Ecosystem Approach".

This annotated bibliography gives an impression of available documentation on the ecosystem approach and related topics. This document does not claim to be exhaustive and comprehensive. Much more literature related to the spirit of the Ecosystem Approach is available, especially literature dated from before the official recognition of the Ecosystem Approach, that contains very worthwhile information.

The ecosystem approach is an evolving concept and during the past years more and more disciplines, sectors, institutions, etc. have become involved in defining, analysing, operationalising and applying the Ecosystem Approach (EsA). IUCN already acknowledged in 1952 in Resolution 23 that 'man and nature are inseparable' and that 'all factors of the environment – soil, water, and the dependent living things, including man – are intimately related in nature and compose an intricate ecological complex in which the action of a single factor immediately affects the action of others'. Furthermore this resolution explains that 'people may wish to relate their activities with those of other groups in comprehensive resource management of large basins or regions, but the basis for combining the works of man with the laws of nature seems reasonable to rest with ecological units where there is a community of human needs'. During the last World Conservation Congress (Amman, 2000), IUCN reconfirmed Resolution 2.2 'Integrating ecosystem management in IUCN's Programme' that 'ecosystem management is fundamental to the mission of IUCN'.

The annotated bibliography starts with documentation on the ecosystem approach in general (no specific ecosystem referenced) and is then structured according to the Convention on Biological Diversity (CBD) thematic work programmes on major ecosystem types:

1. The Ecosystem Approach in general
2. Marine and coastal biological diversity
3. Forest biological diversity
4. Inland water biological diversity
5. Agricultural biological diversity
6. Biological diversity of dry and sub-humid lands

Furthermore all literature has been analysed on the type(s) of approach described, the nature of the document (prescriptive, descriptive, conceptual, practical or field experience), the region and the key features. In Annex II an overview is given of the cited documents and their relevance in regard of the Ecosystem Approach.

## 1.2 The Ecosystem Approach in relation to International Developments

Many approaches have been developed for different types of ecosystems (Integrated Water Resources Management, Sustainable Forest Management, etc.) that are more or less comprehended by the Ecosystem Approach. The CBD concludes in Decision VII/11: Ecosystem approach:

“There is no single correct way to achieve an ecosystem approach to management of land, water, and living resources. The underlying principles can be translated flexibly to address management issues in different social contexts. Already, there are sectors and governments that have developed sets of guidelines that are partially consistent, complementary or even equivalent to the ecosystem approach”.

In many sectors like fisheries and forestry, the objective for many years has been the optimization of the harvestable product (fish, timber). Due to different circumstances (depletion of the resources, lower harvest as a result of the degradation of the ecosystem, pressure from consumers, ...) these industries have acknowledged that they need to adopt less detrimental management strategies. Applying the Ecosystem Approach is an option.

For marine and coastal biological diversity many initiatives to apply the Ecosystem Approach are going on. The Ecosystem Approach is the guiding principle for the new Marine Strategy (2005) of the European Commission. Considerable documentation is available on applying the EsA to Fisheries.

At the request of the CBD, comparisons have been made between Sustainable Forest Management (SFM) and the Ecosystem Approach. It is acknowledged that SFM can be considered as a means of applying the ecosystem approach to forests, but SFM weaknesses are also mentioned (e.g. cross-sectoral integration). There is substantial potential for mutual learning among those implementing both the ecosystem approach and sustainable forest management.

The Ramsar Convention on Wetlands has developed a “wise use approach” for the conservation and sustainable use of wetlands. This approach is highly compatible with the EsA and experiences of the implementation with this approach might be useful for further operationalisation of the EsA. Information on Integrated Water Resources Management (IWRM) applied by many agencies would also be beneficial.

Documentation on applying the EsA to the management of agricultural biological diversity and the biological diversity of dry and sub-humid lands, is limited in this document, but can be found in the case studies in the cited books. These contain examples of the application of the EsA in different types of ecosystems and land uses.

The EsA is a basic guideline for the integrated management of ecosystems and not a *modus operandi*, due to its highly theoretical organization. To ensure the progress of this approach, it should be operationalised for specific ecosystems and land uses. Significant experience with other approaches, similar to and consistent with the EsA has already been gained that can be useful for a further development of the EsA. Case studies could be developed to test the differences and additionalities between the different approaches. A water example could be designed to compare IWRM with EsA, or a forestry case where SFM is combined with an EsA, allowing to look beyond ecosystem boundaries and to involve different sectors.

## 2. The Ecosystem Approach in general

### 2.1 Ecosystem Approach literature with references to the CBD

Title:	<b>The CBD website</b>
Author(s):	CBD Secretariat
Publisher:	
Year:	updated regularly
Pages:	
Where:	<a href="http://www.biodiv.org">www.biodiv.org</a>
Type of approaches:	EsA and the relation to other approaches such as SFM, IWRM, etc.
Region / countries:	-
Nature:	prescriptive
Key features:	basic information and COP decisions about the EsA. In Annex I of Decision VII/11 a table is listed with some implementation suggestions for the 12 principles (a very useful document that can serve as a starting point for further elaboration).

#### Summary

The **Ecosystem Approach homepage** (<http://www.biodiv.org/programmes/cross-cutting/ecosystem/>) gives the definition of the EsA:

*The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way.*

In **Decision V/6: Ecosystem approach** (<http://www.biodiv.org/decisions/default.aspx?lg=0&dec=V/6>) the EsA description, with 12 Principles and 5 points of operational guidance are listed.

**Decision VI/12: Ecosystem Approach** (<http://www.biodiv.org/decisions/default.aspx?id=7186&lg=0>) recognises a/o the necessity to apply the EsA in national policies and legislation and underlines the importance of developing regional guidelines to apply the ecosystem approach. Furthermore it urges parties to (continue to) submit case studies, convene a meeting of experts to compare the ecosystem approach with sustainable forest management and develop proposals for the refinement of the principles.

**Decision VII/11: Ecosystem approach:** (<http://www.biodiv.org/decisions/default.aspx?dec=VII/11>) acknowledges that there has been significant experience in implementing the ecosystem approach, as well as in implementation of similar approaches to management under other national, regional and international processes, but that additional efforts are needed to ensure effective implementation of the approach.

This decision also acknowledges that SFM can be considered as a means of applying the ecosystem approach to forests. There is substantial potential for mutual learning among those implementing both the ecosystem approach and sustainable forest management.

In addition to sustainable forest management, some existing approaches, which are also relevant to other environmental conventions, including "ecosystem based management", "integrated river-basin management", "integrated marine and coastal area management", and "responsible fisheries approaches", may be consistent with the application of the Convention's ecosystem approach, and support its implementation in various sectors or biomes. Implementation of the ecosystem approach in various sectors can be promoted by building upon the approaches and tools developed specifically for such sectors.

There is no single correct way to achieve an ecosystem approach to management of land, water, and living resources. The underlying principles can be translated flexibly to address management issues in different social contexts. Already, there are sectors and governments that have developed sets of guidelines that are partially consistent, complementary or even equivalent to the ecosystem approach (e.g. the Code for Responsible Fisheries, some Sustainable Forest Management standards, adaptive forest management).

Annex I of this decision gives a refinement and elaboration of the EsA. Table 1 lists the 12 Principles of the EsA and their rationale together with suggested annotations to the rationale and implementation guidelines.

Annex II contains a consideration of the relationship between sustainable forest management and the ecosystem approach, as well as a review and development of strategies for the integration of the ecosystem approach into the programmes of work of the Convention.

Title: **Convention on Biological Diversity Handbook: 2nd edition (Updated to include the outcome of the sixth meeting of the Conference of the Parties)**  
Author(s): Secretariat of the Convention on Biological Diversity  
Publisher:  
Year: 2003, regularly updated on the website  
Pages: 937 p.  
Where: ISBN: 92-807-2280-8 / <http://www.biodiv.org/handbook/>  
Type of approaches: ecosystem approach  
Region / countries:  
Nature: prescriptive, descriptive  
Key features: CBD themes and procedures

### Summary

This Handbook is intended to provide a reference guide to decisions adopted by the Conference of the Parties (COP) to the Convention on Biological Diversity as well as a guide to ongoing activities in relation to particular Articles and/or thematic areas of the Convention (a/o The Ecosystem Approach). The structure of the Handbook has been conceived with a view to allowing frequent updates, so as to take into account new decisions of the Conference of the Parties.

This book gives a clear overview of the CBD, including its rules of procedure and provides a guide for COP decisions through brief narrative summaries on how the COP has addressed each Article or thematic area to date (Section VI).

Title: **Using the Ecosystem Approach to Implement the Convention on Biological Diversity: Key Issues and Case Studies**  
Author(s): Smith, R.D. and Maltby, E.  
Publisher: IUCN Publications Services Unit, Cambridge, UK  
Year: 2003  
Pages: 118 p.  
Where: ISBN 2-8317-0742-0 / [http://www.iucn.org/themes/cem/ea/docs/ecosystem\\_approach\\_smith\\_maltby.pdf](http://www.iucn.org/themes/cem/ea/docs/ecosystem_approach_smith_maltby.pdf)  
Type of approaches: Ecosystem Approach  
Region / countries: 26 case studies from Southern Africa, South America and Southeast Asia.  
Nature: conceptual, prescriptive, field experience

Key features: ecosystem approach, awareness, stakeholder participation, benefit sharing, information management, inter-sectoral issues, biodiversity management, protected areas, scale, CBD,

### Summary

This book summarises the discussions and conclusions from the 'pathfinder' workshops and draws lessons from them. CEM, together with the Secretariat of the CBD, the Royal Holloway Institute for Environmental Research, UNESCO-MAB, the Convention on Wetlands (Ramsar, 1971) and WWF-International convened three regional 'pathfinder' workshops in 2000 on the Ecosystem Approach in South Africa, South America and Southeast Asia.

The book concludes that the Ecosystem Approach is not an ecosystems approach. What is meant is that the Ecosystem Approach is not a set of guidelines for the management of various ecosystems but 'a framework for thinking ecologically that results in action based on holistic decision-making'. One aspect of this holism is that the Ecosystem Approach places people, including their needs and socio-economic circumstances, at the centre of biodiversity management. Another aspect of the holism is that the Ecosystem Approach is not designed only to be applied to protected areas, but can be extended to the almost 90 per cent of the planet that is outside protected areas. The report's penultimate chapter discusses the relationship between the Ecosystem Approach and other conservation strategies and this provides a helpful avenue for explaining the concept.

Key distinguishing features of the Ecosystem Approach:

- It is designed to balance the three CBD objectives (conservation, sustainable use and equitable benefit sharing of genetic resources).
- It puts people at the centre of biodiversity management.
- It extends biodiversity management beyond protected areas while recognising that they are also vital for realising CBD objectives.
- It engages the widest range of sectoral interests.

Title: **The International Debate on the Ecosystem Approach: Critical Review, International Actors, Obstacles and Challenges.**  
Author(s): Hartje, V., Klaphake, A. and Schliep  
Publisher: Bundesamt für Naturschutz (BfN), Germany  
Year: 2003  
Pages: 50 p.  
Where: BfN – Skripten 80: <http://www.bfn.de/09/skript80.pdf>  
Type of approaches: ecosystem approach  
Region / countries:  
Nature: descriptive, conceptual  
Key features: diffusion, ecosystem management strategies, institutions,

### Summary

This publication summarizes the international debate that has taken place as a consequence of the adoption of the EsA by the CBD in order to draw conclusions regarding the suitability of the EsA and its potential to foster an international spread of ecosystem management strategies. Whether countries will be prepared to implement management approaches that are in line with the principles and guidelines of the EsA will depend on three important prerequisites.

1. effective diffusion of the concept (depends on the quality of the EsA in terms of its theoretical justification; its internal consistency, its ability to guide and its general connection to the existing natural resource management approaches currently pursued in most CBD member countries.
2. international diffusion of such a demanding concept (requires flexibility in the international system beyond the organs of the CBD)

### 3. implementation “on the ground” on the national and the sub-national level.

Chapter 2 gives a brief description of the innovation side of the EsA.

In chapter 3 some critical reviews are listed that relate particularly to the quality of the EsA in terms of theoretical aspects, its logical consistency and its practical value as a guide for implementation. The central areas of the debate are: divergent priorities or unclear balance among CBD objectives; definition of ecosystems: abstract organisational concept or specific space, and; different emphasis of ecosystem services vs. species and habitats.

Chapter 4 elaborates on existing institutions that perform coordinating functions for the CBD and support policy transfers. In the last chapter general conclusions are drawn and some key challenges stressed for an enforced extension and an acceleration of the EsA’s diffusion process.

Title:	<b>Report of the International Workshop on the “Further Development of the Ecosystem Approach”</b>
Author(s):	Horst Korn, Rainer Schliep & Jutta Stadler (Eds.)
Publisher:	Bundesamt für Naturschutz (BfN), Germany
Year:	2003
Pages:	119 p
Where:	BfN – Skripten 78: <a href="http://www.bfn.de/09/skript78.pdf">http://www.bfn.de/09/skript78.pdf</a>
Type of approaches:	ecosystem approach, INRM
Region / countries:	Case studies from Russia, South Africa, Bolivia, Congo, Germany, UK, Norway
Nature:	conceptual, field experience
Key features:	ecosystem approach, synthesis, lessons learned

#### Summary

The German Federal Agency for Nature Conservation (BfN) organised a scientific workshop entitled: „Further Development of the Ecosystem Approach“ in October 2002. The workshop had a strong emphasis on the clarification of the principles and their underlying concept as well as on the presentation of case studies and lessons learnt on the practical implementation of the Ecosystem Approach.

A description of the proposed revision of Principles and Associated Rationales is listed in table 1 (p.8): summary of the revised Principles of the Ecosystem Approach. The report also elaborates on how to create an enabling environment for the application of the Ecosystem Approach (important conditions, target groups and measures). Six essential measures:

1. Applying tools for participation
2. Public awareness raising
3. Create sustainable benefits to enhance support for implementation of EsA and management plans
4. Elimination of perverse incentives
5. Institutional strengthening and cooperation
6. Information, knowledge and capacity

John Poulsen describes his paper (p.37-42) “the concept of Integrated Natural Resources Management (INRM)”, as developed by the Consultative Group on International Agricultural Research: “It will become evident that INRM resembles the Ecosystem Approach of the CBD in both content and modus operandi, and several elements are useful for the deliberations and clarification of the Ecosystem Approach.”

The task force has adopted the following definition of INRM:

Integrated natural resources management (INRM) is an approach to solving problems (and seizing opportunities) in the way people use natural resources in agro-ecosystems. These include forestry and

fisheries as well as agriculture. INRM uses action-oriented research, in partnerships, in specific locations, focused on stakeholder priorities, to deliver benefits at multiple scales. Its objectives are to help improve livelihoods, system resilience, productivity and environmental services in ways that benefit large numbers of people across large areas. Success in this approach is measured by changes in social, physical, human, natural and financial capital.

Key elements of INRM:

- empower relevant stakeholders
- resolve conflicts of interest among stakeholders
- foster adaptive management capacity
- accommodate complexity by focusing on key causal elements
- integrate levels of analysis
- merge disciplinary perspectives
- guide research on component technologies
- generate policy, technological and institutional options for stakeholders.

An ecosystem approach to NRM will emphasise that:

- different scales need to be considered and that one needs to look beyond boundaries of the system in question,
- all goods and services must be balanced,
- all relevant stakeholders need to be included in negotiations,
- solutions must be adapted to achieve desired outputs.

Title: **The Ecosystem Approach: the UK in a global context**  
Author(s): Kathryn Bryan (Joint Nature Conservation Committee)  
Publisher:  
Year: 2003  
Pages: 18p.  
Where: <http://www.ukbap.org.uk/groups/Perth2003/KathrynBryanNotes.pdf>  
Type of approaches: ecosystem approach  
Region / countries: UK  
Nature: prescriptive, conceptual  
Key features: ecosystem management, scale, stakeholder participation, information management, urban ecosystems

### Summary

Presentation at the first conference meeting of the UK Biodiversity Partnership: 'Biodiversity in the Landscape', Perth, UK (21,22 May 2003). The second day of the conference was centred around the ecosystem approach and its application to the work of the Partnership and the Country groups. The presentations and discussion aimed to widen thinking and share experience, hoping to get closer to best practice. Full report: [http://www.ukbap.org.uk/Library/UKSC/Papers/UKBSC\\_03\\_10.pdf](http://www.ukbap.org.uk/Library/UKSC/Papers/UKBSC_03_10.pdf).

It is necessary to develop models for application of the EA in various situations. Models based on an analysis of existing EA programmes will be useful to address issues such as:

- *Scale* - The EA needs to be applied at a scale appropriate to the ecosystem concerned.
- *Communicating with stakeholders* - how is this best done?. Is it really important to involve everyone or are we looking to influence and involve key groups only?
- *Information management* - this aspect is critical to application of the Ecosystem Approach which can be seen as information intensive. Ecosystems are complex. So is human interaction with those systems. Information - good, accessible information - is vital.

- *Uncertainty* - the complexity of natural systems means we will always be ignorant to some degree. How do we overcome the uncertainties that arise from this without meantime losing the confidence of the policy makers.

Urban EsA would help to promote the concept by applying it in areas where lots of people live rather than limiting the approach to semi-natural areas. Urban EsA should involve consideration of:

- Effective management/linking of green space within cities with biodiversity objectives in mind;
- Adopting an EA to managing urban river systems;
- Using the EA to take account of the effects of a city on the surrounding areas . transport policies, urban sprawl, waste disposal etc.

Title: **The Ecosystem Approach: Lifescapes**  
 Author(s): Keith Porter (English Nature)  
 Publisher:  
 Year: 2003  
 Pages: 12  
 Where: <http://www.ukbap.org.uk/Library/perth2003/presentations/keithporter.pdf>  
 Type of approaches: lifescapes  
 Region / countries: UK  
 Nature: conceptual, prescriptive  
 Key features: maps, partnership, information sharing, scale, multifunctional landscape, monitoring, integrated approach

### Summary

Presentation at the first conference meeting of the UK Biodiversity Partnership: 'Biodiversity in the Landscape', Perth, UK (21,22 May 2003).

A new approach: 'Lifescapes' is introduced. Table in which traditional, lifescapes and future approaches are compared.

EsA Principles	Traditional	Lifescapes	Future?
1. Society chooses	Scary	Limited	Community plans
2. Decision level	Partly	No	Less prescriptive?
3. Wider view	No	Yes	Spatial Planning
4. Economics	Rarely	Yes	Essential
5. Structure & function	No	Yes	Necessary
6. Within limits	Yes	Yes	Essential
7. Appropriate scale	No	Yes	Obvious
8. Long-term Objectives	Yes	Yes	Flexible
9. Manage for change	No	Yes	Essential
10. Conservation vs. use	No	Partly	People vs Specialist
11. All relevant information	No	Partly	Community & Spatial
12. All sectors involved	No	Partly	Essential

Title: **Applying the Ecosystem Approach in High-Mountain Ecosystems in Germany: Experiences with the Alpine Convention.** BfN – Skripten 76.  
 Author(s): Pausch, Axel; Dzedzioch, Cornelia & Plän, Thomas  
 Publisher: BfN (Bundesamt für Naturschutz), Germany  
 Year: 2003  
 Pages: 54 p

Where: <http://www.bfn.de/09/skript76.pdf>  
Type of approaches: ecosystem approach  
Region / countries: Alps (Europe)  
Nature: descriptive, conceptual  
Key features: conservation, sustainable use, institutional framework, ecosystem approach principles

### Summary

The study presented here, prepared within the scope of the R&D project “Developing Concepts for Sustainable Use in Selected Sub domains of Biological Diversity” aims at analysing the current state and use of high mountain ecosystems in Germany. The study investigates the compatibility of the sustainability principles of the Ecosystem Approach with the implementation of the Convention on the Protection of the Alps (Alpine Convention).

The Alpine Convention is a legally binding document signed by all states participating in the mountain range of the Alps. In no other mountain range of the world a comparably binding framework for protection and sustainable use exists for the time being. The Alpine Convention covers an area of 190,912 km<sup>2</sup> inhabited by 14.2 million people in 8 states, 53 regions and 5800 communities. The Alpine Convention consists of a frame and thematic protocols. The frame defines the aims of the convention and the formalities of regular meetings and reports. The protocols cover specific thematic issues in depth. For the time being nine protocols have been agreed to. The Alpine Convention was formulated years before the development of the CBD and the Ecosystem Approach. But it covers in its frame convention and the protocols the aims of the CBD, especially the conservation of biological diversity and the sustainable use of its components.

It can be observed that the Alpine Convention and the protocols consider nearly completely the demands formulated in the 12 Principles of the Ecosystem Approach of the CBD. Hence, the conceptual framework offers all possibilities to implement management measures that help to protect and sustainable use mountain diversity. Although the Alpine Convention can be presented as an example for other mountain regions as well, the process of implementation is quite slow. Ten years after signing the convention, only three signatory parties had ratified all protocols (Liechtenstein, Austria and Germany in 2002). Furthermore, protocols for such important fields like “People and Culture”, “Air Purity”, “Water Household” and “Waste Management” are still missing though they were planned from the start.

### *Conclusions regarding the EsA:*

The Ecosystem Approach itself bears some implicit problems that render the implementation difficult: First of all, the wording of the principles and the guidelines is kept so general that it can not be used as a direct *modus operandi* to implementation. Here, a need of concrete rules for action (or restraint from action) is obvious. Secondly, the Ecosystem Approach (Principle 1, societal choice, and Principle 2, decentralization) requires more or less democratic structures. Unfortunately, these structures are not given everywhere, sometimes especially not in areas with high biodiversity. Third, the Ecosystem Approach calls for an appropriate balance between conservation efforts and use in managing measures (Principle 10). This principle allows wide interpretation insofar as the need to use ecosystems (or to change and destroy them) directly depends on the economic needs of the state hosting the ecosystem under question.

