

MareFrame - Proposal Summary

KBBE.2013.1.2-08: Innovative insights and tools to integrate the ecosystem-based approach into fisheries advice

Deadline: 05 February 2013

Call: FP7-KBBE-2013-7 – single stage

Title: Co-creating Ecosystem-based Fisheries Management Solutions

MareFrame

1. Overview of Research Activities

The MareFrame project will develop new assessment methods and a decision support framework for the management of marine resources. Enhancing the capacity to provide integrated assessment, advice and decision support for an ecosystem based approach to fisheries (EAF), it will support the implementation of the Marine Strategy Framework Directive (MSFD). The project partner SMEs, together with RTD institutions and stakeholders, will develop and demonstrate the use of innovative monitoring systems and decision support tools for fisheries advice through training actions, role-play and workshops. Indicators of Good Environmental Status (GES) will be developed along with models for ecosystem-based management. The models will be evaluated taking multispecies approaches into account in accordance with FAO guidelines to the ecosystem approach to fisheries. Ecosystem models will be developed and compared on seven datasets of six European regional seas and then evaluated using a simulated ecosystem as an operating model. The project is of high relevance to the future management of living marine resources in the European countries in a changing environment, taking a holistic view incorporating socio-economic and legislative issues.

Learning from the experience in previous research projects, MareFrame integrates stakeholders at its core using a co-creation approach. Co-creation combines analytical and participatory processes to provide knowledge that can be usefully applied to policy-making and management. It provides an arena to optimize stakeholders' knowledge and capabilities, allowing for a collective improvement in the knowledge on the paths for implementing the EAF, elaborating and refining ideas on the basis of the results generated in the project. The design of work packages and the allocation of roles is focused on ensuring an effective dialogue and collaboration through the lifetime of the project.

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2. Background to the Research:

It has long been recognized by most national and international, scientific and political bodies concerned with the management of marine resources that the incorporation of a multi-species and ecosystem approach, is of utmost importance for future improvement of the management of fisheries and other living natural resources. Despite this general agreement on the importance of the subject, relatively little progress has been made in this field in recent years. Current models tend to be based on single species, not taking multi-species interactions into account. This typically results in an overestimate of the production capability of the system and quotas which are too high. Although the models being used today have been evaluated using simulations, real data sets etc., it is established (e.g. in the Baltic Sea) that multi-species issues are very important for management.

The project will address important issues within the Common Fisheries Policy (CFP), the Marine Strategy Framework Directive (MSFD) and Habitat Directive (HD), which call for the development of ecosystem-based management tools to improve fisheries and environmental management, to ensure preservation of the marine biodiversity and assess the environmental status of marine waters to proclaim Good Environmental Status (GES).

The circumstances, conditions and dynamics of the ecosystems have a clear impact on fisheries and fish stock dynamics. It is therefore important to have a thorough understanding of mechanisms controlling life history traits and plasticity within species, since time scale adaptations have broad reaching implications. It is critical to be able to predict how any given species or food-web structure will respond to changes within the ecosystem, since it can have significant implications for conservation strategies in an ecosystem-based management framework. Models

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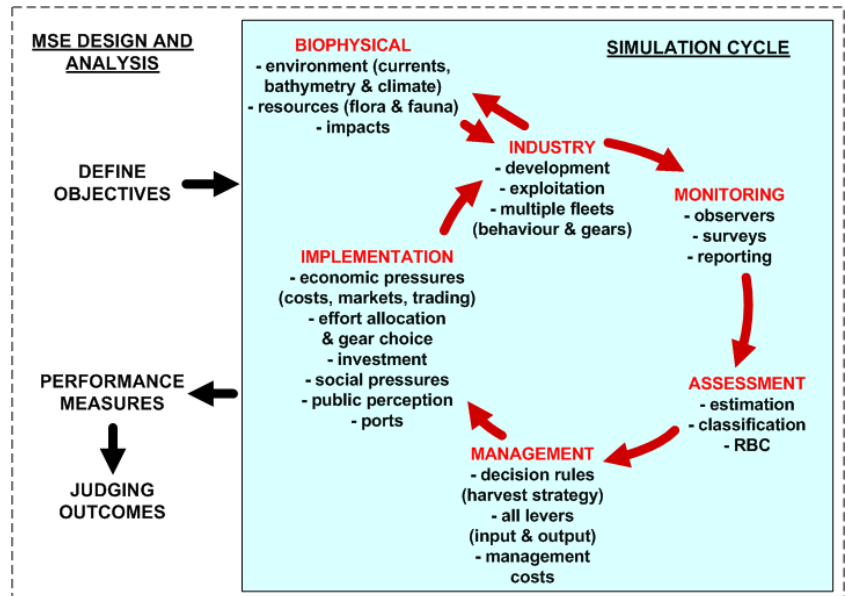
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are key tools for integrating a wide range of system information in a common framework. Attempts to model exploited marine ecosystems can increase understanding of system dynamics; identify major processes, drivers and responses; highlight major gaps in knowledge; and provide a mechanism to virtually test management strategies before implementing them in reality.

