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D2.15 Webbased model library tool with mapping on to GES indicators

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Dissemination Level		
PU	Public	x
PP	Restricted to other programme participants (including the Commission)	
RE	Restricted to a group specified by the consortium (including the Commission)	
CO	Confidential, only for members of the consortium (including the Commission)	



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1. Introduction

Marine Ecosystem Models are built on a diversity of approaches and programming languages to answer specific scientific questions. Each modelling tool is designed, programmed and optimised with a particular problem in mind, often focussing on particular components of the ecosystem. The resulting landscape of marine ecosystem models is thus as complex as it is diverse.

The Marine Ecosystem Evolution in a Changing Environment (MEECE) Project aims to improve the knowledge base on marine ecosystems and their response to climate and anthropogenic driving forces. To achieve this, a suite of modelling tools has been identified, each targeting the major trophic components of the marine ecosystem, from phytoplankton to exploitable fish resources. This diversity poses distinct challenges for the application and comparison of models, and for the assessment of the results across research teams and ecosystems, limiting the ability of environmental managers, policy makers and other stakeholders to make sound decisions.

One of the key aims of MEECE is to develop innovative predictive management tools based on the current generation of marine ecosystem models. A central step in this ambition is making the current generation of marine ecosystem models more transparent and usable by any competent user outside the original development team. Making source code accessible and readily usable is a skill in itself and a task that often does not make the list of priorities when there are pressing scientific questions to be answered.

To address such issues the MEECE consortium has provided, through WP2 (Advanced Ecosystem Modelling), a series of user guides to support competent users in use and application of a range of models.

2. The Model Library

The Model Library provides a source of key technical information for the application and modular coupling of key modelling tools. The objectives & approach of the Model Library are as follows:

Objectives

- To make existing modelling tools accessible and transparent: achieved through extending the use of the MEECE modelling tools by compiling the technical information necessary to apply each tool by competent, non-expert users (e.g. technical user guides, access to programming code)
- To provide modelling tools for Ecosystem Approach to Management (EAM) and to Fisheries Management (EAFM); achieved through the development of a prototype of a modular modelling software structure capable of assessing the impacts of both anthropogenic and climatic pressures on marine ecosystems, their environment and their resources

The technical information is presented as a series of users guides through Deliverables D2.3-D2.12 (<http://www.meece.eu/Deliv.html>) and together form the MEECE Model Library, available at <http://www.meece.eu/Library.aspx>. To increase the functionality and policy relevance of these guides the capabilities of the modelling tools in the Model Library have been mapped onto the EU's [Marine Strategy Framework Directive's](#) descriptors for [Good Environmental Status](#). Users are able to search for a modelling tool addressing specific descriptors in a geographic region of interest, or browse the technical content of the library.

3. MEECE Model Library interactive tool

The MEECE Model Library (Figure 1) provides and disseminates the technical information necessary for a competent, non-expert user to apply and evaluate a range of marine ecosystem modelling tools. The Library currently proposes modelling tools that can be applied in European Seas to address questions on 8 of the 11 GES Descriptors for the regional sea of interest. Technical information necessary to apply the ecosystem models is provided.



Figure 1. Web shot of model library tool show descriptors available

The aim of this tool is to create library of models in a 'stand alone' state with all necessary documentation, technical guides and metadata so that any competent programmer unfamiliar with the model, can perform integrated End-2-End numerical experiments necessary to assess how ecosystems are impacted by global change via drivers such as ocean circulation, ocean climate, ocean acidification, pollution, over fishing and invasive species.

4. Relevance to Policy

MEECE aims to expand the knowledge base on marine ecosystems` response to multiple pressures and provide innovative predictive scientific tools for the implementation of the EU`s Integrated Maritime Policy.

In support of this the Model Library provides the modular building blocks to construct coupled end-to-end models in order to answer questions with an Ecosystem Approach to Management (EAM) in mind, and test specific responses such as the impacts of pressures on marine biodiversity, consequences of invasive species or pollutant dispersal and eutrophication, under specific future scenarios.

The Model Library can be used to implement the IMP's Marine Strategy Framework Directive (MSFD), by allowing users to search for Good Environmental Status (GES) Descriptors and Ecological Quality Objectives (indicators). Figure 2 introduces the current suite of models available.