The Ecosystem Approach sees humans as a part of most ecosystems and demands cautious management of ecosystems (Principle 6). Nevertheless, it must be accepted that in some ecosystems the functioning can not be guaranteed (as demanded in Principle 5) if humans try to use the system or to become part of it. Principle 8 demands to consider future benefits and to favour long-term gains instead of immediate but unsustainable uses. Unfortunately, in many cases, those who renounce from immediate benefits cannot be sure to benefit from future gains in a long term perspective or can not

afford to abstain from immediate use due to vital economic needs. Signatory states must seek solutions that enable people to economize in a long-term perspective.

The ecosystem approach should be understood as a basic guideline for the integrated management of ecosystems but not as a *modus operandi*. Due to its highly theoretical organization, it is not adequate as guidance for concrete measures. Nevertheless, it is certainly possible to successfully employ the approach for introducing the concerns of the CBD into relevant areas of politics.

Title: **Global Biodiversity Outlook**  
Author(s): Secretariat of the Convention on Biological Diversity  
Publisher: Secretariat of the Convention on Biological Diversity  
Year: 2001  
Pages: 282 p.  
Where: ISBN: 1020-9387 / <http://www.biodiv.org/gbo/gbo-pdf.asp>  
Type of approaches:  
Region / countries: -  
Nature: prescriptive, descriptive  
Key features: conservation of biological diversity, sustainable use, fair and equitable sharing of benefits

### Summary

The second meeting of the Conference of the Parties (COP) in 1995 called for production of a periodic report, to be called the Global Biodiversity Outlook (GBO).

This GBO includes a brief summary of the status and trends of biological diversity at global and regional level; a presentation on the implementation of the decisions of the Conference of the Parties and the recommendations adopted by the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA); an analysis of the global and regional trends in the implementation of the objectives of the Convention on Biological Diversity on the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising out of the utilisation of genetic resources; an overview of the cooperation with other biological diversity related conventions and intergovernmental processes; and a summary of the implementation of the Convention on Biological Diversity at the national level on the basis of the information contained in national reports to be submitted by Parties in accordance with Article 26 of the Convention.

The goal of the GBO is to provide a tool for use by Contracting Parties and other stakeholders to review progress made by the Convention toward its three objectives, to identify barriers to implementation, to help set priorities for implementation, and to communicate progress and advocate needs to decision-makers.

The users of the GBO are principally key players in implementation of the Convention, and other decision-makers and planners who need to take account of achievements in and limitations to meeting the objectives of the Convention, in such sectors as trade, finance, agriculture, fisheries and industry. There is an increasingly accessible body of literature on world environmental issues, and a number of recent comprehensive studies on global biological diversity are available. The GBO draws on these in order to illustrate the urgency of the issues and to show how the implementation of the Convention - through its thematic and cross-cutting programmes of work and through cooperation with other bodies - seeks to reverse the current loss of biodiversity and provide a basis for sustainable development in all countries.

The concept of "biodiversity" and the importance of arresting its decline are ideas increasingly familiar to policy-makers, opinion-formers and the concerned public. It is, however, much less clear to many observers, not directly involved in the intergovernmental process or unfamiliar with the specialist literature, just how the international community sets about addressing these problems, and how international commitments can be turned into concrete action at all levels. The aim of the GBO is to

provide this overview, by focusing on the extent and effectiveness of responses adopted by the global community, and the measures being implemented at national and international levels in the context of the Convention.

This report is the first edition of the series, the second is planned for 2004.

Title: **Solving the Puzzle: The Ecosystem Approach and Biosphere Reserves**  
Author(s): UNESCO-MAB Secretariat  
Publisher: UNESCO, Paris, France  
Year: 2000  
Pages: 32p.  
Where: <http://unesdoc.unesco.org/images/0011/001197/119790eb.pdf>  
Type of approaches: biosphere approach, ecosystem approach  
Region / countries:  
Nature: descriptive, prescriptive  
Key features: balanced approach, stakeholder participation, sustainable development, biodiversity conservation

### Summary

This booklet was prepared for the fifth session of the Conference of the Parties of the CBD (Nairobi, May 2000) and illustrates the twelve principles of the ecosystem approach with examples from the World Network of Biosphere Reserves.

Three main goals of the strategy of the World Network of Biosphere Reserves:

1. Use biosphere reserves to identify and conserve natural and cultural diversity
2. Use biosphere reserves as models of land management and of approaches of sustainable development, using appropriate incentives
3. Use biosphere reserves for research, monitoring, education and training

These broad goals and their subsidiary objectives represent a global application of the ecosystem approach.

The booklet associates each principle of the EsA and its rationale with examples of work underway in a sampling of biosphere reserves in different parts of the world.

Title: **Essential ingredients in an ecosystem approach to the conservation of tropical wildland biodiversity**  
Author(s): Daniel H. Janzen  
Publisher: Journal of International Wildlife Law & Policy; March 22, 2000  
Year: 2000  
Pages: 4  
Where: <http://www.biodiv.org/doc/ref/ecs-janzen-en.pdf>  
Type of approaches: ecosystem approach, species approach, bioregional approach  
Region / countries: Costa Rica  
Nature: descriptive, field experience  
Key features: conserved wildlands, biodiversity, adaptive management

### Summary

This paper is a summary of lessons learned from applying the EsA in the Area de Conservacion Guanacaste in Costa Rica (conservation area). The ingredients of an ecosystem approach are a/o: friendly government policy; place-based (land use planning is essential), knowledge (science) based, community based (participatory, decentralization) and an optimization question (trade offs).

Relation with the 'species approach':

"Where does the 'species approach' fit? Species are simply members of ecosystems. When some particular species has attracted the attention of humanity, build on that attraction as one more tool in the ecosystem approach toolbox for the conserved wildland, and/or agroscape. The species approach may be used as part of the decision-making process as to *which* wildland to conserve, or may be one of the products from an established wildland."

Relation with the 'bioregional approach':

"Selection of regional biological representation is primarily part of the decision-making process as to *which* wildland to conserve. Bioregional approaches are also useful for inter-place inferences about the technology of custodianship and use of both wildlands and agrosapes. Consideration of the bioregional characteristics of a conserved wildland is one more ingredient to an ecosystem approach conservation."

Title: **Integrated Ecosystem Management. Operational Program #12**  
Author(s): Global Environment Facility  
Publisher:  
Year: 2000  
Pages: 9  
Where: [http://www.gefweb.org/Operational\\_Policies/Operational\\_Programs/OP\\_12\\_English.pdf](http://www.gefweb.org/Operational_Policies/Operational_Programs/OP_12_English.pdf)  
Type of approaches: integrated approaches such as the ecosystem approach  
Region / countries:  
Nature: prescriptive  
Key features: ecosystem management, funding criteria, integration, convention, sustainable development, synergy

### Summary

The GEF Operational (funding) Program on Integrated Ecosystem Management (OP#12) provides a comprehensive framework to manage natural systems across sectors, and political or administrative boundaries within the context of sustainable development. It facilitates inter-sectoral and participatory approaches to natural resource management planning and implementation on an ecosystem scale. The Operational Program is not aimed at addressing natural resource management issues related to a single GEF focal area, but at bringing synergy between three of the GEF focal areas (i.e. Biological Diversity, Climate Change, and International Waters) and land degradation to optimize multiple benefits.

Integrated Ecosystem Management provides a comprehensive and cross-sectoral approach to addressing many of the goals of global environmental conventions and to the generation of multiple benefits. This approach is consistent with the three major Rio conventions on environment and development:

- CBD: Ecosystem Approach as the primary framework for action
- UNFCCC: comprehensive policies and measures to address issues related to the sources, sinks and reservoirs of greenhouse gases, taking into account different socioeconomic contexts.
- UNCCD: actions to combat desertification should be undertaken within the framework of an integrated approach that can contribute to sustainable development.

Title: **Ecosystem Management: Questions for Science and Society**  
Author(s): Maltby, E., Holdgate, M., Acreman, M., Weir, A. (Editors)  
Publisher: Royal Holloway Institute for Environmental Research, Virginia Water, UK  
Year: 1999  
Pages: 166 p.

Where: ISBN 0 902194 410  
Type of approaches: ecosystem approach  
Region / countries:  
Nature: conceptual, descriptive, prescriptive  
Key features: conservation, ecosystem management, principles

### Summary

The Sibthorp Seminar questioned the science underlying contemporary conservation and the rationale for an innovative approach through ecosystem management. Discussion led to distillation of ten principles of ecosystem management which were reviewed by a wide range of experts and elaborated at the World Conservation Congress in Montreal (1996). This publication presents the results of this process. Together with the papers presented at the original seminar, this volume has contributed to the debate on the ecosystem approach and ecosystem management. Papers presented at the original seminar are included (a/o Hillary Masundire).

Title: **Report of the scientific workshop on “The ecosystem approach - what does it mean for European ecosystems?” at the International Academy for Nature Conservation Isle of Vilm, Germany, November 26/27, 1998**  
Author(s): Horst Korn, Jutta Stadler, Edward Maltby, Alexander J. Kerr (Eds.)  
Publisher: Bundesamt für Naturschutz (BfN)  
Year: 1999  
Pages: 98  
Where: BfN – Skripten 9 / <http://www.bfn.de/09/ecoapproach.pdf>  
Type of approaches: ecosystem approach  
Region / countries: case studies from East and West Europe  
Nature: conceptual, field experience  
Key features: ecosystem approach

### Summary

In November 1998, the German Federal Agency for Nature Conservation (BfN) organised a scientific workshop to advance the debate on the ecosystem approach, the 12 “Principles of an ecosystem approach” worked out at an international workshop held in Malawi in January 1998. The participants discussed the specification of these principles and their possible implementation in the European context.

The discussions showed that there is an urgent need for the clarification of the term and its underlying concept. It was considered to be of major importance not to confuse the ecosystem approach as synonymous with a biome-by-biome approach only. In addition, cross-cutting issues of the Convention should be approached in an integrated and holistic manner.

Participants agreed on the necessity of developing, *inter alia*, guidelines for different audiences (e.g. politicians, decision-makers, managers, interest groups etc.) on different levels (from international bodies to individual persons) and the documentation of lessons learnt from case studies. This last point turned out to be a vital tool for the implementation and better communication of the concept. The case studies clearly showed that there are already a lot of good examples of how the ecosystem approach is applied without a specific reference to the term itself.

Participants generally supported the results of the “Malawi workshop” but preferred to use the term “elements” rather than “principles”. Furthermore, it was pointed out that, even though for an area or a theme all “elements” are equally important, it might well be that different target groups (like scientists, managers, politicians etc.) consider some “elements” more useful for their purpose

Title: **Report of the Workshop on The Ecosystem Approach Lilongwe, Malawi, 26-28 January 1998**  
Author(s): CBD  
Publisher:  
Year: 1998  
Pages: 15 p.  
Where: <http://www.biodiv.org/doc/meetings/cop/cop-04/information/cop-04-inf-09-en.pdf>  
Type of approaches: ecosystem approach  
Region / countries:  
Nature: prescriptive, conceptual  
Key features: founding document of the 12 principles of the EsA.

### **Summary**

In deliberations on the ecosystem approach, it had become apparent that there are different interpretations of what the term might actually mean in practice. In order to help try to resolve this, a workshop was held in Malawi in 1998, where the principles of the Ecosystem Approach were formulated (sometimes referred to as the "Malawi Principles"). This document reports the outcomes of the Malawi workshop.

At its fourth meeting, the Conference of the Parties noted the results of the workshop, which included a set of guidelines, and asked SBSTTA to develop the guidelines further.

During this workshop it was also discussed what an EsA should be and why an EsA should be taken for implementation of the Convention (added value compared with classical nature conservation approaches) and how the EsA can overcome these shortcomings:

- The ecosystem concept helps to define the appropriate management level to meet the three objectives of the Convention.
- Functioning ecosystems are indispensable for the survival of human beings and future generations as well as the global environment, as the Convention recognises the intrinsic value of biological diversity.
- Biological diversity is inextricably linked to ecosystem processes, functioning and resilience.
- Ecosystem understanding allows effective or sustainable use.
- People frequently move among ecosystems, and often use different ecosystems to satisfy their needs.
- Humans are frequently seen as external to ecosystems even when they are resident within them.
- The ecosystem approach allows the use of both indigenous and local knowledge, innovations and practices including traditional management systems and scientific thinking.
- It places appropriate emphasis on the range of goods, services and information which ecosystems provide to humanity.

## 2.2 General literature on the Ecosystem Approach and related topics

Title: **Managing Natural Resources for Sustainable Livelihoods: Uniting Science and Participation**

Author(s): Barry Pound, Sieglinde Snapp, Cynthia McDougall, and Ann Braun (Eds.)

Publisher: Earthscan/James and James

Year: 2004

Pages: 260 p.

Where: ISBN 1844070263 / 1-55250-071-3

Type of approaches: several participatory and user-focused approaches a/o: Participatory Agroecosystem Management, farmer-driven Landcare Movement, innovative community approach

Region / countries: 23 case studies from Asia, Africa and Latin America.

Nature: conceptual, field experiences

Key features: partnerships, institutions, participation, complexity, natural resources management, scale, research practices.

### Summary

Management of local resources has a greater chance of a sustainable outcome when there are partnerships between local people and external agencies, and agendas relevant to their aspirations and circumstances. This book analyses and extends this premise to show that the process of research for improving natural resource management must incorporate participatory and user-focused approaches, leading to development based on the needs and knowledge of local resource users. Drawing on extensive case studies, this book presents innovative approaches for establishing and sustaining participation and collective decision-making, good practice for research, and challenges for future developments. It covers a wide range of natural resources - including forests, soils, and water and management units such as watersheds and common property areas. It offers insights on how to make research participatory while maintaining rigour, high-quality biological science, different forms of participation, and ways to scale up and extend participatory approaches and successful initiatives.

Title: **World Resources 2002-2004: Decisions for the Earth: Balance, Voice and Power**

Author(s): World Resources Institute

Publisher: United Nations Development Programme, United Nations Environment Programme, World Bank, and World Resources Institute

Year: 2003

Pages: 328 p.

Where: ISBN: 1-56973-532-8 / [http://pubs.wri.org/pubs\\_description.cfm?PubID=3764](http://pubs.wri.org/pubs_description.cfm?PubID=3764)

Type of approaches: ecosystem approach (environmental management approaches)

Region / countries: case studies from 150 countries

Nature: descriptive, conceptual

Key features: environmental governance, sustainable use, decision making systems. Data tables on Governance; Economic indicators; Agriculture and food; Biodiversity and protected areas; Climate and atmosphere; Energy; Fisheries and aquaculture; Forests, grasslands and drylands; Freshwater resources; Population, health and human well-being.

### Summary

Who should decide where to build a road or locate a dam? When is the public consulted? Can people appeal decisions they find unfair? *World Resources 2002-2004* examines how we make environmental decisions and who makes them, which is the process of environmental governance. The report argues

that better environmental governance is one of the most direct routes to fairer and more sustainable use of natural resources. Decisions made with greater participation and greater knowledge of natural systems—decisions for the Earth—can help to reverse the loss of forests, the decline of soil fertility, and the pollution of air and water that reflect our past failures.

This report, tenth in the biennial series on the global environment, defines governance in everyday terms, with reference to a wealth of case studies. It assesses the state of environmental governance in nations around the world and reports results from the Access Initiative, a first-ever attempt to systematically measure governments' performance in providing their citizens access to environmental information, decision-making, and justice.

*World Resources 2002-2004* also presents a wealth of national statistics on current environmental, social, and economic trends in more than 150 countries. This edition departs from previous ones by making the full World Resources database freely accessible and searchable on-line in the companion website, EarthTrends ([www.earthtrends.wri.org](http://www.earthtrends.wri.org)). This site also provides data tables, country profiles, maps, and feature stories about current conditions.

Chapter 9 introduces five steps towards Better Governance for Sustainable Ecosystems:

1. *Adopt Environmental Management Approaches that Respect Ecosystems.* Make ecosystems the fundamental unit of environmental management and governance.
2. *Build the Capacity for Public Participation.* Increase the public's environmental literacy and ability to give useful input into environmental decisions. Increase the government's willingness and capacity to deliver environmental information and digest public input.
3. *Recognize All Affected Stakeholders in Environmental Decisions.* Broaden the definition of who can participate in environmental decisions to include all affected parties.
4. *Integrate Environmental Sustainability in Economic Decision-Making.* Incorporate sustainability into the mandates of agencies, businesses, and financial institutions beyond the usual environment and natural resource sectors.
5. *Strengthen Global Environmental Cooperation.* Harmonize and strengthen environmental treaties. Increase the global commitment to environmental monitoring and threat assessment. Enhance civil society's consultative role at the international level. Increase funding to implement global environmental commitments.

The ecosystem approach is referred to under point 1, but only to environmental management (to match human needs with Earth's biological capacities). Making ecosystems the fundamental units of environmental management will require innovative approaches. One such approach is to promote decentralized management of natural resources, so that local stakeholders take a primary role in governing the ecosystems around them. Larger, regional associations—such as river basin authorities linking users across many jurisdictions—may also be useful. In practice, a variety of new institutional and economic arrangements will be needed to connect people to the ecosystems they depend on, to the benefit of both (p. 216).

Many elements from the CBD EsA principles are mentioned, but no reference is made to the CBD.

Title:	<b>Ecosystems and Human Well-being: A Framework for Assessment</b>
Author(s):	Elena Bennett (Editor), Rashid M. Hassan (Editor), Millennium Ecosystem Assessment
Publisher:	Island Press, Washington, USA
Year:	2003
Pages:	224p.
Where:	ISBN: 1-55963-403-0 / <a href="http://www.millenniumassessment.org/en/products.aspx">http://www.millenniumassessment.org/en/products.aspx</a>
Type of approaches:	multiscale approach, ecosystem approach

Region / countries:

Nature: conceptual, prescriptive

Key features: conceptual framework Millennium Ecosystem Assessment (MA), ecosystem services, human well-being, scale

### Summary

The Millennium Ecosystem Assessment (MA) was launched by Kofi Annan in 2001. It is an umbrella organisation gathering scientists from around the world to work on a series of projects. Its job is to assess environmental knowledge, identify likely scenarios and suggest options. The results are to be aimed at policy-makers and the general public rather than directly to scientists. In this respect the MA is gathering and using the knowledge gained by specialist groups within the UN and international agencies to put forward a series of reasonable options for action. The key focus of the MA is to produce a final report in 2005. In the interim, we are getting a series of reports about select aspects of their work of which this text is one.

*Ecosystems and Human Well-being*, the first in a series of 11 reports of the Millennium Ecosystem Assessment, describes the framework that is being used by the 500 scientists from 70 countries participating in the assessment. The basic notion behind this report is simple, based on Costanza's work on ecosystem services: we need quality functioning ecosystems to survive because we cannot replace the services they provide.

The summary outlines the key points of the book. Chapter one both introduces the work and gives some conceptual framework. Human well-being is the central focus of the work, although the intrinsic value of ecosystems is also seen as important. The aim of MA is to provide a scientific basis for policy options which favour such an anthropocentric approach. The conceptual framework is the study of the ecosystem services, the drivers that change them and the ways in which they can contribute to human well-being.

Chapter two looks at the notion of ecosystem services but also at the concept of ecosystem arguing, that we must get our definitions and scales correct before we can work out the value of places. Chapter three moves on to the links between ecosystem health and human well-being. Although it could be argued that many people can live without direct resort to ecosystems, the report makes it clear that there is a considerable need for ecosystems as many people rely directly upon them.

Chapter four looks at the factors which drive change in ecosystems and their subsequent ability to provide services. Drivers can be direct or indirect, endogenous or exogenous giving a 2x2 matrix of potential change factors. The range chosen is substantial from pest control to property rights.

Chapter five looks at the problem of scale, noting that both effect and analysis can be found at a number of scales. Rather than keep to one scale as a reference point, the MA has built in the scale factors through multi-scale analysis.

Chapter six deals with the problem of valuing ecosystem services: the extent to which conventional economic models can be used and the alternatives that we could find.

Chapter seven pulls together the work done up to now to highlight the analytical approaches used. The scale of the undertaking can be gauged by the fact that the MA is based on 9 tasks covering 5 data categories. In addition, new techniques are critically evaluated. The final chapter describes how this information can be presented to policy-makers and the public.

*Some quotes:*

*Summary (p.10):*

The concept of an ecosystem provides a valuable framework for analyzing and acting on the linkages between people and the environment. For that reason, the "ecosystem approach" has been endorsed by the Convention on Biological Diversity (CBD), and the MA conceptual framework is entirely consistent with this approach.

Chapter 2 (p.51) *Ecosystems and their Services:*

For analysis and assessment, it is important to adopt a pragmatic view of ecosystem boundaries, depending on the questions being asked. In one sense, the entire biosphere of Earth is an ecosystem since the elements interact. At a smaller scale, the guiding principle is that a well-defined ecosystem has strong interactions among its components and weak interactions across its boundaries.

*Box 2.1 (p.52): The Ecosystem Approach: A Bridge Between the Environment and Human Well-being*

Chapter 5 (p.107/108) *Dealing with scale:*

Many environmental problems originate from the mismatch between the scale at which ecological processes occur and the scale at which decisions on them are made. There is seldom one ideal scale at which to conduct an ecosystem assessment that will suit several purposes. The Millennium Ecosystem Assessment (MA) advocates a multiscale approach. A multiscale approach that simultaneously uses larger- and smaller-scale assessments can help identify important dynamics of the system that might otherwise be overlooked.

