





## **Stocktaking Report:**

### **A state-of-the-art analysis of the ecosystem approach in the Mediterranean region\***

#### **Background**

1. At the meeting of the 15<sup>th</sup> Meeting of the Contracting Parties held July 2008 in Almeria Spain, the Member States agreed to begin the process of implementing an Ecosystem Approach in order to move towards the goal of “a healthy Mediterranean with marine and coastal ecosystems that are productive and biologically diverse for the benefit of present and future generations” (Decision IG 17/6).

2. To this end, the Contracting Parties enumerated three strategic goals for Mediterranean marine and coastal areas (UNEP(DEPI)MED WG 326/3 Annex 1 page 2):

- 1) To protect, allow recovery, and where practicable, restore the structure and function of marine and coastal ecosystems – thus also protecting marine biodiversity – in order to achieve and maintain good ecological status allowing for sustainable use.
- 2) To reduce pollution in the marine and coastal environment so as to ensure that there are no significant impacts or risks to human and/or ecosystem health and/or on the uses of the sea and the coasts.
- 3) To preserve, enhance, and restore a balance between human activities and natural resources in the sea and the coasts and reduce their vulnerability to risks.

3. A roadmap to achieve these strategic goals was discussed and adopted; it articulates five additional steps that need to be taken, in addition to the ecological vision for the Mediterranean and the strategic goals above, including:

- a) Identification of important ecosystem properties and assessment of ecological status and pressures;
- b) Development of a set of ecological objectives corresponding to the Vision and strategic goals;
- c) Derivation of operational objectives with indicators and target levels;
- d) Revision of existing monitoring programmes for ongoing assessment and regular updating of targets;
- e) Development and review of relevant action plans and programmes.

4. MAP, with its technical components, has begun the process of undertaking assessments, following a decision made by the meeting of government designated experts in July 2008, to subdivide the Mediterranean region into four loosely defined geographic areas – solely for the purposes of assessment and analysis. This report provides background to guide this step of the process (Step 3 of the roadmap – identify ecosystem properties and assess ecological status and pressures), and to help inform the subsequent steps.

#### **Where Does Assessment fit in within the Ecosystem Approach?**

5. It should be noted that assessments and environmental monitoring are not one and the same thing. In order to perform assessment in a meaningful way, the gathering of information and any monitoring that is undertaken must be done in a way that is strategic and targeted. The ultimate aim of assessment is not to determine the condition of marine

---

\* This document has been prepared by Ms Tundi Agardy, Ecosystem Approach Consultant, recruited by the MAP Secretariat.

ecosystems, but rather to discern precisely how human activity is impacting ecosystems, and the ability of those ecosystems to continue to provide ecosystem services. This information can then be used to amend management so it is more integrated and effective – in other words, moving management from a sectoral approach to an Ecosystem Approach.

6. In reviewing marine ecosystem-based management across the globe, Arkema and colleagues derive 17 criteria that mark management as using an Ecosystem Approach (Arkema 2006). These include:

1. Emphasizes maintenance of one or more aspects of the ecosystem
2. Includes non-specific goals for ecosystem health or integrity
3. Recognizes humans as elements in ecosystems
4. Acknowledges linkages between ecosystem components
5. Incorporates temporal scale and dynamic nature of ecosystems
6. Recognizes ecosystem processes operate over a wide range of spatial scales
7. Recognizes humans use and value ecosystem services
8. Integrates economic factors into the vision
9. Engages interested parties in planning
10. Incorporates management decisions based on tested hypotheses
11. Recognizes importance of spatially defining management (MSP)
12. Uses scientific and industrial technology for monitoring
13. Improves management through systematic evaluation
14. Promotes shared responsibility
15. Manages conservatively in the face of uncertainty
16. Bases management on multidisciplinary science
17. Tracks changes in biotic, abiotic, and human ecosystem components for management.

