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Implementing the Ecosystem Approach in the Mediterranean

EDITORIAL

As the Mediterranean countries that are Contracting Parties to the Barcelona Convention approach the task of developing and implementing the ecosystem approach, it is very natural that a number of fundamental questions are arising:

What exactly is the ecosystem approach?

Why is it important for Mediterranean countries to adopt the ecosystem approach as a part of their efforts to improve the Mediterranean Sea's ecosystems?

How can countries think about implementing the ecosystem approach —what are the next steps, and the ones that follow?

What will adopting the ecosystem approach mean in economic terms?

And what is the way forward, the big picture for the Mediterranean?

This edition of MedWaves addresses these questions and points readers to additional sources of information. We hope these articles will provide a useful, but by no means comprehensive or definitive, informational resource.

We very much welcome your feedback, so that future editions of MedWaves can continue to address Mediterranean Sea issues of interest to our readers.

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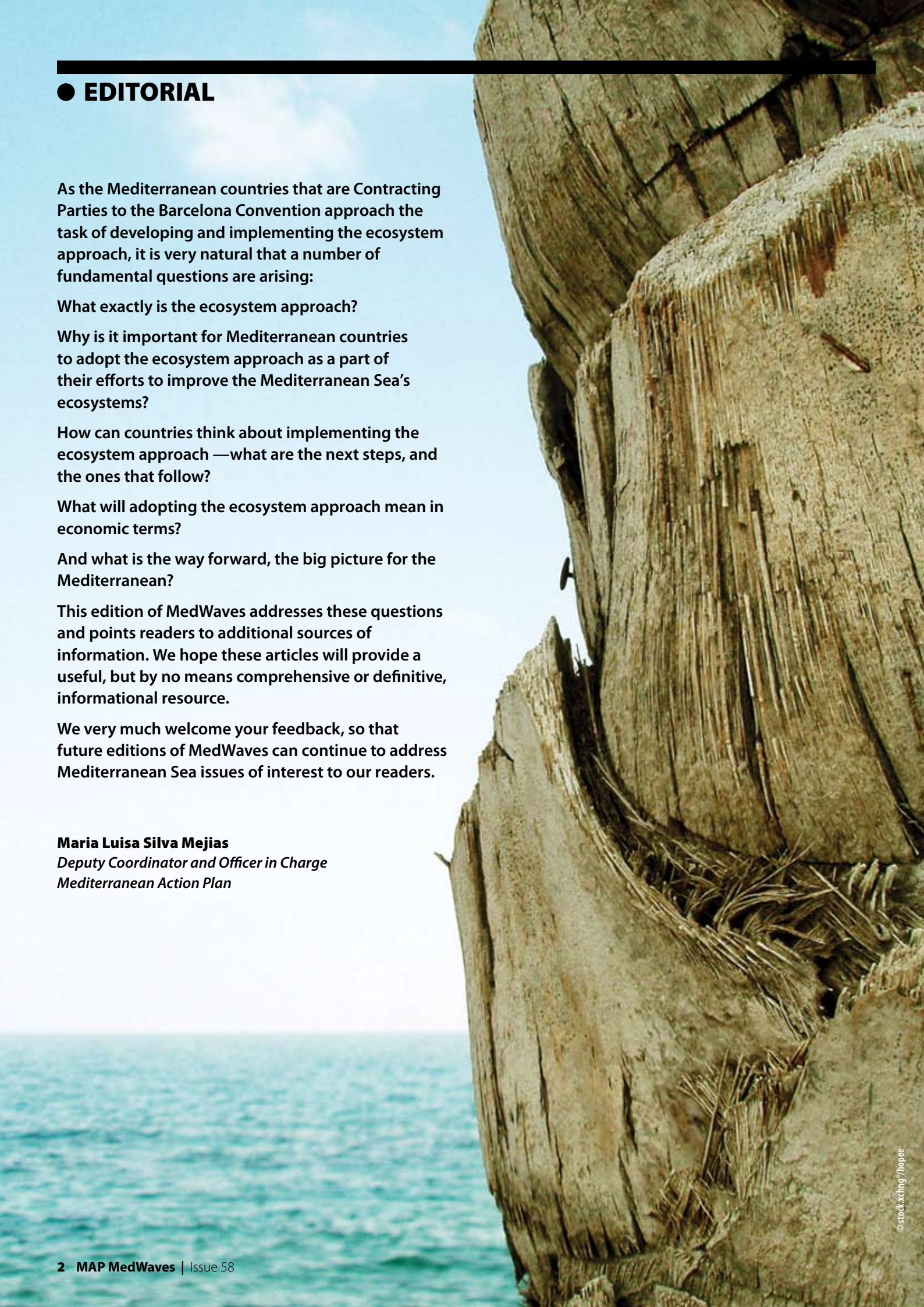

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p10 The ecosystem approach is a tool; it provides a framework that can be used to implement the objectives of the Convention on Biological Diversity, including the work on, *inter alia*, protected areas and ecological networks. There is no single correct way to apply the ecosystem approach to management of land, water, and living resources. The principles that underlie the ecosystem approach can be translated flexibly to address management issues in different social, economic and environmental contexts. **More on page 10.**

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ADDITIONAL TOOLS & RESOURCES

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A word about ecosystems

Ecosystems are dynamic complexes of plants, animals, microbes and physical environmental features that interact with one another. Humans are a part of ecosystems. Ecosystems come in various sizes. The Mediterranean Sea is one of the world's 64 large marine ecosystems, each of which include multiple habitats that sustain marine biodiversity.
Scientific and other knowledge of ecosystems has shown that ecosystem health relies on key interactions among species within an ecosystem. Removing or damaging certain species can dramatically affect others and prevent the ecosystem from providing valued services. Although ecosystems are resilient, there are often levels of disturbance, tipping points, that, if exceeded, may make it impossible for an ecosystem to return to their previous states. These thresholds are difficult to predict, but can be avoided through sound environmental management.

