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Promoting Effective Governance  
of the Channel Ecosystem  
—  
Promouvoir une gouvernance efficace  
de l'écosystème de la Manche



# Marine ecosystems knowledge to support an ecosystem-based management approach.

## ABSTRACT

Human activities within the Channel region impose significant pressures on the marine environment, which contribute to human well-being through different ecosystem services provided by diverse ecosystems. Understanding marine ecosystems and their dynamics and translating this knowledge into practical measures is crucial to ensure sustainable management. In order to define the most appropriate management strategies/, tools are made available such as the ecosystems services assessment, scenario building, engaging stakeholders, or methods to assess the ecological coherence of marine protected areas (MPAs). This report discusses the tools developed or tested by PEGASEAS cluster projects.

## KEY WORDS

BIODIVERSITY  
DECISION-MAKING  
ECOSYSTEM SERVICES  
GOVERNANCE  
HUMAN ACTIVITIES  
INTEGRATED MANAGEMENT  
KNOWLEDGE  
MARINE PROTECTED AREAS

## DESCRIPTION OF KEY FINDINGS

### Introduction

The United Nations Convention on Biological Diversity<sup>1</sup> describes an ecosystem approach as “a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way”. Article 2 of that convention defines that an ecosystem is “a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit”<sup>2</sup>. While our knowledge and understanding of marine ecosystem dynamics is improving, the heterogeneity and complexity of the system, and the high level of uncertainty, make it extremely difficult to translate this knowledge into effective management. Across a number of projects examined by PEGASEAS, different tools have been developed, tested and used in the range of projects. Some are presented in this report including the assessment of the ecological coherence of MPAs network in PANACHE, the Ecosystem Service Assessment (ESA) approach trialled in case studies of VALMER or the scenario building exercise used in LiCCo and in VALMER. These tools should inform and support decision-making processes as well as promote effective, efficient governance.

<sup>1</sup> United Nations (undated). *UN Convention on Biological Diversity website*. Available at: <http://www.cbd.int/ecosystem/default.shtml>

<sup>2</sup> United Nations (undated). *Convention on Biological Diversity, Article 2, Use of Terms*. Available at: <http://www.cbd.int/convention/articles/default.shtml?ac=cbd-02>

### Managing marine protected areas: towards an ecological coherence

The use of scientific knowledge within an ecosystem-based management framework is examined by the PANACHE project which considers both evidence collection and the assessment of the ecological coherence of MPAs networks. Evidence collection, to inform decision-making, may consist of ecological and/or socio-economic data, for example, to monitor the location of features (habitat, species, etc) or the location of specific fishing activities. The evidence-based marine management cycle is a common framework for decision making used by the IFCA<sup>3</sup> which has undertaken a number of appropriate assessments<sup>4</sup>, within protected areas, investigating the impacts of proposed fisheries along the UK Channel coast. These include a study of the Portland mussel beds with fishing surveys, using a towed video sledge, and the use of data over the period 1991-2012.

Ecosystem-based management also occurs over a wider scale i.e. the network of MPAs. Several criteria have been identified by PANACHE to help build and assess an ecologically coherent network of MPAs. These are representivity, replication, adequacy, connectivity, level of protection, and resilience<sup>5</sup>.

A number of approaches for assessing and measuring ecological coherence of MPA networks have also been considered by PANACHE<sup>6</sup>. These include: (1) an expert knowledge based method which combines a scoring system with the subjective perceptions of the person allocating the scoring; (2) a matrix/spreadsheet reporting method which undertakes a species-habitat assessment and considers the spatial distribution of protected features and makes the use of existing data; and (3) the GIS-based spatial analysis to evaluate spatial distributions and is therefore less reliant on subjective opinions. The type of data required for these criteria and approaches are, for example, distribution maps of features, MPA network maps, list of features protected by MPAs, and biogeographic region maps. There is however a lack of data to assess the coherence of the network.

### Assessing ecosystems services: improving knowledge and informing decision-making

Ecosystem services have been defined by the Millennium Ecosystem Assessment<sup>7</sup> as the benefits people gain from ecosystems. Ecosystems contribute to human well-being through three types of services: (1) provisioning services, (2) regulating services and (3) cultural services. The fourth type of ecosystem services, supporting services, can be considered as those that allow the existence of the three others.

