

THE ECOSYSTEM APPROACH IN EUROPE'S SEAS

THE KNOWSEAS PROJECT MAKING MARINE SCIENCE COUNT

Dr Tim O'Higgins SAMS

Europe's regional seas have suffered severe environmental degradation. This damage not only affects the organisms living in the marine environment but also has impacts on the welfare of the human communities which are reliant on them.

The Ecosystem Approach to management, now being adopted by the EU, offers a means of sustainably managing our seas to optimize both ecological and social well being.

The one major obstacle is that nobody is quite sure how the Ecosystem Approach can be put into practice, and this is where the Knowledge-based Sustainable Management for Europe's Seas (KnowSeas) project comes in.

Over the course of European history human activities have had profound effects on our regional seas (North East Atlantic, Mediterranean, Black and Baltic). Unsustainable and damaging practices such as over-fishing, over-use of fertiliser, inadequate wastewater treatment, habitat destruction and the introduction of invasive species have all taken their toll on the health of our marine ecosystems. In turn the damaged marine ecosystems affect human welfare. For example, over-fishing leads to depletion of fish stocks with resulting losses to fishing communities; and eutrophication leads to reduced water quality, which damages marine organisms through

hypoxia and reduces the value of ecosystems as recreational resources.

Today, new uses for the marine environment are emerging. The scramble for increased renewable energy capacity is resulting in the construction of wind farms in marine spaces, with unknown ecological consequences. At the same time, we are gaining new insights into marine ecology, for example our understanding of the extent and importance of deep sea coral reefs, is growing. These developments all occur within seas already subjected to altering conditions caused by climate change. The resulting novel policy dilemmas require robust and well informed decision making which must include both ecological and social considerations.

Since human activities have profound effects on our oceans, and the seas affect human welfare, successful management of these coupled systems needs to include both ecological and human aspects. The Ecosystem Approach, now an element of policy in the EU Marine Blue Book and mandated in legislation by the European Marine Strategy Framework Directive (MSFD), is a resource planning and management approach that recognises the connections between land, air and water and all living things, including people, their activities and institutions.

Despite the legislative mandate to implement the ecosystem approach

and the sound theoretical basis for implementation, there is little hard information on how the approach should be put into practice. In particular, criteria for assessing costs and benefits of management actions are poorly developed in the complex marine environment where multiple uses and management conflicts are common. There is a strong need for a "joined up" systems approach between natural and social science, that delivers the knowledge base to support management for sustainable seas. This is what the KnowSeas project aims to deliver.

Implementing the Ecosystem Approach in Europe's seas requires expertise not only in ecology of marine ecosystems but also in the functioning of human, social systems and the ways in which they interact with the seas. Scientists from SAMS are leading an international team of researchers, which includes ecologists, economists, geographers and anthropologists. This team has been assembled with the aim of understanding how ecological, economic and social data can be brought together and effectively communicated to, and put into practice by, policy makers. Understanding the Ecosystem Approach requires a great deal of multidisciplinary thinking. Given the variety of backgrounds, knowledge-bases and skill-sets of project participants, the project has been carefully structured to allow an effective flow of information between different expert groups.



In the KnowSeas project, ecologists, economists, geographers and anthropologists from across Europe work together to develop a template for the implementation of the Ecosystem Approach to manage Europe's regional seas sustainably.

For example, the systems analysis subgroup is comprised of a think-tank of ecological modellers and economists. A diverse array of ecological modelling methods from statistical syntheses such as Integrated Ecosystem Assessment, to ecosystem models like Ecosim and the stochastic Bayesian Belief Network modelling, are being employed. These will be used to understand and predict how ecological processes and the ecosystem services they provide will flow to the people dependent on Europe's regional seas between now and the year 2050. The outputs of these ecological models will be flows of benefits obtained from the seas. These will be passed on to the economists in the subgroup. The economists will then translate the physical flows of benefits, modelled by the ecologists, into flows of economic benefits using the common currency of monetary values.

Translating ecological process into economic benefits is only one part of the Ecosystem Approach to management. Social and cultural differences between European peoples result in very different preferences, expectations and political cultures and these must all be

accounted for if the Ecosystem Approach is to be practiced effectively. Politicians and ecologists often speak a different language. While the ecologist counts in numbers of individual animals, species or populations, the politician counts in numbers of jobs and votes. To this end the second subgroup will focus on integration. Conversion of the systems analysis information into practical guidance for real world situations will be achieved by means of stakeholder analysis, examining the cultural differences in attitudes and expectations of the seas. The project is also developing a suite of communication tools to allow the transfer of knowledge from the specialist systems analysis group to decision makers to facilitate adaptive management practices.

Supporting the work of the systems analysis and integration subgroups are groups of regional experts and stakeholders from each of the regional seas. The broad geographic scope of the expertise will provide inputs to regional case studies. These case studies include a geographically explicit examination of the interaction between trawl fisheries, climate change and the cold water coral

Lophelia pertusa in the North East Atlantic; a study of the costs and benefits associated with the fishing of the critically endangered bluefin tuna *Thunnus thynnus* in the Mediterranean; a modelling study of the management dilemma caused by the destructive but lucrative fishery for the invasive whelk *Rapana venosa* in the Black Sea; and an examination of the social aspects of eutrophication in the Gulf of Finland. By carefully scrutinizing biological and social aspects of these issues the project will develop a template for the implementation of the Ecosystem Approach throughout Europe and this template will inform the way in which EU nations implement the Ecosystem Approach and the MSFD.

There has been intense interest in the project from within the Directorates General of the European Commission as well as other governmental groups: the International Council for the Exploration of the Seas (ICES), the European Environment Agency, regional seas commissions and non-governmental organisations such as WWF and the International Union for the Conservation of Nature (IUCN). The project is much more than an academic exercise. It has the potential to change the way in which people throughout Europe interact with the marine environment, and aims to achieve this through direct communication with the people who make the decisions.

Further information

www.knowseas.com



Title: Knowledge-based Sustainable Management for Europe's Seas (KnowSeas)
 Funding Instrument: EC FP7 Collaborative Project (Large-scale integrating project)
 Total Project Cost: 7,413,669 €
 EC Contribution: 5,764,200 €
 Project Start Date: 01/04/2009
 Duration: 48 months
 Consortium: 30 partners from 15 countries coordinated by SAMS
 Project Coordinator: Professor Laurence Mee