FINAL REPORT

Grant Agreement number: 217246

Project acronym: BONUS+

Project title: Multilateral call for research projects within the Joint Baltic Sea research programme

Funding Scheme: Coordination and support action (Coordinating), ERANET Plus

Date of latest version of Annex I against which the assessment will be made: 2.2.2011

Period covered: from to 10th May, 2007 to 9th May 2012

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4.1 Final publishable summary report

4.1.1 Executive summary

In 2008-2011 BONUS implemented sixteen transnational, collaborative research projects that had been successful in the BONUS+ call launched in 2007. Competition of the project proposals was high: 149 letters of intent were originally submitted responding to this call and 55 full project proposals prepared based on the first round of selection.

According to the independent observer´s report, the BONUS+ call was a very complex undertaking, which required complex management and governance structures. Selection of reviewers was of a high international standard. Conflicts of interest were efficiently avoided. The overall ratio of reviewers per application was however rather low and it was recommended to increase this ratio in further calls by involving more reviewers. This would reduce workload of reviewers and enhance reviewer expertise on covering proposed scientific topics.

The total committed funding in the BONUS+ call was EUR 22 020 493 including Russian participants. The average size of the funded project budget was ca. EUR 1 400 000 while the maximum allowed budget was EUR 2 000 000. All the project participants were to follow their national rules and regulations except for the non-Baltic participants (three from Norway and two from the Netherlands) who participated in BONUS without their national funding institutions and were therefore integrated under the Finnish rules and regulations and were contracted directly by the BONUS EEIG.

Throughout the implementation of BONUS+, the reporting made using the BONUS electronic proposal submission system proved this to be an extremely efficient and convenient management tool, both at the project and programme levels. Most of the information on the performance of the projects was collected through the BONUS electronic proposal submission system.

The interdisciplinarity analysis of the funded projects revealed relatively good balance and level of integration among the research disciplines within the projects. Nevertheless, the gap between the national sciences and the social sciences is still visible enough and more genuine cooperation between these groups shall be encouraged to achieve the BONUS objectives. BONUS management recognised the importance of collaboration among the projects and proactively facilitated the clustering activities and supported these financially.

In order to inform the broad spectrum of stakeholders and potential users of the research results BONUS has established two effective permanent stakeholder consultation platforms: the BONUS Forum and the Advisory Board. In addition during implementation of the BONUS+ projects a series of stakeholder events were undertaken, such as the “BONUS+ highlights to the European community” and the exhibit at the EUSBSR Annual Forum’s networking village.

Communication with the scientists involved in the BONUS+ projects was effectively maintained through the BONUS forum of project coordinators; also feedback from the scientific community was collected repeatedly, first at the mid-term and second time at the completion of the projects.

On top of the direct funding the BONUS+ projects received substantial support from the participating states through contribution of free of charge services by the research infrastructures. Altogether this contribution equaled to almost EUR 5 million during the BONUS+ implementation phase. The most significant infrastructure categories provided in kind were the research ships and the advanced computing facilities.

The results of the BONUS projects served as the basis of nearly a hundred of PhD dissertations in participating countries representing a variety of scientific disciplines. Thirty PhD dissertations featuring the BONUS material have been already defended. At the central management level the human capacity

building activities focused on arranging training courses, BONUS young scientist club, and collecting the dedicated feedback from the young scientists in order to assess the impact of BONUS on the early career scientists and their needs.

4.1.2 A summary description of project context and objectives

Background: The Baltic Sea is a semi-enclosed European inland sea forming one of the world's largest brackish water bodies. It is surrounded by nine Baltic Sea coastal states: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russian Federation, and Sweden. However, the drainage basin emptying into the Baltic Sea has a population of about 95 million people, from 14 states, situated in a catchment area that is about four times larger than the area of the sea. About 33% of this population lives within 50 km of the coast. Since formation of the Baltic Sea about 8 000 years BP, the region has been a major focus of human habitation attracted by the natural beauty and rich resources of the coastal and offshore areas. These resources have historically provided the basis for food security and trade within the region and with other regions, as well as many other socio-economic benefits.

Today, the Baltic Sea ecosystem is seriously impacted by many naturally and human caused pressures. This has reduced the capacity of the Baltic Sea to sustainably provide the goods and services upon which humans depend directly and indirectly for social, cultural and economic benefits. At the regional seas level in the European Community, the Maritime Policy and the Marine Environment Strategy Directive have recently been introduced to holistically integrate, focus and make more effective a raft of national and international policies, agreements and regulatory instruments. Their aim is to reduce marine pollution, conserve exploitable living resources and biodiversity, and tackle climate change while also ensuring sustainable human socioeconomic development. An important constituent is elaboration and implementation of the 'ecosystem approach to the management of human activities' in the European regional seas, the success of which must be supported by appropriate research and technological development (RTD) across a wide range of scientific disciplines.

The eight Baltic Sea states of the European Union together with the Russian Federation and the European Commission have collaborated within an ERANET project *BONUS for the Baltic Sea science – Network of Funding Agencies* with the aim to establish and implement a joint Baltic Sea Research programme under the article 169 (later article 185) of the EC Treaty. The mission of BONUS is to fund and implement a joint Baltic Sea regional research programme, thereby establishing durable cooperation of the Member States' research policies and their scientific communities in order to support the sustainable development of the Baltic Sea region. The goal of BONUS is to create a cooperative, interdisciplinary, well integrated and focused transnational research programme which will provide scientific outputs that facilitate the implementation of ecosystem-based management of the Baltic Sea environmental issues.

The specific objectives of BONUS are manifested in the eight interlinked themes of the BONUS-169 Science Plan[1] (www.bonusportal.org).

As a bridging measure towards the article 169 status, the BONUS - Baltic Organisations Network for Funding Science EEIG (BONUS EEIG), representing altogether 11 research funding organisations in the Baltic Sea states (Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russian Federation, and Sweden) opened a Call for multilateral research projects within the framework of the BONUS-169 Science Plan. Total amount of funding by BONUS for this call was approximately 22 M€, two thirds allocated by the

[1] The BONUS ERANET has published BONUS—169 Science Plan and Implementation Strategy, which defines the key research issues for the Joint Baltic Sea Research Programme. The Plan can be downloaded from www.bonsportal.org. It is also available in a printed from: Hopkins C.C.E., J. Thulin, J.G. Sutinen, K. Kononen, P. Snoeijs, S. Johansson & H.-O. Nalbach 2006. BONUS-169 Baltic Sea Science Plan and Implementation Strategy. BONUS Publication No. 5.
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participating funding organisations and one third by the ERANET Plus of the 7th Framework Programme of the European Community. The call is hereafter referred as BONUS+.

The objective was to open a joint call for research focusing on introducing ecosystem approach to management of the Baltic Sea. The funded research should enhance our understanding and predictive capacity about the Baltic Sea ecosystem's response to impending changes caused by both naturally and human induced pressures and about linkages between environmental problems and the social and economic dynamics in responding to them. In turn, the research should support formation of the basis for prudent management aimed at safeguarding the sustainable use of the ecosystem's goods and services.

Proposals were requested to focus on key research issues described in the BONUS–169 Science Plan under the scientific themes:

Theme 1: Linking Science and Policy
Theme 2: Understanding Climate Change and Geophysical Forcing
Theme 3: Combating Eutrophication
Theme 4: Achieving Sustainable Fisheries
Theme 5: Protecting Biodiversity
Theme 6: Preventing Pollution
Theme 7: Integrating Ecosystem and Society

In the evaluation process, priority was given to research projects linking themes 2-6 with 1 and 7 in an interdisciplinary manner. Interdisciplinary research among themes 2-6 was also encouraged. The duration of the funded projects was, in general, three years.

Specific research financed by the research council for biosciences and environment research

Proposals with a Finnish coordinator could be financed by the research council for biosciences and environment research at the Academy of Finland. It only financed projects with a potential to have strong impact on the environmental status of the Baltic Sea within the framework of the BONUS+ call. The project could, however, include a higher risk factor as regards its success in reaching its goal. It was recommended that research groups have a strong international set-up. Application procedure and evaluation went through the standard BONUS+ application procedure.

Pre-existing basis: The starting point for the BONUS+ call was the long history of cooperation in several fields of human activity in the Baltic Sea region. A recent study of the Finnish EU-office listed altogether 25 different networks in the region. In the field of research there are numerous networks, which bind together institutes, universities, scientists, and managers/regulators.

Networks of scientists and institutes. The networking of marine scientists in the Baltic Sea region has a long history starting in the beginning of 20th century through the establishment of the International Council for the Exploration of the Sea (ICES) in 1902, organising conferences of Baltic hydrographers from 1920s onwards and establishment of three scientific associations, Baltic Marine Biologists (BMB), Baltic Oceanographers (BO) and Baltic Sea Geologists (BSG) in the 1960s and thereafter.

In the 1990s the European Commission launched a specific Baltic Sea research programme as a part of the regional seas sub-programme of MAST III (marine science and technology programme). This was implemented by one huge multidisciplinary research project called BASYS (Baltic Sea System Study, 1996 - 1999) integrating more than 50 research institutions from all Baltic Sea countries. The two main objectives of BASYS were to further the understanding of the susceptibility of the Baltic Sea ecosystem to external forcing and to improve the quantification of past and present fluxing in the Baltic Sea. BASYS substantially enhanced the multinational, multidisciplinary research cooperation in the Baltic Sea region. Several EU funded research projects focused on more specific aspects of Baltic Sea research followed (e.g. CHARM,

SIGNAL) and further promoted networking of scientists inside the Baltic Sea region and with other European scientists. There have also been and are ongoing co-operative projects which are mainly funded by governmental marine research institutes (e.g. PEX'86, BALTEX). In the latter projects/programmes funding by national research agencies has been variable, in many cases minor, and in none of the cases has it been based on a common agreement between the funding agencies but rather as grants to individual scientists through national application procedures. Neither has it led to direct contacts or networks between funding agencies themselves.

International Council for Exploration of the Sea (ICES) has played an important role in networking of research institutes by organising intercomparisons, by introducing quality assurance procedures and by co-ordinating joint field studies. Likewise, monitoring and assessment carried out within the frameworks of Helsinki Commission (HELCOM) and International Baltic Sea Fisheries Commission (IBSFC) have maintained networks of institutes and their scientists. The governmental research institutes established a network, Baltic Operational Oceanographic System BOOS, within the framework of EuroGOOS, which joins 14 institutes to collect oceanographic data in real-time at a large number of locations. Despite the obvious synergistic benefits that could be reached by organising the shared use, networking and planning of present and future marine research infrastructures owned and managed by the institutes, it has not, so far, been done in the Baltic Sea area.

Networks of universities. Marine science is a rather specialised field of science. In general, the universities in the Baltic Sea region provide basic education, but the resources for advanced training are limited in each university. Major synergistic benefits could be reached if the post-graduate marine science education in the Baltic Sea region could be considered as an entity, and the post-graduate students had the opportunity to attend courses, supervising and other education in any of the Baltic Sea universities. Positive experiences about regional post-graduate training schemes have already been achieved within the nordic programme NorFA, (Nordisk Forskerutdanningsakademi), and a similar model could be applied to the Baltic Sea region.

Universities in the Baltic Sea region have a network called the Baltic University programme (BUP) that is composed of more than 170 universities and other institutes of higher learning throughout the Baltic Sea region. The programme focuses on questions of sustainable development, environmental protection and democracy. The aim is to support the key role that universities play in a democratic and peaceful development. A specific training programme for Baltic Sea research is not, at this stage, included in BUP.

The Nordic Marine Academy is research school established in 2005 with support from the Nordic Research Board (NordForsk) and the Nordic Working Group on Fisheries Research (NAF). It aims at strengthening intra-nordic research co-operation, expertise and innovation in marine sciences, and to enhance research training and mobility of researchers and research students. It covers all aspects of marine research with a particular emphasis on the exploitation, utilization and management of marine living resources and the impacts of human activities on marine ecosystems.

Regional agreements. In parallel with networks of co-operative research, observation, and education there are a number of regional and international agreements regarding management of living marine resources in the Baltic Sea region, in particular the Baltic Sea Environment Protection Convention (Helsinki Convention) and the past Convention on Fishing and Conservation of the Living Resources in the Baltic Sea and the Belts (Gdansk Convention). The protection of the Baltic Sea environment and its biological diversity has become fundamentally influenced by EU regulatory documents such the EU Water Framework Directive (2000/60/EC), the EU Habitats directive (92/43/EEC) and the European Marine Strategy Directive etc. The integration of these policies with effective management of marine resources and the environment, and with the requirements for advancement of science is, however, not sufficient.

Research programmes. In the Baltic Sea states, Germany and Russia have long-term national research programmes in the field of marine research. Finland, Sweden and Poland have shorter, more specific Baltic

Sea research programmes that have either ended, or are near their end, before the start of the planned joint programme. In these states, earmarking of funds was made for the joint BONUS+ call and the foreseen article 169 programme instead of maintaining or continuing separate national programmes. Latvia had established an aquatic research programme KALME. Lithuania was preparing a national research programme. Estonia had wider thematic calls where marine research was one component. Bilateral cooperation between national programmes had been established between Finland and Sweden (research programmes Wood Material Science, MICMAN, Svenskt i Finland - finskt i Sverige) and between Finland and Russia (Baltic Sea research programme BIREME, Nanotechnolgy programme FinnNano, Russia in flux, Substance use and addictions).

Funding cooperation. A sound pre-existing basis for cooperation between research funding agencies in the Baltic Sea region had emerged from the FP6 ERANET project *BONUS for the Baltic Sea Science – Network of Funding Agencies*. The project tasks involved a systematic step-wise approach to create a joint transnational programme. By the start of BONUS+, the participating organizations had agreed about the management of the jointly funded programme, its scientific themes and had allocated funds for the programme. In spring 2007, the organisations committed to fund the Joint Baltic Sea research programme establish a legal entityforl taking the responsibility of managing and coordinating the programme. Its legal form is European Economic Interest Grouping (EEIG) and it is registered in Helsinki.

All nine Baltic Sea coastal states participated in the BONUS ERANET project. The project was running from December 2003 till December 2008, and all partners participated actively in implementing the project tasks. There were altogether 163 people who actively participated in the project, as calculated on the basis of project extranet users. The project created collaboration relations with most of the networks in the region. In particular, it was invited to attend the meetings of the heads of delegations of HELCOM.