Title:	<b>The Science of Sustainable Development: Local Livelihoods and the Global Environment</b>
Author(s):	Sayer, J.A., Campbell, B.M.
Publisher:	Cambridge University Press, UK
Year:	2003
Pages:	288 p.
Where:	ISBN 0521827280
Type of approaches:	integrated natural resource management
Region / countries:	
Nature:	conceptual, field experience
Key features:	integration, scales, system components, disciplines, knowledge types

### **Summary**

Science faces major challenges in tackling the interlinked problems of poverty and environmental sustainability. This book calls for a restructuring of our present arrangements to achieve integrated natural resource management: integration across scales, system components, disciplines and knowledge types. It advocates the necessity of modelling, multi-scale analysis and action research, institutional and organizational development, and communication-enhancement. The book draws on case studies throughout the world.

More than 20 years of discussion about the definition of the concept of sustainable development have given birth to a number of definitions, which the book spells out. None of them is a precise one, but the most flexible is that sustainable development is a continuing social learning process. This basic definition allows to analyze different approaches to the designation of scenarios of sustainable development as an integrative product of joint efforts of different interest groups concerned with particular local conditions.

The book is aimed at diminishing a gap between "hard sciences" in the domain of theoretical ecology and sustainable development, socio-economic research and natural resources management in the field. The authors analyze new approaches to research, while linking them with contemporary visions of project paradigms. But the crucial issue is to provide a track of experience gained in the particular projects to long-term policies of local development, nature conservation and resources management in their interconnections and interdependency.

The book provides an analysis of existing problems of rural development, nature conservation and natural resources management, as well as good experiences of the implementation of sustainable development scenarios in third world countries.

Title: **Integrated Natural Resource Management: Linking Productivity, the Environment and Development**

Author(s): Campbell, B.M. and Sayer, J.A. (eds.)

Publisher: CAB International, Wallingford, UK

Year: 2003

Pages: 315 p.

Where: ISBN 0-85199-731-7

Type of approaches: INRM, participatory approaches.

Region / countries: Case studies, particularly from developing countries in Asia, Africa and Latin America

Nature: descriptive, conceptual

Key features: integration, scale, adaptive capacity, multi-scale analysis, information management, decision making, impact assessment, social learning, systems modelling

### Summary

In August 2000, the CGIAR convened a meeting in Penang, Malaysia to address the dilemmas faced by natural resource researchers and to examine ways in which research might be redirected to meet the challenges. This volume brings together a selection of the papers that formed the subject of the Penang meeting.

To meet the challenges of poverty and environmental sustainability, a more integrated approach must embrace the complexity of systems and redirect research towards the greater inclusion of issues such as participatory approaches, multi-scale analysis, information management and impact assessment. The authors suggest that science will need to be substantially re-organized to meet the challenges. This book discusses both the principles and applications of such an approach to integrated natural resource management.

### *Definition INRM:*

INRM is a conscious process of incorporating multiple aspects of natural resources use into a system of sustainable management to meet explicit production goals of farmers and other users (e.g. profitability, risk reduction) as well as the goals of the wider community.

### *The (interlinked) key components of INRM*

(1) the reorientation of the objectives of research, (2) adding weight to participatory approaches to implementing the research, (3) a series of principles that underlie the research (e.g., broadening temporal and spatial scales of analysis), and (4) the use of a variety of analytical tools (e.g., systems analysis, information management tools).

### *The prime objective of INRM*

Given the complexity and dynamism of systems, one of the prime objectives will be to improve the adaptive capacity of the system, i.e., its ability to sustain a flow of the diverse products and services that poor people depend upon, and to do so under constantly changing conditions.

### *Three key elements for implementing INRM*

Three key elements form part of the approach to implementing INRM: (1) management needs to be adaptive; (2) INRM must move further along the research –management continuum; and (3) the approach must provide for, and be based upon, negotiation among all stakeholders.

### *The adaptive management cycle*

The steps within our adaptive management cycle are (1) subsystem definition; (2) reflection and negotiation; (3) action; and (4) evaluation, readjustment, and adaptation.

#### *Multiple scales of analysis*

A key feature of INRM is its attempt to integrate across spatial and temporal scales. As a result, INRM research usually does not involve a simple learning cycle. It will normally depend upon a number of interlinked and superimposed learning cycles. Generally, INRM research will never be conducted at a single spatial scale; work often will be required at three scales.

Scaling up is most likely to happen in the INRM approach if top-down and bottom-up approaches to development are properly reconciled. Both are likely to be needed for an effective delivery of benefits from INRM research.

#### *Systems modelling*

The problems of nonlinearities, unpredictability, and time lags in natural resource systems suggest that systems modelling is a fundamental tool for INRM research. Across-scale modelling is in its infancy in INRM. Using a decision support tool that is built in a participatory manner will increase the chance of achieving a shared vision. GIS and modelling are also crucial for scaling up. Such tools should not be abused to support top-down mechanical extrapolation of technologies; rather, stakeholder decisions should be informed by spatial analysis.

#### *Impact assessment*

Impact assessment is a key feature of INRM, being a tool for adaptation, learning and performance enhancement; providing data for further negotiation among stakeholders; and for resource allocation decisions (continuous assessment).

#### *Conclusion*

The world is becoming more integrated, and integration emerges as the most important concept in the INRM approach: there is a need to integrate across disciplines, across scales, across stakeholders, and across components. Many of the arguments used in this paper are similar to those that predominate in the modern management science that is taught in business schools. Many of the problems of managing complex natural resource systems are similar to those of running a commercial company in a rapidly changing world.

Title: **Biodiversity and the Ecosystem Approach in Agriculture, Forestry and Fisheries.** Proceedings of the Satellite event on the occasion of the Ninth Regular Session of the Commission on Genetic Resources for Food and Agriculture. Rome 12-13 October 2002.

Author(s): FAO, Inter-departmental Working Group on biological Diversity for Food and Agriculture

Publisher: FAO, Rome

Year: 2003

Pages: 312 p.

Where: ISBN 92-5-104917-3 / <http://www.fao.org/DOCREP/005/Y4586E/Y4586E00.HTM>

Ecosystem: agro-ecosystems, forest, marine

Type of approaches: ecosystem approach, species based conservation, area-based conservation

Region / countries: case studies of grasslands in South Africa, agro-pastoral systems in Nigeria, rice-fish ecosystems in Cambodia, organic agriculture systems in 16 locations and 10 countries (Bangladesh, Brazil, Cuba, Germany, Indonesia, Italy, Mexico, Peru, Spain, South Africa), mahogany forests in Mexico, medicinal plants in India, soil systems in six locations and five countries (Australia, Brazil, India,

Mexico and Sahel), apple pollination in the Himalayas, rice ecology in Asia and ingenious agricultural systems in five countries (Asia, French Guyana, Slovakia, Tanzania, Tunisia)

Nature: descriptive, conceptual, field experience  
Key features: ecosystem approach, fisheries, agriculture, forestry, biodiversity management, stakeholder involvement, adaptive management, traditional and community based management, monitoring

### Summary

This is the report of a FAO satellite event (Rome, October 2002). The meeting aimed to improve awareness of the importance of biological diversity, through concrete cases from around the world, and to support the integration of the ecosystem approach applied to all types of production systems and policies and within biodiversity programmes and plans.

The case studies depicted innovations from over 20 countries and production systems which included some 70 plants (mainly crops) and a number of animals (ranging from honey bees, through fish to livestock) used for food, fibres and medicine. The studies involved universities, research institutions, inter-governmental institutions, government institutions, civil society institutions and farmers' associations.

#### Topics:

- Food production ecology
- Ecological services are productive inputs
- Coping with change through diversification and heterogeneity
- Managed ecosystems increase biodiversity
- Markets valorise managed biodiversity
- Celebrating biodiversity knowledge systems
- Ownership and participation maintain biodiversity

The resilience and stability of agro-ecosystems depend on the quality of connectedness within and among natural and social systems. Too few or too weak connections may marginalize communities or populations and increase their risk of collapse. Too many or too strong connections may amplify local system shocks (like forest fires or economic depression in regional or global markets) and cause wider disruption. Recommendations from the case studies include increased focus on: ecological connections, economic connections and socio-political connections.

The quality of connectedness should be improved through ecological literacy and good governance in order to equip rural communities with the necessary tools and mechanisms to maintain biodiversity and act upon change.

The optimization of the commercial product has been the objective for many years, but environmental problems have affected the amount of harvestable product (pressure from consumers, depletion of the resource, lower harvest as a result of the degradation of the ecosystem, ...), so a different approach needed to be found. This explains the interest for applying an EsA in fisheries, agriculture and forestry.

Title: **Social and Environmental Justice: Rural Poverty Eradication and Natural Resource Conservation**  
Author(s): WWF-Care partnership  
Publisher:  
Year: 2003  
Pages: 2  
Where: <http://www.panda.org/resources/programmes/mpo/wssd/RuralPoverty.pdf>  
Type of approaches: Integrated Conservation and Development (ICD)

Region / countries:  
Nature: prescriptive  
Key features: scale, equitable benefit sharing,

### Summary

Social and Environmental Justice is the equitable achievement of human and environmental rights.

Integrated Conservation and Development (ICD) is based on two principles:

1. Increase control by the rural poor over natural resources and enhance their capacity to manage these resources in sustainable ways.
2. Ensure that the rural poor are fairly rewarded for their role as stewards of rural environmental functions and services that benefit their own country and the world at large.

Key issues include; scale, planning processes, the design of supporting livelihood interventions, the opportunity for increasing local benefits through environmental service payments, and the role of C-D partnerships in providing a solid foundation for ICD programming (from *Issues in Natural Resource Management*. Issue 1 – November 2003).

Title: **Navigating Social-Ecological Systems: Building Resilience for Complexity and Change**  
Author(s): Fikret Berkes (Editor), Johan Colding (Editor), Carl Folke (Editor)  
Publisher: Cambridge University Press  
Year: 2002  
Pages: 416 p.  
Where: ISBN: 0521815924  
Type of approaches: systems theories, adaptive management  
Region / countries: Case studies and examples from all over the world  
Nature: conceptual, descriptive, field experience  
Key features: social-ecological systems, resilience, redundancy, adaptive management, scale, institutions, systems theory

### Summary

Drawing on complex systems theory, this book investigates how human societies deal with change in linked social-ecological systems, and build capacity to adapt to change. The concept of resilience is central in this context. Resilient social-ecological systems have the potential to sustain development in a manner that does not lead to loss of future options. Resilient systems provide capacity for renewal and innovation in the face of rapid transformation and crisis.

The management of natural resources is a complex problem that requires bridging disciplines, political boundaries, and temporal and spatial scales. The book *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change* uses complex systems theory and draws on expertise in ecology, ecological economics, and political and social science to understand how human communities respond and adapt to change in their natural resources and linked social-ecological systems. *Navigating Social-Ecological Systems* continues the research presented in *Linking Social-Ecological Systems: Management Practices and Social Mechanisms for Building Resilience* (2000). As with the previous book, the concept of resilience is central. The authors argue that building resilience in social-ecological systems will enable better management of natural resources, as well as increase human capacity to deal with change.

The book is divided into four sections: (1) Perspectives on resilience, (2) Building resilience in local management systems, (3) Social-ecological learning and adaptation, and (4) Cross-scale institutional response to change. The first of these sections presents the necessary theory to understand how

people respond to surprises in management, and explores the contribution of resilience theory to understanding social-ecological system linkages. Chapter 4, 'Redundancy and diversity: do they influence optimal management', explores the relationship between resilience and redundancy in various systems, from explicitly political systems to ecological systems rich in species. It is a useful synopsis of similarities across systems, and an example of successful multi-disciplinarity.

The second section looks at the role of local-scale resilience in management of multi-scale systems. An interesting analysis of the response of several groups of resource users (Polynesian and Bangladeshi farmers, and African pastoralists) to large-scale disturbance is presented in Chapter 7, 'Living with disturbance: building resilience in social-ecological systems'. The authors describe risk-spreading strategies of communities to deal with variability and disturbance in natural systems. An important point is that the people in the communities described in the chapter anticipate and rely on the disturbance to continue crop-production, and have various ways to deal with surprises in the normal cycle of disturbances.

The third section uses an adaptive management framework to explore various ways of learning from, and responding to, change in managed systems. In Chapter 8, 'Exploring the role of local ecological knowledge in ecosystem management: three case studies', examples are given that detail ways of using local knowledge as a contemporaneous (along with conventional scientific techniques) way of collecting data on the system to be managed. Also useful in this chapter is an excellent discussion of the role of local-knowledge in a science-dominated world, detailing concerns and contexts for both local knowledge and scientifically collected information. This discussion presents methods for deciding how the two ways of knowing can be used together. Chapters 9 and 10 describe how adaptive management is and can be done in large-scale systems in Minnesota and Northern Canada.

The final section examines the role of institutional response to change, with examples from the institutions set up to regulate a lagoon fishery in Brazil that has many stakeholders demanding access to the lagoon, an indigenous movement in Indonesia that seeks a social renewal to adapt to massive changes to a traditional culture, and groups in the United States' forest sector responding to policy changes of the last 35 years.

The examples given throughout the book are engaging. Clear descriptions of workable management practices are presented, with descriptions of how, for example, to be a skilled facilitator during public input meetings. Theory, when outlined, is easy to understand, and accompanied by examples where it has been put into practice, such as in the Maine lobster fishery.

From the review by Starzomski, B. M. (2004). *Ecology and Society* 9(1)

<http://www.ecologyandsociety.org/vol9/iss1/art1>:

Title:	<b>Ecosystems Management: Adaptive, Community-Based Conservation</b>
Author(s):	Gary K. Meffe (Editor), Larry A. Nielsen (Editor), Richard L. Knight (Editor), Dennis A. Schenborn (Editor), Larry Nielson
Publisher:	Island Press
Year:	2002
Pages:	304 p.
Where:	ISBN: 1559638249
Type of approaches:	diverse: from landscape level to single species land management
Region / countries:	
Nature:	conceptual
Key features:	textbook, problem-based learning, genetic diversity in ecosystem management, landscape-level conservation, single-species land management; methodology, examples, and mathematical models

## Summary

Today's natural resource managers must be able to navigate among the complicated interactions and conflicting interests of diverse stakeholders and decision makers. Technical and scientific knowledge, though necessary, are not sufficient. Science is merely one component in a multifaceted world of decision making.

'Ecosystems Management' grew out of a training course developed and presented by the authors for the U.S. Fish and Wildlife Service at its National Training Center in Shepherdstown, West Virginia. It is a textbook that offers an approach that engages students in active problem-solving by using detailed landscape scenarios that reflect the complex issues and conflicting interests that face today's resource managers and scientists. Focusing on the application of the sciences of ecology and conservation biology to real-world concerns, it emphasizes the intricate ecological, socio-economic, and institutional matrix in which natural resource management functions, and illustrates how to be more effective in that challenging arena.

Each chapter presents exercises to help facilitate problem-based learning. The main text is supplemented by boxes and figures that provide examples, perspectives, definitions, summaries, and learning tools, along with a variety of essays written by practitioners with field experience in applying the principles of ecosystem management.

Accompanying the textbook is an instructor's manual that provides a detailed overview of the book and specific guidance on designing a course around it.

Title:	<b>The Institutional Dimensions Of Environmental Change: Fit, Interplay and Scale</b>
Author(s):	Young, Oran B.
Publisher:	MIT Press
Year:	2002
Pages:	237 p.
Where:	ISBN: 0262740249
Type of approaches:	institutional diagnostics
Region / countries:	
Nature:	conceptual
Key features:	institutions, environmental change, fit, interplay, scale, collective action model, social-practices model, .

## Summary

Researchers studying the role institutions play in causing and confronting environmental change use a variety of concepts and methods that make it difficult to compare their findings. Seeking to remedy this problem, Oran Young takes the analytic themes identified in the Institutional Dimensions of Global Environmental Change (IDGEC) Science Plan as cutting-edge research concerns and develops them into a common structure for conducting research: the problems of fit, interplay and scale. They center, respectively, on the (mis)match between properties of bio-geophysical systems and attributes of institutions, on interactions between and among distinct institutions, and on the prospects for scaling up or down in the dimensions of space and time in our efforts to understand the roles that institutions play in causing and confronting environmental change.

The problem may be conceptualized as the dynamics of achieving fit (harmonization of ecosystem and social system characteristics), managing interplay (vertical and horizontal interaction between regimes and responsibilities), and accommodating scale (the magnitude and scope of systemic boundaries and driving forces).

In principle there are two perspectives within which policies are framed:

### The Collective-Action Model

- consequences
- sanctions
- incentives
- stringent standards

### The Social-Practices Model

- commitments
- socialisation
- injunctions
- flexible standards

The result of the partial application of both perspectives is that policy design necessitates a new approach. The idea of generalising standard principles from similar cases, just won't work - every case is too dissimilar from every other. Instead there is the requirement to deconstruct the various aspects of unique systems, and customise solutions to meet each distinct configuration that is encountered.

In the last chapter the link between analysis and praxis is elaborated and a procedure known as 'institutional diagnostics' as a means of bridging the gap between science and policy in this realm, is proposed: a pragmatic methodology that environmental administrators can use.

Examples of environmental change are given ranging in scale from the depletion of local fish stocks to the disruption of Earth's climate system.

This book shows how institutions interact both with one another and with the biophysical environment and assesses the extent to which we can apply lessons drawn from the study of local institutions to the study of global institutions and vice versa. Furthermore it examines how research on institutions can help us to solve global problems of environmental governance. Substantive topics discussed include the institutional dimensions of carbon management, the performance of exclusive economic zones, and the political economy of boreal and tropical forests.

Title:	<b>Adaptive Management: From Theory to Practice</b>
Author(s):	Oglethorpe, J.A.E. (ed.)
Publisher:	IUCN Gland, Switzerland and Cambridge, UK
Year:	2002
Pages:	166 p.
Where:	ISBN 2-8317-0526-6
Type of approaches:	adaptive management, sustainable use
Region / countries:	
Nature:	conceptual, field experiences
Key features:	adaptive management, conflict resolution, sustainability, natural resources management, knowledge management, institutions, community based management, decision making

### **Summary**

This collection of 14 essays from different authors looks at the application of adaptive management to conservation and use of natural resources. Most papers draw in part on examples, all but one located in a developing country. The contributions are diverse in emphasis and only loosely linked to each other.

The most important issues to emerge from this diverse collection of papers (with relevant contributions identified in parentheses) are that adaptive management:

1. is a useful way to involve all relevant actors in resource management for long term sustainability;
2. is in one form or another indispensable for sustainability, because both biological and social systems are too complex and dynamic for any recipe to hold unchanged in the long term (Dankelman; Bridgewater);

3. is more about people and the way they learn and reach decisions (Gonzales; Wiersum and de Hoogh) than about ecological science, so effective models will vary among cultures;
4. requires recognition of multiple interests and power relations at all social and institutional levels as decisive influences on outcomes (Warner; Sithole and Frost), and requires mechanisms for coping with rapid shifts in the distribution and significance of those influences;
5. is not well served by efforts to achieve superficial consensus at the expense of working out ways to manage multiple interests (Anderson);
6. acknowledges the limitations of science, leaving space for other forms of knowledge, including traditional or customary knowledge (Dankelman; Argumedo and Mamen), to influence decision-making, implementation and review;
7. adaptive management models developed for application by resource agencies in developed countries are probably unsuitable for community-based management; new models are required (Dankelman; Wiersum and de Hoog);
8. adaptive management requires support from the highest levels of Government and non-Government institutions to require their agencies to work closely with communities (Danks; Agrawal); and
9. adaptive management works best if the social units that influence decisions and receive benefits are carefully matched to the scale and nature of the resource management issue (Orians): using existing political or administrative structures can be counter-productive over the long term, because inequities are created in distribution of costs and benefits (Sithole and Frost).

The dominant message to emerge from this volume is therefore that adaptive management is a useful addition to the sustainable use toolbox, but requires creative and sometimes substantial modification and then highly skilled and flexible application to work in different contexts.

Local problems and the institutional, social and ecological dynamics that determine the shape of relevant responses demand unique, well-crafted local solutions. These solutions are unlikely to emerge reliably from a collection of generic rules from external “experts”, no matter how well-intentioned. Thoughtful review of informative case studies and making that analysis widely available, as done in this volume, could be a useful activity. Managers can use the experience of others to identify the sorts of approaches they think most likely to apply to their own unique circumstances, adapting those approaches as they themselves gain experience.

From the review of Philip Tipping (<http://www.iucn.org/themes/ssc/susg/am.html>)

Title:	<b>Guiding Principles for Biodiversity in Development: Lessons from field projects</b>
Author(s):	European Commission, IUCN-The World Conservation Union
Publisher:	IUCN, Cambridge
Year:	2001
Pages:	56 p.
Where:	ISBN 2-8317-0603-3 / <a href="http://www.wcmc.org.uk/biodev/index2.html">http://www.wcmc.org.uk/biodev/index2.html</a>
Type of approaches:	integrated approach for development cooperation interventions
Region / countries:	Case studies from Brazil, Cameroon, India, Jamaica, Madagascar, Mexico, Philippines, Senegal, and Zimbabwe
Nature:	prescriptive, descriptive
Key features:	conservation and sustainable use of biodiversity, development cooperation

### Summary

This report represents the conclusions of a consultation process that was carried out to provide information to those responsible for EC development cooperation policies on the conservation and sustainable use of biodiversity. Between July and September 1999, regional consultative workshops were held in Cameroon, Sri Lanka, Botswana and Peru.

