



BONUS

SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION

Annual report

2011



BONUS

BONUS is a joint Baltic Sea research programme producing knowledge to support development and implementation of regulations, policies and management practices specifically tailored for the Baltic Sea region. It issues calls for competitive proposals and funds projects of high excellence and relevance based on its strategic research agenda.

BONUS is supported by national research funding institutions in the eight EU member states around the Baltic Sea and the European Commission's Research Framework Programme. BONUS builds on the ERA-NET and BONUS+ programmes. The BONUS EEIG (Secretariat) is the legal management organisation of BONUS.

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Cover photos: iStockPhoto
Copy: Maija Sirola
Layout: Sole Lätti
Print: Uusimaa, Porvoo 2012

The BONUS annual report 2011 is published by the BONUS Secretariat
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Dr. Joachim Harms

Foreword

During the past year BONUS has continued to provide drive and momentum for scientific communities, policymakers, funders and others. The aim has been to coordinate research needs and resources, and to achieve our common aim of ensuring socially and economically attractive and ecologically stable environment for coming generations in the region.

In 2007 we developed the first stage of a joint research programme launching the BONUS+ Call. The research activities of BONUS+ have now ended. The presentation of the results showcased in Gdansk in October 2011 demonstrates the scientific success of each single project and therefore the success of the whole joint initiative. BONUS+ served as a sound foundation for the research agenda for the period up to 2017.

During the last years the funding organisations within the Baltic countries have demonstrated a strong will to cooperate and join forces. The cooperation is based on personal trust and fairness. The experience from BONUS+ confirms that a joint initiative is justified. It allows to address the respective national requirements and to look for joint solutions in a cooperative way. What counts as a real BONUS strength for the future is that we will try hard to further jointly support qualified research activities for a sustainable development of the Baltic Sea region.

Dr. Joachim Harms

Chair of the BONUS Steering Committee 2011/12
CEO, The Jülich Research Centre, Germany
Rostock-Warnemünde, 15 May 2012

Executive summary

In September 2011, the BONUS strategic research agenda 2011-2017 was published as a result of an extensive, 18-month long, region-wide effort. By the end of the year, of the results of the 16 BONUS+ 2009-2011 projects had begun. During the year, BONUS+ information about the critically important advances made in the Baltic Sea system research was shared in a number of key events.

In August, the final BONUS+ science conference convened as part of the 8th Baltic Sea Science Congress in St. Petersburg; in October the 2nd BONUS Forum was organised in Gdańsk on a stakeholder platform shared with the annual conference of the EU Strategy for the Baltic Sea Region that brought together policymakers and other stakeholders to learn about the newest research results; in November, representatives of the European community came together in Brussels for a BONUS+ information sharing questions and answers session.

Preparations towards opening future BONUS calls continued. First call(s) are envisaged to open in the first half of 2012 after a delay from the originally planned late 2011 call announcement. This was due to time required for the final negotiations to be completed and this way ensuring the widest possible participation in the BONUS programme for the years to come.

The following pages provide an overview of BONUS activity in 2011.

BONUS vision

Economically and ecologically prosperous Baltic Sea region where resources and goods are used sustainably and where the long-term management of the region is based on sound knowledge derived from multidisciplinary research.

BONUS objective

To integrate the Baltic Sea system research into a durable, cooperative, interdisciplinary and focused multinational programme in support of the region's sustainable development.

1 Background and context

BONUS vision, as well as its objective, has remained resolute since the inception of BONUS in June 2010 by the co-decision of the European Parliament and the European Council. While serving as the first model for the development of science-based management of the European regional seas, BONUS also resonates with global initiatives:

The inter-agency paper issued in 2011 titled *A Blueprint for Ocean and Coastal Sustainability* towards the preparation of the UN Summit on Sustainable Development (Rio+20, June 2012) notes that "... *the integration of science into institutional decision making, including policy creation, regulatory enforcement, and adapting to new knowledge as it is created is essential for the future*".

The global science conference *Planet Under Pressure: New Knowledge Towards Solutions* in March 2012 noted in its final declaration (delivered to the Rio +20, June 2012), that "... *the challenges facing a planet under pressure demand a new approach to research that is more integrative, international and solutions-oriented. We need to link high-quality focused scientific research to new policy-relevant interdisciplinary efforts for global sustainability*".

The policy landscape of today is a combination of Baltic Sea regional, European and global initiatives. BONUS works to

enhance the Baltic Sea region's research capacity to underpin the development and implementation of 'fit-for-purpose' regulations, policies and management practices on the macro-regional level – that is the level quoted by many to be the most effective in terms of tangible results. Through its macro-regional vision, BONUS also responds to some major environmental and key societal challenges that are shared on the European and global scales. Examples include adaptation to effects of the climate change and adapting to a sustainable way of living. While the Baltic Sea countries are involved in several global-level political agreements of key importance, also these contribute and shape the reality in which BONUS operates. In particular, important agreements are those dealing with the biological diversity, prevention of pollution from ships, and climate change.

The Baltic Sea Action Plan (HELCOM) and the European Marine Strategy Framework Directive underpin the activities of the BONUS community while also EU's new research and innovation programme 'Horizon 2020' and other EU policy instruments play a role in shaping the BONUS action. Through improved efficiency and effectiveness of the region's fragmented environmental research, BONUS contributes to the establishment and structuring of the European Research Area in the Baltic Sea region.

The Baltic Sea region is a geopolitical entity including countries neighbouring with the Baltic Sea: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Russian Federation (North-Western part) and Sweden. Eight of the Baltic Sea region countries are EU member states as well as participating states of BONUS. Half of the BONUS funding comes from the participating states of BONUS and the other half from the European Community.