What is the Ecosystem Approach?

Although there is not one widely used definition of the ecosystem approach[1], various institutions have described the approach in similar terms.

The Convention on Biological Diversity has called the ecosystem approach *"a strategy for integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way."*[2]

IUCN adds to that description the idea that the ecosystem approach *"places human needs at the centre of biodiversity 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."*[3] In this sense, the ecosystem approach *"stands at the meeting point of sustainable ecosystem management and enhanced livelihood security"* and has the potential to bring conservation and development concerns into a more complementary relationship.[4]

Similarly, the United Nations Division for Ocean Affairs and the Law of the Sea (DOALOS) has said that *"While there is no single internationally agreed-upon ecosystem approach or definition of an 'ecosystem approach' the concept is generally understood to encompass the management of human activities, based on the best understanding of the ecological interactions and processes, so as to ensure that ecosystems' structures and functions are sustained for the benefit of present and future generations."* DOALOS notes that the concept *"builds on a number of existing tools and approaches, such as integrated coastal and ocean management, with greater emphasis on ecosystem goals and objectives."*[5]

The UK's Department for Environment, Food and Rural Affairs has said that *"the core of the approach lies in integrating and managing the range of demands placed on the natural environment in such a way that it can indefinitely support essential services and provide benefits for all."*[6]

According to Jacqueline Alder, Director of the United Nations Environment Programme's Marine and Coastal Branch, the ecosystem approach *"takes into consideration all parts of marine ecosystems, including the dynamics and the forces that make it function —for example, tides, water movement and organisms— and considers how they relate to each other and adjacent ecosystems. The ecosystem approach looks at the physical benefits ecosystems provide, such as biodiversity and nutrient cycling, as well as their value to society in the form of such things as food security and employment."*

The 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.

[1] *The ecosystem approach is sometimes referred to as ecosystem-based management or ecosystem management, though some authors distinguish the terms.*
[2] *See* http://www.cbd.int/ecosystem/description.shtml.
[3] *See* http://www.iucn.org/about/union/commissions/cem/cem_work/cem_ea/.
[4] *See Shephard, G. 2008,* "The Ecosystem Approach, Learning from Experience", *IUCN.*
[5] *See* http://www.un.org/Depts/los/ecosystem_approaches/ecosystem_approaches.htm.
[6] *See DEFRA, 2007,* "Securing a healthy natural environment: An action plan for embedding an ecosystems approach", *10 U.K. Department of Environment, Food and Rural Affairs.*

"Over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth."

Millennium Ecosystem Assessment Report (2005)

The ecosystem approach, then, is not so much a prescribed formula as a broad tool aimed at balancing conservation with sustainable use to maintain healthy, productive and resilient ecosystems that can provide the services humans need and want.

Why is the Ecosystem Approach important?

The scientific understanding of marine ecosystems has advanced considerably over the last few decades. We know more clearly than ever that marine ecosystems support and sustain human wellbeing by providing a host of invaluable goods and services such as food, recreation and tourism, water purification, nutrient cycling, medicine, flood protection and disaster risk reduction, moderation of climate and weather, as well as religious, spiritual and other nonmaterial benefits. Ecosystem conservation is, therefore, essential not only to the environment but to the development and sustainability of human society. Indeed, in developing countries, the loss of ecosystem services threatens the attainment of Millennium Development Goals and the alleviation of hunger and poverty.

Healthy, intact marine ecosystems have a greater capacity to provide the full range of benefits humans need. Human development accompanied by population growth and technological advances, however, has had a dramatic impact on ecosystem health and functioning around the world, including in the Mediterranean Sea. The decline of ecosystems, in turn, is having consequences for human habitat, health and development.

Efforts to halt marine ecosystem degradation have until now mostly targeted particular sectors, e.g., land-based pollutants or fisheries. The sectoral approach, however, has not yielded the progress needed to protect and restore marine ecosystems around the world. The ecosystem approach is grounded in the notion that ecosystem health can be best protected and restored by taking a holistic view of the links between ecosystem service delivery and human needs.

The approach's underlying premise is that management that takes into account ecosystem structure, functioning, and processes is much more likely to ensure the long-term delivery of vital ecosystem services. Delays in implementing the ecosystem approach, on the other hand, can be expected to result in continued conflicts over resources, degradation of marine ecosystems, disrupted fisheries, decreased recreational opportunities, health risks to humans and wildlife and the loss of biodiversity.

UNEP's Alder points to the ecosystem approach's flexibility as a key component. "*Management under the ecosystem approach focuses on being adaptive,*" says Alder. *"As more information is obtained about the ecosystem, the management approach can be adapted to fit the best understanding of the ecosystem's needs. For example, we used to just look at fisheries periodically to understand the ecosystem's condition. With the ecosystem approach, we look at a bay, how it functions, what makes it productive, what influences it and how, for example, fishing affects the bay's ecosystem.*"

Implementation of an ecosystem approach also enables more coordinated and sustainable management of activities that affect the marine environment. As Alder puts it, "*The ecosystem-based analysis enables tradeoffs much more than a sectoral approach does. For example, if we allow more fishing, how will it affect biodiversity and tourism? And if we allow more tourism, how will it affect the ecosystem and fishing? By looking at the whole system and its uses, we can reach an informed consensus on what we can live with. With the ecosystem approach we can minimize impacts on services we value, such as biodiversity, and maximize benefits to human society.*"

The ecosystem approach does not preclude other management and conservation approaches —e.g., biosphere reserves, protected areas, and single-species conservation programmes. Instead, the ecosystem approach integrates all these approaches and other methodologies to deal with complex situations consistent with local, provincial, national, regional or global conditions. By reducing duplication of effort and conflicts, the approach promotes cost effectiveness over the long term.