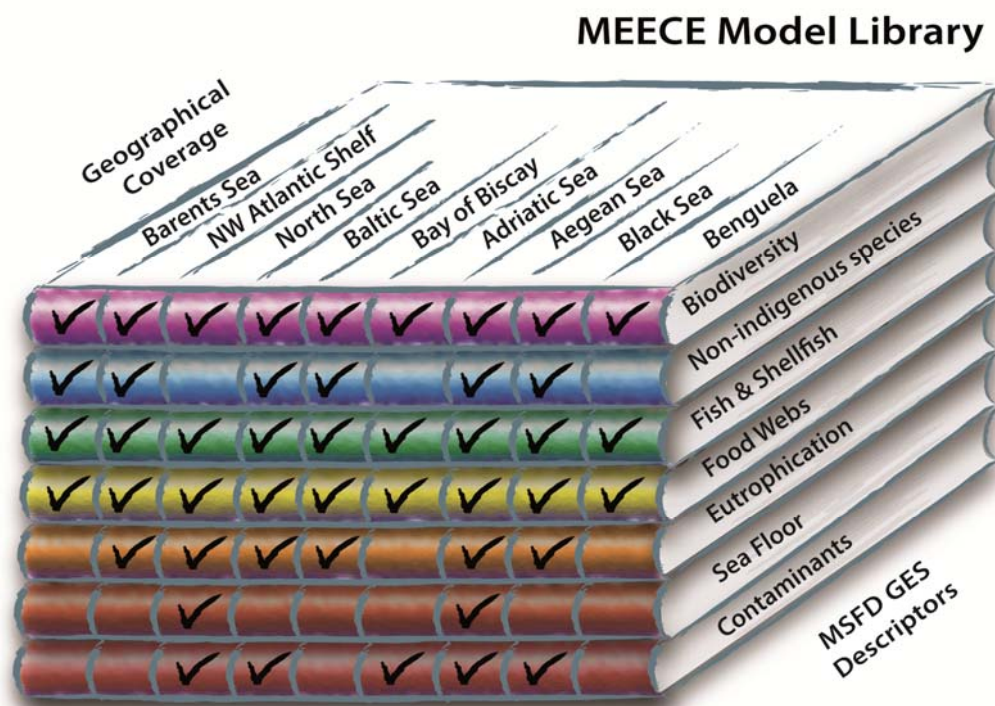


Figure 2: The modelling tools available by European Seas and per MSFD GES Descriptor. The Library will include additional models as documentation becomes available.

5. Future development

MEECE will continue to enrich the Model Library with both established and emerging modelling tools. Users and developers are encouraged to submit additional models for their region in order to expand the coverage for the European Seas and the full list of Good Environmental Status Descriptors.

During the last 12 months of the program, explored means to guarantee the longevity of the Modelling Library will include:

- possible integration of the Model Atlas (D4.4 Atlas of marine ecosystem climate response, due Sept 2012) into the Model Library, thus showcasing the potential of the modelling tools to end users, including model output, statistical measures of performance, and maps of the model application;
- tool autonomy: discussions are under way on possible means to allow autonomous community input into the Model Library;
- beyond project lifetime: the Model Library and Model Atlas (D4.4 Atlas of marine ecosystem climate response, due Sept 2012) forms the basis of a proposal to the Nordic Council of Ministers (NORDEN) to compile and visualise available model output by Good Environmental Status (GES) descriptor, in an easy-to-use web-based interface for non-experts & stakeholders (Appendix I).

6. Further details

For further information and updates please visit the MEECE model library tool at <http://www.meece.eu/Library.aspx> and see the fact sheet produced to highlight this produce http://www.meece.eu/images/KT/MEECE_FS2_web.pdf

Appendix I

NORDEN, Nordic Council of Ministers

Letter of intent by FP7 MEECE Partners DTU-Aqua, Denmark & IMR, Norway

Confirmed Nordic participants:

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Date of Submission: 1 Oct 2011

Short-listing Nov 2011

Full proposal to be submitted Feb 2012

Research data visualization to support environmental managers

Working title: "GIS for GES"

Environmental managers, policy makers, and the European Commission (EC) demand a set of simplified indicators that can reliably present the environmental status of their region with respect to biodiversity, overfishing & stock management, sea-floor integrity and habitat for economically important species. Such environmental indicators rely on a suite of observations, modeling and synthesis, and the data is rarely centralized and presented via a single web-based interface, so that managers and decision makers can visualize it easily in preparation for strategy formulation.

Nordic institutes are strong participants in EC proposals and generate significant knowledge that can be used to provide environmental indicators in the Baltic, North Sea and North East Atlantic. This knowledge and expertise, if categorized by environment indicator of interest to managers and visualized spatially via an easy-to-use web interface, could:

- provide easy and quick access to the latest EC-funded research on environmental indicators,
- promote Nordic institutes expertise to decision makers,
- centralize European project output by Nordic partners into a single platform.

Similar service is already provided by the Helsinki Commission (HELCOM) for the Baltic, but it cannot be expanded to the North Sea and North East Atlantic, and is not an open source platform.

An online resource of this type can build on the OASIS open source software developed by Trond Westgård at IMR (Norway) and would allow all environmental agencies in the region to develop further to their own need if required.

The platform would fit well into the objectives of the Marine Strategy Framework Directive to achieve good environmental status by all member states by 2020, and its development can be funded long-term by EC Framework Program proposals, as a knowledge transfer service between future research consortia and managers.

Proposed timeline:



Workshop early 2012: Technical workshop to explore choices of Open Source Software & define simple common data protocols, involving programmer/developer from all Nordic institutes and regional seas conventions.

Demonstration based on relevant data/model output from EC/national projects

15 July 2012: MSFD Initial Assessment of GES targets & associated indicators

Workshop late 2012: Categorise and visualize data and model maps by management-relevant indicators of environmental status, and integrate into the web-based interface (drawing on June 2012 EC member states consultation process for definition of Good Environmental Status indicators, and existing

scientific workshops planned in FP7 MyFISH & FP7 EURO-BASIN and FP7 HARMONY, and similar efforts by the European regional seas conventions).

Preliminary Budget (Danish Crowns)

2 x 120 000 DKK per workshop to cover venue and travel for GIS/IT/Scientific experts from each regional sea convention and key Nordic partners (Sub-total 240 000 DKK)

6 Months salary for GIS/programmer to built a demonstration based on recent research output (model & observations) (Sub-total 240 000 DKK; Total budget 480 000 DKK)