2 BONUS in 2011

In 2011, BONUS...

- held the final BONUS+ annual science conference in St. Petersburg, Russia together with the 8th Baltic Sea Science Congress (BSSC). The BONUS scientists delivered nearly a quarter of the 400 reports presented at the BSSC. Eight out of 19 thematic sessions of the congress were initiated by the BONUS+ scientists. The high quality of presentations at the BSSC was quoted “unprecedented” by some leading scientists
- ran the BONUS Forum 2011 bringing together 80 representatives of ministries and other institutions across sectoral borders from the nine Baltic Sea coastal states to share BONUS+ projects’ results
- projects contributed to a total of 25 consultations carried out by the European Commission
- scientists served as members or observers in 220 stakeholder and scientific committees
- research resulted 26 times in modifications made to relevant policy documents and action plans
- projects made over 70 suggestions for designing, implementing and evaluating the efficacy of pertinent public policies and governance
- BONUS+ projects organised 12 postgraduate researcher training courses attended by 150 participants
- Secretariat was invited to speak in over 20 international events
- scientists attended over 350 international workshops, workgroup meetings and/or conferences.



On publicity, in 2011 BONUS...

- website experienced an unprecedented surge of 195 % in unique visitors in the last quarter of the year (in comparison to the same time period in 2010). The web traffic increased 34 % (in comparison to 2010), totaling 29 000 visits and 15 000 unique visitors over the 12 month period (www.bonusportal.org)
- e-bulletin recipients increased by 70 % since stakeholder mappings in BONUS member states were completed. Currently 2500 people across the BONUS member countries and stakeholder audiences receive BONUS e-bulletins and slightly over a quarter of them, on average, follow regularly link(s) provided (www.bonusportal.org/bulletin)
- published and distributed ca. 1000 copies of May and November issues of the BONUS in Brief newsletter that contains current news and views from the BONUS community (www.bonusportal.org/inbrief)
- posted over 70 news items on the BONUS website, the homepage and the news room (www.bonusportal.org/news) received most unique page views (15K), followed by BONUS 2010-2016 page views (10K) and About BONUS (7K)
- was interviewed, quoted and/or featured in the media over 200 times related to issues ranging from the research results to the views of the BONUS community
- projects produced over 60 popular science papers (with further papers in the pipeline for 2012)
- produced over 200 posters and other dissemination materials for national, regional and international conferences and stakeholder events
- issued over 20 recommendations aiming to improve general public’s comprehension and priorities regarding the Baltic Sea
- contributed in 90 occasions to development of dissemination products and/or events for general public concerning the marine environmental quality & human health and well-being.

2.1 Developing a strategic research agenda with and for the region

Much of the focus of BONUS in 2011 was realised in development of the strategic research agenda together with stakeholders across the Baltic Sea region. BONUS served as a common vehicle for key actors of the scientific community, policy makers and funders to share and coordinate the most critical research needs and this way contribute to the common goal of ensuring a better future for the Baltic Sea region.

The region-wide development of the research agenda was initiated in summer 2010. In March 2011, 70 representatives from the nine Baltic Sea coastal countries (eight EU member states + Russia) came together for the strategic orientation workshop convened by the BONUS Secretariat at Dikli Manor, Latvia. Based on the knowledge and information obtained throughout the process, a dedicated drafting team, together with the BONUS Secretariat, prepared the materials for consideration of the participants. The materials were derived from the summer 2010 open poll results, the national workshop reports and the BONUS Forum 2010 outcomes. By the end of the workshop, the participants had confirmed jointly five broad strategic objectives and 19 specifically defined themes for 2012-2017. (www.bonusportal.org/sra)

The objectives of the joint strategic research agenda and hence of the BONUS research programme are:

1. Understanding the Baltic Sea ecosystem structure and functioning.
2. Meeting the multifaceted challenges in linking the Baltic Sea with its coast and catchment area.
3. Enhancing sustainable use of coastal and marine goods and services of the Baltic Sea.
4. Improving the capabilities of the society to respond to the current and future challenges directed to the Baltic Sea region.
5. Developing improved and innovative observation and data management systems, tools and methodologies for marine information needs in the Baltic Sea region.

The next update of the agenda will be completed in 2013, again through a transparent and flexible process which will involve key stakeholders and take into account future knowledge demands.



2.2 Concluding the BONUS+ programme 2009-2011

By the end of 2011 unraveling of many of the key results of the 16 BONUS+ projects, funded with a total of EUR 22 million in 2009-2011, had begun. The scientific community, policymakers and other end-users learned about key results of the BONUS+ projects through a number of events and materials. Briefings and posters were produced in particular with end-users in mind (see '2.3 Interacting with stakeholders' for further information).

2.2.1 Highlights on impact of BONUS+

In the three year period of implementing the BONUS+ projects, the following contributions to science in policy interventions and mediation had been made:

Contributions to 37 consultations carried out by the European Commission. For example, BALTICWAY contributed to the consultations carried out by the European Commission on working documents of the Environmental Steering Panel and Energy Steering Panel of the European Academies Scientific Advisory Council; BALCOFISH advised in meetings related to the Marine Strategy Framework Directive Task Group Descriptor 8: Contaminants and pollution effects; BEAST provided consultancy and data on environmental genotoxicity in the Baltic Sea for the European Parliament members as well as for the EU Parliamentary questions to the Commission; ECOSUPPORT presented its model projections of the Baltic Sea to the European Parliament; IBAM served as a member of the Scientific, Technical and Economic committee for fisheries and its decision making; PREHAB took part in the European Commission online consultation collecting background information on maritime spatial planning and integrated coastal zone management for the impact assessment.