Alder thinks the ecosystem approach offers especially important opportunities for progress in the Mediterranean. "*The Mediterranean is under considerable pressure*" says Alder. "*The traditional sectoral approach hasn't worked. If it had, we wouldn't be here. All trends are pointing down. We see declining fisheries, urbanization, rising sea level and other threats from climate change. All these pressures will impact the Mediterranean coast. If we take the ecosystem approach in the Mediterranean, we will be in a much better position to address current problems and future threats.*"

WHAT IS THE ECOSYSTEM APPROACH?

"[The ecosystem approach] takes into consideration all parts of marine ecosystems, including the dynamics and the forces that make it function —for example, tides, water movement and organisms— and considers how they relate to each other and adjacent ecosystems. The ecosystem approach looks at the physical benefits ecosystems provide, such as biodiversity and nutrient cycling, as well as their value to society in the form of such things as food security and employment."

Jacqueline Alder,
Director of the United Nations Environment Programme's Marine and Coastal Branch

Core Elements

The ecosystem approach to management tends to include a number of common elements:

- Focus on a specific ecosystem and the various activities affecting it.
- Use of the best available scientific and other knowledge to understand the ecosystem's structure, processes and functioning, and the relationship between human action and changes in the system's components.
- Acknowledgment of the interrelationship among environmental media, such as air, land and sea and an assessment of cumulative impacts of the different sectors on the ecosystem.
- An integrated, multidisciplinary management approach that encompasses the entire ecosystem, including humans, and that makes protecting and restoring ecosystems and their services its primary focus, even above short-term economic or social goals.
- A comprehensive framework with explicit conservation standards, targets and indicators that will measure ecosystem health, acknowledge uncertainties, be responsive to changes in the ecosystem and maintain the ecosystem's historical level of native biodiversity.
- Management that is adaptive, that operates over a variety of time dimensions and scales, and that acknowledges that ecosystem management is a process rather than an end state.
- Broad stakeholder participation.
- Explicit links between human needs and the biological capacity to fill those needs in the present and over time.
- Coordinated policies at all levels of governance.
- Transboundary arrangements for management and resolution of transboundary ecosystems and issues.

Principles of the Ecosystem Approach

A number of organizations and authorities have developed tools for understanding and developing the ecosystem approach. The CBD, for example, has elaborated the following 12 complementary and interlinked principles:[7]

1. The objectives of management of land, water and living resources are a matter of societal choices. Different sectors of society view ecosystems in terms of their own economic, cultural and society needs. 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. 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.

2. Management should be decentralized to the lowest appropriate level. Decentralized 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.

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. This may require new arrangements or ways of organization for institutions involved in decision-making to make, if necessary, appropriate compromises.

[7] *See* http://www.cbd.org/ecosystems/principles/shtml.

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 programme should: reduce those market distortions that adversely affect biological diversity; align incentives to promote biodiversity conservation and sustainable use; and internalize costs and benefits in the given ecosystem to the extent feasible. 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 favor 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.

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. 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.

6. Ecosystems 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. The limits to ecosystem functioning may be affected to different degrees by temporary, unpredictable of artificially maintained conditions and, accordingly, management should be appropriately cautious.

7. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales. 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 characterized by the interaction and integration of genes, species and ecosystems.

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.

9. Management must recognize that change is inevitable. 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 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.

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

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. Assumptions behind proposed management decisions should be made explicit and checked against available knowledge and views of stakeholders.

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.

WHAT IS THE ECOSYSTEM APPROACH?

An abridged timeline of the development of the ecosystem approach

Over the years, the need to protect ecosystems has been referenced in various intra-governmental declarations, including the following:

1972: The Stockholm Declaration requires that the earth's natural resources be safeguarded through planning or management and cooperation in a spirit of global partnership.

1982: The UN Law of the Sea Convention sets forth a comprehensive framework that, *inter alia*, requires coastal states to take into account effects on associated or dependent species.

1989: The Hague Declaration on the Environment refers to a fundamental duty to preserve the ecosystem.

1992: The Rio Declaration and Agenda 21's oceans chapter emphasizes multi-species management and approaches that take into consideration the relationship among species.

1995: The FAO Code of Conduct for Responsible Fisheries requires conserving, protecting and safeguarding ecosystems and sets forth relevant principles and standards. Articles 5 and 6 of the UN Fish Stocks Agreement call for implementation of the ecosystem approach.

1998: CBD issues a series of detailed principles on the ecosystem approach (the "Malawi Principles").

2000: CBD's Conference of the Parties decides to provide guidance on applying the ecosystem approach. The European Commission adopts the Water Framework Directive 2000, requiring Europe's fresh, surface and groundwaters to be ecologically sound by 2015.

2001: The Rekjavik Declaration declares that states will work to incorporate ecosystem considerations into fisheries management, and the FAO is asked to develop guidelines on the ecosystem approach.

2002: The Johannesburg Plan of Implementation at the World Summit on Sustainable Development calls for application of the ecosystem approach to fisheries management by 2010.

