



Ocean Sustainability (3.7)

Wednesday 19th May, 14:30-16.15

Chair:

Niall McDonough, Marine Board-ESF, Ostend, Belgium

Speakers:

Temel Oguz, Institute of Marine Sciences, Middle East Technical University (IMS, METU), Turkey

Beatriz Morales-Nin, Institut Mediterràni D'Estudis Avançats (IMEDEA, CSIC-UIB), Spain

Evangelos Papathanassiou, Hellenic Centre for Marine Research (HCMR), Greece

Andrew Kenny, Centre for Environment, Fisheries and Aquaculture Science (CEFAS), UK

1. Three key messages

Under the new and accepted paradigm of the ecosystem approach to achieve sustainable management of marine environments, and given Europe's policy framework provided by the Marine Strategy Framework Directive to achieve Good Environmental Status (GES) in European Seas, the key messages presented by the science community in this Workshop were:

1. **Modelling:** There is a need to develop holistic (ecological and socio-economic) modelling approaches to facilitate accurate forecasting and scenario building, essential for decision making and sustainable management.
2. **Observations/Data:** There is a critical lack of observations and data to facilitate integrated assessments, accurate modelling and analysis of environmental change. This shortfall includes observations of the marine environment (physical, chemical and biological) as well as socio-economic data.
3. **Communication and knowledge transfer:** There is an urgent need for the science community to improve its capacity to communicate scientific knowledge to decision-makers, stakeholders and the public, and to bridge the gap between disciplines to facilitate the holistic approach needed to properly implement an ecosystem approach to management.

2. Summary of the interventions from the panel (1-2 pages)

An holistic modelling for the analysis of long-term changes in sustainability of the Black Sea ecosystem.

Temel Oguz, Institute of Marine Sciences, Middle East Technical University (IMS, METU), Turkey

The Black Sea has long been regarded as one of the most heavily degraded and complex ecosystems in the world. The Black Sea in general, and its western coastal waters in particular, have been severely degraded since the 1970s and 1980s. Rapidly intensifying eutrophication, chemical pollution, decline in living resources (mostly fish stocks), alien species invasions, and climatic variations introduced marked changes in the functioning and structure of the ecosystem. Consequently, ecosystem services to the community have been diminished considerably, and their sustainability endangered seriously. Its present state may be summarised as follows:

- The western coastal waters are still subject to high organic and inorganic nitrogen enrichment, but shifted to phosphorus limitation after 1992-1993.
- The pelagic ecosystem has achieved a moderate improvement in respect to the eutrophic system of the 1980s but not to the pristine conditions of the 1960s.
- Climatic variations (cooling in the 1980s and warming in the 1990s) have played strong role on both biomass and species levels, especially for the rise and fall of the gelatinous carnivore species *Mnemiopsis leidyi* and the opportunistic species *Noctiluca scintillans*.
- The recovery of benthic ecosystems is not encouraging so far, and improvement is expected to take much longer. Shallower regions (<30-40 m depths) continue to be dominated by some opportunistic species.
- Multispecies fisheries are unsustainable and there has been no recovery of predatory fish species following their collapse in the 1960s. Anchovy still acts as the top predator in the system. Some ongoing threats are (i) illegal fishing and destructive harvest techniques, (ii) lack of regional cooperative fishery management, (iii) eutrophication-induced instability of the food web structure.

In summary the ecological conditions of the present Black Sea are still fragile and far from the healthy ecological conditions of the pristine ecosystem.

The Black Sea ecosystem can be viewed as a complex adaptive and nonlinearly interactive system driven by the cumulative impacts of various disturbances over long (e.g. decadal) time

scales. This implies that solution to these problems demands an holistic approach in terms of the implementation of social, legal, economic, and ecological mechanisms and measures. To achieve this goal, the collection of robust and sustained long-term time series data must be secured to support Black Sea regional policies. In the meantime, as modelling approaches continue to be refined, the Black Sea Integrated Modelling System (BIMS) described includes a sophisticated lower trophic food web system and nutrient cycling that is coupled to the anchovy population dynamics model as well as the high resolution circulation model in either online or offline mode.