Relevance to EU Objectives: The European Commission has proposed an ambitious strategy to protect more effectively the marine environment across Europe. BONUS+ was therefore extremely timely. BONUS+ objectives were directly addressing the corner stone of the Marine Environment Strategy Directive by calling for research that supports introducing ecosystem approach to management.

BONUS+ initiated an interdisciplinary scientific model-system for the European regional seas by linking science and management that is inherent for the implementation of the European Marine Environment Strategy Directive. It provided a regional contribution to addressing key global challenges: climate change, the impact of increasing encroachment of human activities on coastal and offshore areas, and the consequences of these pressures on ecosystem structure and function.

BONUS+ was within one of the four common European spaces between Russia and the EU, as depicted by the Moscow summit meeting in May 2005. BONUS+ offered means for the Community to face the challenge of developing and applying a more proactive strategy for collaboration with the Russian Federation. BONUS+ was a new opening with major future challenges for research cooperation with Russia.

BONUS+ was an essential contribution to the EUs Northern Dimension Strategy.

BONUS+ was a successive step, following the newly established research funding cooperation with BONUS ERANET, in the progress of building Baltic Sea research area, among the ideas and principle of ERA.

Framework Programme relevance: Coordination of research is one of the key objectives of the 7th Framework Programme (FP7). It is obvious that coordination and real integration of research is most feasible in a regional scale. The Baltic Sea region has a particularly favourable starting point for such a collaboration because there are already a number of networks in various fields of societal life. Scientists have collaborated within Baltic Sea scientific associations and EU funded projects. It was envisaged that this objective would be reached optimally in BONUS+.

In the Specific Programmes of the 7th Framework Programme for research and technological development, special attention was paid to marine research as a priority scientific area, which cuts across themes. Under theme 6. Environment (including Climate Change), *Sustainable Management of Resources* was listed as an activity and there 'Management of marine environments' particularly emphasized.

Critical mass: Eight EU Member States and Russia participated actively in the BONUS ERANET project, and the BONUS+ call, thus all of the Baltic Sea coastal states were involved. According to the study performed within the BONUS ERANET project[2] there are altogether 111 research institutes and universities and 43 research vessels (excluding Russian vessels) carrying out Baltic Sea research in the region. In 2004, some 900 research projects were carried out. As each project typically involves several scientists, the number of research scientists can be estimated at several thousands. The number of collaborating institutes increased after the BONUS+ because the call stimulated and attracted new research cooperation, particularly in the fields of the social and economic sciences.

The above numbers, based on data collected from the participating countries, confirm that there is a sufficient critical mass in the form of the amount of infrastructure, scientific capacity and funding for research funded by the BONUS+ call.

Instrument relevance: The environmental and fisheries policy making is based on reliable assessments of the state and development of the Baltic marine environment and the status of the living resources as well as of the role of anthropogenic impacts. The scientific background for assessments comes from research institutes and universities in the nine Baltic coastal states. The institutes and their scientists have cooperated for decades.

The above-mentioned goals cannot be achieved and the current gaps cannot be filled with research carried out under conventional Framework Programme funding. The funding of Baltic Sea research and development (R&D) is nationally scattered, and has limited regional coordination and focus. The research needs arising from the goal of sustainable development for the Baltic Sea insufficiently reflected the initiatives and outputs of the region's scientific community, and *vice versa*. Furthermore, synthesizing and disseminating research outcomes for management, policy and decision-making purposes needed to be improved and better focused.

The Baltic Sea States had agreed to aim at creating a joint Baltic Sea research programme, which will be implemented under article 169 of the EC Treaty. ERANET Plus and article 169 are funding instruments where Member States are the driving force and where the European Community participates in the programme - in ERANET Plus by up of 1/3 of the total amount of the call. The BONUS+ call, including all its scientific and technical aspects, has completely been planned by the participating national funding agencies. Simultaneously it fulfilled central EU policy goals. The most appropriate way to implement such a programme is under article 169, which aims at deep integration of the Member States' research policies simultaneously fulfilling jointly agreed environmental policy goals. BONUS+ call is an important step towards the full implementation of BONUS-169, and therefore most appropriately implemented with ERANET Plus funding.

[2] BONUS Publication Nr 3: BONUS Publication Nr 3: Baltic Sea Research and Funding in 2004

4.1.3. A description of the main S&T results/foregrounds

4.1.3.1 Call management, evaluation, selection and funding of BONUS projects

BONUS+ call management

The BONUS+ funding was to be provided for transnational, collaborative projects based on division of work with high degree of scientific excellence as well as sharing of resources and data. All seven key research themes of the BONUS-169 science plan were open for the call (see chapter 4.3.4 for more details on thematic profile of the call).

Evaluation was carried out as a two-step procedure: Step one was the evaluation of letters of intent (LOI); step two was the evaluation of full proposals (FP). The evaluation was performed by international peer review, in the form of written review in the first step and a combination of paper and panel review by international experts in the second step. The submitted proposals were evaluated scientifically in both phases. In addition, the full proposals were evaluated against their relevance in relation to the knowledge needs for better management of the environmental issues of the Baltic Sea.

There were 30 reviewers of the LOIs, of which seven were women, and 11 panellists for the review of full proposals, of which two were women. From the 30 reviewers of the LOIs, the majority (about two thirds) came from the non-Baltic countries. Conflicts of interest were thus mostly avoided and occurred only in 6 out of 149 letters of intent. In all such cases the reviewers were duly replaced.

Reviewers were asked to give ratings for the main criteria as well as for subcriteria according to a rating scale, which ranged from 1 (poor) over 2 (fair), 3 (good), 4 (very good) to 5 (excellent). Half-step ratings were allowed. Both for LOI and for full proposals, also an overall score was required. The evaluation criteria were published in the dedicated call brochure[3] and on the web in the frame of the call. Both application and review process were web based, supported by the BONUS Electronic Proposal Submission System (EPSS) and managed by the BONUS Secretariat. For the time of the call a dedicated Call Task Force of representatives of the national funding institutions was established to support the BONUS Secretariat and to serve as the national contact points for the call.

The BONUS+ call was opened on 17 September 2007 and projects started on 1 October 2008. The total duration from the call preparation to the beginning of the implementation of the funded projects was approximately 20 months (see table 1).

Table 1. The chronology of the actions (from the BONUS+ call report by BONUS Secretariat).

Actions	Date
Preparing the documents and webpages BONUS+ Contract with the European Commission, Call text, Form A and Form B for BONUS Electronic Proposal Submission System (EPSS), evaluation forms for letters of intent and full proposal phase.	January-September 2007
Opening of the call	17 September 2007
Submission of the letters of intent	17 September-28 December 2007
Deadline for the letters of intent, 16:00 CET	28 December 2007
The call for letters of intent closed	28 December 2007

[3] BONUS Call for proposals www.bonusportal.org/files/67/BONUS_Call_for_Proposals_brochure.pdf

Searching for independent expert, evaluators and panelists, Invitation letters and e-mails	October-December 2007
Preparation of the other documents needed for the call and updating the webpages (Conflict of Interest rules, Agreement on having a Conflict of Interest, Personal data form for payment, Agreement on the evaluation)	December 2007-January 2008
Evaluation of the submitted letters of intent	14 January-15 February 2008
Rating the proposals. The letters of intent will be evaluated by international peer review. Each proposal was evaluated by three experts.	February-March 2008
Inviting highest rated proposals to submit full proposals based on the ratings and comments given by the evaluators, the Steering Committee decided which consortia are invited to submit a Full Proposal, approx. one third of the consortia were invited.	March 2008
Submission of the full proposals	15 March-14 April 2008
Deadline for the full proposals, 16:00 CET	14 April 2008
Planning and preparation of the panel meeting	January-May 2008
Evaluation of the submitted full proposals, and rating the proposals	April-May 2008
An international evaluation panel meeting	28-29 May 2008
The Steering Committee decided which projects will be funded, which are on a reserve list, and which will not be funded	18 June 2008
National Funding Decisions (depending on national decisions time schedule)	July-October 2008
The Steering Committee decides about the distribution of the EC funding	30 October 2008
Starting the Projects (depending on national decisions time schedule)	1 October 2008
The total duration from starting the call preparation to the beginning of the implementation of the funded projects of the call is approx. 20 months	

The broad spectrum of research themes, the strong interest of the Baltic Sea scientific community and the flexibility of the call resulted in the submission of 149 letters of intent from 19 different countries with an application volume of ca. EUR 190 million and with about 1000 scientists involved. The number of full proposals invited was 55. In addition to the work of evaluation panel the BONUS Steering Committee went through all 55 projects and took consensual decisions on recommendations for funding or rejection of each single project.

Lessons learned

- According to independent observer´s report by Rudolf Novak (Austrian Research Fund) the BONUS+ call was a very complex undertaking, which required complex management and governance structures. Selection of reviewers was of a high international standard. Conflicts of interest were efficiently avoided; the majority of evaluators came from the non-Baltic countries.
- According to Novak, the ratio of reviewers per application was rather low and should be increased in further calls by involving more reviewers, in order to reduce workload of reviewers and enhance reviewer expertise on covering proposed scientific topics. The evaluation process ensured impartiality and selection of proposals of high scientific quality in both steps of the evaluation. Reviewers in both evaluation steps gave ample feedback and recommendations in the frame of full surveys. Time frames were very tight, indicating that number of reviewers involved per proposal should have been higher. Organisation of the combination of paper- and panel review in the evaluation of full proposals could be improved. The decision making process of the BONUS EEIG Steering Committee both on letters of intent and on full proposals was impartial, fair and efficient. Preparatory work of the BONUS EEIG Secretariat and the Call Task Force were excellent, this as well

as indicators (ratings) played a central role. Quality and transparency of the decision process could probably be further improved by giving more time for the consideration of contents of reviews and applications in problematic cases.

- The BONUS Secretariat collected feedback from the BONUS+ call for proposals applicants and from both the letters of intent and full proposal phase evaluators. The applicants and evaluators were asked to fill in short questionnaires on the BONUS website at www.bonusportal.org. Only 15% of the applicants and 50% of the evaluators gave feedback. During the next call attention should be made to get the response rates higher.

For more information on BONUS+ call and feedback from scientists, see the BONUS+ call report by the BONUS EEIG Secretariat (www.bonusportal.org/files/117/2008_06_24_BONUS+_call_report_with_annexes_FINAL.pdf) and the BONUS+ call, independent observer's report by Rudolf Novak (www.bonusportal.org/files/116/BONUS-Call-08_Independent_observer_report_08-06-24.pdf).

4.1.3.2 Financial management

The total committed funding in the BONUS+ call was EUR 22 020 493 including Russian participants. The average size of the funded project budget was ca. EUR 1 400 000 while the maximum allowed budget was EUR 2 000 000. Altogether 16 projects and 137 participants within these were funded.

All the project participants were to follow their national rules and regulations except for the non-Baltic participants (three from Norway and two from the Netherlands) who participated in BONUS without their national funding institutions and were therefore integrated under the Finnish rules and regulations and were contracted directly by the BONUS EEIG.

Altogether nine national funding institutions provided funding to the BONUS+. The financial structure was based on an idea of a virtual common pot where the national funding institutions manage their national allocations and national participants. In BONUS+ the structure was realised as a mixed pot. Seven of the national funding institutions administrated financially their national participants and own national funding and transferred also the EU funding received from the BONUS EEIG to their national participants. Two of the national funding institutions opted for another solution and transferred their national funding to the BONUS EEIG to be managed centrally. These were the Estonian Science Foundation and the Academy of Finland. As a result, the financial management in BONUS+ was a mixture of national financial management and management done by the BONUS Secretariat.

The management structure was the basis for the contractual relationships. All the money and reporting flows followed the contractual relationships. The national funding institutions contracted (or made specific funding decisions with) their national participants. In addition, the BONUS EEIG concluded a co-financing agreement with each national funding institution bilaterally. The third layer of the contracting was introduced when the BONUS EEIG contracted directly 25 participants. The projects were also requested to conclude a consortium agreement including intellectual property rights, management of the project etc. The non-Baltic and Finnish participants were managed by the BONUS EEIG except for two projects whose Finnish participants received their national funding directly from the Academy of Finland's specific budget line. In addition, the BONUS EEIG contracted the five Estonian participants, but the responsibility of monitoring and approving their financial reports remained with the Estonian national funding institution - in the same way as with those national funding institutions who managed their own national funding. The reason for this was that the Estonian Science Foundation had the required competence of knowing the Estonian national rules and regulations. The volume of these contracts with the participants managed by the BONUS EEIG amounted to ca. EUR 4 515 000.

The realisation of the planned budgets was monitored at two levels: by the national funding institutions and/or by the BONUS Secretariat depending on with whom the participant had the contract.
The EU funding was managed centrally by the BONUS EEIG and the EU funding was transferred either to the national funding institution or to the Finnish, Estonian and non-Baltic participants contracted by the BONUS EEIG.

The figure 1 illustrates well the complex structure of the BONUS+ management. The project participants were reporting financially to those organisations with whom they had the contract. If a project participant was contracted e.g. by a German national funding institution, it was reporting to it and according to the German reporting deadlines and rules. If a project participant was contracted by the BONUS EEIG, the reporting was done to the BONUS EEIG and based on the Finnish rules. The exception here was the Estonian participants who regardless of the contractual relationship were reporting to their national funding institution i.e. the Estonian Science Foundation.

In addition, the national funding institutions reported to the BONUS EEIG who was responsible for submitting the joint programme reports to the European Commission. The EU funding was paid to the BONUS EEIG based on the approved reports and the BONUS EEIG transferred the funding in accordance with the approved reports to the national funding institutions. Those participants to whom the BONUS EEIG was paying the funding directly received funds as a total funding; there were no indications between the national and EU shares.

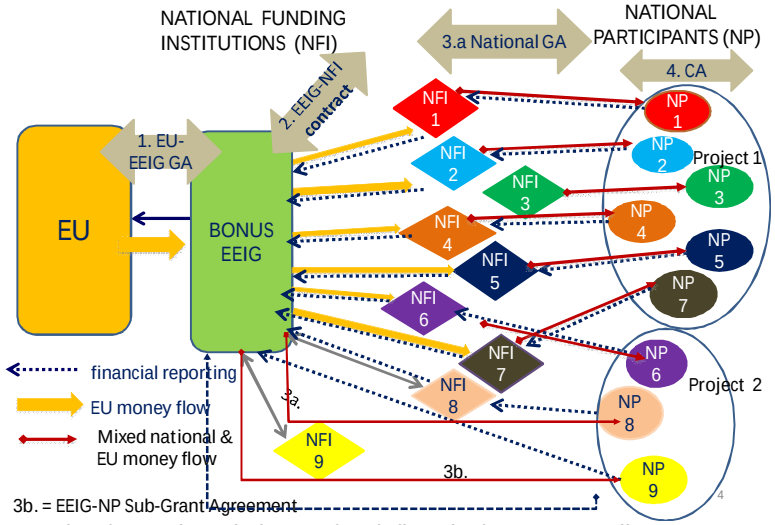

Figure 1. Contractual and reporting relations and cash flows in the BONUS+ call.