2003: The Bremen Statement defines the ecosystem approach and sets out detailed plans for HELCOM and OSPAR to implement the approach.

2006: The UN Informal Consultative Process on Oceans and the Law of the Sea issues an Ocean Resolution emphasizing the ecosystem approach and the importance of ecosystem integrity.

2008: European Union adopts the Marine Strategy Framework Directive calling for the attainment of good environmental status for Europe's marine waters by 2021.

Operational guidance

The CBD has distilled these 12 principles into five points of operational guidance:

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

(For the full text of the CBD's *"Operational guidance for application of the ecosystem approach"* as well as other tools for using the ecosystem approach, see *http://www.cbd.int/ecosystem/.*)

In addition, others have emphasized the need to:

- initiate ecosystem-level planning and area-based management processes that involve multiple stakeholders and take into account the cumulative impacts of human activities as well as long-term environmental changes;
- establish cross-jurisdictional management goals though formal mechanisms and agreements across local, state and federal authorities;
- expand and improve habitat restoration in coastal ecosystems where habitat has been lost or ecosystem functioning has been diminished;
- adopt co-management strategies in which governments and local stakeholders share responsibility for management and stewardship; and
- establish long-term monitoring and research programs to continuously collect data relevant for sound decision making.

UNEP's Ecosystem Management Programme

The UNEP Ecosystem Management Programme is working to move to an environmental management approach that integrates forests, land, freshwater, and coastal systems where they impact upon the overall deliver of ecosystem services. UNEP is working towards assisting countries and regions to:

- integrate an ecosystem approach into development and planning processes;
- acquire and improve the capacity to use ecosystem management tools; and
- realign their environmental programmes and financing to tackle the degradation of priority ecosystem services.

The UNEP Ecosystem Management Programme focuses on 11 priority ecosystem services out of the 15 that the Millennium Ecosystem Assessment identified as being in decline. The 11 priority services were targeted based on the seriousness of the degradation, impacts on human well-being and implications for sustainable development. These services were also considered most relevant to UNEP's mandate, strengths, expertise and current activities, and were not being addressed by other agencies.

The Programme is guided by five major interlinked elements: human well-being, indirect and direct drivers of change, ecosystem functioning and ecosystem services. As ecosystem services are interlinked and cannot be treated in isolation, UNEP promotes a holistic perspective for dealing with bundles of interlinked services to reverse their decline through improved ecosystem functioning and increased resilience. The services fall under the following categories: regulating, provisioning, supporting and cultural services:

Regulating services: climate, water, natural hazard and disease regulation, water purification and waste treatment, which are often strongly affected by the overuse of provisioning services;

Provisioning services: freshwater, energy (especially the emerging issues around biofuel production) and capture fisheries;

Cultural services: Recreation and ecotourism service;

Supporting services: nutrient cycling and primary production which underlie the delivery of all the other services but are not directly accessible to people.

UNEP provides specialized expertise from different disciplines. These include:

- Assessment and monitoring (e.g., indicators, research and access to knowledge);
- Risk management;
- Management tools e.g., conservation and protection, restoration, sustainable management, legislation, certification;
- Ecosystem economics e.g., payments for ecosystem services, incentives and financing mechanisms, valuation, equity and fairness principles;
- Governance e.g., international agreements, legislation, policies; and
- Capacity-building and technology support.

See *http://www.unep.org/ecosystemmanagement/Home/tabid/163/language/en-US/Default.aspx* for more information.

The CBD Beginners' Guide to using the Ecosystem Approach

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1. Introduction

This guide provides a brief introduction on how to apply the ecosystem approach to a project or issue. Further information can be found under the Advanced User Guide. There is no single way to deliver the three objectives of the Convention on Biological Diversity. However, there are a number of actions which can be taken and can help this process. Much can be learnt from the experiences of others when attempting to use the ecosystem approach. The searchable component of the ecosystem approach sourcebook can be used to find information on case studies and tools which have met some or all of ecosystem approach principles.

The ecosystem approach is a tool; it provides a framework that can be used to implement the objectives of the Convention on Biological Diversity, including the work on, *inter alia*, protected areas and ecological networks. There is no single correct way to apply the ecosystem approach to management of land, water, and living resources. The principles that underlie the ecosystem approach can be translated flexibly to address management issues in different social, economic and environmental contexts. Already, there are sectors and governments that have developed guidelines that are partially consistent, complementary or even equivalent to the ecosystem approach (e.g. the Code for Responsible Fisheries, the Sustainable Forest Management approach, adaptive forest management).

There are a number of options for implementing the ecosystem approach. For example, the principles can be included in national and regional policies, planning processes and sectoral plans. The principles can also be applied at a local level to smaller projects.

2. Steps to using the ecosystem approach

Problem Definition

The first task is to define the problem or problems that need to be addressed. For example, how to control an invasive non-native species on an island. If the problem is very complex it might be necessary to break it down into several smaller problems so that each can be addressed more easily. For example, to conserve a wetland ecosystem while facilitating its sustainable use, it might be necessary to address (i) ecological degradation resulting from unsustainable use of wetland resources, and (ii) community well-being such as health, education, food security, and cultural values.

Having identified the issues, the next step is to ascertain what tasks would allow the problem to be addressed. The problem can be assessed against the tasks listed below as an initial step towards identifying a plan of action. This process can also be used to prioritise the actions to be undertaken.

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3. Identifying the tasks to meet the problems identified

The tasks below have been drawn from the principles of the ecosystem approach. In each case the ecosystem approach principle has been rephrased into a question, which can be asked in relation to the problem(s) being addressed. The tasks are not listed in order of importance, they should be used in a way which best fits the problem. For more information on how to answer the questions posed by the tasks and the rationale behind each please refer to the Advanced User Guide.