How

The approach used will involve an iterative management plan co-created with stakeholders, taking environmental, economic, social and legal issues into account using methods indicated in the figure¹, although the primary aim will not be a formal management strategy evaluation.

The outcome of this project will include development of innovative tools to simulate the impact on the ecosystem under different management scenarios in collaboration with stakeholders of marine resources. The aim is to contribute to the implementation of the CFP, MSFD and HD by improving ecosystem-based management in the European regions taking a multispecies approach into account.



The models and analyses will be used to address specific important issues in each case study. Although the modelling approach is well-defined from the outset, these specific applications will be defined during the co-creation phase of the project.

The project will address the following:

1. **New Tools and Technologies** will be used for developing new knowledge on population distribution, spatial patterns of spawning components, stock structure and definition, habitat preferences, species interactions (including food-web and predator-preys interactions), migration patterns, and biological parameters.
2. **Multispecies Assessment Methods** include fitting models to multiple datasets. Two main models (the statistical multispecies toolbox GADGET and Ecopath with Ecosim (EwE)) will be fitted to seven Case Study datasets representing six regional seas (Baltic Sea, North Sea, Northern Waters, Western Waters, Mediterranean Sea and Black Sea). Model results will be compared by area and both models and ecosystem indicators will be evaluated using the Atlantis-based simulated ecosystem. Of these models, EwE models tend to be holistic ecosystem models whereas GADGET models are formal statistical models, being consistent with FAO guidelines on Best Practise models for the ecosystem approach to fishery management.
3. **Decision Support Framework**. Set of policy options of the Case Studies for Managers involving iterative management plan developed with stakeholder and considering the socioeconomic responses.
4. **Training Actions and Cooperation of Stakeholders**.

The project is organized in work packages: WP1 provides a framework for integrating stakeholder knowledge and define strategic questions to be addressed; WP2 specifies how to integrate new data into assessments; WP3 develops database structures to be used throughout; WP4 specifies ecosystem processes to be implemented in multispecies assessment tools in WP5 and WP4 will also evaluate these methods. The case studies are all in WP6, which consolidates the data and uses the tools developed in WP5, providing feedback to WP3 on data needs and to WP4-5 on further processes which need to be

¹ From http://atlantis.cmar.csiro.au/www/en/atlantis/mainColumnParagraphs/00/content_files/file/atlantis_mse_cycle.gif where this describes methods for Management Strategy Evaluation. Here Atlantis will be used as an operating model to compare the performance of EwE and GADGET.

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implemented. Finally, WP7 will develop a decision support framework and visualisation methods based on the databases and WP8 will evaluate and synthesize project outputs.

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What is new about this approach?	Why now?
<p>There have been developments within the field of modelling tools and data collection is now greater than ever before. Widely different models are now used with extensive ecosystems data. A fundamental question is how well and consistently these models work for real ecosystems. This has created a need for comparing the models on the same datasets, to ultimately test the prediction of the models. It is a process that requires a sufficient historical data set. For the first time, the performance of such a broad spectrum of ecosystem based models will be developed, tested and compared systematically on the same ecosystem, and evaluated using the same underlying dataset. The new predictive monitoring system will be based on responsiveness, flexibility, stakeholders' responsibility and communication and developed and demonstrated through training actions, role-play and workshops with stakeholders.</p>	<p>As pointed out by DG MARE, the European fisheries policy is in urgent need of reform. Vessels are catching more fish than can be considered safe, exhausting individual stocks and threatening the marine ecosystem. Today, three out of four stocks are overfished: 82% of Mediterranean stocks and 63% of Atlantic stocks. The fishing industry is experiencing smaller catches and facing an uncertain future. Considerable changes are needed to make fishing environmentally, economically, and socially sustainable.</p> <p>The CFP is reviewed every 10 years, which gives an opportunity to implement new knowledge and tools into the marine management systems in Europe. The importance of this ecosystem approach to fisheries management has been highlighted by DG MARE, FAO, ICES, IWC and NAMMCO. FAO has recently provided guidelines on the Ecosystem-based approach to fisheries management and stakeholders show increased interest in sustainable management, e.g. through the requests for certification of sustainable fishing. These requests arise due to pressure from consumers, advocacy groups, general societal awareness of limited resources and environmental concerns.</p>

3. Main Results of the Research

Research Results	First Users of the Results
Evaluations and developments of scientific modelling tools, which can be used in a broad spectrum within ecosystem-based management.	Stakeholders, policy makers, ecosystem managers, recreationists, scientists, public officials, conservation groups, IGO's and NGO's.
Identify data requirements, set up ecosystem databases populated with data and create broad consistency of GES indicators.	Ecosystem managers, scientists, stakeholders, NGO's and IGO's
Decision Support Framework. Identification of the need for change in the practises of the management advice to achieve the principles of ecosystem-based management,	Ecosystem managers, stakeholders, scientists, IGO's and NGO's.
Innovative solution that ensure synergy between scientists and the managers.	Stakeholders, ecosystem managers, recreationists, scientists, public officials, conservation groups, policy makers, IGO's and NGO's.
Socio-economic cost-benefit analysis	Stakeholders, ecosystem managers, recreationists, scientists, public officials, conservation groups, IGO's and NGO's.