Ocean Sustainability: Fisheries Changes in Paradigms

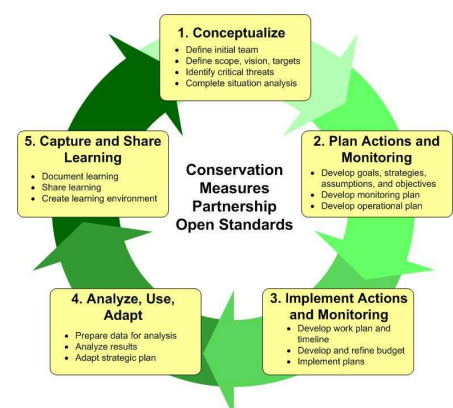
Beatriz Morales-Nin, Institut Mediterràni D'Estudis Avançats (IMEDEA, CSIC-UIB), Spain

Fishing has always provided humans with food resources. However, the development of more efficient fishing gear and vessel technologies has allowed us to exploit more species, in greater areas and at greater depths. With inadequate management, this has resulted in overexploitation of a common resource, also known as the tragedy of the commons.

Although fisheries management started in the last part of the 19th century, the continuous failure of management measures has resulted in the overexploitation of 90% of the global fish stocks. We have also seen the depletion of top predators resulting from fishing down the trophic chain and a consequent loss of biodiversity. Therefore, the awareness of the need to develop effective management practices has caused a shift in management paradigms from the protection of the fisheries activity to the protection of nature. Management has evolved in parallel with the knowledge of the fisheries and trying to preserve gains, a way of living and the access of a source of healthy proteins.

The shifting fisheries management paradigms were described:

- 1000 Market access, improved infrastructure
- 1700 Technological development, regulation to increase efficiency
- 1900 Acknowledging overfishing problems
- 1970 Assuming catch to determine stock development
- 1975 Limited entry and quota regulation
- 1977 Exclusive Economic Zones
- 1985 Closing the commons, property rights
- 1992 Precautionary approach
- 1995 Indicator based harvest control rules
- 2000 Preserve biodiversity



- 2002 Ecosystem Approach to Management
- Adaptive management

In order to address today's problems, it is necessary to examine the historical record of fishery development from artisanal subsistence-based efforts to high-tech modern fishing practices, and how the latter has resulted in the need for more complex management approaches to ensure sustainability. Sustainable management implies that the fishing activity is three-stranded, depending of the biological dynamics of the resources including in the concept the ecosystem, that the fishery itself has its own socio-economic dynamisms and that the environmental constrains interact in a complex way with both. We can only manage two parts of this interactive system and therefore a precautionary approach is absolutely relevant. We have finally accepted that integrated, adaptive and holistic management approaches incorporated in the ecosystem approach to management, are essential for sustainability but there is a long way to go before we can implement this new paradigm

Sustainability of the Southern European Seas: Issues and Concerns

Evangelos Papathanassiou, Hellenic Centre for Marine Research (HCMR), Greece

Owing to their relatively small size and enclosed nature, the Southern European Seas (Mediterranean and Black Seas) are sensitive areas and thus provide a model for the impacts of change in the global oceans. The FP6 SESAME project is providing critical data and analyses to improve our understanding of ecosystem functioning in the two seas. The project is developing models, with regional components, where the two seas are fully coupled with each other and with the atmosphere. This work allows us to move towards prediction of future scenarios derived from current trends and identified ecosystem pressures, using the tools provided by ecological theory. Such forecasting will be essential for policy and management actions in the future.

There are a number of threats to the achievement of this goal, not least a scarcity of data in large sections of these Seas (e.g. south Mediterranean, east Black Sea). Other critical requirements include extensive seabed mapping initiatives, improved fisheries data and knowledge, carrying capacity models to support aquaculture and the capacity to define economic costs and value of marine environmental goods and services.