Task 1: How do you involve all members of society in decisions associated with the management of land, water and living resources?

Task 2: How do you ensure management is decentralised to the lowest appropriate level?

Task 3: How do you ensure the effects of management actions (potential or actual) on adjacent and other ecosystems are taken into account?

Task 4: How can the economic context be understood so that market distortions that affect biological diversity are reduced, incentives are developed to promote biodiversity and sustainable use, and ecosystem costs and benefits are externalized?

Task 5: What measures could be used to conserve ecosystem structure and functioning so as to maintain ecosystem services?

Task 6: What measures can be taken to ensure ecosystems are managed within the limits of their functioning?

Task 7: What actions can be taken so that the problem(s) is (are) addressed at the appropriate temporal and spatial scales?

Task 8: How can varying temporal scales and lag-effects be taken into account when considering the sustainable use of ecosystems?

Task 9: How can adaptive management be used to address the problem(s) identified?

Task 10: How can an appropriate balance be sought between, and integration of, conservation and use of biological diversity?

Task 11: How do you ensure all forms of relevant knowledge including, scientific, indigenous and local knowledge, innovations and practices are included?

Task 12: What measures can be taken to facilitate the involvement of all stakeholders including all sectors of society and scientific disciplines? It is important to remember that whilst there is no single correct way to implement the ecosystem approach, it should be stressed that all its principles need to be considered in a holistic way, and appropriate weight given to each, according to individual circumstances.

Cross-cutting issues

In addition to the individual tasks identified above there are a number of crosscutting issues that need to be considered when applying the ecosystem approach.

Capacity-building and participation: Community partnerships, stakeholder engagement, political and institutional willingness to participate and empower, and the commitment of other donors and sponsors is crucial for successful outcomes. Capacity building through financial and infrastructure support are important requirements for success.

Information, research and development: Resource, biophysical, social, and economic information is important to the successful completion of a project using ecosystem approach. Research and development might be required to target gaps in knowledge. Information should be readily accessible to all stakeholders, to allow more transparent decision-making and empowerment.

Monitoring and review: Monitoring and review are crucial components of any programme using the ecosystem approach framework. They allow a responsive and adaptive management capability to be developed, and for reporting on performance and outcomes.

Governance: Good governance is essential for successful application of the ecosystem approach to a problem. Good governance includes sound environmental, resource and economic policies and administrative institutions that are responsive to the needs of the people.

Having identified what tasks need to be undertaken to meet the issues raised the next step is to create a management plan.

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4. Creating a Management Plan

There is no correct way to create a plan, every situation is different and it is important to modify the plan to fit the circumstances under which the project will operate. The Advanced User Guide provides further information on how to create a management plan.

The following steps are thought key to the development of the management plan.

Identifying the issues: Issue identified and the project plan developed can be difficult to separate. The use of the ecosystem approach should begin with an issue. Having identified the issue (or several) it can be assessed against the tasks set out above in Section 3.

Creating a draft management plan: The draft management plan sets out the tasks, determines who should be involved and creates a draft timetable for action.

Timing: Choosing the right time to set up a project can be important. Opportunities or circumstances which can help or hinder the project's success include: Political stability; New government policies and strategies; and Re-organisation of government departments and institutions.

The time taken to restore or maintain ecosystems should not be underestimated. Stakeholders should be given realistic timings so that they do not become disillusioned or frustrated by the time taken to put plans into action and for results to be achieved.

Key actors: A primary task is to decide which organisation should lead the project's development and implementation. Reliance should not be placed on one organisation as this can jeopardise its success. Successful projects often have one fully committed organisation (either governmental or non-governmental) which works with other partner organisations.

Engaging with stakeholders: Engage with the stakeholders as early as possible. Initial consultations are vital for ensuring people feel they can contribute to the development of the management plan, especially if it might impact on their activities. Stakeholders can provide ideas and reactions to help develop the project.

Setting Objectives: All projects need well-defined and readily identifiable objectives. These and any actions should be agreed through discussions with stakeholders so that an understanding of the issues and actions necessary to address them can be agreed and understood.

Project design: The development of the project plan should consider Adaptive management.

Long-term viability: The ultimate aim for any project should be the continuation of the objectives beyond the project's lifespan. Financial stability is also key to long-term viability.

Defining the boundaries, scope and time scale: Although boundaries lead to limitations these can be necessary for managing ecosystems.

Producing the project work plan: The first task of the core work team is to produce a work plan, which should be done in a participatory and collaborative manner, using logical framework techniques to facilitate problem analysis and planning.

Reducing risk to project outcomes: Risk analysis should be used to identify critical issues/risks to the project.

Monitoring and evaluation: Monitoring can be used to assess progress and determine how future management can be developed to meet the project's goals. The monitoring of activities, aims and objectives should not be fixed but remain adaptable to changing conditions as knowledge, understanding and issues are raised and resolved.

Project Implementation: Key concerns in implementing natural resource management projects include length of time required. Habitat restoration may require 10–15 years of work before results become apparent. Staff competence and commitment is vital to project success. The creation of a network of partner agencies and interest groups, which will progressively take on the implementation of the project activities are also crucial.

Political, institutional and community support must be secured to fulfill the project goals and objectives.

Project implementation generally follows a series of stages, some of which overlap and can include several steps. For example:

Stage 1: build project team; produce work plan and develop links with local community; and establish advisory committees.

Stage 2: determine project activities; desk-based actions; do capacity building; and review project (adapting monitoring and research as required).

