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BalticSTERN

Baltic Systems Tool for Ecological-economic evaluation: a Refined Nest-model

A proposal for an international research and development program

May 2008

BalticSTERN: Baltic Systems Tool for Ecological-economic evaluation – a Refined Nest-model

A proposal for an international research and development program

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Table of contents

Foreword			3
0	Summary		4
	0.1	General background and objective	4
	0.2	Program organization and budget	5
1	Introduction		9
	1.1	General overview of the research program	10
	1.2	On the practical usefulness of models	13
	1.3	Conclusion	16
2	Work packages		17
	2.1	WP1. Development and applications of ecological and economic models to manage the Baltic Sea Ecoregion	18
	2.2	WP2. A food web model integrating fishery economics	37
	2.3	WP3. Cost-minimizing strategies and instruments for a cleaner Baltic Sea under changing market conditions	47
	2.4	WP4. Benefits of an improved marine environment in the Baltic Sea	61
	2.5	WP5. Program management and communication	71
3	Overview of the program		77
	3.1	List of work packages and work tasks	77
	3.2	List of deliverables	78
	3.3	Total budget	82
References			83
Annex I.		Details on co-funding and co-operation opportunities	86
Annex II.		Budgetary details	91
Annex III.		Brief presentations of program partners	99
Annex IV.		Short CVs for leaders of WPs, WTs and partners	112

Foreword

This proposal for the BalticSTERN research program is the result of a project carried out during the period of June 2007-May 2008. The proposal preparation has been coordinated by Tore Söderqvist (Enveco Environmental Economics Consultancy Ltd.), administratively supported by Marmar Nekoro (Beijer Institute of Ecological Economics). Financial support for the project from Baltic Sea 2020 is gratefully acknowledged.

The process of preparing the proposal has involved the identification of a suitable research team, and discussions and agreements about what components should be included in the program proposal. The process was greatly facilitated by having three workshops (presentations and other materials from the workshops are available upon request from the proposal coordinator):

1. A general workshop at the Stockholm Resilience Centre on 19-20 September 2007.
2. A workshop focusing on fish and fisheries at the Stockholm Resilience Centre on 22-23 November 2007.
3. A workshop focusing on economic issues on 17-18 January 2008. The first day of the workshop was held at the Stockholm Resilience Centre. The venue of the second day was the Swedish Environmental Protection Agency, which also co-funded the workshop.

It was gradually possible to identify the researchers to be in charge for developing the main constituents ("work packages") of the program, and these work package leaders became in turn responsible for gathering the partners necessary for carrying out the work tasks in the work packages. I would like to take this opportunity to thank them as well as the other persons who have contributed to this proposal.

The proposal is hereby submitted to Baltic Sea 2020, which is asked to consider the proposal for potential funding. If clarifications, revisions, supplementary information etc. would be needed for a complete consideration, the research team is of course willing to accomplish this to the best of its ability.

Stockholm, 30 May 2008

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0. Summary

0.1 General background and objective

This document is a proposal for a 3-year international and multidisciplinary research and development program involving partners from all Baltic Sea countries. Its main objective is to develop a number of scientifically sound tools, models and methods that are useful for decision-makers at international, national, regional and local levels for assessing the ecological and economic consequences of taking different actions for improving the environmental status of the sea. While the tool will be based on a number of natural scientific and economic models and interactions among these models, a user-friendly interface will be constructed that enables non-experts to use the tool.

The program is called *Baltic Systems Tool for Ecological-economic evaluation: a Refined Nest-model (BalticSTERN)* because it will partly be built upon the existing Baltic Nest model. However, the new tool, which in turn consists of several sub-tools, will constitute a major further development of the Baltic Nest. This development of novel tools, models and methods will allow detailed assessments of the costs and benefits of different measures taken in different countries around the Baltic Sea. At present, there is a high risk that money is wasted by taking measures in the Baltic Sea countries that are unnecessary expensive for meeting environmental objectives or by taking measures that entail costs that exceed the benefits of what the measures actually accomplish in terms of an improved marine environment. The development of tools, models and methods in BalticSTERN will help minimize the risk of resources being wasted by, for example, providing new opportunities to identify cost-effective combinations of measures in different countries.

The research work in BalticSTERN thus includes the construction of models and linking different models to each other. The models will make it possible to say something about the complex relationship between mankind and nature in the Baltic Sea and its drainage basin: how humans affect the physical and biological characteristics of the natural system and how changes in the natural system affect humans and their wellbeing. The reason for why models are needed for saying something about these relationships is simply because almost everything depends on almost everything. There are so many feedbacks between the different parts of the natural system and humans that it is virtually impossible to analyze the outcome manually. Explicit models are needed in order to be as certain as possible in assessing consequences of a proposed or realized policy. Moreover, many such models have turned out to be practical tools, used in practice for influencing and guiding decisions.

On the whole, we anticipate that the BalticSTERN program will contribute to an increased understanding of the economic impacts of environmental degradation in the Baltic Sea, analogous to the Stern Review on climate change. We also perceive that the program and model components will contribute in practice to an improved environment. Further, the timing is right for launching a BalticSTERN program. Marine issues are high on the EU agenda, as well as regionally. Sweden and Finland have explicitly stated the need for a Stern-like review and Sweden will focus on marine issues during its EU chairmanship during the fall of 2009. The BalticSTERN can be used for a more qualified

discussion on pros and cons related to the marine environment, with regard to the Baltic Sea, but also other areas such as the North and Black Seas.

The BalticSTERN activities proposed in this document represent a state-of-the-art exercise. The program has been designed so as to accomplish results that are scientifically sound and novel and represent a major step forward to combat eutrophication in the Baltic Sea Ecoregion. The tools, models and methodological approaches to be developed in the BalticSTERN program will be easy to understand and ready to use for politicians, managers and the public. For making sure that the outcomes from the program are useful in practice, the program will includes active involvement of decision-makers. On a global scale, the overall importance and impact of combining ecology, economics and management are unique and outstanding. The general concepts, tools and models developed in BalticSTERN can be applied all over the world.

0.2. Program organization and budget

It is suggested in this proposal that BalticSTERN consists of the five core activities ("work packages", WPs) listed in table 0.1. In these WPs, the work to be done for meeting the objectives of BalticSTERN are carried out by researchers associated to the organizations that are involved in BalticSTERN as partners. Organizations from all Baltic Sea countries are found among the other partners. These partners and their researchers constitute together the quite unique network of experienced economists and natural scientists in the Baltic Sea region that is required for BalticSTERN to be successful.

Table 0.1. The five work packages in BalticSTERN.

Work package	*Work package leader*
WP1. Development and applications of ecological and economic models to manage the Baltic Sea Ecoregion	Bo Riemann (Baltic Nest Institute, National Environmental Research Institute, Aarhus University)
WP2. A food web model integrating fishery economics	Olle Hjerne (Department of Systems Ecology, Stockholm University)
WP3. Cost-minimizing strategies and instruments for a cleaner Baltic Sea under changing market conditions.	Berit Hasler (National Environmental Research Institute, Aarhus University)
WP4. Benefits of an improved marine environment in the Baltic Sea.	Tore Söderqvist (Enveco Environmental Economics Consultancy Ltd., Stockholm)
WP5. Program management and communication.	Tomasz Zylicz (Warsaw Ecological Economics Center, Warsaw University) – also Program Director

Figure 0.1 describes in a very general way the focus of each WP and indicates that the four research-orientated WPs 1-4 are designed for providing pieces of knowledge that are possible to put together for enabling, for example, ecological-economic policy assessments. While each WP will produce deliverables that are useful in themselves, important synergies arise when the results of the WPs are put together. It is the combination of results from the different WPs that makes it possible to, for example, carry out ecologically and economically consistent evaluations of policy options related to the Baltic Sea. Such evaluations will be a part of two main deliverables of BalticSTERN:

1. A web-based decision-support tool characterized by a user-friendly interface enabling non-experts to use the tool and thus giving decision-makers and others opportunities to carry out their own evaluations of different policy options. This tool will be the considerably refined and updated Baltic Nest.

2. A BalticSTERN Report written in all Baltic Sea languages (and English) and giving a non-technical summary of the results of the entire program.

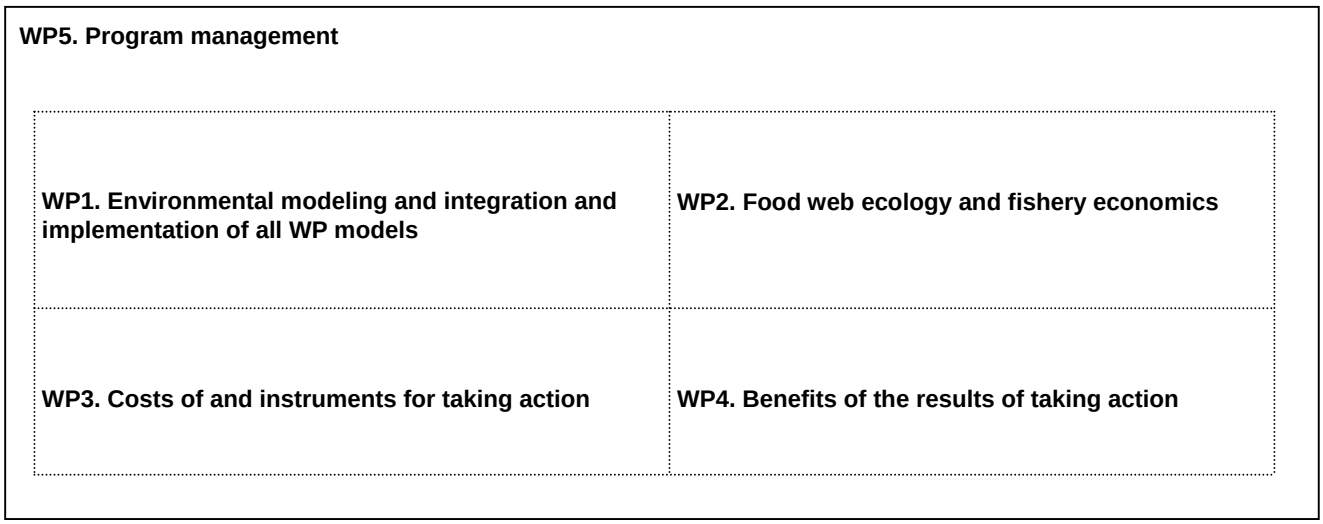

Figure 0.1. The main contents of each of the five WPs.

Figure 0.2 describes an example of how WPs 1-4 provide results that together can be used for assessing the costs and benefits of different nutrient load reductions to the Baltic Sea, among them the load reductions implied by the HELCOM Baltic Sea Action Plan (BSAP) recently agreed upon by the Baltic Sea countries. Such assessments are likely to be crucial for future international and national negotiations about what measures to take for reducing the nutrient loads to the Baltic Sea.

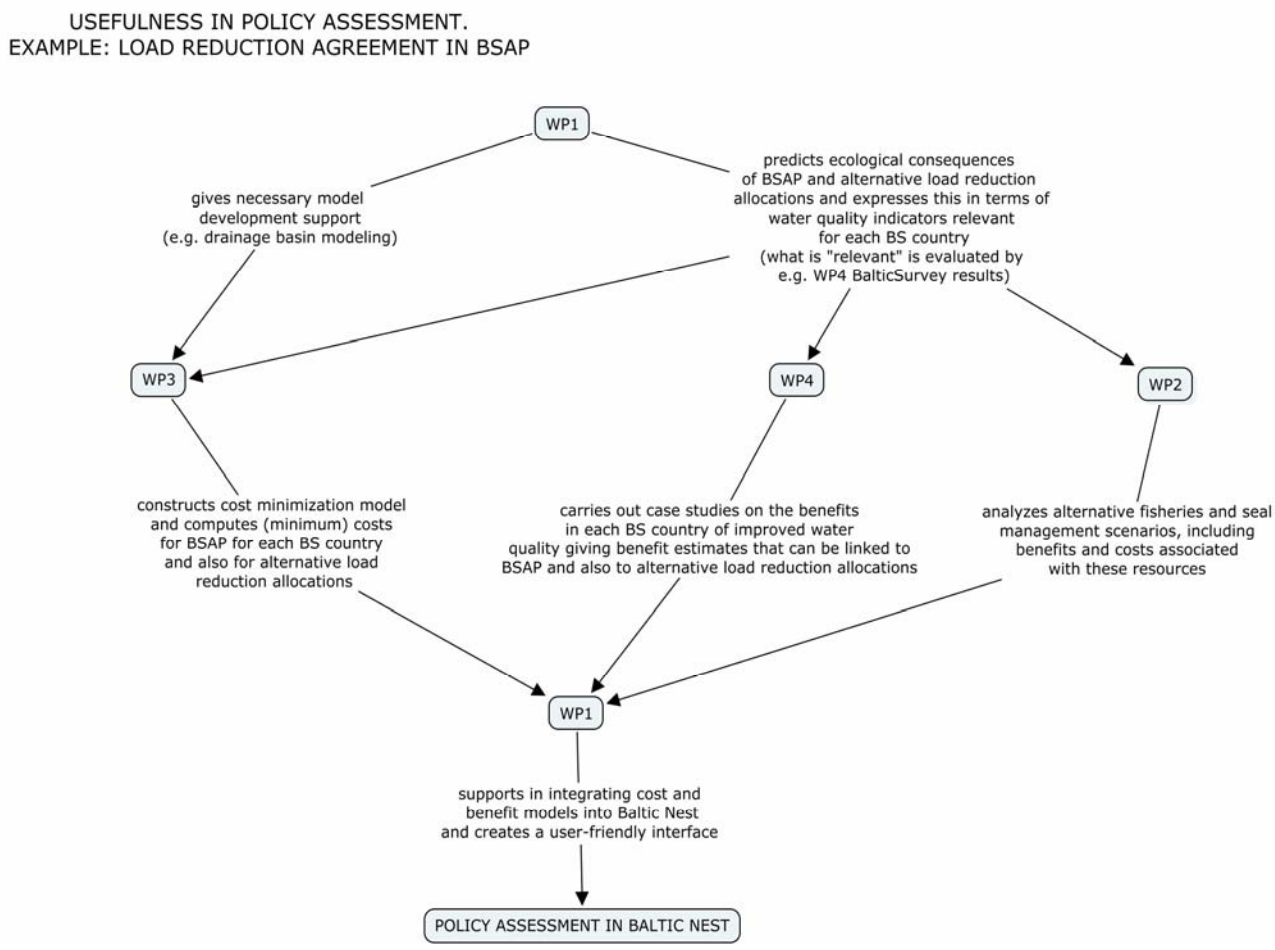

Figure 0.2. BalticSTERN policy assessment of the load reduction agreement in the HELCOM Baltic Sea Action Plan (BSAP).

As to WP5, figure 0.3 shows how this WP is proposed to be organized. The internal program management is handled by the Program Director, a Program Secretariat and a Steering Committee. The Program Secretariat provides administrative and coordination support to the Program Director and the Steering Committee is the body having ultimate responsibility for all major decisions and for ensuring that the objectives, work tasks and deliverables are satisfactorily executed. The Program Secretariat will physically be situated at the Stockholm Resilience Centre, which is also suggested to be the main contractor for the whole BalticSTERN program.

As is also shown by figure 0.3, two other groups are connected to WP5, a Reference Group and a Communication Group. The former will consist of representatives of those who will make use of the results of BalticSTERN, i.e. primarily decision-makers at various levels in all Baltic Sea countries and administrative bodies such as HELCOM. The Communication Group is suggested to consist of representatives of the communication experts that Baltic Sea 2020 has established co-operating with. This group would – in consultation with the Steering Committee and the Reference Group – be responsible for the design of the communication of BalticSTERN.

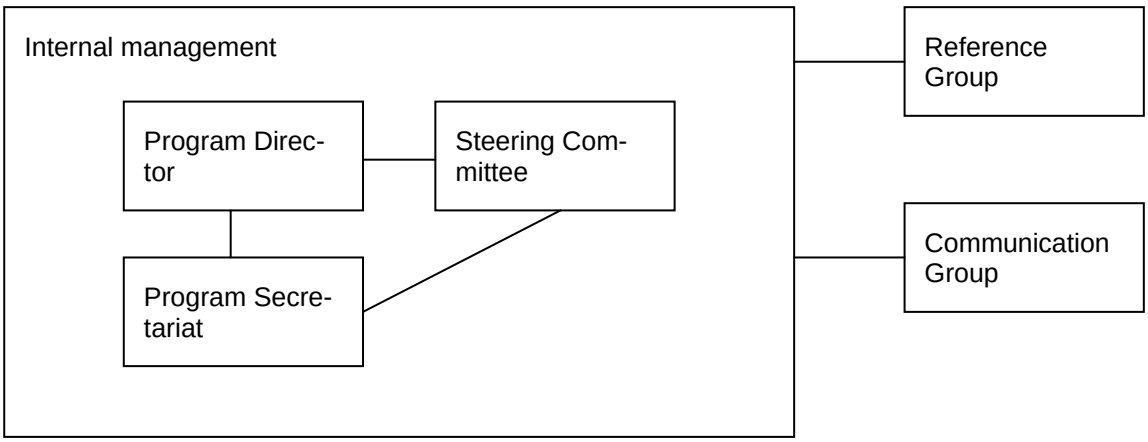

Figure 0.3. The organization of WP5.

The funding required for realizing the activities in WPs 1-5 and thus the BalticSTERN program is shown by table 0.2. The grand total is 7.2 million EUR, i.e. on average 2.4 million EUR per year. WP1 accounts for 34% of the total budget, WP2 8%, WP3 21%, WP4 29% and WP5 8%.

Table 0.2. Total program budget, rounded off to million EUR.

Period	*WP1 (million €)*	*WP2 (million €)*	*WP3 (million €)*	*WP4 (million €)*	*WP5 (million €)*	***Total for BalticSTERN (million €)***
Month 1-12	0.87	0.21	0.61	0.84	0.20	***2.73***
Month 13-24	0.75	0.21	0.46	1.03	0.20	***2.65***
Month 25-36	0.79	0.18	0.42	0.23	0.20	***1.82***
Total	***2.41***	***0.60***	***1.49***	***2.10***	***0.60***	***7.20***

1. Introduction

This document is a proposal for a 3-year international and multidisciplinary research and development program involving partners from all Baltic Sea countries. Its main objective is to develop a number of scientifically sound tools, models and methods that are useful for decision-makers at international, national, regional and local levels for assessing the ecological and economic consequences of taking different actions for improving the environmental status of the sea. While the tool will be based on a number of natural scientific and economic models and interactions among these models, a user-friendly interface will be constructed that enables non-experts to use the tool.

The program is called *Baltic Systems Tool for Ecological-economic evaluation: a Refined Nest-model (BalticSTERN)* because it will partly be built upon the existing Baltic Nest model (see section 1.2.3). However, the new tool, which in turn consists of several sub-tools, will constitute a major further development of the Baltic Nest. This development of novel tools, models and methods will allow detailed assessments of the costs and benefits of different measures taken in different countries around the Baltic Sea. At present, there is a high risk that money is wasted by taking measures in the Baltic Sea countries that are unnecessary expensive for meeting environmental objectives or by taking measures that entail costs that exceed the benefits of what the measures actually accomplish in terms of an improved marine environment. The development of tools, models and methods in BalticSTERN will help minimize the risk of resources being wasted by, for example, providing new opportunities to identify cost-effective combinations of measures in different countries.

Moreover, the present institutions and political agenda for the Baltic Sea suggest that the possibility to make such assessments will have a major impact for the individual countries around the Baltic Sea. We draw this conclusion from the fact that both the Swedish and Finnish Ministers of the Environment have requested a "Stern-like" review of the situation in the Baltic.[1] The strategies and measures to reach the goal of a healthy marine environment must focus on a reduction of discharges, emissions and losses for all relevant sources and on ecological objectives for the marine environment. Such ecological objectives are formulated for regional areas (HELCOM), and for the European community via the Water Framework Directive (WFD), the Habitat Directive (HD) and the Marine Strategy Directive (MSD). The Johannesburg declaration also includes strong commitments for restoring depleted fish stocks. There is thus a tight coupling and major synergies between BalticSTERN and the legislative management carried out by the individual nations around the Baltic Sea. The anticipated results from BalticSTERN are likely to be consulted in formulating policies and making priorities between different sectors. We conclude that the tools to be developed in BalticSTERN are highly relevant to the political agenda and are therefore likely to have a profound impact on the future management of the Baltic Sea Ecoregion.[2] In addition, the political agenda implies an urgent need to launch the BalticSTERN program. It is therefore suggested that the program starts with a kick-off meeting gathering researchers and decision-makers in the fall of 2008.

This proposal is organized as follows. In the rest of this introductory section, we provide a general overview of the structure of the research program (section 1.1). In section 1.2, it is explained how research work involving the development of models is motivated from a practical point of view.

1. See also annex II.

2. The Baltic Ecoregion concept used here incorporates all land-based and adjacent sea interactions as well as nutrient contributions from the atmosphere to the Baltic Sea.

Section 1.3 concludes the introduction. Section 2 presents in detail the work tasks, deliverables and budgets for the five work packages (WPs) that together constitutes the program. In section 3, the information about the individual work packages in section 2 are aggregated to a program level for work tasks, deliverables and budgets. The proposal also includes four annexes: Annex I provides details about projects and other activities that will or might co-fund various work tasks in the WP2, annex II contains some supplementary budgetary information, annex III contains brief presentations of all partner organizations included in the proposal, and annex IV consists of CVs for work package leaders, work task leaders and – to the extent that that they are mentioned in the WP descriptions – partner leaders.

1.1. General overview of the research program

BalticSTERN will consist of five WPs, which constitute the core activities in the program and described in detail in section 2. The WPs are closely linked to each other, and they will together carry out the work that is necessary for constructing the useful tool that is the main output of the program. The WPs are the following:

WP1. Development and applications of ecological and economic models to manage the Baltic Sea Ecoregion.

WP2. A food web model integrating fishery economics.

WP3. Cost-minimizing strategies and instruments for a cleaner Baltic Sea under changing market conditions.

WP4. Benefits of an improved marine environment in the Baltic Sea.

WP5. Program management and communication.

WPs 1-4 are the WPs that will provide the necessary new knowledge, tools and methods for accomplishing what BalticSTERN as a whole is aiming at. The overall objectives of these WPs are summarized in table 1.1. The work to be done for meeting these objectives are carried out by researchers associated to the organizations that are involved in BalticSTERN as partners. The Stockholm Resilience Centre is proposed to be the main contractor of the program. Table 1.2 lists all partners and shows that organizations from all Baltic Sea countries are partners in the program. These partners and their researchers constitute together the quite unique network of experienced economists and natural scientists in the Baltic Sea region that is required for BalticSTERN to be successful.

Table 1.1. Overall objectives of work packages 1-4. (See section 2 for details on the WPs.)

WP1. Development and applications of ecological and economic models to manage the Baltic Sea Ecoregion.

The overall objective of WP1 is to increase the confidence in the current reduction targets in the Baltic Nest model, develop links between the ecological and economic models and provide HELCOM and national authorities around the Baltic Sea with sufficient knowledge to effectively implement cost-efficient nutrient reduction measures and ensure that targets are met. Particularly, WP1 will:

- Develop quantitative nutrient transport matrices and transformation from land-based emission sources to the Baltic Sea and link interactions between the atmosphere, drainage basin and coastal zone.
- Quantify ecological effects of reduced nutrient inputs from land in comparison with the internal loading within the Baltic Sea. Particularly, develop and apply models to describe nutrient inputs from the sediments.
- Develop and analyse links between the modelling of loads, the ecological models, food web models (WP2) and the economic modelling of costs and benefits in WP3 and WP4, and hereby develop the basis within marine ecology and modelling of loads to ensure scientifically sound quantitative estimates of the welfare-economic effects of nutrient reductions.

WP2. A food web model integrating fishery economics.

The primary objective of WP2 is a further development of an existing eutrophication/fisheries ecosystem model and extending the model to also allow analyses of food web interactions and fishery economics issues. This model will assist managers in exploring “what-if” and “cost-benefit” scenarios related to, for example:

- effects of nutrient management on fish production (bottom up effects)
- effects of fisheries management on the ecosystem
- eutrophication (top-down effects), ecological/economic/social consequences of different management actions

WP3. Cost-minimizing strategies and instruments for a cleaner Baltic Sea under changing market conditions.

A cost-minimization model is currently implemented as part of the Baltic Nest system. WP3 will provide added value by further develop the model by linking it to a framework where market conditions, prices and policies are important drivers for the development of economic activities and resulting emissions to the sea. This dynamic approach is new and necessary to enable modelling of scenarios for the Baltic Sea that considers macroeconomic and sectorwise consequences as well as welfare and distributional effects on sectors, countries and regions from different cost-minimizing abatement strategies. Furthermore, the model framework proposed in WP3 aims to model how changes in demand, technology and environmental as well as non-environmental policies influence the abatement costs. For example, WP3 will make it possible to assess changing market conditions and changed agricultural support policies (e.g. due to changes in the EU Common Agricultural Policy) and new regularory instruments such as quotas and permit trading systems.

WP4. Benefits of an improved marine environment in the Baltic Sea.

Taking measures for improving the marine environment in the Baltic Sea always entails costs, since the resources spent on such measures could be used in other ways. However, the costs are economically justified if the environmental improvement results in benefits that are at least equal to the costs. These benefits could be due to, for example, higher profits in the tourist industry from lower levels of algal blooms or an increased well-being among people due to their enjoyment of the improved water quality and their knowing that the sea has become healthier. Knowledge of the extent of these and other benefits is therefore crucial for being able to justify various improvement measures from an economic point of view. The objective of WP4 is to use a concerted approach across all Baltic Sea countries to the issue of the benefits of an improved marine environment in order to produce facts that are relevant to decision-makers in all Baltic Sea countries.

Table 1.2. Partners in the program. (See annex III for brief presentations of all partners.)

Country	*Partner organization*
Denmark	Aarhus University, National Environmental Research Institute Aarhus University, National Environmental Research Institute, Baltic Nest Institute University of Copenhagen, Institute of Food and Resource Economics
Estonia	Estonian Institute of Sustainable Development/The Stockholm Environmental Institute Tallinn Centre, Tallinn
Finland	Åbo Akademi University, Environmental and Marine Biology/Husö Biological Station Finnish Environment Institute (SYKE), Helsinki MTT Agrifood Research Finland, Helsinki
Germany	Berlin Institute of Technology, Environmental and Land Economics Bonn University, Institute for Food and Resource Economics Leibniz Institute for Baltic Sea Research Warnemünde University of Greifswald, Department of Landscape Economics
Latvia	Baltic International Centre for Economic Policy Studies (BICEPS), Riga
Lithuania	Center for Environmental Policy, Vilnius
Poland	Warsaw University, Warsaw Ecological Economics Center
Russia	Centre for Economic and Financial Research (CEFIR) at New Economic School, Moscow
Sweden	Enveco Environmental Economics Consultancy Ltd. (Enveco Miljöekonomi AB), Stockholm Stockholm Resilience Centre (main contractor) Stockholm University, Stockholm Resilience Centre, Baltic Nest Institute Stockholm University, Department of Systems Ecology Swedish University of Agricultural Sciences, Department of Economics, Uppsala Swedish University of Agricultural Sciences, Department of Soil Sciences, Uppsala University of Gothenburg, Department of Earth Sciences

While each WP will produce deliverables that are useful in themselves, important synergies arise when the results of the WPs are put together. It is the combination of results from the different WPs that

makes it possible to, for example, carry out ecologically and economically consistent evaluations of policy options related to the Baltic Sea. Such evaluations minimize the risk of society's resources to be wasted by taking too expensive or counter-productive actions. This is an economic justification for the efforts to be described in this proposal and the funding necessary for carrying them out – the total budget for the program is on average about 2.4 million EUR per year (see section 3).

Figure 1.1 describes an example of how the WPs provide results that together can be used for assessing the costs and benefits of different nutrient load reductions to the Baltic Sea, among them the load reductions implied by the HELCOM Baltic Sea Action Plan (BSAP) recently agreed upon by the Baltic Sea countries. Such assessments are likely to be crucial for future international and national negotiations about what measures to take for reducing the nutrient loads to the Baltic Sea.

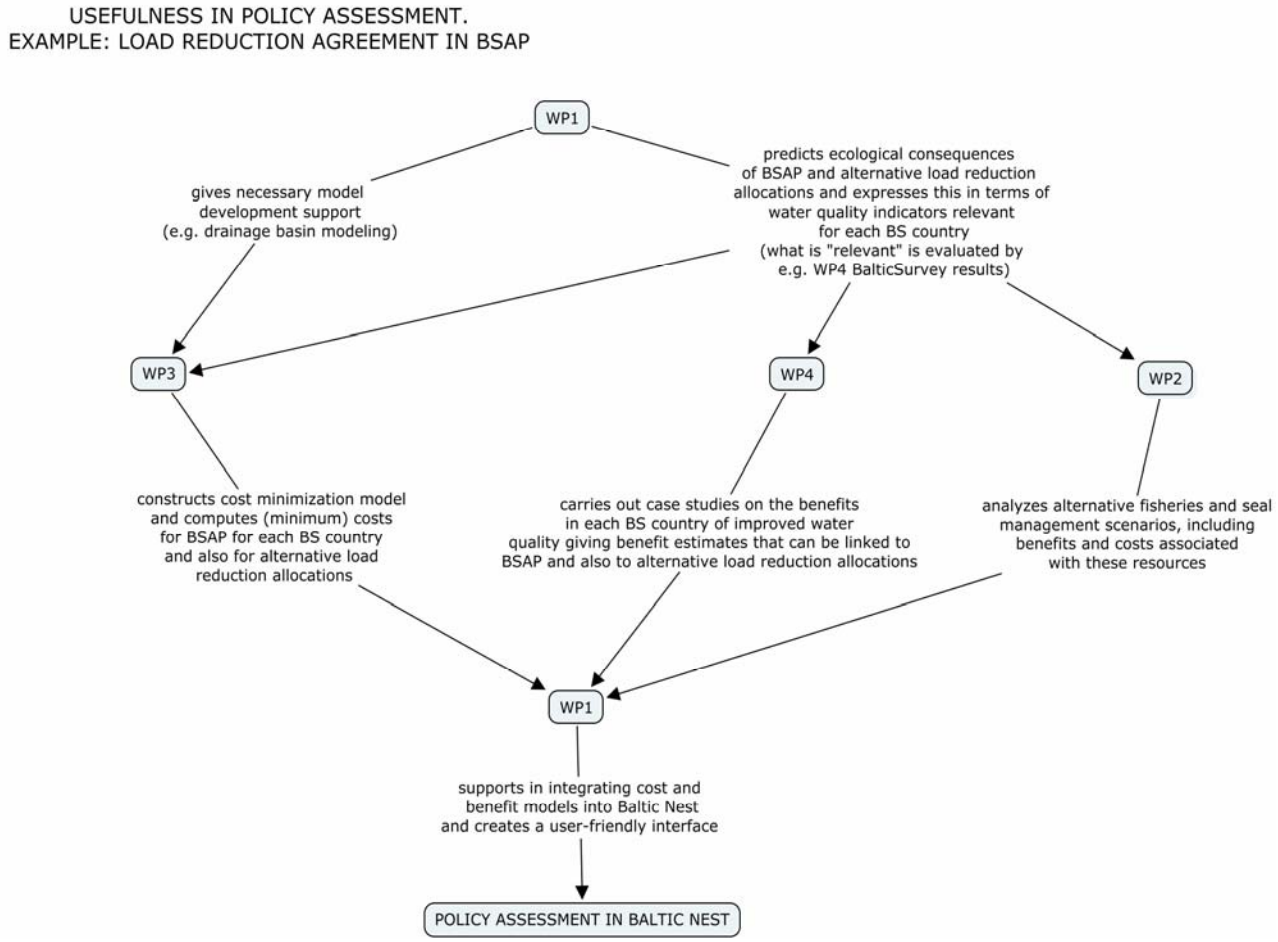

Figure 1.1. BalticSTERN policy assessment of the load reduction agreement in the HELCOM Baltic Sea Action Plan (BSAP).

1.2. On the practical usefulness of models

The research work in BalticSTERN includes the construction of models and linking different models to each other. The models will make it possible to say something about the complex relationship between mankind and nature in the Baltic Sea and its drainage basin: how humans affect the physical and biological characteristics of the natural system and how changes in the natural system affect humans

and their wellbeing. The reason for why models are needed for saying something about these relationships is simply because almost everything depends on almost everything. There are so many feedbacks between the different parts of the natural system and humans that it is virtually impossible to analyze the outcome manually. Explicit models are needed in order to be as certain as possible in assessing consequences of a proposed or realized policy. Moreover, many such models have turned out to be practical tools, used in practice for influencing and guiding decisions. Below, this is illustrated by three examples: The Stern Review, the RAINS model and the Baltic Nest model.