BONUS scientists as members or observers of 570 stakeholder and scientific committees. For example, across different BONUS+ projects, these ranged from a member in the ICES Working Group on Baltic Fisheries Assessment, ICES Working Group on Biological Effects of Contaminants and ICES Advisory Committee, to ICES/ HELCOM Working Group on Integrated Assessments of the Baltic Sea, HELCOM CORESET project committee for biodiversity and HELCOM TARGREV group for reviews on ecological targets for eutrophication. The BONUS+ projects had also members in the BACC II Science Steering group, Curonan Lagoon Transboundary International Stakeholder Committee, the Steering Committee of the EU FP7 Deep Sea and Sub-seafloor Frontier Coordinated Action and the EU FP7 Environment and Climate Change Advisory Group, to name only a few.





A total of 49 modifications to relevant policy documents and action plans. For example, input to HELCOM Monitoring and Assessment Group on core indicators and indicator fact sheets concerning eelpout as indicator species for contaminant and contaminant effects (BALCOFISH); drafting of national reports for the EU Marine Strategy Framework Directive Descriptor 8 (BEAST); methodology developed and used to calculate maximum sustainable yields for fisheries 'FMSY'-targets for ICES recommendations on Herring and Sprat that in turn was used as the basis of the recommendation from ICES to the European Commission (IBAM); expert comments on the governmental edict on the regulation of non point source loads of housing to the Baltic Sea (PREHAB).

A total of 153 suggestions by the BONUS+ projects for designing, implementing and evaluating the efficacy of pertinent public policies and governance. For example, during the final ECOSUPPORT/RECOCA stakeholder conference, the RECOCA scientist presented a concept titled An outlook to the future Baltic Sea: how can we reach the targets of the Baltic Sea Action Plan? to some 80 invited scientists and stakeholders; PREHAB provided advice on mapping and protection of fish habitats in marine protected areas in some 10 counties in Finland and Sweden; BEAST presented recommendations for CORE and Candidate bioeffect indicators for future MONAS monitoring in CORESET workshops in Hamburg, Helsinki and Klaipeda as well as at the Third Meeting of the Joint Advisory Board of the HELCOM CORESET and TARGREV projects; BALCOFISH provided input to the revision of the Danish monitoring programme for nature and environment 2011-2015 concerning marine monitoring of contaminants and pollution effects; AMBER results of the modelling efforts were taken into account in the plans of Lithuanian Ministry of Environment on activities in the Nemunas basin, also based on the project's results, a report for the Nida city municipality on eutrophication and public bathing possibilities was prepared.

A total of over 330 people worked in BONUS+ projects; some were involved in more than one project. Half of the BONUS+ projects included natural science and economics and/or social sciences in their workpackages. Interdisciplinarity was common in the BONUS+ projects although this can be much improved still in the composition of future BONUS projects. It is also noteworthy that the BONUS+ projects demonstrated throughout the implementation phase a considerable transnational flair. For instance, over 220 foreign scientists took part on research vessel cruises of BONUS+ projects in 2009-2011. On over 160 occasions foreign scientists worked in other major facilities used by the BONUS+ projects, stretching into a total of six years worth working days.

2.2.2 BONUS+ and young scientists

Early career researchers (i.e. young scientists) are highly valued and integral part of the BONUS research programme. During 2009-2011, a total of 99 PhD dissertations were prepared and 30 defended involving BONUS+ material. The high number of dissertations in preparation in relation to the number of dissertations defended refers to the time factor as three years is not enough for most of the doctoral students to finish their studies. Also, a total of over 30 PhD courses were organised by the BONUS+ projects with 370 persons participating. Over 30 modifications were made to current PhD course programmes that resulted from the work of the BONUS+ projects in the three year period. Furthermore, students working in BONUS+ projects visited different BONUS+ projects in 50 occasions of varying durations.

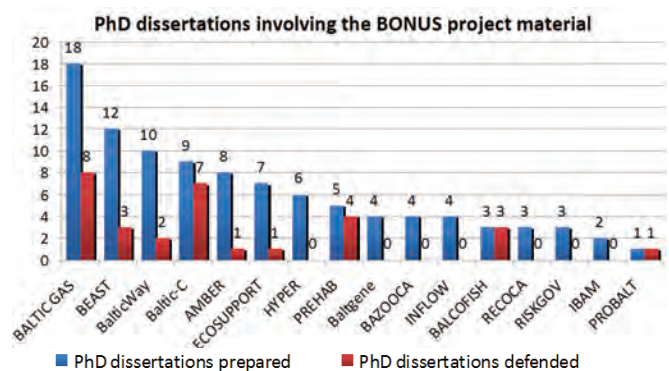


Figure 1. The number of PhD dissertations in preparation and the number of already defended PhD dissertations

According to the young scientists' feedback collected, "opportunity to network with other scientists of your field outside your country" was by far the most quoted impact that has resulted from being part of a BONUS+ project, followed by "opportunity to gather new data for your study" and "trust in practical usefulness of your study".

The BONUS EEIG supported activities for the young scientists included also three BONUS Young Scientist Club meetings convened in 2009-2011. The Russian State Hydrometeorological University in St. Petersburg hosted the most recent of these meetings in August 2011. Some 50 young scientists, attending the 8th Baltic Sea Science Congress and the BONUS+ final science conference in St. Petersburg that week, took part.



2.2.3 BONUS+ projects 2009-2011 – key results

The following pages present key highlights from the results of the individual BONUS+ projects. Further updates and developments can be found from the BONUS and project websites.