It is becoming increasingly accepted that there is an urgent need to improve public awareness of environmental problems. The science community has a duty to improve its communication and to ensure that scientific findings are translated into knowledge for decision -makers, stakeholders and the public. It is also of critical importance to integrate science, policy and economy towards more effective management of the marine environment. Future activities suggested included:

- Improvement in networking towards development of a regional strategy for the Mediterranean and Black Sea;
- Development of a central data repository for marine environmental data;
- Improvement of coverage of under-explored areas and standardization of research methods;
- Development of Rapid Assessment Techniques (RATs);
- Integration of disciplines (e.g. ecology, socio-economics, ICZM, modeling etc.) to facilitate an holistic approach; and
- Increase of training and education for the next generation of scientists.

Science in Support of Integrated Management and the Ecosystem Approach

Andrew Kenny, Centre for Environment, Fisheries and Aquaculture Science (CEFAS), UK

Presentation on behalf of the Marine Board/ICES/EFARO Working Group on “Science dimensions of an Ecosystem Approach to Management of Biotic Ocean Resources (SEAMBOR)”

The significant advances in European marine and maritime policy in the last five years have created a framework for Member States of the European Union to work towards Good Environmental Status (GES) in marine waters by 2020. This goal is central to the Marine Strategy Framework Directive (MSFD) which came into force in 2008 and which represents the environmental pillar of Europe’s Integrated Maritime Policy (2007). However, while we now have a policy framework and clear targets, the means to achieve the goals of GES are not fully in place. In fact there will be a significant multi-disciplinary scientific effort needed over the coming years to develop the necessary tools to lead to an ecosystem approach to management of our seas and oceans.

This presentation marked the launch of the tri-partite (Marine Board, ICES and EFARO) position paper, “Science dimensions of an Ecosystem Approach to Management of Biotic Ocean Resources” (SEAMBOR). The central organising theme of the position paper addressed the critical requirement of linking the natural, socio-economic and governance systems in developing an Ecosystem Approach to Management. The position paper addresses the identified gaps and needs in the scientific knowledge and capacities for rapid and full implementation of the MSFD and the current impediments to an Ecosystem Approach to Management. To address these gaps and impediments, the paper sets out a workplan, including science priorities identified as:

- Research on status and uses of Biotic Ocean Resources - issues of scale
- Research on interactions between human activities and conservation of Biotic Ocean Resources – issues of welfare
- Development of operational tools to support management and policy - issues of evaluation & adaptation

Acknowledgement was given to the efforts of the Working Group in bringing about this position paper, with particular thanks to Jake Rice, Chair of the Group, and Aurelien Carbonniere, Science Officer with the Marine Board-ESF, who coordinated the process.

3. Discussion: Key questions and messages from the floor, as well as responses given by the panellists. If possible please indicate names and organisations of persons intervening in the discussion.

1. The first comment was related to knowledge transfer and communication, highlighting the fact that there is still an important effort needed from the science community to enable the right balance between objective analysis and expert judgment to best support implementation of an Ecosystem Approach to Management.

The Panel agreed with this statement, re-emphasising the relevance of this recurrent issue in science policy management processes.

2. The second comment questioned the accuracy and usefulness of some of the complex modelling techniques which are increasingly being used to guide policy and management decisions. Are we not in danger of over-reliance on models?

The comment was addressed by Temel Oguz, who indicated that model development is an iterative process and that there are many needs which have been outlined during the session to allow more accurate models to be developed, not least comprehensive *in situ* datasets. However, without ongoing work and refinement on model-based approaches, we are operating blind.

3. A further comment questioned the separation made in a diagram shown as part of presentation 4 (SEAMBOR) between social science and governance. The questioner felt that these are intrinsically linked and should not be presented as two distinct components.

Andrew Kenny responded that the diagram was designed to show how all of the different components must come together to underpin the Ecosystem Approach to Management. Whilst governance represents the definition of policy or the actual implementation of actions by decision makers, socio-economic science represents the scientific investigation of society and governance and is therefore included on the “science” side of the diagram. Whilst there are interactions, they are represented as

distinct elements here to clearly illustrate the different elements which must combine and integrate for successful implementation of EAM.

4. Links to presentations and speeches by speakers, and other documentation relevant for the workshop

The Marine Board/ICES/EFARO Position Paper on “Science Dimensions of an Ecosystem Approach to Management of Biotic Ocean Resources” (SEAMBOR), published in May 2010, can be downloaded from:

www.esf.org/marineboard/publications

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