The guiding principles are a result of an extensive literature review, input from EC and EU donors, input from EC- and EU-supported projects in the field, and consultation with nearly 100 developing country practitioners at the workshops. This report was presented to the CBD COP5 in Nairobi (2000).

#### **GUIDING PRINCIPLES**

- A: Adopt an ecosystem and multi-sectoral approach to development cooperation programmes (taking into account the impacts on adjacent and downstream areas)
  - A.i. Conservation and sustainable use of biodiversity must be an integral part of land use management
  - A.ii. Avoid irreversible losses of biodiversity (e.g. impairment of ecosystem functions, species extinction and erosion of genetic material) and, where necessary, restore ecosystem functions and promote threatened species recovery
  - A.iii. Observe strict protocols on the introduction of alien/invasive species, and genetically modified organisms, and control those which threaten ecosystems, species or genetic material
- B: Promote fair and equitable sharing of costs and benefits from biodiversity conservation and sustainable use at and between local, national, regional and international levels.
  - B.i. Support and develop income generating activities that foster sustainable use of biodiversity
  - B.ii. Encourage positive, and discourage negative incentive measures for conservation and sustainable use of biodiversity
  - B.iii. Encourage international, long term funding mechanisms for effective biodiversity conservation and sustainable use programmes / projects, in the context of sustainable development
- C: Encourage full stakeholder participation, including partnerships between civil society, government and private sector.
  - C.i. Respect local values and build on social and cultural contexts, expressed needs, and locally-adapted approaches, making full use of indigenous/local knowledge
  - C.ii. Reach, fully involve and empower poor and marginalised groups, including women and indigenous peoples, in the development processes
- D: Ensure that the institutional arrangements are effective, transparent, accountable, inclusive and responsive.
  - D.i. Support capacity building of sustainable structures
- E: Ensure that development cooperation project and programmes are consistent with the wider policy framework, and/or changes are made for supportive policies and laws.
  - E.i. Respect and promote local peoples' rights of access to, and tenure of, land, natural resources and biodiversity
  - E.ii. Harmonise national policies with international conventions and treaties
- F: Use/Provide accurate, appropriate, multidisciplinary information, which is both accessible and understood by all stakeholders.
- G: Development cooperation investments must be sensitive to, and complement, local/national structures, processes and capacities

Title: **Panarchy: Understanding Transformations in Systems of Humans and Nature**  
Author(s): Lance H. Gunderson (Editor), C. S. Holling (Editor)  
Publisher: Island Press  
Year: 2001  
Pages: 450 p.  
Where: ISBN: 1559638575  
Type of approaches: adaptive management, systems theories  
Region / countries:  
Nature: conceptual

Key features: inter-disciplinarity, scales, institutional learning, systems theory, adaptive management, resilience

### Summary

Panarchy represents the first step in integrating disciplinary knowledge for the adaptive management of human-natural systems across widely divergent scales, and offers an important base of knowledge from which institutions for adaptive management can be developed. Panarchy combines theories of hierarchies with theories of change.

Creating institutions to meet the challenge of sustainability is arguably the most important task confronting society; it is also dauntingly complex. Ecological, economic, and social elements all play a role, but despite ongoing efforts, researchers have yet to succeed in integrating the various disciplines in a way that gives adequate representation to the insights of each.

Panarchy, a term devised to describe evolving hierarchical systems with multiple interrelated elements, offers an important new framework for understanding and resolving this dilemma. Panarchy is the structure in which systems, including those of nature (e.g., forests) and of humans (e.g., capitalism), as well as combined human-natural systems (e.g., institutions that govern natural resource use such as the Forest Service), are interlinked in continual adaptive cycles of growth, accumulation, restructuring, and renewal. These transformational cycles take place at scales ranging from a drop of water to the biosphere, over periods from days to geologic epochs. By understanding these cycles and their scales, researchers can identify the points at which a system is capable of accepting positive change, and can use those leverage points to foster resilience and sustainability within the system.

Gunderson and Holling claim that most management failures and environmental problems have a simple cause. If humans control nature without considering that nature is dynamic and changes, nature strikes back. Controlling water levels, food production, fish stocks, and pest invasions has, in many cases, had severe consequences for both human health and welfare.

The authors argue that poverty, social inequity, human health, human migration, political upheaval, loss of biodiversity, and land use changes cannot be dealt with as separate issues. Neither are they only global or only local problems. Closer collaboration is needed among traditional disciplines, among researchers, policymakers and resource users themselves, and among local, regional and global levels.

Throughout the book adaptive approaches to management are identified that recognize uncertainty and encourage innovation while fostering resilience.

Title: **World Resources 2000-2001: People and ecosystems: The fraying web of life**  
Author(s): World Resources Institute, United Nations Development Programme, United Nations Environment Programme, World Bank.  
Publisher: Elsevier Science  
Year: 2000  
Pages: 389 p.  
Where: ISBN 0-08-0437818 / [http://pubs.wri.org/pubs\\_description.cfm?PubID=3027](http://pubs.wri.org/pubs_description.cfm?PubID=3027)  
Type of approaches: ecosystem approach  
Region / countries:  
Nature: descriptive, conceptual  
Key features: assessment of the major ecosystems

### Summary

The millennial edition presents a comprehensive assessment of the world's major ecosystems:

- agro-ecosystems

- coastal and marine ecosystems
- forest ecosystems
- freshwater systems
- grassland ecosystems

Chapter 4 deals with 'Adopting an Ecosystem Approach'. On the website:

[www.wri.org/wr2000/ecosys\\_approach.html](http://www.wri.org/wr2000/ecosys_approach.html), on-line (basic) information from the publication can be downloaded on: What is an ecosystem approach, the challenge for policy makers, how can we sustain ecosystems, scorecard of ecosystem conditions and changing capacities, what is the state of ecosystems today, what is the problem, primary goods and services provided by ecosystems, why care about ecosystems, what are ecosystems, repairing the web: a call to action by UNDP, UNEP, World Bank, and WRI.

Box 4.2 on p. 227 gives an example of the differences between a traditional approach and an ecosystem approach in forestry. It seems that traditional forest management is coming from a production perspective. The optimization of the product (timber) has been the objective for many years, but due to different circumstances (pressure from consumers, depletion of the resource, lower harvest as a result of the degradation of the ecosystem, ...). the industry acknowledges that it needs to adapt less detrimental management strategies. Applying the EsA is an option.

Title:	<b>Ecosystem Management – Lessons learnt from around the World: a guide for development and conservation practitioners.</b>
Author(s):	Pirot, J.–Y., Meynell P.–J., Elder D. (Editors).
Publisher:	IUCN-The World Conservation Union
Year:	2000
Pages:	142
Where:	ISBN 2-8317-0542-8 / <a href="http://www.iucn.org/webfiles/doc/WWRP/Publications/EcosystemManagement.pdf">http://www.iucn.org/webfiles/doc/WWRP/Publications/EcosystemManagement.pdf</a>
Type of approaches:	Ecosystem based management approach
Region / countries:	24 case studies
Nature:	conceptual, descriptive, prescriptive, field experience
Key features:	ecosystem management, scale, integration, ecosystem functions, partnerships, planning; environmental assessments, participatory processes, institutional coordination

### Summary

Based on the practical experience gained in 24 different projects, the first part of this Guide examines theoretical issues, definitions and principles. The second part contains practical information aiming to help formulate and implement ecosystem-based management activities and their integration into development projects.

The case studies show that ecosystem management approaches must be flexible, that they are only partly about ecosystem science and must take into account socio-economic and cultural factors, and that participation of stakeholders is imperative. The Guide presents the detailed background and principles concerning these conclusions and provides practical information on how to integrate them into projects in the field. The introduction explains the notion that people are an integral part of ecosystems and depend on other components of the ecosystems and their interactions – ecological processes – for our existence. These include the water cycle, the maintenance of stable atmospheric, climatic and hydrological conditions, the continued production of foodstuffs and many other products and services of ecosystems that contribute to our well-being.

Also introduced is the fact that ecosystem functions are the result of plants and animals (including humans) interacting with each other and with the physical components of their environment. Ecosystem-based management attempts to regulate the use of ecosystems so that we can benefit from them while at the same time modifying the impacts on them so that basic ecosystem functions are preserved.

Title: **The Global 200 Ecoregions. A User's Guide**  
Author(s): WWF  
Publisher: WWF, Washington D.C., USA  
Year: 2000  
Pages:  
Where: [http://www.panda.org/about\\_wwf/where\\_we\\_work/ecoregions/global200](http://www.panda.org/about_wwf/where_we_work/ecoregions/global200)  
Type of approaches: Ecoregional approach  
Region / countries:  
Nature: prescriptive  
Key features: integrated approach, landuse planning, biodiversity conservation, ecoregions

### Summary

WWF originally focused on single species and protection areas, but developed more integrated management approaches that culminated in the WWF's ecoregional policy that promotes a holistic, multi-stakeholder and broad scale approach in natural resource management.

The Global 200 is a science-based global ranking of the Earth's most biologically outstanding terrestrial, freshwater and marine habitats. It provides a critical blueprint for biodiversity conservation at a global scale. It has been developed by WWF scientists in collaboration with regional experts around the world.

Ecoregions that represent the most distinctive examples of biodiversity for a given major habitat type were identified within each biogeographic realm. They were chosen based on the following parameters: species richness; endemism; higher taxonomic uniqueness, extraordinary ecological or evolutionary phenomena and; global rarity of the major habitat type.

Title: **Enterprise Development for Natural Products. Manual**  
Author(s): ANSAB (Asian Network for Small-scale Agricultural Bioresources), Enterprise Works Worldwide (EWW).  
Publisher: ANSAB, Nepal.  
Year: 2000  
Pages: 51p.  
Where: ISBN: 99933-325-0 / <http://www.enterpriseworks.org/PDFs/npmanual.pdf>  
Type of approaches: integrated approach  
Region / countries: based on experiences in Nepal  
Nature: practical  
Key features: natural resources management, enterprise development, sustainable development

### Summary

This manual is a hands-on, step-by-step guide for a practical, realistic and economic way to integrate natural resources management into daily life activities of resource dependent communities. It presents a holistic economic (sustainable) approach that balances conservation and use of biodiversity, using all means including biotechnology to make local resources profitable to local communities, which increases the probability of duration of the mechanism. The manual provides a framework of enterprise development planning in natural products in general and the non-timber forest products (NTFP) sub-

sector in particular. It provides practical tools for addressing the issues of marketing, resource assessment, business fundamentals and policy environment.

This manual is very useful for grassroots level initiatives to adopt an integrated approach in processing natural products.

Title: **Uncertainty, Complexity, and Ecological Integrity: Insights from an Ecosystem Approach** (in Implementing Ecological Integrity: Restoring Regional and Global Environmental and Human Health, pp. 121-156)  
Author(s): Kay. J., Regier, H.  
Publisher: Kluwer, NATO Science Series, Environmental Security  
Year: 2000  
Pages: 34 p.  
Where: <http://www.fes.uwaterloo.ca/u/jjkay/pubs/NATO/>  
Type of approaches: ecosystem approach  
Region / countries:  
Nature: conceptual  
Key features: ecological integrity, self-organisation, human societal systems, complex systems thinking

### Summary

This paper explores the concept of ecological integrity in the context of our understanding of the complexity of ecological phenomena. Ecological integrity pertains to the integrity of the self-organization of ecological systems, including human societal systems. Ecological integrity is about three facets of self-organization of ecological systems:

- current well being,
- resilience,
- capacity to develop, regenerate and evolve.

Given the nature of ecological systems as self-organizing holarchic open systems, a definition of ecological integrity is hierarchical and requires choosing a restricted set of attractors from the possible set in the given circumstances. This reality, in principle, negates the possibility of a strictly science based definition of integrity. This paper presents an alternative basis for discussing integrity, an adaptive ecosystem approach which integrates human issues with ecological reality.

A Self-organizing Holarchic Open Systems framework for discussing ecological systems and their integrity is presented along with examples of the issues this framework raises. This sets the stage for a discourse on the relationship between humans and ecological integrity. A conceptual model for dealing with the complexity of the human-natural ecosystem is introduced. Finally, drawing upon complex systems thinking and post normal science, an adaptive ecosystem approach for sustaining ecological integrity is put forward.

Title: **Sustainable livelihoods approaches**  
Author(s): **DFID & IDS**  
Publisher:  
Year:  
Pages:  
Where: <http://www.livelihoods.org/>  
Type of approaches: sustainable livelihood approach  
Region / countries:  
Nature: conceptual, informative, descriptive

Key features: poverty alleviation, development cooperation

### Summary

An integrated (holistic) approach to poverty, used in development activities by DFID.

The term 'sustainable livelihood' was first used as a development concept in the early 1990s.

Chambers and Conway (1991) defined a sustainable livelihood as follows:

'A livelihood comprises people, their capabilities and their means of living, including food, income and assets. Tangible assets are resources and stores, and intangible assets are claims and access. A livelihood is environmentally sustainable when it maintains or enhances the local and global assets on which livelihoods depend, and has net beneficial effects on other livelihoods. A livelihood is socially sustainable if it can cope with and recover from stress and shocks, and provide for future generations.'

Sustainable Livelihoods Approaches (SLAs) are centred on people and their livelihoods. They prioritise people's assets (tangible and intangible); their ability to withstand shocks (the vulnerability context); and policies and institutions that reflect poor people's priorities, rather than those of the elite. It differs from previous approaches to development in that:

- It puts people at the centre of development. People - rather than the resources they use or the governments that serve them - are the priority concern.
- It builds upon people's strengths rather than their needs.
- It brings together all relevant aspects of people's lives and livelihoods into development planning, implementation and evaluation.
- It unifies different sectors behind a common framework.
- It takes into account how development decisions affect distinct groups of people, such as women compared to men, differently.
- It emphasises the importance of understanding the links between policy decisions and household level activities.
- It draws in relevant partners whether State, civil or private, local, national, regional or international.
- It responds quickly to changing circumstances

### Sustainable Livelihoods Toolbox ([http://www.livelihoods.org/info/info\\_toolbox.html](http://www.livelihoods.org/info/info_toolbox.html))

The tools are an evolving collection of practical resources organised by types of activity:

- Policy, Institutions and Processes
- Programme Identification and Design
- Planning New Projects
- Reviewing Existing Activities
- Monitoring and Evaluation
- Ways of Working
- Sharing the Approach

The section of 'Training Support' contains training materials and ideas to help you organise training events on the Sustainable Livelihoods approach.

Title: **Sustainable Livelihoods in Practice: Early Applications of Concepts in Rural Areas**  
Author(s): John Farrington, Diana Carney, Caroline Ashley and Cathryn Turton  
Publisher: Overseas Development Institute  
Year: 1999  
Pages:  
Where: ISSN: 1356-9228 / <http://www.odi.org.uk/nrp/42.html>  
Type of approaches: sustainable livelihood approach

Region / countries:

Nature: prescriptive, conceptual, descriptive

Key features: poverty alleviation, developing cooperation

### Summary

This paper outlines a new approach to poverty alleviation – sustainable livelihoods – setting out its basic concepts and drawing lessons from early experience.

Core concepts: a focus on people, holism and macro-micro links.

Early experience in implementing a sustainable livelihoods approach suggests that it:

- helps to bring together different perspectives on poverty and integrate the contributions to eliminating poverty that different skills and sectors can make, in for instance designing projects and programmes, sector analysis and monitoring;
- makes explicit the choices and possible trade-offs in planning and executing different development activities;
- helps to identify the underlying constraints to improved livelihoods and the means of overcoming these;
- helps to link improved micro-level understanding of poverty into policy and institutional change processes.
- Facilitates cross-sectoral collaboration

Practical difficulties remain in:

- understanding how conflict over access to resources impinges on livelihood choices, and what can be done to address this;
- developing cost effective modes of livelihood analysis that ensure that the needs of the poorest are prioritised;
- identifying appropriate in-country partners, and developing collaborative approaches to understanding the complexity of poverty and integrating that understanding into a common livelihoods frame;
- understanding how, in practice, to handle trade-offs, for instance between local pressures (e.g. for increased short-term income or better infrastructure) and wider concerns about resource sustainability and national-level policy considerations.

Title: **Linking Social and Ecological Systems : Management Practices and Social Mechanisms for Building Resilience**

Author(s): Fikret Berkes (Editor), Carl Folke (Editor)

Publisher: Cambridge University Press

Year: 1998

Pages: 476 p.

Where: ISBN: 0521785626

Type of approaches: interdisciplinary approach, systems theories, adaptive management

Region / countries: detailed description of 12 cases and the summary of management practices

Nature: descriptive, conceptual, prescriptive

Key features: guiding principles for sustainable ecosystem management, linking of extractive practices and institutions, institutional learning, systems theory

### Summary

While scientists usually examine either ecological systems or social systems, the need exists for an interdisciplinary approach to the problems of environmental management and sustainable development. Developed under the auspices of the Beijer Institute in Stockholm, this volume analyzes social and ecological linkages in selected ecosystems using an international and interdisciplinary case

study approach. The chapters provide detailed information on a variety of management practices for dealing with environmental change.

Failures of large-scale "managed" ecosystems have challenged natural resource management theory and practice. Berkes and Folke (1998) address the problems of environmental management and sustainable development with an interdisciplinary approach. This book uses the organizing concept of resilience, defined as the capacity of a system to absorb disturbances, to bridge the traditional divide between social research, which focuses on institutions, organizations, and social practices, and ecological research, which focuses on the cross-scale dynamics of ecosystems.

The book presents 12 case studies that document linkages between resilient ecosystems on the one hand and ecosystems, people and technology, local ecological knowledge, and property rights on the other. The cases are grouped around three themes: the conflict between local and larger-scale institutions, the long-term dynamics of local management systems, and the effects of regional conservation plans on local action.

The first set of case studies deals with interactions between locally crafted institutions based on local ecological knowledge and national management regimes that promote scientific extractive practices. The case studies that explore the long-term trajectories of local management systems examine the question, "Do crises foster institutional learning?" The final set of case studies explores how deeply regional systems are embedded in national legal frameworks.

Three integrative chapters discuss the lessons learned from these case studies. The first focuses on the fishing sector. As an approach to managing chaotic fisheries, Acheson et al. propose the use of parametric management, which builds on "ecosystem management" and uses key ecosystem variables to influence the target species. Holling et al. contend that conventional science is mainly "disciplinary, reductionist, mechanistic and detached from policies and politics," and that scientific recommendations have led to narrow utilitarian policies, such as the pursuit of maximum sustained yield, that view resources as a commodity. Conventional science and utilitarian policies in natural resource management frequently clash with the nonlinear, multistable, discontinuous behaviours of ecosystems. The authors argue that systems theory can help to unravel management puzzles, and that adaptive management can usefully link science to ecological management policy.

The book concludes with a summary of management practices based on local ecological knowledge and offer guiding principles for building resilience in social-ecological systems. These management practices are summarized in a table on page 417 that provides a starting point for the further identification of practices that lead to resilience and sustainability. The guiding principles, "as social mechanisms behind these management practices," consist of designing management systems that (1) "flow with nature," (2) enable the development and use of local ecological knowledge to understand local ecosystems, (3) promote self-organization and institutional learning, and (4) develop values consistent with resilient and sustainable social-ecological systems.

*From the review by Raufflet, E. 2000, Conservation Ecology 4(2): 5.*

<http://www.consecol.org/vol4/iss2/art5>:

Title: **Definitions of Ecosystem Management and Related Terms**  
Author(s): Karyn McDermaid, Georgia Sebesta and Greg Mclsaac  
Publisher:  
Year: 1996  
Pages:  
Where: <http://classes.aces.uiuc.edu/NRES325/defin.html>  
Type of approaches: -

Region / countries:

Nature: conceptual, descriptive

Key features: definitions of ecosystem management and interesting quotes from key-people in ecology

### Summary

This webpage gives an interesting and extensive overview of ecosystem management definitions and descriptions, unfortunately only until 1996 and very much focussed on North-America. But it reflects the discussions around this topic and the evolution in thinking.

Some selected quotes:

"The ecosystem approach is not a new concept. It does not hinge on any one program or course of action. Rather, it denotes a more comprehensive and interdisciplinary methodology for environmental research, planning, reporting and management." (Canadian Perspective)

"People should take care of the land as a "whole organism" and try to keep all the cogs and wheels in good working order." (Aldo Leopold)

"The ecosystem approach recognizes the interrelationship between natural systems and healthy, sustainable economies. It is a common sense way for public and private managers to carry out their mandates with greater efficiency." (Federal Interagency Ecosystem Management Task Force, June 1995)

Title: **ESA Report on the scientific basis of ecosystem management,**

Author(s): Christensen, N.L., et al

Publisher: Ecological Applications 6(3): 665-691

Year: 1996

Pages: 41 p

Where: <http://www.epa.gov/ecocommunity/tools/ecosysmn.pdf>

Type of approaches: ecosystem management

Region / countries:

Nature: conceptual, prescriptive

Key features: ecosystem management, scale, sustainability, ecosystem services, human interaction, adaptive management, endangered ecosystems

### Summary

This report of the Ecological Society of America (ESA) addresses the concept of ecosystem management and its scientific foundation. It gives a useful overview and explanation of basic components of ecosystem management, and the role of science and scientists in implementing ecosystem management.

Sustainability has become an explicitly stated, even legislatively mandated, goal of natural resource management agencies. In practice, however, management approaches have often focused on maximizing short-term yield and economic gain rather than long-term sustainability. Several obstacles contribute to this disparity, including:

- 1) inadequate information on the biological diversity of environments;
- 2) widespread ignorance of the function and dynamics of ecosystems;
- 3) the openness and interconnectedness of ecosystems on scales that transcend management boundaries;
- 4) a prevailing public perception that the immediate economic and social value of supposedly renewable resources outweighs the risk of future ecosystem damage or the benefits of alternative management approaches.