AMBER

www.bonusportal.org/amber

Assessment and modelling Baltic ecosystem response

- Present and future changes in precipitation patterns over the Baltic Sea catchment will cause a decrease in salinity and a loss of marine biodiversity
- Coastal areas of the Baltic have specific dynamics in nutrient cycling decoupled from the open sea. While terrestrial organic matter is an important component in river loads, its role is currently grossly underestimated
- The combination of climate and land use models indicate that it may be a major holdback to fulfill the environmental goals of the Baltic Sea Action Plan, if the demand for humans' animal protein consumption increases as projected



BALCOFISH

www.bonusportal.org/balcofish

Investigates chemical pollution by developing fish monitoring

- Collection of eelpout data into the BonusHAZ database, to be reported to ICES, provides a unique source of information that will enable us to follow chemical impact on fish in the Baltic Sea from both historical and geographical perspectives
- Ecotoxicogenomics provides new insight of impaired functions in fish from polluted sites and have as well provided suggestion of new biomarkers
- Laboratory exposure studies of zebra fish using chemicals at concentrations found in the Baltic Sea contributes to the identification of compounds possibly affecting reproduction in Baltic fish species
- Observations of intersex (egg cells within the testis) of male eelpout indicate the presence of endocrine disruptors in the coastal environment
- Eelpout population modelling indicates that the survival of early life stages is the most important factor for eelpout population growth and persistence. An important fact to consider as a high frequency of malformed and dead larvae is repeatedly found in the south of the Baltic Sea
- Genetic work gives evidence that eelpout has a stronger migration behaviour than earlier believed which is of major practical importance in designing field monitoring programmes for eelpout



BALTGENE

www.bonusportal.org/baltgene

Baltic Sea genetic biodiversity

- Current conservation policy lacks implementation for genetic biodiversity in the Baltic Sea
- Large gaps in knowledge on genetic biodiversity in the Baltic Sea have been identified with a very few species having acceptable levels of genetic data for proper management
- Species are in general genetically heterogeneous in the Baltic Sea which means that each species is divided into several more or less independent populations
- Commonly used methods over-estimate loss of genetic diversity in the presence of gene flow and many fish populations are not that seriously threatened than earlier thought
- Connectivity (dispersal) is a major factor for sustainability of most Baltic populations, being more important than habitat quality, and models are developed that can be used to predict optimal designs of Marine Protected Areas
- Genetic diversity support ecosystem function and resilience for seaweeds, indicating direct values of genetic diversity in addition to long-term values
- Release of fishes can compromise genetic diversity and local adaptation which should be taken into account during restocking

BALTIC-C

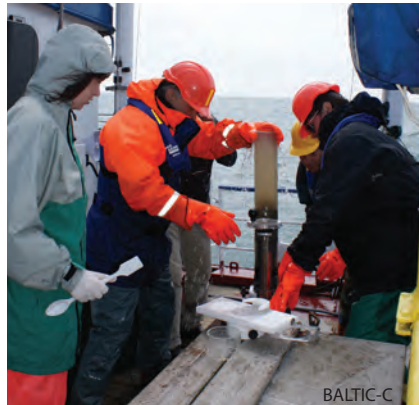
www.bonusportal.org/balticc

Building predicative capability regarding the Baltic Sea carbon and oxygen system

- BALTIC-C has developed the first integrated Baltic Basin (the sea and its catchment) model framework, addressing all major river inflows of inorganic and organic carbon, alkalinity and nutrients, atmospheric load and interaction with the North Sea
- Extensive field measurements have also been taken. For example, a fully automated system for the measurement of the surface water pCO₂ was deployed on a cargo ship that commutes regularly between Lübeck and Helsinki
- The high temporal and spatial resolution of the data facilitated the identification of different production periods in the Baltic
- Neither the post-spring bloom nor the mid-summer nitrogen fixation production

were consistent with the availability of nutrients and conflicted with our present conception of the surface water productivity

- These results have strong implications on the Baltic Sea modelling



BALTICWAY

www.bonusportal.org/balticway

The potential of currents for environmental management of the Baltic Sea maritime industry

- Development of a technique for environmental management of offshore sea areas that minimises current-driven risks for coastal regions
- Development of algorithms for the identification of the environmentally safest fairways
- Mapping of long-term behaviour and dispersion properties of surface currents in the Baltic Sea with the use of autonomous drifters
- Quantification of spatial and temporal variability of properties of the Baltic Sea wave fields

BALTIC GAS

www.bonusportal.org/balticgas

Methane emission in the Baltic Sea: gas storage and effects of climate change and eutrophication

- BALTIC GAS has developed a new interdisciplinary approach to map and quantify the occurrence of gas. The project has demonstrated where the hotspots of methane production occur, why methane accumulates to high concentrations, and how the barrier against methane emission is controlled
- Models of the evolution of shallow gas have now been calibrated against field data and are used to predict the future methane balance in the Baltic Sea under different scenarios of climate change and eutrophication. A critical factor is the accumulation of organic-rich mud in several of the oxygen-depleted basins where methane now penetrates up very close to the sediment surface
- BALTIC GAS has generated and compiled an extensive database for methane in the Baltic Sea which is the basis for the first GIS maps of methane and gas distribution in any marginal sea