1.2.1. The Stern Review

Almost two years ago, the Stern Review of climate change (Stern, 2007), requested by the then UK Chancellor Gordon Brown, was published. Almost immediately, the study was read and created headlines in newspapers all over the world. The publicity and the content of the review resulted in an increased awareness of climate issues and demand for a sharper climate policy globally. Although no scientific evaluations of the impact of the review have been made so far, it is very probable that it has remarkable impacts on policy making in the climatic field. EU has sharpened its positions on reducing emissions of greenhouse gases and even the present US administration has softened its attitude. Australia, which for many years followed the American path of denying the threat from changes in climate, did change its mind. After a general election and a new government been in place, Australia has now signed the Kyoto protocol. It is very probable that the Stern Review contributed substantially to these changes.

Why did the Stern Review have such consequences? There have been many reports during the last ten years describing the consequences of increasing concentrations of greenhouse gases in the atmosphere, but often they have tended to been ignored by the general public. What made the Stern Review different? The most probable answer to that question is that Sir[3] Nicholas Stern presented the consequences of continued global warming in a currency that laymen could identify – money. By showing that taking the costs for reduced emissions now, large benefits will be realized in the future. That is, taking emission abatement now is a very profitable investment. These results were computed from combining a climate model with a model describing interactions in economies (a computable general equilibrium (CGE) model) to capture the relations between nature and mankind. The credibility of the results in the Stern Review hinged upon having this solid scientific basis.

1.2.2. The RAINS model

The RAINS model is another example of models having a remarkable impact on the policy discussion and on the final outcome of international negotiations (Hordijk and Amann, 2007). This model was developed at the International Institute for Applied System Analysis (IIASA) and is basically a model with three components. The first and central one is the EMEP model[4], which is a transport model of

3 . He is now Lord Stern.

4. EMEP= European Monitoring and Evalution Program under the Convention of Long-Range Air Pollution.

sulphur oxides, nitrogen oxides and ammonia from one square in a European grid to another square. Alternatively, the EMEP model can also be sued to find the transport of these three pollutants from one country to another. The EMEP model, as such, is extremely useful as it gives the effects on deposition of sulphur in one area that follows from a change in emissions in another area.

However, the RAINS model makes the EMEP model much more powerful by including two more components:

1. A model of the abatement costs for the pollutants in each country. This enables the model to calculate cost efficient abatement strategies, i.e. an allocation of pollution abatement among European countries so as to minimize the total European abatement cost in order to achieve a desired pattern of reduction in "acid rains". For example, the model is able to tell the user about the cost efficient abatement strategy for achieving emission reductions that would result in depositions that would not exceed critical loads, i.e. the maximum annual loads ecosystems can accommodate without long-run damage. It could also be used to predict the effect on emissions of the pollutants from a tax of the emissions of the same pollutants.
2. Data on the social cost from acid rains in European countries from a change in abatement. Knowledge of these costs makes it possible to compute the cost savings that would result from a reduction in the deposition of sulphur, nitrogen and ammonia in water bodies, soil, and health.

The work on the RAINS model started in 1983 and the work still continues. Initially, the focus was only on sulphur oxide emissions, but later on emissions of nitrogen oxides, ammonia, volatile organic substances and particulate matter were added. The model turned out to be perfectly tuned to the need of negotiators trying to establish a new protocol on sulphur emissions calling form a 60 per cent uniform reduction. However, the results from the RAINS model demonstrated that such a uniform reduction would be far from cost efficient, because abatement costs vary among countries and critical loads vary among local ecosystems. By using the RAINS model the decision-makers could find out directly the cost savings made possible from a more flexible protocol. Eventually, the protocol from 1994 was based on a scenario generated by the RAINS model in 1992. Hordijk and Amann (2007) conclude that the reason for the RAINS model to be successful in practice was its role as a bridge between scientists and decision-makers.

1.2.3. The Baltic Nest model

The Baltic Nest model, upon which the BalticSTERN work will be built, has already been found very important for guiding negotiations on discharges and runoff of nutrients to the Baltic Sea and the results in terms of the HELCOM BSAP. The Nest model is the result of the Mistra founded research program MARE (MArine Research on Eutrophication).[5] Nest contains a number of different models quantifying, for example, the flow of nutrients from land to sea, internal nutrient dynamics and atmospheric deposition. Further, it contains a model for fish stock dynamics. It can both be used as a tool for scenarios on future development given trends in, for example, agriculture, but it can also be used to calculate the effects of a range of different management options (Wulff et al., 2007).

5 . The Baltic Nest model is available online through the website of the Baltic Nest Institute, www.balticnest.org.

Although Nest very recently has been completed and evaluated, it has already been used for international political decision-making. In the process of developing the HELCOM BSAP, Nest was used to calculate the required nutrient reductions needed in order to achieve politically agreed targets for water transparency (water quality) in the Baltic. The model was also used to define a "fair" method of dividing this required reduction between states. Nest shares many similarities with the RAINS model, although significant differences also can be found. It can be said that the nutrient reductions defined by Nest are analogous to the critical loads defined by RAINS and has thereby been an effective tool to bridge science and policy.

However, Nest does currently not have an effective way to calculate cost-efficient measures. Moreover, Nest does not provide any information at all about the social costs of inaction or the benefits of improving the environmental conditions in the Baltic Sea. The key factors for the success of RAINS are thus not in place yet. This is why incorporating these functions in Nest (according to this proposal) are regarded as critical components for political change.

1.3. Conclusion

We anticipate that the BalticSTERN program will contribute to an increased understanding of the economic impacts of environmental degradation in the Baltic Sea, analogous to the Stern Review on climate change. We also perceive that the program and model components will contribute to an improved environment, analogous to the RAINS model described above. Further, the timing is right for launching a BalticSTERN program. Marine issues are high on the EU agenda, as well as regionally. Sweden and Finland have explicitly stated the need for a Stern-like review and Sweden will focus on marine issues during its EU chairmanship during the fall of 2009. The BalticSTERN can be used for a more qualified discussion on pros and cons related to the marine environment, with regard to the Baltic Sea, but also other areas such as the North and Black Seas.

The BalticSTERN activities proposed in this document, and described in more detail in section 2, represent a state-of-the-art exercise. The program has been designed so as to accomplish results that are scientifically sound and novel and represent a major step forward to combat eutrophication in the Baltic Sea Ecoregion. The tools, models and methodological approaches to be developed in the BalticSTERN program will be easy to understand and ready to use for politicians, managers and the public. For making sure that the outcomes from the program are useful in practice, the program will includes active involvement of decision-makers. On a global scale, the overall importance and impact of combining ecology, economics and management are unique and outstanding. The general concepts, tools and models developed in BalticSTERN can be applied all over the world.

2. Work packages

As was mentioned in section 1, the following five work packages (WPs) together constitute the BalticSTERN program:

WP1. Development and applications of ecological and economic models to manage the Baltic Sea Ecoregion.

WP2. A food web model integrating fishery economics.

WP3. Cost-minimizing strategies and instruments for a cleaner Baltic Sea under changing market conditions.

WP4. Benefits of an improved marine environment in the Baltic Sea.

WP5. Program management and communication.

In this section, each of the WPs is presented in detail by following a similar structure. The first WP section is a general introduction explaining what the WP as a whole is aiming at. This is followed by a section containing descriptions of the work tasks (WTs) that the WP consists of, including timetables, deliverables, task leaders, participating partner organizations and budgets. The final WP section is presenting a total WP budget.

The WP presentations below are short, but nevertheless contain a considerable amount of details. When reading the WP sections, it is therefore important to have figure 2.1 below in mind. It describes in a very general way the focus of each WP and indicates that the WPs are designed for providing pieces of knowledge that are possible to put together for enabling, for example, the types of policy assessments mentioned in section 1.

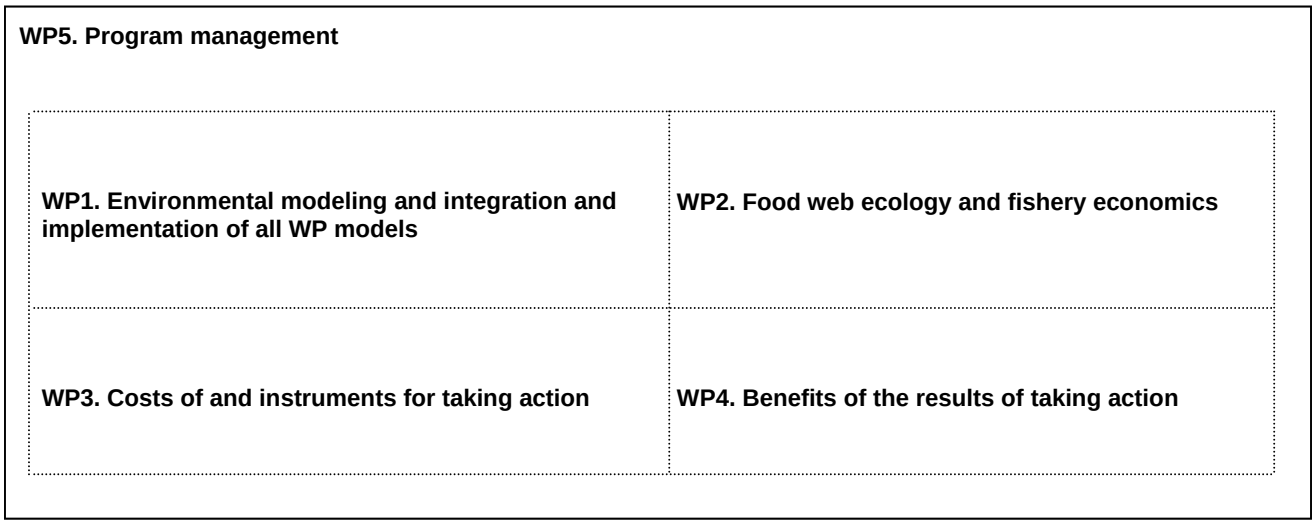

Figure 2.1. The main contents of each of the five WPs.

2.1. WP1. Development and applications of ecological and economic models to manage the Baltic Sea Ecoregion

WP1 leader: Bo Riemann (Baltic Nest Institute, National Environmental Research Institute, Aarhus University)

2.1.1. Introduction

The overall objective of WP1 is to increase the confidence in the current reduction targets in the Baltic Nest model, develop links between the ecological and economic models and provide HELCOM and national authorities around the Baltic Sea with sufficient knowledge to effectively implement cost-efficient nutrient reduction measures and ensure that targets are met. Particularly, WP1 will:

- Develop quantitative nutrient transport matrices and transformation from land-based emission sources to the Baltic Sea and link interactions between the atmosphere, drainage basin and coastal zone.

- Quantify ecological effects of reduced nutrient inputs from land in comparison with the internal loading within the Baltic Sea. Particularly, develop and apply models to describe nutrient inputs from the sediments.

- Develop and analyse links between the modelling of loads, the ecological models, food web models (WP2) and the economic modelling of costs and benefits in WP3 and WP4, and hereby develop the basis within marine ecology and modelling of loads to ensure scientifically sound quantitative estimates of the welfare-economic effects of nutrient reductions.

As to the work plan for WP1, the objectives of WP1 can be achieved only by including expertise from many different fields into a common system that describes the entire chain from environmental policies to regulate emissions, the pathways of nutrient emissions via atmosphere and drainage basin to the coast, the retention of nutrients in the coastal zone, the effects of external nutrient inputs to the Baltic Sea in addition to the internal recycling, and consequences for the services that the Baltic Sea offers to humans (figure 2.2). Closing this chain by comparing the cost of reduction measures to the net value of ecosystem changes provides an instrument for assessing consequences of environmental policies.

The work plan for WP1 is divided into 8 tasks: 7 tasks focus on individual components of the further developed Baltic Nest model system and 1 task is devoted to integration and synthesis. There will be close collaboration between WP1 and WP2 (development of Nest food web model) since many of the components in WP1 interface with WP2 (see figure 2.2). There will also be close collaboration between

WP1 and WP3 on the modelling of loads and modelling of cost-minimizing nutrient reductions related to a chosen target, such as improved visibility, reduced eutrophication, etc. It is necessary to minimize

the costs to obtain one target, and therefore the N and P reductions has to be translated into one effects/ measure. WP1 is also closely linked to WP4 as quantitative assessments of the benefits of nutrient reductions have to be built on knowledge of the quantitative ecological effects on the ecosystem services and goods in the sea from these changes in nutrient loads.

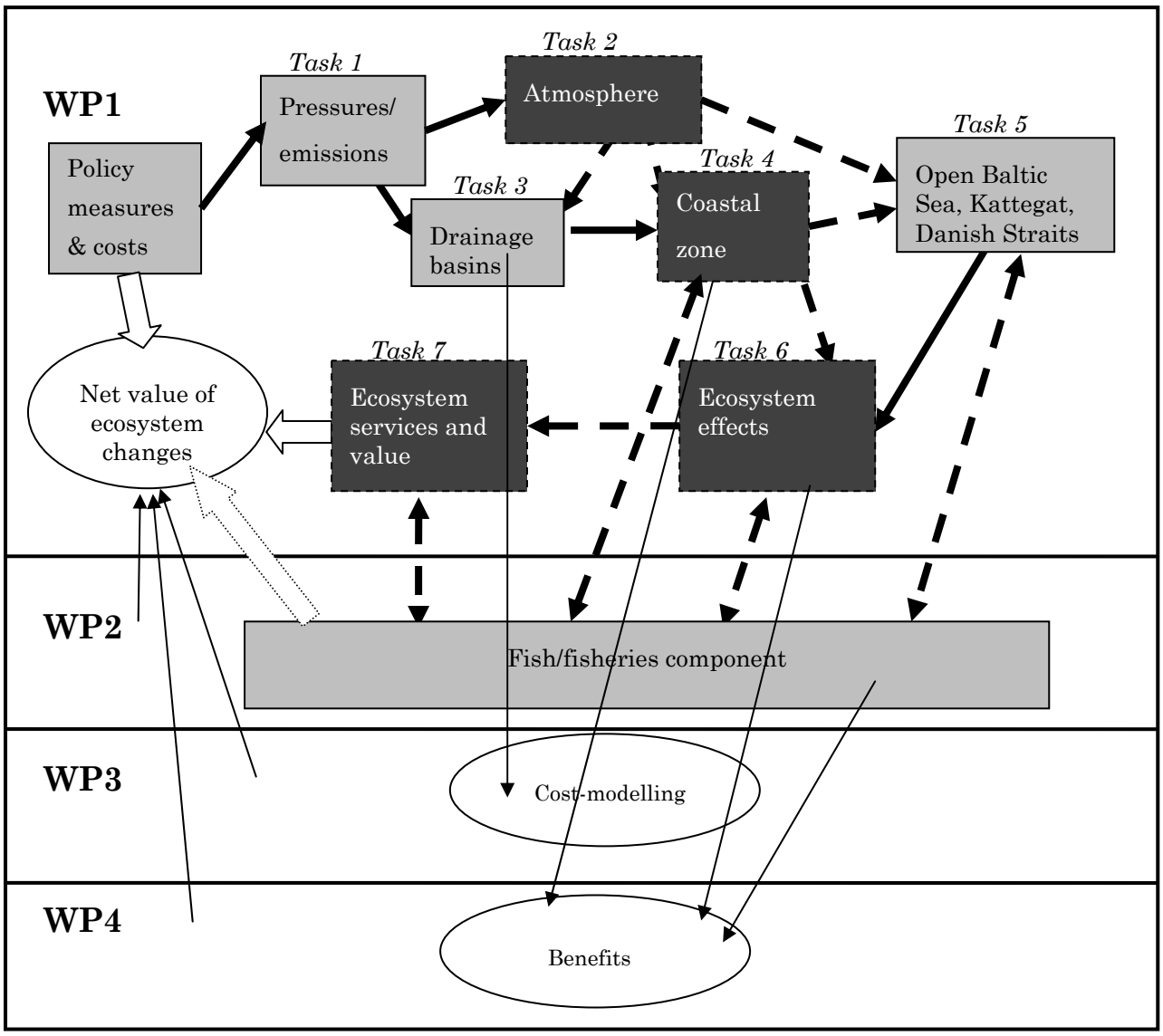

Figure 2.2. A conceptual diagram of the proposed BNI modelling framework. The first 7 tasks in WP1 are displayed as light grey boxes indicating existing components of NEST that will be improved and dark grey boxes indicating new components. Task 1.8 concerns the WP1 infrastructure between components. Thick lines show how the output from these activities are connected with unbroken lines from existing component and broken lines from new components. The WP2 fish component exists in the present NEST version but the link to the open water model has not been developed. Thin lines indicate links from WP1 tasks to WP3 and WP4. Inputs from WP1 task 1 and task 7 will be combined with inputs from WP2-WP4 to assess net economic benefits of policy actions.

The basis for developing this integrated tool is the Nest system used for estimating the required nutrient reductions in the Baltic Sea Action Plan. Nest would still benefit from additional components (see figure 2.2) and the accuracy of existing components should also be further improved. WP1 will strive for fulfilling the Nest vision to achieve a decision-support system for the Baltic Sea that describes the entire chain from environmental policies on reduction measures to costs, benefits and effects in the Baltic and estimates the economic value of restoring the Baltic Sea ecosystem.

2.1.2. Work tasks

WP1 consists of the following eight work tasks, which are described in detail in this section:

1. Nutrient emission regulation
2. Atmospheric emissions and deposition
3. Drainage basin modelling
4. Coastal zone modelling
5. Marine biogeochemistry modelling
6. Ecosystem effects
7. Assessments of the provision of ecosystem services and goods
8. Module integration and implementation

2.1.2.1. Work task 1: Nutrient emission regulation

2.1.2.1.1. Description

Different measures can be undertaken to regulate nutrient emissions by restrictions and reductions at the site of pollution or by changed utilisation of the nutrients within the recipients by adaptation measures. Both of these types of measures can be directed to different actors and sources. Restrictions and regulations can be directed towards industrial sources, municipalities, households, agriculture and mussel producers. The first types of measures comprise reduced nutrient application to crops, better utilisation of animal manure and better timing of application, reduced livestock production (cattle, pigs, poultry), border zones between agricultural soils and the aquatic environment, changed land use by catch crops, energy crops and grass production, as well as NOx reductions from shipping and automobiles. The other types of measures, adaptation measures, cover e.g. wetland restoration and mussel production in fjords and open sea. Both wetlands and mussel production take up some of the exceeding nutrients and hereby reduces the emissions to the sea, or the nutrients present in the sea. Another type of mitigation is wastewater/sewage plants.

2.1.2.1.2. Time for carrying out the work task

All the activities will be carried out during the first 24 months.

2.1.2.1.3. Deliverables and time for their delivery

- Update databases for nutrient emission sources, including types of agricultural production, waste water plants etc. at drainage basin levels (input to WT 2 and 3 in WP1).
    - **Deliverable WT1.1**: Updated database for emission sources - month 9.

- Describe measures relevant at local scales, i.e. at drainage basin level. Assess the potential for each of the measures within each drainage basin and related sea regions. Define actors to whom regulation and measures should be addressed, e.g. industries, municipalities and agriculture as well as countries.
    - **Deliverable WT1.2**: Report on potential nutrient reduction measures – month 15.

- Create database of model pre-compilations for different regulation options (input to WT 2 and 3 in WP1).
    - **Deliverable WT1.3**: Database for model compilations of regulation options – month 24.

- Create link between measures and nutrient emissions to cost-minimization model.
    - **Deliverable WT1.4**: Report describing the link. - month 24.

2.1.2.1.4. Work task leader

Christoph Humborg (Baltic Nest Institute, Stockholm Resilience Centre, Stockholm University)

2.1.2.1.5. Partner organizations

- Baltic Nest Institute, Stockholm Resilience Centre, Stockholm University
- Baltic Nest Institute, National Environmental Research Institute, Aarhus University
- Finnish Environment Institute (SYKE)

2.1.2.1.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collec-tion, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT1 (€)***
Month 1-12	5	33 700	10 000	2 500	15 165	***61 365***
Month 13-24	5	33 700	0	2 500	15 165	***51 365***
Month 25-36	5	33 700	0	2 500	15 165	***51 365***
Total for WT1	***15***	***101 100***	***10 000***	***7 500***	***45 495***	***164 095***

Note that some of the activities in WT1 are overlapping with already funded activities. This is taken into account in section 2.1.3. See also details in annex I.

2.1.2.2. Work task 2: Atmospheric emissions and deposition

2.1.2.2.1. Description

In the Baltic Nest, atmospheric deposition has so far been an unregulated source of nitrogen to the open Baltic Sea marine model. Although the Baltic Sea airshed has many more countries than the watershed, and it is not realistic to regulate all emissions throughout the entire airshed, it should be acknowledged that local atmospheric depositions from HELCOM member states constitute a significant portion of nitrogen deposition to the Baltic Sea. The objective of this task is to replace the EMEP deposition database in Baltic Nest with an atmospheric model that is linked to regulation measures for atmospheric emissions. The atmospheric chemical and transport model shall be customised to interface with other Baltic NEST components.

2.1.2.2.2. Time for carrying out the work task

All activities will be carried out during the first 36 months.

2.1.2.2.3. Deliverables and time for their delivery

- Develop emission relationships for different policy measures (WT1) at a local scale. Upscale emission relationships to a country-specific emission database. Compare atmospheric deposition results with EMEP database.
    - **Deliverable WT2.1**: Report comparing atmospheric model results with EMEP depositions – months 6.

- Develop interfaces for atmospheric model to drainage basin models, coastal models and marine model.
    - **Deliverable WT2.2**: Measures-emissions relationships implemented in atmospheric model – month 18.

- Create database of model pre-compilations for different regulation options.
    - **Deliverable WT2.3.** Database for atmospheric depositions under different regulation options – month 26.

2.1.2.2.4. Work task leader

Kaj Mantzius Hansen (Baltic Nest Institute, National Environmental Research Institute, Aarhus University)

2.1.2.2.5. Partner organizations

Baltic Nest Institute, National Environmental Research Institute, Aarhus University

2.1.2.2.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT2 (€)***
Month 1-12	4	30 800	15 000	2 000	13 860	***61 660***
Month 13-24	4	30 800	0	2 000	13 860	***46 660***
Month 25-36	4	30 800	0	2 000	13 860	***46 660***
Total for WT2	***12***	***92 400***	***15 000***	***6 000***	***41 580***	***154 980***

2.1.2.3. Work task 3: Drainage basin modelling

2.1.2.3.1. Description

The retention of nutrients in surface and ground water systems is not explicitly and dynamically parameterized in the current Catchment Simulation model (CSIM) version. Further, atmospheric deposition of nutrients, use of fertilizer and effects of agricultural management is not considered explicitly, but included through the choice of type concentrations for ground and surface waters. This hampers simulation of administratively relevant management scenarios and of climate change scenarios. Expanding and refining the Nest drainage basin model component to reflect both the local scale relevant for agricultural management and the regional scale relevant for analysing how River Basin Management Plans will improve load estimates to the Baltic Sea. Some improvements of the Nest drainage basin model are being undertaken and financed as a basic Baltic Nest Institute activity (surface water retention). Funding for further improvements are being applied for at the BONUS+ programme (detailed mechanistic modelling of nitrogen losses at the farm scale by the DAISY model, regional scale modelling of point and diffuse losses using the detailed mechanistic model SWAT on type river basins). The objective of this task is to complement these activities:

i. to improve type concentrations of phosphorus in CSIM by calculating surface and subsurface phosphorus losses at the farm scale and the effects of mitigation measures for type farms representing regional combinations of climate, soils and management using the detailed farm/ field scale mechanistic model ICECREAM.

ii. to increase the number of type river basins modelled by SWAT thus strengthening the data base on which CSIM will be improved regarding the effect of nutrient retention in ground and surface waters.

iii. to link the drainage basin model to the agricultural sector model CAPRI used in WP3 to model the cost minimizing reductions as well as the changes in agricultural production from measures,

price changes and changes in agricultural policies.

2.1.2.3.2. Time for carrying out the work task

All the activities will be carried out during the first 36 months.

2.1.2.3.3. Deliverables and time for their delivery

- Data set on type farms as input to the CAPRI model and to the ICECREAM model.
    - **Deliverable WT3.1** – month 6.

- Data set on regional type river basins as input to the SWAT model.
    - **Deliverable WT3.2** – month 6.

- Create link to the cost-minimization model (WP3).
    - **Deliverable WT3.3** – month 8.

- Library of type concentrations of phosphorus in surface and ground waters for both present management and for mitigation measures.
    - **Deliverable WT3.4** – month 24.

- Library of scenario runs on type river basins on nutrient input to the Baltic Sea.
    - **Deliverable WT3.5**: -- month 30.

2.1.2.3.4. Work task leader

Hans Estrup Andersen (Baltic Nest Institute, National Environmental Research Institute, Aarhus University)

2.1.2.3.5. Partner organizations

- Baltic Nest Institute, National Environmental Research Institute, Aarhus University
- Baltic Nest Institute, Stockholm Resilience Centre, Stockholm University
- Department of Soil Sciences, Swedish University of Agricultural Sciences, Uppsala
- Finnish Environment Institute (SYKE)

2.1.2.3.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collec-tion, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT3 (€)***
Month 1-12	9	60 900	10 000	4 500	27 405	***102 805***
Month 13-24	9	60 900	0	4 500	27 405	***92 805***
Month 25-36	9	60 900	0	4 500	27 405	***92 805***
Total for WT3	***27***	***182 700***	***10 000***	***13 500***	***82 215***	***288 415***

2.1.2.4. Work task 4: Coastal zone modelling

2.1.2.4.1. Description

Coastal zone models are used to assess the response of coastal systems to changes in local (i.e. river drainage) and external (open-water) forcing. Apart from describing the local water quality important for the local population and socio-economic activities, they are used to assess the retention capacity, which is the fraction of local nutrient load that may reach neighbouring off-shore waters and regions. 3-D process oriented dynamic models based on a detailed understanding of hydrodynamic and biogeochemical processes provide qualitative and operational assessments of the relation between climate, nutrient loading and environmental quality. The models describe nutrient cycling and removal processes in the water column and sediments, and they are used to assess the retention in response to changing load, thereby allowing for quantitative estimates of open ocean load and modelling of open ocean conditions (Baltic Sea) in response to changes in local nutrient load and retention. The objective of this task is to investigate the transformation and retention of nutrients in different coastal waters by means of complex process-based models and empirical models, and to compare the two approaches in

order to derive simple empirical emulators of the complex process-based models that can be implemented in the Nest system.

2.1.2.4.2. Time for carrying out the work task

All the activities will be carried out during the first 33 months.

2.1.2.4.3. Deliverables and time for their delivery

- Configuration of complex 3-D hydrodynamic models for selected cases.
    - **Deliverable WT4.1**: Coastal systems around the Baltic Sea categorised into classes of similar responses – month 12.

- Responses (retention and transformation) of coastal systems to local and external forcing (importance of local vs. external forcing) by means of the 3D models. Cross-system empirical analyses of coastal responses from analysing monitoring data across the entire Baltic Sea.
    - **Deliverable WT4.2**: Complex 3-D hydrodynamic models established for at least 3 case areas – month 21.

- Development of simple emulators for process-based models for fast computation.
    - **Deliverable WT4.3**: Comparison of process-based and empirical models – month 24.

- Describe and estimate changes in water quality to be used for the assessment of changes in marketed and non-marketed services and goods.
    - **Deliverable WT4.4**: Emulator models developed for case areas – month 33.

2.1.2.4.4. Work task leader

Johanna Mattila (Environmental and Marine Biology/Husö Biological Station, Åbo Akademi University)

2.1.2.4.5. Partner organizations

- Baltic Nest Institute, National Environmental Research Institute, Aarhus University

- Baltic Nest Institute, Stockholm Resilience Centre, Stockholm University
- Earth Sciences Centre, University of Gothenburg
- Environmental and Marine Biology/Husö Biological Station, Åbo Akademi University
- Leibniz Institute for Baltic Sea Research Warnemünde (IOW), Germany

2.1.2.4.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT4 (€)***
Month 1-12	9	58 900	10 000	4 500	26 505	***99 905***
Month 13-24	9	58 900	0	4 500	26 505	***89 905***
Month 25-36	9	58 900	0	4 500	26 505	***89 905***
Total for WT4	***27***	***176 700***	***10 000***	***13 500***	***79 515***	***279 715***

2.1.2.5. Work task 5: Marine biogeochemistry modelling

2.1.2.5.1. Description

The backbone of the Baltic Nest is the marine model SANBaLTS, which is a relatively simple biogeochemical model, acting on 8 different compartments of the Baltic Sea. It has the advantage of computational speed (on-line results) but it lacks horizontal and vertical resolution as well as seasonal resolution. This produces less reliable results for the Danish straits characterised by relatively short retention times. One of the best models for describing the Baltic Sea biogeochemistry is BALTSEM, developed at Göteborg University, although this model has not been validated for the western part of the Baltic Sea. The model should be improved to include recent understanding and parameterisation of these processes. The objective of this task is to replace SANBaLTS with a better hydrodynamical model (BALTSEM), and improve the description of nutrient removal processes in the water column and sediments in response to changing gradients of salinity, temperature and macrofauna composition. Particularly, the effect of increasing temperatures on hypoxia, and associated feedbacks on macrofauna composition and nutrient releases from the sediments will be modelled.

2.1.2.5.2. Time for carrying out the work task

All the activities will be carried out during the first 36 months.

2.1.2.5.3. Deliverables and time for their delivery

- Parameterise BALTSEM biogeochemistry for the Danish straits. Modify BALTSEM to interface with the coastal model, the atmospheric model, ecosystem effects and the food web component (WP2).
    - **Deliverable WT5.1**: BALTSEM calibrated for the entire Baltic Sea – month 12.

- Improve the process description for nitrogen and phosphorus removal in the water column and sediments.
    - **Deliverable WT5.2**: Interface to selected coastal case areas developed – month 24.

- Include the influence of benthic organisms into the model.
    - **Deliverable WT5.3**: Benthic organisms component linked to the model – month 30.

- Optimise computational speed of BALTSEM for on-line calculations using the web-interface.
    - **Deliverable WT5.4**: Online version BALTSEM on the Nest web-site – month 36.

2.1.2.5.4. Work task leader

Bo Gustafsson (Earth Sciences Centre, University of Gothenburg)

2.1.2.5.5. Partner organizations

- Baltic Nest Institute, National Environmental Research Institute, Aarhus University
- Baltic Nest Institute, Stockholm Resilience Centre, Stockholm University
- Earth Sciences Centre, University of Gothenburg

2.1.2.5.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT5 (€)***
Month 1-12	6	41 400	15 000	3 000	18 630	***78 030***
Month 13-24	6	41 400	0	3 000	18 630	***63 030***
Month 25-36	6	41 400	0	3 000	18 630	***63 030***
Total for WT5	***18***	***124 200***	***15 000***	***9 000***	***55 890***	***204 090***

Note that some of the activities in WT5 are overlapping with already funded activities. This is taken into account in section 2.1.3. See also details in annex I.

2.1.2.6. Work task 6: Ecosystem effects

2.1.2.6.1. Description

The HELCOM Baltic Sea Action Plan was developed on targets for water transparency in the different basins of the Baltic Sea, since historical data were available and water transparency provides a proxy of algae biomass in the surface layer. However, the phytoplankton of the Baltic Sea is characterised by conspicuous summer blooms of cyanobacteria frequently covering major parts of the Baltic proper, the Gulf of Finland and the south-western Baltic Sea. These surface accumulations of cyanobacteria have a severe effect on recreational value of the Baltic Sea, particularly in the coastal zone. Therefore, the Nest system should be improved to estimate the spatial distribution of cyanobacteria blooms. The effects of the Baltic Sea Action Plan on the coastal ecosystem will therefore be assessed using the coastal models (WT 4 in WP1) in combination with empirical relationships linking physical/chemical status to ecosystem effects. The objective of this task is to develop relationships that link indicators of good ecosystem health to the model outputs from the coastal and open sea models.

2.1.2.6.2. Time for carrying out the work task

All the activities will be carried out during the first 36 months.

2.1.2.6.3. Deliverables and time for their delivery

- Establish relationships between the coastal and open sea model outputs and phytoplankton composition.
    - **Deliverable WT6.1**: Updated Baltic Sea database including biological variables – month 12.

- Estimate the effect of temperature increases on the development of cyanobacteria blooms.

- Develop tools to estimate the spatial distribution of cyanobacteria blooms in the Baltic Sea.
    - **Deliverable WT6.2**: Spatial extrapolation tool for cyanobacteria blooms and hypoxia – month 18.

- Establish relationships which link distribution and abundance of sea-grasses and macroalgae to eutrophication status in the coastal zones. Establish relationships between abundance/biomass/ diversity of benthic fauna and model output variables. Validate the coastal model for benthic vegetation and fauna using the extensive monitoring data available.
    - **Deliverable WT6.3**:- Empirical relationship established for components not part of the 3-D model – month 24.

