Ecosystem approach to wetlands management

The Regional Training Course on
Sustainable Use and Management of Wetlands
5-20 November 2007

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Wetland characteristics that need attentions in management practices.

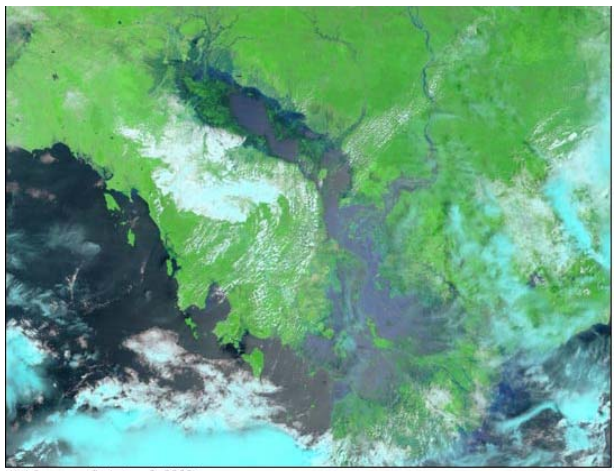
Wetlands have catchment interactions and upstream and downstream processes.

Habitats can change greatly among seasons, even without catastrophic events.

Flora and fauna have seasonal patterns.

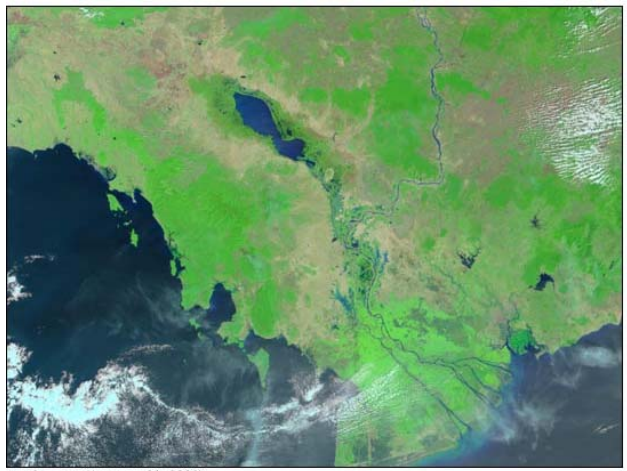
Local human communities substantively use wetland resources year round.

Diversity of landscapes and biological resources bring in diversity of stakeholders.



Wet Season (October 9, 2002)

Tonle Sap in Cambodia



Dry Season (January 29, 2003)

An approach to seek an appropriate balance between the conservation and use of biological diversity in areas where there are multiple resource users and important natural values.

Melaleuca harvesting

Harvesting reeds

Fish traps and
Traditional fishing

Photo from www.ramsar.org

Conservation in management context: important concepts

- Evolutionary change
  - Not to stop genetic change and thus evolutionary change, not to try and conserve the status quo, but rather to ensure that populations may continue to respond to environmental change in an adaptive manner.
- Dynamic ecology
  - Understand how the interplay between nonequilibrial processes and the hierarchy of species interactions determines community structure and biodiversity.
- Landscape ecology
  - Understand the interrelationship among natural resources and interconnection of ecosystems within landscape and interconnection among landscapes.
- The human presence
  - Any conservation efforts that attempt to safeguard nature from humans will fail.

- Ecological resilience
  - "the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state that is controlled by a different set of processes"
  - A resilient ecosystem can withstand shocks and rebuild itself when necessary.
  - Resilience in social systems has the added capacity of humans to anticipate and plan for the future.
  - Resilence is conferred in human and ecological systems by adaptive capacity.

Ecosystem approach

- Large-scale and system-wide perspectives
- Focusing on the composition and processes of ecological systems and their complexities
- Recognizing the need for integration across multiple scale of concern – ecological, economic, and cultural
- Recognizing long-term sustainability of the ecosystem and management goal

Comparison:

Conventional VS Ecosystem approaches to management of natural resources

Conventional Management	Ecosystem Management
Emphasis on natural resource extraction and commodities	Emphasis on balance between commodities, amenities and ecological integrity
Equilibrium perspective	Non-equilibrium perspective
Ecological stability	Dynamics, resilience
Climax communities	Shifting mosaics
Reductionism	Holism
Prescription, command, and control management	Uncertainty and flexibility; adaptive management
Site specificity	Attention to context
Solutions imposed by resource management agencies	Solutions developed through discussions among stakeholders
Optimization, problem simplification, search for single best answer	Multiple solutions to complex problems
Confrontation, single-issue polarization	Consensus building, multiple issues
Public seen as adversary	Public invited as partners

