

MarBEF Theme 2: Marine Biodiversity and Ecosystem Functioning

RMPs: Progress Report, September 2007

Participants at the GBIRM meeting in Tjärnö, Sweden.

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The objective of Theme 2 is to generate theory, models and tests of the relationship between marine biodiversity and ecosystem function through the integration of theory, modelling, meta-analysis and experimental tests. The Core Strategic Programme (CSP) aims to provide a functional dataset with which to compare the activities of marine systems with those of terrestrial systems. In order to complete this dataset, analysis will consist of a co-ordinated strategy to determine rates of ecosystem functionality from a variety of benthic and pelagic ecosystems.

Theme 2 consists of 7 RMPs (see Table 1). The overall aim of these RMPs is to determine rates of ecosystem functionality in both benthic and pelagic systems, by generating theories, models and experimental tests of the relationship between marine biodiversity and ecosystem function. Details of the meetings and any downloads regarding the RMPs can be obtained from the individual RMP websites, while minutes of the kick-off workshops are placed as deliverables in the download section of the MarBEF webpage (www.marbef.org).

CSP progress

The task and deliverable list of the Theme 2 Core Strategic Programme (CSP) programme is now complete. The only outstanding deliverables are in the form of workshops, which are currently being organised and will be completed within JPA IV.

The third training course, "Measuring Ecosystem Function: Field and Laboratory Methods," was held in St Andrews in June 2007 and was met with great enthusiasm by

the participants. Due to the success of the course, funding was applied for through Work Package 7 (Training) and the workshop will be held again in the summer of 2008.

Theme 2 was involved in the cross-theme workshop "Ecological data to quantify goods and services," organised by Melanie Austen at Plymouth Marine Laboratory, the outcome of which will be a paper that will be ready for submission to a suitable journal by the month of December 2007.

RMP progress

GBIRM held their second workshop, "The role, in space and time, of boundaries and other transition zones on the evolution and the structuring of marine organism species and populations," in Tjärnö, Sweden, on 11-12 June 2007. The workshop included a presentation of the results of the North Atlantic discussion group, a report on the sampling trips in preparation, sample collections and what kind

Table 1: THEME 2 RMPs (RESPONSIVE MODE PROJECTS)

<i>WP-RMP code and title</i>	<i>Principal Investigator(s)</i>
4-1 RMP on Genetic Biodiversity (GBIRM) (www.marbef.org/projects/gbirm/index.php)	J.-P. Ferral
4-2 The role of native and/or invasive ecosystem engineers in explaining biodiversity	T. Bouma, P. Herman, T. Ysebaert
4-3 Marine Propagation Along the Coasts of Europe (MARPACE) (www.marbef.org/projects/settlement/index.php)	K. Philippart
4-4 Effects of biodiversity on the functioning and stability of marine ecosystems – European scale comparisons (BIOFUSE) (www.marbef.org/projects/biofuse/index.php)	T. Crowe, L. Benedetti-Cecchi
4-5 Functioning of FOOD Webs across ecosystems of different BIODiversity level (FOODWEBIO) (www.marbef.org/projects/foodwebio/index.php)	A. Sokolowski
4-6 Microbial diversity and ecosystem functions: concepts, open questions and recommendations for integration of microbes into general ecological frameworks	K. Jürgens, J.M. Gasol
4-7 Role of Secondary Metabolites in Ecosystem Biodiversity (ROSEMEB) (www.marbef.org/projects/rosemeb/index.php)	A. Ianora

of meta-analysis should be carried out. The next GBIRM workshop will be held in Crete (Iraklion, May-June 2008).

The second **MarENGIN** workshop was hosted and coordinated by Anastasija Zaiko and Sergej Olenin of KUCORPI, in Klaipeda, Lithuania (22-27 April 2007). During this workshop participants provided updates on their progress and offered contributions for a special issue of *Helgoland Marine Research* on the role of native and/or invasive ecosystem engineers in explaining biodiversity (expected publication date: May 2008, Volume 62:2).

The Theme 2 MarENGIN RMP workshop "Experimental assessment of the role of marine biodiversity on energy dissipation" (see MarBEF Newsletter 6:7) was followed up by a workshop at the Institut Mediterraneo d'Estudis Avançats (IMEDEA), organised and hosted by Iris Hendriks. During this workshop, the participants, including several partners from the RMP, wrote the bases for two joint papers.

MarSETTLE began their one-year sampling programme in December 2006, collecting bi-weekly samples. Water samples are being taken to determine the presence/absence of larvae of key species and for a few stations, standardised settlement panels have been deployed to determine the presence/absence of post-larvae (early settlers). Further research has begun at Texel on the importance of spatial scale on these results, and an overview of the species encountered will be published on the MarBEF website, including photographs, species' names and main features.