Committed funding

Allocation of the BONUS+ funding per country is presented in figure 2.

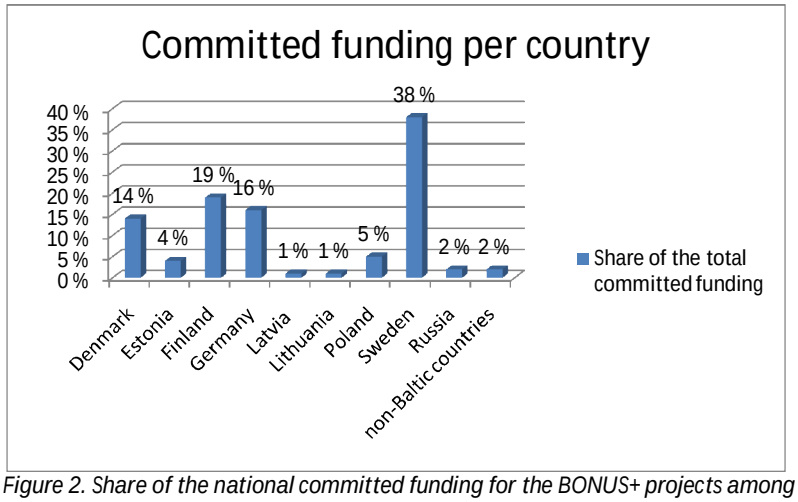

Figure 2. Share of the national committed funding for the BONUS+ projects among participating states.
A total of 38% of the funding of the BONUS+ projects was committed to the Swedish participants.

Differences in the committed funding between Finland, Germany and Denmark were small and varied from 14 to 19 %. Regardless of the country's size the Estonian participants (4% of the total funding) were rather successful when comparing e.g. to Poland to whose participants 5% of the total funding was committed. The smaller Baltic countries received small shares of the total funding.

The BONUS+ funding was compiled of the national and EU funding except for the non-Baltic countries for which only the EU funding is shown in the figure 3.

On the programme level, the EU funding for the BONUS+ projects is ca. 32%. On the country level the share of EU funding was varying depending on how much national funding had been allocated in the first place and how many participants from each country were in the selected projects. The total funding to the BONUS+ project participants was 100% of their approved, eligible costs regardless of the allocation between the national and EU funding. The non-Baltic participants received 50% EU funding and the other half was provided and reported as national co-financing. The Russian participants were funded completely by the Russian Foundation for the Basic Research.

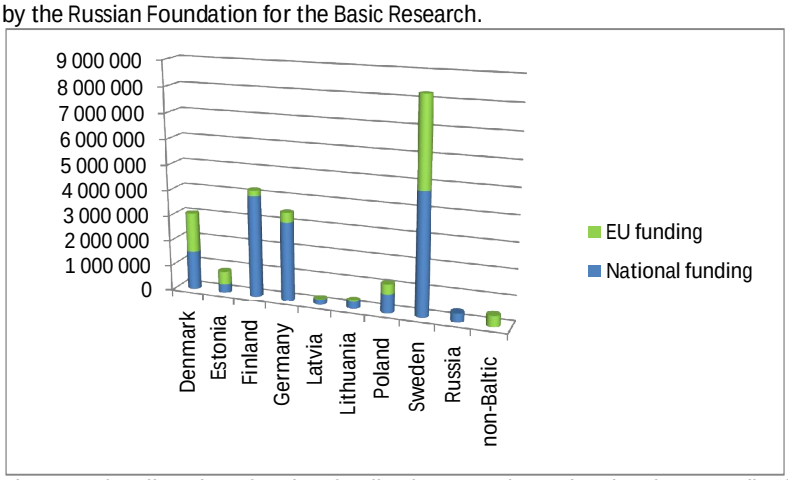

Figure 3. The allocation of project funding between the national and EU contributions per country.

Figure 3 shows how much EU funding was allocated for each country and its proportion in relation to the allocated national funding. The outcome indicates scientists' capability to consume research funding in each country. For those countries that have bigger shares in the EU funding, the national allocations have not been completely sufficient to fulfill the consumption capability by their national participants.

Division of the funding per theme is described in figure 4. The themes are those indicated in the BONUS+ call and from which the applicant had to choose from when submitting the application:

Theme 1+7 Linking Science and Policy and Integrating Ecosystem and Society
Theme 2 Understanding Climate Change and Geophysical Forcing
Theme 3 Combating Eutrophication
Theme 4 Achieving Sustainable Fisheries
Theme 5 Protecting Biodiversity
Theme 6 Preventing Pollution

Based on the allocated funding the theme 3 was the most popular with the share of 35% of the total committed funding. Except for the theme 4 which was not addressed at all, the other themes were addressed rather equally.

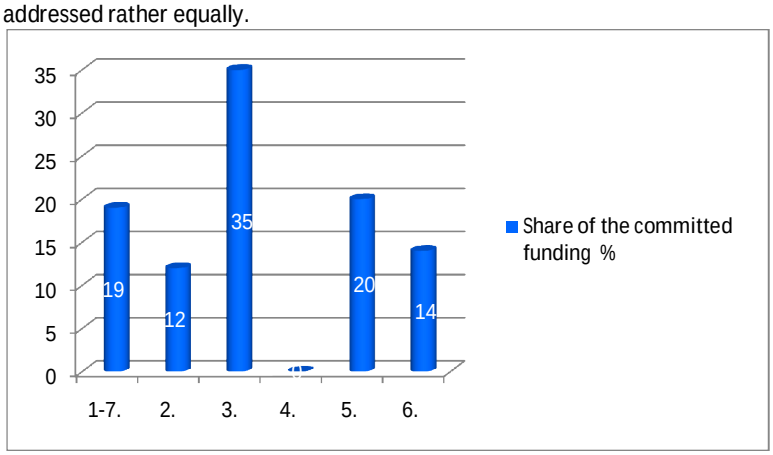

Figure 4. BONUS+ funding per call theme. See the titles of themes in the text.

Attribution of each of the BONUS+ projects to a sole science plan theme as indicated in the call is difficult and in many cases even impossible (see more on this in chapter 4.3.4). In order to assess the investment of the BONUS+ call into gathering new knowledge on different key policy-related questions and relevant within the programme scope, the projects were grouped in accordance with their contribution to the various problem-oriented sessions at the BONUS Forum 2011 (see more on the BONUS Forum in chapter 4.4.1). These key policy-related questions are:

- Question I How to make decisions concerning the Baltic Sea in the face of multiple risks and stressors
- Question II What can be learned from the past - and future scenarios - of the Baltic Sea
- Question III How to manage nutrient loads for the good of the Baltic Sea
- Question IV How to ensure a healthy state of the biological diversity in the Baltic Sea

Figure 5 shows that most of the funding was allocated to Question II "What can be learned from the past - and future scenarios - of the Baltic Sea". It represents 36 % of the total funding allocated.

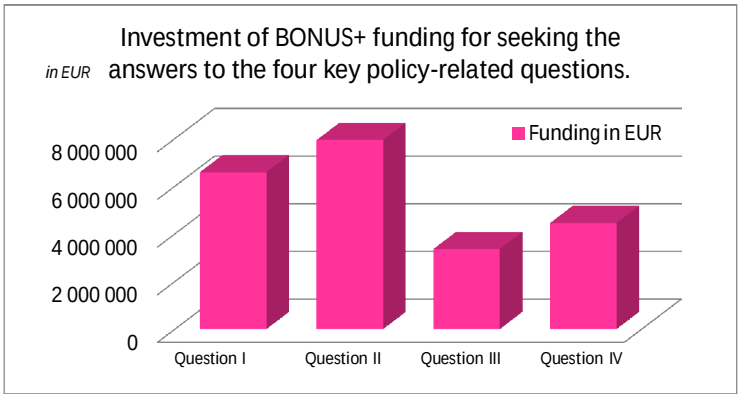

Figure 5. BONUS+ funding profile in accordance to the key questions addressed by the projects. See formulation of the key policy-related questions in the text.

Programme closure

The final reporting and closure of the BONUS+ on the programme level is ongoing and will be finalised in 2012. The BONUS EEIG had also the responsibility to organise on-the-spot checks based on the approved audit plan. These checks have been targeted to the participants with whom the BONUS EEIG had contracts. The checks were started in 2010 and they will be completed in 2012. Altogether 12 checks have been planned to be implemented during this timeframe. For the other participants the respective national funding institutions are responsible for the carrying out the checks and verifications in accordance with their national rules and regulations.

4. 1.3.3. Scientific reporting and progress monitoring

Negotiating the schedules of deliverables with the projects – a good lesson learned

Monitoring the progress of the funded projects was one of the major tasks of the BONUS Secretariat. As in the original work plans the expected deliverables were presented in a markedly uneven manner and level of details, the BONUS Secretariat drafted and subsequently negotiated with each of the projects selected for funding a specific schedule of deliverables (SoD) in a standardised format (see example in Figure ~~Figure 5~~5) in order to streamline the reporting and progress monitoring. These schedules specified such information as the work package responsible for deliverable, its title, due month, nature of deliverable and its publicity level.

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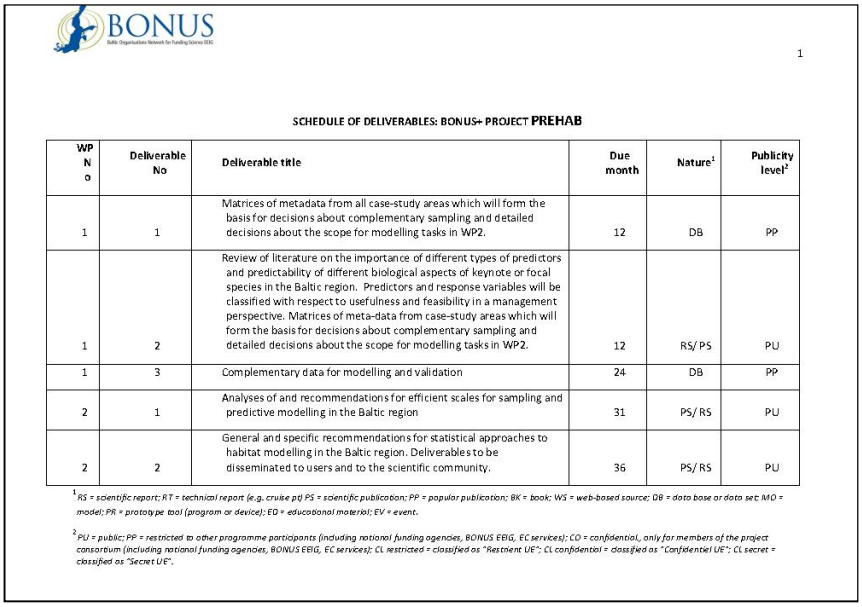

1

SCHEDULE OF DELIVERABLES: BONUS+ PROJECT **PREHAB**

WP No	Deliverable No	Deliverable title	Due month	Nature[1]	Publicity level[2]
1	1	Matrices of metadata from all case-study areas which will form the basis for decisions about complementary sampling and detailed decisions about the scope for modelling tasks in WP2.	12	DB	PP
1	2	Review of literature on the importance of different types of predictors and predictability of different biological aspects of keynote or focal species in the Baltic region. Predictors and response variables will be classified with respect to usefulness and feasibility in a management perspective. Matrices of meta-data from case-study areas which will form the basis for decisions about complementary sampling and detailed decisions about the scope for modelling tasks in WP2.	12	RS/ PS	PU
1	3	Complementary data for modelling and validation	24	DB	PP
2	1	Analyses of and recommendations for efficient scales for sampling and predictive modelling in the Baltic region	31	PS/ RS	PU
2	2	General and specific recommendations for statistical approaches to habitat modelling in the Baltic region. Deliverables to be disseminated to users and to the scientific community.	36	PS/ RS	PU

[1] *RS = scientific report; RT = technical report (e.g. cruise pt) PS = scientific publication; PP = popular publication; BK = book; WS = web-based source; DB = data base or data set; MO = model; PR = prototype tool (program or device); ED = educational material; EV = event.*

[2] *PU = public; PP = restricted to other programme participants (including national funding agencies, BONUS EEIG, EC services); CO = confidential, only for members of the project consortium (including national funding agencies, BONUS EEIG, EC services); CL restricted = classified as "Restrient UE"; CL confidential = classified as "Confidentiel UE"; CL secret = classified as "Secret UE".*

Figure 6. Example of the schedule of deliverables of a BONUS+ project.

Together with project work plans these schedules of deliverables were subsequently annexed to the consortium agreement of each of the projects. Also a procedure for modifying of the schedules during implementation of project was developed and disseminated through the BONUS website[4].

In general the BONUS management did not receive many change requests after adoption of the project grants. Altogether there were only three cases when coordinator requested complete deletion of a deliverable from the schedule, typically by merging to another deliverable and not implying in any alternation in project's work effort and budget. More frequent were requests to edit the title of deliverable, to postpone its due time, or change its nature, e.g. from a scientific or technical report (RS/RT) to a data set (DB), or from a publication (PS) to a report. In quite many cases a deliverable originally declared as a report was 'upgraded' to a status of scientific publication. Such cases of exceeding the initial commitment were accepted without prior notification by the projects. The publicity level of deliverables appeared to be the most problematic in this part of the programme management. Apparently, the coordinators did not regard the publicity of project outputs with the needed care during the early stages of the project. Only when a deliverable was produced, it appeared that the declared publicity level is not appropriate (most often publicity was 'downgraded' from public (PU) to restricted within the programme or project (PP or CO).