Meffe, G.K., et al. 1997. Principles of Conservation Biology

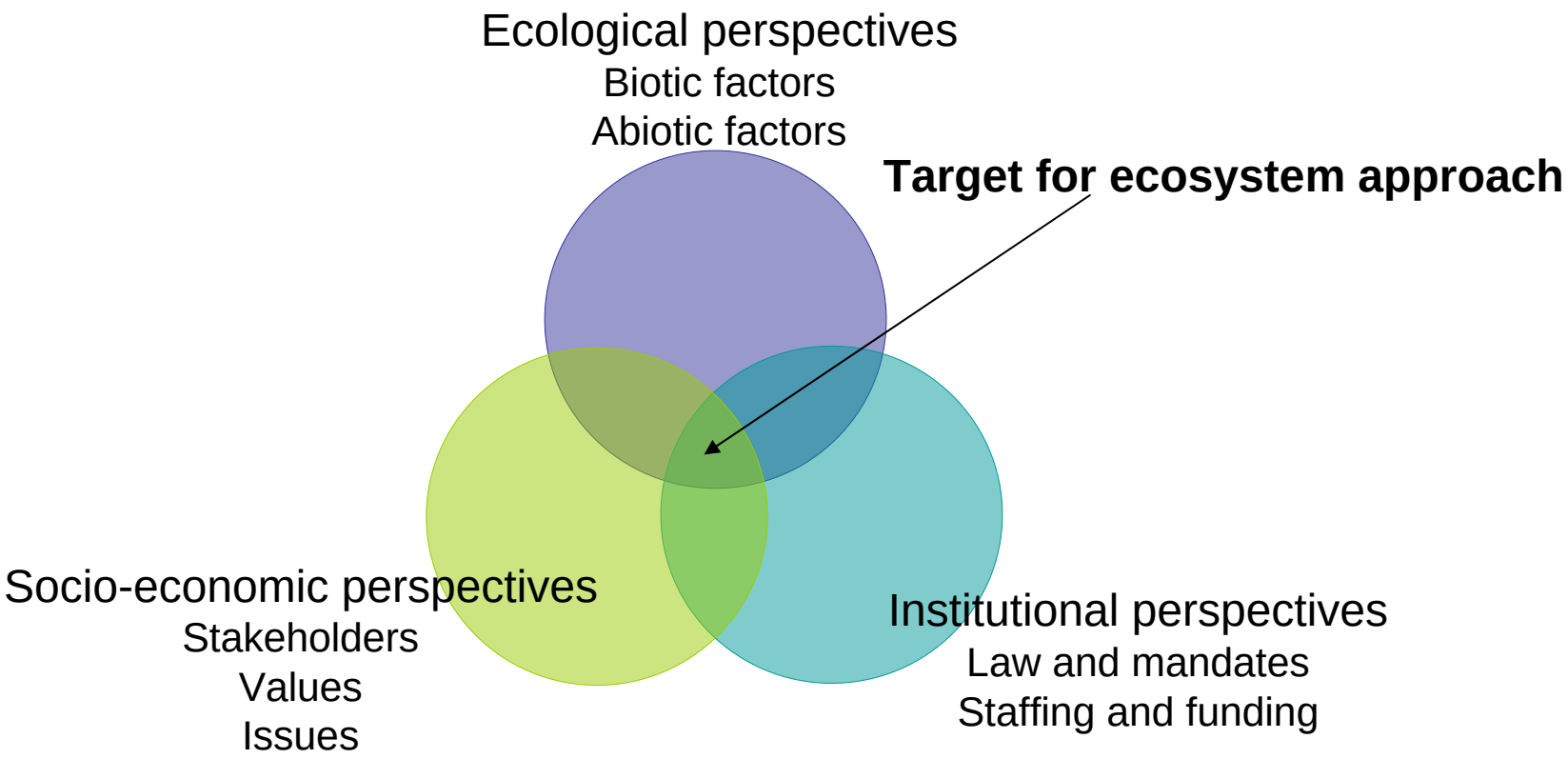
Ecosystem approach: definition

- *An approach to maintaining or restoring the composition, structure, and function of natural and modified ecosystems for the goal of long-term sustainability.*

- *It is based on a collaboratively developed vision of desired future conditions that integrates ecological, socioeconomic, and institutional perspectives, applied within a geographic framework defined primarily by natural ecological boundaries.*