#### Definition Ecosystem Management:

Ecosystem Management is management driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem composition, structure, and function.

#### Eight components for ecosystem management:

1. Sustainability.
2. Goals.
3. Sound ecological models and understanding.
4. Complexity and connectedness.
5. The dynamic character of ecosystems.
6. Context and scale.
7. Humans as ecosystem components.
8. Adaptability and accountability..

#### *Scales of organization:*

“To address ecosystem-level processes, we must understand the dynamics of the lower levels of ecological organization such as communities and populations.”

#### *Humans as Ecosystem Components:*

“To say that ecosystem management is about managing human activities is not necessarily to call for increased regulation or ‘command and control’. Concerns such as the rights of private property owners and local loss of jobs are not likely to diminish and ecosystem management must include strategies that deal positively with those concerns.”

“Ecosystem Management is not the rejection of the anthropocentric for a totally biocentric world view. Rather, it is management that acknowledges the importance of humans’ needs while at the same time confronting the reality that the capacity of our world to meet those needs in perpetuity has limits and depends on the functioning of ecosystems.”

#### *Adaptive management:*

“Successful ecosystem management depends on institutions that are adaptable to variations and changes in ecosystem characteristics, as well as on changes in our knowledge base. Ecosystem managers must acknowledge ignorance and uncertainty. Adaptive management must be an integral component of ecosystem management implementation.”

“*Science as a model for ecosystem management* is unlikely to become reality unless scientists are involved with managers and the public in adaptive management processes.”

“To sustain intensively managed ecosystems such as cities, heavy subsidies of energy and materials must be imported from other ecosystems. The need for such subsidies diminishes as the intensity of use diminishes.”

Appendix 2 ‘Ecosystem Representation as a Conservation Goal’ contains an overview of the identified endangered ecosystems of the USA in the categories:

- Critically endangered (>98% decline)
- Endangered (85-98% decline)
- Threatened (70-84% decline)

Decline refers to outright destruction, conversion to other landuses, or other significant degradation of ecological structure, function, or composition since European settlement. Estimates are based on quantitative studies and qualitative assessments.

### 3. Marine and Coastal Biological Diversity

Title: **Integrated Marine and Coastal Area Management (IMCAM) approaches for implementing the Convention on Biological Diversity**

Author(s): AIDEnvironment, National Institute for Coastal and Marine Management/Rijksinstituut voor Kust en Zee (RIKZ), Coastal Zone Management Centre, the Netherlands

Publisher: Secretariat of the Convention on Biological Diversity, Montreal, Canada

Year: 2004

Pages: 51 p.

Where: ISBN: 92-807-2409-6 / <http://www.biodiv.org/doc/publications/cbd-ts-14.pdf>

Type of approaches: Integrated marine and coastal Area management (IMCAM) approaches, ecosystem approach

Region / countries:

Nature: conceptual, field experiences

Key features: participatory process, decision making, conservation, sustainable use, CBD

#### Summary

Integrated marine and coastal area management (IMCAM) is a participatory process for decision making to prevent, control, or mitigate adverse impacts from human activities in the marine and coastal environment, and to contribute to the restoration of degraded coastal areas.

IMCAM is one of the elements of the marine and coastal program of work of the CBD, which has been launched in order to protect and restore biodiversity in these specific ecosystems. The objective is to come up with practical guidance in order to promote the inclusion of Ecosystem approach in IMCAM.

IMCAM approaches have been recognized as the most effective tools for implementing the Convention on Biological Diversity with respect to conservation and sustainable use of marine and coastal biodiversity. This document seeks to fill this gap by providing practical guidance on integrating IMCAM practices and those under the Convention, and represents the culmination of a series of activities. It is the result of an extended participatory process with contributions from numerous practitioners and policy makers working with IMCAM approaches and the Convention on Biological Diversity.

Discussions on the Ecosystem Approach have focused on three Critical Issues:

1. It remains unclear how one should focus on the CBD objectives conservation, sustainable use and benefit sharing simultaneously.
2. How to deal with the limited knowledge of ecosystem structure and functioning and uncertainties when determining ecosystem performance.
3. How can the ecosystem be placed central in integrated coastal management of areas subject to major human pressures, without compromising the socio-economic development in these areas?

The outcome of the online discussion provided the groundwork for the further elaboration of four themes: ecosystem approach, indicators, restoration of habitats, and incentives. This document is a synthesis of the online discussion and the work of the assigned specialists and aims to provide a tangible and pragmatic input to further the implementation of the Convention on Biological Diversity in marine and coastal areas.

Title: **The Ecosystem Approach to Fisheries Management**

Author(s): A. D. Hawkins

Publisher: unpublished (background paper for the 14<sup>th</sup> Meeting of the European Sustainable Use Specialist Group's Fisheries working group)  
Year: 2004  
Pages: 20  
Where:  
Type of approaches: ecosystem approach  
Region / countries:  
Nature: conceptual, descriptive  
Key features: EC, ecosystem management, fisheries, institutions, policy, scale

### **Summary**

The ecosystem approach is really a political and societal concept rather than a scientific one. Essentially, the approach aims to manage the human activities that have an impact on the environment and its life forms. The approach recognises that humans are a part of the ecosystem and aims to make both economic activities and the environment more sustainable, in terms of their capacity to absorb stress without fundamental change.

The European Community has firmly endorsed the ecosystem approach, and has sought to apply it as part of plans for the reform of the Common Fisheries Policy. The new European Council Regulation 2371 states that the objectives of the reformed CFP are "to ensure sustainable exploitation of living aquatic resources". For this purpose it will "apply the precautionary approach" and "aim at progressive implementation of an ecosystem approach" while "following principles of good governance". In practice, however, few steps have yet been taken towards implementing an ecosystem-based approach in the management of the European fisheries.

Much work has been undertaken by FAO in preparing for the introduction of an ecosystem approach. The "Basic Principles of Ecosystem Management" are set out in the FAO Fisheries Atlas. Also, in the United States, the Ecosystem Principles Advisory Panel, in its 1995 Report to the US Congress, has considered how to implement "ecosystem principles" and subsequently the Ecosystem Approach Task Force of the United States Marine Fisheries Advisory Committee defined the essential elements of the ecosystem approach. Within the European Community, a Working Group on Ecosystem Approach to Human Activities (EAM) has prepared a draft 'Roadmap'. Although all these organisations may have carried out valuable groundwork the principles they have outlined have yet to be adopted in the management of real fisheries.

One of the few fisheries which is widely regarded as sustainable is the Western Rock Lobster Fishery managed by the Western Australian Department of Fisheries. A series of guidelines have been drawn up and followed for the ecologically sustainable management of the fisheries by its managers. The guidelines consist of a series of principles, supported by more detailed objectives. Emphasis is placed upon a reduction of by-catches, reduction of mortality of, or injuries to, endangered, threatened or protected species and the avoidance of impacts on threatened ecological communities. The fishery is conducted in a manner that minimises the impact of fishing operations on the ecosystem generally. Such a simple approach is perhaps a model which should be emulated.

One of the difficulties which stands in the way of adopting an ecosystem approach is the weakness of the different concepts being applied by international agencies. Some of those agencies have failed to realise that ecosystems themselves cannot be managed. That management must be applied to human activities. There are problems in defining the ecosystem approach itself, and wide use is made of terms like "ecosystem health" or "ecosystem integrity", which are difficult to pin down. It is almost impossible to delimit the extent of large marine ecosystems, and most ecosystems themselves are made up of smaller ecosystems. A search has begun for "ecosystem indicators" but these may have limited utility in the management of real fisheries. Finally, the so-called "precautionary approach" is often invoked, but again is of limited value unless it is carefully defined.

Given these difficulties with the concept of an ecosystem approach it is not surprising that little progress has been made in introducing an ecosystem approach under the Common Fisheries Policy. The concentration on a single species approach adopted in areas like the North Sea, together with the strong political control of management, may have contributed to this failure. It is suggested that the new Regional Advisory Councils proposed by the European Commission may be a great assistance in introducing a pragmatic version of the ecosystem approach to fisheries.

Title: **Penang Statement: Adopting the Ecosystem Approach to Inland Fisheries**  
Author(s): WorldFish Center  
Publisher:  
Year: 2004  
Pages: 3  
Where: [http://www.worldfishcenter.org/news/PDF/PR\\_16Jan04.pdf](http://www.worldfishcenter.org/news/PDF/PR_16Jan04.pdf)  
Type of approaches: ecosystem approach  
Region / countries: Asia  
Nature: prescriptive  
Key features: ecosystem approach, inland fisheries

### Summary

More than 200 million people depend on fisheries for their livelihoods. Highlighting the important contributions of fisheries to the sustainable development agenda, WorldFish Center released the "Penang Statement" at the Convention on Biological Diversity meetings. The statement outlines a strategy for improving fisheries management, both in support of the Convention and FAO's Ecosystem Approach to Fisheries (EAF) and calls for:

#### The Ecosystem Approach: Why and What?

- Threats to inland fisheries and degradation of aquatic ecosystems are affecting the livelihoods of millions of poor people. This problem cannot be solved within the fishery sector alone
- The inland fisheries' problems are largely ignored and invisible outside the sector. The outreach inherent to the ecosystem approach to inland fisheries will give the sector a voice.
- Aquatic resources are more than managing fish - it is about people! The ecosystem approach brings people from all sectors together, making the link between fisheries, water and the environment
- Implementing the ecosystem approach poses new challenges

#### The Ecosystem Approach: how?

- Work towards a coherent and coordinated set of policies, laws and guidelines
- Strengthen institutions and their functions to implement the ecosystem approach in cross-sectoral cooperation
- Create an enabling environment to promote stakeholder participation
- Support research and the collection, dissemination and use of local knowledge to provide an informed basis for implementing the ecosystem approach

Title: **The ecosystem approach to fisheries. FAO Technical Guidelines for Responsible Fisheries No. 4, Suppl. 2**  
Author(s): FAO  
Publisher: FAO Rome  
Year: 2003  
Pages: 112 p  
Where: ISBN 92-5-104897-5 / <http://www.fao.org/DOCREP/005/Y4470E/y4470e00.htm>

Type of approaches: ecosystem approach  
Region / countries:  
Nature: prescriptive  
Key features: fisheries management, ecosystem management, policy goals, operational objectives, sustainable development, stakeholder participation, decision making, scale

### **Summary**

These guidelines have been produced to supplement the FAO Code of Conduct for Responsible Fisheries. The Code and many international agreements and conferences highlight the many benefits that can be achieved by adopting an ecosystem approach to fisheries (EAF) and elaborate a number of agreed principles and concepts relating to EAF.

Interest in an ecosystem approach to fisheries (EAF) has been motivated by:

1. heightened awareness of the importance of interactions among fishery resources and between fishery resources and the ecosystems within which they exist;
2. recognition of the wide range of societal objectives for, and values of, fishery resources and marine ecosystems within the context of sustainable development;
3. poor performance of current management approaches as witnessed by the poor state of many the world's fisheries; and
4. recent advances in science, which highlight knowledge and uncertainties about the functional value of ecosystems to humans (i.e. the goods and services they are capable of providing).

The term ecosystem approach to fisheries has been adopted in these guidelines to reflect the merging of two different but related and converging paradigms. The first is that of ecosystem management, which aims at meeting its goal of conserving the structure, diversity and functioning of ecosystems through management actions that focus on the biophysical components of ecosystems (e.g. introduction of protected areas). The second is that of fisheries management, which aims to meet the goals of satisfying societal and human needs for food and economic benefits through management actions that focus on the fishing activity and the target resource.

These guidelines attempt to make EAF operational by recognizing that this approach is a way to implement many of the provisions of the Code and achieve sustainable development in a fisheries' context. They provide guidance on how to translate the economic, social and ecological policy goals and aspirations of sustainable development into operational objectives, indicators and performance measures. They are not seen as a replacement for, but rather an extension of, current fisheries management practices that need to be broadened to take into account the biotic, abiotic and human components of ecosystems in which fisheries operate.

EAF will require that current fisheries management processes include a broader range of users of marine ecosystems (including both extractive and non-extractive users) in deliberations and decision-making and, through improved participatory processes, broader assessment and consensus among users, whose objectives frequently compete. The process will need to take into account more effectively the interactions between fisheries and ecosystems, and the fact that both are affected by natural long-term variability as well as by other, non-fishery uses. The approach aims to ensure that future generations will benefit from the full range of goods and services that ecosystems can provide by dealing with issues in a much more holistic way, rather than by focusing on only certain target species or species groups, as has often been the case until now.

These guidelines also examine other aspects of current fisheries management approaches that will need to be broadened to implement EAF. They include the measures and incentives available to managers to assist in meeting operational objectives. They are a re-assessment of the legal and

institutional infrastructure associated with fisheries management at regional and national levels, as well as ways to improve data collection, research and analysis.

The guidelines outline a certain number of impediments that may prevent achieving the significant longer-term benefits to be gained from adopting EAF. These impediments include a lack of investment in the management process, lack of adequate training and education, gaps in knowledge and lack of participation by the main stakeholders. As experience grows and as solutions to these major challenges become available, they will be published in subsequent editions of these guidelines.

Principles of relevance to an ecosystem approach to fisheries (Annex II):

- Avoiding overfishing
- Ensuring reversibility and rebuilding
- Minimizing fisheries impact
- Considering species interactions
- Ensuring compatibility
- Applying the precautionary approach
- Improving human well-being and equity
- Allocating user rights
- Promoting sectoral integration
- Broadening stakeholders participation
- Maintaining ecosystem integrity

Title: **The ecosystem approach to fisheries: Issues, terminology, principles, institutional foundations, implementation and outlook.** FAO Fisheries Technical Paper. No. 443

Author(s): Garcia, S.M et al.

Publisher: FAO Rome

Year: 2003

Pages: 71 p

Where: ISBN 92-5-104960-2

Type of approaches: Fisheries Management, Ecosystem Management, Ecosystem Approach, Ecosystem-based Fisheries Management (EBFM), Ecosystem Approach to Fisheries (EAF), Integrated Management (IM)

Region / countries:

Nature: descriptive, conceptual

Key features: ecosystem approach, fisheries, complexity, operationalisation,

### Summary

The overarching principles of the Ecosystem Approach to Fisheries (EAF) define the approach as an extension of the conventional principles for sustainable fisheries development and management to explicitly deal with ecosystem issues such as resources conservation, habitat protection, fishery and non-fishery impacts, etc. The aim is to ensure that, despite variability, uncertainty and likely natural changes in the ecosystem, the capacity of aquatic ecosystems to produce fish food, revenues, employment and, more generally, other essential services and livelihoods, are maintained indefinitely for the benefit of present and future generations.

Fisheries have a direct impact on the ecosystem, which is also impacted by other human activities, therefore they need to be managed in an ecosystem context. The meaning of the terms "ecosystem management", "ecosystem-based management", "ecosystem approach to fisheries" (EAF), etc., are still not universally defined and progressively evolving. The justification of EAF is evident in the characteristics of an exploited ecosystem and the impacts resulting from fisheries and other activities. The rich set of international agreements of relevance to EAF contains a large number of principles and

conceptual objectives. Both provide a fundamental guidance and a significant challenge for the implementation of EAF. The available international instruments also provide the institutional foundations for EAF. The FAO Code of Conduct for Responsible Fisheries is particularly important in this respect and contains provisions for practically all aspects of the approach. One major difficulty in defining EAF lies precisely in turning the available concepts and principles into operational objectives from which an EAF management plan would more easily be developed. The paper discusses these together with the types of action needed to achieve them. Experience in EAF implementation is still limited but some issues are already apparent, e.g. in added complexity, insufficient capacity, slow implementation, need for a pragmatic approach, etc. It is argued, in conclusion, that the future of EAF and fisheries depends on the way in which the two fundamental concepts of fisheries management and ecosystem management, and their respective stakeholders, will join efforts or collide.

Title: **Marine Protected Areas in Ecosystem-based management of Fisheries**  
Author(s): Ward, T. & Hegerl, E  
Publisher: Commonwealth of Australia  
Year: 2003  
Pages: 73 p  
Where: ISBN 0 642 54948 6 / <http://www.deh.gov.au/coasts/mpa/wpc/fisheries.html>  
Type of approaches: protected areas, integrated management, ecosystem approach  
Region / countries:  
Nature: conceptual, descriptive  
Key features: marine conservation, fisheries, sustainability, spatial management, stakeholder participation, interface, institutions, economic valuation

### Summary

This document provides some of the key concepts and supporting technical evidence for the dual and potentially complementary role of marine protected areas (MPAs) in both fisheries and conservation. Furthermore the use of protected areas as an important component of ecosystem-based management of fisheries is explored.

MPAs have long been used in fisheries management to achieve a variety of objectives, but they have mainly been established to maintain fish stocks and their associated important habitats. However, MPAs created for fisheries purposes may also provide increased stability in fisheries, act as an offset for the unavoidable effects in fishing grounds, and help to maintain well-being in local communities. World-wide, many different types of MPAs also are used to achieve specific marine conservation objectives. While MPAs declared for fisheries purposes (such as areas closed to specific gear types, habitat reserves) also contribute to biodiversity conservation, this often is not well recognised or documented.

MPAs have consistently been identified for their important potential role in supporting fisheries to become both ecologically and economically sustainable. In this role, MPAs are considered to be capable of providing insurance as a hedge against fishery failure resulting from the many weaknesses and the multiplicity of uncertainties that afflict fish, fishing and fisheries management systems.

The World Summit on Sustainable Development (WSSD) Plan of Implementation (POI) proposes integrated oceans management as the guiding principle through which sustainability of the oceans may be achieved (using a/o the ecosystem approach). Such integration will only be efficient if it is based on a framework of spatial management that fully involves all stakeholders and conservation objectives. In this framework, MPAs may be identified and managed as one important tool to meet the multiple objectives of fisheries, other economic uses including tourism, transportation, energy and mineral uses, and biodiversity conservation.

Designing MPAs to meet dual fishing and conservation objectives requires a strong cooperative interface between conservation and fisheries agencies. With agreement on joint objectives, implementation and management, MPAs can achieve the double payoff —benefits for both fisheries and conservation. Modern optimisation decision-support tools and approaches are available to assist with the technical complexities of such design problems, and MPA designs will be most successful when they are based on rigorous scientific principles.

Achieving successful dual-objective MPAs requires:

- articulation of a succinct ‘end game vision’ for dual-objective MPAs across a range of types of jurisdictions, including nested policy and implementation arrangements;
- integrated institutional arrangements (including partnerships) for dealing with the design and implementation of MPAs at the regional, national and sub-national (fishery) levels;
- analysis and documentation of the costs and benefits of MPAs in case studies of MPAs that have been designed to provide benefits for both regional conservation and fisheries;
- a program to assess the regional conservation biodiversity benefits that are derived from a range of the types of existing MPAs created for fisheries purposes.

Title: **The ecosystem approach – conclusions from a seminar** (chapter 7)  
Author(s):  
Publisher: unpublished  
Year: 2003  
Pages: 8 (p.151-158)  
Where:  
Type of approaches: ecosystem approach  
Region / countries: case study of the Baltic Sea  
Nature: descriptive, conceptual  
Key features: stakeholder participation, monitoring, natural resources management, capacity building, adaptive management, political initiative

### **Summary**

Conclusions from a seminar organised in 2003 by the Commission on the Marine Environment entitled ‘How can the ecosystem approach be applied in practice?’ (participants from Europe, Australia and the USA).

In preparing the European marine strategy (2005), the ecosystem approach has been defined as an overall, integrated way of managing human activities. This paper briefly describes how the ecosystem approach can be applied in practice, using the Baltic Sea as a case study. A firm political initiative is required in order to successfully apply the ecosystem approach. One country needs to assume the responsibility to be a pioneer and drive the process.

The case study of the Baltic Sea aims at a Baltic Sea cooperation that implies coordinated measures and promotes local initiatives, whilst participating countries are at the same time legally bound by it. Working methods: Greater participation, mapping the ecosystem’s products, services, users and managers, risk assessments, joint objective-setting, measures, monitoring and information to the society.

### *Guaranteeing continuity:*

Apart from funding, the most important factor to guarantee continuity is creating and maintaining commitment from stakeholders. An initial focus on manageable problems starts the process and creates confidence in it. Rapid, visible success can generate new activities involving a greater number of people. Far from all measures are taken voluntarily and legally binding agreements may be necessary. Control mechanisms including sanctions for failure to comply with agreements should be

discussed, but there should also be evaluation methods to examine the reasons behind any lack of compliance. A common vision and shared insights by all those involved are central to ascertain a feeling of ownership and hence responsibility. If stakeholders are entitled to make decisions and implement agreements, their involvement will no doubt increase. Applying an ecosystem approach in practice means allowing stakeholders to participate in defining objectives, managing resources and monitoring the results of management measures. Involving stakeholders in the process may take time and requires resources and commitment from all parties. Successful participation demands a high level of trust. Building up such trust takes a long time and can easily be lost if results are negative or participation is badly organised. Trust is an important driver in the process and facilitates capacity-building among stakeholders. This creates the necessary flexibility in management to be able to adapt to specific issues. Flexibility and the ability of the management system to adapt itself to change stimulates learning by all those involved. The sciences are an important tool in an adaptive management process and follow-up can provide rapid feedback on the results of management measures. Adaptive management may on the other hand create problems of legitimacy, transparency and predictability, which makes participation and the rapid feedback of information essential. Coordination and cooperation among institutions and stakeholders will create a more flexible management system that can be adapted to work on different levels.