7. These criteria have relevance in the design of assessments. In an Ecosystem Approach, assessment methodologies should: be designed to address multiple aspects of ecosystems and the linkages between them (criteria 1-4); be undertaken in a way that integrates different scales of systems (criteria 5 +6); address ecosystem services and their value (criteria 7 +8); track important changes in biotic, abiotic, and human ecosystem components using multidisciplinary science and hypothesis testing (criteria 10,12, and 16 and 17).

8. Initial assessments provide information on baseline, or reference conditions. But choice of parameters being used to assess environmental condition at the beginning of the process can and should also influence what kind of parameters will subsequently be used to track changes over time, and continually evaluate the efficacy of management.

9. The assessments currently being undertaken by MAP technical components and focal countries are, for the most part, providing baseline information on two main ecosystem properties: biodiversity and environmental quality (focused primarily on pollutants, including nutrients, heavy metals, persistent organics, debris, etc.). Once full information for these baseline assessments is acquired across all four geographic areas, the areas can be initially assessed for their environmental status. It should be stressed that the division into the four areas or subregions (Western Mediterranean, Adriatic, Central Mediterranean and Ionian Sea, and Eastern Mediterranean) is necessary for creating the proper scale for assessment, and neither reflects ecosystem or ecoregion limits, nor conforms to political and jurisdictional boundaries.

10. The analysis of the four sub-regional assessments (once completed) will provide information on possible ecological objectives and, in turn, operational objectives, as described in Steps 4 and 5 of the roadmap. However, the choice of objectives must be strategic – and it must reflect not only the current conditions, but also what is expected to

happen in the future if the status quo is maintained. In other words, the goal of an Ecosystem Approach to management is not to preserve conditions as they are at the time of assessment, but to tailor management so that ecosystems can continue to function and deliver ecosystem services. Priorities for management must be established in some way before operational objectives can be determined.

11. Assessments provide information for establishing priorities. In order for the Ecosystem Approach to be effective and efficient (and practical), science must be used to highlight what human activities will need improved management. Periodic assessment will generate information needed to:

- Determine trends in environmental status
- Help predict changes in ecosystem services delivery and values
- Develop scenarios that describe various management outcomes
- Allow decision-makers to evaluate trade-offs
- Highlight key management issues
- Determine the form of management, including choice of management tools and scale of management (Mediterranean-wide measure, national policy, marine protected area management, fisheries area management, mitigation measure in a specific location, etc.)

12. The design of these assessments, and the research agenda needed to complete assessments, must be carefully considered. To maximize efficiency and make assessments for the purpose of adopting an Ecosystem Approach feasible and achievable, ongoing or existing monitoring programmes and research should be used to the maximum extent possible.

### **What Kind of Information is Needed to Guide an Ecosystem Approach in the Mediterranean?**

13. Assessment methodologies can determine status of ecosystems (what is known as environmental or ecological status, and what is specifically referred to in the EU as 'GES or Good Environmental Status'); impacts on the condition of ecosystems resulting from direct and indirect human uses; present value of ecosystem services; trends in delivery of ecosystem services; and management effectiveness. In other words, in order to know what it is that an EA to management can achieve, it is necessary to know basic information about how the ecosystem operates, what values it provides human beings, how it is being used and impacted, and how it is faring under existing management.

14. A basic understanding of the target ecosystem(s) is needed, focusing on key ecosystem functions, resilience, and delivery of ecosystem services (values capitalized by humans). This is not to say that everything must be known with certainty. Given limited time and resources to "get it right" – a special challenge in a marine area as large, diverse, and complex as the Mediterranean -- assessment must focus on priorities. These priorities can emerge by focusing on known threats, or on the most valuable ecosystem services, or on special areas (high diversity, habitats identified under the Habitats Directive and Natura 2000, SPAMI sites, Ecologically or Biologically Significant Areas, critical areas for endangered species, etc).

15. The scale of the ecosystem(s) under consideration is significant, such that the larger the geographic and sectoral scales, the greater the need for a hierarchical or integrated strategy to maintain linkages between scales. In the case of the Mediterranean Sea, the division into four loosely defined areas makes sense for practical purposes, but it also

presents some challenges regarding data consistency across all four regions, and whether analyses can be aggregated (or, alternatively, whether each of the four areas needs its own set of ecological and operational objectives for an Ecosystem Approach).