Meffe, G.K., et al. 1997. Principles of Conservation Biology

Ecosystem approach

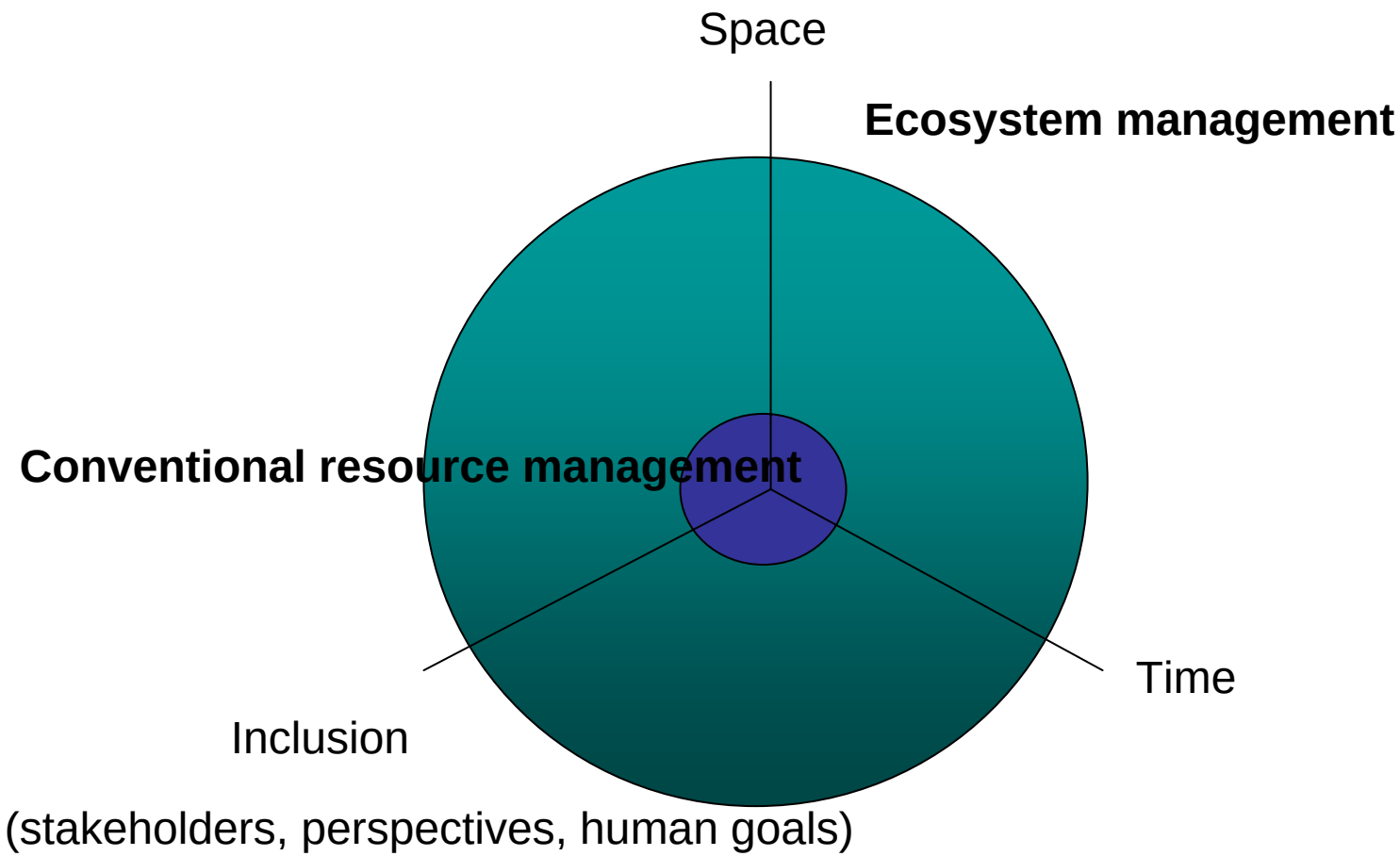


Meffe, G.K., et al. 1997. Principles of Conservation Biology

Scales of ecosystem management

- *The spatial and temporal scales of ecosystem management must be appropriate to the particular ecological system, which require that a landscape mosaic of habitats contains sufficient resources to meet the life cycle requirement of populations under condition of inter-annual environmental variation.*

- The temporal dimension is expanded into the indefinite future.
- The spatial dimension is expanded to include the larger landscape and connections to other landscapes.
- The human dimension is expanded to include a broader diversity of interests, talents, and perspectives in natural resource decision making.