- Establish links between oxygen levels and the benthic fauna biomass and composition.

- Describe and estimate changes in marine ecosystems to be used for the assessment of changes in marketed and non-marketed services and goods.
    - **Deliverable WT6.4**:- Scenarios of nutrient reductions for ecosystem components – month 36.

2.1.2.6.4. Work task leader

Anna-Stiina Heiskanen (Finnish Environmental Institute)

2.1.2.6.5. Partner organizations

- Baltic Nest Institute, National Environmental Research Institute, Aarhus University
- Baltic Nest Institute, Stockholm Resilience Centre, Stockholm University
- Environmental and Marine Biology/Husö Biological Station, Åbo Akademi University
- Finnish Environmental Institute (SYKE)
- Leibniz Institute for Baltic Sea Research Warnemünde (IOW), Germany

2.1.2.6.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collec-tion, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT6 (€)***
Month 1-12	9	58 900	10 000	4 500	26 505	***99 905***
Month 13-24	9	58 900	0	4 500	26 505	***89 905***
Month 25-36	9	58 900	0	4 500	26 505	***89 905***
Total for WT6	***27***	***176 700***	***10 000***	***13 500***	***79 515***	***279 715***

2.1.2.7. Work task 7: Assessments of the provision of ecosystem services and goods

2.1.2.7.1. Description

The provision of ecosystem services and goods in the Baltic are influenced by the ecosystem changes, positive and negative, stemming from e.g. aquatic and agricultural policies around the Baltic, as well as from unintended changes, e.g. the climate effects. These type of changes are resulting in changes in the provision of marketed and non-marketed services and goods, e.g. fisheries, production of other types of seafood, tourism, shipping and other types of boat traffic, recreational possibilities for humans as well as changing living conditions for animals, fish and plants – including both threatened and unthreatened

species. Utilising the results and models developed in WT1 to WT6, and closely linked to WP4, the changes in ecosystem services and goods will be described quantitatively as a background for the assessments and modelling in WP4. The results from WP3 and WP4 will be used for assessments of the net present value of changing the ecosystem services and goods of the Baltic Sea, with a thorough use of discounting the benefits and costs over time.

2.1.2.7.2. Time for carrying out the work task

All the activities will be carried out during the first 36 months.

2.1.2.7.3. Deliverables and time for their delivery

- Describe ecosystem changes, make use of results from WT1 to WT6 to translate ecosystem changes and water quality changes into changes in ecosystem services and goods, where these changes can be made subject to market and non-market valuation.
    - **Deliverable WT7.1** – month 30.

- Link the activities and results to activities in WP4.
    - **Deliverable WT7.2** – month 36.

2.1.2.7.4. Work task leader

Jacob Carstensen (Baltic Nest Institute, National Environmental Research Institute, Aarhus University)

2.1.2.7.5. Partner organizations

- Baltic Nest Institute, National Environmental Research Institute, Aarhus University
- Finnish Environment Institute (SYKE)
- Leibniz Institute for Baltic Sea Research Warnemünde (IOW), Germany
- Stockholm Resilience Centre (Baltic Nest Institute and Beijer Institute of Ecological Economics)

2.1.2.7.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT7 (€)***
Month 1-12	8	54 600	10 000	4 000	24 570	***93 170***
Month 13-24	8	54 600	0	4 000	24 570	***83 170***
Month 25-36	8	54 600	0	4 000	24 570	***83 170***
Total for WT7	***24***	***163 800***	***10 000***	***12 000***	***73 710***	***259 510***

2.1.2.8. Work task 8: Module integration and implementation

2.1.2.8.1. Description

The success of Baltic Nest is linked to the open access over the Internet and the open module structure allowing different components to be replaced. This open architecture should be maintained and further developed, and it is therefore important that interfaces between model components are well-defined and protocols for inter-model communication are developed. The models should build on up-to-date information on land-use and economy in the drainage basins, well-defined coastal zones and open-water segments and well-documented procedures for converting gridded model data to surface shapes. Furthermore, the models should be validated and forced by updated monitoring data from all institutions around the Baltic Sea. Therefore, a network including data information centers around the Baltic Sea should be established and maintained such that Baltic Nest builds on the most accurate and updated information. The objective of this task is to facilitate the access to information used for the different models and structure this information in databases and Geographical Information Systems (GIS). Validation and implementation of Baltic Nest components in the web-based system is another main objective.

2.1.2.8.2. Time for carrying out the work task

All the activities will be carried out during the first 36 months.

2.1.2.8.3. Deliverables and time for their delivery

- Definition of model interfaces and communication protocols.

- Establish Baltic Sea networks for data information services.

- Develop a high-resolution GIS theme for land use.
    - **Deliverable WT8.1**: High-resolution GIS theme for land use – month 12.

- Develop a high-resolution GIS theme for the economic models developed in WP3 and WP4.
    - **Deliverable WT8.2**: Distributed database structure implemented – month 15.
    - **Deliverable WT8.3**: High-resolution GIS theme for economic key statistics – month 27.

- **Deliverable WT8.4:** Together with other WTs in WP1, draft book chapter about the main results of WP1 for the BalticSTERN Report – month 30.

- Maintain and develop the marine monitoring database BED.
    - **Deliverable WT8.5**: Updated web-site for Nest with GIS themes and latest model developments – month 36.

2.1.2.8.4. Work task leader

Cordula Göke (Baltic Nest Institute, National Environmental Research Institute, Aarhus University)

2.1.2.8.5. Partner organizations

- Baltic Nest Institute, National Environmental Research Institute, Aarhus University
- Baltic Nest Institute, Stockholm Resilience Centre, Stockholm University
- Earth Sciences Centre, University of Gothenburgy
- Environmental and Marine Biology/Husö Biological Station, Åbo Akademi University
- Finnish Environmental Institute (SYKE)

- Leibniz Institute for Baltic Sea Research Warnemünde (IOW), Germany

2.1.2.8.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT8 (€)***
Month 1-12	21	154 600	35 000	10 500	69 570	***269 670***
Month 13-24	21	154 600	0	10 500	69 570	***234 670***
Month 25-36	21	154 600	35 000	10 500	69 570	***269 670***
Total for WT8	***63***	***463 800***	***70 000***	***31 500***	***208 710***	***774 010***

2.1.3. Total budget for WP1

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WP1 (€)***
Month 1-12	71	493 800	115 000	35 500	222 210	***866 510***
Month 13-24	71	493 800	0	35 500	222 210	***751 510***
Month 25-36	71	493 800	35 000	35 500	222 210	***786 510***
Total for WP1	***213***	***1 481 400***	***150 000***	***106 500***	***666 630***	***2 404 530***

Note that some of the activities in WT1 and WT5 in WP1 are overlapping with already funded activities. As is described in detail in annex I, these overlapping activities imply that the necessary funding for WP1 amount to EUR 2 222 792 rather than EUR 2 404 530.

2.2. WP2. A food web model integrating fishery economics

WP2 leader: Olle Hjerne (Department of Systems Ecology, Stockholm University)

2.2.1. Introduction

The primary objective of WP2 is a further development of an existing eutrophication/fisheries ecosystem model and extending the model to also allow analyses of food web interactions and fishery economics issues. This model will assist managers in exploring "what-if" and "cost-benefit" scenarios. We will create a software interface that allows the linking of the WP1 and WP2 models. The deliverables from WP2 are scenario projections of, for example:

- effects of nutrient management on fish production (bottom up effects)
- effects of fisheries management on the ecosystem
- eutrophication (top-down effects), ecological/economic/social consequences of different management actions

Model tools are useful to evaluate different management options and their potential ecological/ economic impacts. An ecosystem model (Harvey et al., 2003) designed to explore possible impacts of different fisheries and nutrient management scenarios was developed within the MARE (Marine Research on Eutrophication) program, now Baltic Nest Institute at Stockholm Resilience Centre. The model is built within the Ecopath with Ecosim (EwE) software developed at the University of British Columbia, Canada, primarily by Daniel Pauly, Villy Christensen and Carl Walters (www.ecopath.org). It is one of the most used software in ecological modelling connected to fish and fisheries and has been ranked as one of the US National Oceanic and Atmospheric Administrations' ten most momentous breakthrough achievements.

Last year a new version of the EwE software was released, and with this version it is possible to have model structures that are more advanced to address fisheries management questions. The model will also allow the integration of economic analyses of fisheries. A shortcoming of the current EwE model is that it does not allow interactive data exchange with the nutrient/eutrophication effects model developed within the MARE program, but with the new version of EwE it is possible to develop such an interface. This will make it possible to explore scenarios on possible effects of changes in nutrients on the production of fish, but also on possible effects of, for example, how water clarity (phytoplankton biomass) responds to changes in the fish community structure. Since fisheries economy will be included in the EwE model developed in this WP, it will also be possible to derive state-of-the-art cost-benefit analyses.

The MARE nutrient/eutrophication model is already used by e.g. HELCOM and a linkage between that model and the EwE ecosystem/fisheries/economy model would reasonably be an important tool in environmental and fisheries management. The need for this function has been clearly expressed by e.g. HELCOM, the Swedish Ministry of Environment and the Swedish Environmental Protection Agency. There is thus a clear target audience for this model. We are also engaged in a dialogue with relevant

ICES scientists on possible means to use the model. There are synergies between this proposal and e.g. the pikeperch project in Himmerfjärden (financed by BalticSea 2020), the BigFishBack program (the Swedish Board of Fisheries) and the Working Group of Integrated Assessment from ICES. The co-operation with these programs will produce observation data and experimental data, which can then be compared with the model outputs and allow parameterization improvements of the model.

A new version of EwE that can perform the tasks described above is a prioritized work task for Baltic Nest Institute and Olle Hjerne (Department of Systems Ecology, Stockholm University) during the present and coming years. Most of the needed work to develop EwE will be covered by available funds (see further below).

BalticSTERN is generally aiming at ecological and economic evaluations of different management actions. The contribution of WP2 for accomplishing this is to develop a new version of the EwE model and engage fisheries economists that will parameterize (i.e. inclusion of cost functions) this new model for economic analyses. This will allow evaluations of alternative regulations of fisheries (including commercial fisheries with different gears, tourism and anglers, seal culling and nutrient loadings). Since EwE allows for simulating effects of external forcing factors, it will also be possible to explore climate change scenarios. Our ambition is to be able to ascribe costs and benefits related to different concrete and realistic management options that can be used to evaluate short-term losses from a reduced fishery (in particular cod fishery) in relation to potential long-term gains.[6] We also hope to be able to explore possible effects of different fisheries management scenarios on other ecosystem components, e.g. phytoplankton densities (interactions with the impacts of eutrophication).

How could the costs for increasing water quality (increased water clarity) be minimized – by reducing the load of nutrients to the sea or by reducing their effects on the ecosystem by actively influencing the food web through fisheries management? Our aim is to develop a tool that allows fisheries management and nutrient load management to be integrated, and help in decisions on how to use of the Baltic Sea as a natural resource with many usages (recipient for polluting nutrients, commercial fisheries, tourist industry, angling and other types of recreation).

One goal of the project is to evaluate scenarios for the economic value of different management options: e.g. what is an economically rational way of managing Baltic Sea fisheries in a sustainable way. The main problem in fisheries today is not eutrophication but overcapitalization of the fleet and high fishing effort. However, the problematic ecological status of the spawning areas, low salinity because of low inflows from the North Sea and low contents of oxygen, are influencing the reproduction success of cod and also herring stocks.[7] Nevertheless, as many model calculations by fisheries biologists show (e.g. Rechlin, 1999), a more careful strategy in the past would have led to a better stock status today. Additionally, a lower fishing effort today will lead to higher stocks in the future especially for cod independently of the problematic ecological conditions in the spawning areas. Therefore, it is our aim to provide different fisheries management options to formulate a strategy for sustainable fisheries in the Baltic Sea.

The model calculation with different management scenarios will allow for recommendations to policy makers and stakeholders on how to change fisheries management in a way that lead to an improved economic situation for the fishing sector. By running scenarios with different management options in

the EwE model we can show developments of costs and benefits of reduced nutrient load in the future. At the moment the influence of a reduced nutrient content in the Baltic Sea on fishing opportunities is uncertain. It may lead to lower revenues for the commercial fishing sector and a lower value added of the commercial and recreational sectors to GDP. However, giving policy makers scenario calculations and recommendations at hand how to change fisheries management will lead to sustainable fisheries with higher gains in the future than at today's situation of overuse of stocks. This is especially predictable for the cod fisheries. This could compensate possible losses from reduced nutrients in the long run. Results from the model calculation will be discussed in the project group and participants will transfer the results back to their home countries to discuss scenarios with policy makers. Afterwards, it is possible to debate policy recommendations with the Regional Advisory Council and the EU Commission.

In November 2007, a workshop oriented around this specific work package showed that a) the aim of this WP is realistic and b) there are no reasons to expect difficulties in enrolling relevant experts for shorter or longer periods. The WP will therefore be designed as a co-operation among experts on different tasks. Besides the WP leader (Olle Hjerne) and personnel at Baltic Nest Institute, the principle investigator carrying out the economic evaluation of the project will be Ralf Döring (Greifswald University). Moreover, one economist/modeller at Institute for Food and Resource Economics, University of Copenhagen, is needed at half time for three years to develop the economic modules in the new EwE, and in co-operation with other persons, develop and maintain a functioning interface between EwE, the nutrient/eutrophication model and costs/benefits of fisheries related management options.

The economic section of the model will be worked out in cooperation with Ayoe Hoff (Institute for Food and Resource Economics, University of Copenhagen). Further, other specialists will be hired for shorter periods, forming an economic Project Group to discuss the management scenarios and to collect data from the countries around the Baltic Sea. Possible management scenarios will be explored together with representatives from the commercial fishery and processing industry, the tourist industry, recreational fisheries and different environmental NGOs. As a suggestion, the organizations to be represented in the Project Group include Institute for Food and Resource Economics, University of Copenhagen (Denmark), Estonian Marine Institute (Estonia), Finnish Game and Fisheries Research Institute (Finland), Department of Landscape Economics, University of Greifswald (Germany), Lithuanian Institute of Agrarian Economics (Lithuania), Sea Fisheries Institute (Poland) and Swedish National Board of Fisheries (Sweden).

Bringing together experts on different tasks, in the way proposed in this WP, will be the most cost-efficient way to produce a sound model. The issue of creating a functioning interface between the EwE model and the nutrient/eutrophication effects model (WP1) will be managed by WP2. Since the models will be improved and modified throughout the project, this interface needs to be continuously maintaining.

In conclusion, the schematic figure 2.3 below illustrates the different tasks and their interactions in the WP 2. The idea is that the "new food web model" will be forced by the marine eutrophication model from WP 1. Further, an economic component will be integrated into the food web model. This new

6. See Döring and Egelkraut (2008) for gains from a long term management plan with a phase of stock recovery.

7. In case of herring, mostly the stocks spawning in autumn.

model will then be forced with different fishery management scenarios which will result in a number of different management options. For each of those options, a cost and benefit calculation will be performed.

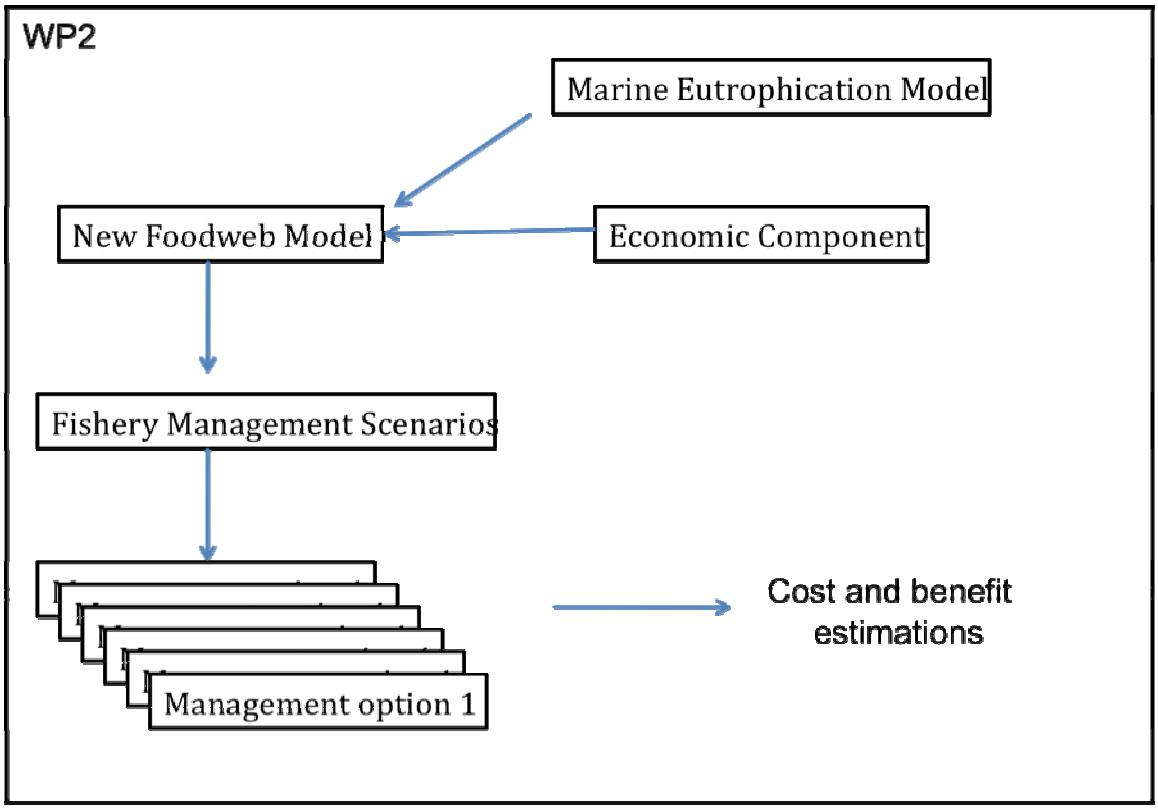

Figure 2.3. A schematic overview of WP2.

2.2.2. Work tasks

WP2 consists of the following four work tasks, which are described in detail in this section:

1. Developing and improving the food web model
2. Developing the special design of EwE needed for WP2 and linking the EwE model to Nest
3. Economic analyses
    a. Incorporating economy in the EwE model
    b. Eutrophication and fisheries cost-benefit analysis

2.2.2.1. Work task 1: Developing and improving the food web model

2.2.2.1.1. Description

The necessary development and improvement of the food web model will be co-ordinated by Olle Hjerne (Department of Systems Ecology, Stockholm University) in co-operation with researchers at the Baltic Nest Institute. The model will also be linked to available model components in Baltic Nest. Hjerne is a scientifically qualified researcher with experience in working with EwE and is therefore judged to be very well suited for the task. Ecological expertise will be contracted for specific tasks during the development process.

2.2.2.1.2. Time for carrying out the work task

The model will be developed continuously. A first revised model will be finalized during month 12. During the end of the program's first year, we will be able to start running the first scenarios.

2.2.2.1.3. Deliverables

A first, updated version of the food web model will be available online in month 12.

2.2.2.1.4. Work task leader

Olle Hjerne (Department of Systems Ecology, Stockholm University)

2.2.2.1.5. Partner organizations

- Baltic Nest Institute, Stockholm Resilience Centre
- Department of Systems Ecology, Stockholm University

2.2.2.1.6. Work task budget

Olle Hjerne is financed at Stockholm University for the coming four years. Baltic Nest Institute will have funds and personnel available for the development of the ecosystem model. The only financial resources needed are for contracting ecological experts for specific tasks.

Period	*Number of person-months*	*Personnel (€)*	*Data collec-tion, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT1 (€)***
Month 1-12	3	18 000	0	2 000	5 475	***25 475***
Month 13-24	3	18 000	0	2 000	5 475	***25 475***
Month 25-36	3	18 000	0	2 000	5 475	***25 475***
Total for WT1	***9***	***54 000***	***0***	***6 000***	***16 425***	***76 425***

2.2.2.2. Work task 2: Developing the special design of EwE needed for WP2 and linking the EwE model to Nest

2.2.2.2.1. Description

The EwE models are very easy to use, but complex and very demanding to build and parameterize. Therefore, experts with a detailed understanding of the model will be required. EwE model experts (e.g., from University of British Columbia) will therefore be contracted by the Baltic Nest Institute for developing the EwE model in such a way that it will be specifically tailored to answer the questions related to the fisheries economy issues specified in WP2. This work task will also include the work to link the EwE model to available model components in Baltic Nest.

2.2.2.2.2. Time for carrying out the work task

This work task will be carried out continuously during month 1-36.

2.2.2.2.3. Deliverables

A first version of an EwE model specially designed for the tasks outlined in this WP (month 24).

A working link between the EwE model and the marine eutrophication model in Nest (month 24).

2.2.2.2.4. Work task leader

Thorsten Blenckner (Baltic Nest Institute, Stockholm Resilience Centre)

2.2.2.2.5. Partner organizations

- Baltic Nest Institute, Stockholm Resilience Centre
- Department of Systems Ecology, Stockholm University

2.2.2.2.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€*	***Total for WT2 (€)***
Month 1-12	3	18 000	0	2 000	5 475	***25 475***
Month 13-24	3	18 000	0	2 000	5 475	***25 475***
Month 25-36	3	18 000	0	2 000	5 475	***25 475***
Total for WT2	***9***	***54 000***	***0***	***6 000***	***16 425***	***76 425***

2.2.2.3. Work task 3: Economic analyses

2.2.2.3.1. Description

This work task of performing economic analysis consists of two parts:

a. Incorporating economy in the EwE model

b. Eutrophication and fisheries cost-benefit analysis

Part a. Incorporating economy in the EwE model

The current model of EwE has not been parameterized for economic analyses. Inclusion of economic data into the new EwE model must thus be done from scratch. We need e.g. national data on subsidies and the value of the fisheries and processing sectors. What will it cost to substantially decrease the fishery during a limited time period, and what will be the economic benefits (related to the increased fish production) from this action? Data will be needed on expected costs for initiating changes in a fishery during a limited time period, for example to allow the building up of depleted fish stocks. This will be done in a way that allows analyses of both traditional commercial fishery and angling/tourism. Touristic values of marine mammals (seals, harbor porpoises) will also be addressed, as well as perceived values of fishing vessels in local harbors and values added to local communities. We will also evaluate different means to govern the fishery, e.g. by annual quotas or by other measures, or what fleet size is most efficient – i.e. what is the "optimal" way to manage the fishery.

Part b. Eutrophication and fisheries cost-benefit analyses

The new parameterized and calibrated EwE model, coupled to the nutrient/eutrophication model (WP1), will be used to quantify the costs and benefits for commercial fishing, angling and tourism of alternative management of nutrient loads, fisheries and seal populations. This will take into account both bottom-up and top-down interactions (effects of reduced nutrient loads on fish/fisheries, and effects of changes in fisheries on water quality).

2.2.2.3.2 Time for carrying out the work task

Part a: Collection of basic input data will be initiated from the start of the project, but most work will be done after month 12, when the EwE model has been structured. The economic parameterization of the model will be ready month 24.

Part b: The analyses in part b will be conducted primarily in months 24-36.

2.2.2.3.3. Deliverables and time for their delivery

Part a: A scientific article that describes the economic parameterization of the model will be available in month 24.

Part b: The outcome of the analyses in part b will be communicated to managers, different stakeholders and the public in general by workshops. Given that eutrophication, climate change and fisheries are high on the political agenda, we expect that our results will gain substantial public interests.

Both parts (and together with WTs 1 and 2): Draft book chapter about the main results of WP2 for the BalticSTERN Report – month 30.

2.2.2.3.4. Work task leader

Ralf Döring (Department of Landscape Economics, University of Greifswald)

2.2.2.3.5. Partner organizations

- Baltic Nest Institute, Stockholm Resilience Centre
- Department of Landscape Economics, University of Greifswald
- Department of Systems Ecology, Stockholm University
- Institute for Food and Resource Economics, University of Copenhagen

Besides partners with this project and co-operation with the Program Group (see section 2.2.1), the work will be done by Ralf Döring and other economists from the Baltic Sea area. The work will also be done in close co-operation with all parties that have been involved in producing the end products.

2.2.2.3.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT3 (€)***
Month 1-12	12	66 066	43 000	27 000	25 533	***161 599***
Month 13-24	12	66 066	40 500	27 000	25 533	***159 099***
Month 25-36	12	66 066	20 500	16 000	24 533	***127 099***
Total for WT3	***36***	***198 198***	***104 000***	***70 000***	***74 249***	***447 797***

2.2.3. Total budget for WP2

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WP2 (€)***
Month 1-12	18	102 066	43 000	31 000	36 483	***212 549***
Month 13-24	18	102 066	40 500	31 000	36 483	***210 049***
Month 25-36	18	102 066	20 500	20 000	35 483	***178 049***
Total for WP2	***54***	***306 198***	***104 000***	***82 000***	***108 449***	***600 647***

2.3. WP3. Cost-minimizing strategies and instruments for a cleaner Baltic sea under changing market conditions

WP3 leader: Berit Hasler (National Environmental Research Institute, Aarhus University)

2.3.1. Introduction

2.3.1.1. WP3 overview

The economic costs of improving the environmental quality of the Baltic Sea will be significant, and calls for cost-effective strategies that achieve the Baltic Sea Action Plan targets as well as the environmental qualities valued by the populations across the Baltic Sea, where the latter is analysed in WP4. Cost-minimization modelling tools are prerequisites for defining such cost-effective solutions for a cleaner Baltic Sea.

The participants of WP3 have long experiences developing and using cost-minimization models for analyses of measures to improve the quality of the Baltic Sea – e.g. Gren et al. (1997), Elofsson (2003) and Schou et al. (2006). A cost-minimization model is currently implemented as part of the Baltic Nest system. The added value of this proposal is to further develop the model by linking it to a framework where market conditions, prices and policies are important drivers for the development of economic activities and resulting emissions to the sea. This dynamic approach is new and necessary to enable modelling of scenarios for the Baltic Sea that considers macroeconomic and sectorwise consequences as well as welfare and distributional effects on sectors, countries and regions from different cost-minimizing abatement strategies.

Furthermore, the model framework proposed in WP3 aims to model how changes in demand, technology and policies influence the abatement costs. In basic models, such as the present cost-minimization model in Nest, it is generally assumed that there exists "a social planner", whose objective it is to minimize total costs subject to a restriction on the loads of a single pollutant. The analysis in such a framework is static, and information about abatement costs for different measures at different sources and about different pollutant pathways to and in the sea form major part of such a model. There is a need however, to apply approaches where the links between abatement cost functions and other policies and developments than those within the environmental policy field. These other policies might be either endogenous or exogenous to the policymaker – such as e.g. the agricultural and fossil fuel policies, where policy makers in the Baltic Region to some extent can and to some extent cannot influence policy development. Swedish analyses done by Brady (2003) show, for example, that the cost-efficient abatement strategy in the agricultural sector is highly dependent on the design of the Common Agricultural Policy (the CAP).

The CAP is under reform, and the impact of these changes on abatement costs and resulting environmental effects can be highly important for the abatement cost of the Baltic Sea, as agriculture is one of the major contributors to the eutrophication of the sea. In addition, future increase in world-wide demand for agricultural products can have potentially large effects on the eutrophication problems of the Baltic Sea. To analyse how the CAP influences the abatement costs and the choice of measures, links between agricultural sector models and the cost-minimization model have to be established. One of the tasks in WP3 is therefore to use and refine the agricultural sector model CAPRI (cf. Heckelei and Britz,

2001) and link this model to the cost-minimization model for the Baltic Sea.

Furthermore, cost-minimization models do not take into account the impact of large-scale abatement strategies on other economic sectors and actors involved. Within this project such effects will be analysed not only by linking the cost-minimization model to the agricultural sector model CAPRI but also by linking the cost-minimization model to an Applied General Equilibrium model (an AGE model), which models the changes in other sectors due to intersectoral linkages as well as changes in the overall economy. This model will be built for specifically for this project and tailored to the analytical needs. In the AGE model, policy changes – in environmental and economic policies –will influence the productivity and output of the polluting sectors – such as e.g. agriculture – as well of the rest of the economy, and the policy changes may result in different macro- and welfare economic consequences in the countries and regions surrounding the Baltic Sea. The consequences will depend on differences in the activity generated in the rest of the economy and dependencies with other economic activities. How the rest of overall economy is influenced is therefore also an important matter for assessment of abatement policies, which has to be dealt with by linking the cost-minimization model to macro-economic models. Therefore an AGE model for the region surrounding the Baltic Sea will be developed as part of this WP.

Another important issue covered in this WP is the instruments used for implementation of the different measures and actions to improve the Baltic Sea. By the use of economic instruments it is possible to deal with both the incentives for change as well as the distribution of costs, e.g. by tradable permit systems and quotas. Gren et al. (1997) and Markowska and Zylicz (1999) have analysed the use of tradable permit systems in the Baltic. However, assessments regarding such system need to be further developed in the light of the growing scientific and empirical experience of using tradable quota systems for greenhouse gases, as well as the experiences with tradable permit systems for nutrient management in the USA. Such permit systems have not yet been used for the regulation of nutrients in the countries surrounding the Baltic.

The challenge for WP3 is therefore to develop an integrated modelling framework in order to minimize the abatement costs under different scenario assumptions, and to assess the sector-, macro- and welfare economic costs resulting from these scenarios. The most important scenarios chosen for the assessment are changing market conditions and changed agricultural support policies (e.g. due to changes in the CAP) and new regulatory instruments such as quotas and permit trading systems. Due to the architecture of the integrated modelling framework and the integrated model-chain – an AGE model to be developed for the countries surrounding the Baltic, BALTIGEM, CAPRI and the cost-minimization model (CMM) – it will be possible to assess how these scenarios will affect the nutrient abatement costs, the polluting sectors and the societies surrounding the Baltic Sea. This modelling and analyses will result in new and strategic knowledge related to the achievement of the socially optimal water quality in the Baltic, BSAP-targets and other objectives. The target group for this work is decision-makers in all countries surrounding the Baltic Sea.

The work in the WP is divided into three different work tasks and proceeds along the following path: In ***WT 1***, a new and further refined common model framework is developed including CMM, CAPRI and BALTIGEM. A baseline projection will be developed using the model framework, and the results will be linked to WP1. In ***WT 2***, potential changes in market conditions will be modelled using the model

framework. Focus is on potential CAP-changes but also changes from climate policies and biofuel production will be analysed and modelled. The results cover the consequences for the abatement costs and cost-minimizing solutions under changed market conditions, as well as welfare- , macro- and sector economic consequences. In ***WT 3,*** cost-effectiveness analyses of nutrient quotas and trading programmes will be analysed and linked to WP1.

The work tasks will be carried out by the research team described in table 2.1. As is evident from the table, the team consists of partners in a number of Baltic Sea countries, ensuring expertise of modelling and analysis as well as availability to data.

Table 2.1. The research team in WP3.

Country	*Partner organization*	*Partner leader*
Germany	Berlin Institute of Technology, Institute for Landscape and Environmental Planning, Department of Environmental and Land Economics	Malthe Grossman
Latvia	Baltic International Centre for Economic Policy Studies (BICEPS), Riga	Alf Vanags
Poland	Warsaw University, Warsaw Ecological Economics Center, Warsaw	Tomasz Zylicz
Finland	MTT Agrifood Research Finland, Helsinki	Anni Huhtala
Russia	Centre for Economic and Financial Research (CEFIR) at New Economic School, Moscow	Natalia Volchkova
Germany	Bonn University, Institute for Food and Resource Economics	Alexander Gocht
Sweden	Swedish University of Agricultural Sciences, Department of Economics	Katarina Elofsson
Denmark	Institute of Food and Resource Economics, Faculty of Life Sciences, University of Copenhagen	Lars Bo Jacobsen
Denmark	National Environmental Research Institute, Roskilde, University of Aarhus	Berit Hasler

2.3.1.2. Description of the model system for the cost assessments

Three different analytical modelling tools are refined and developed into an integrated model framework to enable assessments of the costs of different nutrient abatement scenarios with respect to cost-effectiveness, sector economic consequences and adaptation, as well as macro- and welfare

economic consequences. The outputs of these models are subsequently linked to the marine models developed in WP1, and to the benefit assessments in WP4.

The model system is illustrated in figure 2.4.

