



## **1<sup>st</sup> BONUS BIO-C3 periodic report, publishable summary**

Recent international research programs, such as the Census of Marine Life (CoML) and Marine Biodiversity and Ecosystem Functioning (MARBEF) have emphasised that marine biodiversity remains largely unexplored and that diversity at the genotype, species, population, habitat and functional levels is closely linked to pivotal ecosystem features, such as stability and functioning. BIO-C3 targets all of the above levels in the Baltic Sea, and adopts a dynamic view on biodiversity by accounting for the evolutionary potential of populations and species to adapt. In doing so, it goes beyond traditional biodiversity inventories.

Key project objectives are to i) determine linkages between biodiversity and ecosystem functioning, ii) assess effects of interacting natural and anthropogenic drivers on biodiversity and ecosystem functioning as well as provision of goods and services in the past, present and future, and iii) evaluate implications and develop tools for an integrated, adaptive management of the Baltic Sea. To address these goals, BIO-C3 takes an interdisciplinary approach and combines a range of different disciplines, including molecular genetics, eco-physiology, community and food web ecology, macro-ecology, fisheries biology, oceanography, climatology and socio-economics. Process oriented studies including experiments, molecular genetics and ship based surveys within BIO-C3 will generate detailed and previously lacking knowledge, but can only address few species and selected habitats. As a second step, data from existing long-term data and sample series and new project results are thus applied in trait, community based, and ecosystem modelling. This allows us to scale up to the ecosystem level, and to use insights derived from the analysis of past and recent changes to improve predictions of possible futures of the Baltic Sea.

The scientific work since the inception of the project has been advancing according to plan, and we expect to be able to address the objectives described above. The key focus to date has been the creation of a solid data and sample foundation and the establishment of laboratory cultures required for the experiments, analyses and models to come. Highlights to date include significant progress regarding reviews of (1) environmental factors influencing distributions of selected Baltic species, (2) the effects of changing predation pressure on

benthic and pelagic species, and (3) the patterns and dynamics of drivers of biodiversity across Baltic Sea ecosystems in space and time. Project output to date includes ~50 public presentations and popular and peer-reviewed papers, e.g., on the quantification of environmental drivers, the distribution, spread and management of invasive species, and dynamics of Baltic key species in response to environmental drivers. While of interest in themselves, these results are even more important for BIO-C3 as stepping-stones that will feed into the analyses and modelling runs planned for the year 2015 and beyond.

BIO-C3 has made strong efforts to pass on the expertise of project personnel, and to use the project output, to inform stakeholders and policy makers in the Baltic realm and beyond. This includes contributions to the implementation of the MSFD, and the design of the Ballast Water Management Convention and EU marine fisheries research priorities, as well as advice to national policy makers and stakeholders on several occasions. The role of BIO-C3 I in the science-policy interface was reflected in the membership and participation of project personnel in a total of 99 committees and working groups in 2014, including ICES, HELCOM, EC, MSFD, UN, and OSPAR. Another benefit of the project activities has been the improved coordination of large-scale scientific activities in the Baltic Sea. This includes the coordination of the temporal and thematic coverage of research cruises of the consortium in the Baltic (9 in total in 2014), and the initiation of new collaborative activities (e.g., sampling initiatives of invasive combjelly *Mnemiopsis leidyi*, invasive round goby *Neogobius melanostomus*; assembly, data harmonization and collaborative use of long-term data series on meso-zooplankton, <http://kodu.ut.ee/~riina82/>). All of these activities will continue and are expected to increase further, as scientific output from BIO-C3 grows.

For 2015, we expect to take a significant step from data and sample acquisition and organization, towards new process based results and first modeling approaches. The BIO-C3 2015 meeting, scheduled for July 1-3 in Kiel, and the BONUS BIO-C3/BAMBI/INSPIRE Summer school “*The Baltic Sea: a model for the global future ocean?*” from July 5-11 in Glücksburg, Germany, will be used to strengthen collaborative links, and will place specific focus on the integration of new scientific information into the modelling and synthesis project work packages. New results will be highlighted in the joint BONUS BIO-C3/BAMBI/INSPIRE theme session “*From genes to ecosystems: spatial heterogeneity and temporal dynamics of the Baltic Sea*” at the 2015 ICES Annual Science Conference.

For more detailed information on BIO-C3, up-to-date information on project output, and project activities and initiatives, please visit us at [www.bio-c3.eu](http://www.bio-c3.eu).