Lessons learned

- Free form allowed for the project work plans required lot of work to standardise the SoDs, but it would be extremely difficult to manage the projects and monitor their performance if such schedules would not exist. Measure: include a standardised SoD template into the guide for applicants. (Done)
- Some SoDs are 'overdone': involving too many relatively insignificant deliverables. This caused additional work while checking, approving and filing them. In several cases these 'low level'

[4] www.bonusportal.org/about_bonus/bonus_and_era-net/bonus_2009-2011/bonus_background/bonus_cruise_calendar/change_request/

deliverables (e.g. cruise reports or minutes of events) were automatically integrated into the annual reports by projects and accepted as a part of these. Measure: Recommend in the Guide for applicants to list only significant deliverables. (Done)

- Publicity level of deliverables was not perceived within the project consortia as an important deliverable. Measure: Explain to coordinators on the early stages of project the significance of publicity level. Treat change of the publicity level of deliverables as a true modification of the SoD.

BONUS EPSS project reporting module – an invention that helped much in reporting and progress monitoring

In the latter half of 2008, while negotiating the grant agreements with the projects selected for funding, a dedicated reporting module was created within the BONUS electronic proposal submission system (EPSS) that served successfully throughout the two-stage proposal submission and evaluation process. Users' interface of the reporting module was equipped with an exhaustive guidance; procedure of scientific reporting was also described in detail on the BONUS website[5]. A session during the first BONUS conference (January 2009) was dedicated for explaining to the project participants the reporting procedure. Project coordinators received from the EPSS administrator the access keys, built the work package structure of their project and invited the work package leaders to formulate deliverables under their responsibility. To submit a deliverable for coordinator's approval and subsequent acceptance by the BONUS EEIG Secretariat, the leader of the work package in charge had to fill in a specific online submission form including, along with other characteristics of the deliverable, its exact location and provide its summary (annotation). If the deliverable appeared to be projects' annual or final report, system allowed uploading the pdf file of report and required updating the cumulative information on significant research infrastructures jointly used by the project and the list of project performance statistics. All deliverables that were waiting for the BONUS Secretariat's acceptance were accessible through a special window in the Secretariat's interface (Figure ~~Figure 6~~). They could either be accepted or sent back to the project for re-working. In both cases the EPSS generated an automated e-mail to the work package leader involved. If the deliverable was not accepted, the work package leader received the respective comments from the BONUS Secretariat.

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Throughout the implementation of BONUS+, the BONUS electronic proposal submission system proved to be an extremely efficient and convenient management tool, both at the project and programme levels. Within the limited work time, it allowed the BONUS Secretariat to monitor the performance of each project in (near to) real time. The BONUS electronic proposal submission system will be further developed for the future BONUS calls taking into account the lessons learned from the BONUS+.

Lessons learned:

- A window for optional uploading of the full deliverable must be invented.
- A double-approval of the deliverables produced by the project coordinator shall be avoided.
- The 'nature' and 'publicity' information reported in the EPSS must strictly correspond with the factual properties of the deliverable in question. In several cases e.g. the deliverables reported as public were in fact located in the restricted parts of the project's web page.
- Project participants must receive very clear instructions concerning the requirements applicable to the deliverables reported as datasets. The metadata base descriptors shall be uploaded as a table of fixed format, e.g. an MS Excel worksheet.
- Project participants must receive very clear instructions concerning the requirements applicable to the deliverables reported as scientific papers, particularly in regard acknowledging the funding sources.

[5] www.bonusportal.org/about_bonus/bonus_and_era-net/bonus_2009-2011/bonus_background/bonus_cruise_calendar/reporting/scientific_reporting/

- Agenda and participant lists are mandatory parts of the reports on project meetings and events. If there is any significant decision concerning the project implementation made, these shall also be reflected in the reports.
- The BONUS Secretariat must have access to make uploads to the deliverables already accepted, as these are often requested by the project coordinators.

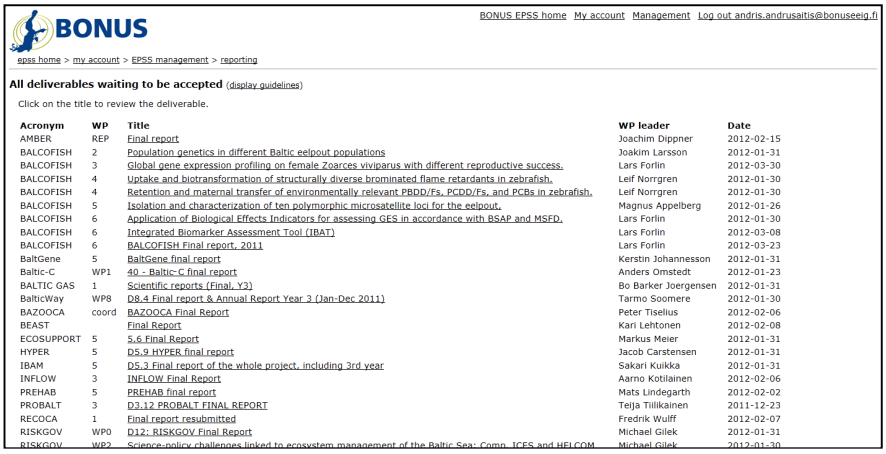

Figure 7. Screenshot of the BONUS Secretariat's interface in the BONUS EPSS for the overview of deliverables ready for acceptance.

4.1.3.4. Thematic profile, interdisciplinarity, and clustering of projects

The BONUS+ call required the proposed research to focus on supporting an ecosystem-based approach to management of human activities[6]. It was expected to enhance our understanding and predictive capacity about the Baltic Sea ecosystem's response to impending changes caused by both naturally and human-induced pressures and about linkages between environmental problems and the social and economic dynamics in responding to them. In turn, the research was expected to support formation of the basis for prudent management aimed at safeguarding the sustainable use of the ecosystem's goods and services. The proposals had to focus on key research themes described in the BONUS-169 Science Plan:

1: Linking Science and Policy
2: Understanding Climate Change and Geophysical Forcing
3: Combating Eutrophication
4: Achieving Sustainable Fisheries
5: Protecting Biodiversity
6: Preventing Pollution
7: Integrating Ecosystem and Society

The call also stipulated that the priority would be given to research projects within themes 1 and/or 7 and to projects that link themes 2–6 with 1 and 7 in an interdisciplinary manner. Interdisciplinary research among themes 2–6 was encouraged as well. As the call did not limit the number of themes each proposal was allowed to address, the proposals appeared pretty multi-thematic. For example, out of 16 proposals selected for funding, three proposals expressed an ambition to focus on all seven call themes. Another three successful proposals identified six out of seven call themes as being in their focus (Table 2).

[6] www.bonusportal.org/files/67/BONUS_Call_for_Proposals_brochure.pdf

Table 2. Research themes addressed by the BONUS+ proposals selected for funding.

Project	Themes addressed
Amber	1, 2, 3, 4, 7
BALCOFISH	1, 2
BaltGene	1, 2, 4, 5, 7
Baltic Gas	1, 2, 3, 7
BalticWay	1, 2, 4, 5, 6, 7
Baltic-C	1, 2, 3, 6, 7
BAZOOCA	1, 2, 3, 4, 5, 7
BEAST	1, 2, 3, 4, 5, 6, 7
ECOSUPPORT	1, 2, 3, 4, 7
IBAM	1, 2, 3, 4, 5, 6, 7
INFLOW	2
PREHAB	1, 2, 3, 4, 5, 6, 7
PROBALT	1, 7
RISKGOV	1, 3, 4, 5, 6, 7
RECOCA	1, 2, 3, 7

Thus, based on successful projects' proposals in the BONUS+ call, 'Linking Science and Policy', 'Understanding Climate Change and Geophysical Forcing' and 'Integrating Ecosystem and Society' were the most substantially covered themes by the projects.

Still the true scientific focus of each letter of intent, full proposal, and eventually a project selected for funding had to be deducted by the Call Task Force and the BONUS Secretariat based on each project's work plan. The outcome of this analysis revealed that five of the funded projects had the issue of the Baltic Sea eutrophicaton as their key focus, four projects focused on the issues of linking science and policy and integrating the ecosystem and society, three projects focused on the various aspects of the Baltic Sea biodiversity, while climate change and pollution issues constituted the core of two projects each (Figure ~~Figure~~ 8). Different aspects of thematic framework of the BONUS+ call were analysed in more detail in the independent observer's report by R. Novak (Austrian Science Fund)[7], in particular in its chapter 3.6.

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[7] www.bonusportal.org/files/116/BONUS-Call-08_Independent_obeserver_Report_08-06-24.pdf

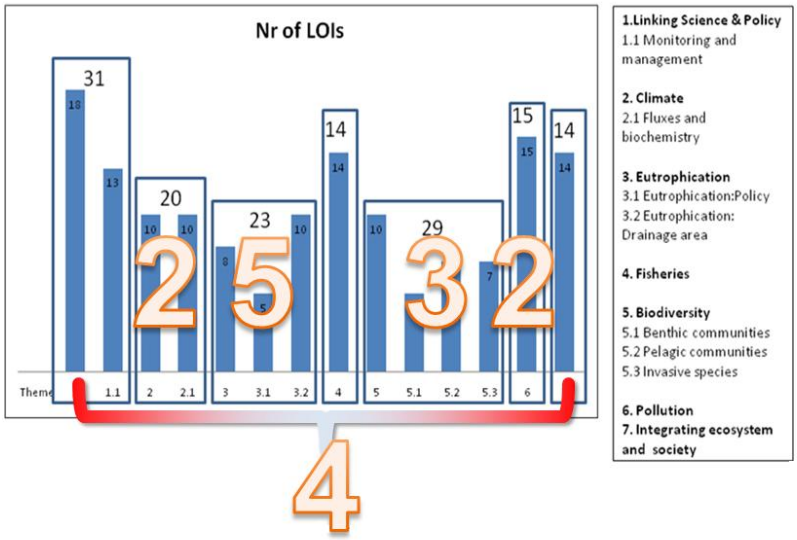

Figure 8. Thematic profile of the letters of intent submitted in response to the BONUS+ call (numbers in the bars) and sixteen proposals selected for funding (large numbers).

Interdisciplinarity

In 2010, Academy of Finland performed an interdisciplinarity study of the BONUS+ projects. The following chapter is based on the mentioned study. In defining the science disciplines represented in the projects', the authors of the study used the research plans and the training background of principal scientists (found in research plans, BONUS or institutions' websites). If none of the principal scientists had the education of the discipline of the project, the authors looked at the publication history of the scientist in question. Based on the descriptions of the work plans, the work packages were classified to three classes: those including natural sciences only, those including also social sciences or economics and those on management and dissemination. Work packages included also social sciences or economics, if there was clearly research on these disciplines (by the research plan).

Most of the disciplines represented in the BONUS+ projects belonged to natural sciences (in fields of environmental sciences, biology, chemistry, physics, geology, geography, agronomy, mathematics and engineering) and most of the funding was allocated to natural scientific research. Half of the projects included social sciences or economics. The number of disciplines represented in one project ranged between two and seven. The most common disciplines were environmental science (in all projects) and biology (in 13 projects).

Interdisciplinarity materialised well in the projects when it came to biology and other natural sciences. In a few projects genuine interdisciplinarity was also achieved between natural sciences and social sciences or economics, but generally connections between these disciplines were better characterised as multidisciplinarity i.e. the research in different fields was done separately.

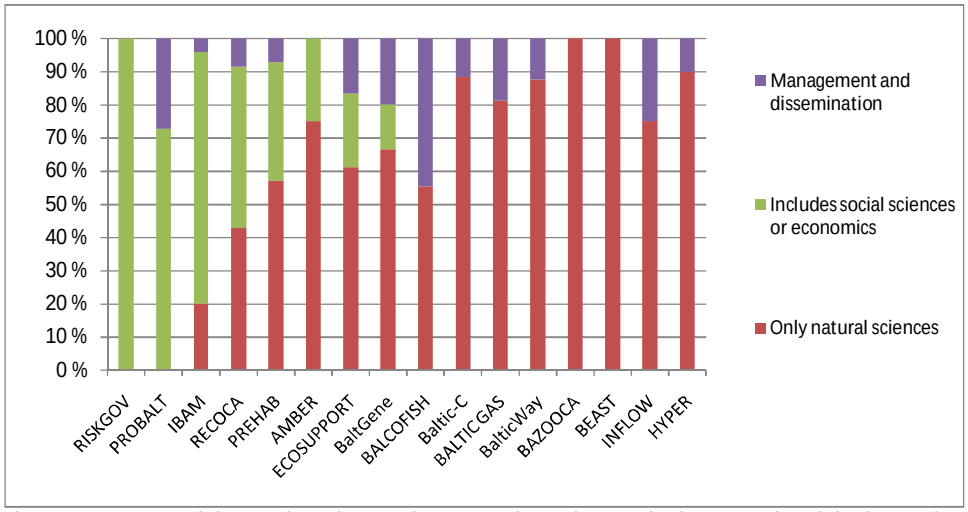

Figure 9. Contents of the Work Packages: the proportions of natural sciences and social sciences / economics.

Figures 9 and 10 show that eight out of the 16 projects covered only natural sciences. In the other eight projects the percentage of work packages that included social sciences or economics varied from 13 to 100 %.

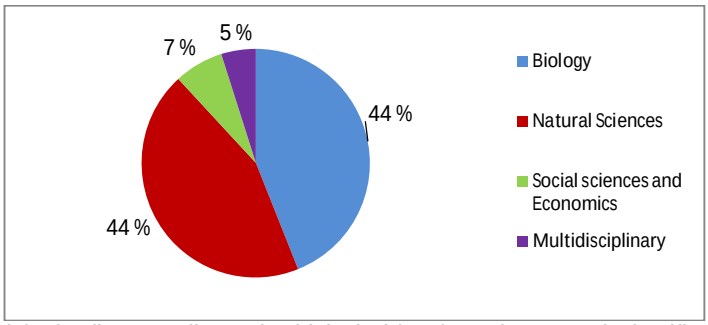

Figure 10. Most of the funding was allocated to biological (44%) or other natural scientific research (44%). 7 % of the funding was allocated to social sciences and economics and 5 % to multidisciplinary research groups.

Clustering

The BONUS+ management clearly recognised the importance of programme's role in creating favourable conditions for cooperation among the projects by joint events, collecting and distributing of information and resources. The management work plan of the first year of the BONUS+ implementation prioritised promotion of collaboration among the projects and establishing thematic clusters of the projects. The cross-project cooperation was perceived to be greatly facilitated when clearly defined and mutually respected data-exchange IPR and rules were in place. The need and the main principles of the BONUS data policy were established already during the BONUS ERA-NET[8]. The data policy was first published in December 2008, before the work of majority commenced and has been updated regularly ever since[9].