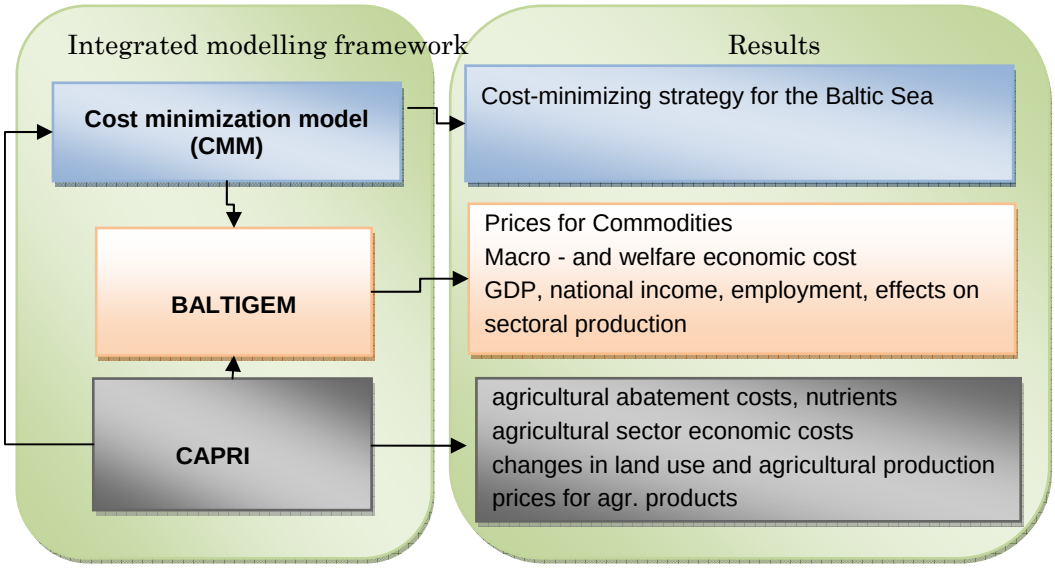

Figure 2.4. The model system for assessments of nutrient abatement scenarios.

Compliance and adjustment costs at farm and catchment levels are assessed using the EU- and Baltic wide model CAPRI, whereas the welfare economic costs at regional (Baltic) and national levels are assessed using the BALTIGEM model developed for this project. These two types of models are interlinked with the further refined cost minimization model which is used to assess the least cost solutions for a cleaner Baltic Sea.

The nutrient loads for different sources and economic activities are embedded in the cost minimization model. Thus the cost minimization model linked to the two other economic models will allow decision makers to evaluate cost-efficient solutions for different choices of environmental target indicators for the Baltic Sea, influenced by different market policies such as the EU agricultural policy (the CAP). Also, the minimum costs resulting from specific goals, such as the Baltic Sea Action Plan (BSAP) can be evaluated. When evaluating the minimum costs under target, the decision maker will also obtain data on the distribution of costs between different countries and sectors, as well as the distribution of different abatement activities.

As mentioned above, WP3 is divided into three interrelated tasks, which are described in detail in the next section.

2.3.2. Work tasks

WP3 consists of the following three work tasks, which are described in detail in this section:

1. Model development, refinement and links
    a. BALTIGEM
    b. CAPRI
    c. The cost-minimization model
    d. Linking the models
2. Modelling market changes and CAP effects
3. Tradable quotas and permit system

2.3.2.1. Work task 1: Model development, refinement and links

2.3.2.1.1. Description

This work task comprises the following parts:

a. Development of the AGE model for the Baltic, "BALTIGEM".

b. Refinement of the CAPRI model to suffice the links and the scenario analyses of the CAP, nutrient quota and trading permits in the Baltic ecoregion.

c. Refinement of the cost-minimization model to suffice consistent model links and the scenario analyses (CAP and nutrient quota trading, permits).

d. Developments of links between the cost-minimization model, CAPRI and the BALTIGEM model.

Part a. BALTIGEM

The construction of a Baltic General Equilibrium Model (BALTIGEM) allows for evaluation of policies targeted at improving the environmental status of the Baltic Sea at the sector-, macro- and country level. The model enables evaluation of consequences of range of policy instruments including a Baltic tradable emission quota scheme, as well as changes in agricultural production.

The model will be adapted to the Baltic countries from the a regionalized version of the well known ORANI model[8] (Dixon et al., 1982) initially applying data from the GTAP framework (Hertel, 1997; Dimaranan, 2006) initially applying data from the GTAP framework supplemented by national data from each Baltic country. A part of the work is to ensure an accurate representation of wastewater treatments industry which together with agricultural emissions will allow for analyzing various aspect of emission trading in the Baltic region.

Scenarios will be evaluated both in the short run (1-3 years) and in the long run (10-15 years) when all sectors have adjusted to the new situation. In each scenario winning and losing industries are identified and results for e.g. GDP, national income, employment and sectoral production are evaluated. Furthermore, the model allows for an evaluation of the distribution of the economy-wide costs among the countries surrounding the Baltic Sea for each of the scenarios.

The results will be linked to the CAPRI model and the cost-minimization model. The models will also be used to model how the cost-minimization strategies influence the sector and macro-economy.

Part b. CAPRI

CAPRI is the acronym for "Common Agricultural Policy Regional Impact", an agricultural partial equilibrium model covering EU27 plus Norway and Western Balkans at NUTS 2 level, plus the rest of the world at the resolution of countries or group of countries. It consists of two interlinked components:

- individual regional non-linear programming models per NUTS 2 region, responsible for simulating the decision of the farmers regarding production structure and intensity and therefore responsible to simulate the adjustment of the farmer on policy changes and price changes,
- and a global spatial Multi-Commodity for major primary and secondary agricultural products, responsible to clear the market via an endogenous price discovery to balance demand and production worldwide.

The model features explicit modelling of trade policy instruments such as quotas or subsidized exports. It is iteratively linked in a transparent and consistent way to a layer of non-linear regional mathematical programming embedding an econometrically estimated cost function for arable crops, which allow rich and detailed modelling of instruments as the farm premium scheme, quotas or set-aside.

The baseline, developed in this subtask, for CAPRI will results in a projection in time covering the most probable future development or the European agricultural sector under the status-quo policy and including all future changes already foreseen in the current legislation such as the abolishment of the milk quota regime. The CAPRI model will be responsible for describing the agricultural production of the EU27 member states and in particular for those sharing the borders with the Baltic Sea. Hereby, the model is responsible to assess different policy scenario regarding the change of nutrient emissions.

Part c. The cost-minimization model

The cost minimization model will be further developed for the purpose of this project, building on the Nest model systems, developed by Elofsson (2003), Gren (2001) and Schou et al. (2006). Although the former work has been pioneering when it comes to the analysis of the costs to reduce environmental pressure on the Baltic Sea and its different basins, there is a considerable need to develop these early models with regard to an extension of the abatement options covered, to explore and identify the role of

agricultural policies and markets for the abatement costs and impact that different choices of environmental target indicators has on the cost efficient abatement strategy as well as assessments of the welfare economic effects for the countries surrounding the Baltic Sea.

Better and updated cost data will be compiled for all measures, and new measures will be added if necessary. In particular updating will be ensured for the new EU member states and for Russia. The link to the CAPRI-model is inevitable for the estimation of abatement cost functions for the measures in the cost-minimization model, and costs functions will be estimated taking realistic ongoing and future reforms in agricultural policy, including price and subsidy changes, into considerations. The CAPRI model describes agricultural production and demand, and hence, the impact of policy reform on production patterns can be calculated together with the associated nutrient emissions from different agricultural activities. Also, policy reforms change the profitability of different agricultural activities and thereby also the cost of adopting the agricultural sector to nutrient reduction policies.

The new abatement cost functions will be developed and verified through the establishment of a network of researchers in the countries surrounding the Baltic Sea. Through this network, data for calculation of cost functions can be retrieved from all countries from different national and local sources. Typically, costs can be expected to differ considerably between new and old EU member states, but also between different regions of the member states, due to different structural and economic and climatic conditions. In particular, the quality of cost data for Russia and the new EU member states will benefit from the inclusion of active economic researchers in these countries in the network.

In order to calculate the minimum costs of improvements in ecological indicators for the sea, information about the impact of abatement on the environmental target is necessary. This implies that nutrient pathways and behaviour on the way from the sources to the recipient must be included in the model. Information on retention of nutrients in soils, wetlands and inland and coastal waters as well as nutrient exchange between different basins will be retrieved from WP1.

The information delivered needs to fit the aggregation in time and space of the cost model. Similarly, the modelling of transports of airborne emissions in the cost model should be consistent with modelling in other parts of the Nest model. Moreover, information on the functional relationship between loads and different ecological indicators must be delivered from WP1 and WP2. Notably, the cost model will use input data regarding land use, population and agricultural activities that are consistent with data used in WP1 as well as with CAPRI. Finally, the estimations of benefits in WP4 will (if possible) be used for calculation of the optimal nutrient reductions/net benefits of different abatement strategies – this will be done as part of WP3 and WP1.

Part d. Linking the models

The linking between the models in WP3 cannot be viewed independently of the development of each model, so a great deal of the linking requirements will be developed as part of the separate models. Careful considerations of outputs from one model as necessary inputs to the next model will be made (e.g. changed prices from AGE to the CAPRI models), and the links between the models as well as a

8. ORANI is one of the most widely used AGE models. It was originally built and used extensively for policy analysis in Australia for nearly two decades. Adaptations for ORANI exist for many countries, including China, Thailand, South Africa, Korea, Pakistan, Brazil, the Philippines, Japan, Ireland, Vietnam, Indonesia, Venezuela, Taiwan and Denmark.

common timeframe and baseline will be developed.

The different river basin surrounding the Baltic Sea will be the regional entity for the modeling in the cost-minimization model and the agricultural production model CAPRI. For the general equilibrium model BALTIGEM these regional units are aggregated on the country level. CAPRI is an EU-wide economic model and works partially on large administrative regions below the country level. Within these administrative boundaries the natural conditions of soil, relief and climate usually differ in such a manner that the assumption of identical cropping pattern, yields or input use and emissions cannot be maintained. It is therefore necessary to derive the agricultural supply models in CAPRI based on river basin regions. A model approach is already developed to break down the estimated production from administrative units into spatial units and river basins regions, and this break down will be done consistent to the conditions in the Baltic Nest cost-minimization model.

2.3.2.1.2. Time table

Month 1-6:

- Developing AGE model
- Develop links between models
- Adjust and refine cost-minimization model and CAPRI
- Describe how scenarios should be run in each model and in the model system; CAP scenario and scenario for tradable permits and quotas

Month 7-16:

- Further development of the AGE models and adjustment of models
- Entering data
- Calibration and testing the links
- Sensitivity assessments
- Delivering results to WP1

2.3.2.1.3. Deliverables

Month 12:

- Document describing the family of models, the refinements and the links.

- Baseline results from the integrated modelling as well as models on its own are made available in English at the BalticSTERN website.
- Scientific paper.

2.3.2.1.4. Work task leader

Berit Hasler (National Environmental Research Institute, Aarhus University)

2.3.2.1.5. Partner organizations

These partners will be involved with the modelling, data and scenario assessments:

- Berlin Institute of Technology, Institute for Landscape and Environmental Planning, Department of Environmental and Land Economics (links between models, river basin level modelling)
- Bonn University, Institute for Food and Resource Economics (CAPRI)
- Institute of Food and Resource Economics, Faculty of Life Sciences, University of Copenhagen (AGE) and National Environmental Research Institute, Roskilde, University of Aarhus (cost-minimization)
- Swedish University of Agricultural Sciences, Department of Economics (cost-minimization)

These partners will be involved with data collection for the models and as discussants:

- Baltic International Centre for Economic Policy Studies (BICEPS), Riga
- Berlin Institute of Technology, Institute for Landscape and Environmental Planning, Department of Environmental and Land Economics
- Centre for Economic and Financial Research (CEFIR) at New Economic School, Moscow
- MTT Agrifood Research Finland, Helsinki
- Warsaw University, Warsaw

2.3.2.1.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT1 (€)***
Month 1-12	53	314 636	28 000	22 500	131 963	***497 099***
Month 13-24	0	0	0	0	0	***0***
Month 25-36	0	0	0	0	0	***0***
Total for WT1	***53***	***314 636***	***28 000***	***22 500***	***131 963***	***497 099***

2.3.2.2. Work task 2: Modelling market changes and CAP effects

2.3.2.2.1. Description

WT2 comprehends of three consecutive steps. Counterfactual analysis will be conducted against the "most probable future projection" developed in task one, by defining first relevant agricultural policy scenarios (nutrient reduction scenarios) - developed together with decision makers and agricultural policy experts – and afterward applying the defined changes in policy to the CAPRI model. A further step will calculate the changes of abatement costs for the relevant measures in agriculture for the CMM model and hand over the agricultural sector results (price changes and quantities for commodities) to the BALTIGEM model, which calculate corresponding welfare effects for the other sectors. Beside changes in CAP, demand preferences as well as climate oriented policies such as production of bio fuels from crops and the resulting price effects changes will be considered as scenario.

2.3.2.2.2. Timetable

Month 10-20

- Defining relevant agricultural policy scenario (CAP, others – bio fuels)
- Modelling these changes for the integrated model (CAPRI → CMM; CAPRI → BALTIGEM → CMM)
- Dissemination of the results via a exploitation tool for policy makers, scientific paper and popular dissemination

Month 21-4:

- Modelling market price changes (outside CAP) in all three models
- Describe effects, scientific paper and popular dissemination
- Delivering results to WP1

2.3.2.2.3. Deliverables

Month 24:

- Report describing how the abatement costs are influenced by market price changes, sector economic costs , macro and welfare economic costs
- Scientific papers.

2.3.2.2.4. Task leader

Alexander Gocht (Bonn Unversity, Institute for Food and Resource Economics)

2.3.2.2.5. Partner organizations

Modelling, data collection and scenario description:

- Bonn University, Institute for Food and Resource Economics
- Institute of Food and Resource Economics, Faculty of Life Sciences, University of Copenhagen
- National Environmental Research Institute, Roskilde, University of Aarhus
- Swedish University of Agricultural Sciences, Department of Economics, Uppsala

Data collection, scenario description and discussion:

- Baltic International Centre for Economic Policy Studies (BICEPS), Riga
- Berlin Institute of Technology, Institute for Landscape and Environmental Planning, Department of Environmental and Land Economics
- Centre for Economic and Financial Research (CEFIR) at New Economic School, Moscow
- MTT Agrifood Research Finland, Helsinki
- Warsaw University, Warsaw

2.3.2.2.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT2 (€)***
Month 1-12	15	85 462	0	0	29 044	***114 506***
Month 13-24	42	243 072	0	22 500	89 354	***354 926***
Month 25-36	0	0	0	0	0	***0***
Total for WT2	***57***	***328 534***	***0***	***22 500***	***118 398***	***469 432***

2.3.2.3. Work task 3: Tradable quotas and permit system

2.3.2.3.1. Description

This final work task of WP3 is to make scenarios modelling tradable quotas and permit systems for nutrient emissions. The quota and permit system works by distributions of initial emission rights between countries/regions, allowance of trading these quotas and permits between them. Different assumptions on initial distributions as well as the role of uncertainties and information will be analysed. The obtainment of the BSAP target and other environmental targets from WP1 and WP4 will be modelled both by tradable permits and quotas, as well as by equally distributed efforts by each country. Comparisons will be drawn with respect to abatement costs, distributions of the abatement costs, sector economic assessments and welfare and macroeconomic effects. The scenarios regarding tradable quotas and permits will be modelled with baseline assumptions as well as with CAP-developments as the basic model assumptions.

2.3.2.3.2. Timetable

Month 16-30:

- Description of tradable permits systems
- Calibration of models to model the permits systems
- Scenario modelling and analysis
- Delivering results to WP1 for integration in Baltic Nest

2.3.2.3.3. Deliverables

Month 30:

- Delivery of data to WP1
- Draft book chapter about the main results of WP3 for the BalticSTERN Report

Month 36:

- Scientific papers

2.3.2.3.4. Task leader

Katarina Elofsson (Department of Economics, Swedish University of Agricultural Sciences, Uppsala)

2.3.2.3.5. Partner organizations

Modelling, data and scenario description:

- Bonn University, Institute for Food and Resource Economics
- Institute of Food and Resource Economics, Faculty of Life Sciences, University of Copenhagen
- National Environmental Research Institute, Roskilde, University of Aarhus
- Swedish University of Agricultural Sciences, Department of Economics, Uppsala

Data collection, scenario description and discussion:

- Baltic International Centre for Economic Policy Studies (BICEPS), Riga
- Berlin Institute of Technology, Institute for Landscape and Environmental Planning, Department of Environmental and Land Economics
- Centre for Economic and Financial Research (CEFIR) at New Economic School, Moscow
- MTT Agrifood Research Finland, Helsinki
- Warsaw University, Warsaw

2.3.2.3.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT3 (€)***
Month 1-12	0	0	0	0	0	***0***
Month 13-24	11	70 992	0	0	30 080	***101 072***
Month 25-36	48	295 501	0	14 000	114 380	***423 881***
Total for WT3	***59***	***366 493***	***0***	***14 000***	***144 460***	***524 953***

2.3.3. Total budget for WP3

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WP3 (€)***
Month 1-12	68	400 097	28 000	22 500	161 006	***611 603***
Month 13-24	53	314 064	0	22 500	119 435	***455 999***
Month 25-36	48	295 501	0	14 000	114 380	***423 881***
Total for WP3	***169***	***1 009 662***	***28 000***	***59 000***	***394 821***	***1 491 483***

2.4. WP4. Benefits of an improved marine environment in the Baltic Sea

WP4 leader: Tore Söderqvist (Enveco Environmental Economics Consultancy Ltd.)

2.4.1. Introduction

Taking measures for improving the marine environment in the Baltic Sea always entails costs, since the resources spent on such measures could be used in other ways. However, the costs are economically justified if the environmental improvement results in benefits that are at least equal to the costs. These benefits could be due to, for example, higher profits in the tourist industry from lower levels of algal blooms or an increased well-being among people due to their enjoyment of the improved water quality and their knowing that the sea has become healthier. Knowledge of the extent of these and other benefits is therefore crucial for being able to justify various improvement measures from an economic point of view.

However, at present quite little is in fact known about how large the benefits are. This is shown by a recent international inventory of benefit studies (Hasselström et al., 2008). The inventory was made as a subproject in the project *Economic Marine Information*, a Swedish government assignment for the Swedish Environmental Protection Agency. This inventory was compiled by researchers in all nine Baltic Sea countries. An important conclusion of this inventory is that some Baltic Sea countries lack recent research results that would be helpful as a base for discussions about whether it would be gainful for these countries to take measures for improving the marine environment. In particular, this is true for Denmark, Estonia, Germany, Latvia, Lithuania, Poland and Russia. While there are some results available through a research program carried out in the mid-1990s (see e.g. Turner et al., 1999), these results are likely to be obsolete because economic as well as environmental factors have changed a lot during the past 15 years. This is a serious knowledge gap because of the need for urgent international action against the marine environmental problems. For example, the extent of measures taken against nutrient loadings from countries such as Poland might be of crucial importance for the marine environment in the whole Baltic Sea.

There is, therefore, a need for a concerted approach to the issue of the benefits of an improved marine environment, resulting in facts that are relevant to decision-makers in all Baltic Sea countries. WP4 will deliver such facts by carrying out three work tasks, see figure 2.5 and the text below. The work tasks will be carried out by the research team described in table 2.2. As is evident from the table, the team consists of partners in all Baltic Sea countries, which ensures that the work results are helpful and relevant for decision-makers in all countries. Further, the team has earlier experience of working together, see e.g. Hasselström et al. (2008).

Table 2.2. The research team in WP4.

Country	*Partner organization*	*Partner leader*
Denmark	National Environmental Research Institute, University of Aarhus	Berit Hasler
Estonia	Estonian Institute of Sustainable Development, Tallinn	Heidi Tuhkanen
Finland	MTT Agrifood Research, Helsinki	Anni Huhtala
Germany	Berlin Institute of Technology, Berlin	Jürgen Meyerhoff
Latvia	Baltic International Centre for Economic Policy Studies (BICEPS), Riga	Alf Vanags
Lithuania	Center for Environmental Policy, Vilnius	Daiva Semeniene
Poland	Warsaw University, Warsaw Ecological Economics Center	Tomasz Zylicz
Russia	Centre for Economic and Financial Research (CEFIR) at New Economic School, Moscow	Natalia Volchkova
Sweden	Enveco Miljöekonomi AB, Stockholm	Tore Söderqvist

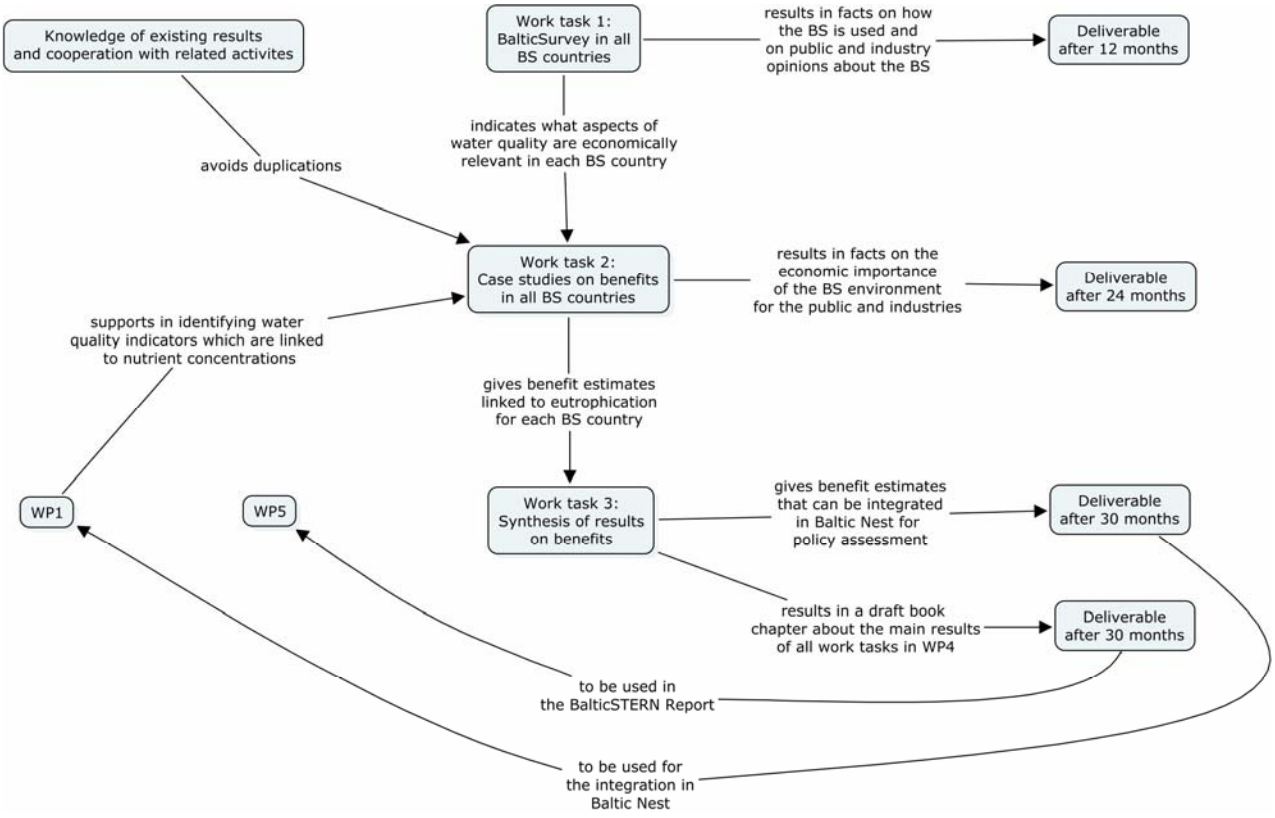

Figure 2.5. An overview of the contents of WP4.

2.4.2. Work tasks

WP4 consists of the following three work tasks, which are described in detail in this section:

1. BalticSurvey
2. Case studies on benefits
    a. Case study on benefits to the general public
    b. Case study on benefits to industry
3. Synthesis

2.4.2.1. Work task 1: *BalticSurvey*

2.4.2.1.1. Description

The benefits of an improved marine environment are dependent on the awareness, attitudes towards and use (present and future) of the Baltic Sea among both the general public and industry leaders/ entrepreneurs/industries (such as tourism). At present, there is no coherent information available on such awareness, attitudes and use for all Baltic Sea countries. This means that relatively little is known about, for example, the number of people actually using the Baltic Sea, in what ways they use it, under what circumstances they might use it less or more, and what opinions people have about the Baltic Sea environment and actions to improve it.

Such facts on use and attitudes are important to decision-makers, but also for judging how research on the benefits of an improved marine environment should best be designed. If it is the case, for example, that use and attitudes related to the Baltic Sea among Germans are very different from those of Finns, Germans and Finns might also then derive benefits from different types of improvements to the Baltic Sea environment. Thus, economically justified improvements might vary from country to country.

Work task 1 is therefore about carrying out a survey among the general public and industry representatives about their attitudes and use related to the Baltic Sea. This will result in facts that are helpful in and of themselves to decision-makers. In addition, the facts constitute an important basis for work task 2. This *BalticSurvey* will be carried out simultaneously in all Baltic Sea countries and include questions that are as similar as possible in order to obtain data that are coherent and comparable across countries. The number of questions will be limited to about 10-15 in order to maximize response rates. However, the choice of data collection method (mail questionnaires/ telephone interviews/face-to-face interviews) should be adapted to national conditions. At least for the general public, the survey should be based on a random sample of people that is big enough for results to be credible to, for example, decision-makers and the scientific community.

2.4.2.1.2. Time table

Month 1-6:

- Developing questions
- Organizing the survey
- Testing the questions through pilot studies

Month 7-12:

- Carrying out the survey
- Entering data
- Reporting results

2.4.2.1.3. Deliverables

Month 12:

- Results from the BalticSurvey are made available in all Baltic Sea languages (and English) at the BalticSTERN website.
- Scientific paper.

2.4.2.1.4. Work task leader

Tore Söderqvist (Enveco Environmental Economics Consultancy Ltd.)

2.4.2.1.5. Partner organizations

All partner organizations listed in table 2.2 participate in this work task.

2.4.2.1.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT1 (€)***
Month 1-12	65	359 511	135 000	27 000	121 891	***643 402***
Month 13-24	0	0	0	0	0	***0***
Month 25-36	0	0	0	0	0	***0***
Total for WT1	***65***	***359 511***	***135 000***	***27 000***	***121 891***	***643 402***

2.4.2.2. Work task 2: Case studies on benefits

2.4.2.2.1. Description

Work task 1 results in facts on attitudes and use of the Baltic Sea, which means that it provides a basis for designing in-depth studies of what benefits an improved marine environment would entail. Work task 2 is about carrying out such studies on benefits in each Baltic Sea country. These studies are therefore referred to as *case studies on benefits*, of which at least two case studies is to be carried out per Baltic Sea country. This work task is therefore divided into two parts:

a. Case study on the benefits to the general public of an improved marine environment.

b. Case study illustrating how industries might benefit from such an improvement.

This work task is likely to benefit from co-operation with a number of ongoing or planned research projects, see annex I for details.

Part a. Case study on benefits to the general public

The case study focusing on the general public will be based on a scenario describing an improvement of the marine environment. A state-of-the-art stated preferences valuation method will be applied for valuing these improvements in economic terms in order to assess the benefits. Other valuation methods should complement the stated preferences approach if data allow for it. The scenario and this case study will be characterized by the following:

- The improvement described in the scenarios can be quantitatively linked to at least indicators of eutrophication such as the nutrient concentration in water. For example, in cases where it is

adequate to describe an environmental improvement in terms of an increased water transparency, there must also exist a quantitative relationship between water transparency and nutrient concentration. This link to indicators of eutrophication is necessary in order for WP4 to produce information that is possible to integrate in Baltic Nest. It also allows for the benefits of improvement to be compared to the costs of reducing nutrient loads to the sea. These costs are modeled and estimated in WP3. WP1 will support in identifying suitable indicators of eutrophication and functional relationships, but each case study might also have to involve their own ecological expertise.

- The application of the valuation method in each country are designed in a way that enables – to the greatest extent possible – to compare results among countries and to aggregate results to national and international levels. The survey instrument to be developed and the valuation method being applied must thus be as similar as possible. Taken together, this case study will provide information on the benefits from environmental improvements for all Baltic Sea countries.
- The *BalticSurvey* will indicate how people actually use the Baltic Sea and will thus be of help for showing what types of benefits are important to cover in the case studies.

Part b. Case study on benefits to industry

The second case study will investigate how industries might be affected by an improved marine environment in terms of changed profits and other indicators of relevance to decision-makers, e.g. employment opportunities. While the choice of industry to focus on might differ from country to country, tourism is likely to be the focus on most case studies. Also for this case study, the information provided by the *BalticSurvey* will help for the selection of industry in the case studies.

The construction of scenarios will be an important basis also in this case study. Note that results on the economic effects due to past or present changes in the marine environment might constitute an important input for evaluating scenarios about future change. Such economic effects might have been negative or positive depending on the local setting and the environmental aspects that are relevant in that local setting. For example, recent heavy blue-green algal bloom episodes might have affected the tourist industry on the island of Gotland negatively. On the other hand, in countries such as Estonia, Latvia and Poland water quality improvements due to better sewage treatment are likely to have stimulated the renaissance of seaside resorts. Such a tourist industry development might also be possible at other potential resorts that today do not have an adequate water quality.

The scenarios to be evaluated are likely to be specific for the different case studies, but all should include a baseline scenario serving as a benchmark. The scenarios could be based on assumptions and results concerning, for example:

- Type of environmental improvement.
- Firms being affected, for example, tourist industry or fisheries.
- Climate change, which might have consequences such as potentially increased competitiveness for

Baltic seaside resorts in comparison to those situated in Southern Europe and potentially augmented eutrophication effects because of increased precipitation.

- General economic development, which might influence such things as the demand for recreation.

Further, the scenario construction should take the potential existence of complex feedback mechanisms and threshold effects into account. This also includes secondary effects such as environmental changes affecting bird and seal populations that in turn might have further economic consequences. Potential negative feedbacks from an increased economic activity should also be considered. For example, a growing tourist industry might cause substantially negative effects on coastal ecosystems and recreational quality if it entails careless and unregulated exploitations of coastal areas.

2.4.2.2.2. Timetable

Month 10-18

- Selection of case studies
- Preparing case studies

Month 19-24:

- Carrying out case studies
- Analyzing data
- Reporting results

2.4.2.2.3. Deliverables

Month 24:

- Case study reports with facts on the economic importance of improvements in the Baltic Sea environment. The case study reports are written in English and the national language of the country in which a case study was carried out. Reports are made available through the BalticSTERN website.
- Scientific papers.

2.4.2.2.4. Task leader

Tore Söderqvist (Enveco Environmental Economics Consultancy Ltd.)

2.4.2.2.5. Partner organizations

All partner organizations listed in table 2.2 participate in this work task.

2.4.2.2.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT2 (€)***
Month 1-12	28	156 770	0	0	40 514	***197 284***
Month 13-24	111	621 660	180 000	29 500	196 081	***1 027 241***
Month 25-36	0	0	0	0	0	***0***
Total for WT2	***139***	***778 430***	***180 000***	***29 500***	***236 595***	***1 224 525***

2.4.2.3. Work task 3: Synthesis

2.4.2.3.1. Description

This final work task of WP4 is to make a synthesis of the results of the case studies in work task 2, and to prepare them for integration in Baltic Nest. This is done in co-operation with WP1. This entails a modeling of how benefits are linked to indicators of eutrophication.

Moreover, co-operation with other activities at Berlin Institute of Technology will aim at complementing the synthesis with an analysis of the conditions that have to be fulfilled for results of

benefit studies to have an impact in practice in decision-making.

2.4.2.3.2. Timetable

Month 25-30:

- Synthesis work.
- Reporting results including preparation of popular scientific book chapter.
- Delivering results to WP1 for integration in Baltic Nest.

2.4.2.3.3. Deliverables

Month 30:

- Delivery of data to WP1.
- Draft book chapter about the main results of WP4 for the BalticSTERN Report.

Month 36:

- Scientific papers.

2.4.2.3.4. Task leader

Tore Söderqvist (Enveco Environmental Economics Consultancy Ltd.)

2.4.2.3.5. Partner organizations

All partner organizations listed in table 2.2 participate in this work task.

2.4.2.3.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WT3 (€)***
Month 1-12	0	0	0	0	0	***0***
Month 13-24	0	0	0	0	0	***0***
Month 25-36	29	163 780	0	25 000	46 014	***234 794***
Total for WT3	***29***	***163 780***	***0***	***25 000***	***46 014***	***234 794***

2.4.3. Total budget for WP4

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WP4 (€)***
Month 1-12	93	516 281	135 000	27 000	162 405	***840 686***
Month 13-24	111	621 660	180 000	29 500	196 081	***1 027 241***
Month 25-36	29	163 780	0	25 000	46 014	***234 794***
Total for WP4	***233***	***1 301 721***	***315 000***	***81 500***	***404 500***	***2 102 721***

2.5. WP5. Program management and communication

WP5 leader and Program Director: Tomasz Zylicz (Warsaw Ecological Economics Center, Warsaw University)

2.5.1. Introduction

The BalticSTERN program is large-scale both in terms of researchers and countries involved. It includes several scientific disciplines necessary to study complex dynamics of the Baltic Sea. It also includes scientists from all the Baltic Sea countries – an effort we consider essential for the success of the entire initiative. At the same time, however, the scale of the project calls for a suitable management structure and a communication plan. Therefore we developed a separate work package in order to handle such tasks. However, we have received indications from Baltic Sea 2020 that in case of funding, a more detailed communication plan should be developed at a later stage in co-operation with communication experts that already are co-operating with Baltic Sea 2020. This is likely to be a cost-effective option and therefore only the management component is elaborated in more detail in this section.