BAZOOCA

www.bonusportal.org/bazoooca

Baltic zooplankton cascades

- Sprat and herring remain the main predators on zooplankton and because of that, fisheries continues to be the largest regulatory factor for the pelagic food web in the Baltic. The fishery policy thus remains the key tool for the management of the Baltic from higher trophic levels. Eutrophication and inflow of salty water are the other factors determining the trophic state of the Baltic Sea
- Predation impact from gelatinous predators is modest in the Baltic. The moon jelly (*Aurelia*) is the most important jellyfish and it reproduces throughout the Baltic Sea. Also, the lions mane (*Cyanea*) has recently been shown to reproduce in salinities as low as 12‰, but it is less common than *Aurelia*. In contrast, the comb jelly *Mnemiopsis* cannot reproduce at salinities below 6‰ and therefore it is confined to the western parts of the Baltic
- Earlier concerns regarding *Mnemiopsis* feeding on cod eggs were unsupported; the experiments showed that the jellyfish do not eat cod eggs. Thus, it constitutes no threat to the Baltic cod population. Due to its limited dispersal, it is not likely that the Baltic will experience a drastic change in the pelagic ecosystem from the introduced *Mnemiopsis*



ECOSUPPORT

www.bonusportal.org/ecosupport

Advanced tool for scenarios of the Baltic Sea Ecosystem to support decision making

- ECOSUPPORT has developed a multi-model system tool to assess the combined effect of climate change and nutrient loads to the Baltic Sea
- The tool demonstrates that as a consequence of changing atmospheric and hydrological conditions the overall water temperature is projected to increase and salinity to decrease. Such changes together with present loads will very likely lead to enhanced eutrophication, increased bottom areas with missing higher forms of life, so-called hypoxic areas, reduced biodiversity and increased risk for acidification
- To reach HELCOM targets for a Baltic Sea unaffected by eutrophication, nutrient load reductions are even more important in a future climate. For instance, under the Baltic Sea Action Plan scenario the future water transparency will not increase significantly and will even be reduced assuming present loads

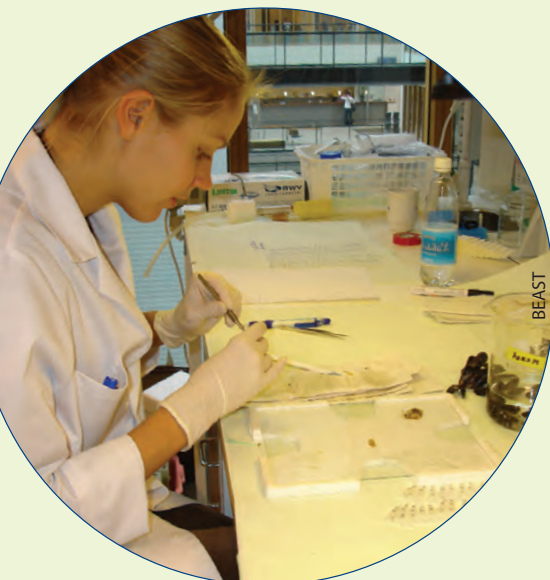


BEAST

www.bonusportal.org/beast

Biological effects of human induced chemical stress: tools for the assessment of ecosystem health

- Guidance on the application of biological effects methods for the assessment of impacts of chemical contamination on ecosystem health of the Baltic Sea have been developed and actively disseminated through practical training of staff
- A set of bioeffect “core indicators” for the Baltic Sea monitoring and assessment programme have been proposed: (1) general stress: lysosomal membrane stability (various species); (2) genotoxic effects: induction of micronuclei (various species); (3) reproductive impairments: embryo aberrations in fish (eelpout) and amphipods; (4) Fish Disease Index, based on externally visible diseases, macroscopic liver neoplasms and liver histopathology. In addition, two contaminant-specific indicators, imposex in marine snails and PAH metabolites in fish, are included as indicators of TBT and PAH contamination, respectively
- The most comprehensive database to date on various biological effects of contaminants on Baltic Sea organisms has been created. This allows comparison of data from various species in different sub-basins of the Baltic and the establishment of assessment criteria for various parameters and species



HYPER

www.bonusportal.org/hyper

Hypoxia in the open waters of the Baltic Sea

- Oxygen trends constructed by the project over the last 110 years show that hypoxia was confined to a spatially restricted area before 1950. Since then the hypoxic area has increased drastically to a present level around 60,000 km². Trends of hypoxia are closely linked with nutrient inputs
- Significant amounts of phosphorus are buried in the sediments in organic forms, when hypoxic conditions prevail. This pool of phosphorus will be remineralised during oxic conditions and bound to iron. If the system becomes hypoxic again the ironbound phosphorus is released to the water, potentially sustaining large harmful algal blooms. Thus, the Baltic Sea contains a potential 'P-bomb' that can be released with alternating hypoxic-normoxic conditions
- Denitrification is the most important pathway for removing nitrogen. Low oxygen levels induce a shift from denitrification to another process (DNRA), which recycles nitrogen back the water column. Moreover, the increase in hypoxia over time has displaced the zone of denitrification from the sediment to the water column
- Benthic invertebrates play an important role modulating nutrient cycles and enhancing ecosystem recovery. Hypoxia can be reversed, but it requires that nutrient inputs are first reduced to achieve oxygen levels suitable for these species to colonise. Bio-irrigating benthic organisms will speed up and maintain the recovery process after colonising the area



HYPER

INFLOW

www.bonusportal.org/inflow

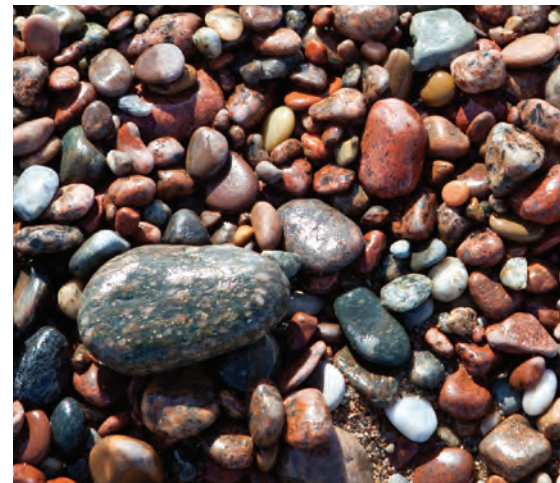
Holocene saline water inflow changes into the Baltic Sea, ecosystem responses and future scenarios