[8] Hopkins C.C.E., J. Thulin, J.G. Sutinen, K. Kononen, P. Snoeijs, S. Johansson & H.-O. Nalbach 2006. BONUS-169 Baltic Sea Science Plan and Implementation Strategy. BONUS Publication No. 5, Chapter 5 (4) (www.bonusportal.org/files/40/Publication_Nr._5.pdf

[9] www.bonusportal.org/files/1446/2012_01_19_BONUS_data_policy_Final.pdf

During the first meeting of the forum of project coordinators, after each of the BONUS+ was presented at the programme's kick-off conference, a bottom-up clustering exercise was performed. Each project was asked to identify those other projects with which the project would be interested to collaborate during the implementation. As it could be expected, the broader were project's own interests, the broader interest it attracted from the other projects (figure 11).

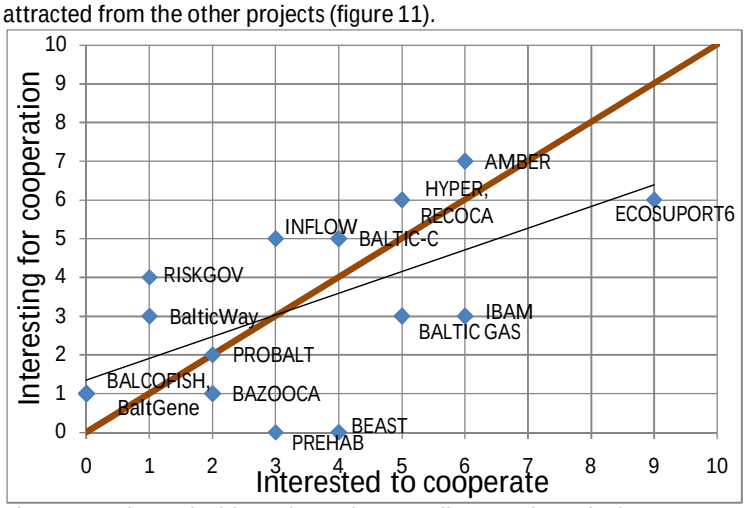

Figure 11. When asked from the project coordinators about the interest to co-operate with other projects, some projects were clearly more enticing than others: 'More comprehensive, 'ecosystem-level' projects are more interesting to others than the narrow ones and vice versa'.

Based on the outcome of this exercise (figure 12) further project clustering activities were duscussed within the forum of project coordinators. The following activities were accentuated by the BONUS+ leading scientists as the most urgent:

- Establishing a scenario/modelling project cluster consisting of both natural and socio-economic scientists
- Establishing a workshop/working group of scientists studying policy and governance issues to review the current knowledge and gaps in designing, implementing and evaluating the efficacy of pertinent public policies and governance
- Establishing a problem-oriented thematic interdisciplinary cluster/working group of the BONUS+ projects to prepare synthesis on the current knowledge and gaps on application of the Baltic Sea Action Plan
- Establishing a workshop/working group of socio-economists participating in the BONUS+ projects to review the current knowledge and gaps on general public's comprehension and priorities regarding the Baltic Sea
- Establishing a workshop/working group to review the current knowledge on dynamic modelling of human activities linked to marine ecosystems.

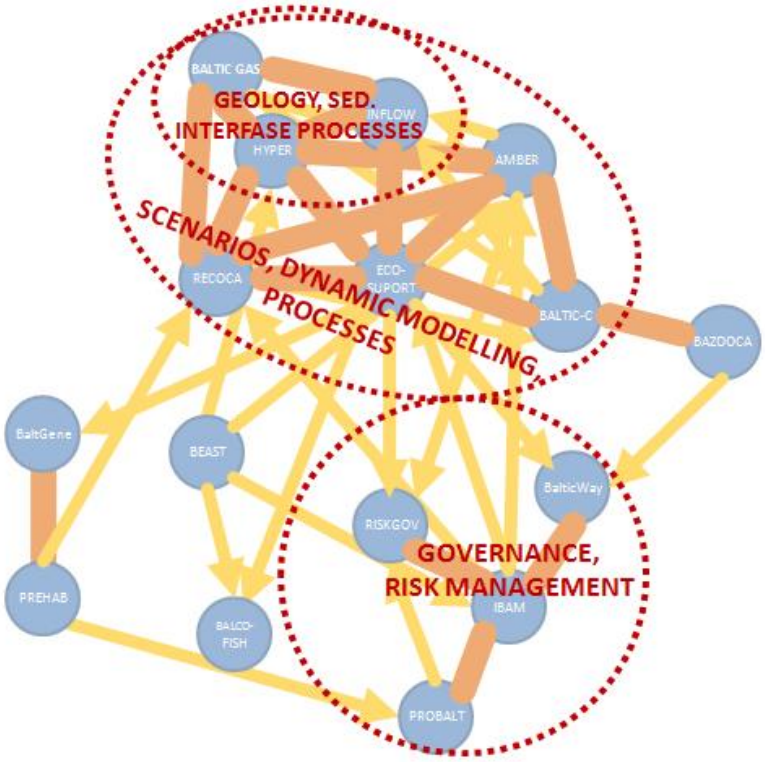

Figure 12. The bottom-up clustering exercise revealed three project clusters clearly emerging among sixteen BONUS+ projects in the fields of "geology", "scenarios and dynamic modelling processes" and "governance and risk management".

The first in the series of project clustering meetings was held in Tallinn 18 August 2009 parallel to the 7th Baltic Sea Science Congress. The theme of the meeting led by the PROBALT project was "Binding Science and Policy"; its participants represented AMBER, Baltic-C, ECOSUPPORT, IBAM, INFLOW, RECOCA and RISKGOV projects. The aim of the meeting was to discuss the general issues of the science-policy relationships appropriate to the BONUS+ research and decide what kind of cooperation among the projects would be realistic and productive in order to advance these relationships. The discussions revealed contrasting approach to the communication with the stakeholders. While the majority of the participants accepted the importance of involving the stakeholders and end users already at the early stages of research, there were also arguments in favour of refraining of premature dissemination in order to avoid misuse of the information and eventually discrediting of science. It was also noted, that clustering meetings should not put extra burden on the projects and that there should be more horizontal and thematic cooperation among the projects.

The topic of the second BONUS+ project clustering meeting was "Scenarios, Processes and Models". The meeting held in Norrköping on 15 October 2009 was attended by the representatives of eight BONUS+ projects: ECOSUPPORT, HYPER, RECOCA, AMBER, INFLOW, BALTICWAY, BALTIC GAS and IBAM projects. The objective of this meeting was to coordinate activities related to modelling and developing scenarios for climate change and nutrient inputs to the Baltic Sea. Topics of discussion were common data, data exchange, joint cruises, identification of overlaps, standardisations and joint training and dissemination activities.

The third clustering meeting was held at Stockholm on 15 November 2009. Participants were from projects RISKGOV and PROBALT. There were roundtable discussions on uncertainty challenges (and possible ways to address these) connected to BONUS and represented by the BONUS projects, discussions on a planned AMBIO special issue and a potential joint BONUS article and discussions on future collaborations and meetings (PhD courses, roundtables, workshops etc.).

Clustering that has been initiated during the first year strengthened collaboration across the BONUS+ projects, including projects' access to each other's data, joint use of infrastructures and optimising the data-collecting effort and division of labour, comparison of ideas, approaches, methodologies and results as well as joint training and dissemination activities. Examples include: the joint database of the biological effects of the contamination was created as a joint initiative of two BONUS+ projects – BEAST and BALCOFISH. Also these two projects jointly contributed to the build-up of the biological effects monitoring in the Baltic Sea within the system of assessing the environmental status. ECOSUPPORT and RECOCA projects held a joined final conference including both the technical (scientific) part and the end-user oriented part. The BONUS+ log of the research cruises witnessed many occasions of joint fieldwork by the projects, while the list of the major accomplished training activities featured several training workshops organised as a joined effort of several projects.

Lessons learned

- Somewhat vague formulation of the meaning of key theme prompted many applicants, including the successful ones, to present their research proposals as exceptionally multifocal ones. The true core theme(s) of each project had to be deduced by Secretariat.
- As the call evaluation operated with a single joint ranking list, the themes opened for the call (actually, all themes of the BONUS-169 science plan) where competing with each other.
- Clustering and cross-project collaboration could have been more active if a set of specific programme-level products (e.g. synthesis of knowledge, cross-disciplinary analysis of the state-of-art *etc.*) attainable through the joint effort of projects was set. Production of such programme-level deliverables, and running the programme-level events (e.g. cluster meetings, workshops etc.) will also require additional resources.

4.1.3.5 Dissemination of the results of research

Publication activity by the BONUS+ projects is reflected in the projects' final reports. Most, but not all, scientific publications were submitted as deliverables by the BONUS+ projects. As the publication activity increased towards the final stages of the projects the information about new publications continue to come in several months after completion of the projects.

In addition to the scientific dissemination, the BONUS + included also dissemination of their findings to the public at large. The measurable performance indicators recorded a multitude of popular articles, interviews and other media communications prepared by the BONUS+ scientists. BAZOOCA project had a massive media attention in 2010 and 2011 with questions concerning the invasive comb jelly *Mnemiopsis*. A press release by Cornelia Jaspers for the publication "The invasive ctenophore *Mnemiopsis leidyi* poses no direct threat to Baltic cod eggs and larvae" was broadcasted by more than 50 International and Danish newspapers, magazines, and online news. INFLOW gained a lot of attention from the media for their research on oxygen depletion of Baltic Sea, and PROBALT for overall protection of the Baltic Sea, the state of the Archipelago Sea and the need for binding agreements, especially in the Finnish media. ECOSUPPORT project's results have been used to make a "researchers corner" at the Norrköping Visualisation Centre C exhibition on Ocean Environment and its 'Geodome' – the mobile interactive classroom on the issues of the global change in the Baltic Sea region – was the highlight of the networking village at the EU Strategy for the Baltic Sea Region Forum 2011, Gdansk, September 2012). The project secured a special issue with

AMBIO, which will be published in autumn 2012. HYPER consortium actively disseminated Baltic Sea Science to the public, school classes and the media.

4.1.3.6. Communication with scientists and obtaining feedback from the science community

Mid-term assessment was performed in April-May 2010. Purpose of the Mid-term assessment was to review the work of programme structures, identify at an early stage the potential issues, and support further improvement of the programme management. BONUS+ final assessment was carried out in January-February 2012, after 36 months of implementation of the projects. Final assessment was based on feedback from three groups of scientists involved in projects: coordinators, principal scientists (PSs, leaders of the research institutions' teams), and young scientists (YSs).

As an exception to the mid-term assessment, when each of the mentioned groups were addressed a specific questionnaire form, in the final assessment there were two different questionnaire forms for 1) coordinators and principal scientists and 2) young scientists. The first questionnaire focused on overall project performance and management, collaboration among the projects, human capacity building and project's stakeholder and dissemination activities. Young scientists' questionnaire was intended for maximising the added value to an early career scientist, feedback about the most needed capacity building activities by the programme, and feedback about the BONUS young scientist club activities.

With regards to the project administration, the assessment on how coordination and management of projects were performed was mostly positive. Overall 44 % of coordinators and principal scientists found that coordination and management of their project was excellent and 31 % found that it went very well. Programme-related benefits, such as networking among scientists, bringing in more multidisciplinarity and creative atmosphere within an international consortium, were seen as most significant values of BONUS+ project. To the contrary, mechanical benefits like avoiding duplication are valued less by scientists. To summarise the overall feedback, BONUS+ is seen as important, cross-disciplinary scientific networking platform. Participation in the BONUS+ project had affected also to young scientists' opportunity to network with other scientists of different fields of research.

There were 129 respondents altogether, which is approximately 32 % of all people involved in BONUS+ projects. 14 out of 16 project coordinators, 74 principal scientists and 41 young scientists replied to the questionnaire. The response rates in these three groups were 88 %, 54 % and around 23 %, accordingly. Coordinators from two projects didn't answer to the questionnaire and four of the young scientists didn't tell which projects they were in. It is also notable that several principal scientists, and apparently their teams, act in more than one BONUS+ project.

There was also some feedback concerning the carrying out of the questionnaire. Some scientists wished that it would be possible to respond anonymously, so it would be more comfortable to give critiques to the secretary also. Some feedback considered about the contents of questionnaire, which was not appropriate for the social sciences. Some respondents were also frustrated on the technical execution of the questionnaire.

Lessons learned

- Although requiring quite a lot of effort by the Secretariat, collecting feedback from the scientists appears useful and will be continued in the future BONUS calls.
- It would be better to organise the query so that it is possible to respond anonymously, so it would be more comfortable for respondents to provide feedback to the Secretariat and the management of the particular project.

- The contents of questionnaire shall be developed so that they are equally appropriate for the natural and for the social scientists.
- The technical execution of the questionnaire must be made user friendlier and less time-consuming as well as more convenient for extraction of the results.

4.1.3.7 In kind contribution by the participating states and integration of the significant research infrastructures

During the first months of programme implementation all projects were requested to provide information on the significant research infrastructures they are expecting to receive from the participating states and institutes in a form of in kind contribution to the programme. The total expected contribution through free of charge use of research infrastructures amounted to nearly EUR 5.7 million, more than a quarter of the programme's budget volume. More than half of the infrastructure contribution (equivalent to EUR 3.2 million) was expected to come through shiptime (figure 13); the next most valuable resource being the advanced computing facilities (EUR 1.2 million) and the data brought in by the project participants, i.e. their intellectual property data background. In the cross-country profile Germany stood up as the biggest potential contributor of research infrastructures (44%), followed by Sweden (27%) and Finland (15%).

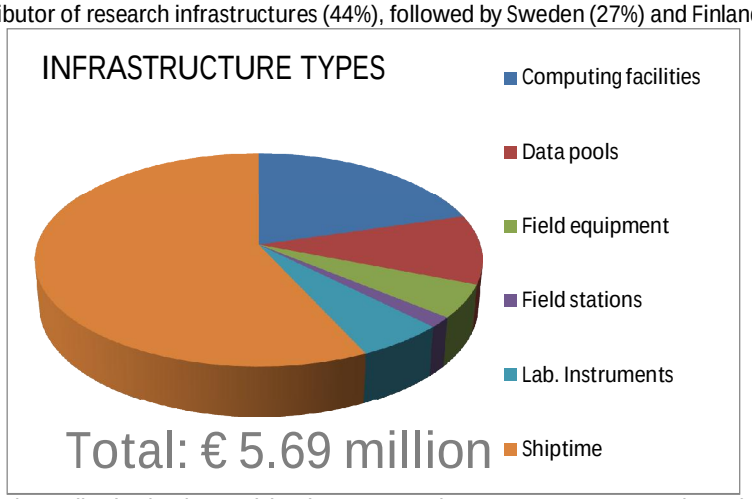

Figure 13. In kind contribution by the participating states to the BONUS+ programme through granting use of the significant research infrastructures, a projection at the onset of implementing.