Stage 3: put agreed plan into action.

Stage 4: continue work and forward planning; and develop strategic plan for future initiatives.

For further information on the application of the ecosystem approach please see the Advanced User Guide, at *http://www.cbd.int/ecosystem/sourcebook/.*

CASE STUDY

The Barents Sea Integrated Management Plan, Norway

In 2002 the Norwegian Parliament adopted a white paper that set forth the country's oceans policy and signalled Norway's intention to introduce integrated oceans management based on the ecosystems approach.

In 2006, the country adopted its first integrated oceans management plan, the Integrated Management of the Marine Environment of the Barents Sea and the Sea Areas off the Lofoten Islands (BSIMP). The Barents Sea, just off Norway's northern coast, is a marine area of major economic significance. It is one of the world's most important fishing areas, experiences considerable marine traffic, is thought to contain viable petroleum resources and has experienced considerable growth in tourism.

The Norwegian Ministry of Environment describes the management plan as follows[1]:

> *The management plan sets the overall framework for both existing and new activities in these waters, and facilitates the co-existence of different industries, particularly the fisheries industry, maritime transport and petroleum industry*
>
> *The aim of the plan is to establish a holistic and ecosystem-based management of the activities in the Barents Sea – Lofoten area. This means that all activities in the area should be managed within a single context and that the total environmental pressure from activities should not threaten the structure, functioning and productivity of the ecosystems.*
>
> *The management of the sea area will be based on ambitious goals that have been set for the desired environmental quality of the area. These goals are intended to ensure that the state of the environment is maintained where it is good and is improved where problems have been identified. The achievement of the goals will then be measured through a coordinated and systematic monitoring of the state of the environment in the sea area. Should the monitoring detect negative changes in environmental quality, the need for further measures will be assessed.*

Development of the BSIMP began in 2002. The process relied on multi-sector decision-making took into account a variety of views and concerns. Planning was organized through an inter-ministerial Steering Committee. The Committee was chaired by the Ministry of the Environment and included five other ministries and two agencies that provided technical support and led assessments and analyses.[2]

The plan's development involved three phases. An initial scoping phase produced status reports focused on economic sectors in the region, valuable areas, socio-economic conditions, and the area's environment and natural resources. A second phase produced assessments of the potential impacts of petroleum activities, shipping, fisheries and external stressors such as climate change. The final phase developed aggregate analyses, assessing the total impact on the environment, identifying particularly valuable and vulnerable areas, defining knowledge gaps, and setting management goals. During the second and third phases ecological quality objectives were developed. Stakeholders were consulted, including via a stakeholder conference with broad participation.

The process led to the identification of large and challenging gaps in the knowledge needed to design and implement a scientifically sound plan, particularly in the areas of monitoring, research and mapping. This led to a call for improved procedures for identifying, prioritizing and filling knowledge gaps and for handling scientific uncertainty. Integrating institutional sectors was also a major challenge. The process has been described as difficult and time consuming. In the end, however, it was successful: in 2006, the Parliament adopted the BSIMP.

[1] *See* http://www.regjeringen.no/en/dep/md/Selected-topics/Svalbard_og_polaromradene/integrated-management-of-the-barents-sea.html?id=87148.

[2] *The Ministry of Labor and Social Inclusion, the Ministry of Fisheries and Coastal Affairs, the Ministry of Trade and Industry, the Ministry of Petroleum and Energy, and the Ministry of Foreign Affairs with scientific and technical support from the Institute for Marine Research, the Norwegian Polar Institute and the Directorate on Nature Management.*

The plan established a number of policy tools: area-based management, species management, ecosystem indicators, monitoring, and risk evaluation. The identification of valuable and vulnerable areas, though debated during the plan's development, is also considered a centerpiece of the plan. The Plan provides a foundation for co-existence of key industries (fishing, petroleum) as well as measures for addressing pollution and maintaining biodiversity.

Ecosystem-based management requires cooperation across sectors. Under the plan, sector-based ministries and agencies are responsible for gathering data and enforcing laws relating to the management plan. Overall responsibility for implementing the plan, however, resides with the Ministry of the Environment. This responsibility is aided by the existence of a relatively new ocean resources law and forthcoming biodiversity legislation emphasizing the ecosystem approach.

Implementation of the management plan relies heavily on integration between Norway's science and relevant management agencies. To meet this goal, three permanent working groups were established: an advisory group on monitoring; a forum on environmental risk management; and a forum responsible for coordination and implementation of the scientific aspects of ecosystem-based management. The different groups all have broad memberships and report to an inter-ministerial steering group headed by the Ministry of Environment. Non-government actors are also consulted via a stakeholder group.

Because the Barents Sea is shared by Russia, trans-boundary cooperation is crucial. Norway and Russia have had bilateral cooperation via a Joint Fisheries Commission since 1975 and via a Joint Commission on Environmental Protection since 1988. In 2005, the Commission on Environmental Protection established a marine environment group to enhance cooperation on ecosystem-based management of the Barents Sea. Norwegian and Russian scientists are currently preparing a joint assessment of the state of the Barents Sea environment and its biological resources as a basis for further cooperation on ecosystem-based management.

The management plan is adaptive and is already being revised to take into account new knowledge and changing situations. Finalization of the first update is expected in 2010. The entire management plan will be revised in 2020 and will extend to 2040. A separate management plan for the Norwegian Sea is expected to be adopted in 2009.

For more information about the BSIMP, see the web site of the Norwegian Ministry of Environment at *http://www.regjeringen.no/en/dep/md/Selected-topics/Svalbard_og_polaromradene/integrated-management-of-the-barents-sea.html?id=87148*.