- Integrated modelling and sediment proxy studies reveal increased sea surface temperatures and extended seafloor anoxia (in deep basins of the Baltic Sea) also during earlier natural warm climate phases such as the Medieval Climate Anomaly. There is strong natural variability at millennial to multi-decadal timescale which will have some impact on the future Baltic
- Observations on past changes together with model simulations suggest that ongoing climate warming, predicted in Intergovernmental Panel on Climate

Change (IPCC) scenarios, will increase the environmental (anoxia) problems of the Baltic Sea



INFLOW



iStockPhoto

IBAM

www.bonusportal.org/ibam

Integrated Bayesian risk analysis of ecosystem management in the Gulf of Finland

- Interactive Bayesian decision models demonstrate that the exclusion of some risk factors underestimates the total risks
- According to an interview study, the expansion of common reed is the third biggest environmental concern for the people living by the sea
- The reed very likely continues to spread to new areas, which may result in further changes in the ecosystem
- Baltic Main basin herring has been overfished, and if the recommendations produced in this project concerning the fishing effort would have been available and applied earlier, a loss of approximately EUR 440 million would have been avoided
- The uncertainty due to the reactions of stakeholders must be taken into account when management actions are planned
- There is a need to further expand the use of modern risk analysis to Baltic Sea science and management

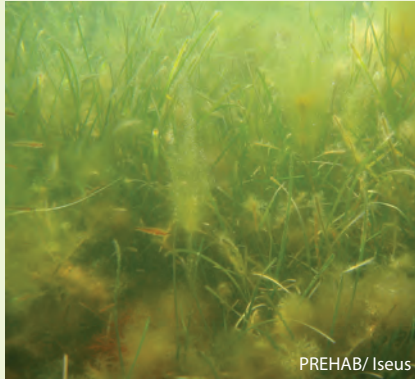
PREHAB

www.bonusportal.org/prehab

Providing tools for sustainable development of the Baltic Sea

- Predictive modelling allows managers to obtain useful maps on the distribution of species and habitats
- PREHAB's scenario analyses illustrate the usefulness of ecological modelling to explore ecosystem responses to environmental changes. Apart from revealing patterns that are important both from a biological and socio-economic perspective, it clearly demonstrates the absolute need to put management actions in a spatial context when evaluating alternative management measures
- The citizens of the Baltic Sea countries value a clean and healthy sea and are

willing to pay for mitigation actions, but between different areas of the region there are clear differences



PREHAB/ Iseus



iStockPhoto

RISKGOV

www.bonusportal.org/riskgov

Environmental risk governance of the Baltic Sea

- A more reflexive environmental risk governance needs to be developed by addressing eight general challenges: acknowledging uncertainty; multi-scale approaches; multisector approaches; interest, knowledge and value conciliation; path dependency; governance dynamics; governance plurality; monitoring and self-monitoring
- Assessment–management interactions need to be developed by addressing six key challenges: regional and ecosystem basis; integration of various forms of scientific knowledge; stakeholder participation; coping with scientific uncertainty and disagreement; interdependencies among environmental risk issues; transparency regarding diffuse and politicised science/policy interfaces.
- A more integrated system of stakeholder input/advice needs to be developed by addressing these challenges: how to reach fairness and competency in stakeholder representation; how to achieve stakeholder motivation and capacity for joining such a system; how to link regional advice with advice produced at other policy levels



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PROBALT

www.bonusportal.org/probalt

Improving societal conditions for the Baltic Sea protection

- On the basis of the case studies carried out in order to improve the Baltic Sea eutrophication governance, PROBALT puts forward four sets of measures that are urgently needed at various governance levels ranging from international to local:
1. A macro-regional, binding, cost-effective and fair agreement on the prevention of eutrophication in the Baltic Sea.
 2. Spatial and temporal specification of policies.
 3. More effective and thorough integration of different policy sectors.
 4. Increased publicity, environmental awareness, and deliberative democracy.

RECOCA

www.bonusportal.org/recoca

Reduction of Baltic Sea nutrient inputs and cost allocation within the Baltic Sea catchment

- Dramatic increases in fertilizer use are likely to occur in transitional countries, and there is a high risk that nutrient loads to the Baltic Sea, particularly from Poland, the Baltic states and Russia will increase
- Costs of achieving a cost-effective fulfilment of the targets set in the Baltic Sea Action Plan will undoubtedly be lower for the countries around the Baltic than the costs, which are incurred by these states under the present Baltic Sea Action Plan allocation of emissions reductions
- RECOCA enables decision makers to produce well-grounded recommendations on how to achieve cost-effective nutrient reductions programmes at regional and Baltic-wide scale



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RISKGOV/ Rosenbad

2.3 Interacting with stakeholders

Stakeholder involvement in BONUS is one of the key priorities of the programme. The stakeholders of BONUS include every person, group or organisation who/that affects or can be affected by the actions of BONUS. When executed well, and considered throughout the BONUS programme and its projects' implementation, the dialogue with stakeholders can have a considerable impact in improving the relevance of the research at the decision making level and in the society at large, stimulate and raise aspirations, develop knowledge and understanding and enable stakeholders to contribute to the region-wide, top research.

