



3rd BONUS BIO-C3 periodic report, publishable summary

Brief description of the project's overall goals and expected final results

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. BONUS 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. 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. In doing so, it goes beyond traditional biodiversity inventories, and will allow us to use insights derived from the analysis of past and recent changes to improve predictions of possible futures of the Baltic Sea.

Work performed in 2016

All BONUS BIO-C3 work packages are running, including disciplines from molecular genetics, eco-physiology, community and food web ecology, macro-ecology, fisheries biology, oceanography to socio-economics. Interdisciplinary applications, such as the integration of hydrographic and biological datasets via collaborations between scientists from different BIO-C3 work packages, has strongly increased. The new wealth of data from the completed deliverables of BIO-C3 has been applied in trait, community based, and ecosystem modelling, as well as in the testing of indicators, and exploiting these data pipelines will remain a focus in the synthesis work packages of in the remaining project period.

Main results achieved in 2016, and their impact and use

The scientific output from the project has yet again multiplied, and is mirrored in 38 peer-reviewed international publications in 2016 alone (cumulative total 81 up to now), addressing amongst others the quantification and projection to the future of environmental drivers, the distribution, spread, impacts and management of invasive species, and the dynamics of Baltic key species, communities and foodwebs in response to environmental

drivers and anthropogenic use. This progress was also reflected by the completion and publication on the BONUS BIO-C3 website www.bio-c3.eu/publications of the BIO-C3 scientific deliverables D1.2, D2.1, D2.2, D3.1, D3.2, D3.3 and D4.1 in 2016.

We have continued to make strong efforts to pass on the expertise of our BONUS BIO-C3 project personnel, and to use the scientific output resulting from BIO-C3 to inform stakeholders and policy makers in the Baltic realm and beyond. In 2016, this included contributions to the implementation of the MSFD by several of our partners, to the design of the Ballast Water Management Convention (ratified in 2016), to plans for an integrated non-native species monitoring programme within HELCOM, and to scientific fisheries management advice within ICES. The role of the BONUS BIO-C3 consortium in the science-policy interface was expressed in the continued strong membership and participation in a total of 99 committees or working groups in 2016, including those of ICES, HELCOM, EC, MSFD, UN, and OSPAR.

A continued benefit of BONUS BIO-C3 has been the improved coordination of large-scale scientific activities in the Baltic Sea, including the optimization of research cruises (10 BIO-C3 cruises in total in 2016), the expansion of the Baltic zooplankton network (<http://kodu.ut.ee/~riina82/>), and the completion of large-scale international sampling initiatives, e.g., of the invasive combjelly *Mnemiopsis leidyi* and invasive round goby *Neogobius melanostomus* across the Baltic Sea.

Other highlights from our consortium included the successful second installment of our BONUS BIO-C3/INSPIRE/BAMBI/COCOA summer schools, with the 2016 topic “*Modelling biodiversity for sustainable use of Baltic Sea living resources*” and the first BIO-C3 high school teacher training workshop “*Bringing Science to the class room: biodiversity in the Baltic realm – function, services and anthropogenic threats*” (see event summaries at www.bio-c3.eu/links). Moreover, as part of the BONUS supported clustering activities, BIO-C3 initiated the concept paper writing initiative “*The Baltic Sea: a time machine for the global future ocean?*” uniting 20 scientists from 8 BONUS projects, with a first workshop successfully completed in 2016 and a second, finishing workshop, planned for 2017.

For detailed information on BONUS BIO-C3, up-to-date information on project news, output, and past, present and future project activities, please visit us at www.bio-c3.eu.

Acknowledgements

The research leading to these results is part of the BIO-C3 project and has received funding from BONUS (Art 185), funded jointly by the EU and the Innovation Fund Denmark, Estonian Research Council, Academy of Finland, German Federal Ministry of Education and Research, Research Council of Lithuania, Polish National Centre for Research and Development, the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning and the Swedish Environmental Protection Agency.