It should be stressed that the content of WP5 does not exhaust management efforts, some of which are included in WPs 1 through 4. The size of each of these work packages is large enough to call for a separate management structure (and budget). Consequently this part of the programme deals with activities that do not confine to a single work package.

Even though the communication plan is only alluded to here, we demonstrate what deliverables are expected to be objects of communication too. In addition to a multilingual website, press releases and policy reports prepared periodically, we suggest two major avenues that a possible communication campaign could take advantage of. One is a book that is suggested to be published in all Baltic Sea languages (and English). This book will be a non-technical summary of the results of the entire program, and therefore it is referred to as the *BalticSTERN Report* in this proposal. Additionally, we suggest a "sailing exhibition" comprised of posters, samples and software products installed on a boat that will visit all the major Baltic Sea coastal cities in the third year of the project. All these suggestions should be discussed with the communication experts that Baltic Sea 2020 is co-operating with. Since such discussions are required, any budgets for these communication activities are not included in the proposal.

Figure 2.6 shows how WP5 is proposed to be organized. The internal management is handled by the Program Director, a Program Secretariat and a Steering Committee. The Program Secretariat provides administrative and coordination support to the Program Director and the Steering Committee is the body having ultimate responsibility for all major decisions and for ensuring that the objectives, work tasks and deliverables are satisfactorily executed. The members of the Steering Committee include the Program Director and the WP leaders. The Steering Committee might also include a communication expert and members appointed by the funder(s). However, this structure is open for discussion with funder(s) – another option might be to have a separate board for the program.

The Program Secretariat will physically be situated at the Stockholm Resilience Centre, which is also suggested to be the main contractor for the whole BalticSTERN program. The Stockholm Resilience

Centre can also serve as a place where some program researchers are working as guests for shorter or longer period.

As is also shown by figure 2.6, two other groups are connected to WP5, a Reference Group and a Communication Group. The former will consist of representatives of those who will make use of the results of BalticSTERN, i.e. primarily decision-makers at various levels in all Baltic Sea countries and administrative bodies such as HELCOM. The Reference Group will meet at least once a year with an initial meeting at the program kick-off. The advice from the Reference Group will ensure that the program is producing decision-support that is as useful as possible. The Communication Group is suggested to consist of representatives of the communication experts that Baltic Sea 2020 is co-operating with. This group will – in consultation with the Steering Committee and the Reference Group – be responsible for the design of the communication of BalticSTERN. A budget for the efforts of the Communication Group is not included in this proposal.

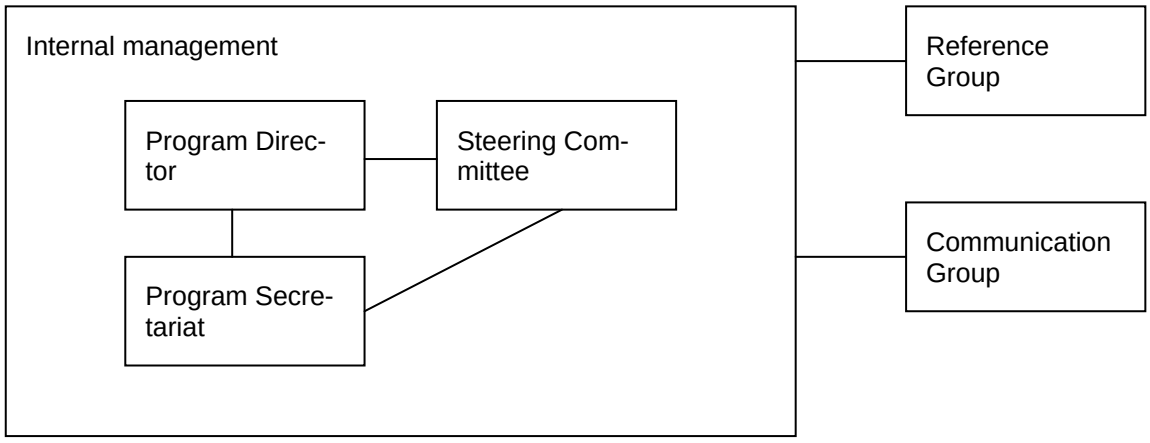

Figure 2.6. The organization of WP5.

2.5.2. Work tasks

WP5 consists of the following two work tasks, which are described in detail in this section:

1. Internal management
2. Communication

2.5.2.1. Work task 1: Internal management

2.5.2.1.1. Description

The project will combine research efforts from several scientific disciplines, such as ecology, political science, economics, and optimization. Much of the work will be carried out by senior researchers with

wide experience in their respective fields. This calls for a particular care in co-ordinating their work.

The core of the research will build on an earlier Nest framework developed at the Baltic Nest Institute at Stockholm Resilience Centre (Stockholm University). The framework combines the knowledge of ecology and economics, as it analyzes e.g. eutrophication effects of alternative land use decisions affecting nutrient leakage and their transport into the sea and its sub-basins. The analysis is based on a biogeochemical model of the Baltic Sea and cost functions estimated for several types of abatement activities. One serious co-ordination task is to refine the biogeochemical model to better fit economic data. A dual effort will be aimed at refining the analysis of abatement activities in order to obtain results that can better match the requirements of ecological investigations. An additional insight is obtained by considering alternative fishery regimes. In the original Nest approach, fishing rates are exogenous and they are independent of other policy choices. In our refinement effort, we will try to "endogenize" as many variables as possible, by looking at their mutual relationships. For instance, fishery patterns may be affected by land use changes, and both of them are likely to be affected by assessments of economic benefits from a cleaner and more resilient Baltic Sea.

Various parts of the project fall within competence of distinct scientific disciplines, such as ecology, chemistry, economics and so on. The main managerial challenge is thus to co-ordinate various disciplinary parts into a coherent whole. Sometimes the lack of coherence may result from addressing different questions. In this case, however, this is not a major concern, since scholars who have built the project have an established record of successful cooperation; they understand each other and they are used to multidisciplinary endeavours. Nevertheless the challenge is to plan all the pieces in such a way as to maximize the practical effect of cooperation, and to minimize the risk of reaching intermediate mono-disciplinary effects that cannot be fully utilized by other disciplines.

One example of unsuccessful co-ordination would be to deliver results on nutrient transfers requiring specific inputs that economists cannot assess with sufficient accuracy. Or, *vice versa*, to estimate economic outputs with accuracy that marine specialists cannot appreciate in their subsequent efforts to create an interface between terrestrial and marine systems. In order to secure a perfect match between what scientists involved in various work packages achieve, a close cooperation between their leaders is absolutely necessary.

To this end, careful and detailed planning, as well as regular Steering Committee meetings are envisaged. It is planned that the members of the Steering Committee meet personally once a year, and they co-ordinate their decisions through teleconferences at least once between annual meetings. In particular, specific effects of work packages are discussed among their leaders in order to eliminate the risk that some results cannot be fully utilized by the project while some others are not available at sufficient space or time resolutions. The planning also include the end results of the program, for example, coordinating work for ensuring that a manuscript for the BalticSTERN Report mentioned in section 2.5.1 is available at the end of the program.

The work of the Program Director and the Steering Committee is supported by the Program Secretariat, which will be based at the Stockholm Resilience Centre. The secretariat will include one full-time administrator. Part-time resource persons will be associated to the secretariat for shorter or longer periods for facilitating the internal management. At least in an initial phase, resources at Baltic Nest Institute, e.g. Henrik Österblom (Stockholm Resilience Centre), and Tore Söderqvist (Enveco Environmental Economics Consultany Ltd.) will serve as such resource persons.

2.5.2.1.2. Time for carrying out the work task

Continuously.

2.5.2.1.3. Deliverables and time for their delivery

- Detailed research plans adopted at the beginning of each project year, in months 1, 13 and 25.
- Meetings, such as a program kick-off meeting in month 1 and annual Steering Committee meetings.
- Manuscript for the BalticSTERN Report in month 36.

2.5.2.1.4. Work task leader

Tomasz Zylicz (Warsaw Ecological Economics Center, Warsaw University)

2.5.2.1.5. Partner organizations

- Stockholm Resilience Centre, including Baltic Nest Institute and Beijer Institute of Ecological Economics
- Warsaw University

2.5.2.1.6. Work task budget

Period	*Number of person-months*	*Personnel (€)*	*Data collec-tion, software, equipment*	*Meetings (€)*	*Other costs (€)*	***Total for WT1 (€)***
Month 1-12	21	114 000	0	30 000	52 050	***196 050***
Month 13-24	21	114 000	0	30 000	52 050	***196 050***
Month 25-36	21	114 000	0	40 000	52 050	***206 050***
Total for WT1	***63***	***342 000***	***0***	***100 000***	***156 150***	***598 150***

2.5.2.2. Work task 2: Communication

As was mentioned above, a detailed communication plan is to be prepared jointly with the funding entity. The purpose of this section is therefore confined to a number of suggestions related to communication activities. These suggestions are to be discussed with the Communication Group. Budgets for communication activities are not included.

In general, we anticipate three major communication-related paths for the program. One is communicating program results to academic peers – mainly through refereed publications and a website where basic modelling tools will be open for independent simulation experiments. We do not consider this path as essential for achieving policy-related targets, but rather as a "quality-control" instrument. By communicating our work among scholars (such as marine scientists, ecologists, economists and geographers), we would like to make sure that our methodology meets highest academic standards.

The second path is targeted at professionals active in administration and business. To this end, besides periodic releases of results of general interest at the BalticSTERN website, one major outcome will be the BalticSTERN Report (see section 2.5.1), i.e. a book based on the final results of the program and aims at explaining in non-technical terms the complicated web of interdependencies of sea-related activities, such as agriculture, city planning, sewage abatement, fisheries and marine recreation. This book is planned to be published in all Baltic Sea languages (and English) and a manuscript will be available at the end of the project, when all major feedback loops are studied and quantified. A marketing effort will be required to make sure that the book reaches key decision makers in national administrations, HELCOM, and the European Commission.

However, we suggest these two paths are complemented with a path that is likely to create considerable public attention. This would be the sailing exhibition mentioned in section 2.5.1. In its scientific layer it will be based on the same experience as the BalticSTERN Report. However, education specialists will be employed in order to make its message accessible and attractive for school

children and broad public. In addition to posters that the vessel will display in order to explain the web of interdependencies, there will be computer games and models to experiment with nutrient flows and abatement strategies. The exhibition will include biological and geological samples of marine life too. Visitors will also be invited to perform simple experiments with chemical substances that are important for the eutrophication of the sea. It is planned that the sailing exhibition will start its itinerary early in May 2011, and by the end of October 2011, it will have visited all the major ports in the Baltic Sea.

2.5.3. Total budget for WP5

Because budgets for communication activities are not included, the total budget for WP5 is identical to the budget for work task 1. This budget is repeated here for convenience.

Period	*Number of person-months*	*Personnel (€)*	*Data collection, software, equipment (€)*	*Meetings (€)*	*Other costs (€)*	***Total for WP5 (€)***
Month 1-12	21	114 000	0	30 000	52 050	***196 050***
Month 13-24	21	114 000	0	30 000	52 050	***196 050***
Month 25-36	21	114 000	0	40 000	52 050	***206 050***
Total for WP5	***63***	***342 000***	***0***	***100 000***	***156 150***	***598 150***

3. Overview of the program

3.1. List of work packages and work tasks

- BalticSTERN research and development program
  Program Director: Tomasz Zylicz; main contractor: Stockholm Resilience Centre

  - WP1: Development and applications of ecological and economic models to manage the Baltic Sea Ecoregion. Leader: Bo Riemann.

    - WT1: Nutrient emission regulation. Leader: Christoph Humborg.
    - WT2: Atmospheric emissions and deposition. Leader: Kaj Mantzius Hansen.
    - WT3: Drainage basin modeling. Leader: Hans Estrup Andersen.
    - WT4: Coastal zone modeling. Leader: Johanna Mattila.
    - WT5: Marine biogeochemistry modeling. Leader: Bo Gustafsson.
    - WT6: Ecosystem effects. Leader: Anna-Stiina Heiskanen.
    - WT7: Assessments of the provision of ecosystem services and goods. Leader: Jacob Carstensen.
    - WT8: Module integration and implementation. Leader: Cordula Göke.

  - WP2: A food web model integrating fishery economics
    Leader: Olle Hjerne.

    - WT1: Developing and improving the food web model. Leader: Olle Hjerne.
    - WT2: Developing the special design of EwE needed for WP2 and linking the EwE model to Nest. Leader: Thorsten Blenckner.
    - WT3: Economic analyses. Leader: Ralf Döring.

  - WP3: Cost-minimizing strategies and instruments for a cleaner Baltic Sea under changing market conditions
    Leader: Berit Hasler

    - WT1: Model development, refinement and links. Leader: Berit Hasler.
    - WT2: Modelling market changes and CAP effects. Leader: Alexander Gocht.
    - WT3: Tradable quotas and permit system. Leader: Katarina Elofsson.

  - WP4: Benefits of an improved marine environment in the Baltic Sea
    Leader: Tore Söderqvist (also leader of the WTs)

- WT1: *BalticSurvey*
- WT2: Case studies on benefits
- WT3: Synthesis

- WP5: Program management and communication
  Leader: Tomasz Zylicz (also leader of the WTs)
  - WT1: Internal management
  - WT2: Communcation

3.2. List of deliverables[9]

3.2.1. Year 1

Month 1

- Kick-off meeting (WT1 in WP5)
- Detailed research plan (WT1 in WP5)

Month 6

- Report comparing atmospheric model results with EMEP depositions (WT2 in WP1)
- Data set on type farms as input to the CAPRI model and to the ICECREAM model (WT3 in WP1)
- Data set on regional type river basins as input to the SWAT model (WT3 in WP1)

Month 8

- Creation of link to the cost-minimization model in WP3 (WT3 in WP1)

Month 9

- Updated database for emission sources (WT1 in WP1)

Month 12

- Coastal systems around the Baltic Sea categorized into classes of similar responses (WT4 in WP1)
- BALTSEM calibrated for the entire Baltic Sea (WP5 in WP1)
- Updated Baltic Sea database including biological variables (WT6 in WP1)
- High-resolution GIS theme for land use (WT8 in WP1)
- A first, updated version of the food web model will be available online (WT1 in WP2).
- Document describing the family of models, the refinements and the links (WT1 in WP3)
- Baseline results from the integrated modeling as well as models on its own are made available in English at the BalticSTERN website (WT1 in WP3)
- Results from the *BalticSurvey* are made available in all Baltic Sea languages (and English) at the BalticSTERN website (WT1 in WP4)

3.2.2. Year 2

Month 13

- Annual Steering Committee meeting (WT1 in WP5)
- Detailed research plan (WT1 in WP5)

Month 15

- Report on potential nutrient reduction measures (WT1 in WP1)
- Distributed database structure implemented (WT8 in WP1)

Month 18

- Measures-emissions relationships implemented in atmospheric model (WT2 in WP1)
- Spatial extrapolation tool for cyanobacteria blooms and hypoxia (WT6 in WP1)

Month 21

- Complex 3-D hydrodynamic models established for at least 3 case areas (WT4 in WP1)

9. Scientific papers are not included in this list.

Month 24

- Database for model compilations of regulation options (WT1 in WP1)
- Report describing the link between measures and nutrient emissions to cost-minimization model (WT1 in WP1)
- Library of type concentrations of phosphorus in surface and ground waters for both present management and for mitigation measures (WT3 in WP1)
- Comparison of process-based and empirical models (WT4 in WP1)
- Interface to selected coastal case areas developed (WT5 in WP1)
- Empirical relationship established for components not part of the 3-D model (WT6 in WP1)
- A first version of an EwE model specially designed for the tasks outlined in WP2 (WT2 in WP2).
- A working link between the EwE model and the marine eutrophication model in Nest (WT2 in WP2)
- Paper describing the economic parameterization of the EwE model (WT3 in WP2)
- Report describing how the abatement costs are influenced by market price changes, sector economic costs, macro and welfare economic costs (WT2 in WP3)
- Case study reports with facts on the economic importance of improvements in the Baltic Sea environment (WT2 in WP4)

3.2.3. Year 3

Month 25

- Annual Steering Committee meeting (WT1 in WP5)
- Detailed research plan (WT1 in WP5)

Month 26

- Database for atmospheric deposition under different regulation options (WT2 in WP1)

Month 27

- High-resolution GIS theme for economic key statistics (WT8 in WP1)

Month 30

- Library of scenario runs on type river basins on nutrient input to the Baltic Sea (WT3 in WP1)
- Benthic organisms component linked to the model (WT5 in WP1)
- Description of ecosystem changes, make use of results from WT1 to WT6 to translate ecosystem changes and water quality changes into changes in ecosystem services and goods (WT7 in WP1)
- Delivery of data to WP1 for integration in Baltic Nest (WT3 in WP3)
- Delivery of data to WP1 for integration in BalticNest (WT3 in WP4)
- Draft book chapter about the main results of WP1 for the BalticSTERN Report (WT8 in WP1).
- Draft book chapter about the main results of WP2 for the BalticSTERN Report (WT3 in WP2).
- Draft book chapter about the main results of WP3 for the BalticSTERN Report (WT3 in WP3)
- Draft book chapter about the main results of WP4 for the BalticSTERN Report (WT3 in WP4).

Month 33

- Emulator models developed for case areas (WT4 in WP1)

Month 36

- Online version BALTSEM on the Nest web-site (WT5 in WP1)
- Scenarios of nutrient reductions for ecosystem components (WT6 in WP1)
- Link the activities and results to activities in WP4 (WT7 in WP1)
- Updated web-site for Nest with GIS themes and latest model developments (WT8 in WP1)
- Manuscript for the BalticSTERN Report (WT1 in WP5).

3.3. Total budget

As is shown by the table below, adding the WP budgets together give a total budget for the BalticSTERN program amounting to about 7.2 million EUR for the whole 3-year period.

Period	*WP1* *(€)*	*WP2* *(€)*	*WP3* *(€)*	*WP4* *(€)*	*WP5* *(€)*	***Total for BalticSTERN*** ***(€)***
Month 1-12	866 510	212 549	611 603	840 686	196 050	***2 727 398***
Month 13-24	751 510	210 049	455 999	1 027 241	196 050	***2 640 849***
Month 25-36	786 510	178 049	423 881	234 794	206 050	***1 829 284***
Total	***2 404 530***	***600 647***	***1 491 483***	***2 102 721***	***598 150***	***7 197 531***

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Annex I. Details on co-funding and co-operation opportunities

There are a number of ongoing or planned research activities that might benefit from co-operation with BalticSTERN, and vice versa. In general, all WPs will continuously identify potential co-operation and evaluate whether such co-operation could also imply co-funding and thus reduce the necessary funding for BalticSTERN.

One example of co-ordination opportunities and possibly also co-funding is the "Stern initiative" concerning the Baltic Sea that is under way in Finland. A pre-study called *The Economics of the State of the Baltic Sea*, financed by several Finnish ministries will be carried out during 2008 with one of the partners in BalticSTERN (MTT Economic Research/Anni Huhtala) as a main coordinator. Based on the assessment of the pre-study, a research program aiming at a Stern review for the Baltic Sea will be launched in 2009. At present, it is not known whether this gives any co-funding opportunities. Also the Swedish government has taken a "Stern initiative", which has resulted in an assignment for the Swedish Environmental Protection Agency called *Economic Marine Information* (see also section 2.4.1). This assignment will be reported in the fall of 2008 and does not provide any co-funding opportunities for BalticSTERN since the work carried out for the assignment is based on existing information and models. However, BalticSTERN benefits from this work in the sense that it, for example, results in useful literature reviews and other data surveys that thus do not have to be a part of the some work tasks in BalticSTERN. Hasselström et al. (2008) was mentioned in section 2.4.1 as one such survey of information being available.

Another example of an activity that might provide co-operation opportunities and possibly also co-funding is the implementation of the Water Framework Directive (WFD) of the European Union in the member states. According to the WFD, river basin management plans including economic analysis, cost-effective programs of measures and cost-benefit analysis in specific cases, should be ready in each member state by the end of 2009. This means that WFD implementation activities are going on in the member states that are likely to benefit from co-ordination with BalticSTERN and vice versa. For example, a consultancy project currently is under way in Lithuania to develop the Nemunas river basin management plan. This project will include modeling and other type of analysis, also related to the quality of the Lithuanian part of the Baltic Sea, and related economic analysis. One of the partners in BalticSTERN (Center for Environmental Policy) is involved in this Lithuanian project, so ensuring co-operation will not be complicated.

As two final examples, the Swedish research program *Economic Assessment for the Environment* (funded by the Swedish Environmental Protection Agency) and the EU FP6 integrated program *Science and Policy Integration for Coastal System Assessment* (SPICOSA) involve benefit studies and economic analysis related to coastal system case studies in the Baltic Sea. These represent ongoing research activities which should be part of the evaluation at the start of this work task of WP4. One of the partners in BalticSTERN (Enveco) is also a partner in these two research programs, which will simplify co-operation.

For WP1 and WP2, co-funding has been identified already at this proposal stage, and details about this are presented below.

AI.1. WP1 – Co-financing and synergies to other projects

Below is a presentation of projects that either have a degree of overlap to the WP1 description in BalticSTERN or have synergies to the activities. In the first case, potential overlapping activities is briefly described scientifically and economically, and the economy is subtracted from the funding in the BalticSTERN application. In the second case, projects are complementary to the BalticSTERN activities, and these synergies will be of mutual importance for all. In this case the synergies are explained and the economy is defined as co-financing activities in addition to the BalticSTERN economy.

As an example, the two Baltic Nest Institute (BNI) Departments, situated in Stockholm and in Roskilde, Denmark, have received funding to continue the work initiated in the *Marine Research on Eutrophication* (MARE) project. The funding is not directly comparable between the two departments, since the Danish BNI department has funding until September 2011, while the Stockholm BNI department has funding for only one year, although there are signs of activities for additional funding for more years. The two BNI departments have a common research platform and identical overall goals. However, the Danish BNI department also has a responsibility to consider specific Danish and/ or other international management challenges defined by the Advisory Group and/or by The Danish Ministry of Environment, and by the Danish Ministry of Food, Agriculture and Fisheries. These challenges are not necessary along the lines defined by The Baltic Sea Action Plan or by the BalticSTERN application. In such examples, the activities in The Danish BNI either are not relevant or at most have synergies to the goals and activities in the BalticSTERN application.

Some of the projects with potential overlapping and/or synergies to the BalticSTERN application are under evaluations at other funding agencies. As an example, several BONUS+ applications have recently been submitted to the BONUS Secretariat, and a first indication of success or failure is expected to be made at the end of July 2008. The final decision and a contract are expected to be ready September/October 2008. The success rate in BONUS+ is expected to be 25-30%, suggesting that several of the projects with potential overlapping activities and/or synergies to the BalticSTERN application will fail.

The 8 work tasks in WP1 are compared with possible overlapping activities and synergies to other projects, and a description of the consequences for the BalticSTERN application are made at the end of the section.

Work task 1: Nutrient emission regulation

A major proportion of this part of WP1 is already funded by activities in BNI, and a substantial part of the economy can be defined as overlapping activities and should therefore be subtracted from the BalticSTERN application. Some of the deliverables (WT1.2 and WT1.4) include reports which are not included in the BNI funding. As a consequence, The Danish BNI contribution can be reduced from 3 to 1 person months, and the Stockholm BNI contribution can be reduced from 9 to 2 person months. The contribution from SYKE is not influenced. As an overall figure there are overlapping activities for 9 person months, which should be subtracted from the applied 15 person months. In addition, there are synergies from BNI, equivalent to 6 person months.

Annex I. Details on co-funding and co-operation opportunities

Work task 2: Atmospheric emissions and deposition

Most of the work on atmospheric emissions and depositions are carried out at the Danish BNI department, however, the work funded from BNI is devoted to modelling of contaminants, and there is not identified potential overlapping activities or synergies to the BalticSTERN application.

Work task 3: Drainage basin modelling

There are synergies in the work devoted to improve the Nest drainage basin model. However, since such improvements are not included in the BalticSTERN application, these synergies are of mutual interest and do not represent overlapping activities. There are a total of 6 person months from BNI as co-financing to the BalticSTERN application. In addition, there is applied for funding in the BONUS+ programme for further improvements of the Nest drainage basin model using another model (DAISY) and a regional scale modelling of point and diffuse losses at the farm scale by means of a mechanistic model SWAT on type river basins. Again these activities are not overlapping but complementary to the work carried out in the BalticSTERN application. If the BONUS+ activities will be funded, there is an additional 8 person months as co-financing.

Work task 4: Coastal zone modelling

The contribution from the BNI partners are small (6 person months for BNI, Denmark, and 3 person months for BNI Stockholm for all 3 years) and there is not identified overlapping activities in BNI at or any of the other partners or in other applications.

Work task 5: Marine biogeochemistry modelling

In this task, the SANBaLTS BNI model will be replaced by a better hydrodynamic model BALTSEM. There is an overlap from BNI funding, in particular the BNI Stockholm department has employed Bo Gustafsson 50% time for one year, and this employment include in principle the same work as described in BalticSTERN application. Deliverables WT5.1 and partly WT5.2 are, however not included. In addition, Bo Gustafsson and others are applying for additional funding via BONUS+. There are 3 applications (HYPER, ECOSUPPORT and COIN), and they all represent synergies to the BalticSTERN application and no overlapping activities. There is an important risk of failure in the present situation. The BNI 50% financing is at present not covering 2009 and 2010, and the funding contributions from the BONUS applications are also uncertain. Bo Gustafsson has developed most of the BALTSEM model, and his skills cannot easily be replaced. It is therefore at the moment rather dangerous to reduce the funding in WT5 in the BalticSTERN application because of potential overlaps. The risk might be that qualified resources will limit progress and deliverables and invalidate BalticSTERN. We recommend that the funding situation for WT5 should be reconsidered when the BNI and BONUS committments are made. With reference to the above mentioned activities there are overlapping activities for 3 person months for BNI Stockholm, and potential synergy activities for about 6 person months.

Work task 6: Ecosystem effects

There are synergies to BONUS+ applications (HYPER, COIN and ECOSUPPORT), but no overlapping activities have been identified. The synergies from the BONUS applications amounted to 6 person months in WT5, and part of this also can be integrated into the deliverables in WT6, but not as additional co-financing.

Work task 7: Assessments of the provision of ecosystem services and goods

No overlaps and synergies from other projects have been identified.

Work task 8: Module integration and implementation

No overlaps and synergies from other projects have been identified.

Conclusion

The following table provides an overview of WP1 BalticSTERN economy, overlapping activities and synergies to other projects. The overlapping activities are subtracted from the BalticSTERN economy and indicated as contributions applied for in BalticSTERN. The synergies are added to the contribution from BalticSTERN and reflect the total economy. All values in EUR.

	WT1	*WT2*	*WT3*	*WT4*	*WT5*	*WT6*	*WT7*	*WT8*	*Total*
BalticSTERN	164 095	154 980	288 415	279 715	204 090	279 715	259 510	774 010	2 404 530
Overlapping activities	135 526	0	0	0	46 212	0	0	0	181 738
Contributions applied for in BalticSTERN. Overlapping activities sub-tracted	28 569	154 980	288 415	279 715	157 878	279 715	259 510	774 010	2 222 792[b]
Synergies – Co-financing	90 350	0	120 928	0	92 424	87 816[a]	0	0	391 518
Baltic STERN + Co-financing	118 919	154 980	409 343	279 715	250 302	367 531	259 510	774 010	2 614 310

[a] 6 person months from WT5. Should be included but just indicated.

[b] This figure was also mentioned in section 2.1.3 about the total budget for WP1.

Annex I. Details on co-funding and co-operation opportunities

The way of handling the budget in WP1 and treating the overlapping activities and synergies have two implications. First of all, there is a clear distinction between the resources applied for in the BalticSTERN application and additional resources applied for to other funding agencies. The second implication is that if the resources applied for at the other funding agencies will not be funded, the consequences are that these activities will not be carried out without additional funding either via the BalticSTERN negotiation or via new applications to other funding agencies.

AI.2. WP2 – Co-financing

The WP leader Olle Hjerne is financed at Stockholm University for the coming four years, and no funding is therefore required for him from BalticSTERN. Also researchers at the Baltic Nest Institute will contribute to WP2 without any costs for BalticSTERN, see work task 1 in WP2. Additionally, Ralf Döring and Ayoe Hoff will work in the project without payments. In case of Ralf Döring this means 10% of his salary as own contribution of Greifswald University (approximately 5 000 EUR per year).

Annex II. Budgetary details

Section 2 provides annual and total budgets for each WP and also for each work task. Budgets for each partner organization are not presented, but are available from the proposal coordinator upon request. The budget tables in section 2 consist of four cost items:

1. Personnel costs, which are computed as the number of person-months for each partner organization times the relevant person-month rate of the partner organization. The person-month rate varies among organizations, and information about the rates used by the partner organizations is available from the proposal coordinator upon request.

2. Costs for data collection, software and equipment, which constitute a substantial part of total costs in some WPs. In particular, this is true for WP4, which involves data collection by surveys in all Baltic Sea countries.

3. Costs for meetings. This cost item also includes all travel costs. It will be evaluated in the beginning of the program how the greenhouse gases emissions caused by travels should best be subject to climate compensation.

4. Other costs. This cost item refers to costs for office space, administrative support and other indirect costs that that are associated to the research activities in the WPs.

The budget figures do not include VAT, and it is important that a contract negotiation includes a discussion of how to handle VAT.

This annex is primarily about the fourth cost item, i.e. “other costs”. For covering the inevitable costs due to office space, administration etc., universities and other organizations typically use an overhead cost rate which is multiplied either to personnel costs or to total costs. When preparing the proposal, all partner organizations were asked to provide information on their overhead cost rates and also a breakdown of the overhead costs into the specific cost items that the overhead cost rate is intended to cover. Below, these rates and breakdowns are presented for the partner organizations in all WPs except WP1. As is explained in the section below about WP1, WP1 followed a somewhat different strategy.

AII.1. "Other costs" in WP1

After some discussions among the partners in WP1, it was decided to exclude overheads to the salaries included in the application. However, there are a number of expenditures coupled to the individual institutions in relation to management of research- and development contracts that cannot be eliminated. These expenditures vary among institutions and also among funding agencies. Most often

the level of the applied overheads depends on the proportion of the co-financing, but other national or regional factors can influence as well.

We suggest a two-step procedure in order not to complicate the budget before more concrete steps have been taken to finance BalticSTERN.

In the present budget in WP1 we have used a general level of other costs constituting 45% of the salary expenses. This level is taken as a proxy for an average level for many of the countries and research councils around the Baltic Sea, and they are much lower than the rates used in many EU-applications or consultancy contracts.

In the second step we propose that a future contract negotiation include a specific negotiation with the individual institutions involved in order to define the minimum actual levels of other cost that are needed to establish the contract. From the current dialogue with the partners, such a negotiation most likely will lead to lower rates for some institutions and slightly higher rates for others.

As an example, The Danish National Environmental Research Institute (NERI) is now a part of The University of Aarhus. NERI is an independent institution equivalent to a faculty, but salaries and other kind of support does not come from the University. NERI is paying everything including salaries, buildings, cars, electricity and all kinds of infrastructure to run a professional institution responsible for marine research, monitoring and consultancy. Our costs needed to carry out research contracts depends on a number of factors inherent in the contracts. For example, the required number of laboratory facilities, freezing rooms, equipment, cars and general expenditures will influence other costs, and the resulting cost levels vary from about 50 to 196% of the salary expenses. With respect to the BalticSTERN application the other cost levels will most likely be at the lower end of this scale, but slightly higher than the 45% used in the WP1 budget.

In a similar level, other institutions have their own rules and regulations. The extent to which such rules can be bended or not calls for an individual examination during the contract negotiation period.

AII.2. "Other costs" in WP2

The overhead cost rates and breakdowns of overhead costs for the partner organizations in WP2 are as follows.

Baltic Nest Institute, Stockholm Resilience Centre (Sweden)

Office space, supplies, etc.: 7500 EUR per person and year

In addition, the Centre is tied to Stockholm University which implies an overhead cost rate of 20% of personnel costs.