The Economics of the Ecosystem Approach

Any discussion of planning and implementing the ecosystem approach leads inevitably to considerations of cost. At a time when government agencies are facing enormous budgetary challenges, decisions about the allocation of scarce public resources have become even more challenging. Managers need to justify all investments, especially shifts in policies and approaches

Ecosystem-based management envisions a holistic approach to environmental decision-making. Government managers consider multiple, sometimes opposing environmental and socio-economic objectives. Options are laid side by side for stakeholder consideration. Trade offs, including cost considerations, are made transparent. In this sense, the ecosystem approach promotes fiscal accountability and public support for government decision-making.

But how can the costs and benefits of protecting ecosystems be expressed? Historically, the physical characteristics of ecosystems have been more closely studied than has their economic benefits to society. Classical economics did not quantify environmental benefits in terms comparable to manufactured capital or economic services. As a result, ecosystem services —the conditions and processes through which natural ecosystems sustain and fulfill human life— were generally overlooked or given little weight in policy analysis.

"Economic analysis is very important for the ecosystem approach because it will illuminate choices and assist decision-making. Economic tools, however, are not sufficient. They give us information that has to fit within a larger moral dimension and be integrated with considerations of human welfare. The question is how do we want to live."

Anaïs Mangos,
Marine Ecosystems Programme Officer,
MAP Blue Plan

In the last few decades, however, it has been increasingly recognized that our economies rely not just on manufactured or human capital services but also on the planet's rich natural assets, its natural capital, which serves as our ecological life-support system. Think, for example, of the benefits that safe drinking water, healthy soil, robust fisheries and natural buffers against storm surge have provided to human development. Natural capital consists not only of specific natural resources, however, but also of the complex interactions within and among ecosystems. The continued rapid destruction of ecosystems and their services threatens to undermine a vital cornerstone of human welfare.

Economic analysis has developed various methods for valuing the ecosystem goods (e.g., food, timber, water) and services (e.g., nutrient cycling, climate regulation, erosion control) we have inherited. In some cases the value of ecosystem goods and services can be measured in monetary terms. Even when they cannot, however, managers can often demonstrate that their environmental investments are being managed cost effectively. By expressing the comparative benefits of different programs economic analysis can help managers decide how to prioritize, allocate and maximize the environmental benefits of public spending on conservation or restoration initiatives.

Sometimes the valuation process can be generalized. For example, New York City's drinking water supply comes from a series of upstate reservoirs that are surrounded by inhabited areas. In the mid-1990's, the city was faced with a choice whether to develop a comprehensive plan that would protect the watershed's natural filtration processes or to bear the $6-8 billion expense of building a filtration plant. With a combination of land use regulations, payments for ecosystem services, land acquisition and other measures the city was able to protect the quality of its water supply at the cost of $1–1.5 billion, a fraction of the cost of filtration.

In New York City's case, it was not necessary to value all of the watershed's ecosystem services, because it could be demonstrated that the cost of protecting the whole watershed would be far less expensive than filtration. In other cases, specific ecosystem services need to be valued. In Campeche, Mexico[1], for example, it was estimated that the urban, industrial and agricultural development of one square kilometre of coastal mangrove forest that provided crucial fisheries habitat would reduce the annual shrimp harvest in the Gulf of Mexico by $150,000.

The tools of ecosystem valuation will be important for the Mediterranean as the region makes a transition to the ecosystem approach. The MAP's Blue Plan Regional Activity Centre in France is currently developing an economic approach to analysing marine ecosystems in the Mediterranean. A regional study is aimed at valuing ecological goods and services in the region. A second study will try to assess the local value of ecosystem services and the impacts of marine protected areas on local economic activity. Blue Plan's regional project will be subject to a mid-term review in October 2009 and will be finalized in 2011. The local study will begin in early 2010 and end in 2011.

The significance of economic analysis, however, needs to be kept in perspective, says Anaïs Mangos, Marine Ecosystems Programme Officer with Blue Plan. "*Economic analysis is very important for the ecosystem approach because it will illuminate choices and assist decision-making,*" says Mangos. "*Economic tools, however, are not sufficient. They give us information that has to fit within a larger moral dimension and be integrated with considerations of human welfare. The question is how do we want to live.*"

[1] *See, Heal, G. M. and E.B. Barbier, January 2006,* "Valuing Ecosystem Services", *Economists Voice, Berkeley Electronic Press.*

Implementing the Ecosystem Approach in the Mediterranean

In January 2008, during the 15th biennial meeting of the Contracting Parties in Almeria, Spain it was decided that a number of steps would be taken in advance of the November 2009 Contracting Parties meeting to be held in Marrakech, Morocco. In January 2009, the Mediterranean Action Programme (MAP) received a € 685,000 grant from the European Union for implementation of the ecosystem approach. Including funds for biodiversity and pollution control, a total of € 761,000 is available to advance implementation of the ecosystem approach in the Mediterranean. MAP's Special Protected Areas Centre in Tunis, Tunisia is leading the implementation of several components of the EU project, which may last three years and will focus on the development of ecological objectives for the region. The ecological objectives will, in turn, set the stage for the development of operational objectives.

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MAP is also organizing an assessment of gaps in data and information in the region. "*This is a problem in many areas*", says Michael Angelidis, UNEP MED POL Programme Officer. "*We need more information to identify gaps and to understand how to fill them. MED POL, for example, has a database on pollutants and the state of the marine environment, but it doesn't cover the whole Mediterranean.*" MED POL , in cooperation with the Special Protected Areas Centre in Tunis, is preparing the assessment document for the project. Angelidis said that the assessment will involve technical experts from the region and that it is hoped that the assessment work will be completed in 2010.