During the project implementation information on the received in-kind contribution through use of the research infrastructures was collected on annual basis through the dedicated form within the BONUS EPSS reporting module (see Chapter 4.3.3). The summary of information gained this way is summarised in figure 14.

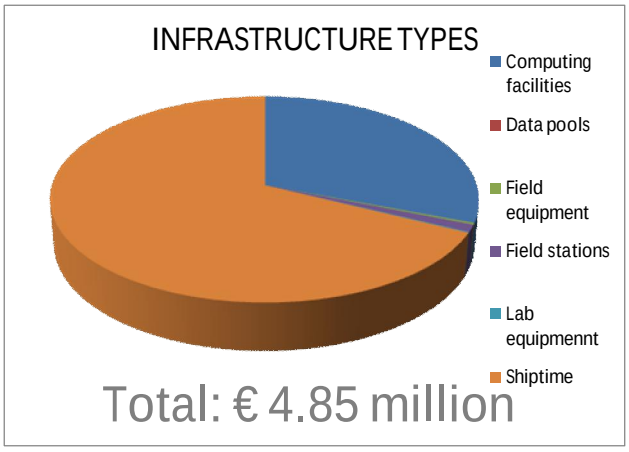

Figure 14. Summary of in-kind contribution by the participating states to the BONUS+ programme through granting use of the significant research infrastructures, based on the annual reports by the projects.

Although the research ships and advanced computing facilities occupy the highest ranking, as it was projected, other types of the research infrastructures are represented to much lesser degree. Remarkably, access to the national data repositories is not considered as an infrastructure contribution in the reports at all.

Cruises

As pointed out earlier in this chapter, the see-going field work as the single most costly and infrastructure-demanding activity of the BONUS+ projects. The BONUS+ cruise calendar accounted 41 research cruises of different extension. Almost every vessel of the Baltic Sea research fleet was involved. Absolute majority of the cruises took place in the first two years of the project implementation: 2009 and 2010. Noteworthy, only four of the reported cruises were arranged in cooperation in two and more projects. In future there is much space of strengthening the cooperation among the BONUS in using the services of the research ships.

Lessons learned

- Monitoring of the joint use of the significant research infrastructures was a useful exercise by the BONUS Secretariat and will be continued in the future.
- Combined with the new scheme of the infrastructure integration and notification of the planned use of infrastructures as a part of the project proposal will allow further optimising of the infrastructure use.
- More attention must be given to cross-project cooperation on the use of significant research infrastructures.

4.1.3.8 BONUS human capacity building activities

Carrying out strategies to strengthen human capacity building in interdisciplinary science and science-based management is one of the management priorities of the BONUS programme[10]. The initial situation in the domain of human capacity building was assessed and recommendations set forward already within the ERA-NET phase of the programme development[11]. During implementation of the BONUS+ call a series of actions by the BONUS Secretariat targeted at researchers in early career. These included the competition

[10] Outline of the BONUS-169 Joint Baltic Sea research programme. Strategic development 2012-2011 and inplementation 2012-2016. BONUS publication No. 11, 2010. www.bonusportal.org/files/725/Publication_No._11.pdf
[11] Baltic school of researchers. BONUS publicaton No. 7, 2008, www.bonusportal.org/files/30/Publication_Nr._7.pdf

for the grants in support of the field courses and summer schools among the funded projects, arranging the BONUS young scientist club sessions during the annual BONUS conferences, organising the young scientist workshop on the generic issues in 2009, and collecting feedback from the young scientists involved in the BONUS+ projects twice during projects' term. As a part of their annual reporting, projects were required to inform the programme management on such indicators of their involvement the human capacity building actions as the number of PhD-level courses arranged by the project and number of students at these courses, number of modifications to the PhD-level courses that originated from the project's work, as well as the number and duration of student exchange visits among the projects.

Involvement of early career scientists in the BONUS+ projects

As confirmed while collecting the feedback from the BONUS+ teams at a midterm of projects, out of total 445 scientists taking part in the BONUS+ projects, 164 would qualify as young scientists[12]; that is roughly 37% of the whole BONUS+ scientific manpower (Figure 15). There were eight institute 8 teams in BONUS+ that appeared consisting entirely of young scientists. Twenty four teams, however, reported that their teams do not include any young scientist.

According to the sample of the final feedback respondents about one third of the young researchers were biologists, with physical oceanography and biogeochemisty as the two other most frequently represented fields. More than 75% of the young scientists that participated in the BONUS+ projects were PhD students, and more than 19% were post-docs.

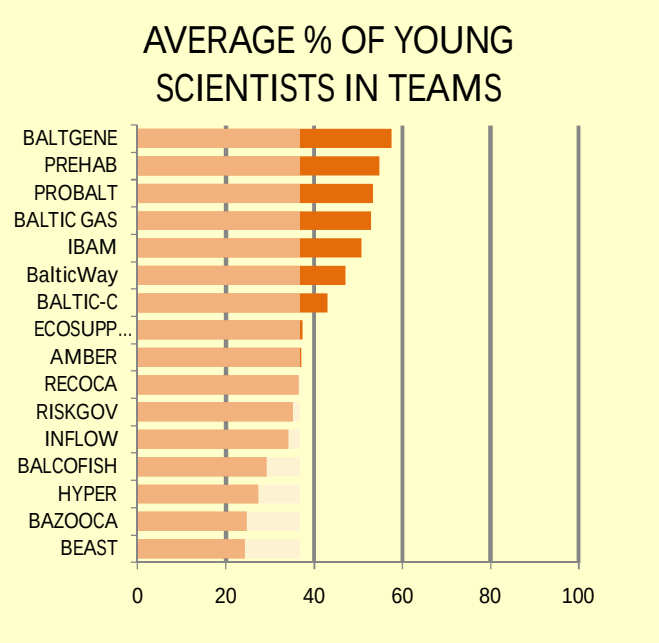

Figure 15. Average percentage of young scientists in BONUS+ project teams, PS assessment. Light brown overlay indicates the global mean – 36.8%. Data from the BONUS+ midterm feedback by the project participants.

[12] For this questionnaire, young scientists were defined as persons in the final year of their primarily MSc, students of PhD programmes, and those within first two years of their first PostDoc programme.

PhD projects

Assuming that almost 40% of the BONUS+ workforce were young scientists and two thirds of them were PhD students it is not surprising that according to the feedback from the research teams, a total of 99 PhD dissertations were prepared based entirely or significantly on the results by the BONUS+ projects obtained in 2009-2011. However, of these, only 30 dissertations were successfully defended prior completing the BONUS+ projects. More explicit details on the thesis are available in the final reports and the individual webpages of the BONUS+ projects. Apparently the three-year term allowed for the BONUS+ projects was not sufficient for most of the doctoral students to finish their studies.

PhD courses and summer schools

The BONUS+ projects represented an extraordinary concentration of the multidisciplinary Baltic marine research capacity, equally in terms of personal competence of the involved scientists as in methodological capability of the participating laboratories. It was of utmost importance to utilise this capacity as much as possible for training of the young generations of scientists. In order to motivate projects to arrange PhD-level courses and summer schools open for any applicant on competitive basis, in January 2009 BONUS initiated a competition for EUR 10 000 worth joint training event grants among the BONUS+ projects. The call was open until 24 April 2009. Altogether eight proposals were received, two of them prepared in cooperation by two projects. Proposals were evaluated in written by five independent evaluators. Based on the evaluation five proposals were eventually funded:

- AMBER, "Time series analyses and modelling of environmental data" hosted by Archipelago Research Institute, University Turku, Finland
- BALTIC GAS, "Seismo-acoustic Imaging of Sedimentary and Gas-related Features in the Baltic Sea" hosted by Department of Geosciences, Bremen University, Germany
- ECOSUPPORT/BALTIC-C, "Climate impacts on the Baltic Sea – from science to policy" hosted by DTU Aqua, Denmark
- PREHAB, "Ecological, economical and institutional challenges for spatial planning in the Baltic - a multidisciplinary introductory course on ecological mapping and economic valuation of coastal areas" hosted by Husö biological station, Åbo Akademi University, Åland, Finland
- RISKGOV/ PROBALT, "Governing Environmental Risks in the Baltic Sea – Multidisciplinary Perspectives and Approaches" hosted by Department of Life Sciences, Södertörn University, Sweden.

The AMBER course "Time series analyses and modelling of environmental data" was held on 12 -18 August 2009. The course included 42 hours of work (lectures and working groups), which equal 7 credits. The topics of the course were Bayesian modelling, recurrence quantification analysis, network analysis, transfer function modelling, non-linear methods, self-organised maps, empirical orthogonal functions, statistical downscaling and principal oscillation patterns. This course was mandatory for PhD students from the AMBER project. Student feedback collected by the organisers was in general very positive with some practical suggestions which will be useful for further similar courses. In particular students desired to receive more practical training and introduction to the standard software used.

The BALTIC GAS course "Seismo-acoustic imaging of sedimentary and gas-related features in the Baltic Sea" consisted of a preparatory class in Szczecin (15-18 July 2010), Poland and the research cruise in the southern Baltic Sea (19.-25.7.2010). After the cruise, there were two days reserved for presentations, discussion and documentation of preliminary results.

The ECOSUPPORT/BALTIC-C course "Climate impacts on the Baltic Sea – from science to policy" took place in Nexø, Bornholm, from 27 July to 5 August 2009. The course assembled students and instructors from nearly all Baltic countries and was highly interdisciplinary. Students acquired state-of-the-art knowledge from leading Baltic scientists on topics ranging from climate modelling, physical oceanography,

biogeochemical cycles and models, foodweb models and fishery population dynamics and models. The course had as its overall objective to teach students how to integrate different scientific disciplines into an ecosystem-based management and policy framework. The students learned some specific discipline-specific skills and more general integrative approaches for transferring those skills and knowledge into broader ecosystem and policy-oriented goals. This was achieved by topic-specific exercises on each day of the course, and a course-long sub-group exercise transcending disciplines and topics and aimed at management policy. The students benefitted from working with different disciplines and students from different countries and disciplines. This interaction was stimulated by intentionally designing the course in ways to promote and stimulate thinking and collaboration across disciplines and national boundaries. Students were nearly all very satisfied with the course. The students gave these positive comments even though 10 of 18 who responded said that the workload was too high relative to the number of ECTS credits that they received.

The PREHAB course "Ecological, economical and institutional challenges for spatial planning in the Baltic - a multidisciplinary introductory course on ecological mapping and economic valuation of coastal areas" took place from 22 February to 3 March 2011. Most of the PREHAB-researchers were engaged as teachers. The course combined both theoretical lectures and practical exercises. In the latter students worked in groups to evaluate the use and outcome of previous mapping and modeling in real management cases, as well as doing economical evaluation practices. According to the feedback, the course was very much appreciated by students.

The RISKGOV/PROBALT course "Governing environmental risks in the Baltic Sea – multidisciplinary perspectives and approaches" took place in Askö Marine Laboratory, 16-22 August 2010. Taking a point of departure in a theoretical discussion on EAM (Ecosystem Approach to Management), the course was structured to cover all the five case study areas of RISKGOV. During the last seminar a sum-up was undertaken where the students briefly presented their preliminary drafts of their respective home assignments. The fact that the students had quite different disciplinary backgrounds was made discussions over disciplinary borders both common and fruitful. The general opinion among the students was positive, especially regarding the content and relevance of the lectures and the field excursion. Some participants commented that the number of lectures at this course was too large, and some lectures should have been replaced by discussion seminars.

In addition to these five centrally supported PhD training events the BONUS+ projects held many more with their own resources and attracting funding from other sources. According to the feedback received from the scientists altogether the BONUS+ projects were involved in organising over 30 PhD courses with 370 persons participating. More detailed information about many of the held training activities can be found on the projects' individual webpages.

BONUS young scientist club

Through the three years of implementing the BONUS+ projects Secretariat has developed a format of the BONUS young scientists club (YSC) that is appreciated by the BONUS community. The YSC sessions are linked to the BONUS conferences/Baltic Sea Science Congresses. They were arranged by the local young scientists and are discussed the actual problems in a relaxed form. These events strengthened the networking among the young scientists, and allowed them to formulate their views and proposals in order to enhance the future science governance in the Baltic Sea region. They also facilitated the discussion and the exchange of ideas among the young researchers and the most reputable scientists and senior science managers. The first session of the BONUS YSC was arranged during the first BONUS conference in January 2009. It was hosted by the young researchers of Finnish Environment Institute, Finnish Meteorological Institute, University of Helsinki and Finnish Geological Survey. The next event organised under the auspices of the BOONUS YSC was the intensive young scientist workshop on the generic issues held during the 7th Baltic Sea Science Congress, Tallinn, August 2009. The participants of this workshop had an opportunity to meet the most reputable experts on the issues of the science ethics, protection of the intellectual property

rights and the international system of protection of the Baltic Sea environment. BONUS YSC sessions took place also during the second BONUS Conference, Vilnius, January 2010 (hosted by the young scientists of Klaipeda University) and during the third BONUS Conference/8th Baltic Sea Science Congress, St. Petersburg, August 2011 (hosted by the young scientists of the Russian State Hydrometeorological University).

Feedback from the young scientists

Collecting the feedback from the young scientists involved in the BONUS+ projects is discussed in more detail in the specific document "Summary of the BONUS+ final feedback from the scientists". Here we focus on the suggestions on the human capacity building activities that might be useful in future development of BONUS.

Young scientists recognised that the opportunity to network with other scientists of the same field outside respondent's country improved the most due to their involvement in the BOMNS+ projects. To the other hand their chance to publish in good journals, opportunity to participate in training courses, the study mobility improved insignificantly.

Suggestions on how to better integrate young scientists into the consortia of BONUS projects and the whole programme in future focused mainly on organising courses and other meetings. Mobility is recognised as the most important for development of the young scientists, and BONUS is suggested to facilitate it by creating an earmarked reserve of funds to support young scientists participating at different kinds of training and conferences.