Meffe, G.K., et al. 1997. Principles of Conservation Biology

Components of ecosystem approach

- Ecosystem scale
  - Dynamic and resilient to disturbances in landscapes
  - Humans included
- Adaptive management
  - Approaching all management actions as scientific experiments
  - Requiring continual monitoring, reassessment and innovation
- Stakeholders
  - Requiring a greater degree of partnership among stakeholders

Ecosystem approach and sustainable development

- The ecosystem approach places human needs at the center of biological management.

- It aims to manage the ecosystem, based on the multiple functions that ecosystems perform and the multiple uses that are made of these functions.

- The ecosystem approach does not aim for short term economic gains, but aims to optimize the use of an ecosystem without damaging it.

Ecosystem approach and sustainable development

- maintaining ecosystem function and integrity
- recognizing ecosystem boundaries and trans-boundary issues
- maintaining biodiversity
- recognizing the inevitability of change
- recognizing people as part of the ecosystem
- recognizing the need for knowledge-based adaptive management
- recognizing the need for multi-sector collaboration
- making ecosystem-based management a mainstream development approach

Ecosystem approach and the Convention on Biological Diversity

- Ecosystem approach has been adapted as the framework for balancing the 3 key objectives of the Convention on Biological Diversity
  - Conservation of biological diversity
  - Sustainable use of its components
  - Fair and equitable sharing of the benefits arising out of the utilization of genetic resources

- Ecosystem approach extends biodiversity management beyond protected areas while recognizing that protected areas are also vital for delivering the CBD objectives.

Edward Multby. 2000. Ecosystem management and the ecosystem approach – new tools for integrated catchment management.

The **Ecosystem Approach** acts as a framework for balancing and integrating the three objectives of the Convention on Biological Diversity.

5 descriptions

- 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.

- An ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems.

5 descriptions (continued)

- It focuses on structure, processes, functions and interactions within an ecosystem. The scale of analysis and action should be determined by the problem being addressed.

- 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.

5 descriptions (continued)

- The ecosystem approach does not preclude other management and conservation approaches, such as biosphere reserves, protected areas, and single-species conservation programs, 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.

12 principles

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

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

Principle 3: *Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems*.

Principle 4: *Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management program should:*

a) Reduce those market distortions that adversely affect biological diversity;

b) Align incentives to promote biodiversity conservation and sustainable use;

c) Internalize costs and benefits in the given ecosystem to the extent feasible.

12 principles (continued)

Principle 5: *Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach*.

Principle 6*: Ecosystem must be managed within the limits of their functioning*.

Principle 7: *The ecosystem approach should be undertaken at the appropriate spatial and temporal scales*.

Principle 8: *Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term*.

12 principles (continued)

Principle 9: *Management must recognize the change is inevitable*.

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

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

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

12 principles

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

- Indigenous peoples and other local communities living on the land are important stakeholders and their rights and interests should be recognized.
- Both cultural and biological diversity are central components of the ecosystem approach, and management should take this into account.

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

- 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*.

- Management interventions in ecosystems often have unknown or unpredictable effects on other ecosystems; therefore, possible impacts need careful consideration and analysis.

Principle 4: *Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem-management program should:*

a) Reduce those market distortions that adversely affect biological diversity;

b) Align incentives to promote biodiversity conservation and sustainable use;

c) Internalize costs and benefits in the given ecosystem to the extent feasible.

Principle 5: *Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach*.

- 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.

- **Principle 6***: Ecosystem must be managed within the limits of their functioning*.
  - 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.

Principle 7: *The ecosystem approach should be undertaken at the appropriate spatial and temporal scales*.

- Boundaries for management will be defined operationally by users, managers, scientists and indigenous and local peoples.
- The ecosystem approach is based upon the hierarchical nature of biological diversity characterized by the interaction and integration of genes, species and ecosystems.

Principle 8: *Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term*.

- Ecosystem processes are characterized 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 recognize the change is inevitable*.

- Ecosystems change, including species composition and population abundance. Hence, management should adapt to the changes.
- The ecosystem approach must utilize 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*.
  - 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*.
  - 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.