Title: **Ecosystem based approach: Irish Sea Pilot contributions**  
 Author(s): Chris Lumb  
 Publisher : presentation at the UK Biodiversity Partnership Conference (Perth, 21-22 May 2003)  
 Year: 2003  
 Pages:  
 Where: <http://www.ukbap.org.uk/Library/perth2003/presentations/ChrisLumb.pdf>  
<http://www.ukbap.org.uk/Library/perth2003/ChrisLumbNotes.pdf>  
 Type of approaches: ecosystem approach  
 Region / countries: Irish Sea  
 Nature: field experience  
 Key features: stakeholder participation, spatial scales, ecosystem services, integration

### Summary

The marine environment is under considerable and increasing pressure from the effects of human activities. There is a perception of a growing inequality in conservation policies on land compared to at sea, emphasised by the substantial strengthening to the protection and management of terrestrial nature conservation

The Irish Sea Pilot started in the middle of 2002, submitted draft recommendations in December 2003, and will be completed in March 2004. The Irish Sea Pilot has 4 overall objectives:

- To test a proposed new implementation framework for conservation
- To test ways of integrating nature conservation into key sectors to contribute to sustainable development on a regional basis
- To review the potential of existing regulatory systems to deliver effective marine nature conservation
- Recommend measures to fill the gaps identified

Title: **Ramsar Resolution VIII.4 on Integrated Coastal Zone Management (ICZM)**  
 Author(s): Ramsar COP8, Valencia, Spain,  
 Publisher:  
 Year: 2002  
 Pages:

Where: [www.ramsar.org/key\\_res\\_viii\\_04\\_e.htm](http://www.ramsar.org/key_res_viii_04_e.htm)  
Type of approaches: integrated coastal zone management (ICZM)  
Region / countries:  
Nature: prescriptive  
Key features: sustainable development, integrated management, scale, stakeholder participation

### Summary

Appendix I lists the ICZM definitions, terms and current approaches:

ICZM is essentially a mechanism for bringing together the multiplicity of users, stakeholders, and decision-makers in the coastal zone in order to secure more effective ecosystem management whilst achieving economic development and intra- and inter-generational equity through the application of sustainability principles.

ICZM is a cyclical process, generally composed of three basic stages: 1) initiation; 2) planning; and 3) implementation, monitoring, and evaluation.

Integrated approaches to coastal management are known under a variety of different names and abbreviations, including Integrated Coastal Zone Management (ICZM), Integrated Coastal Area Management (ICAM), Integrated Coastal Management (ICM), and Integrated Marine and Coastal Area Management (IMCAM).

Defining boundaries can vary in the inter-tidal shore between low and high water marks; this inter-tidal zone plus adjacent parts of the land, either as a defined distance landward from the shore (sometimes including also wider buffer zonation) or a more flexible inclusion of adjacent terrestrial ecosystems; to terrestrial, inter-tidal and near shore marine parts of a coastal system, up to Economic Exclusion Zones (EEZ) of territorial waters.

The purposes of ICZM are generally recognized to be to:

1. guide the level of coastal uses or interventions so as not to exceed the carrying capacity of the resource base, by identifying which resources need to be harnessed without causing their degradation or depletion, and which resources need to be renewed or rehabilitated for traditional and new uses;
2. respect natural dynamic processes, encouraging beneficial processes and preventing adverse interventions;
3. reduce risks to vulnerable resources;
4. ensure the coastal ecosystems' biodiversity;
5. encourage complementary rather than competitive activities;
6. ensure that environmental, social, and economic objectives are achieved at an acceptable cost to society;
7. protect traditional uses and rights and equitable access to resources; and
8. resolve sectoral issues and conflicts.

A vital feature of a successful ICZM process is ensuring the full engagement and participation from its earliest stages of local communities.

ICZM should incorporate a dual "bottom-up" and "top-down" approach. This seeks to ensure that the interests of all stakeholders are taken into consideration through a local consultation and participation process, whilst at the same time creating a legal and regulatory environment for an effective implementation of the ICZM process.

There are a number of *dimensions of integration* that need to be taken into consideration within the ICZM process. These include:

*vertical* integration among institutions and administrative levels within the same sector;  
*horizontal* integration among various sectors at the same administrative level;  
*systemic* the need to ensure that all important interactions and issues are taken into consideration;  
*functional* interventions by management bodies which must be harmonised with the coastal area management objectives and strategies;  
*spatial* integration between the land and marine components of the coastal zone;  
*policy* coastal area management policies, strategies and plans which need to be incorporated into broader-scale (including national) development policies, strategies and plans;  
*science-management* integration among different scientific disciplines and the transfer of science for use by end-users and decision-makers;  
*planning* plans at various spatial scales should not have conflicting objectives, strategies or planning proposals; and  
*temporal* coordination among short-, medium- and long-term plans and programmes.

There is no single general model for a successful ICZM process, since successful implementation depends upon, among other things, local conditions, experience, ecosystem features, and patterns of development pressure, as well as the nature and extent of national and regional legislative and policy frameworks.

However, experience with implementing ICZM to date has identified some key components that need to be incorporated in any ICZM initiative if it is to succeed. These include:

1. achieving integration and coordination among government departments at various levels;
2. linking sectors by "internalizing" problem solutions within them;
3. achieving long-term sustainability of the intervention by securing its financial security;
4. ensuring political support and institutional arrangements for project implementation;
5. securing local community and stakeholders' full participation and consultation;
6. achieving consensus on the sustainable use and management of coastal resources;
7. shaping the management process to allow flexibility and adaptation to the changing conditions; and
8. fitting the ICZM process to the institutional, organizational, and social environments of the countries or regions involved.

However, there are a number of frequently encountered barriers that stand in the way of a more effective implementation of ICZM. Bureaucratic inertia, opposition to changes, opposition from multiple private economic interests, lack of adequate political will to start the process, lack of minimal financial resources, complexity of the legislative issues in defining the coastal zone, and lack of understanding between marine scientists and land use planners are generally some of the most important barriers.

These barriers may be broken down through actions that include:

1. placing the proposed ICZM programme in its full social context at the earliest possible moment;
2. indicating clearly to the largest possible number of stakeholders what ICZM is and what it can, and cannot, achieve;
3. increasing the transparency of the decision-making process through ICZM mechanisms;
4. improving the stakeholders' participation; and
5. bringing into the process, as early as possible, the representatives of all affected agencies with regulatory or implementation responsibilities in the coastal zone.

Title: **Marine Stewardship Council: Principles and Criteria For Sustainable Fishing**  
 Author(s): Marine Stewardship Council  
 Publisher: Marine Stewardship Council, UK  
 Year: 1998  
 Pages: 6

Where: [http://www.undp.org/bpsp/thematic\\_links/MSC2.doc](http://www.undp.org/bpsp/thematic_links/MSC2.doc)  
Type of approaches: integrated approach  
Region / countries:  
Nature: prescriptive  
Key features: sustainable production, certification, standard, stakeholder participation

### Summary

This document contains guidelines for sustainable fishing around the world. The principles are intended to build upon and to complement the work of international organisations and the best practices of the fishing industries. Furthermore they are designed to recognize and emphasize that management efforts are more likely to be successful in accomplishing the goals when there is full co-operation among the full range of fisheries stakeholders. The MSC Certification Criteria are based on these principles and give very clear guidance to the information required to ensure that a fishery is truly sustainable:

- The maintenance and re-establishment of healthy populations of targeted species;
- The maintenance of the integrity of ecosystems;
- The development and maintenance of effective fisheries management systems, taking into account all relevant biological, technological, economic, social, environmental and commercial aspects; and
- Compliance with relevant local and national local laws and standards and international understandings and agreements.

The three Principles of the MSC Standard are (<http://eng.msc.org>):

1. The condition of the fish stocks *This examines if there are enough fish to ensure that the fishery is sustainable.*
2. The impact of the fishery on the marine environment *This examines the effect that fishing has on the immediate marine environment including other non-target fish species, marine mammals and seabirds.*
3. The fishery management systems *This principle evaluates the rules and procedures that are in place, as well as how they are implemented, to maintain a sustainable fishery and to ensure that the impact on the marine environment is minimised.*

Title: **Workshop on the Ecosystem Approach to the Management and Protection of the North Sea Oslo, Norway 15-17 June 1998**  
Author(s): TemaNord  
Publisher: Nordic Council of Ministers. No. 579  
Year: 1998  
Pages: 100 p.  
Where: ISBN 92-893-0245-3 / <http://odin.dep.no/md/html/conf/workshop/1998/report.html>  
Type of approaches: ecosystem approach, Integrated Coastal Zone Management (ICZM)/ Integrated Coastal Area Management (ICAM)  
Region / countries: North Sea  
Nature: field experience, descriptive, conceptual  
Key features: stakeholder participation, human activities, operationalisation, scale, knowledge management, monitoring, decision making, institutions

### Summary

The main goal of the workshop was to further develop the concept of the Ecosystem Approach for the management of the North Sea

The report includes a summary and conclusions based on the discussions during the meeting, conclusions from group discussions and the text or summary of the different lectures presented.

Title: **Biodiversity in the Seas: Implementing the Convention on Biological Diversity in Marine and Coastal Habitats.** IUCN Environmental Policy and Law Paper, No. 32

Author(s): A. Charlotte de Fountaubert, David R. Downes and Tundi S. Agardy

Publisher: IUCN, UK

Year: 1996

Pages: 82 p.

Where: ISBN: 2-8317-0338-7

Type of approaches:

Region / countries:

Nature: descriptive

Key features: conservation, sustainable use, tools, CBD

### Summary

The report lays out the actions required to operationalise the recommendations of the Convention on Biological Diversity (CBD) Jakarta Mandate. The report explains the special challenges that marine and coastal biodiversity pose for achievement of the CBD objectives of conservation, sustainable use, and equitable sharing of the benefits from genetic resources. It also identifies the policy tools that will be most effective for implementing the CBD in marine and coastal areas. The recommended actions are defined in general terms and are illustrated by specific examples drawn from all over the world.

Title: **FAO Code of Conduct for Responsible Fisheries**

Author(s): FAO

Publisher: FAO

Year: 1995

Pages:

Where: <http://www.fao.org/DOCREP/005/v9878e/v9878e00.htm#TABLE>

Type of approaches: ecosystem-based management approach

Region / countries:

Nature: prescriptive

Key features: sustainable exploitation, fisheries

### Summary

The FAO Code of Conduct for Responsible Fisheries was unanimously adopted on 31 October 1995 by the FAO Conference, provides a necessary framework for national and international efforts to ensure sustainable exploitation of living aquatic resources in harmony with the environment. This Code is voluntary. However, certain parts of it are based on relevant rules of international law, including those reflected in the United Nations Convention on the Law of the Sea of 10 December 1982. The Code also contains provisions that may be, or have already been, given binding effect by means of other obligatory legal instruments amongst the Parties, such as the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas, 1993, which, according to FAO Conference resolution 15/93, paragraph 3, forms an integral part of the Code. The Code is now being expanded through a series of FAO Technical Guidelines for Responsible Fisheries of which eight have been released to date.

## 4. Forest Biological Diversity

Title: **Ecosystem Approaches And Sustainable Forest Management**  
Author(s): IUCN, PROFOR, World Bank  
Publisher:  
Year: 2004  
Pages: 14  
Where: [http://www.iucn.org/info\\_and\\_news/press/UNFF%204\\_final\\_SFM\\_EsA.pdf](http://www.iucn.org/info_and_news/press/UNFF%204_final_SFM_EsA.pdf)  
Type of approaches: ecosystem approach, sustainable forest management  
Region / countries:  
Nature: conceptual, prescriptive  
Key features: SFM, EsA, adaptive management, precautionary principle, landscape management

### Summary

This paper is a submission from IUCN, PROFOR, and the World Bank in follow up to discussions held at the third meeting of the United Nations Forum on Forests (UNFF) on the relationship between sustainable forest management (SFM) and ecosystem approaches (EsA) - as applied to forests.

#### Definition SFM:

The stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfill, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems.

It would be preferable if EsA were to be regarded as a different approach to decision making rather than an additional layer of regulation.

In a table a characterization of the differences between Conventional Forestry, EsA and SFM are given. The EsA advocates the use of the Precautionary Principle. But, if not properly applied, the Precautionary Principle can pose difficulties in practice. There are many recent examples of very high costs being incurred to resolve uncertainties or negotiate trade-offs in forest management. There have always been risks, uncertainties and trade-offs in forest management and these will certainly increase in the future.

Ultimately the EsA vision tends more towards process and negotiation for resolving such difficult issues whereas the SFM tends more towards the application of professional judgment.

Title: **Ecosystem approach: further elaboration, guidelines for implementation and relationship with sustainable forest management**  
Author(s): CBD Executive Secretariat  
Publisher: CBD  
Year: 2003  
Pages: 27  
Where: <http://www.biodiv.org/doc/meetings/sbstta/sbstta-09/official/sbstta-09-08-en.pdf>  
Type of approaches: ecosystem approach, sustainable forest management  
Region / countries:  
Nature: descriptive, conceptual  
Key features: integration, harmonization, sustainable forest management, ecosystem approach, cross-sectoral, scale

## Summary

Annex II, section A 'Sustainable forest management' deals with the Conceptual basis of the ecosystem approach in relation to sustainable forest management and gives some suggestions for integration of the two concepts.

SFM incorporates the following key sustainability concepts:

1. stewardship;
2. enabling environment;
3. continuous flow of goods and services without undermining the resource base;
4. maintenance of ecosystem functioning and biodiversity; and
5. maintenance of economic, social, and cultural functions.

It is therefore not limited to timber production.

The broad overlap between the concepts of SFM and the ecosystem approach is encouraging, but there are yet significant opportunities for mutual learning.

In order to achieve greater harmonization of the SFM and ecosystem approach concepts, there is a need for SFM to pursue cross-sectoral integration, which can be undertaken at least in part through application of SFM tools into other sectors. SFM should also place greater emphasis on biodiversity conservation issues, including protected areas and indicators of biodiversity conservation. The development of criteria and indicators as well as certification programmes within SFM at the landscape level should also be pursued.

The ecosystem approach should, in turn, consider lessons learned from application of SFM tools and approaches, such as criteria and indicators, certification systems, and model and demonstration forests in its effort to move towards an outcome-oriented approach. In addition, both approaches should explicitly incorporate the principle of sustainability.

Title:	<b>Comparison of the conceptual basis of the ecosystem approach in relation to the concept of sustainable forest management</b>
Author(s):	CBD Executive Secretary
Publisher:	
Year:	2003
Pages:	4
Where:	<a href="http://www.biodiv.org/doc/meetings/esa/ecosys-01/official/ecosys-01-06-en.pdf">http://www.biodiv.org/doc/meetings/esa/ecosys-01/official/ecosys-01-06-en.pdf</a>
Type of approaches:	ecosystem approach, sustainable forest management
Region / countries:	
Nature:	conceptual
Key features:	comparison, ecosystem approach, sustainable forest management

## Summary

Background paper for the CBD Expert meeting on the Ecosystem Approach (Montreal 7-11 July 2003).

SFM can be characterised as being an outcomes-based approach, with greater emphasis being placed on meeting certain outcomes in the form of standards (the criteria). This is in contrast to the ecosystem approach of the Convention on Biological Diversity, which currently seems to place greater emphasis on the content and comprehensiveness of the principles, rather than what precisely needs to be achieved and how that achievement can be demonstrated through management. Perhaps this reflects the greater maturity of SFM and the enormous amount of work and resources devoted to refining the approach over the past decade. Moreover, SFM deals largely with only one kind of production system—forestry—whereas the CBD Ecosystem Approach seeks to address managing biodiversity more broadly, as something that exists in all production systems, but in different and often unique ways. Although the Ecosystem Approach of the CBD contains aspects that can be taken into account in SFM,

the integration of SFM with that of the ecosystem approach of the CBD would need to move the latter to an outcomes-based approach.

Title: **“Ecosystem Approach” versus “Sustainable Forest Management” - Attempt at a comparison**  
Author(s): Hermann Ellenberg  
Publisher: Workreport of the Institute for World Forestry, Hamburg, Germany  
Year: 2003  
Pages: 17 p.  
Where: [http://www.un.org/esa/forests/pdf/session\\_documents/unff4/add-docs/euannex2.pdf](http://www.un.org/esa/forests/pdf/session_documents/unff4/add-docs/euannex2.pdf)  
Type of approaches: ecosystem approach, sustainable forest management  
Region / countries:  
Nature: conceptual  
Key features: traditional forest management, sustainable forest management, ecosystem approach, Germany, integration, participation, definitions, context, specification,

### Summary

A comparison or distinction between the Ecosystem Approach (EsA) and Sustainable Forest Management (SFM) must take two different levels into account; the specific specification level of both approaches (depth of specification), on the one hand, and the contents involved in these two approaches (content-wise specification), on the other hand.

With regard to the depth of specification, environmentally-adapted/close-to-nature forest management and, in a similar way, also traditional sustainable forestry in Germany, as well as the certification systems PEFC, FSC and Naturland go deeper than the EsA.

SFM and EsA can be compared in terms of content in three ways: on the basis of *definitions*, on the basis of *meanings of words* and on the basis of the respective *contexts of interpretation*. Ellenberg elaborates on the semantic differences between SFM and EsA.

He concludes that SFM stresses the management aspect compared with EsA and is restricted to forest management; EsA stresses the integration into ecosystems and encompasses more than just the forest aspect, i.e. also the ecological integration of the examined forest ecosystem into neighbouring ecosystems.

Title: **ITTO guidelines for the restoration, management and rehabilitation of degraded and secondary tropical forests.** ITTO Policy Development Series No 13  
Author(s): International Tropical Timber Organization  
Publisher: International Tropical Timber Organization  
Year: 2002  
Pages: 84 p.  
Where: ISBN 4 902045 01 / [http://www.itto.or.jp/live/Live\\_Server/154/ps13e.pdf](http://www.itto.or.jp/live/Live_Server/154/ps13e.pdf)  
Type of approaches: integrated approaches, landscape approach  
Region / countries:  
Nature: prescriptive  
Key features: restoration, degradation, participation, adaptive management

## Summary

These guidelines provide a introduction to the issues confronting the policy-makers, forest practitioners, extension workers and others who want to restore and manage degraded or secondary forests. They stress that the policy, legal and social conditions in and outside the forest must be analyzed and addressed before restoration, management and rehabilitation activities are decided on. They point out that many people have a stake in the forest and any restoration, management or rehabilitation efforts must be made with their full participation. Land tenure issues must be resolved, and transparent mechanisms for sorting out conflicts over property and access rights must be established. Silvicultural techniques that can be understood and implemented by owners of small areas of forest need to be developed..

Title: **Best Practice to Implement the Convention on Biological Diversity in Ancient Forests, Briefing No.11: The Case of the Great Bear Rainforest British Columbia, Canada**

Author(s): Greenpeace, Canada  
Publisher: Greenpeace, Canada  
Year: 2001  
Pages: 12 p.  
Where: [www.greenpeace.org/saveordelete](http://www.greenpeace.org/saveordelete)  
Type of approaches: ecosystem approach  
Region / countries: British Colombia  
Nature: field experience  
Key features: protection, sustainable use

## Summary

This paper is to show how the CBD has been, or could be, implemented for ancient forests. It shows that conservation and sustainable use are reconcilable. This paper gives an interesting example of how some principles of the EsA and other articles of the CBD can be used to build a case for forest protection.

More experiences about the application of SFM and EsA in the pacific North-West (British Columbia): Jeffrey Franklin ([jff@u.washington.edu](mailto:jff@u.washington.edu)), Kaw Lee and Bob Zara.

Title: **Sustainable Forest Management in Germany: The Ecosystem Approach of the Biodiversity Convention reconsidered: Results of the R+D–Project 800 83 001 BfN-Skripten 51**

Author(s): Andreas Häusler, Michael Scherer-Lorenzen  
Publisher: BfN (Bundesamt für Naturschutz), Germany  
Year: 2001  
Pages: 65 p.  
Where: <http://www.bfn.de/09/skript51.pdf>  
Type of approaches: multifunctional forest use, ecosystem approach  
Region / countries: Germany  
Nature: conceptual, descriptive  
Key features: forest functions, ecosystem management, sustainability, stakeholder participation

## Summary

This substudy, prepared within the scope of the R&D project “Developing Concepts for ‘Sustainable Use’ in Selected Subdomains of Biological Diversity”, aims at analysing the current state of forest use in Germany with regard to its compatibility with the frame of reference set by the ecosystem approach.

Today, almost one third of the territory of Germany is covered with forest, and forested areas have gradually increased over the past decades. Contrary to the natural potential vegetation, only about one third of the total forest area is now stocked with broadleaf trees. The other two thirds are predominantly pure or mixed conifer forests. In Germany there exists an extensive system of legal provisions pertaining to the forest sector, according to which all forest owners are under the obligation of "sustainable, proper management". Besides the economic utility of the forest, "the continuous capacity of the natural resources" and other functions of the forests (conservational and recreational functions) need to be taken into account too.

Based on the concept of "multifunctional forest use", several management systems were developed in Germany, which are however setting different priorities concerning the functions of the forests. All types of management ensure the quantitative sustainability (harvest  $\leq$  re-growth, i.e. material safeguarding of raw material), but differ in their fulfilment of extensive ecological and social criteria of sustainability. In future, these criteria should be taken more into account through the introduction of certification measures or through the initiation of Forest Programmes on a national and federal state level. While, by and large, the principles of the ecosystem approach of the CBD are being taken into consideration in German forest management, there is certainly a need for further development in some fields.