A workshop was held in Paris in June 2007 to discuss and solve the logistical problems that some of the partners were encountering, to check species identification and to discuss the results of the first six months.

The **BIOFUSE** meta-analysis is almost complete, with 28 datasets having been collated and analysed to date. Results were discussed amongst the BIOFUSE partners at the Roscoff meeting (see MarBEF Newsletter 6:5-6) and a final report on analysis of existing datasets (D2.2) was posted (Month 44, September 2007). The third set of six-monthly samples of biodiversity on rocky shores around Europe (9 partners) were collected in summer 2007. Simple experiments were set up in three habitats (rocky shores, soft sediments and seagrasses) and the last proposed sampling will be in February 2008.

Rocky shore sampling was carried out on five dates over an 18-month period. Measurements of community respiration and photosynthesis were taken in the summers of 2006 and 2007 by researchers from CNRS Roscoff, who visited each participant involved in the experiment and deployed a benthic incubation chamber. With the sampling now complete, the data is being collated in order to do some basic analyses prior to the next meeting. Two partners have completed the soft sediment

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Some ROSEMEB project participants.

experiment and, while the data analysis from NIOO is complete, the analysis of the data collected by USTAN is currently underway. The seagrass simple experiment was repeated during the summer of 2007 by two partners, and the analysis of extracellular polymeric substances was performed by IOPAS at the EMI field-site. The participants are now involved in the analysis of the samples collected during the experiments and the elaboration of results. Complex experiments have been set up at all of the six participating institutions, where plates have been deployed and each of the partners is currently establishing the required assemblages for the manipulation. The experiment itself will begin within the next month and continue until the end of 2008. Further information about all the experiments can be found on the BIOFUSE website (see Table 1).

During the last meeting the possibility of formally testing the perception of biodiversity and its conservation among European undergraduates on a European scale, in order to treat the outreach component of the BioFUSE RMP in an experimental context, was discussed. As a result of this, a very simple questionnaire was given to three groups of students across Europe: one group familiar with environmental sciences, one group attending economics classes and one group dealing with law (each group composed of about 50 students). The questionnaire addressed basic aspects regarding the state of the marine environment, the most widespread threats, and the role of European and local institutions in identifying conservation actions. This initiative also involved participants from Theme 3. Consorzio Nazionale Inter-universitario per le Scienze del Mare (CoNISMa) is compiling the dataset with the help of Luciana Muscogiuri. The analysis of responses will likely provide the network with better instruments for promoting public awareness and interest in marine biodiversity issues throughout Europe. A final workshop is scheduled to occur in Pisa (January 2008).

The last few months for **FOODWEBIO** have been devoted to completing acquisition of data on species diversity and the benthic

community structure (number of species, abundance, biomass) across a range of ecosystems on a wide European scale (IO UG, Gdansk) as a necessary prerequisite to linking food-web functioning with biodiversity. An extensive database (comprising 13 sites along the European coast) on stable isotope composition of carbon ($^{13}\text{C}/^{12}\text{C}$) and nitrogen ($^{15}\text{N}/^{14}\text{N}$) in various components of coastal ecosystems has been built at CRELA (La Rochelle) with the aim of identifying the origin of organic matter in various components of the systems studied, and to define trophic relations between species and groups (trophic) of organisms.

Relevant information for Network Analysis has been simultaneously collected (AWI, List) to unravel the interactions between the living and non-living components of ecosystems, and energy flow within them, and to quantify the flow of energy and materials between the system components.

During the last workshop, held in Arcachon, France (11-13 September 2007), project partners gathered to review the progress of **FOODWEBIO** and to discuss further development. Methods of data processing for assessing the potential relations of biodiversity of communities or systems and the efficiency of food-webs were established. The structure and content of a synthesis paper summarising the current state-of-the-art in the field of marine biodiversity and ecosystem functionality has been set up. It is intended to have separate presentations showing the output of the RMP with respect to two methodological approaches (the use of natural isotopes and Network Analysis) during the last MarBEF GA, prior to the World Conference on Marine Biodiversity in November 2008.

Future work within the **MarMICRO** RMP includes the creation of a website, and a conceptual paper, summarising the current understanding, differences between the research communities and gaps of knowledge.

ROSEMEB held a training course on "Chemical methods in marine ecology" in Naples (Italy) from 12-15 September 2007. The course covered traditional and emerging subjects concerning marine ecology, with the focus on modern chemical methods currently used to study inter- and intra-specific interactions mediated by secondary metabolites in benthic and planktonic communities. More details about the course (including programme and a picture of the flyer for the course) can be found on the ROSEMEB website (News section).

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