16. Thus assessments will vary according to the scale of management, the type of ecosystem being managed, and the location. There are publications and training tools that can guide assessment processes. One useful guide is the Integrated Ecosystem Assessment (IEA) put forward by Levin and colleagues (2009). The five step process they outline begins with a **scoping** step, where ecosystem objectives and threats are identified. The second step involves determining what **ecosystem indicators** will be useful in tracking EBM, and setting benchmarks and targets so that management effectiveness may be evaluated. The third step involves **risk analysis**, evaluating the risks to features of the ecosystem described by the indicators. These risks are those posed by human activity and by natural variability. The next step in the process uses **ecosystem modelling frameworks** (or scenarios) to evaluate different management strategies. This will allow decision makers to evaluate trade-offs and make informed choices. Finally, the IEA process leads to a continuous system of **monitoring and evaluation**, so that the potential for adaptive management may be realized.

17. Using this framework as a guide to gauge the process being undertaken by the national focal points (and being synthesized by the coordinators in each of the four subregions), it seems MAP is nearing the point where it can begin to work with Mediterranean countries to perform risk analysis – or prioritization. Much of the scoping has already been achieved, and under the leadership of MAP, MED POL together with SPA/RAC have guided national efforts in doing assessments of biodiversity and pollution. Additionally, a report on ecosystem services values is being generated by Blue Plan (BP/RAC), which provides Mediterranean-wide data as well as country specific figures.

18. These sets of information can and should be combined with information coming about the High Seas, or Areas Beyond National Jurisdiction (ABNJ). Within this vast portion of the Mediterranean, large scale areas known as Ecologically or Biologically Significant Areas (EBSAs), and within these priority areas that have potential as SPAMI sites – have been identified through a project led by SPA/RAC. A systematic threats analysis of these potential SPAMI sites would result in crucial information about priorities for focused assessment, to complement assessments taking place under the auspices of national authorities and coordinated by MEDPOL and SPA/RAC, within each of the four subregions. Together, the two sets of assessments will point to specific areas, at scales smaller than the four subregions, where continuing assessments of ecological status should be launched, and where additional management measures may be needed in order to achieve progress towards an Ecosystem Approach.

### **What Lessons Can be Drawn from Ecosystem Approaches and EBM in Other Regions?**

19. Good examples of large scale ecosystem approaches are few and far between, though many countries of the world and many Regional Seas embrace the concept and are moving in that direction.

20. In Europe, OSPAR and HELCOM have showed great progress towards an Ecosystem Approach. However, the scale of management is much smaller than that needed for an EA in the Mediterranean, and the ecosystems of the Northeast Atlantic and Baltic Seas are far better and more consistently studied than those of the Mediterranean as a whole. Nonetheless, hands-on management in these two areas has spurred the development of a common methodology for progressing towards an Ecosystem approach.

21. More recently, the Marine Strategy Framework Directive of the European Union, with help from ICES, has developed a set of eleven descriptors to frame GES and help guide the selection of environmental and operational objectives. These are:

- 1) biodiversity is maintained;
- 2) non-indigenous species (introduced) are not at levels adversely altering ecosystems;
- 3) populations of commercially exploited fish and shellfish are within safe biological limits;
- 4) all elements of food webs occur at normal abundance;
- 5) human-induced eutrophication is minimized;
- 6) sea floor integrity is safeguarded;
- 7) permanent hydrological changes adversely affecting ecosystems are avoided;
- 8) contaminants are at levels not giving rise to pollution effects;
- 9) contaminants in seafood do not exceed public health standards;
- 10) marine litter is minimized; and
- 11) introduction of energy is at levels that do not adversely affect [organisms].

22. How applicable these are to the Mediterranean as a whole should be discussed, given the enormous amount of research which would need to be performed in order to monitor all ecosystems for all these descriptors. However, it would appear that the ongoing research and monitoring being done by MAP and its technical components, and by Mediterranean nations to meet their obligations under the Barcelona Convention and its 6 protocols (Dumping; Prevention and Emergency; Land-Based Sources and Activities; Specially Protected Areas and Biodiversity; Offshore; Hazardous Wastes) provides much good information that could be incorporated into assessing these descriptors in specified areas.