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

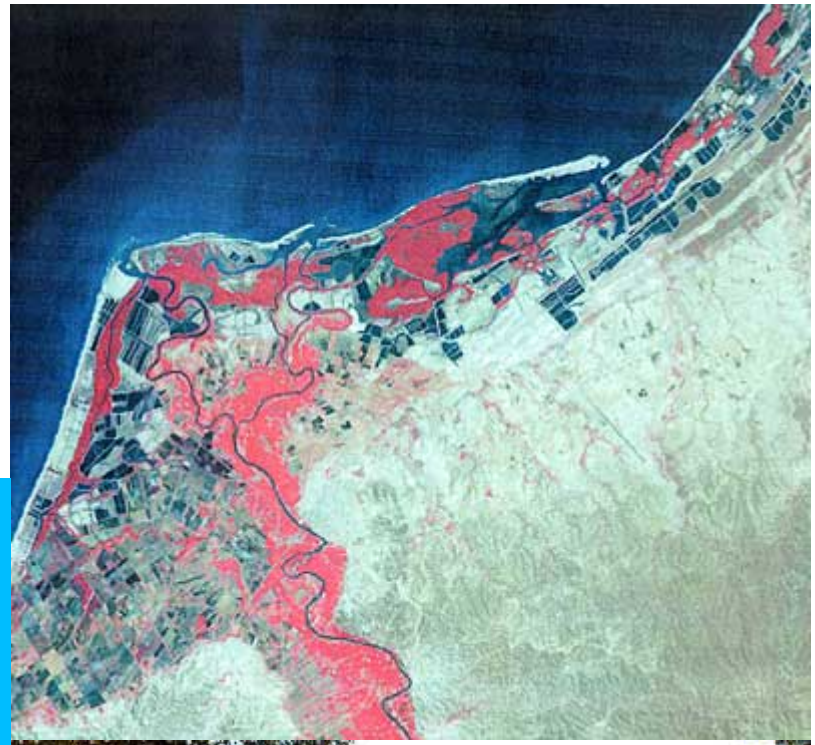
- Most problems of biological-diversity management are complex, with many interactions, side-effects and implications, and therefore should involve the necessary expertise and stakeholders at the local, national, regional and international level, as appropriate.

Operational guidance for application of the ecosystem approach

1. Focus on the relationships and processes within ecosystem.
2. Enhance benefit-sharing.
3. Use adaptive management practices.
4. Carry out management actions at the scale appropriate for the issue being addressed, with decentralization to lowest level, as appropriate.
5. Ensure intersectoral cooperation.

Application to wetlands

Integral Use and Management of the Tumbes Mangroves, Peru



The project was implemented over a 5 year-process, based on the Ecosystem Approach of the Convention on Biological Diversity (CBD).

Key aspects of the approach included

- a central community-based planning and management scheme (i.e. active participation of stakeholders and resource users),
- an integrated approach (focused on the entire ecosystem and not only on the protected area),
- a zoning program for land-use planning,
- clearly defined conservation objectives,
- identification and mitigation of key impacts,
- a solid technical base for the project's implementation and monitoring.

The positive results of this initiative were strongly reinforced in 1998, with the inclusion of the Tumbes Mangroves National Sanctuary as part of the North-Western Biosphere Reserve.

Among the most remarkable outcomes achieved in the last 2 years are:

the strengthening of the TMNS administration capacities

the creation of an inter-institutional management committee

the preparation of the Regional Fisheries and Aquaculture Development Plan

the initiation of the Bi-National Project:
“Promotion and Sustainable Development of the transboundary Peru-Ecuador Mangroves Ecosystem”.

Melaleuca harvesting, Mekong Delta, Viet Nam

Local transport and trading of freshly salvage-logged Melaleuca poles

An increasing proportion of the Mekong Delta has infertile, acid sulphate soil. This soil type is becoming more widespread in the Delta as a result of wetlands drainage, removal of Melaleuca (Melaleuca cajuputi) trees and other natural vegetation, agricultural production, poverty and the expansion of canals.

Balance between conserving wetlands that improve water quality and promotion of agriculture that benefits from the improved water (and hence soil) quality is needed. Agroforestry may also be a viable option.

Integrated Melaleuca reforestation with agriculture is practicable, profitable and sustainable.

Severely acidic soil should be managed as a natural wetland ecosystem to overcome problems of environmental degradation and economic loss.

It is essential to work with individual farmers and address socio-economic priorities as the entry point for biodiversity recovery and environmental restoration.