Lessons learned

- The set of the human capacity building support activities initiated during the BONUS+ is useful and deserves continuation and further development in the future.
- Programme management need more centralised support resources in order to support training activities initiated by projects and strengthen the student mobility.

4.1.4 The potential impact (including socio-economic impact and the wider societal implications of the project so far) and the main dissemination activities and exploitation of results (not exceeding 10 pages)

4.1.4.1 Programme level stakeholder engagement activities (implemented under BONUS Strategic Phase)

There were no resources reserved for dissemination within BONUS+. However, programme level dissemination and stakeholder engagement activities benefited from the dissemination activities within the BONUS ERANET project between May 2007 and December 2008 and the strategic phase of BONUS-169 programme between June 2010 and May 2012. On one hand, this created an opportunity to disseminate BONUS+ issues and outcomes much more broadly than it would have been possible with resources provided by BONUS+ only. On the other hand the outcomes of the BONUS+ projects served as an outstanding material for stakeholder communications, in particular during the strategic phase.

<u>BONUS Forum</u>

The BONUS stakeholders, and in particular the policymakers, have a critically important role to play in the region wide partnership. BONUS Forum was established in 2010 within the strategic phase of the BONUS-169 phase. In this context, the aims of the annual BONUS Forums 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 the development and updating of the policy-driven strategic research agenda.

The BONUS Forum 2010 was held in Tallinn on 12 October 2012. Altogether 66 representatives of ministries and governmental research institutes from nine countries surrounding the Baltic Sea took part. The main objective of this first meeting of the Forum was to provide this well defined group of stakeholders an opportunity to contribute to the development of the BONUS strategic research agenda for the years 2011-2017 (review and update planned for 2013). After the stage-setting plenary session, participants worked in thematic work groups and each formulating the end-users perspective on the specific aspect of the emerging BONUS 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.

Advisory Board

The BONUS Advisory Board was established already during the ERANET time, and several of the members have been involved through the entire existence of BONUS since 2004. The terms of reference outlines how the Advisory Board is to advise the BONUS EEIG Steering Committee and Secretariat in matters related to:

- prospective analysis, strategic research planning, organisational development, joint programming, policy, and outreach
- calls for proposals
- scientific coordination of the research funded by BONUS-169 programme
- monitoring and review of the implementation of the BONUS-169 programme
- communication with stakeholders and international actors
- linking the BONUS-169 goals and objectives with relevant regional and European policy objectives
- bring experience and ideas related to programme management from outside the Baltic sea region and Europe.

The following persons have been members of the Advisory Board:

- Anne-Christine Brusendorff, HELCOM, 2004-2011
- Gerd Hubold, International Council for the Exploration of the Seas ICES 2004-2011
- Kostas Nittis, ESF Marine Board 2004 -
- Vicki Lee Wallgren/Pauli Merriman, World Wildlife Fund 2009 -
- Johanna Ikävalko, Finnish Farmers Association & Baltic Sea Action Group 2009-2011
- Pauli Snoeijs, Baltic Marine Biologists, 2004 –
- Olle Hagström, DG MARE, 2008
- Hans-Joerg Isemer, BALTEX 2009 -
- Susanne Scherrer, Baltic Sea Regional Programme 2009 -
- Donald Boesch, University of Maryland 2004 -
- Karin Hilmer Pedersen, University of Aarhus 2009 -
- Dzintra Upmace, VASAB 2009 –
- Iwona Sagan, University of Gdansk 2008
- Jon Sutinen University of Rhode Island , 2006-2008
- Mike Depledge 2004-2005
- Siv Ericsdotter, BalticStern programme 2009 -
- Ilkka Herlin, Cargotec, Baltic Sea Action Group 2011 -

The board convenes once a year in June. The meetings are generally scheduled in the following way:

1st day

afternoon: briefing of the board about BONUS activities during the last year
evening: a joint 'evening school' with the BONUS Steering Committee and the Forum of Project Coordinators.

2nd day
morning: joint meeting with the BONUS Steering Committee and the Forum of Project Coordinators
afternoon: closed session of the Advisory Board

During the period of BONUS+ 2009-2011 the Advisory Board convened altogether four times and made altogether 35 significant recommendations. These recommendations have been taken up by the Secretariat, and the measures to improve the programme management have been elaborated and as much as possible implemented.

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.

Exhibit at the EUSBSR Forum's networking village, Gdansk October 2011

BONUS participated in the networking village of the EU Strategy for the Baltic Sea Region and Baltic Development Forum conference 2011 with a display of the BONUS+ results showcased in a series of posters and briefing documents. In addition, the visitors had a chance to gain an insight on BONUS future activities, the strategic research agenda and the first BONUS thematic call that opens in 2012.

On the second day of the event, BONUS Executive Director Kaisa Kononen was joined by professors Fredrik Wulff from the RECOCA project and Jacob Carstensen from the HYPER project to present on chosen topic of eutrophication to the networking village visitors.

4.1.4.2 Project level stakeholder engagement activities

During the three year period of the implementation phase ending in December 2011, BONUS+ projects had made contributions to 37 consultations carried out by the European Commission, had had scientists as members or observers of 570 stakeholder and scientific committees, had made a total of 49 modifications to relevant policy documents and action plans, and on 153 occasions suggestions for the design, implementation and evaluation of the efficacy of pertinent public policies and governance.

A total of 37 times (ranging from 0 to 9 per project) projects contributed to consultation carried out by European Commission. The most contributions was made by IBAM, whose coordinator Sakari Kuikka served as a member of STECF (Scientific, Technical and Economic committee for fisheries and its decision making) during the whole project. Some examples of other projects are the following: 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. 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.

Scientists working in BONUS+ projects served as members or observers in scientific and stakeholder committees a total of 570 times. The most active projects in this instance were BEAST and BalticWay (120 and 106 times, accordingly). 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, Curonian 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 a few.

Number of times the effort of the projects resulted in modifications made to relevant policy documents and action plans, Baltic Sea Action plan in particular, was 49. IBAM was the most successful project in this instance with a total of 12 times. Especially the conclusion that, as environmental risks are not manageable, fisheries management must adapt to these risks, has had a big impact in several cases. Examples of the efforts are 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 for designing, implementing and evaluating the efficacy of pertinent public policies and governance originated from the work of the projects. PREHAB had 44 suggestions, mostly inputs to strategies, such as Future strategy of Finnish marine research or implementation of EU Marine strategy directive, advisory on fish habitat protection and restoration measures and several suggestions to Finnish stakeholders like Environment Committee of the Finnish Parliament and City of Helsinki. For example, PREHAB provided advice on mapping and protection of fish habitats in marine protected areas in some 10 counties in Finland and Sweden. 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. 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 3rd 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 and 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, and some were involved in more than one project. BONUS+ projects demonstrated throughout the implementation phase a considerable transnational flair with, for instance, over 220 foreign scientists taking 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.

4.1.5 The address of the project public website and other relevant details

Address of the project public web site: www.bonusportal.org

Project coordinator: Kaisa Kononen, Dr, Executive Director

Address: BONUS EEIG, Hakaniemenranta 6, 00530 Helsinki, Finland

4.2 Use and dissemination of foreground

- Section A

Not applicable as the project concerned call management and no scientific or technological foreground was created. The foreground created by the sixteen projects funded by the call have their individual dissemination activities and plans.

There were no resources reserved for dissemination within BONUS+. However, programme level dissemination and stakeholder engagement activities benefited from the dissemination activities within the BONUS ERANET project between May 2007 and December 2008 and the strategic phase of BONUS-169 programme between June 2010 and May 2012. On one hand, this created an opportunity to disseminate BONUS+ issues and outcomes much more broadly than it would have been possible with resources provided by BONUS+ only. On the other hand the outcomes of the BONUS+ projects served as an outstanding material for stakeholder communications, in particular during the strategic phase.
Template A2 indicates if a particular dissemination activity has been also reported under BONUS ERANET or strategic phase grant agreement.

- Section B

Not applicable.

Section A (public)

- Template A1: not applicable
- Template A2: List of all dissemination activities (publications, conferences, workshops, web sites/applications, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters).

TEMPLATE A2: LIST OF DISSEMINATION ACTIVITIES

Comment about reporting[13].	Type of activities[14]	Main leader	Title	Date	Place	Type of audience[15]	Size of audience	Countries addressed
ERANET	Portal	BONUS Secretariat	BONUS Portal	Continuous activity	Virtual	Policy makers, scientific community, civil society, industry		All countries
ERANET	Publications	BONUS Secretariat	BONUS Newsletter May 2007	15 May 2007	Helsinki	Policy makers, scientific community, civil society, industry	700+ in hard copies, available for downloading online	All BONUS countries, Russia, EU
ERANET	Publications	BONUS Secretariat	Joint Baltic Sea Research Programme: BONUS+ call for proposals	17 September 2007	Helsinki	Scientific community	ca. 1000	All Baltic Sea and BONUS countries, Russain federation, EU, overseas
ERANET	Workshop	BONUS Secretariat, Academy of	BONUS Seminar "Integrating ecosystems and	21 September 2007	Helsinki	Science community	84	All BONUS countries, Russia,

[13] ERANET = the activity has been also reported under BONUS ERANET grant agreement ERAC-CT-2003-510204, SP = the activity has been also reported under BONUS Strategic phase grant agreement 271534, BONUS+ = the activity is reported in this report only

[14] A drop down list allows choosing the dissemination activity: publications, conferences, workshops, web, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters, Other.

[15] A drop down list allows choosing the type of public: Scientific Community (higher education, Research), Industry, Civil Society, Policy makers, Medias ('multiple choices' is possible.

		Finland	society – experiences across the ocean"					
ERANET	Publications	BONUS Secretariat	BONUS Newsletter November 2007	15 November 2007	Helsinki	Policy makers, scientific community, civil society, industry	700+ in hard copies, available for downloading online	All BONUS countries, Russia, EU
BONUS+	Conference	BONUS Secretariat	BONUS+ Kick off conference	13-15 January 2008	Helsinki	Scientific community	100+	Baltic Sea and BONUS countries, Russia
BONUS+	Media briefing	BONUS Secretariat	Press conference during BONUS+ kick off conference	13 January 2008	Helsinki	Medias	ca. 10	Finland
ERANET	Workshop	MarinERA and BONUS Secretariat	MarinERA-Baltic dialogue meeting	15 April 2008	Tallinn	Actors in European marine research policy	ca. 20	All BONUS countries, EU
ERANET	Publications	BONUS Secretariat	BONUS Newsletter May 2008	15 May 2008	Helsinki	Policy makers, scientific community, civil society, industry	700+ in hard copies, available for downloading online	All BONUS countries, Russia, EU
BONUS+	Press Release	BONUS Secretariat	EUR 22 million for Baltic Sea research	18 June 2008	Helsinki	Medias (& civil society, scientific community, policy makers, industry...)		All Baltic Sea and BONUS countries, EU
BONUS+	Press Release	BONUS Secretariat and Academy of Finland	Yhteistyötä Itämeri-tutkimuksen hyväksi – BONUS ETEY juhlistaa 1. vuosipäiväänsä!	16 April 2008	Helsinki	Medias (& civil society, scientific community, policy makers, industry...)		Finland

ERANET	Workshop	BONUS Secretariat and IOPAS, Poland	BONUS-Black Sea dialogue meeting	24 September 2008	Varna	National and regional bodies of environmental governance and RTD policy and funding	16	Black Sea states
ERANET	Workshop	BONUS Secretariat	BONUS-Mediterranean dialogue meeting	23 October 2008	Athens	National and regional bodies of environmental governance and RTD policy and funding	10	Mediterranean states
ERANET	Publications	BONUS Secretariat	BONUS Newsletter November 2008	15 November 2008	Helsinki	Policy makers, scientific community, civil society, industry	700+ in hard copies, available for downloading online	All BONUS countries, Russia, EU
BONUS+	Publications	BONUS Secretariat	BONUS Newsletter April 2009	15 April 2009	Helsinki	Policy makers, scientific community, civil society, industry	700+ in hard copies, available for downloading online	All BONUS countries, Russia, EU
BONUS+	Publications	BONUS Secretariat	BONUS Newsletter November 2009	15 November 2009	Helsinki	Policy makers, scientific community, civil society, industry	700+ in hard copies, available for downloading online	All BONUS countries, Russia, EU
BONUS+	Article	BONUS Secretariat	BONUS-169 – Top science for better management of the Baltic Sea	June 2009	Parliament Magazine Regional Review13: 50-51.	Policy makers,		All BONUS countries, Russia, EU
BONUS+	Article	BONUS Secretariat	BONUS-169 – Top science for better management of the Baltic Sea	July 2009	Parliament Magazine 292: 50-51.	Policy makers,		All BONUS countries, Russia, EU

BONUS+	Article	BONUS Secretariat	Science for a more sustainable Baltic Sea	June 2009	Mediaplanet 1/June : 9. 2009	Policy makers, scientific communities, civil society		Sweden
BONUS+	Posters	BONUS Secretariat	A set of 5 roll-ups presenting BONUS+ projects	December 2009		Policy makers, scientific communities		All BONUS countries, Russia, EU
BONUS+	Conference	BONUS Secretariat	BONUS+ mid-term conference	19-21 January 2010	Vilnius	Scientific community	150+	All BONUS countries, Russia,
BONUS+	Publications	BONUS Secretariat	BONUS Newsletter May 2010	15 May 2010	Helsinki	Policy makers, scientific community, civil society, industry	700+ in hard copies, available for downloading online	All BONUS countries, Russia, EU
SP	Publications	BONUS Secretariat	BONUS in Brief November 2010	3 November 2010	Helsinki	Policy makers, scientific community, civil society, industry	700+ in hard copies, available for downloading online	All BONUS countries, Russia, EU
SP	Media briefing	BONUS breakfast with journalists	INFLOW project	15 February 2011	Helsinki	Medias	12 (incl. National)	Finland
SP	Publications	BONUS Secretariat	BONUS annual report 2010	1 April 2011	Helsinki	Policy makers, civil society, industry, medias, scientific community	500 in hard copies, downloadable online	All BONUS countries, Russia, EU
SP	Publications	BONUS Secretariat	BONUS in Brief May 2011	15 May 2011	Helsinki	Policy makers, scientific community, civil society, industry	700+ in hard copies, available for downloading online	All BONUS countries, Russia, EU
SP	Conference	BSSC together with BONUS	The 8th Baltic Sea Science Congress and the final BONUS+	22-28 August 2011	St. Petersburg	Scientific community	400+	Baltic Sea and BONUS countries; EU and wider

			science conference					
SP	Conference	ICES	Annual conference	19-23 September 2011	Gdansk	Scientific community, policy makers	200+	
SP	Posters	BONUS Secretariat, BONUS+ projects	BONUS+ roll-ups series (16) of key results: AMBER, BALCOFISH, BALTGENE, BALTIC-C, BALTIC GAS, BALTICWAY, BAZOOCA, BEAST, ECOSUPPORT, HYPER, IBAM, INFLOW, PREHAB, PROBALT, RECOCA, RISKGOV	24 October 2011		Policy makers, civil society, industry, medias		All Baltic Sea and BONUS countries, EU, overseas
SP	Publications	BONUS Secretariat, BONUS+ projects	BONUS+ briefing documents numbers 2-17 of key results: AMBER, BALCOFISH, BALTGENE, BALTIC-C, BALTIC GAS, BALTICWAY, BAZOOCA, BEAST, ECOSUPPORT, HYPER, IBAM, INFLOW, PREHAB, PROBALT,	24 October 2011		Policy makers, civil society, industry, medias,		All Baltic Sea and BONUS countries, EU, overseas