2.3.1 BONUS advocate network

The basis for stakeholder platforms was founded by appointing a dedicated BONUS advocates network in 2010 to work at the country level in the BONUS countries throughout the strategic phase of BONUS. The final hours of the advocate work were recorded in November 2011 and a report summarising the advocate work experience was published in December 2011 (downloadable at www.bonusportal.org/publications, category 'other').

The BONUS advocates network was an encouraging pilot experiment. Without it the amount of participating stakeholders would have been most probably less and more one sided than it was during the period. Advocates facilitated communication between different stakeholder groups especially between science, management, business and policy. The national workshops formed stakeholder platforms through which it was easier to form views on national priorities in the run-up to the completion of the BONUS strategic research agenda 2011-17.

A key tool for future BONUS stakeholder communication was achieved by completing country specific stakeholder mappings. This allowed BONUS to continue to build and involve a community of individuals working cross-sectorally across the Baltic Sea region. For instance, the number of recipients of the BONUS e-bulletin alone increased radically as a result of this activity. Also, the advocate work on the funding development has made a marked advancement in broadening the BONUS funding base and including eco-innovation in the BONUS research programme.

2.3.2 BONUS Forum 2011

The BONUS stakeholders, and in particular the policymakers, have a critically important role to play in the region wide partnership. In this context, the aims of the annual BONUS Forum are twofold. Firstly, BONUS Forum is the most important stakeholder and end-user platform where all the bespoke knowledge generated within the BONUS programme can be shared while ensuring a meaningful and direct dialogue between BONUS and policymakers. Secondly, the BONUS Forum acts as the key platform for integrating the decision making perspective into



Hanna Aho

BONUS Executive Director Kaisa Kononen (l.) in discussion at the BONUS Forum 2011 with Christian Alecke (middle), Federal Ministry of Education and Research, Germany and Joachim Harms (r.), Chair of BONUS Steering Committee and CEO Jülich Research Center, Germany

the development and updating of the policy-driven strategic research agenda.

The BONUS Forum 2011 focused on knowledge sharing, when on 24 October 2011 over 80 participants including representatives across different ministries and governmental research institutes from the nine countries surrounding the Baltic Sea came together. The participants learned about the BONUS+ projects key results. The day was facilitated through a series of posters, briefings and presentations by the 16 BONUS+ project coordinators on the most current and important research findings related to the Baltic Sea system. Videos of the presentations and all other materials can be viewed at www.bonusportal.org/bf11

The next Forum (2012) will begin to pave the way to the consultation process involving the policymakers regarding the updating needs of the BONUS strategic research agenda which is to be completed in 2013.

2.3.3 BONUS+ highlights to the European community

The BONUS seminar titled BONUS+ highlights to the European community, which was held in Brussels on 8 November 2011, provided an opportunity for a continued strong and transparent dialogue between BONUS and the European community. Those registered for the afternoon seminar represented different European Commission's General Directorates, regional offices, the European Parliament offices and the BONUS+ projects.

The focus of the questions and answers session facilitated by the BONUS Secretariat and presented by representatives of the BONUS+ projects was in some of the most critical challenges faced by the Baltic Sea region. Under scrutiny were issues related to the fragile biodiversity of the region, eutrophication and climate change and interlinkages between these two, the critically important science and policy interface as well as the life styles of the people living in the region that need adapting or changing for the good of the environment in order to sustain their own life quality in the long run. Voices from the floor commended the high quality answers/presentations.



2.4 Preparing for BONUS calls opening in 2012-2014

Besides the BONUS strategic research agenda 2011-2017 development and communicating the results of the ambitious BONUS+ pilot programme, a considerable effort in 2011 was put into developing necessary agreements, guidelines and other implementation modalities in preparation for the future calls.

BONUS will launch altogether up to five calls that are to be announced in years 2012, 2013 and 2014. These will invite proposals for projects that address strategic objectives of the research agenda.

The 'thematic calls' address the complexity of the Baltic Sea ecosystem, role and management of coastal areas as well as changes in the catchment. Also, research needs related to fisheries management and maritime risk management and pollution from shipping are included as are issues related to governance, policy, life styles and maritime spatial planning.

The 'innovation calls' in collaboration with the BSR Stars* are to be implemented in cooperation with innovation funding agencies of the participating countries. These calls address eco-technological approaches, aquaculture as well as measurement techniques and ICT services. They give small and medium sized enterprises a chance to participate actively in developing knowledge and products for the benefit of the Baltic Sea.

The maximum funding available for the five calls is EUR 100 million for the years 2012-2017. Half of the sum, up to EUR 50 million matching national contributions, is provided by the European Community Seventh Framework Programme, and the other half by the participating funding institutions. The first thematic and innovation calls to be launched in 2012 amount to maximum of EUR 40 million and EUR 10 million respectively. The opening of the first call has been delayed from the original opening time of December 2011 due to the final negotiations between all the funding partners in order to ensure the widest possible participation in the BONUS programme and calls.

When executed well, BONUS and the multidisciplinary science it supports, promises to take a critical role in the coming decade and beyond in finding solutions for some of the major challenges presently facing the Baltic Sea region and in making the region an environmentally, socially and economically attractive and wealthy place to live.

*BSR Stars is a flagship programme of the European Strategy for the Baltic Sea Region

2.5 Financial review of BONUS in 2011

Year 2011 was the last implementation year of 16 BONUS+ projects with the funding volume of ca. EUR 22 million. Altogether BONUS+ projects were funded by the eight Baltic Sea national funding institutions and the European Commission. Through the BONUS+ projects over 100 research institutes and universities have received funding. The final results of the projects' expenditure will be available later this year after the financial reporting is finished.