While assessing ecosystem services has a crucial role in integrating knowledge at the border of human and social sciences and ecology, it is also important to develop ways to make this concept operational and useful to management. Within the VALMER project, the ecosystem service approach is used at different management levels as the six study sites are different from one another as regards their management context. For example, while the *Parc naturel marin d'Iroise* is a well-established MPA with a Management council and an active 15 year-management plan, the *Golfe normand-breton* site is still under discussion. The management issues they are facing are thus different, and call for different ecosystem services assessment techniques. Different interdisciplinary methods are therefore being used to assess marine ecosystem services, ranging from social science techniques such as questionnaires to mathematical models (e.g. Kelp fields model). As such, the knowledge required and used refer to biophysical parameters (e.g. density of kelp fields) as well as socio-economic ones (e.g. how much people are willing to protect seagrass beds); and always depends on the ecosystem under study, on the type of ecosystem services to be assessed, and on the assessment approach itself. The first phase of assessment will result in a better understanding of the ecological system and the flow from ecological functions to societal benefits even though further research will be necessary to improve our knowledge on interactions between habitats, functionalities and ecosystem services. Economic valuation of ecosystem services take place in

<sup>3</sup> Association of Inshore Fisheries and Conservation Authorities. <http://www.association-ifca.org.uk>

<sup>4</sup> Appropriate Assessments are a requirement of Articles 6(3) and 6(4) of the Habitats Directive, for example, which requires any plan or project not directly connected with, or necessary to, the management of a European Marine Site but likely to have an impact on that site, to have an appropriate assessment of the implications of that plan or project. See: [http://ec.europa.eu/environment/nature/natura2000/management/guidance\\_en.htm--ad6](http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm--ad6)

<sup>5</sup> PANACHE (2014). Report on Criteria for Assessing Ecological Coherence of MPA Network, A Review. Available at: <http://www.panache.eu.com>

<sup>6</sup> PANACHE (2014). Report on Methods for Assessing Ecological Coherence of MPA Networks, A Review. Available at: <http://www.panache.eu.com>

<sup>7</sup> Millennium Ecosystems Assessment (2005). *Ecosystems and Human Well-being: Policy Responses*, Volume 3, page vii. Available at: [http://www.maweb.org/documents/document\\_772.aspx.pdf](http://www.maweb.org/documents/document_772.aspx.pdf)

several study sites, testing various methods (e.g. travel cost method, contingent valuation, choice experiment) and consider different types of ecosystem services. Also, tools to explore ecosystem services trade-offs are being used to produce management solutions which focus on sustainable use whilst ensuring/maintaining or restoring ecosystem function. Involving stakeholders in the process ensures a common understanding and ownership of these management outcomes.

A common cross-border understanding of the marine environment and ecosystem services should ensure the sustainable environmental development of the shared space within the Channel, and ecosystem services assessment should provide an ideal framework to achieve that understanding.



Shellfish farming in the Golfe normand-breton (© Xavier Desmier / Les Champs photographiques)

### Supporting decision-making under uncertainty: building scenarios

The Channel region (and wider seas and oceans) faces an uncertain future in light of climate change risks, changes in uses (e.g. fisheries, maritime transport), and technological developments (e.g. marine renewable energy). Two projects examined by PEGASEAS – LiCCo and VALMER – seek to develop scenarios (known as a prospective approach in France) to highlight different possible futures and their implications in the field of natural resources management and urban planning. Both projects stress the necessity to involve stakeholders as soon as possible in the process to ensure the effective use of scenarios in management. This is also a way to integrate local knowledge.

Climate change will affect communities living and working on the open coast, in particular the ones more exposed to onshore winds and wave action leading to a greater risk of flooding and more vulnerability to erosion. It is therefore important to understand how the coastal environment might change and whether the impacts will have a positive or negative effect on communities. Alongside the development of indicators of change (e.g. through the observation of coastal waders), the LiCCo project builds scenarios in order to understand how stakeholders and users of the Normandie coastal area might react to change by 2025 and 2050, and how their decisions might impact activities and local development. As part of the scenario building process, strong communication and sensitisation strategies have been implemented, towards the different stakeholders (e.g. local politicians, social and professional groups), which ensure an understanding of the issues at stake and relevant considerations during the scenario exercise.

In order to translate and apply ecosystem services concepts into operational management, the VALMER project undertakes a participatory scenario building exercise. Its goal is to link uncertainty about the future to current management considerations, creating a co-learning process by thinking of the future in terms of the ecosystem services we need, we want or we may impact. Knowledge acquired during the ecosystem services assessment is mobilised, along with new ideas, perceptions and facts brought by stakeholders during dedicated workshops. In the *Golfe normand-breton* study site, the scenario exercise seeks to characterize the evolution of ecosystem services in relation to the changes in some critical economic and ecologic uncertainties. To come up with these critical uncertainties, the 'pestle method'<sup>8</sup> has been used, engaging stakeholders in defining what they consider the most critical uncertainties to be taken into account and imagine how they could evolve in a near future. Among the panel of ecosystem services delivered by the marine environment, two have been chosen thanks to the application of a *triage process*<sup>9</sup>: a provisioning service offshore (e.g. fish harvesting) and a coastal cultural service (e.g. recreational activities).

A number of tools have been developed to support those participatory scenarios. These include: (i) a *numerical platform* to gather and organise multi-dimensional information, (ii) *economic and ecosystem accounting* to quantitatively assess current ecosystem services and their evolution according to each explored scenario, and (iii) *ecosystem service numerical modelling* to compare the potential gain or loss of ecosystem functionalities and services resulting from different societal choices and related cumulative pressures.