Partners: The proposal group (UI IS, MATIS IS, MRI IS, NRC UK, UABDN UK, SLU SE, NMFRI PL, NEST SE, CETMAR ES, INCDM RO, CNR IT, UH FI, UiT NO, Nofima NO, IFM-AAU DK, CSIC ES, IEO ES, UCT ZA, SLGO CA, CSIRO AU, NIWA NZ, SYN DK, SIM UK, MAPIX UK, STL UK) have been active both in fisheries research, modelling and its management in close cooperation with the industry. The partners have experience as consultants within strategic management, marketing and processing. The group is experienced both in co-ordinating and participating in FP6 and FP7 projects.

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Duration: 48 months

Expected budget: EUR 7.800.000

FP7 contribution maximum: EUR 6.000.000

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Specific Programme(s): COOPERATION

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The challenge of implementing the ecosystem-based approach to fisheries management requires development and best use of innovative scientific methods, new tools and technologies as well as new statistical, modelling tools and assessment methods that go beyond the single-species approaches which used to be, to a large extent, the main sources of scientific advice. It will also require adaptation of current management objectives and practises.

Tools and Technologies

The first objective of the project is to make the best use of new tools and technologies such as genetics, microchemistry, and isotope analyses to develop new knowledge on population distribution, spatial patterns of spawning components, stocks structure and definition, habitat preferences, species interactions (including food-web and predator-preys interactions), migration patterns, and some biological parameters such as growth and fecundity, for species targeted in fisheries carried out **in EU waters as well as for other species caught incidentally or are affected by fisheries because of related impacts on their habitats or food sources.**

Multispecies Assessment Methods

The second objective is to develop innovative assessment methods that address multispecies concerns resulting from biological interactions between species. This includes consideration of biodiversity, food-web structures and habitat impacts including indicators of these. A new range of approaches supporting the development of new assessment tools, **including ecosystems models** such as size-based models and **indicators of ecosystem function** (e.g. size based metrics, stable isotopes, etc), among other options, should be considered and developed. These approaches and the ecosystem models should be tested on data rich marine ecosystems with a long history of fisheries exploitation, as well as on data poor systems using simulations. The performance of these ecosystems models should be compared and evaluated with respect to their suitability for fisheries and environmental management purposes, and to their ability to predict responses of a multispecies community of fish to changes in fishing mortality. Future data requirements for correct implementation of these models should be also investigated.

Decision Support Framework

The third objective is to develop an innovative decision support framework that serves to provide an evidence basis for policy makers about the trade-off between various management options on a multispecies basis. The project shall utilise the assessment methods developed under the second objective as a basis **to develop interactive and integrated tools for decision support** and include a series of case studies of possible approaches, **involving iterative management plan** development with stakeholder involvement and considering the socioeconomic effects. Modelling development and management aspects should be based on close cooperation with the **fishing industry** in order to integrate fishers' knowledge.

Training Action

In addition, **training actions** will have to be planned between scientists and stakeholders (including fishing sector, international scientific organisations providing scientific advice on fisheries management and competent authorities for decision-making).

CASE STUDIES & DATASETS

The project should use available information (including historical data sets) from the EU Data Collection Framework. It should also liaise with other relevant national and international research initiatives (e.g. on-going FP7 research activities such as FP7 **ECOKNOWS, MYFISH and BENTHIS** projects).

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The project should address the regional dimension of the Common Fisheries Policy (CFP) and at least one case study should be developed in each of the following regional seas: Baltic Sea, North Sea, Northern and Western Waters, and Mediterranean and Black Seas.

International Collaboration

Participation of relevant partners from **Australia, Canada and New Zealand** will add to the scientific and/or technological excellence of the project and ensure effective uptake of ongoing international efforts for the implementation of the ecosystem-based approach to fisheries management.

Funding scheme: Collaborative Project (large-scale integrating project targeted to SMEs).

One project may be funded.

Additional eligibility criteria:

- The requested European Union contribution shall not exceed **EUR 6 000 000** per proposal.
- The estimated EU contribution going to **SMEs shall be at least 15%** total requested EU contribution. This will be assessed at the end of the negotiation, before signature of the Grant Agreement.
- The duration of the proposed project shall be maximum 4 years.

Expected impact: The project will provide new knowledge, methods, models and tools to support the integration of an ecosystem-based approach in fisheries advice and to support decision-making for ecosystem based fisheries and environmental management. It will be of high relevance to the future management of marine living resources and will support proper implementation of the new CFP, the Marine Strategy Framework Directive (MSFD) and the Habitat Directive.