Five steps to the implementation of the Ecosystem Approach

1. Determining the main stakeholders, defining the ecosystem area, and developing the relationship between them. (P1, 7, 11, 12)

2. Characterizing the structure and function of the ecosystem and setting in place mechanisms to manage and monitor it. (P2, 5, 6, 10)

3. Identifying the important economic issues that will affects the ecosystem and its inhabitants. (P4)

4. Determining the likely impact of the ecosystem on adjacent ecosystems. (P3, 7)

5. Deciding on long-term goals, and flexible ways of reaching them. (P7, 8, 9)

Gill Shepherd, 2004. The Ecosystem Approach: Five Steps to Implementation, IUCN

Step 1:
Determining the main stakeholders, defining the ecosystem area, and developing the relationship between them.

Identifying stakeholders

- Stakeholder analysis to select any one part of society and its knowledge over any other.
  - Identify all the key stakeholders with interests in the proposed ecosystem.
  - Weight them as primary, secondary or tertiary stakeholders, and assess their views in that light.
  - Assess relative stakeholder management capacity and commitment, in regard to the ecosystem.
  - Set up a stakeholder forum that will meet regularly.

Primary stakeholders: those who are most dependent upon the resource, and most likely to take an active part in managing it.
Secondary and tertiary stakeholders: those who live near the resource but do not greatly depend on it (secondary); and national level government officials and international conservation organizations (tertiary).

Step 1:
(continued)

Identifying ecosystem area

- Area analysis to decide what size of ecosystem management area is going to be chosen, using what criteria?
  - An appropriate size and scale is one which does the following:
    - Meet scientific criteria.
    - Is appropriate to existing management capacity, knowledge, and experience.
    - Takes account of administrative, legal and cultural boundaries where possible.
    - Understands that a long-term ideal area may be constrained by what is likely to be an effective management unit in the short term.
    - Always rethinks the selected area boundaries while implementing management practices.

Step 1:
(continued)

Building a logical relationship between stakeholders and area

- A mosaic of areas, managed by different stakeholders, at different intensities, within the overall ecosystem.

- The coordination and management practices need to be built up from below, through the stakeholder forum, not command from above.

Step 2:
Characterizing the structure and function of the ecosystem and setting in place mechanisms to manage and monitor it.

- How can we identify the characteristics of ecosystem structure and function that are needed to deliver key ecosystem goods and services?

- How can we tell when an ecosystem is under threat?

=>Involve scientists and local inhabitants working together. Each group's knowledge is likely to be different and complementary.

=> Tools such as joint mapping, transect walks, PRA, along with monitoring exercises.

Step 3:
Identifying the important economic issues that will affects the ecosystem and its inhabitants.

- Which economic values will drive management choices in the ecosystem?

- What negative incentives, or subsidies, are causing people to use natural resources unsustainably?

- The challenge is to avoid concentrating the benefits inside one ecosystem while exporting the costs into the next.

- It is also vital to work with key aspects of local economy. Those who look after the resource control its benefits, and those who generate environmental costs have to pay for them.

Step 4:
Determining the likely impact of the ecosystem on adjacent ecosystems.

Adaptive management over space

Changes in one ecosystem often lead logically to step-by-step scaling up, as residents in adjacent ecosystems adapt to unforeseen impacts by making their own ecosystem management changes.

In the same way, circumstances sometimes force change in the opposite direction, and scaling down occurs.

Step 5:
Deciding on long-term goals, and flexible ways of reaching them.

Adaptive management over time

Good adaptive management requires excellent monitoring methods, so that indications of potential problems are spotted early.

Adaptive management over time requires the capacity to diagnose the reasons for problems, and solutions to them, drawing on all the other Ecosystem Approach principles to understand what is going wrong and how to design new responses to reach goals.

All these tasks demand an active and responsive stakeholder forum.

Dealing with scale

- Guidance for multi-scale assessments
  - Choosing the appropriate scales, resolutions, and boundaries
    - Two common approaches: (1) Select a scale (often regional) on the basis of empirical evidence about the process involved or (2) Select a scale that corresponds to human systems for decision-making
    - Despite the fact that the scale of a system is subjective, the location of the boundaries should not be arbitrary.
      - A well-defined system has key feedbacks in it and interactions across the boundaries.
      - An ecosystem can move over time, ex. marine ecosystem
  - Integration across scales
    - Effective approaches are needed for integrating top-down and bottom-up perspectives.

To successfully implement the ecosystem approach, it is challenging to

(1) manage diverse tenure and institutional arrangements existing within ecosystems,

(2) scale up smaller ecosystems which are managed well by local people to the much larger ones which are favored by conservation organizations through adaptive management,

(3) enhance the understanding of ecosystem structure, function, and management through the empowering multi-stakeholder relationships.

(4) develop multi-scale environmental assessments as well as indicators to be used in monitoring process vital for adaptive management.