Overhead cost breakdown:

44% administration

30% general contribution to the university

26% service and support

Department of Landscape Economics, University of Greifswald (Germany)

Overhead cost rate: 15% of personnel costs

Overhead cost breakdown:

50% administration

50% consumables and communication

Institute for Food and Resource Economics, University of Copenhagen (Denmark)

Overhead cost rate: 50% of total costs

Overhead cost breakdown:

49% administration

17% IT

16% office

18% other costs

AII.3. "Other costs" in WP3

The overhead cost rates and breakdowns of overhead costs for the partner organizations in WP3 are as follows.

Baltic International Centre for Economic Policy Studies (Latvia)

Overhead cost rate: 11% of personnel costs

Overhead cost breakdown:

80% administrative support (secretary, accountant, computer support, etc.)

15% office space

5% other items (telephone, paper, post, etc.)

Berlin Institute of Technology (Germany)

Overhead cost rate: 200 EUR per person-month

Overhead cost breakdown:

The overhead is for literature and office equipment (paper, printer cartridges, etc.) and phone.

Bonn University, Institute for Food and Resource Economics (Germany)

Overhead cost rate: 20% of personnel costs and other costs

Overhead cost breakdown:

40% heating, office space

40% administrative help (including IT support and library)

20% cleaning

Centre for Economic and Financial Research (Russia)

Overhead cost rate: 15% of total costs

Overhead cost breakdown:

60% office space

30% administrative personnel costs

10% communications

Institute of Food and Resource Economics, University of Copenhagen (Denmark)

Overhead cost rate: 55% of total costs

Overhead cost breakdown:

49% administration

17% IT

16% office

18% other costs

MTT Agrifood Research Finland (Finland)

Overhead cost rate: 34% of personnel costs

Overhead cost breakdown:

72% administrative personnel

28% office space

National Environmental Research Institute (Denmark)

Overhead cost rate: 45% of total costs

Overhead cost breakdown:

55% administration

45% office space, communication and supplies

Swedish University of Agricultural Sciences (Sweden)

Overhead cost rate: 36% of total costs

Overhead cost breakdown:

61% administration

39% office space, communication and supplies

Warsaw Ecological Economics Center, Warsaw University (Poland)

Overhead cost rate: 45% of total costs

Overhead cost breakdown:

25% office space

25% administrative support

25% other office expenses

25% general contribution to the university

AII.4. "Other costs" in WP4

The overhead cost rates and breakdowns of overhead costs for the partner organizations in WP4 are as follows.

Baltic International Centre for Economic Policy Studies (Latvia)

Overhead cost rate: 11% of personnel costs

Overhead cost breakdown:

Annex II. Budgetary details

80% administrative support (secretary, accountant, computer support, etc.)

15% office space

5% other items (telephone, paper, post, etc.)

Berlin Institute of Technology (Germany)

Overhead cost rate: 200 EUR per person-month

Overhead cost breakdown:

The overhead is for literature and office equipment (paper, printer cartridges, etc.) and phone.

Center for Environmental Policy (Lithuania)

Overhead cost rate: 25% of total costs

Overhead cost breakdown:

55% administration

45% office space, communication and supplies

Centre for Economic and Financial Research (Russia)

Overhead cost rate: 15% of total costs

Overhead cost breakdown:

60% office space

30% administrative personnel costs

10% communications

Enveco Environmental Economics Consultancy Ltd. (Sweden)

Overhead cost rate: 25% of total costs

Overhead cost breakdown:

35% office space

35% communication and supplies

30% administrative support

MTT Agrifood Research Finland (Finland)

Overhead cost rate: 34% of personnel costs

Overhead cost breakdown:

72% administrative personnel

28% office space

National Environmental Research Institute (Denmark)

Overhead cost rate: 45% of total costs

Overhead cost breakdown:

55% administration

45% office space, communication and supplies

Stockholm Environment Institute Tallinn (Estonia)

Overhead cost rate: 34% of personnel costs

Overhead cost breakdown:

50% financial manager salary and other administrative help

25% communication costs (phone, internet)

25% office rental and other

Warsaw Ecological Economics Center, Warsaw University (Poland)

Overhead cost rate: 45% of total costs

Overhead cost breakdown:

25% office space

25% administrative support

25% other office expenses

25% general contribution to the university

Annex II. Budgetary details

AII.5. "Other costs" in WP5

Stockholm Resilience Centre (Sweden)

Office space, supplies, etc.: 7500 EUR per person and year

In addition, the Centre is tied to Stockholm University which implies an overhead cost rate of 20% of personnel costs.

Overhead cost breakdown:

44% administration

30% general contribution to the university

26% service and support

Warsaw Ecological Economics Center, Warsaw University (Poland)

Overhead cost rate: 45% of total costs

Overhead cost breakdown:

25% office space

25% administrative support

25% other office expenses

25% general contribution to the university

Annex III. Brief presentations of program partners

Aarhus University, National Environmental Research Institute (NERI) (Denmark)

www.dmu.dk

NERI is a research institute, formerly affiliated to the Danish Ministry of Environment, but from 1. January 2007 part of the University of Aarhus. NERI provides data and the scientific basis for environmental policy and decisions pertaining to nature and the environment. Primary clients are the national, regional and international authorities in the field of nature and environment. Staff members comprise about 450.

NERI has significant experience in policy analysis, and has over the last five years provided the Danish Ministry of Environment with strategic research within the field of environmental economics, as well as performed a number of *ex ante* policy analysis studies. Key competences are within issues of land use and the interaction between agriculture and the environment.

NERI is organised in ten research departments covering a number of research areas, such as atmospheric pollution, aquatic and terrestrial environment, global change and the arctic environment, risk assessment, and integrated analyses related to sectors and themes.

The Department of Policy Analysis will be partner in WP1, WP3 and WP4 in this project. The department's research and advisory activities are focused on interdisciplinary and integrated analysis and assessment of driving forces and pressures related to complex environmental problems, including agricultural and rural development. Impact assessment, forecasting models, integrated environmental information systems, environmental economics, -sociology and -geography, environmental indicator systems are among the expertises.

NERI and the Department of Policy Analysis have a wide experience in working as contractors for the Danish Environmental Agencies, EEA,the Commission and the Nordic Council, and the Department of Policy Analysis has participated in several EU research projects as part of management groups, as module leaders and work package leaders.

Aarhus University, National Environmental Research Institute (NERI), Baltic Nest Institute (Denmark)

www.balticnest.org

Baltic Nest Institute is a research institution physically located in Sweden and in Denmark, at the Stockholm Resilience Centre, Stockholm University and at National Environmental Research Institute

(NERI), Aarhus University at Roskilde. The institute uses information from a range of institutions around the Baltic Sea, making the integrated, large scale modeling of the Nest model possible. Baltic Nest Institute represents a strategic alliance between Stockholm University, Swedish Environmental Protection Agency, National Environmental Research Institute (NERI), University of Aarhus, Danish Meteorological Institute and National Institute of Aquatic Resources at the Technical University of Denmark (DTU-Aqua), Danish Technical University.

NERI is an applied research institute under University of Aarhus, Denmark. NERI is responsible for providing the technical and scientific foundation for policy decisions related to nature and environment in Denmark. NERI collects, processes and assesses information about nature and the environment and utilizes this knowledge as the basis for providing independent scientific advice to decision makers and various governmental agencies. (www.dmu.dk). There are 450 employees in NERI, and 80 employees in the Department of Marine Ecology. NERI has been and is coordinator in several ongoing and terminated EU projects (MEICE, CHARM, ORMOLTEN, MEAD, CREAM), or partner (REBECCA, THRESHOLDS, CARBOOCEAN, RECLAIM, ECOOP, SIBER, SEA-DATA-NET, ACE, DOMAINE, MIDAS, DANLIM, M & M, SPICOSA, MEDEA, PHASE, KEYCOP, COMET). NERI is consultant for the Ministry of Environment, Denmark. NERI is responsible for the topic centre in the National Monitoring Programme, is participating in a number of HELCOM and OSPAR working groups, and participates in projects and evaluation of a number of national water action plans.

Åbo Akademi University, Environmental and Marine Biology/Husö Biological Station (Finland)

http://web.abo.fi/fak/mnf/biol/huso/

Åbo Akademi offers both undergraduate and graduate studies and extensive research opportunities to some 8000 students on three campuses. Our University is located in Åbo (Turku in Finnish), on the south west coast of Finland and in Vaasa. Åbo Akademi University has an acknowledged position at the forefront of research in such areas as biosciences, computer science, democracy, human rights, material science, process chemistry and psychology.

The unit of Environmental- and Marine Biology has long experience and renowned reputation in research of the Baltic Sea ecosystems. Research is focused on different aspects of the ecosystem, e.g. structure and function of shallow water ecosystems, biodiversity in the archipelago areas, eutrophication of the Baltic Sea, alien species, harmful substances, modeling of water quality, decision support systems including interdisciplinary studies etc. Husö Biological Station (Åland) has a 50 years long history in coastal studies. Annually both basic research and applied studies, mainly in cooperation with the Local Government of Åland, are conducted. At the department several research projects concerning the ecological status of the Baltic Sea (habitat mapping and modeling, ecosystem functions, eutrophication, ecosystem goods and services, modeling and decision support systems) are currently running. Ca 10 PhD students are involved within these projects.

Baltic International Centre for Economic Policy Studies (BICEPS) (Latvia)

www.biceps.org

The Baltic International centre for Economic Policy Studies (BICEPS) is an independent research centre which became a legal entity in Latvia in May 2002. We are located in the Stockholm School of Economics in Riga building and work closely with the School in many areas. Our aim is to promote and undertake high quality policy-oriented research in economics and other social sciences and to provide informed advice and consultation for both government and business. BICEPS has developed a broad portfolio of research projects. Ongoing projects include: an evaluation of the impact of the structural funds for Latvia which has been commissioned by the Latvian Finance Ministry; the Global Entrepreneurship Monitor for Latvia; a Sixth Framework Programme on knowledge based entrepreneurship (RICAFE II) in a consortium of 10 leading European Universities led by the London School of Economics. We have participated in a SEPA project that was intended to explore the status of knowledge about Latvian willingness to pay for a cleaner Baltic Sea. We have particular experience of survey based research in Latvia. More information about BICEPS activities can be found on our website, see the link above.

Berlin Institute of Technology, Environmental and Land Economics (Germany)

www.tu-berlin.de

The Chair in Environmental and Land Economics, Institute for Landscape Architecture and Environmental Planning, Technische Universität Berlin (Berlin Institute of Technology)

Prof. Dr. Volkmar Hartje

The Chair in Environmental and Land Economics addresses economic aspects of environmental problems on the national as well as on the international level. The Chair has been working during the last years on topics such as “water resource management”, “governance, institutions, and instruments, and “regional development”. Recent projects in these areas were dealing with, for example, transboundary water management in Africa or the global change impacts on the water cycle in the Elbe River basin. Various projects have also dealt with the European Water Framework Directive and its consequences for river basin management in Germany. Another major field of research at the Chair is the evaluation of the costs and benefits of nature protection. Particularly the application of stated preference methods, i.e. contingent valuation and choice experiments, in environmental valuation is one of the main fields of expertise. Examples are the protection of coastal wetlands against the consequences of climate change, ecological enhancement of river ecology in the River Elbe and changes in forest biodiversity due to forest conversion. A series of studies has also estimated the benefits arising from recreational activities in urban parks or urban bathing sites in Berlin. Currently the externalities of wind power production are estimated using choice experiments. A more recent field of research is the measurement of crowding respectively congestion of visitors at, for example, national parks.

Annex III. Brief presentations of program partners

Bonn University, Institute for Food and Resource Economics (Germany)

www.ilr1.uni-bonn.de/agpo/AGPO_E.HTM

The team at Institute of Food and Resource Economics has already a long-standing experience in co-ordinating CAPRI related research projects since 1996. IAP at Bonn University has specialised on agricultural sector modelling and the development of agricultural policy information systems over more then three decades. In the 70s and beginning 80s the IAP has steered for 10 years a larger "Concentrated Research Program" of the German Research Foundation (DFG) on agricultural sector modelling in which almost all German agricultural economic institutes participated. These research activities gave light to quantitative modelling systems at farm (DIES), regional (RAUMIS) and national level (DAPS). Since the beginning of the 80s, the team developed the SPEL-System for Eurostat, including an ex-post data-base, as well as forecasting and simulation systems for the Short-term (SFSS) and the Medium-term (MFSS) for the EU Member States. Finally, The team co-ordinated the 4th framework project "CAPRI", 5th framework project "CAP-STRAT" and the 6th framework project "CAPRI-Dynaspat" centred around the CAPRI modelling system. IAP is thus a central German research institute in the field of agricultural economics. On of its main objective is to advise local, national and international policy institutions in policy strategies (economic, social and environmental aspects) based on broad quantitative analysis.

Center for Environmental Policy (Lithuania)

www.aapc.lt

Center for Environmental Policy (Lith. Aplinkos apsaugos politikos centras (AAPC)) is a non profit organisation that provides consultancy, research and project administration services in the field of environmental protection. The Center operates on a network or 'pool' system which enables rapid and efficient response to the needs of the clients. The Center has a both core staff working in Vilnius office and an extensive network of experts who can be contracted in for specific contracts and assignments as required by clients.

Since its establishment in 1997, the Center has implemented over 100 environmental projects in Albania, Bosnia and Herzegovina, Croatia, Cyprus, Estonia, Lithuania, Latvia, Poland, Romania, Slovakia and Turkey, focusing on all environmental sectors: Environmental economics and policy; Water; Waste; Air quality; Chemicals; IPPC; GMO; Nature protection and protected areas; Noise; Climate change; EIA; Environmental education; Institutional strengthening; Green procurement.

AAPC has a strong experience in water policy, water management and economics. It's experts have been involved in such projects as the EC research The Baltic Drainage Basin project; The AquaMoney project, which brings together 16 leading European research institutions to develop and test practical guidelines for the assessment of environmental and resource costs and benefits in the European Water Framework Directive. Other water sector projects include Water Pricing in Selected Accession Countries to the European Union, Current Policies and Trends (covering all three Baltic States); The Great Lakes / Baltic Sea Partnership to support the Northern European Initiative; Transposition of EU requirements in the Water Sector; Transposition of the EU Water Framework Directive and Elaboration of a National Strategy for the Management of Water Resources in Lithuania; Project on Implementation of the Nitrates Directive in Lithuania. Recently AAPC has been deeply involved in the implementation

of the Water Framework Directive in Lithuania, especially focusing on economic analysis and assessment of environmental and resources costs and benefits.

Centre for Economic and Financial Research (Russia)

www.cefir.ru

The Centre for Economic and Financial Research (CEFIR) is an independent economic policy think tank established in Russia in 2000. CEFIR's mission is to improve Russia's economic and social policies by producing cutting-edge academic research and policy analysis and by helping policymakers and the public to make informed choices. CEFIR researchers use advanced methods of economic analysis and contribute to the formulation of Russia's economic and social policy by informing policymakers and the public about the costs and benefits of specific policy actions. Since it was established CEFIR has accomplished more than 50 research projects in such research areas as: Administrative Reform, Industrial Organization and Competition policy, Corporate Governance and Financial Markets, Macroeconomic policy, Political Economics and Federalism, International Trade and Foreign Investments, Social Policy and Labor Market, Migration Policy, and Regional Economics.

CEFIR economists make regular appearance in reputable newspapers, such as «Vedomosti», «Kommersant», «SmartMoney», «The Moscow Times», as well as provide expert opinions in various radio and TV programs.

CEFIR's critical resources are the high-quality human capital and the academic infrastructure. Research Papers in Economics (www.RePEc.com) has ranked CEFIR a top 10% institution in Europe (#139). CEFIR is closely integrated in the world economic community and has partner relations with leading economic think tanks in many countries. On the number of publications in top Western economics journals, including American Economic Review, Journal of European Economic Association, Journal of Economic Perspectives, Economics of Transition and others, CEFIR outperforms all other Russian economic think tanks combined.

CEFIR brings together 30 young Russian economists, who graduated from the most prestigious Russian universities. Many researchers hold PhDs from leading Western institutions, including Harvard University, Massachusetts Institute of Technology, Tilburg University, Universite Libre de Bruxelles, Toulouse University, University of Manchester. Three of CEFIR's researchers are Research Affiliates with Centre for Economic Policy Research in London, at which no other Russian organizations are represented. Two of CEFIR scholars have been selected Young Global Leaders by the World Economic Forum in Davos.

CEFIR's project portfolio includes research work done for Russia's Central Bank, Ministry of Finance, Ministry of Economic Development and Trade, Ministry of Education and Science, Ministry of Health and Social Development, Presidential Administration, the World Bank, the European Bank of Reconstruction and Development, Swedish International Development Agency, USAID, International Finance Corporation, United Nations Development Programme.

Since 2004 CEFIR has also been actively involved in the production of the «Beyond Transition» newsletter on reforming economies, which it has been doing on the initiative of the World Bank. The newsletter is available both in English and in Russian and is disseminated to thousands of subscribers around the world.

Enveco Environmental Economics Consultancy Ltd. (Enveco Miljöekonomi AB) (Sweden)

www.enveco.se

Enveco Environmental Economics Consultancy Ltd. (Enveco Miljöekonomi AB) is a consultancy founded in 2004 and based in Stockholm. Enveco is based in Stockholm and carries out analyses, research, education and training in environmental economics and ecological economics. The staff has qualifications in the fields of economics, political science and environmental science and a considerable experience in interdisciplinary research. One speciality is policy evaluations involving empirical economic valuation of the environment. Clients include national and local authorities and also research institutes and universities. Enveco also participates in several national and international research programs, such as Economic Assessment for the Environment (funded by the Swedish Environmental Protection Agency) and Science and Policy Integration for Coastal Systems Assessment (SPICOSA) (funded by EU).

Estonian Institute for Sustainable Development / The Stockholm Environment Institute Tallinn Centre (SEIT) (Estonia)

www.seit.ee

The Stockholm Environment Institute (SEI) is an independent international research institute whose mission is to support decision- making and induce change towards sustainable development around the world providing integrative knowledge that bridges science and policy in the field of environment and development. Since 1992, SEI-Tallinn has bridged SEI network's activities to the Baltic region/Central and Eastern Europe, as one of the six current SEI global centres. As a non-profit foundation, SEIT aims to promote decision-making on community development and the environment based on sustainability. SEIT has been well integrated into Estonian society and links with scientific, environmental and policy communities and involves the private sector, local and national governments and other interest groups internationally.

The staff consists of experts and project managers working in four cross-cutting thematic programmes. The Climate and Energy Programme's main activities cover the related issues of climate change, energy and air quality in Estonian, European and international context. The Sustainability Measures Programme focuses upon the development and analyses of integrated environmental policy. The Environmental Management Programme deals with the so-called grey environment that is with industrial pollution and

its prevention, the problems inherited from the Soviet period and introducing environmental thinking to current enterprises. The Environmental and Ecological Economics and Accounting Programme works mainly with the themes of environmental taxation, capital accounting, and valuation of natural resources.

Finnish Environment Institute (SYKE) (Finland)

www.environment.fi

SYKE being the only national research institute in Finland in the field of the environment has a strong emphasis on providing support to the decision-making processes, including scientific and technical advice and through the development of methods to combat harmful environmental changes. SYKE is a research and development institute located within the administration of the Finnish Ministry of Environment. Part of the research funding at SYKE comes directly from the State budget, part from the Ministry of Environment, and the remainder from various other national and international sources. SYKE's responsibilities include environmental research and monitoring, publishing and disseminating the results, providing expert services to the administration, and maintaining appropriate information systems. All SYKE's research is carried out in seven research programmes Global Change, Contaminants, Protection of the Baltic Sea, Biodiversity, Environmental Technology, Environmental Policy and Integrated River Basin Management, which work on themes varying from global environmental issues, like climate change and biodiversity, to more national and regional issues, like controlling eutrophication in water bodies, management of hazardous substances, restoration of habitats, and analysis of environmental policies. The Research Department works in close co-operation with Expert Services Department, which is responsible for various expert, authority and development functions within nature conservation, water resources management, hydrology, environmental protection and management, control of chemicals, and environmental damage mitigation. SYKE employs nearly 600 people, more than 370 of which are university-educated scientists.

Leibniz Institute for Baltic Sea Research Warnemünde (IOW) (Germany)

www.io-warnemuende.de

The Leibniz Institute for Baltic Sea Research (IOW for Institut für Ostseeforschung Warnemünde) is a member of the Science Association Gottfried Wilhelm Leibniz. IOW is jointly funded by the federal government and the state of Mecklenburg-Vorpommern and is associated with Rostock University. IOW has a staff of approximately 146, whereof 30 are third-party funded. About 50% are scientists including PhD students. The institute is structured in four departments representing the main fields of marine research: physical oceanography, marine chemistry, biological oceanography and marine geology. The scientific work of the departments is supported by an instrumentation group, which is part of the Department of Physical Oceanography, and the service of a central IT-group.

According to its statute the institute is dedicated to the promotion of science, research and education in the field of oceanography. Furthermore, interdisciplinary marine research shall be carried out with a special emphasis on the Baltic Sea ecosystem. The overall objective is to understand the causal links between external forcing by a coupled ocean – atmosphere system and the human impact on the one hand and the variability of marine ecosystems including their organisms on the other hand. By creating

a close cooperation of all disciplines to analyze the biotic-abiotic interactions qualitatively and quantitatively, to describe the causal links theoretically and to integrate them in numerical models, IOW has developed a profile, unique in the whole Baltic Sea region.

The range of tasks of IOW comprises also the national commitments to monitor the state of the Baltic Sea (HELCOM), a task which IOW was charged by the Federal Agency of Hydrography (BSH). Baltic Sea research and the monitoring programme are of mutual benefit building an important corner stone of IOW work. IOW research programme highlights interdisciplinary research, encourages interdisciplinary projects, and structures the comparative research outside the Baltic Sea region.

MTT Agrifood Research Finland (Finland)

www.mtt.fi

MTT Agrifood Research Finland is an expert body operating under the Finnish Ministry of Agriculture and Forestry. Its Economics unit carries out research on agricultural production systems management, commodity markets and agribusiness economics, accounting, environmental economics and environmental policies for agriculture, rural areas and the environment. The unit has about 55 scientific staff.

The unit's environmental economics group has been engaged in numerous projects with external funding from the Academy of Finland, the Ministry of Agriculture and Forestry, the Ministry of Environment, the Nordic Council of Ministries, and the European Union. The environmental economics group has experience in working with and modeling problems related to agricultural water pollution and protection of the Baltic Sea through past and ongoing Academy of Finland and Ministry of Agriculture funded projects, such as Searching efficient protection strategies for the eutrophied Gulf of Finland (2003-2006), Environmentally optimised phosphorus cycle for Finnish livestock farming (2004-2008), Cost-efficiency in agricultural water protection (2006-2010), and Effects of water quality on the benefits of water recreation in Finland (2006-2010).

More information about MTT Economics at http://www.mtt.fi/english/mttl.

Stockholm Resilience Centre (Sweden)

www.stockholmresilience.su.se

Stockholm Resilience Centre is a new international research centre (established on 1 January 2007) that advances transdisciplinary research for governance of social-ecological systems with a special emphasis on resilience – the ability to deal with change and continue to develop. The research activities in the centre are organized in nine principal themes, several of which are relevant for this application. The

relevant themes include: 1) Understanding ecosystem dynamics for the generation of ecosystem services in socia-ecological systems, 2) The new economics of complex social-ecological systems, 3) Multilevel institutions and goverance of social-ecological systems, 4) governance and ecosystem management of coastal and marine systems.

The centre employs a number of natural and social scientist, e.g. a number of ecologists, economists and modellers. It is a collaboration between Stockholm University (www.su.se), Stockholm Environment Institute (www.sei.se) and the Beijer Institute of Ecological Economics at the Royal Swedish Academy of Sciences (www.beijer.kva.se) Baltic Nest Institute forms an integral part of the centre. The centre is funded by the Foundation for Strategic Environmental Research, Mistra.

Stockholm University, Department of Systems Ecology (Sweden)

www.ecology.su.se

At the Department of Systems Ecology both basic and applied ecological problems are studied, with an emphasis on coastal and marine ecosystems and coupled social-ecological systems. They have a long tradition of research on the Baltic Sea and its drainage basin. The Department has been involved in the development of the interdisciplinary field of ecological economics, and they perform research in many developing countries, mostly in the tropics. They view humanity as an integral part of ecosystems, and apply a systems perspective in the analyses of how ecosystems are used and abused by humans and on the interplay between societal development and the life-supporting environment. There is close collaboration with the Stockholm Resilience Centre at Stockholm University and the Beijer International Institute of Ecological Economics at the Royal Swedish Academy of Sciences, the Södertörn and Gotland University Colleges and the Institute of Coastal Research of the Swedish Board of Fisheries.

Stockholm University, Stockholm Resilience Centre, Baltic Nest Institute, (Sweden)

www.balticnest.org

The Swedish Baltic Nest Institute is a research institution physically located at the Stockholm Resilience Centre, Stockholm University. The institute uses information from a range of institutions around the Baltic Sea, making the integrated, large scale modeling of the Nest model possible. The Nest model is a decision support system aimed at facilitating adaptive management of environmental concern in the Baltic Sea. Nest can be used to calculate required actions needed to attain politically agreed targets for the Baltic Sea ecosystem. Nest has been used to calculate the Country Allocation Scheme on Nutrient Reductions for the Baltic Sea Action Plan. BNI is a recently founded institute and the researchers have participated in various EC-funded projects relevant to this proposal: ELME, CHARM, SIBER, BOING, REFLECT, CLIME. BNI have been instrumental in formulating the Baltic Sea Action Plan and is member of the HELCOM advisory group for the implementation of the BSAP. Staff participates in the Land Ocean Interactions in the Coastal Zone project (LOICZ), the ICES/HELCOM working Group on Integrated Assessment of the Baltic Sea. Staff also contributed to the BALTEX programme and the recently published Assessment of Climate Change for the Baltic Sea Basin.

Annex III. Brief presentations of program partners

Swedish University of Agricultural Sciences (SLU), Department of Economics (Sweden)

www.ekon.slu.se

The Economics group within the Department of Economics, SLU carries out internationally acclaimed research in environmental and resource economics, and agricultural policy and international trade. We employ two professors and two lecturers, as well as a number of post-doctoral researchers and doctoral students. We also cooperate closely with researchers belonging to the Business administration arm of the department, and are developing links with the Agrarian History group; furthermore we carry out interdisciplinary research with other departments at SLU and beyond. We receive significant research financing from the university each year, as well as having a long and successful record of attracting external financing. We aim to provide a friendly and stimulating environment for researchers of all backgrounds; knowledge of Swedish is not required.

Our vision for the future is to cement our place as the leading centre for research into environmental economics and agricultural policy and trade in Sweden. We aim to carry out research of high quality. Measures of quality include international publications in quality journals, and doctoral students who complete their studies within the allotted four years, and are then sought-after for jobs within or outside academia. We also aim to continue and strengthen the tradition of influencing debates on agricultural and environmental policy within Sweden. It is therefore essential for us to recruit and retain high quality staff. Apart from offering an excellent home research environment, we are also strengthening ties with other research centres within and outside Sweden in order to provide our staff with opportunities to cooperate with other leading researchers. We cooperate closely with Uppsala University in offering a program of PhD courses.

Swedish University of Agricultural Sciences (SLU), Department of Soil Sciences (Sweden)

www.mv.slu.se

Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden. SLU is the only agricultural university in Sweden and has developed to a competitive international centre of excellence, within food quality and environmental research since it was founded in 1977. The university has 2500 employees and 2500 students. SLU is the national centre for expertise in areas concerning biological production and environmental research. The university is active in a wide range of subjects of relevance to the call. The university has well established contacts with stakeholders within industry and organizations, governmental and non-governmental organizations.

Research focused on at the Department of Soil Sciences is related to basic soil processes, interactions in the soil-plant-water systems, human influence on the soil and water systems and soil reactions with environmental disturbances and different land use practices. The department runs long-term field experiments, some of which are more than 30 years old – w§ith different farming systems related to

nutrient leaching to water. These experiments provide excellent experience for improving agricultural management and testing models. The department is also involved in many collaborative national and international education and research programmes.

University of Copenhagen, Faculty of Life Sciences, Institute of Food and Resource Economics (Denmark)

www.foi.life.ku.dk

The Institute of Food and Resource Economics is an independent department at the Faculty of Life Sciences under the University of Copenhagen. FOI has a staff of approx. 115 employees. The activities of the Institute comprise teaching and research within the sphere of food sector economics and environmental and natural resources economics. In addition to this the responsibilities of the Institute include advisory activities and the compilation of accounts statistics for agriculture, horticulture and fisheries.

Within the field of environmental economics the primary focus of FOI's research is on environmental policy instruments and project and policy appraisal. A substantial model apparatus is available for environmental policy analyses describing economic behaviour at the at the producer, sector and macro levels. The Institute has a long experience with the use of computable general equilibrium models for evaluation of policy issues related to agriculture, environment and trade.

The Fisheries Economics and Management Division has since 1997 conducted research in fisheries economics topics including development of bio-economics models, analyses of various management measures such as individual transferable quotas and effort restrictions, price formation on fisheries products, and market studies. The division collaborates closely with the statistical division at FOI, which is responsible for the collection of the costs and earnings statistics for the Danish fishery.

University of Gothenburg, Department of Earth Sciences/Earth Sciences Centre (Sweden)

www.gvc.gu.se

The department encompasses the specialties oceanography, marine geology, physical geography, geology and geography. There are currently about 40 researchers/professors at the department. About 15 of these are in the oceanography division, which is the largest in Sweden, and the only with complete educational programs for Batchelor, Master and PhD degrees. Oceanographic research is both theoretical and experimental and spans a wide range of topics, in particular Baltic Sea eutrophication and climate, Arctic Ocean physical circulation including ice and carbon cycling, ocean mixing and deepwater renewal and coastal water quality modeling including effects of aquaculture. Some of the researchers are members of Tellus, the Centre of Earth Systems Science at the University of Gothenburg.

Annex III. Brief presentations of program partners

University of Greifswald, Department of Landscape Economics (Germany)

www.uni-greifswald.de

Head of Department: Prof. Dr. Ulrich Hampicke

Senior Researcher: Dr. Ralf Döring

The department was established in 1996 as part of the interdisciplinary teaching course Landscape Ecology and Nature Conservation. The researchers at the department work extensively on costs, benefits, incentives and political implementation of nature conservation, particularly in the Central European cultural landscape, and considering different biotopes (forests, streams, grasslands, agricultural fields). One focus is on the implementation of payments for ecological services delivered by land users.

Other research areas include fisheries economics, focusing on ecologically sustainable fisheries. Together with the Environmental Ethics Research Group problems of intergenerational justice in the economical method of discounting were analysed.

Since 1996 the department is involved in numerous research projects funded by the EU, Federal ministries, Federal Agencies, Foundations and NGOs.

Warsaw University, Warsaw Ecological Economics Center (Poland)

www.woee.pl

Warsaw University (UW) has been involved in scientific research in economics since 1953. The Faculty of Economic Sciences (WNE) of Warsaw University is one of the leading scientific centres in economics in Poland, with recognised international renown related both to the scope and the high teaching level, as well as to the scientific research undertaken. Warsaw Ecological Economics Center (WOEE) specialises in issues related to the natural environment and natural resources and their impact on social welfare.

The mission of the WOEE is to develop, improve and promote economic methods and tools used in resolving problems related to environmental protection policy and conducting empirical research concerning the evaluation of environmental resources and the purposefulness and effectiveness of selected environmental protection programmes. These activities are aimed at improving social welfare through indicating the best ways of use of environmental capital in economic development, while maintaining the principle of sustainable development. The research conducted by WOEE also aims to demonstrate ways of resolving conflicts between various interest groups in the context of the use of environmental goods. These solutions meet both economic effectiveness and justice criteria.

WOEE members have participated in many national projects in the environmental protection field. The analyses of WOEE were often used by the Ministry of Environment and the National Fund for Environmental Protection. WOEE also has extensive experience in international research. WOEE has ongoing cooperation in place with many scientific centres abroad, including Harvard University, the Beijer International Institute of Ecological Economics in the Royal Swedish Academy of Sciences, the International Society for Ecological Economics and the European Association of Environmental and Resource Economists.

WOEE scientists have extensive knowledge and experience in economics and environmental protection. Research conducted in the centre, as well as experience gained in international research projects are reflected in the non-market valuation methodology of WOEE being on the highest European level. The use of this methodology might contribute to a more socially effective forest management in Poland.

The research team of WOEE consists of: Professor Tomasz Żylicz, Professor Jerzy Śleszyński, Dr Anna Bartczak, Dr Marek Giergiczny, Dr Olga Kiuila, Dr Agnieszka Markowska, Dr Jan Rączka, MSc Mikołaj Czajkowski, Msc Anna Kukla-Gryz, Msc Olimpia Markiewicz and Msc Jakub Rak. The CVs of employees and the full list of publications, opinions and reports by WOEE employees can be found on the Centre's Website: http://www.woee.pl/.