In addition to the assessment, Blue Plan in France is preparing a socio-economic analysis of the ecosystem approach in the Mediterranean. "*The challenge comes when countries have to include the ecosystem approach in their national planning,*" says Angelidis. "*This is not always easy, because many countries have pressing needs for development. Socio-economic studies are very important because they make clear the economic benefits of protecting ecosystem good and services.*"

Angelidis also emphasized that MAP will be working with countries to help integrate stakeholders into the process of developing the ecosystem approach —ministries, industrial interests, local authorities, citizens group, NGOs and others. "*We hope and plan to catalyze cooperation within countries and on a trans-boundary basis,*" says Angelidis. "*We believe that by including a wide range of stakeholders the process is strengthened and will lead to a positive result.*"

About the Ecosystem Approach

How can governance institutions adjust to take on the challenges the ecosystem approach?

The governance of ecosystem-based management has been addressed by a number of authorities. See, e.g., A Handbook on Governance and Socioeconomics of Large Marine Ecosystems (full citation under Further readings on the ecosystem approach). Institutions need to set operational objectives that will be recognized as legitimate, fair and achievable. Mechanisms for incorporating broader, integrated perspectives in decision-making may involve expanding sectoral management mandates, adopting new, multi-disciplinary management arrangements, and ensuring transparency and stakeholder participation. Scientific and technical capacities may also need to be expanded and data integrated across sectors.

Can the ecosystem approach be implemented when there is insufficient information about ecosystems?

By looking at ecosystems as unified, interactive wholes, ecosystem-based management offers the best opportunity to understand and protect ecosystem health. While the supply of information about a given ecosystem is unlikely to be comprehensive, there is usually enough information to identify qualitatively the likely interactions among species and sectors and some of the probable resulting impacts. An adaptive management process will identify knowledge gaps, identify scientific priorities to reduce uncertainties and accommodate new information as it becomes available. The ecosystem approach will also provide a framework for combining data in ways that add value. Because of the nature of scientific inquiry, there will always be uncertainties about ecosystems and their responses. Challenging policy choices will nevertheless need to be made as knowledge continues to grow in the framework of the ecosystem approach.

Are there good examples or case studies of ecosystem approach implementation?

With 25 member states, the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) provides an example of the application of ecosystem-based management principles on a trans-boundary basis. See Kock, K-H. 2000. Understanding CCAMLR's Approach to Management, which can be found at ***http://www.ccamlr.org/pu/e/e_pubs/am/p1.htm***. On the national level, the ecosystem principles have been adopted in the laws and policies of the EU and many other parts of the world. Links to case studies can be found via web sites and publications listed in the Tools & Resources section of this edition of MedWaves.

How can the ecosystem approach be implemented when institutional capacity is limited?

Institutional capacity to implement the ecosystem approach means having the financial, human and informational resources sufficient to plan and manage monitoring, evaluation, enforcement, stakeholder participation and more. This is a challenge in developed and developing countries alike. In a survey of coastal managers conducted by the U.S. National Oceanic & Atmospheric Administration, 60 percent said a lack of resources affected their ability to implement ecosystem-based management, and nearly 90 percent said more professional development training in the ecosystem approach was needed. Several steps can be taken to strengthen capacity, including developing a long-term and sustainable funding plan, investing in scientific and management training and communicating scientific information to the public. In addition, working with in a regional framework, such as UNEP/MAP, creates opportunities for information sharing and co-management. For more information on this topic, see the March–May 2008 edition of Marine Ecosystems and Management, which is dedicated to the topic of creating capacity for marine ecosystem-based management.

What tools exist to guide development and implementation of an ecosystem-based management plan?

Ecosystem-based management has been adopted and implemented in a number of local, national and international settings. As a result, a substantial body of extremely useful guidance, case studies and other tools is available. A number of these resources are listed in the "Tools & resources" section.

"The problem is confoundingly simple: we are consuming far more than this planet can sustain. And if we humans want to persist on this planet with a minimally acceptable, universal quality of life we will need to manage and utilize our resources in far more efficient and creative ways, and fast! The stakes could hardly be higher."

Jason Jabbour, Associate Programme Officer, UNEP Division of Early Warning and Assessment

ADDITIONAL TOOLS & RESOURCES

Convention on Biological Diversity (CBD)
Web site contains numerous tools for practitioners, including guides for using the ecosystem approach, operational guidance, case studies, tools and e-newsletters.
http://www.cbd.int/ecosystem/

EBM (Ecosystem-Based Management) Tools Network
An alliance of EBM tool developers, practitioners, and training providers to develop EBM tools and support their use in EBM implementation in coastal and marine environments and the terrestrial environments that affect them.
http://www.ebmtools.org/

Food and Agriculture Organization of the United Nations
Fisheries and Aquaculture Department – The ecosystem approach to fisheries management.
http://www.fao.org/fishery/topic/13261.

IUCN (World Conservation Union) Ecosystem Management Programme
http://www.iucn.org/about/work/programmes/ecosystem_management/

MEAM (Marine Ecosystem and Management)
A free quarterly publication on marine ecosystem-based management published by Marine Affairs Research and Education in association with the University of Washington School of Marine Affairs.
http://depts.washington.edu/meam/

SeaWeb Ecosystem-Based Management Resources
http://www.seaweb.org/resources/Ecosystem-basedmanagement/SeaWeb--Ecosystem-basedManagementCommunicationTools.php