The work under the BONUS strategic phase continued in 2011 and the majority of the costs have been incurred from these core tasks towards the joint implementation programme. The strategic phase is funded jointly by the nine BONUS EEIG member institutions and the European Commission. The accounts for the financial year 2011 will be presented to the BONUS Steering Committee in June 2012. Prior to that financial details can be requested from the BONUS Secretariat.

3 2012 and beyond

In today's reality of an imperative need to seek solutions to complex problems, the BONUS fit-for-purpose research takes a considered measure to fill in the knowledge needs of the society and in particular the policymakers and other end-users. By doing so, it adds its critical part to the continued, joint efforts of ensuring long-term, sustainable ecosystem based management of the Baltic Sea region.

Based on the experiences gained from running the now ended BONUS+ pilot programme, BONUS will announce calls in 2012 and, through its transparent evaluation process, future projects will be selected and confirmed in the last quarter of 2012. The implementation of the first projects will commence in the first months of 2013 and further calls will follow next year. The BONUS strategic research agenda will be updated with the most current research needs identified prior the themes of the call 2014 are announced. For instance, so called 'blue technologies', including marine biotechnology and marine renewable energy, as a new emerging area, is worthy an exploration also in the Baltic Sea research context.

BONUS values partnerships and looks forward to continuing its work with other key actors such as HELCOM, VASAB, CBSS and many others that share the common goal of ensuring a better future of the Baltic Sea region. In addition, as a pioneering European macro-regional marine research governance network, BONUS has continued to collaborate actively with its partner projects like SEAS-ERA and MARCOM+ and looks forward to strengthening further the cooperation with the joint programming initiative Healthy and productive seas and oceans.

BONUS people in 2011:

BONUS members and related funding institutions:

Denmark: Danish Agency for Science, Technology and Innovation; Danish Council for Strategic Research

Estonia: Estonian Research Council (former Estonian Science Foundation)

Finland: FiRD Coop, Academy of Finland

Germany: Forschungszentrum Jülich Beteiligungsgesellschaft mbH; Federal Ministry of Education and Research

Latvia: Latvian Academy of Sciences; Ministry of Education and Science of the Republic of Latvia

Lithuania: Research Council of Lithuania; Ministry of Education and Science of the Republic of Lithuania

Poland: Foundation for the Development of Gdańsk University; Ministry for Science and Higher Education; National Centre for Research and Development

Sweden: Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning, FORMAS; Swedish Environmental Protection Agency

Russian scientists participated in BONUS in 2011 through special agreements.

BONUS Steering Committee:

Maija Bundule	Latvian Academy of Sciences
Eugenijus Butkus	Research Council of Lithuania
Jüri Elken	Estonian Research Council (former Estonian Science Foundation)
Erik Fellenius	Swedish Environmental Protection Agency
Leszek Grabarczyk	National Centre for Research and Development (Poland)
Joachim Harms (chair 1.7.-31.12.2011)	Forschungszentrum Jülich Beteiligungsgesellschaft mbH (Germany)
Fritz Köster	Danish Agency for Science, Technology and Innovation
Anna Ledin	Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning
Laura Raaska (chair 1.1.-30.6.2011)	FiRD Coop, Academy of Finland
Andrzej Tonderski	Foundation for the Development of Gdańsk University (Poland)

BONUS Advisory Board:

Valeria Abaza	Black Sea Commission Permanent Secretariat
Donald Boesch	University of Maryland
Anne-Christine Brusendorff	HELCOM
Siv Ericsson	BalticSTERN Secretariat
Ilkka Herlin	Baltic Sea Action Group / Cargotec
Karin Hilmer Pedersen	University of Aarhus
Gerd Hubold	International Council for the Exploration of the Seas ICES
Johanna Ikävalko	Finnish Meteorological Institute
Hans-Joerg Isemer	BALTEX
Pauli Merriman	WWF
Kostas Nittis	European Science Foundation Marine Board
Karin Nygård-Skalman	BSR Stars
Susanne Scherrer	Baltic Sea Region Programme 2007-2013
Pauline Snoeijis	Baltic Marine Biologists
Dzintra Upmace	VASAB
Violeta Velikova	Black Sea Commission Permanent Secretariat

BONUS Forum of Projects Coordinators:

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Joachim Dippner	Leibniz Institute for Baltic Sea Research Warnemünde, Germany (AMBER)
Lars Förlin	University of Gothenburg, Sweden (BALCOFISH)
Michael Gilek	Södertörn University College, Sweden (RISGOV)
Kerstin Johannesson	University of Gothenburg, Sweden (BALGENE)
Bo Barker Joergensen	Aarhus University, Denmark (BALTIC GAS)
Aarno Kotilainen	Geological Survey of Finland, Finland (INFLOW)
Sakari Kuikka	University of Helsinki, Finland (IBAM)
Kari Lehtonen	Finnish Environment Institute, Finland (BEAST)
Mats Lindegarth	University of Gothenburg, Sweden (PREHAB)
Markus Meier	Swedish Meteorological and Hydrological Institute, Sweden (ECOSUPPORT)
Anders Omstedt	University of Gothenburg, Sweden (BALTIC-C)
Tarmo Soomere	Tallinn University of Technology, Estonia (BALTICWAY)
Teija Tiilikainen	Finnish Institute of International Affairs, Finland (PROBALT)
Peter Tiselius	University of Gothenburg, Sweden (BAZOOCA)
Fredrik Wulff	Stockholm University, Sweden (RECOCA)

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BONUS is supported by the national research funding institutions in the eight EU member states around the Baltic Sea and the EU Commission's Research Framework Programme