The legal situation of WOEE in the structures of Warsaw University ensures professional financial and conceptual management as well as necessary resources, instruments and human capital required to conduct ambitious research projects.

Jacob Carstensen

CURRICULUM VITAE

Name: Jacob Carstensen

Date and Place of Birth: 13 January 1966, Slagelse, Denmark

Nationality: Danish

Home Address: Jagtvej 31, DK-4040 Jyllinge, Denmark

Research Interests

Environmental modelling and statistics, particularly quantitative links between anthropogenic inputs and effects in the marine environment. I am interested in long term trends of ecosystem variables and how they respond (linearly and non-linearly) to changes in nutrient input and climate. Such links have primarily been established in Danish coastal waters for nutrients, phytoplankton, macrophytes and oxygen conditions. Development of indicators that give a clear signal to anthropogenic inputs by filtering out sampling and meteorologically induced variations.

Education

Ph.D., Department of Mathematical Statistics and Operations Research, Technical University of Denmark, Lyngby, Denmark, 1994.

M.Sc., Engineering, Technical University of Denmark, Lyngby, Denmark, 1990.

Postdoctoral Experience

Postdoctoral Research Associate, Department of Environmental Science and Technology, Technical University of Denmark, Lyngby, Denmark, 1994-1997.

Present position

Senior Scientist, Department of Marine Ecology, National Environmental Research Institute, Aarhus University, Roskilde, Denmark. 100% Research Position.

Professional Experience

Senior Scientist, Department of Marine Ecology, National Environmental Research Institute, Aarhus University, Roskilde, Denmark, 1998-present.

Visiting Scientist, Institute for Environment and Sustainability, European Commission Joint Research Centre, Ispra, Italy, 2004-2005.

Visiting Assistant Professor, Horn Point Laboratory, Center for Environmental Studies, University of Maryland,

Cambridge, MD, USA, 1999.

Research Assistant Professor, Technical University of Denmark, Lyngby, Denmark, 1994-1997.

Software QA programmer, SAS Institute Inc., Cary, NC, USA, 1990.

Member of Scientific Societies

The International Environmetrics Society (TIES)

American Society for Limnology and Oceanography (ASLO)

Coastal and Estuarine Research Federation (CERF) – Assoc. editor of the CERF journal Estuaries and Coasts

Ph.D. Students Supervised

Jan Kloppenborg Møller, Ph.D. Student, Technical University of Denmark, Supervisor. (Expected Aug. 2009)

Søren Lophaven, Ph.D., Technical University of Denmark, Supervisor. (2001-2005)

Management of externally Funded Large Research Projects (2000-present)

2007-2011. Baltic Nest Institute in Denmark (**BNI**), with J. Carstensen as Coordinator and 3 Danish institutions involved (NERI budget 8 million DKK; 1,074,000 €)

2006-2011. A Pan-European Infrastructure for Ocean and Marine Data Management (**SeaDataNet**), with C. Maillard as Coordinator and 47 European partners, European Union. (NERI budget 1.5 million DKK; 208,000 €)

2006-2009. IT infrastructure in relation to the Danish administrative re-organization (**IT-Kommunal reform**), with L. Svendsen as coordinator (NERI budget 54.0 million DKK; 7,235,000 €)

2005-2008. Thresholds of Environmental Sustainability (**THRESHOLDS**), with C. Duarte as Coordinator and 24 European partners, European Union. (NERI budget 5.8 million DKK; 785,000 €)

2004-2006. Estuarine Quality Classes for Water Framework Directive indicators (**EQUAL**), with J. Carstensen as Coordinator and 6 Nordic and Baltic partners, Nordic Council of Ministers. (NERI budget 320,000 DKK; 43,000 €)

2003-2005. Comparative Analysis of Eutrophication: Black Sea and Baltic Sea (**COMPANION**), with J. Carstensen as Coordinator and 5 European partners, NATO Linkage Grant. (140,000 DKK; 19,000 €)

2002-2005. A Pan-European Network for Ocean & Marine Data and Information Management (**Sea-Search**), with D. Schaap as Coordinator and 32 European partners, European Union. (NERI budget 860,000 DKK; 116,000 €)

1998-2002. Statistical analysis and modelling of phytoplankton dynamics - exploitation of data in the Nordic and Baltic monitoring program (**STAMP**), with J. Carstensen as Coordinator and 4 Scandinavian and Baltic partners, Nordic Council of Ministers. (NERI budget 580,000 DKK; 78,000 €)

Relevant publications (2003-present)

Petersen, J. K., Hansen, J. W., Laursen, M. B., Clausen, P., Conley, D. J., Carstensen, J. (2008) "Regime shift in a coastal marine ecosystem". *Ecological Applications 18, pp. 497-510.*

Kernegger, L., Carstensen, J., Zaldívar, J.-M. (2008) "Application of specific eco-exergy to FAO fisheries data".

The Open Fish Science Journal 1, pp. 11-18.

Carstensen, J., Henriksen, P., Heiskanen, A.-S. (2007) "Summer algal blooms in shallow estuaries: Definition, mechanisms and link to eutrophication". *Limnology and Oceanography 52, pp. 370-384*.

Carstensen, J. (2007) "Statistical principles for ecological status classification of Water Framework Directive monitoring data". *Marine Pollution Bulletin 55, pp. 3-15.*

Krause-Jensen, D., Carstensen, J., Dahl, K. (2007) "Total and opportunistic algal cover in relation to environmental variables". *Marine Pollution Bulletin 55, pp. 114-125.*

Carstensen, J., Heiskanen, A.-S. (2007) "Phytoplankton species-specific responses to nutrient status in the Baltic Sea". *Marine Ecology Progress Series 336, pp. 29-42*.

Conley, D. J., Carstensen, J., Ærtebjerg, G., Christensen, P. B., Dalsgaard, T., Hansen, J. L. S., Josefson, A. (2007) "Long-term changes and impacts of hypoxia in Danish coastal waters". *Ecological Applications 17(5), pp. S165-S184.*

Yunev, O.A., Moncheva, S., Khaliulin, A., Ærtebjerg, G., Carstensen, J. (2007) "Long-term variabilitity in phytoplankton, chemical and bio-optical characteristics on the western Black Sea shelf in response to cultural eutrophication and climate change". *Estuarine Coastal Shelf Science 74, pp. 63-76*.

Krause-Jensen, D., Middelboe A. L., Carstensen, J., Dahl, K. (2007) "Spatial patterns of macroalgal abundance in relation to eutrophication". *Marine Biology 152, pp. 25-36.*

Carstensen, J., Conley, D. J., Andersen, J., Ærtebjerg, G. (2006) "Coastal eutrophication and trend reversal: a Danish case study". *Limnology and Oceanography 51, pp. 398-408.*

Lophaven, S., Carstensen, J., Rootzen, H. (2006) "Stochastic modeling of dissolved inorganic nitrogen in space and time". *Ecological Modelling 193, pp. 467-478*.

Spokes, L. and others (2006) MEAD: An interdisciplinary study of the marine effects of atmospheric deposition in the Kattegat. *Environmental Pollution 140, pp. 453-462.*

Carstensen, J., Henriksen, O.D., Teilmann, J. (2006) "Impacts on harbour porpoises from offshore wind farm construction: Acoustic monitoring of echolocation activity using porpoise detectors (T-PODs)". *Marine Ecology Progress Series 321, pp. 295-308.*

Carstensen, J., Frohn, L. M., Hasager, C. B., Gustafsson, B. (2005) "Summer algal blooms in a coastal ecosystem: The role of atmospheric deposition versus entrainment fluxes". *Estuarine Coastal and Shelf Science 62, pp. 595-608.*

Kronvang, B., Jeppesen, E., Conley, D. J., Søndergaard, M., Larsen, S. E., Ovesen, N. B. Carstensen, J. (2005). "Nutrient pressures and ecological responses to nutrient loading reductions in Danish streams, lakes and coastal waters". *Journal of Hydrology 304, pp. 274-288.*

Yunev, O. A., Moncheva, S., Carstensen, J. (2005) "Long-term variability of vertical chlorophyll a and nitrate profiles in the open Black Sea: eutrophication and climatic changes". *Marine Ecology Progress Series 294, pp. 95-107.*

Poikane, R., Carstensen, J., Dahllöf, I., Aigars, J. (2005) "Distribution patterns of particulate trace metals in the water column and nepheloid layer of the Gulf of Riga". *Chemosphere 60, pp. 216-225.*

Danielsson, Å., Rahm, L., Conley, D.J. and Carstensen, J. (2004). "Identification of Characteristic Regions and Representative Stations: A Study of Water Quality Variables in the Kattegat". *Environmental Monitoring and Assessment 90, pp. 203-224.*

Carstensen, J., Conley, D.J., Henriksen, P. (2004) "Frequency, composition and causes of summer phytoplankton blooms in a shallow coastal ecosystem, the Kattegat". *Limnology and Oceanography 49, pp. 191-201.*

Lophaven, S., Carstensen, J., Rootzén, H. (2004) "Space-time modeling of environmental monitoring data". *Environmental and Ecological Statistics 11, pp. 237-256.*

Carstensen, J., Helminen, U., Heiskanen A.-S. (2004) "Typology as a structuring mechanism for phytoplankton composition in the Baltic Sea". *Coastline Reports 4(2004), pp. 55-64.*

Carstensen, J., Conley, D.J. and Müller-Karulis, B. (2003). "Spatial and temporal resolution of carbon fluxes in a shallow coastal ecosystem". *Marine Ecology Progress Series 252,* pp. 35-50.

Hasager, C.B., Carstensen, J., Ellerman, T., Gustafsson, B.G., Hertel, O., Johnsson, M., Markager, S., Skjødth, C. (2003). On extreme atmospheric and marine nitrogen fluxes and chlorophyll-a levels in the Kattegat strait. *Atmospheric Chemistry and Physics 3,* pp. 797-812.

Toompuu, A., Müller-Karulis, B., Carstensen, J. (2003). "Seasonal variation of average phytoplankton concentration in the Kattegat". *Journal of Sea Research 49*, pp. 323-335.

Annex IV. Short CVs for leaders of WPs, WTs and partners

Ralf Döring

CV Ralf Döring

Birthyear: 1966

1988 – 1995	Studies in Economics University of Kassel, Diploma II (master) in Economics with a work on property rights in fisheries.
1996	from 01.06. Scholarship from the Deutschen Bundesstiftung Umwelt staying at the department of landscape economics University of Greifswald (till August 1999).
1999	from 06.10. Research Associate department of landscape economics University of Greifswald
2000	30.06. Last examination in dissertation process. Dissertation on the small scale fishing sector at the German Baltic Sea coast.
2001	from 01.01. Research Associate at the German advisory council on the environment.
2002	since 24.06. Assistent Lecturer/Senior Scientist department of landscape economics University of Greifswald
2007	since 01.11. Member of the Scientific, Technical and Economic Committee for Fisheries (STECF) of the European Commission.

Research Projects (fisheries economics)

Chances of an eco-labelling of products from sea-fisheries for the German fishing sector. Funded by the Federal Ministry for Nutrition, Agriculture and Consumer Protection. 01-12/2006.

Ways towards ecologically sound fisheries inselected areas of the Southern Baltic Sea. Funded by the Federal Agency for Nature Conservation. 07/2002-06/2004.

EU-Concerted Action: Economic Assessment of European Fishing Fleets. Funded by the European Commission. 04/2002-10/2004.

Publications (most important in fisheries economics last 4 years)

with Egelkraut, T. M. 2008. Investing in Natural Capital as Management Strategy in Fisheries: The Case of the Baltic Sea Cod fishery. Ecological Economics, Vol 64(3): 634-642.

with Wichtmann, W. 2007. Chances of an eco-labelling of products from sea-fisheries for the German fishing sector [in German]. Final report. Greifswald, 94 p.

with Bender, S., Brosda, K., Kraus, G., Kube, J., Laforet, I., Schaber, M., Schulz, N. & H. Sordyl. 2005. Ways for ecologically sound fisheries in selected areas of the Southern Baltic Sea [in German].Final Report. Federal Agency for Nature Conservation. Bonn (www.habitatmarenatura2000.de).

with Bender, S. 2004. Germany. In: Economic Assessment of European Fisheries - Annual Report 2004, The Hague (LEI): 59-62.

Katarina Elofsson

Personal data

Born: 6th April 1963, Stockholm, Sweden

Place of residence: Kungsängen, Upplands-Bro

Family: husband and three children

Address

Prästhagsvägen 27

196 30 Kungsängen

Sweden

Tel. +46 8 581 651 50

e-mail: katarina.elofsson@agriculture.ministry.se

Fields of Research Specialization

Applied Microeconomics

Environmental and Natural Resource Economics

Water Management and Agriculture

Education

PhD	2002	Swedish University of Agricultural Sciences
Licentiate degree	1997	Swedish University of Agricultural Sciences
M.Sc. in Horticulture	1992	Swedish University of Agricultural Sciences

Professional Experience

Non-Academic Experience:

2005-	Senior Administrative Officer, Analysis Unit, Ministry of Agriculture (on leave from 2008)
2004 (May-Nov.)	Researcher, Swedish Institute for Food and Agricultural Economics (Livsmedelsekonomiska Institutet)
2003-2006	Researcher, National Institute of Economic Research (Konjunkturinstitutet)
1995-1999	Head of Section, Ministry of the Environment
	(Departementssekreterare, Miljödepartementet)

Academic Experience:

2008-	Assistant professor, Dept. of Economics, Swedish University of Agricultural Sciences
2002-2003	Substitute Senior Lecturer, Dept. of Economics, Swedish University of Agricultural Sciences
1999-2002	PhD-student, Dept. of Economics, Swedish University of Agricultural Sciences
1993-1995	Research Assistant, Beijer Institute of Ecological Economics

Teaching Experience:

2003 Visiting lecturer at the Department of Economics, 6 lecture-hours.

2002-2003 Responsible lecturer for 10p 2nd-year course in Environmental and Resource Economics, Dept. of Economics, Sw. Univ. of Agr. Sciences

1999-2002 Seminars and exercises at 1st, 2nd and 3rd year courses, approx. 60 hours, Dept. of Economics, Sw. Univ. of Agr. Sciences

1999-2002 Lectures at 1st, 2nd and 3rd year courses, approx. 15 lecture-hours, Dept. of Economics, Sw. Univ. of Agr. Sciences

Supervision of 2 M.Sc. students:

Selected Publications

Thesis:

Elofsson, K. 2002. *Economics of marine pollution.* Swedish University of Agricultural Sciences, Department of Economics. Acta Universitatis Agriculturae Sueciae. Agraria 348. [Doctoral Dissertation].

Journal articles:

Elofsson, K. 2007. Cost uncertainty and unilateral abatement. *Environmental and Resource Economics* 36:143-162.

Elofsson, K. 2006. Control of interdependent water pollutants. *Environmental Management* 37(1):54-68.

Gren, I-M. and Elofsson. 2004. Beräkning av kostnader för minskad kvävebelastning på Egentliga Östersjön. *Vatten* 60:85-94.

Elofsson, K. and Gren, I-M. 2004. Kostnadseffektivitet i svensk miljöpolitik för Östersjön – en utvärdering. *Ekonomisk Debatt* 3:57-68.

Elofsson, K., Gren, I-M. and Folmer, H. 2003. Management of eutrophicated coastal ecosystems: a synopsis of the literature with emphasis on theory and methodology. *Ecological Economics* 47(1):1-11.

Elofsson, K. 2003. Cost efficient reductions of stochastic agricultural loads to the Baltic Sea. *Ecological Economics* 47(1):13-31.

Gren, I-M. Elofsson, K. and Jannke, P. 1997. Cost-effective nutrient reductions to the Baltic Sea. *Environmental and Resource Economics* 10(4):341-64.

Book chapters:

Gren, I-M. Elofsson, K. and Jannke, P. 2004 Cost-effective nutrient reductions to the Baltic Sea. Reprint in Horan, R. and Batie, S. (eds.): The Economics of Agro-Environmental Policy. Vol I. Ashgate, Alderhot, UK.

Elofsson, K. 1999. Cost-effective reductions in the agricultural load of nitrogen to the Baltic Sea. In M. Boman et al. (eds.) *Topics in Environmental Economics.* Kluwer Academic Publishers.

Elofsson, K. 2000. Review of Shortle, J.S. "Environmental Federalism and the Control of Water Pollution from US Agriculture: Is the Current Division of Responsibilities between National and Local Authorities about Right?" In Bromley, D.W. (ed.) *Economic knowledge and economic advice,* Swedish University of Agricultural Sciences, Uppsala. Report 135. Uppsala.

Elofsson, K. 2002. Utsläppen av kväve of fosfor till Östersjön varierar – hur påverkas kostnaden för rening av Östersjön? In Carlsen, H., Drake, L., Elofsson, K., Gren, I-M., and Petterson, O. (eds.): *Jordbruk, ekonomi och miljö*. SLU Kontakt, Swedish University of Agricultural Sciences. Uppsala.

Annex IV. Short CVs for leaders of WPs, WTs and partners

Hans Estrup Andersen

Curriculum Vitae

Name **Hans Estrup Andersen**

Position Senior Scientist

Work place National Environmental Research Institute, Department of Freshwater Ecology, University of Aarhus, Denmark

Key qualifications

- Modelling of diffuse nutrient losses at the catchment scale
- Monitoring programmes
- Project management

Education

2003 Ph.D. Soil Science and Hydrology

1991 M.Sc. Soil Science and Hydrology

Employments

1991 – now Scientist and Senior Scientist at The National Environmental Research Institute, Department of Freshwater Ecology

1995 – 2003 Ph.D study The Royal Veterinary and Agricultural University, Copenhagen

1990 – 1991 Research stay at The Soil Erosion Laboratory, University of Toronto, Canada

Senior Scientist Hans Estrup Andersen, PhD has specialised in hydrology and soil science. He works with models describing diffuse nutrient losses to surface waters and supports this work by collecting of field data. He has been the manager of several projects. Presently he is, among other projects, leading a project which combines mapping of risk areas for nutrient losses with mitigation measures in a tool intended for water district managers helping them fulfil the requirements of the Water Framework Directive. He is the author or co-author of 20 peer reviewed scientific papers and 50+ other scientific publications and technical reports

Recent scientific publications

Kronvang, B., Andersen, H. E., Børgesen, C. D., Dalgaard, T., Larsen, S. E., Bøgestrand, J. & Blicher-Mathiesen, G. 2008: Effects of policy measures implemented in Denmark on nitrogen pollution of the aquatic environment. – Environmental Science and Policy 11: 144-152.

Kronvang, B., Andersen, I.K., Hoffmann, C.C., Pedersen, M.L., Ovesen, N.B. & Andersen, H.E. 2007: Water Exchange and Deposition of Sediment and Phosphorus during Inundation of Natural and Restored Lowland Floodplains. - Water, Air and Soil Pollution 181(1-4): 115-121.

Andersen, H.E. & Kronvang, B. 2006: Modifying and evaluating a P index for Denmark. - Water, Air and Soil Pollution 174: 341-353.

Andersen, H.E., Kronvang, B., Larsen, S.E., Hoffmann, C.C., Jensen, T.S. & Rasmussen, E.K. 2006: Climate-change impacts on hydrology and nutrients in a Danish lowland river basin. - Science of the Total Environment 365: 223-237.

Andersen, H.E., Hansen, S. & Jensen, H.E. 2005: Evapotranspiration from a riparian fen wetland. - Nordic Hydrology 36(2): 121-135.

Andersen, H.E., Kronvang, B. & Larsen, S.E. 2005: Development, validation and application of Danish empirical phosphorus models. - Journal of Hydrology 304: 355-365.

Annex IV. Short CVs for leaders of WPs, WTs and partners

Alexander Gocht

Personal information

Surname(s) / First name(s)	Gocht, Alexander
Address(es)	Alexander Str 19, 53111 Bonn, Germany
Telephone(s)	(49-228) 73 2843 Mobile:
Fax(es)	(49-228) 982 29 23
E-mail	Alexander.gocht @ilr.uni-bonn.de
Nationality	German
Date of birth	12.09.1976
Gender	Male
Desired employment / Occupational field	Model Design and Empirical Specification and analysis of results, Software deveopment

Work experience

Dates 1999-2000	
Occupation or position held	Assistant Professor (Hochschulassistent), University of Applied Science, Dresden
Main activities and responsibilities	Research and lectures
Name and address of employer	University of Applied Science, Dresden
Type of business or sector	Applied University
Dates	2000-2001
Occupation or position held	Research Associate,
Main activities and responsibilities	Model development and project coordination
Name and address of employer	Centre for Technology and Applied Studies, Dresden
Type of business or sector	Research institute
Dates	2003-pres.:
Occupation or position held	Research Associate
Main activities and responsibilities	Agricultural supply modeling, CAPRI, RAUMIS, FARMIS
Name and address of employer Institute of Farm Economics	Federal Agricultural Research Centre, Institute of Rural Studies and
Type of business or sector	Federal Agricultural Research Centre
Dates	Current position
Occupation or position held	Research Associate
Main activities and responsibilities	Research, Modeling
Name and address of employer	University Bonn - Department for Economics and Agricultural Policy, University Bonn

Type of business or sector	University
Education and training	
Dates	2001-2002
Title of qualification awarded	MSc
Principal subjects/occupational skills covered	Master ThesisTitle: “Production Frontiers and Efficiency Analysis with Data Envelopment Analysis”
Name and type of organisation providing education and training	Imperial College at Wye, University of London
Level in national or international classification	ISCED 5
Dates	1996-2000
Title of qualification awarded	Diploma in agricultural sciences (Dipl. Ing. agr. (FH))
Principal subjects/occupational skills covered	Agricultural policy
Name and type of organisation providing education and training	Applied University of Dresden
Level in national or international classification	ISCED 5

Personal skills and competences

Mother tongue(s) German

Other language(s)	English
Social skills and competences	- I have worked in teams at university level and in institutional institutions for research and policy analysis issues. - I am experienced in working with experts from different countries
Organisational skills and competences	- Experience in project and team management through participation of EU framework projects and national Projects

Additional information

PUBLICATIONS

Gocht A, Balcombe K (2006) Ranking efficiency units in DEA using bootstrapping an Applied analysis for Slovenian farm data. Agricultural Economics 35:223-229

Adenäuer M, Britz W, Gocht A, Gömann H, Cristoiu A, Ratinger T (2006) Modelling impacts of decoupled premiums: building-up a farm type layer within the EU-wide regionalised CAPRI model; proceedings of the 93rd EAAE Seminar 22-23 September 2006, Prague (Czech Republic).

Münch T, Gocht A (2006) Farm Boss-Software zur strategischen Beratung landwirtschaftlicher Betriebe. Lecture notes in informatics : proceedings 78:189-192

Hüttel S, Bernd K, Gocht A, Kleinhanß W, Offermann F Assessing the 2003 CAP Reform Impacts on German Agriculture In: Bahrs, E.; Cramon-Taubardel, S. von; Spiller, A.; Theuvsen, L.; Zeller, M. (Hrsg.): Unternehmen im Agrarbereich vor neuen Herausforderungen. Schriften der Gesellschaft für Wirtschafts- und Sozialwissenschaften des Landbaues (GeWiSoLa), Münster-Hiltrup: Landwirtschaftsverlag GmbH (in print).

Offermann F, Gocht A. Huettel S. Kleinhanss W, Kuepker B (2006) Assessing The Impacts Of The 2003 Cap Reform In Different EU Member States, presented at the annual conference of the 80th Agricultural Economics Society, 30th and 31st March 2006 PARIS, France

Gocht A (2005) Assessment of simulation behaviour of different mathematical programming approaches In Arfini F (ed) Modelling agricultural policies: state of the art and new challenges ; proceedings of the 89th European Seminar of the European Association of Agricultural Economists (EAAE), Parma, Italy, February 3-5, 2005. Parma : Monte Universita Parma Editore, pp 166-187

Annex IV. Short CVs for leaders of WPs, WTs and partners

Cordula Göke

Name	Cordula Beatrix Göke
Date of birth	30.09.1975

WORK EXPERIENCE

Sep 2007 onwards	GIS expert in the Department for Marine Ecology National Environmental Research Institute, Roskilde Denmark
Jan 2004 – Aug 2007	-GIS expert at the Groundwater Unit Umweltbundesamt, Vienna, Austria (National Environmental Agency) - Implementation of the EU Water Framework Directive (WFD) in Austria and member of international WFD working groups for information management and GIS of the international commissions of the river basin districts Danube, Rhine and Elbe and the European Commission - Responsibility for the management of the Austrian river network - Expert in Geographic Information Systems (GIS) – design of databases, data management, evaluation of ground- and running water data, modelling, cartography
Oct 2002 – Dec 2003	GIS expert Ingenieurbüro Peter Heidel, Flintbek, Germany (consulting engineer) GIS projects and hydrological models, databases, expert for the WFD
Jan 1999 - Dec 1999	Part-time assistant at the Institute for Rural Water Management University Rostock, Rostock, Germany Preparation of scripts for the classes in River Engineering and Sediment Transportation
Aug 1998 - Oct 1998	Internship MRM Konsult AB, Luleå, Sweden (consultant for geology, geophysics and environment)

EDUCATION AND TRAINING

Jan 2002 – Dec 2002	GIS Specialist Certificate Seminarcenter, Schwerin, Germany GIS (mainly ESRI products), databases, programming, remote sensing

Oct 1995 – Jun 2001	Graduate engineer in Land Management and Environmental Protection (Diplomingenieurin Landeskultur und Umweltschutz)
	Rostock University, Rostock, Germany
	- Water resources management / hydraulic engineering
	- Applied ecology
Sep 1997 – Jun 1998	Exchange student Environmental Engineering
	Luleå Technical University, Luleå, Sweden
	- Water resources management / runoff models
	- GIS
1986 - 1995	Abitur (qualification for university entrance)
	Alexander-von-Humboldt-Schule, Neumünster, Germany

PERSONAL SKILLS & COMPETENCES

Languages	German (native language), English, Danish, Swedish
Key qualification	- GIS (ESRI ArcINFO Desktop)
	- Web GIS
	- Database design
	- Watershed modelling

PUBLICATIONS

Eisenkölb, G., Göke, C., Vincze, G.(2007): Berichtsgewässernetz des Bundes – die zentrale Bezugseinheit für gewässerbezogene Fachdaten, die Erfüllung internationaler Berichtspflichten und Modellierung. In Strobl/Blaschke/ Griesebner: Angewandte Geoinformatik 2007, Heidelberg, pp. 171 - 176

Annex IV. Short CVs for leaders of WPs, WTs and partners

Malte Grossmann

Malte Grossmann

PERSONAL INFORMATION

Name	MALTE GROSSMANN
Address	EB 4-2, STRASSE DES 17 JUNI 145, 10623 BERLIN
Telephone	++49-30-31473492
E-mail	GROSSMANN@IMUP.TU-BERLIN.DE
Nationality	German
Date of birth	27.06.1969

EDUCATION AND TRAINING

Dates	September 1997 – September 1998
Organisation	University of London – School of Oriental and African Studies (SOAS), London, UK
Qualification	M.Sc. in Development Studies
Dates	September 1993 – May 2001
Organisation	Christian Albrechts University Kiel – Faculty of Agriculture and Food Science, Kiel, Germany
Qualification	M.Sc. in Agricultural Sciences
Dates	September 1998
Organisation	Chamber of Agriculture Schleswig Holstein, Kiel, Germany
Qualification	Practical qualification in farming

EMPLOYMENT

Dates	June 2001 – ff
Organisation	Berlin University of Technology, Institute for Landscape - and Environmental Planning, Department of Environmental and Land Economics, Berlin, Germany

Position	Research Fellow / Wissenschaftlicher Mitarbeiter
Dates	September 1991 – September 1993
Organisation	Hof Danwisch, Horst, Germany
Position	Vocational trainee in organic farming
Dates	June 1989 – March 1991
Organisation	Schutzstation Wattenmeer – Waddensea Conservation Center Langeness, Hallig Langeness, Germany
Position	Center Manager (Civilian National Service)

CONSULTANCIES AND THIRD PARTY FUNDED RESEARCH PROJECTS

Federal Agency for Nature Conservation (BFN)	ECONOMIC ASSESSEMENT OF NATURE ORIENTED FLOOD RISK MANAGEMENT STRATEGIES FOR THE RIVER ELBE (2005 – 2006)
Federal Institute of Hydrology (BFG)	APPROACHES TO ECONOMIC ASSESSEMENT FORIMPLEMENTATION IN THE DECISION SUPPORT SYSTEM FOR RIVER BASIN MANAGEMENT OF THE RIVER ELBE (2004) PART I: FLOODRISK MANAGMENT PARTII: NAVIGATION PART III : NUTRIENT MANAGEMENT
Federal Ministry for Education And Reserach (BMBF) / Programme on Global Change And the Hydrological Cycle (GLOWA)	GLOWA ELBE I: ECONOMIC VALUE OF ENVIRONMENTAL FLOWS FOR WETLANDS / CASE SPREEWALD (2002 - 2003) GLOWA ELBE II: SCIENTIFIC COORDINATION (2004 – 2007) GLOWA ELBE II: WETLAND MANAGEMENT IN A RIVER BASIN CONTEXT / CASE SPREE – HAVEL RIVER BASIN (2004 – 2007) GLOWA ELBE II: COST EFFECTIVE STRATEGIES FOR REDUCING NUTRIENT EMISSIONS IN THE ELBE RIVER BASIN (2004 – 2007) GLOWA ELBE III: FROM THEORY TO PRACTICE. IMPLEMENTING DECIION SUPPORT FOR RIVER BSAIN MANAGEMENT (2008-2010): TOOL FOR ECONOMIC ASESSESMENT OF NUTRIENT - AND WATER RESOURCE MANAGEMENT OPTIONS
Federal Ministry for Education And Research (BMBF/ Programme on Interated Coastal Zone Management ((IKZM)	IKZM ODRA III: INTEGRATED COASTAL ZONE MANAGEMENT FOR THE ODRA ESTUARY. SUB-PROJECT: MANAGING NUTRIENT EMISSIONS FROM THE ODRA RIVER (2008)

Annex IV. Short CVs for leaders of WPs, WTs and partners

Federal Ministry for	PROMOTING TRANSBOUNDARY RIVER BASIN MANAGEMENT IN AFRICA (
Economic Cooperation (BMZ)	(2005)
	TRANSBOUNDARY COOPERATION IN GROUNDWATER MANAGEMNT IN AFRICA (2007)
Global Environment Facility	POTENTIALS AND CONSTRAINTS FOR COMMUNITY CO-MANAGEMENT
Small Grants Program	OF KAZUMA FOREST RESERVE IN PANDAMATENGA, BOTSWANA (1997)
(GEF-SGP) Botswana	
Mueritz National Park Authority	CONCEPTION OF A GIS BASED MONITORING SYSTEM FOR DEER MANAGEMENT IN THE MUERITZ NATIONAL PARK (2001)
	INTERVIEW SURVEY AND VISITOR MONITORING TO INFORM PADDLING TRAIL MANAGEMENT IN THE MUERITZ NATIONAL PARK (2004)
Waddensea National Park	CONCEPT FOR A NATIONAL PARK INFORMATION CENTER AND
Authority	INFORMATION MATERIAL, HALLIG LANGENESS (1991)
WWF Project Office Waddensea	EVALUATION OF THE AGRICULTURAL POLICY TO SUPPORT EXTENSIVE GRAZING ON SALTMARSH GRASSLAND (1989 – 1991)

PUBLICATIONS

Articles:

De Kok, J.L. & Grossmann, M. (in submission): Large scale assessment of the flood risk along the Elbe River

Grossmann, M. (in submission): Economic assessment of basin scale strategies to achieve water quality goals (good status) in the Elbe River Basin.

Grossmann, M., Lienhoop, N., Vögele, S., Mutafoglu, K., Koch, H., Kaltofen, M., Dietrich, O. (in submission): Economic assessment of risk associated with low flows in the Elbe River Basin: an integrated economic-hydrologic modelling approach.

Grossmann, M. (2008): Kilimanjaro Aquifer. In: Scheumann, W. & Herrfahrdt-Pähle, E. (Eds.) (2008): Conceptualizing Cooperation for Africa's Transboundary Aquifer Systems, DIE Studies Nr. 32 German Development Institute, Bonn: pp 87-125.

Grossmann, M. (2006): Cooperation on Africa's International Waterbodies: Information needs and the role of information-sharing. In Scheumann, W. and Neubert, S. (Eds.) Cooperation on Africa's International Waterbodies, DIE Studies: Bonn. S 173 - 237.

Grossmann, M. (2005): Berücksichtigung des Wertes von Feuchtgebieten bei der ökonomischen Analyse von Bewirtschaftungsstrategien für Flussgebiete: Beispiel Spreewaldniederung. In Wechsung, F., Becker, A. & Graefe, P. (Hrsg.): Integrierte Analyse der Auswirkungen des globalen Wandels auf Wasser, Umwelt und Gesellschaft im Elbegebiet. Auswirkungen des globalen Wandels auf Wasser, Umwelt und Gesellschaft im Elbegebiet. Weißensee Verlag: Berlin, s 304-325.