			RECOCA, RISKGOV					
SP	Videos	BONUS Secretariat, BONUS+ projects	BONUS Forum 2011 key note and BONUS+ projects' presentations on YouTube linked via BONUS website.	24 October 2011		Policy makers, civil society, industry, medias		All Baltic Sea and BONUS countries, EU, overseas
SP	Workshop	BONUS Secretariat	BONUS+ highlights to EU community	8 November 2011	Brussels	Policy makers, scientific community, civil society	70+	EU community, Baltic Sea and BONUS countries
SP	Publications	BONUS Secretariat	BONUS in Brief November 2011	15 November 2011	Helsinki	Policy makers, scientific community, civil society, industry	700+ in hard copies, available for downloading online	All BONUS countries, Russia, EU
SP	Conference	ECOSUPPORT and RECOCA	Final project results to scientific community and stakeholders	5-6 December 2011	Stockholm	Scientific community, policy makers, civil society	80+	Baltic Sea and BONUS countries, EU
SP	Publications	BONUS Secretariat	BONUS briefing number 18 on Russian participation in BONUS	6 March 2012		Scientific community, policy makers, civil society		Russia and BONUS countries

Section B (Confidential[16] or public: confidential information to be marked clearly)

Not applicable.

[16] Note to be confused with the "EU CONFIDENTIAL" classification for some security research projects.

4.3 Report on societal implications

Replies to the following questions will assist the Commission to obtain statistics and indicators on societal and socio-economic issues addressed by projects. The questions are arranged in a number of key themes. As well as producing certain statistics, the replies will also help identify those projects that have shown a real engagement with wider societal issues, and thereby identify interesting approaches to these issues and best practices. The replies for individual projects will not be made public.

A General Information *(completed automatically when **Grant Agreement number** is entered.*

Grant Agreement Number:	217246
Title of Project:	Multilateral call for research projects within the joint Baltic Sea
Name and Title of Coordinator:	Kaisa Kononen, Dr, Executive Director

B Ethics

1. Did your project undergo an Ethics Review (and/or Screening)? • If Yes: have you described the progress of compliance with the relevant Ethics Review/Screening Requirements in the frame of the periodic/final project reports? Special Reminder: the progress of compliance with the Ethics Review/Screening Requirements should be described in the Period/Final Project Reports under the Section 3.2.2 *'Work Progress and Achievements'*	***No***
2. Please indicate whether your project involved any of the following issues (tick box) :	***NO***
RESEARCH ON HUMANS	
• Did the project involve children?	
• Did the project involve patients?	
• Did the project involve persons not able to give consent?	
• Did the project involve adult healthy volunteers?	
• Did the project involve Human genetic material?	
• Did the project involve Human biological samples?	
• Did the project involve Human data collection?	
RESEARCH ON HUMAN EMBRYO/FOETUS	
• Did the project involve Human Embryos?	
• Did the project involve Human Foetal Tissue / Cells?	
• Did the project involve Human Embryonic Stem Cells (hESCs)?	
• Did the project on human Embryonic Stem Cells involve cells in culture?	
• Did the project on human Embryonic Stem Cells involve the derivation of cells from Embryos?	
PRIVACY	
• Did the project involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	
• Did the project involve tracking the location or observation of people?	

RESEARCH ON ANIMALS	
• Did the project involve research on animals?	
• Were those animals transgenic small laboratory animals?	
• Were those animals transgenic farm animals?	
• Were those animals cloned farm animals?	
• Were those animals non-human primates?	
RESEARCH INVOLVING DEVELOPING COUNTRIES	
• Did the project involve the use of local resources (genetic, animal, plant etc)?	
• Was the project of benefit to local community (capacity building, access to healthcare, education etc)?	
DUAL USE	
• Research having direct military use	0 Yes 0 No
• Research having the potential for terrorist abuse	

C Workforce Statistics

3. Workforce statistics for the project: Please indicate in the table below the number of people who worked on the project (on a headcount basis).

Type of Position	Number of Women	Number of Men
Scientific Coordinator		1
Work package leaders	2	1
Experienced researchers (i.e. PhD holders)	1	1
PhD Students	-	-
Other	1	

4. How many additional researchers (in companies and universities) were recruited specifically for this project?	**0**
Of which, indicate the number of men:	0

D Gender Aspects

5. Did you carry out specific Gender Equality Actions under the project?	○ x	~~Yes~~ No

6. Which of the following actions did you carry out and how effective were they?

	Not at all effective				Very effective
❑ Design and implement an equal opportunity policy	○	○	○	○	○
❑ Set targets to achieve a gender balance in the workforce	○	○	○	○	○
❑ Organise conferences and workshops on gender	○	○	○	○	○
❑ Actions to improve work-life balance	○	○	○	○	○

○ Other: Gender equality aspect was considered when recruiting personnel to BONUS EEIG

7. Was there a gender dimension associated with the research content – i.e. wherever people were the focus of the research as, for example, consumers, users, patients or in trials, was the issue of gender considered and addressed?

○ Yes- please specify

X No

E Synergies with Science Education

8. Did your project involve working with students and/or school pupils (e.g. open days, participation in science festivals and events, prizes/competitions or joint projects)?

X Yes- please specify: BONUS+ young scientists club convening during BONUS annual conferences

○ No

9. Did the project generate any science education material (e.g. kits, websites, explanatory booklets, DVDs)?

○ Yes- please specify

X No

F Interdisciplinarity

10. Which disciplines (see list below) are involved in your project?

○ Main discipline[17]: 1.4

○ Associated discipline[17~~1~~]: 1.5 ○ Associated discipline[17~~1~~]: 5.2, 5.4

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G Engaging with Civil society and policy makers

11a Did your project engage with societal actors beyond the research community? *(if 'No', go to Question 14)*	X ○	Yes No

11b If yes, did you engage with citizens (citizens' panels / juries) or organised civil society (NGOs, patients' groups etc.)?

X No

○ Yes- in determining what research should be performed

○ Yes - in implementing the research

○ Yes, in communicating /disseminating / using the results of the project

[17] Insert number from list below (Frascati Manual).

11c In doing so, did your project involve actors whose role is mainly to organise the dialogue with citizens and organised civil society (e.g. professional mediator; communication company, science museums)?	○ X	Yes No

12. Did you engage with government / public bodies or policy makers (including international organisations)

○	No
○	Yes- in framing the research agenda
○	Yes - in implementing the research agenda
X	Yes, in communicating /disseminating / using the results of the project

13a Will the project generate outputs (expertise or scientific advice) which could be used by policy makers?

X	Yes – as a **primary** objective (please indicate areas below- multiple answers possible)
○	Yes – as a **secondary** objective (please indicate areas below - multiple answer possible)
○	No

13b If Yes, in which fields?

Agriculture		Energy		~~Human rights~~	
~~Audiovisual and Media~~		Enlargement		~~Information Society~~	
~~Budget~~		~~Enterprise~~		~~Institutional affairs~~	
Competition		Environment		~~Internal Market~~	
~~Consumers~~		~~External Relations~~		~~Justice, freedom and security~~	
~~Culture~~		~~External Trade~~		~~Public Health~~	
~~Customs~~		Fisheries and Maritime Affairs		~~Regional Policy~~	
~~Development-Economic and~~		Food Safety		Research and Innovation	
Monetary Affairs		~~Foreign and Security Policy~~		~~Space~~	
~~Education, Training, Youth~~		~~Fraud~~		~~Taxation~~	
~~Employment and Social Affairs~~		~~Humanitarian aid~~		Transport	

13c If Yes, at which level?

- x Local / regional levels
- x National level
- x European level
- x International level

H Use and dissemination

14. How many Articles were published/accepted for publication in peer-reviewed journals?	**0**
To how many of these is open access[18] provided?	**0**
How many of these are published in open access journals?	
How many of these are published in open repositories?	
To how many of these is open access not provided?	**0**
Please check all applicable reasons for not providing open access:	
❑ publisher's licensing agreement would not permit publishing in a repository ❑ no suitable repository available ❑ no suitable open access journal available ❑ no funds available to publish in an open access journal ❑ lack of time and resources ❑ lack of information on open access ❑ other[19]: ……	

15. How many new patent applications ('priority filings') have been made? *("Technologically unique": multiple applications for the same invention in different jurisdictions should be counted as just one application of grant).*		**0**
16. Indicate how many of the following Intellectual Property Rights were applied for (give number in each box).	Trademark	**0**
	Registered design	**0**
	Other	**0**
17. How many spin-off companies were created / are planned as a direct result of the project?		**0**
Indicate the approximate number of additional jobs in these companies:		

18. Please indicate whether your project has a potential impact on employment, in comparison with the situation before your project:

❑	Increase in employment, or	❑	In small & medium-sized enterprises
❑	Safeguard employment, or	❑	In large companies
❑	Decrease in employment,	❑	None of the above / not relevant to the project
X	Difficult to estimate / not possible to quantify		

19. For your project partnership please estimate the employment effect resulting directly from your participation in Full Time Equivalent (*FTE = one person working fulltime for a year*) jobs:	*Indicate figure:*

[18] Open Access is defined as free of charge access for anyone via Internet.
[19] For instance: classification for security project.

Difficult to estimate / not possible to quantify	❑

I Media and Communication to the general public

20. As part of the project, were any of the beneficiaries professionals in communication or media relations?

X Yes X No

Project benefited from a communication professional of an adjacent project

21. As part of the project, have any beneficiaries received professional media / communication training / advice to improve communication with the general public?

○ Yes X No

22 Which of the following have been used to communicate information about your project to the general public, or have resulted from your project?

X	Press Release	X	Coverage in specialist press
X	Media briefing	❑	Coverage in general (non-specialist) press
❑	TV coverage / report	X	Coverage in national press
❑	Radio coverage / report	X	Coverage in international press
X	Brochures /posters / flyers	X	Website for the general public / internet
❑	DVD /Film /Multimedia	❑	Event targeting general public (festival, conference, exhibition, science café)

23 In which languages are the information products for the general public produced?

❑	Language of the coordinator	X	English
❑	Other language(s)		

Question F-10: Classification of Scientific Disciplines according to the Frascati Manual 2002 (Proposed Standard Practice for Surveys on Research and Experimental Development, OECD 2002):

FIELDS OF SCIENCE AND TECHNOLOGY

1. NATURAL SCIENCES

1.1 Mathematics and computer sciences [mathematics and other allied fields: computer sciences and other allied subjects (software development only; hardware development should be classified in the engineering fields)]

1.2 Physical sciences (astronomy and space sciences, physics and other allied subjects)

1.3 Chemical sciences (chemistry, other allied subjects)

1.4 Earth and related environmental sciences (geology, geophysics, mineralogy, physical geography and other geosciences, meteorology and other atmospheric sciences including climatic research, oceanography, vulcanology, palaeoecology, other allied sciences)

1.5 Biological sciences (biology, botany, bacteriology, microbiology, zoology, entomology, genetics, biochemistry, biophysics, other allied sciences, excluding clinical and veterinary sciences)

2 ENGINEERING AND TECHNOLOGY

2.1 Civil engineering (architecture engineering, building science and engineering, construction engineering, municipal and structural engineering and other allied subjects)

2.2 Electrical engineering, electronics [electrical engineering, electronics, communication engineering and systems, computer engineering (hardware only) and other allied subjects]

2.3. Other engineering sciences (such as chemical, aeronautical and space, mechanical, metallurgical and materials engineering, and their specialised subdivisions; forest products;

applied sciences such as geodesy, industrial chemistry, etc.; the science and technology of food production; specialised technologies of interdisciplinary fields, e.g. systems analysis, metallurgy, mining, textile technology and other applied subjects)

3. MEDICAL SCIENCES

3.1 Basic medicine (anatomy, cytology, physiology, genetics, pharmacy, pharmacology, toxicology, immunology and immunohaematology, clinical chemistry, clinical microbiology, pathology)

3.2 Clinical medicine (anaesthesiology, paediatrics, obstetrics and gynaecology, internal medicine, surgery, dentistry, neurology, psychiatry, radiology, therapeutics, otorhinolaryngology, ophthalmology)

3.3 Health sciences (public health services, social medicine, hygiene, nursing, epidemiology)

4. AGRICULTURAL SCIENCES

4.1 Agriculture, forestry, fisheries and allied sciences (agronomy, animal husbandry, fisheries, forestry, horticulture, other allied subjects)

4.2 Veterinary medicine

5. SOCIAL SCIENCES

5.1 Psychology

5.2 Economics

5.3 Educational sciences (education and training and other allied subjects)

5.4 Other social sciences [anthropology (social and cultural) and ethnology, demography, geography (human, economic and social), town and country planning, management, law, linguistics, political sciences, sociology, organisation and methods, miscellaneous social sciences and interdisciplinary , methodological and historical S1T activities relating to subjects in this group. Physical anthropology, physical geography and psychophysiology should normally be classified with the natural sciences].

6. HUMANITIES

6.1 History (history, prehistory and history, together with auxiliary historical disciplines such as archaeology, numismatics, palaeography, genealogy, etc.)

6.2 Languages and literature (ancient and modern)

6.3 Other humanities [philosophy (including the history of science and technology) arts, history of art, art criticism, painting, sculpture, musicology, dramatic art excluding artistic "research" of any kind, religion, theology, other fields and subjects pertaining to the humanities, methodological, historical and other S1T activities relating to the subjects in this group]