23. Beyond Europe, two large scale working examples of EA are the management activities under in Antarctic waters under CCAMLR, and the management of Australia's Great Barrier Reef Marine Park (GBRMP) under the auspices of the Great Barrier Reef Marine Park Authority. The kinds of assessments that feed into these EA approaches are quite different: the GBRMP operates a system of permitting under a zoning plan (using Marine Spatial Planning) – operational objectives essentially guide the delimitation of different areas for differing uses, as well as the management within each zone, whereas CCAMLR is focused on an ecosystem approach to fisheries management, in order to maintain the broad ecological community. The process by which GBRMP adopted an Ecosystem Approach may provide lessons to the Mediterranean context, but there are two important distinctions: a single government agency takes the lead in management, and the Act that created the GBRMP provides the statutory and legislative authority for the management of the entire marine protected area. Clearly, the multi-national character of the Mediterranean and the large number of management agencies that have some role to play creates a much more complex management challenge here.

## **Conclusions**

24. Adopting an Ecosystem Approach in the Mediterranean, with its enormous scale, variety of management challenges, non-uniform capacity for management, and limited resources, will be complicated and will take time. Assessments currently underway will lead to better understanding of environmental and ecological status, and will present options for further monitoring and evaluation, which will then provide the necessary information for determining trends, determining ecological and operational objectives, and prioritizing these so that small, feasible steps towards an Ecosystem Approach can be taken.

25. Many of the preliminary assessment reports coming from the four sub-regions of the Mediterranean call for significant new research or expansion of research into new geographic

areas. However, the roadmap has a set timeline, and delaying the setting of operational objectives and management measures needed to achieve them will not serve the marine and coastal ecosystems well. MAP and the institutions of the region will need to draw upon information coming from existing monitoring and research being done under the LBS protocol, SAPBio, SPAMI, etc. More importantly, some consensus will need to be reached on which ecosystem components or ecosystem services should constitute priorities – whether because of their inherent value, vulnerability, or degree of threat they face. Finally, MAP should frame discussions on how to design an optimal research agenda to guide not only collection of data but also ways to analyze all relevant information in efficient ways, without unnecessary duplication of effort. These discussions could articulate a research agenda that describes in detail: 1) what new applied research is needed; 2) how data generated from this new research, together with data generated from ongoing research and monitoring programmes, can be fed into assessment; and 3) how to proceed with analysis of data and information in a way that is optimal for targeted assessment.

26. Before a final assessment report can be completed in order to meet the requirements of Step 3 of the road map, the following questions about integration need to be addressed: How to integrate assessment over the 4 subregions? Whether to integrate information across all major threats or prioritize threats to make the EA as strategic as possible? How to integrate across time to discern trends and develop scenarios? How to integrate across differing ecosystem services with their different values? It is likely that although assessments need to be done at subregional scales, the derivation of ecological objectives and subsequent operational objectives for management will be accomplished at smaller scales within subregions (or, in some cases, at larger scales that pertain to the Mediterranean as a whole).

27. Given the lack of baseline for many features and in many areas, there is also need for serious discussion of what can realistically be considered baseline or reference measurements. This will of course influence choice of targets and benchmarks (operational objectives and indicators). There may be instances in which restoration is called for, so the baseline cannot be considered the reference condition, in the sense of a target. These issues will have to be debated within MAP and among the Contracting Parties, beginning with the First Meeting of Technical Experts scheduled for April 8-9 2010.

#### **Literature Cited**

- Arkema, K.K. and others. 2006. Ecosystem-based management: from characterization to implementation. *Ecology and Environment* 4 (10):525-532
- Levin, P.S. and others. 2009. Integrated ecosystem assessments: developing the scientific basis for ecosystem-based management of the ocean. *PLoS Biology* Jan 2009 Volume 7 (1) n e1000014