In the assessment of forest use in Germany on the basis of the ecosystem approach, the basic problem was encountered in the wording of the principles and guidelines which is held so general that it permits a host of different interpretations. Thus, the ecosystem approach in its current form may serve as a superordinate ideal for further ecological optimisation of sustainable forest management in Germany. However, its wording is not tangible enough to be able to promote or assess concrete activities for securing biological diversity in forestry.

To sum up, the ecosystem approach should be understood as a basic guideline for the integrated management of ecosystems but not as a *modus operandi*. While it is certainly possible to successfully employ the ecosystem approach for introducing the concerns of the CBD into relevant areas of politics, it is not adequate as guidance for tangible projects, due to its highly theoretical organization. Therefore, to ensure the progress of this approach, it is concrete rules for action, or for restraint from action, directed at specific ecosystems and forms of use, that need to be elaborated and implemented.

The strong points of the ecosystem approach are to be seen primarily in the promotion of communication and discussion between the various stakeholders and actors. This approach may therefore, similar to the international approach for a National Forest Programme, serve to win the support of as many stakeholders as possible for the implementation of a broad range of sustainability objectives.

Title:	<b>International Initiatives Sustainable Forest Management</b>
Author(s):	several initiatives
Publisher:	
Year:	
Pages:	
Where:	
Type of approaches:	sustainable forest management
Region / countries:	
Nature:	prescriptive
Key features:	certification systems, principles, criteria, indicators

## **Sustainable Forest Management**

The concept of Sustainable Forest Management has been and continues to be a frequently debated issue in (inter)national symposia concerning the world's tropical forests. According to the EU, the promotion of sustainable forest management should be based on the UNCED outcome and other agreed international principles. In this respect SFM will:

- follow an ecosystem-based approach, recognise the inter-relationship between forests and other land uses, and be decentralized;
- encourage the improvement of livelihoods and well-being of people through full involvement and empowerment, as beneficiaries and active participants, at all stages of the development process.”

## **International Initiatives Sustainable Forest Management**

Apart from the UNCED with the "Forest Principles", other international parties like the International Tropical Timber Organisation (ITTO) presented Guidelines for Sustainable Management of Natural tropical Forest (in 1992). These principles and guidelines were further developed and made operational by the formulation of Criteria and Indicators for Sustainable Forest Management through a variety of international initiatives, such as:

- **ITTO**, International Timber Trade Organisation <http://www.itto.or.jp>
- **Montreal process** is the Working Group on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests (founded in 1994).  
[http://www.mpci.org/rep-pub/1995/santiago\\_e.html](http://www.mpci.org/rep-pub/1995/santiago_e.html)
- **The Helsinki process** which began in 1990, developed the general guidelines for the sustainable management of forests in Europe. <http://www.iisd.ca/forestry/indicat.html>
- **Tarapoto Proposal or Amazone process**, 1995,  
<http://www.fao.org/montes/foda/wforcong/PUBLI/V6/T373E/2.HTM>
- **Dry Zone Africa**, 1995,  
<http://www.fao.org/montes/foda/wforcong/PUBLI/V6/T374E/2.HTM>
- **African Timber Organisation, ATO/ITTO principles, criteria and indicators for the sustainable management of African natural tropical forests, 2003.**  
[http://www.itto.or.jp/live/Live\\_Server/155/ps14e.pdf](http://www.itto.or.jp/live/Live_Server/155/ps14e.pdf)
- **CIFOR**, 1996  
**Criteria and Indicators ToolBox Series:** Guidelines for Developing, Testing and Selecting Criteria and Indicators for Sustainable Forest Management (Prabhu, R., Colfer, C.J.P., Dudley, R.G.) <http://www.cifor.cgiar.org/acm/methods/toolbox1.html>  
This manual provides methods for the development and evaluation of criteria and indicators (C&I) which can then be used to assess the sustainability of forest management. The manual is written primarily for researchers, people or groups interested in evaluating C&I for assessments of forests in new areas, or as a reference for readers wanting to know how CIFOR's Generic Template was produced.
- **Forest Stewardship Council, FSC**, 1996.  
<http://www.fscoax.org/principal.htm>
- **Pan European Forest Certification Scheme, PEFC**, 1999.  
<http://www.pefc.org>

## 5. Inland Water Biological Diversity

Title: **IWRM Toolkit of the Global Water Partnership**  
Author(s): Global Water Partnership  
Publisher: Global Water Partnership  
Year: ongoing  
Pages:  
Where: <http://gwpforum.netmasters05.netmasters.nl/en/index.html>  
Type of approaches: integrated water resources management  
Region / countries:  
Nature: field experiences  
Key features: tools, policy making, institutions, legal framework, management options,

### Summary

This ToolBox is an instrument to help decision makers and practitioners to put together policy packages for sustainable water resources management. It draws together experience and shares knowledge in implementing IWRM, worldwide.

The ToolBox contains some 50 Tools and shows how, by combining tools and policies, you can find solutions to a wide range of water management problems - through building strong institutions in a clear policy and legal framework, and adopting concrete management options.

Lessons learned in using the Tools are described in Cases. Case studies are practical descriptions of actual experience, submitted by ToolBox users from all over the world and offering realistic lessons for others (case studies are peer reviewed through the GWP network).

In addition, the ToolBox contains references. All the Tools and Cases are linked to reference materials - websites, references, organizations

Title: **Flow. The Essentials of Environmental Flows**  
Author(s): Dyson, M., Bergkamp, G., Scanlon, J. (eds).  
Publisher: IUCN Gland, Switzerland and Cambridge, UK  
Year: 2003  
Pages: 118 p  
Where: ISBN 2-8317-0725-0 / <http://www.waterandnature.org/pub/FLOW.pdf>  
Type of approaches: ecosystem approach  
Region / countries:  
Nature: conceptual, practical  
Key features: flow, integration, monitoring, assessment, infrastructure, financial, legal framework, capacity building, political, scale, stakeholder participation,

### Summary

An environmental flow is the water regime provided within a river, wetland or coastal zone to maintain ecosystems and their benefits where there are competing water uses and where flows are regulated. Environmental flows ensure the continued availability of the many benefits that healthy river and groundwater systems bring to society.

The concept of environmental flows is part of a broader notion of taking an ecosystem approach to integrated water resources management.

This guide offers practical advice for the implementation of environmental flows in the river basins of the world. It explains how to assess flow requirements, change the legal and financial framework, and involve stakeholders in negotiations. 'Flow' sets out a path from conflict over limited water resources

and environmental degradation to a water management system that reduces poverty, ensures healthy rivers and shares water equitably.

Title: **Sustainable Management of Water Resources: The Need for a Holistic Ecosystem Approach Running out of Freshwater or maintaining Freshwater through an Ecosystem Based Approach – An Easy Choice**

Author(s): The Swiss Agency for the Environment, Forests and Landscape (SAEFL), the Bureau of the Convention on Wetlands (Ramsar, Iran, 1971) and the World Wide Fund for Nature (WWF)

Publisher:

Year: 2002

Pages: 68p

Where: [http://www.ramsar.org/cop8\\_doc\\_32\\_e.pdf](http://www.ramsar.org/cop8_doc_32_e.pdf)

Type of approaches: ecosystem approach, IWRM

Region / countries:

Nature: descriptive, prescriptive

Key features: sustainability,

### Summary

Policy Paper circulated during the World Summit on Sustainable Development. The aim of this paper is to briefly analyze the holistic river/lake basin and ecosystem approach, and to promote this approach as a basis for concrete actions/initiatives.

Title: **The Ecosystem Approach to Water Management**

Author(s): IUCN Water and Nature Initiative

Publisher: IUCN

Year:

Pages: 2

Where: <http://www.waterandnature.org/pub/EcoMan.pdf>

Type of approaches: ecosystem approach, Integrated Water Resources Management

Region / countries:

Nature: prescriptive

Key features: water management, ecosystem approach, measures,

### Summary

The ecosystem approach to water management complements the current thinking on Integrated Water Resources Management. The approach builds on the consensus that has been reached during the decade after 'Dublin' and 'Rio'. This consensus can be summarized in seven principles of modern water management:

1. *Equity*. Water management activities enhance equitable distribution of costs and benefits from water resources use and management and explicitly include activities to alleviate poverty and create a gender balance.
2. *Efficiency*. Management of scarce water resources places an emphasis on the most efficient use and reflects the full value of the resource including market values, ecosystem values and socio-cultural values.
3. *Sustainability*. The water management regime endures and supports self-sustaining changes in water management including those to adapt to changing conditions.
4. *Legitimacy*. Water management institutions are open, transparent, representative and have a sound legal basis while their decisions and actions are seen as legitimate and fair by all stakeholders.

5. *Accountability.* Water policies, responsibilities and actions are decided and implemented in a transparent and accountable way and lead to clear, effective, fair and legitimate uses of water resources.
6. *Subsidiarity.* Water management institutions devolve decision-making authority to the lowest appropriate level, ensuring that the power and resources to make such decisions meaningfully are similarly developed.
7. *Participatory.* All stakeholders are given the opportunity to participate in water resources planning and management decision making and to become involved in reducing water conflicts.

#### *The logic of the Ecosystem Approach*

- Water resources are derived from a catchment or river basin ecosystem;
- The ecosystem provides goods and services, such as fresh water, to users and uses;
- To maintain these goods and services, ecosystems need to be protected and wisely managed, which includes the need to allocate water to ecosystems such as forested slopes and downstream floodplain wetlands;
- Protection of goods and services also requires preventing the negative impacts of land-use, agriculture, industry, mining and urban areas on water bodies;
- It further requires maintaining the river's lateral and longitudinal connectivity to floodplains and upper catchment areas respectively;
- Re-allocating water and protecting water sources puts restriction on other land and water uses and can lead to conflicts of interests as well as opportunities for benefit sharing and cooperation.

Title:	<b>Strategic approaches to freshwater management: background paper – The Ecosystem Approach</b>
Author(s):	Ger Bergkamp (IUCN), Shannon Kearns (IUCN-USA), Carole Saint-Laurent (WWF International), Chris Tydeman (WWK-UK)
Publisher:	
Year:	1998
Pages:	
Where:	<a href="http://www.ramsar.org/key_csd6_iucnwwf_bkgd.htm">http://www.ramsar.org/key_csd6_iucnwwf_bkgd.htm</a>
Type of approaches:	ecosystem approach, IWRM
Region / countries:	
Nature:	conceptual
Key features:	integrated water resources management, integration, sustainable management, ecosystem functions,

#### **Summary**

In this background paper for the 6<sup>th</sup> Session of the CSD it is explained why fresh water management would benefit from the implementation of the ecosystem approach. The implementation of the ecosystem approach is consistent with the implementation of integrated water resources management.

Taking an ecosystem approach to freshwater management means assessing water availability (quantity and quality), identifying inter-relationships at the ecosystem level, predicting the environmental and social impact of any proposed action and evaluating the consequences before any decision is made on use. An ecosystem approach to freshwater management emphasises the dependence of maximising the sustainable use on the conservation of freshwater ecosystems and focuses on catchments or groundwater systems as the appropriate units of management.

The implementation of the ecosystem approach is based on four principles: a) adapting policy and practices including the equitable sharing of costs and benefits and the implementation of sustainable practices; b) establishing new partnerships to improve effectiveness and efficiency in freshwater

ecosystem management; c) strengthening the capacities at different levels to sustainably manage water resources; d) improving the assessment of water resources and ecosystem functions and identifying threats to the resource base.

Title: **Guidelines for the Implementation of the Wise Use Concept**  
Author(s): The Ramsar Convention on Wetlands  
Publisher:  
Year: 1990  
Pages:  
Where: [http://www.ramsar.org/key\\_guide\\_wiseuse\\_e.htm](http://www.ramsar.org/key_guide_wiseuse_e.htm)  
Type of approaches: wise use approach  
Region / countries:  
Nature: prescriptive  
Key features: wise use, integrated management, integration, sustainable utilisation, sustainable development, policies

### Summary

Wise use of wetlands is "the sustainable utilisation of wetland resources for the benefit of mankind in a way that is compatible with the maintenance of the natural properties of the wetland system". Sustainable utilisation is defined as "human use of a wetland so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations". Natural properties of the ecosystem are defined as "those physical, biological or chemical components, such as soil, water, plants, animals and nutrients, and the interactions between them".

The concept of wise use seeks both the formulation and implementation of general wetland policies, and wise use of specific wetlands. These activities are integral parts of sustainable development. The presented guidelines include both elements for comprehensive national wetland policies and priority actions:

– *Establishment of national wetland policies*

National wetland policies should as far as possible address all problems and activities related to wetlands within a national context. These may be grouped in different sections:

1. Actions to improve institutional and organizational arrangements, including:
2. Actions to address legislation and government policies, including:
3. Actions to increase knowledge and awareness of wetlands and their values, including:
4. Actions to review the status of, and identify priorities for, all wetlands in a national context,
5. Actions to address problems at particular wetland sites,

– *Priority actions at national level*

Whether or not national wetland policies are being prepared, several actions should receive immediate attention at national level in order to facilitate the preparation of national wetland policies, and to avoid delay in practical implementation of wetland conservation and wise use.

– *Priority actions at particular wetland sites*

As at national level, immediate action may be required in order to avoid destruction or degradation of important wetland values at particular wetland sites. These actions will undoubtedly include some elements listed in section 5 above, and Contracting Parties will select those appropriate to their own national priorities and requirements.

## 6. Agricultural Biological Diversity

Title:	<b>The ecosystem approach: towards its application to agricultural biodiversity</b>
Author(s):	CBD COP5 in Nairobi, Kenya
Publisher:	
Year:	2000
Pages:	11
Where:	<a href="http://www.biodiv.org/doc/meetings/cop/cop-05/information/cop-05-inf-11-en.pdf">http://www.biodiv.org/doc/meetings/cop/cop-05/information/cop-05-inf-11-en.pdf</a>
Type of approaches:	EsA, farmer field school approaches to Integrated Pest Management (IPM)
Region / countries:	global, case study of integrated pest management in Asian rice production systems
Nature:	prescriptive, conceptual, field experience
Key features:	interesting analysis of the farmer field school approach to IPM in the context of the 12 principles and 5 points of operational guidance of the EsA

### Summary

This document illustrates how the ecosystem approach can provide a framework for the conservation and sustainable use of the agricultural biodiversity.

Agriculture is the largest user of biodiversity and its components. Farmers are, de facto, ecosystem managers. Agriculture now extends to cover about one third of the land surface, with three quarters of the world's population living in these areas.

Global food production will need to double over the next half-century to meet the projected increases in world food demand. Total production has to be increased as well, which can be achieved through sustainable intensification of existing agricultural lands and/or expansion of agriculture into other areas. Both scenarios have potential impacts for biodiversity. The productive management of agricultural biodiversity will be key to meeting future food needs while also maintaining or enhancing the other goods and services provided by agricultural ecosystems.

Section II of this document gives an extensive illustration of the application of the ecosystem approach to the tropical rice production system in Asia. The main tool used for the Integrated Pest Management is the 'farmer field school', a form of community-based non-formal adult education. The text clearly explains how this approach is compatible with the EsA.

The management of agricultural biodiversity may provide useful examples that illustrate application of the EsA. Adaptive management of biodiversity in agricultural ecosystems constitutes a massive experimental base with the potential to provide lessons for the application of the EsA.

## 7. Biological diversity of dry and sub-humid lands

Title:	<b>An Ecosystem Approach to Drylands: Building Support for New Development Policies</b> Information Policy Brief No.1.
Author(s):	Robin p. White, Dan Tunstall and Norbert Henninger
Publisher:	World Resources Institute. Washington, USA
Year:	2002
Pages:	14p
Where:	ISBN 1-56973-499-2 / <a href="http://pdf.wri.org/drylands_ecosystem_approach.pdf">http://pdf.wri.org/drylands_ecosystem_approach.pdf</a>
Type of approaches:	ecosystem approach
Region / countries:	
Nature:	descriptive, conceptual
Key features:	scale, ecosystems goods and services, sustainable development, integrated management, conservation, risk management, stakeholder participation

### Summary

The ecosystem approach views management as successful only if it preserves or enhances the capacity of a given ecosystem to produce a diverse array of goods and services over time, allowing for sustainable production of crops and other commodities.

The paper reviews application of the ecosystem approach, outlining typical goods and services that might be included in an ecosystem-based drylands assessment and listing some of the human-induced pressures on drylands that could be addressed in such an exercise. The ecosystem approach promises to equip decision-makers with a powerful tool for creating and implementing more effective drylands policy. It would provide stakeholders with enhanced information for critical examination of the benefits and risks of development, investment, and management alternatives for dryland areas. The paper concludes with recommendations for action at the national, regional, and international levels aimed at generating momentum for widespread adoption of the ecosystem approach to drylands assessment and management.

An ecosystem approach to management and development evaluates how human use of an ecosystem affects its functioning and productivity. This approach identifies specific objectives in relation to scale, social considerations, and management practices.

The following are central characteristics of an ecosystem approach:

1. An ecosystem approach is integrated. It considers the entire range of goods and services and tries to optimize the benefits from a given ecosystem.
2. The approach attempts to make tradeoffs efficient, transparent, and sustainable.
3. It manages not only for the present but also for future generations.
4. It recognizes that ecosystems function as whole entities; they cannot be managed in pieces. Thus, it goes beyond traditional jurisdictional boundaries, since ecosystems often cross state and national lines.
5. An ecosystem approach includes people. It integrates social and economic information with environmental information about the ecosystem. With this approach, human needs are explicitly linked with the biological capacity of ecosystems to fulfil those needs.
6. An ecosystem approach focuses on protecting and conserving entire ecosystems. Rather than concentrating on production alone, this approach views management as successful only if it preserves or increases the capacity of an ecosystem to produce a diverse array of goods and services over time.

Box 3 (p.6) gives an overview of the differences between the traditional approach to dryland management and the ecosystem approach (Drylands Management and Traditional Agricultural Production Contrasted with an Ecosystem Approach).

In contrast with an ecosystem-based approach, conventional techniques for monitoring and assessment of drylands do not adequately account for many noncommodity, often non-market goods and services that ecosystems provide to humans.

Overall, the ecosystem approach could provide support for management, development, and investment in drylands by focusing on preserving dryland ecosystems as an interconnected whole, striving to maintain capacity to produce an entire array of ecosystem goods and services while allowing for sustainable commodity production.

Quantitative indicators of dryland ecosystem goods and services would help institutions and stakeholders to communicate and use this information in policy dialogues, environmental reporting and monitoring, and impact assessment.

## **Annex I: The Ecosystem Approach**

UNEP/CBD/COP/5/23

DECISIONS ADOPTED BY THE CONFERENCE OF THE PARTIES TO THE CONVENTION ON BIOLOGICAL DIVERSITY AT ITS FIFTH MEETING  
Nairobi, 15-26 May 2000  
Decision V/6

### **ECOSYSTEM APPROACH**

The Conference of the Parties,

1. Endorses the description of the ecosystem approach and operational guidance contained in sections A and C of the annex to the present decision, recommends the application of the principles contained in section B of the annex, as reflecting the present level of common understanding, and encourages further conceptual elaboration, and practical verification;
2. Calls upon Parties, other Governments, and international organisations to apply, as appropriate, the ecosystem approach, giving consideration to the principles and guidance contained in the annex to the present decision, and to develop practical expressions of the approach for national policies and legislation and for appropriate implementation activities, with adaptation to local, national, and, as appropriate, regional conditions, in particular in the context of activities developed within the thematic areas of the Convention;
3. Invites Parties, other Governments and relevant bodies to identify case-studies and implement pilot projects, and to organise, as appropriate, regional, national and local workshops, and consultations aiming to enhance awareness, share experiences, including through the clearing-house mechanism, and strengthen regional, national and local capacities on the ecosystem approach;
4. Requests the Executive Secretary to collect, analyse and compare the case-studies referred to in paragraph 3 above, and prepare a synthesis of case-studies and lessons learned for presentation to the Subsidiary Body on Scientific, Technical and Technological Advice prior to the seventh meeting of the Conference of the Parties;
5. Requests the Subsidiary Body on Scientific, Technical and Technological Advice, at a meeting prior to the seventh meeting of the Conference of the Parties, to review the principles and guidelines of the ecosystem approach, to prepare guidelines for its implementation, on the basis of case-studies and lessons learned, and to review the incorporation of the ecosystem approach into various programmes of work of the Convention;
6. Recognises the need for support for capacity-building to implement the ecosystem approach, and invites Parties, Governments and relevant organisations to provide technical and financial support for this purpose;
7. Encourages Parties and Governments to promote regional co-operation, for example through the establishment of joint declarations or memoranda of understanding in applying the ecosystem approach across national borders.

#### **A. Description of the ecosystem approach**

1. The ecosystem approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Thus, the

application of the ecosystem approach will help to reach a balance of the three objectives of the Convention: conservation; sustainable use; and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.

2. An ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organisation, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognises that humans, with their cultural diversity, are an integral component of many ecosystems.
3. This focus on structure, processes, functions and interactions is consistent with the definition of "ecosystem" provided in Article 2 of the Convention on Biological Diversity: "'Ecosystem' means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit." This definition does not specify any particular spatial unit or scale, in contrast to the Convention definition of "habitat". Thus, the term "ecosystem" does not, necessarily, correspond to the terms "biome" or "ecological zone", but can refer to any functioning unit at any scale. Indeed, the scale of analysis and action should be determined by the problem being addressed. It could, for example, be a grain of soil, a pond, a forest, a biome or the entire biosphere.
4. The ecosystem approach requires adaptive management to deal with the complex and dynamic nature of ecosystems and the absence of complete knowledge or understanding of their functioning. Ecosystem processes are often non-linear, and the outcome of such processes often shows time-lags. The result is discontinuities, leading to surprise and uncertainty. Management must be adaptive in order to be able to respond to such uncertainties and contain elements of "learning-by-doing" or research feedback. Measures may need to be taken even when some cause-and-effect relationships are not yet fully established scientifically.
5. The ecosystem approach does not preclude other management and conservation approaches, such as biosphere reserves, protected areas, and single-species conservation programmes, as well as other approaches carried out under existing national policy and legislative frameworks, but could, rather, integrate all these approaches and other methodologies to deal with complex situations. There is no single way to implement the ecosystem approach, as it depends on local, provincial, national, regional or global conditions. Indeed, there are many ways in which ecosystem approaches may be used as the framework for delivering the objectives of the Convention in practice.