### Involving stakeholders: ensuring the inclusion of knowledge in decision-making

The CAMIS project addressed the challenge of preparing a platform for marine governance in the Channel region. This consisted of two key elements, the Integrated Maritime Strategy (IMS)<sup>10</sup> for the Channel and Cross Channel Forums. Both of these tools were supported by the Cross Channel Resource Centre and the Channel Atlas. The project also undertook action development work on several topics by involving stakeholders. The project demonstrated that it is essential to create an environment of involvement for stakeholders which leads to the ownership of decisions. In an attempt to link the decisions required to manage an environment as complex as the marine environment and management concepts such as ecosystem services it is essential to adopt an open and clear approach to decision-making.

The ecosystem services concept and results are, in fact, complex to understand and should be used with extreme caution for ecosystem based management. Stakeholders, especially policy and decision-makers, should be included at the very base of any tool development in order to better understand the uncertainty and limitation of generated results for management.

The success or otherwise of conveying the benefits of an ecosystem services approach to those in a position to make decisions is very much dependent on quality of the discussions, communication and involvement, and by also making sure that all parties affected by decisions are given an opportunity to participate in the process and contribute to the discussions. Both LiCCo and VALMER projects engage stakeholders, especially through the scenario building exercise, to ensure that decisions are both understood and supported by affected parties.

<sup>8</sup> The pestle analysis is a way to organize ideas, trends or possible futures into different categories (e.g. Political, Economic, Social, Technologic, Legal and Environmental) and to consider all the aspects of a problem.

<sup>9</sup> This "triage process" presented in Pendleton et al. (2014) is intended to help defining the aim, scope, methods and tool of the ecosystem services assessment in order to make it meaningful (interpretable), useful (in relation to management concerns, needs and projects) and feasible (according to the available knowledge and means). See: Pendleton, L., R. Mangruel, N. Beaumont, T. Hooper M. Charles, M. (2014) *A Triage Approach to Improve the Relevance of Marine Ecosystem Services Assessments*. Marine Ecology Progress Series, (submitted for publication)

<sup>10</sup> CAMIS (2013). *Integrated Maritime Strategy for the Channel Region: A Plan for Action*. Available at: [https://camis.acmanche.eu/stock/files/user4/13\\_247\\_Camis\\_doc\\_strategie\\_maritime\\_UK\\_BO\\_1.pdf](https://camis.acmanche.eu/stock/files/user4/13_247_Camis_doc_strategie_maritime_UK_BO_1.pdf)

## CONCLUSIONS/WORK LEADS

Various knowledge-based tools are developed and used in order to inform and support marine ecosystems management.

With regard to MPA management, PANACHE has demonstrated that knowledge can be used in its simplest form through evidence collection and into the evidence-based marine management cycle for assessing human activities' impacts for example. Other criteria and methods also require different knowledge in order to assess the ecological coherence of the MPA network and therefore provide better protection of the marine biodiversity.

In order to assess ecosystem services delivered by the marine environment, a framework combining biophysical data on ecosystems, monetary data and non monetary data on benefit flows has been developed. Then, so as to link uncertainty to the management considerations and create a co-learning process, VALMER seeks to build plausible scenarios to explore possible impacts on marine ecosystem services. This has the potential to help with ecosystem management by:

- allowing to involve the stakeholders of the sites which are using an ecosystem services assessment approach and by using the data and tools developed;
- linking the natural and human environments in order to understand the pressures and impacts of activities.

LiCCo is also using a scenario building approach, in conjunction with analysis of historical data and environmental monitoring systems to identify the possible impacts of climate change and to assist with planning to mitigate or adapt to such events.

CAMIS demonstrated the essential nature of open and transparent governance in the research of an agreement of actions that affect the marine environment. A platform for discussion, the 'Cross Channel Forum' was developed and highlighted the value of unambiguous information being available in a clear format. It also demonstrated the need to hear all voices from large governance structures or from small organisations and, in open discussion, critique these contributions. For the future, it is proposed that the tools developed in the CAMIS project are re-examined and refined with a view to establishing them in the longer term as a means of participatory governance.

Developing for the marine environment an ecosystem based management will require further development of innovative and operational tools and supporting methodologies. The projects discussed in this report use combinations of tools and methods which may be applicable to different sectors, regions, scales and over long periods of time. Further research is therefore needed to assess their applicability in this way.

PANACHE, VALMER and LiCCo are ongoing projects and further results regarding MPA management, ecosystem services and scenario building are expected.

*Authors: Carpenter Angela (Plymouth University), Charles Mahé (Agence des aires marines protégées), Dedieu Karine (Agence des aires marines protégées), Morisseau François (Agence des aires marines protégées), Pagny Julie (Conservatoire du Littoral), Vaschalde Diane (Agence des aires marines protégées)*