## **B. Principles of the ecosystem approach**

6. The following 12 principles are complementary and interlinked:

Principle 1: The objectives of management of land, water and living resources are a matter of societal choice.

Rationale: Different sectors of society view ecosystems in terms of their own economic, cultural and societal needs. Indigenous peoples and other local communities living on the land are important stakeholders and their rights and interests should be recognised. Both cultural and biological diversity are central components of the ecosystem approach, and management should take this into account. Societal choices should be expressed as clearly as possible. Ecosystems should be managed for their intrinsic values and for the tangible or intangible benefits for humans, in a fair and equitable way.

Principle 2: Management should be decentralised to the lowest appropriate level.

Rationale: Decentralised systems may lead to greater efficiency, effectiveness and equity. Management should involve all stakeholders and balance local interests with the

wider public interest. The closer management is to the ecosystem, the greater the responsibility, ownership, accountability, participation, and use of local knowledge.

- Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.
- Rationale: Management interventions in ecosystems often have unknown or unpredictable effects on other ecosystems; therefore, possible impacts need careful consideration and analysis. This may require new arrangements or ways of organisation for institutions involved in decision-making to make, if necessary, appropriate compromises.
- Principle 4: Recognising potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management programme should:
- i. Reduce those market distortions that adversely affect biological diversity;
  - ii. Align incentives to promote biodiversity conservation and sustainable use;
  - iii. Internalise costs and benefits in the given ecosystem to the extent feasible.
- Rationale: The greatest threat to biological diversity lies in its replacement by alternative systems of land use. This often arises through market distortions, which undervalue natural systems and populations and provide perverse incentives and subsidies to favour the conversion of land to less diverse systems.
- Often those who benefit from conservation do not pay the costs associated with conservation and, similarly, those who generate environmental costs (e.g. pollution) escape responsibility. Alignment of incentives allows those who control the resource to benefit and ensures that those who generate environmental costs will pay
- Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.
- Rationale: Ecosystem functioning and resilience depends on a dynamic relationship within species, among species and between species and their abiotic environment, as well as the physical and chemical interactions within the environment. The conservation and, where appropriate, restoration of these interactions and processes is of greater significance for the long-term maintenance of biological diversity than simply protection of species.
- Principle 6: Ecosystems must be managed within the limits of their functioning.
- Rationale: In considering the likelihood or ease of attaining the management objectives, attention should be given to the environmental conditions that limit natural productivity, ecosystem structure, functioning and diversity. The limits to ecosystem functioning may be affected to different degrees by temporary, unpredictable or artificially maintained conditions and, accordingly, management should be appropriately cautious.
- Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
- Rationale: The approach should be bounded by spatial and temporal scales that are appropriate to the objectives. Boundaries for management will be defined operationally by users, managers, scientists and indigenous and local peoples. Connectivity between areas should be promoted where necessary. The ecosystem approach is based upon the hierarchical nature of biological diversity characterised by the interaction and integration of genes, species and ecosystems.
- Principle 8: Recognising the varying temporal scales and lag-effects that characterise ecosystem processes, objectives for ecosystem management should be set for the long term.

Rationale: Ecosystem processes are characterised by varying temporal scales and lag-effects. This inherently conflicts with the tendency of humans to favour short-term gains and immediate benefits over future ones.

Principle 9: Management must recognise that change is inevitable.

Rationale: Ecosystems change, including species composition and population abundance. Hence, management should adapt to the changes. Apart from their inherent dynamics of change, ecosystems are beset by a complex of uncertainties and potential "surprises" in the human, biological and environmental realms. Traditional disturbance regimes may be important for ecosystem structure and functioning, and may need to be maintained or restored. The ecosystem approach must utilise adaptive management in order to anticipate and cater for such changes and events and should be cautious in making any decision that may foreclose options, but, at the same time, consider mitigating actions to cope with long-term changes such as climate change

Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.

Rationale: Biological diversity is critical both for its intrinsic value and because of the key role it plays in providing the ecosystem and other services upon which we all ultimately depend. There has been a tendency in the past to manage components of biological diversity either as protected or non-protected. There is a need for a shift to more flexible situations, where conservation and use are seen in context and the full range of measures is applied in a continuum from strictly protected to human-made ecosystems.

Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.

Rationale: Information from all sources is critical to arriving at effective ecosystem management strategies. A much better knowledge of ecosystem functions and the impact of human use is desirable. All relevant information from any concerned area should be shared with all stakeholders and actors, taking into account, inter alia, any decision to be taken under Article 8(j) of the Convention on Biological Diversity. Assumptions behind proposed management decisions should be made explicit and checked against available knowledge and views of stakeholders.

Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

Rationale: Most problems of biological-diversity management are complex, with many interactions, side-effects and implications, and therefore should involve the necessary expertise and stakeholders at the local, national, regional and international level, as appropriate.

### **C. Operational guidance for application of the ecosystem approach**

7. In applying the 12 principles of the ecosystem approach, the following five points are proposed as operational guidance.

#### **1. Focus on the functional relationships and processes within ecosystems**

8. The many components of biodiversity control the stores and flows of energy, water and nutrients within ecosystems, and provide resistance to major perturbations. A much better knowledge of ecosystem functions and structure, and the roles of the components of biological diversity in ecosystems, is required, especially to understand: (i) ecosystem resilience and the effects of biodiversity loss (species and genetic levels) and habitat fragmentation; (ii) underlying causes of biodiversity loss; and (iii) determinants of local biological diversity in management decisions.

Functional biodiversity in ecosystems provides many goods and services of economic and social importance. While there is a need to accelerate efforts to gain new knowledge about functional biodiversity, ecosystem management has to be carried out even in the absence of such knowledge. The ecosystem approach can facilitate practical management by ecosystem managers (whether local communities or national policy makers).

## **2. Enhance benefit-sharing**

9. Benefits that flow from the array of functions provided by biological diversity at the ecosystem level provide the basis of human environmental security and sustainability. The ecosystem approach seeks that the benefits derived from these functions are maintained or restored. In particular, these functions should benefit the stakeholders responsible for their production and management. This requires, inter alia: capacity-building, especially at the level of local communities managing biological diversity in ecosystems; the proper valuation of ecosystem goods and services; the removal of perverse incentives that devalue ecosystem goods and services; and, consistent with the provisions of the Convention on Biological Diversity, where appropriate, their replacement with local incentives for good management practices.

## **3. Use adaptive management practices**

10. Ecosystem processes and functions are complex and variable. Their level of uncertainty is increased by the interaction with social constructs, which need to be better understood. Therefore, ecosystem management must involve a learning process, which helps to adapt methodologies and practices to the ways in which these systems are being managed and monitored. Implementation programmes should be designed to adjust to the unexpected, rather than to act on the basis of a belief in certainties. Ecosystem management needs to recognise the diversity of social and cultural factors affecting natural-resource use. Similarly, there is a need for flexibility in policy-making and implementation. Long-term, inflexible decisions are likely to be inadequate or even destructive. Ecosystem management should be envisaged as a long-term experiment that builds on its results as it progresses. This "learning-by-doing" will also serve as an important source of information to gain knowledge of how best to monitor the results of management and evaluate whether established goals are being attained. In this respect, it would be desirable to establish or strengthen capacities of Parties for monitoring.

## **4. Carry out management actions at the scale appropriate for the issue being addressed, with decentralisation to lowest level, as appropriate**

11. As noted in section A above, an ecosystem is a functioning unit that can operate at any scale, depending upon the problem or issue being addressed. This understanding should define the appropriate level for management decisions and actions. Often, this approach will imply decentralisation to the level of local communities. Effective decentralisation requires proper empowerment, which implies that the stakeholder both has the opportunity to assume responsibility and the capacity to carry out the appropriate action, and needs to be supported by enabling policy and legislative frameworks. Where common property resources are involved, the most appropriate scale for management decisions and actions would necessarily be large enough to encompass the effects of practices by all the relevant stakeholders. Appropriate institutions would be required for such decision-making and, where necessary, for conflict resolution. Some problems and issues may require action at still higher levels, through, for example, transboundary co-operation, or even co-operation at global levels.

## **5. Ensure intersectoral co-operation**

12. As the primary framework of action to be taken under the Convention, the ecosystem approach should be fully taken into account in developing and reviewing national biodiversity strategies and action plans. There is also a need to integrate the ecosystem approach into agriculture, fisheries, forestry and other production systems that have an effect on biodiversity. Management of natural resources, according to the ecosystem approach, calls for increased intersectoral communication and co-operation at a range of levels (government ministries, management agencies, etc.). This might be promoted through, for example, the formation of inter-ministerial bodies within the Government or the creation of networks for sharing information and experience.

## ANNEX II Overview of the cited documents

p.	Title	Author	Year	Nature	relevance
<b>THE ECOSYSTEM APPROACH IN GENERAL</b>					
<b>Ecosystem Approach literature with references to the CBD</b>					
8	<b>The CBD website</b>	CBD Secretariat		prescriptive	High
9	<b>Convention on Biological Diversity Handbook: 2nd edition (Updated to include the outcome of the sixth meeting of the Conference of the Parties)</b>	CBD Secretariat	2003	prescriptive, descriptive	Medium
9	<b>Using the Ecosystem Approach to Implement the Convention on Biological Diversity: Key Issues and Case Studies</b>	Smith, R.D. and Maltby, E.	2003	conceptual, prescriptive, field experience	High
10	<b>The International Debate on the Ecosystem Approach: Critical Review, International Actors, Obstacles and Challenges</b>	Hartje, V., Klaphake, A. and Schliep, R. Bonn	2003	descriptive, conceptual	High
11	<b>Report of the International Workshop on the "Further Development of the Ecosystem Approach"</b>	Horst Korn, Rainer Schliep & Jutta Stadler (Eds.)	2003	conceptual, field experience	High
12	<b>The Ecosystem Approach: the UK in a global context</b>	Kathryn Bryan (Joint Nature Conservation Committee)	2003	prescriptive, conceptual	High
13	<b>The Ecosystem Approach: Lifescapes</b>	Keith Porter (English Nature)	2003	conceptual, prescriptive	Medium
13	<b>Applying the Ecosystem Approach in High-Mountain Ecosystems in Germany: Experiences with the Alpine Convention</b>	Pausch, Axel; Dziedziuch, Cornelia & Plän, Thomas	2003	descriptive, conceptual	High
15	<b>Global Biodiversity Outlook</b>	CBD Secretariat	2001	prescriptive, descriptive	Medium
16	<b>Solving the Puzzle: The Ecosystem Approach and Biosphere Reserves</b>	UNESCO-MAB Secretariat	2000	descriptive, prescriptive	Medium
16	<b>Essential ingredients in an ecosystem approach to the conservation of tropical wildland biodiversity</b>	Daniel H. Janzen	2000	descriptive, field experience	Medium
17	<b>Integrated Ecosystem Management. Operational Program #12</b>	Global Environment Facility	2000	prescriptive	Medium
17	<b>Ecosystem Management: Questions for Science and Society</b>	Maltby, E., Holdgate, M., Acreman, M., Weir, A. (Editors)	1999	conceptual, descriptive, prescriptive	Medium
18	<b>Report of the scientific workshop on "The ecosystem approach - what does it mean for European ecosystems?"</b>	Horst Korn, Jutta Stadler, Edward Maltby, Alexander J. Kerr (Eds.)	1999	conceptual, field experience	High
19	<b>Report of the Workshop on The Ecosystem Approach Lilongwe, Malawi, 26-28 January 1998</b>	CBD	1998	prescriptive, conceptual	High
<b>General literature on the Ecosystem Approach and related topics</b>					
20	<b>Managing Natural Resources for Sustainable Livelihoods: Uniting Science and Participation</b>	Barry Pound et al. (Eds.)	2004	conceptual, field experiences	High
20	<b>World Resources 2002-2004: Decisions for the Earth: Balance, Voice and Power</b>	World Resources Institute	2003	descriptive, conceptual	High

21	<b>Ecosystems and Human Well-being: A Framework for Assessment</b>	Elena Bennett, Rashid M. Hassan (Eds.)	2003	conceptual, prescriptive	Medium
23	<b>The Science of Sustainable Development: Local Livelihoods and the Global Environment</b>	Sayer, J.A., Campbell, B.M	2003	conceptual, field experience	Medium
24	<b>Integrated Natural Resource Management: Linking Productivity, the Environment and Development</b>	Campbell, B.M. and Sayer, J.A. (eds.)	2003	descriptive, conceptual	High
25	<b>Biodiversity and the Ecosystem Approach in Agriculture, Forestry and Fisheries.</b>	FAO	2003	descriptive, conceptual, field experience	High
26	<b>Social and Environmental Justice: Rural Poverty Eradication and Natural Resource Conservation</b>	WWF-Care partnership	2003	prescriptive	Low
27	<b>Navigating Social-Ecological Systems: Building Resilience for Complexity and Change</b>	Fikret Berkes (Editor), Johan Colding (Editor), Carl Folke (Editor)	2002	conceptual, descriptive, field experience	High
28	<b>Ecosystems Management: Adaptive, Community-Based Conservation</b>	Gary K. Meffe, Larry A. Nielsen, Richard L. Knight, Dennis A. Schenborn, Larry Nielson (Eds.)	2002	conceptual	Medium
29	<b>The Institutional Dimensions Of Environmental Change: Fit, Interplay and Scale</b>	Young, Oran B.	2002	conceptual	High
30	<b>Adaptive Management: From Theory to Practice</b>	Oglethorpe, J.A.E. (ed.)	2002	conceptual, field experiences	Medium
31	<b>Guiding Principles for Biodiversity in Development: Lessons from field projects</b>	European Commission, IUCN-The World Conservation Union	2001	prescriptive, descriptive	Medium
32	<b>Panarchy: Understanding Transformations in Systems of Humans and Nature</b>	Lance H. Gunderson (Editor), C. S. Holling (Editor)	2001	conceptual	Medium
33	<b>World Resources 2000-2001: People and ecosystems: The fraying web of life</b>	World Resources Institute, United Nations Development Programme, United Nations Environment Programme, World Bank	2000	descriptive, conceptual	High
34	<b>Ecosystem Management – Lessons learnt from around the World: a guide for development and conservation practitioners</b>	Pirot, J.–Y., Meynell P.–J., elder D. (Eds.)	2000	conceptual, descriptive, prescriptive, field experience	High
35	<b>The Global 200 Ecoregions. A User's Guide</b>	WWF	2000	prescriptive	Medium
35	<b>Enterprise Development for Natural Products. Manual</b>	ANSAB (Asian Network for Small-scale Agricultural Bioresources), Enterprise Works Worldwide (EWW)	2000	practical	High
36	<b>Uncertainty, Complexity, and Ecological Integrity: Insights from an Ecosystem Approach</b>	Kay. J., Regier, H.	2000	conceptual	High
36	<b>Sustainable livelihoods approaches</b>	DFID & IDS		conceptual, informative, descriptive	High
37	<b>Sustainable Livelihoods in Practice: Early Applications of Concepts in Rural Areas</b>	John Farrington, Diana Carney, Caroline Ashley and Cathryn Turton	1999	prescriptive, conceptual, descriptive	Medium
38	<b>Linking Social and Ecological Systems : Management</b>	Fikret Berkes (Editor), Carl Folke	1998	descriptive, conceptual,	High

	<b>Practices and Social Mechanisms for Building Resilience</b>	(Editor)		prescriptive	
39	<b>Definitions of Ecosystem Management and Related Terms</b>	Karyn McDermaid, Georgia Sebesta and Greg McIsaac	1996	conceptual, descriptive	Medium
40	<b>ESA Report on the scientific basis of ecosystem management</b>	Christensen, N.L., et al	1996	conceptual, prescriptive	High
<b>MARINE AND COASTAL BIOLOGICAL DIVERSITY</b>					
42	<b>Integrated Marine and Coastal Area Management (IMCAM) approaches for implementing the Convention on Biological Diversity</b>	AIDEnvironment et al.	2004	conceptual, field experiences	Medium
42	<b>The Ecosystem Approach to Fisheries Management</b>	A. D. Hawkins	2004	conceptual, descriptive	High
44	<b>Penang Statement: Adopting the Ecosystem Approach to Inland Fisheries</b>	WorldFish Center	2004	prescriptive	Medium
44	<b>The ecosystem approach to fisheries. <i>FAO Technical Guidelines for Responsible Fisheries</i> No. 4, Suppl. 2</b>	FAO	2003	prescriptive	High
46	<b>The ecosystem approach to fisheries: Issues, terminology, principles, institutional foundations, implementation and outlook. <i>FAO Fisheries Technical Paper</i>. No. 443</b>	Garcia, S.M et al.	2003	descriptive, conceptual	High
47	<b>Marine Protected Areas in Ecosystem-based management of Fisheries</b>	Ward, T. & Hegerl, E	2003	conceptual, descriptive	High
48	<b>The ecosystem approach – conclusions from a seminar</b>		2003	descriptive, conceptual	High
49	<b>Ecosystem based approach: Irish Sea Pilot contributions</b>	Chris Lumb	2003	field experience	Medium
49	<b>Ramsar Resolution VIII.4 on Integrated Coastal Zone Management (ICZM)</b>	Ramsar COP8, Valencia, Spain	2002	prescriptive	Medium
51	<b>Marine Stewardship Council: Principles and Criteria For Sustainable Fishing</b>	Marine Stewardship Council	1998	prescriptive	High
52	<b>Workshop on the Ecosystem Approach to the Management and Protection of the North Sea Oslo</b>	TemaNord	1998	field experience, descriptive, conceptual	High
53	<b>Biodiversity in the Seas: Implementing the Convention on Biological Diversity in Marine and Coastal Habitats</b>	A. Charlotte de Fountaubert, David R. Downes and Tundi S. Agardy	1996	descriptive	Medium
53	<b>FAO Code of Conduct for Responsible Fisheries</b>	FAO	1995	prescriptive	Medium
<b>FOREST BIOLOGICAL DIVERSITY</b>					
54	<b>Ecosystem Approaches And Sustainable Forest Management</b>	IUCN, PROFOR, World Bank	2004	conceptual, prescriptive	Medium
54	<b>Ecosystem approach: further elaboration, guidelines for implementation and relationship with sustainable forest management</b>	CBD Executive Secretariat	2003	descriptive, conceptual	High
55	<b>Comparison of the conceptual basis of the ecosystem approach in relation to the concept of sustainable forest management</b>	CBD Executive Secretary	2003	conceptual	High
56	<b>“Ecosystem Approach” versus “Sustainable Forest Management” -Attempt at a comparison</b>	Hermann Ellenberg	2003	conceptual	Low

56	<b>ITTO guidelines for the restoration, management and rehabilitation of degraded and secondary tropical forests.</b>	International Tropical Timber Organization	2002	prescriptive	Medium
57	<b>Best Practice to Implement the Convention on Biological Diversity in Ancient Forests, Briefing No.11: The Case of the Great Bear Rainforest British Columbia, Canada</b>	Greenpeace, Canada	2001	field experience	Medium
57	<b>Sustainable Forest Management in Germany: The Ecosystem Approach of the Biodiversity Convention reconsidered</b>	Andreas Häusler, Michael Scherer-Lorenzen	2001	conceptual, descriptive	High
58	<b>International Initiatives Sustainable Forest Management</b>	ITTO, ATO/ITTO principles, Montreal process, The Helsinki process, CIFOR, FSC, PEFC		prescriptive	High
<b>INLAND WATER BIOLOGICAL DIVERSITY</b>					
60	<b>IWRM Toolkit of the Global Water Partnership</b>	Global Water Partnership		field experiences	High
60	<b>Flow. The Essentials of Environmental Flows</b>	Dyson, M., Bergkamp, G., Scanlon, J. (eds).	2003	conceptual, practical	High
61	<b>Sustainable Management of Water Resources: The Need for a Holistic Ecosystem Approach</b>	The Swiss Agency for the Environment, Forests and Landscape (SAEFL), Ramsar and WWF	2002	descriptive, prescriptive	Medium
61	<b>The Ecosystem Approach to Water Management</b>	IUCN Water and Nature Initiative		prescriptive	High
62	<b>Strategic approaches to freshwater management: background paper – The Ecosystem Approach</b>	Ger Bergkamp, Shannon Kearns, Carole Saint-Laurent, Chris Tydeman	1998	conceptual	High
63	<b>Guidelines for the Implementation of the Wise Use Concept</b>	The Ramsar Convention on Wetlands	1990	prescriptive	High
<b>AGRICULTURAL BIOLOGICAL DIVERSITY</b>					
64	<b>The ecosystem approach: towards its application to agricultural biodiversity</b>	CBD COP5 in Nairobi, Kenya	2000	prescriptive, conceptual, field experience	High
<b>BIOLOGICAL DIVERSITY OF DRY AND SUB-HUMID LANDS</b>					
65	<b>An Ecosystem Approach to Drylands: Building Support for New Development Policies</b>	Robin p. White, Dan Tunstall and Norbert Henninger	2002	descriptive, conceptual	High