Stock, M., Teenck, G., Grossmann, M. & Lindemann, J. (1992): Extensivierung von Salzwiesengrünland. Sind Auswirkungen auf die Brutvögel der Hallig Langeness erkennbar? Vogelwelt 113: 20 – 33.

Discussion Papers & Conference Full Papers:

Meyerhoff, J. & Grossmann, M. (2007): Queuing in Front of Locks: Recreational Skippers' Willingness to Pay for Passing Through Faster. Working Papers on Managment in Environmental Planing 018/2007, TU Berlin.

De Kok, J.L. & M. Grossmann (2006): Rapid Flood Risk Assessment in the Elbe DSS prototype. In: Jüpner, R. (ed.) Beiträge zur Konferenz "Strategien und Instrumente zur Verbesserung des vorbeugenden Hochwasserschutzes" 23. - 25. November 2006 in Tangermünde Magdeburger Wasserwirtschaftliche Hefte Band 2006 / 6: Shaker Verlag Aachen: s 93 - 101.

Hartje, V. & Grossmann, M. (2005): Projection of socio-economic and climatic effects of global change to the river basin scale. In: PT-DLR (eds.) Global Change in the Hydrological Cycle. Status Report 2005. Bonn.

Grossmann, M. (2005): Kooperation an Afrikas internationalen Gewässern: Die Bedeutung des Informationsaustauschs, DIE Discussion Paper Nr. 9/2005, Deutsches Institut für Entwicklungspolitik (DIE), Bonn.

Monsees, J. & Grossmann, M., 2004, Institutionelle Arrangements zur Wasserregulierung: Staubeiräte in Brandenburg in: Dombrowsky, I., Wittmer, H. Rauschmeyer, F. (Eds.). Institutionen in Naturschutz und Ressourcenmanagement. Beiträge der Neuen Institutionenökonomik. UFZ-Berichte 7/2004. Leipzig. S. 99-109.

Grossmann, M., Klaphake, A. & Meyerhoff, J. (2006): Canoe Trail Congestion, Quotas and User Fee's. Combining Interview Survey and Visitor Monitoring to Inform Paddling Trail Management in the Mueritz National Park. Working Papers on Managment in Environmental Planing 017/2006, TU Berlin.

Grossmann, M., Klaphake, A. & Meyerhoff, J. 2004 Canoes versus birds or canoeists versus canoeists? Combining interview survey and visitor monitoring to inform visitor management in the Mueritz National Park in: Sievänen, T. et al. (eds.) Policies, Methods and Tools for Visitor Management. Proceedings of the Second International Conference on Monitoring and Management of Visitor Flows in Recreational and Protected Areas. Working Papers of the Finnish Forest Research Institute, pp 283 –290.

Grossmann, M. 2004 Berücksichtigung des Wertes von Feuchtgebieten bei der ökonomischen Analyse von Bewirtschaftungsstrategien für Flussgebiete: Beispiel der Spreewaldniederung im Spree – Havelgebiet. In: Wechsung F., Becker A., Gräfe P. (eds) Integrierte Analyse der Auswirkungen des globalen Wandels auf Wasser, Umwelt und Gesellschaft im Elbegebiet. PIK-Report, Potsdam: pp 20 – 36.

Grossmann, M., Bangert, U., Dietrich, O., Schwärzel, K., Vater, G., Hartje, V., Kowarik, I., Quast, J. & Wessolek, G., 2002, Management strategies for regulated wetland ecosystems in the context of global change: case study Spreewald in: Gast, M. (ed): Proceedings of the First Status Conference of the German Program on Global Change in the Hydrological Cycle, GSF München, pp 14 -18.

Research & Consultancy Reports:

Grossmann, M., & Hartje, V & Meyerhoff, J. (2007): Ökonomische Bewertung naturverträglicher Hochwasservorsorge an der Elbe. BfN Skripten XX. Bundesamt für Naturschutz, Bonn.

Grossmann, M. (2005): Methode zur ökonomischen Bewertung der Auswirkung von veränderter Wasserführung auf die Binnenschifffahrt im Rahmen des Decision Support System für das Flussgebiet der Elbe. Abschlussbericht für die Bundesanstalt für Gewässerkunde. TU Berlin.

Grossmann, M. (2005): Methode zur Kosten Nutzenanalyse von Hochwasserschutzmaßnahmen und zur Schätzung von Hochwasserschadenspotenziale im Rahmen des Decision Support System für das Flussgebiet der Elbe. Abschlussbericht für die Bundesanstalt für Gewässerkunde. TU Berlin.

Grossmann, M. (2005): Methode zur Kosten Wirksamkeitsanalyse von Maßnahmen zur Reduktion der Nährstoffemissionen im Rahmen des Decision Support System für das Flussgebiet der Elbe. Abschlussbericht für die Bundesanstalt für Gewässerkunde. TU Berlin.

Grossmann, M., Meyerhoff, J. & Hartje, V. (2003): Optimierung der Landnutzung im Spreewald bei vermindertem Wasserdargebot, Abschlussbericht des BMBF Verbundvorhaben GLOWA Elbe, TU Berlin.

Grossmann, M. & Müller, B. (1997): Potentials and constraints for community co-management of Kazuma Forest Reserve in Pandamatenga, Botswana. Report for GEF-SGP Botswana.

Grossmann, M. (1991): Ausstellungskonzept für das Nationalpark Informationszentrum auf der Rixwarf, Hallig Langeneß. Abschlußbericht im Auftrag des Landesamts für den Nationalpark Schleswig Holsteinisches Wattenmeer.

Grossmann, M., Teenck, G. & Lindemann, J. (1991): Entwicklungs- und Nutzungskonzept für das Bildungs- und Informationszentrum der Schutzstation Wattenmeer auf der Peterswarf, Hallig Langeness. Konzeption im Auftrag der Schutzstation Wattenmeer e.V.

Grossmann, M. (1991): Auswirkung extensiver Salzwiesenbeweidung im Rahmen des Halligschutzprogramms auf die Brutvogeldichten und Laufkäfergemeinschaften der Hallig Langeness. Berichte des Naturschutzzentrum Langeness. Schutzstation Wattenmeer: Langeness.

Grossmann, M. (1990): Auswirkungen von potentiellen Entwässerungsmaßnahmen auf die Vegetation der Vorlandsalzwiesen der Hallig Hooge. Berichte des Naturschutzzentrum Langeness. Schutzstation Wattenmeer: Langeness

Annex IV. Short CVs for leaders of WPs, WTs and partners

Bo Gustafsson

Curriculum Vitae

Bo Gustav Gustafsson

Born on July 11, 1966 in Degerfors, Sweden

Married and one daughter born January 2006

Formal qualifications

2004-03-25: Approved as Associate Professor at Göteborg University

1997-10-22: PhD in Oceanography, Göteborg University

1990-06-07: Bachelor of Science in Physics and Hydrodynamics, Göteborg University

Employments

Current:

Vikarierande lektor - Deputy lecturer (50%), Department of Earth Sciences, Göteborg University (external funding)

Forskare – Researcher (50%) at Baltic Nest Institute, Stockholm Resilience Centre, Stockholm University

Past (all at Department of Oceanography/Earth Sciences, Göteborg University):

2007 – 2007*: Vikarierande lektor - Deputy lecturer (100%), about 90% funded externally

2006 – 2006: Deputy Director of studies and deputy lecturer 50% and junior scientist 50%.

2002 – 2005: Junior scientist (100%)

2001 – 2001: Project manager (100%)

1997 – 2000: Project assistant (100%)

1991 – 1996: PhD-student and Project assistant

1993-02-01 – 1993-06-30: Guest scientist at the Nansen Environmental and Remote Sensing Center in Oslo.

1990 – 1990: Project assistant (100%)

*Paternity leave: 25% during 2007-1-1-2007-2-28

Other commitments

2007-2008: Member of the advisory board of "Working group on Baltic Sea hypoxia" initiated by Björn Carlsson Foundation for the Baltic Sea

2004-2007: Lead author in the BALTEX Assessment of Climate Change for the Baltic Sea Basin (see http://www.gkss.de/baltex/BACC/web-content/index.html).

1999-2007: Consultant to the Swedish Nuclear Waste Management Co.

1998: Consultant to Swedish Meteorological and Hydrological Institute

1993-1998: Swedish national representative in the MAST Committee for Modeling Coordination (chaired by Martin Bohle-Carbonell, C.E.C.)

1993-1996: Swedish national representative in the MAST Data Committee (chaired by Martin Bohle-Carbonell, C.E.C.)

1992-1999: Coordinator of the Nordic Council of Ministers working group on "Hydrodynamic models for Kattegat-Skagerrak"

Project participation (2002-)

Time	Funding agency	Project	Role	Funding
2007-2008	BalticSea 2020	Simulations of some engineering methods proposed to improve oxygen condi-	Coordinator	430 ksek
2007-2009	BalticSea 2020	Benthic-pelagic coupling in the Baltic Sea: the effects of redox changes on sediment P release and implications for water quality	PI at GU	330 kSEK
2007	SIDA-Research	Ocean and Climate variability in the South West Indian Ocean	PI: Rydberg	100 kSEK
2006-2007	SEPA	Contributions to "Klimat- och sårbarhetsutredningen"	PI: Stigebrandt	100 kSEK
2005-2006	SEPA	Artificial oxygenation of the deepwater of the Baltic proper	PI :Stigebrandt	500 kSEK
2003-2006	MISTRA	Marine Research on Eutrophication (MARE)	WP leader and PI at GU	900 kSEK
2004-2006	VR	Investigation of internal tides in Kattegat	PI	729 kSEK
2000-2003	EU	Marine Effects of Atmospheric Deposition (MEAD)	WP leader and PI at GU	285 kEUR
1999-2002	MISTRA	Marine Research on Eutrophication (MARE)	PI: Stigebrandt	4500 kSEK

Faculty opponent for PhD-theses: Jon Albretsen, University of Oslo, June 2006 (Prof. Lars Petter Røed)

PhD students: Christian Nohr (defense scheduled to September 2008), Lena Victorsson (co-supervisor)

Publications: 22 printed/in press in peer-review journals, 1 reviewed book chapter and 19 reports/ extended abstracts/non-reviewed articles.

Teaching: During 2005-2007 I worked with undergraduate teaching about 10-15 weeks per year. In the function of deputy Director of studies in 2006, I was highly involved in the planning and implementation of new bachelor and masters programs in Oceanography, Marine Sciences and Geosciences at the Göteborg University. I was the initiator of the new Master program in Physical Oceanography.

Minor commitments:

Served as project application evaluator for the EU-MAST program in September 1994 and for the

Norwegian Research Council 1999-2003.

I have been invited lecturer on six occasions. I have participated in >25 international conferences, additionally in 10 meetings with the MAST Modeling Committee and MAST Data Committee, and numerous other workshops and project meetings.

Reviewed articles in Continental Shelf Res., J. of Marine Research, J. of Geophysical Res., Ambio, J. Marine Systems, Oceanologia, Climate Res., Nordic Hydrology, J. Sea Res., Ocean Dynamics, Geophysical Research Letters, Can J Fish Aq Sciences.

Berit Hasler

Personal data: Born: 10-06-1960, Norwegian.

Present position:

Environmental Economist, Senior Researcher, Head of Social Science Section, Department of Policy Analysis, National Environmental Research Institute, Denmark.

Education:

- Cand. Techn Soc, Roskilde University, 1990
- PhD in Environmental Economics, Royal Veterinary and Agricultural University, 1998

Professional career:

- 2007 - Head of social science section, Dept. of policy Analysis,
- 2002 - National Environmental Research Institute, Dept. of policy Analysis, senior researcher
- 1999 - 2002 Institute of Local Governmental Studies, Denmark (AKF) , senior research fellow
- 1997 - 1999 National Environmental Research Institute, researcher
- 1990 - 1997 National Environmental Research Institute, research assistant and PhD-student

Related work experience:

- 2006-2009: Project manager on DSF project Modelling cost and benefits of reductions of nitrogen and phosphorus loads from Danish agriculture
- 2006-2007: Project manager of the project Valuation of biodiversity: scope and scale, Ministry of Environment
- 2006-2007; Advisory work related to implementation of the Water Framework Directive, economic assessments for the Danish EPA and the EU Commission
- 2005-2006:participant in the project "MARE" developing a cost minimization model for the Baltic
- 2006-2008: Responsible for model development and scenario modelling"Modelling costs of pesticide regulation", Danish EPA research programme on pesticides.,
- 2004-2005: Advisory work, the Aquatic Action Plan

- 2000-2006: Project manager, selectedcompleted projects: Valuation of nature restoration in the wetland area Aamosen (2005, Ministry of Environment), Valuation of groundwater protection in Denmark (2004-2005, Ministry of Environment), Costs of reducing Nutrient losses from agriculture – Analyses prior to the Danish Aquatic Programme III (2003-2004, Ministry of Environment), Costs of nature conservation in Denmark (2003, Ministry of Environment), Valuation of forestation and lake restoration projects (2002, DFFE and akf), Agriculture in the future development of Rural Districts (2000-2002, DFFE and akf), Local regulation of agriculture and environment (2001-2002, Ministry of Environment).

Referee:

Ecological Economics, Environmental Pollution, Environmental and resource economics, International Journal of Agricultural Economics, Danish Journal of Geography, Food Economics, Journal of Transdisciplinary Environmental Studies, The Norwegian Research Council.

Teaching experience:

Lecturer at courses at The Danish Technical University and University of Copenhagen/Faculty for Life Sciences. Supervisor for 2 master students and 1 PhD student.

Opponent on 2 PhD defences

Publications:

BH is author or co-author of in all 150 publications and presentations.

Selected international Scientific Publications

Hasler, B., Lundhede, T. & Martinsen, L. 2007: Protection versus purification - assessing the benefits of drinking water quality. - Nordic Hydrology 38(4-5): 373-386.

Available at: http://www.iwaponline.com/nh/038/nh0380373.htm

Jensen, T.S., Jensen, J.D., Hasler, B., Illerup, J.B. & Andersen, F.M. 2007: Environmental sub models for a macroeconomic model: Agricultural contribution to climate change and acidification in Denmark. - Journal of Environmental Management 82(1): 133-143.

Available at: http://dx.doi.org/10.1016/j.jenvman.2005.12.017

Vejre, H., Abildtrup, J., Andersen, E., Andersen, P.S., Brandt, J., Busck, A., Dalgaard, T., Hasler, B., Huusom, H., Kristensen, L.S., Kristensen, S.P. & Præstholm, S. 2007: Multifunctional agriculture and multifunctional landscapes - land use as an interface. In: Mander, Ü., Wiggering, H. & Helming, K.(Eds.): Multifunctional Land Use. Meeting Future Demands for Landscape Goods and Services. Berlin: Springer Verlag. Pp. 93-104.

Schou, J.S., Hasler, B. & Nahrsted, B. 2006: Valuation of Biodiversity Effects From Reduced Pesticide Use. - Integrated Environmental Assessment and Management 2(2): 174-181.

Available at: http://entc.allenpress.com/entconline/?request=get-abstract&doi=10.1897%2F1551-3793(2006)2%5B174:VOBEFR%

Hasler, B., Jacobsen, B.H. & Jensen, J.D. 2005: Welfare economic assessments of nitrogen losses from agriculture to river basins and other water bodies. In: Brebbia C.A. & Antunes de Carmo, J.S. (eds.): River Basin Management III. WIT Press. - Progress in Water Resources 12: 295-304.

Lundhede, T. & Hasler, B. 2005: Valuation of the non-marketed benefits of groundwater protection . In: Brebbia C.A. & Antunes de Carmo, J.S. (eds.): River Basin Management III. WIT Press. - Progress in Water Resources 12: 237-246.

Hasler, B., Romstad, E. & Schou, J.S. 2003: The complexity of modelling farmers' provision of landscape goods in a multifunctional setting. In: Brandt, J. & Vejre, H. (eds): Multifunctional Landscapes: Monitoring, Diversity and Management. WIT Press. - Advances in Ecological Sciences 15: 163-182.

Wier, M. & Hasler, B. 1999: Accounting for Nitrogen in Denmark - a Structural Decomposition Analysis. - Ecological Economics 30: 317-331.

Wier, M., Hasler, B. & Andersen, J.M. 1999: Evaluating Consequences of Agricultural Policy Measures in an Integrated Economic and Environmental Model System. In: Usó, J.L. & Brebbia, C.A.: Ecosystems and Sustainable Development II. WIT Press. pp. 113-122.

Hasler, B. 1998: Analysis of Environmental Policy Measures Aimed at Reducing Nitrogen Leaching at the Farm Level. In: Van der Hoek, K.W., Erisman, J.W., Smeulders, S.; Wisniewski, J.R. & Wisniewski, J. (eds.): Proceedings of the First International Nitrogen Conference. Elsevier Science. - Environmental Pollution 102(S1): 749-754.

Annex IV. Short CVs for leaders of WPs, WTs and partners

Anna-Stiina Heiskanen

CURRICULUM VITAE

NAME: Anna-Stiina Heiskanen[1]

NATIONALITY: Finnish, Born in Finland in 1961

LANGUAGES: Finnish, English, Swedish, Italian, and some German and French

CURRENT POSITION:

Programme Manager / Professor: Research Programme for the Protection of the Baltic Sea, Finnish Environment Institute[2] (SYKE), May 2008 – until December 2009

ACADEMINC QUALIFICATIONS:

1998 Docent of Marine Biology, University of Helsinki.

1998 Ph.D. (Doctor of Philosophy)**,** Hydrobiology, University of Helsinki, Finland.

1991 Ph.Lic. (Licenciate in Philosophy), Hydrobiology, University of Helsinki, Finland.

1987 M.Sc. (Master of Science)**,** Hydrobiology, University of Helsinki, Finland.

PREVIOUS APPOINTMENTS AND EXPERIENCE:

2000 - 2008 Action leader; Institute for Environment and Sustainability[3], Joint Research Centre (European Commission), Ispra, Italy. Leading an Action *European Ecological Water Quality assessment and Intercalibration* (EEWAI); supporting the implementation of the Water Framework Directive (WFD) (currently on leave).

2000 (until October) Head of the Plankton Ecology Unit, Finnish Environment Institute.

1995 - 1999 Senior Scientist, Impacts Research Division, Finnish Environment Institute. Research on eutrophication processes of the Baltic Sea coastal waters.

1991 - 1995 Research assistant, Academy of Finland. Project "Nitrogen discharge, pelagic nutrient cycles, and the eutrofication of the northern Baltic coastal environment"

1987 - 1990 Research scientist, University of Helsinki, Tvärminne Zoological Station, Project "Ecological Plankton Research of the Baltic Sea (PELAG)".

1982 - 1986 Research assistant (part-time), Finnish Institute of Marine Research. Supporting research and environmental monitoring of the Baltic Sea (totally 29 months).

MAJOR SCIENTIFIC PROJECTS AND ACTIVITIES:

2003 -2008 Co-Leader of the EU Expert Working Group on Ecological Status (ECOSTAT), under the Common Implementation Strategy (CIS) of WFD (2003-2008).

2003 - 2007 FP6 project REBECCA (Relationships between ecological and chemical status of surface waters, SSPI-CT-2003-502158). JRC lead scientist, Work Package Leader.

2001 - 2004 FP5 project CHARM (Characterisation of the Baltic Sea Ecosystem: Dynamics and Function of Coastal Types, EVK1-2001-00080). JRC lead scientist, Work Package Leader.

2000 - 2003 FP5 project SIGNAL (Significance of external/anthropogenic nitrogen for central Baltic Sea N-

cycling, EVK3-CT-1999-00020). SYKE lead scientist (until October 2000).

1999 - 2001 Maj and Tor Nessling's Foundation's Project "Internal nutrient loading and sedimentation in the coastal Gulf of Finland, Baltic Sea. Project leader (Ph.D. grant)

1996 - 1999 EU project COMWEB (Comparative analysis of food webs based on flownetworks: Effects of nutrient supply on structure and function of coastal plankton

communities; MAST3-CT96-0052).

1995 - 1998 Finnish-Russian project: Eutrophication of the eastern Gulf of Finland and the Neva Estuary: Nutrient loss processes. Finnish Environment Institute.

[1] Current address: Finnish Environment Institute, Research Programme for Protection of the Baltic Sea, P.O.Box 140, FI-00251 Helsinki, Finland, email: anna-stiina.heiskanen @ymparisto.fi, tel. +358-40-825 8188

[2] http://www.ymparisto.fi/

[3] http://ies.jrc.ec.europa.eu/

1993 - 1997 The Gulf of Riga Project: Task leader in the sub-project "Pelagic Eutrophication and Sedimentation in the Gulf of Riga". Nordic Environmental Research Programme: Environmental Research in the Baltic Region. Nordic Council of Ministers.

1987 Visiting scientist at the University of Oslo, Norway; research on phytoplankton dynamics and sedimentation in the Oslofjord. Nordic Council for Marine Biology.

Since 1996 Scientific Referee in several peer reviewed international scientific *journals (e.g. Limnology & Oceanography; Marine Ecology Progress Series, Continental Shelf Research; Journal of Marine Systems, Oceanologia, Estuarine, Coastal and Shelf Science; Estuaries, Polar Biology; Polar Research; Hydrobiologia, Advances in Limnology, Aquatic Ecology, Boreal Environment Research*)

SELECTED INVITED PRESENTATIONS IN INTERNATIONAL CONFERENCES

2008 Invited plenary talk at the Ocean Sciences meeting[4], Orlando, U.S.A (ASLO, AGU)

2007 Invited keynote at the European Water Conference[5], Brussels, Belgium (organised by the European Commission's Environment Directorate General)

2006 Invited keynote speaker at the Nordic Hydrological Conference NORDIC WATER 2006, Vingsted, Denmark, 6-9 August (topic: *Good water quality for Europe - Challenges in the WFD ecological quality assessment*)

SELECTED PUBLICATIONS:

Author and co-author of 32 peer-reviewed scientific publications, ca. 50 other publications

Heiskanen, A.-S. 1993. Mass encystment and sinking of dinoflagellates during a spring bloom. *Marine Biology* 116: 161-167.

Heiskanen, A.-S., Tamminen, T., Gundersen, K. 1996. The impact of planktonic food web structure on nutrient retention and loss from a late summer pelagic system in the coastal northern Baltic Sea. *Marine Ecology Progress Series* 145:195-208.

Heiskanen, A.-S., Haapala, J., Gundersen, K., 1998 Sedimentation and pelagic retention of particulate C, N, and P in the coastal northern Baltic Sea. *Estuarine Coastal and Shelf Science* 46: 703-712

Olli, K., Heiskanen, A.-S. 1999. Seasonal stages of phytoplankton community structure and sinking loss in the Gulf of Riga. *Journal of Marine Systems* 23 (1-3): 165-184.

Blomqvist, S., Heiskanen, A.-S. 2001. The Challenge of Sedimentation in the Baltic Sea. In: F. Wulff, L. Rahm and P. Larsson (eds.), A Systems Analysis of the Baltic Sea. *Ecological Studies*, Vol. 148. Springer-Verlag, Berlin Heidelberg, pp. 211-227.

Heiskanen, A.-S, Bund, W.J. van de, A.C. Cardoso, A.C., Nõges, P. 2004. Towards good ecological status of surface waters in Europe – Interpretation and harmonisation of the concept". *Water Science and Technology* 49 (7): 169-177

Gasiunaite, Z., Cardoso, A.C., Heiskanen, A.-S., Henriksen, P., Kauppila,P., Olenina, I., Pilkaityte, R., Purina, I., Razinkovas, A., Sagert, S., Schubert, H.,Wasmund, N. 2005. Seasonality of coastal phytoplankton communities in the Baltic Sea: influence of salinity and eutrophication. *Estuarine, Coastal and Shelf Science* 65: 239-252.

Heiskanen, A-S., Carstensen, J., Gasiūnaitė, Z., Henriksen, P.,Jaanus, A., Kauppila, P., Lysiak-Pastuszak, E., Sagert, S., 2005. Monitoring strategies for phytoplankton in the Baltic Sea coastal waters. EUR 21583 EN. European Communities, 2005.

Solimini, A., A-C. Cardoso, A.C., Heiskanen, A-S. (editors) 2006. Indicators and methods for the Ecological Status Assessment under the Water Framework Directive. Linkages between chemical and biological quality of surface waters. EUR 22314 EN. European Communities, 2006. 248 p., ISBN 92-79-02646-1.

Carstensen, J., Heiskanen, A-S. 2007. Phytoplankton species-specific responses to nutrient status in the Baltic Sea. *Marine Ecology Progress Series* 336: 29-42

[4] www.aslo.org/orlando2008

[5] http://ec.europa.eu/environment/water/water-framework/conference.html

Olle Hjerne

Curriculum Vitae

Namn: Olle Hjerne

Födelsedag: 1969-03-22

Familj: Fru Bodil Nelsäter och tre barn: Freja och Filippa (1 år) och Viggo (5 år)

Adress: Systemekologiska Institutionen, Stockholms Universitet, 106 91 Stockholm

E-post: olle@system.ecology.su.se

Hemadress: Sparvhöksvägen 15, 147 34 Tumba

Forskningsinriktning

Som akvatisk ekolog har jag, med fokus på Östersjön, främst studerat marina fiskars roll i födoväven/ ekosystemet och fiskeriförvaltningens effekter och möjligheter. Överfisknings-problematiken och alternativa förvaltningsmodeller är ett av mina kärnområden. Ett annat har varit eutrofieringens effekter på fisk och fiske, men även hur fisk och fiske i sig påverkar närsaltsdynamiken och effekter av eutrofiering. Jag har studerat marina fiskars reproduktion (främst Östersjötorsken) och hur den påverkas av miljöfaktorer (eutrofiering, salt, syre) och fiske. Jag har arbetat med konflikter mellan fisket och fiskätande toppreadatorer (säl och skarv), bl.a. uppskattningar av sälens fiskkonsumtion och dess ekologiska effekter. Den största delen av arbetet har varit att leta reda på och analysera befintliga data, samt modellering (från populations- till ekosystemmodellering), medan en mindre del har varit laboratorie- och fältarbete.

Utbildning

1988	Studentexamen från Naturvetenskaplig linje, Botvidsgymnasiet
1998	Fil. Magisterexamen i Biologi, Stockholms Universitet, Examensarbete: ”Managing the Baltic Sea cod – stable catches in an unstable environment”
2000	Fil. Licentiatexamen i Systemekologi, Systemekologiska institutionen, Stockholms Universitet, Avhandling: ”Fish and fisheries management in an ecological context, with emphasis to the Baltic Sea”
2003	Fil. Doktorsexamen inom Marin- och brackvattensekologi, Systemekologiska institutionen, Stockholms Universitet. Avhandling: ”Fisheries management in an ecological context – examples from the Baltic Sea”

Anställning efter disputationen

2003	Projektledare, Systemekologiska institutionen (2003-01-04 till 2003-12-31)
2004	Pappaledig (2004-01-01 till 2004-09-07)
2004	Projektanställd på Systemekologiska institutionen, Stockholms Universitet (2004-09-08 till 2004-10-31)
2004-2006	Postdoctjänst på Tjärnö marinbiologiska laboratorium, Göteborgs Universitet (2004-11-01 till 2006-04-30)
2006-2008	Forskartjänst på Systemekologiska institutionen, Stockholms Universitet (2006-05-01 till 2008-

04-30)

2008 Pappaledig (2008-01-01 till ca 2008-09-01)

2008 Forskarassistentjänst på Systemekologiska institutionen, Stockholms Universitet (från 2008-05-01, men i praktiken när jag är tillbaka från pappaledigheten)

Urval av vetenskapliga publikationer

Hjerne, O. and Hansson, S. 2001. Constant Catch or Constant Harvest Rate? – An Analysis of the Baltic Sea Cod (*Gadus morhua* L.) Fishery. Fisheries Research 53:57-70

Nissling, A. Westin, L. and **Hjerne, O.** 2001. Spawning success in relation to salinity of three flatfish species, Dab (*Pleuronectes limanda*), Plaice (*Pleuronectes platessa*) and Flounder (*Pleuronectes flesus*), in the brackish water Baltic Sea. ICES J. of Mar. Sci. 59(1):93-108

Hjerne, O. and Hansson, S. 2002. The role of fish in nutrient dynamics of the Baltic Sea. Limnology and Oceanography 47(4):1023-1032.

Lundström, K. **Hjerne, O.** Alexandersson, K. and Karlsson, O. 2007. Estimation of grey seal (*Halichoerus grypus*) diet composition in the Baltic Sea. *in* Grey seals in the North Atlantic and the Baltic Sea. NAMMCO Scientific Publication. Vol 6:177-196.

Hansson, S. **Hjerne, O**. Harvey, C. Kitchell, J F. Cox, S P. and Essington, T E. in press (2007) Managing Baltic Sea fisheries under contrasting production and predation regimes – ecosystem model analyses. Ambio 36 (2/3)

Österblom, H. Hansson, S. Larsson, U. **Hjerne, O.** Wulff, F Elmgren, R. Folke, C. 2007. Human-induced trophic cascades and ecological regime shifts in the Baltic Sea. Ecosystems Vol 10(6).

Undervisning och presentationer

Årligt återkommande föreläsningar på:

C-kursen Akvatisk ekologi, Systemekologiska institutionen, SU, (1999-2004)

Miljövård med internationell inriktning, Naturgeografiska institutionen, SU (2003-2007)

Naturen och Människan, Naturgeografiska institutionen, SU, (2006-2007)

Inbjuden föreläsare på skolor, myndigheter och organisationer i Sverige och utomlands (ca 15 tillfällen) och muntliga presentationer på internationella vetenskapliga konferrenser (4 tillfällen).

Anställd som Ma/NO-lärare (1991-92) och Idrottslärare (1988-89) på högstadium i Botkyrka kommun.

Mediaframträdanden

Fem framträdanden i TV och radio samt intervjuad ett antal gånger av tidningar.

Utmärkelser

Belönad för framstående doktorsarbete av Kungliga Skogs- och Lantbruks-akademien vid dess årliga

högtidssammankomst 2004-01-28

Handledaruppdrag

Biträdande doktorandhandledare för Karl Lundström, Tjärnö marinbiologiska laboratorium, Göteborgs Universitet. Beräknad disputation 2008.

Betygskommittéer och refereeuppdrag

Suttit i två betygskommittéer för licentiatexamen (Gustav Almqvist – 2005 och Jerker Lokrans 2006, Systemekologiska institutionen, SU) och granskare av vetenskapliga artiklar för Journal of Experimental Marine Biology and Ecology (2003), Fisheries Oceanography (2004), Fisheries Research (2006) och Ecosystems (2007).

Annex IV. Short CVs for leaders of WPs, WTs and partners

Ayoe Hoff

Date of birth: July 9, 1968

Education:

Ph.D. in physics, University of Copenhagen, 1997.

Master of Science (physics), University of Copenhagen, 1994.

Bachelor of mathematics and physics, University of Copenhagen, 1991.

Current Position: Research Fellow, Institute of Food and Resource Economics - Fisheries Economics and Management Division, Faculty of Life Science, University of Copenhagen

Current activities:

- Bioeconomic Research, with special emphasis on econometric analysis and modelling.
- Development of models for fisheries, with special emphasis on assessment of management strategies.
- Participating in the development of the FLR framework (Fisheries Library in R, http://flr-project.org/doku.php).

Qualifications:

- Extensive knowledge of Econometric Modelling and Analysis.
- Extensive knowledge of Data Envelopment Analysis (DEA).
- Extensive Knowledge of Economic Production Theory.
- Experience of statistic empirical data processing.
- Experience of theoretical and experimental research in fluid transport in soil.
- Experience of theoretical and experimental research in radioactive radiation.
- Experience of modelling within fluid dynamics, theoretical and practical.
- Teaching experience in mathematics at university level.
- Teaching experience in mathematics and physics at high-school level.

Previous employment:

- January 2001- , Institute of Food and Resource Economics, Research Fellow.
- July 2000 - December 2000, The Danish University of Education, Research Fellow.
- April 1999 - June 2000, The Danish National Institute for Educational Research, Research Fellow.
- Spring semester 2000, University of Copenhagen, Niels Bohr Institute for Astronomy, Physics and Geophysics, External junior lecturer in mathematics.
- October 1998 - March 1999, The Royal Danish School of Educational Studies, Department of mathematics, physics, chemistry and informatics, Research Fellow.

- 1997 - 1998, Centre for Adult Education Oresund, temporary Lecturer in Physics and Mathematics
- 1994 - 1997, Risø National Laboratory, Radiation Research Department, Ph.D. student.
- 1991 - 1993, University of Copenhagen, Teaching assistant in mathematics.

Publications:

Peer-reviewed papers:

Hoff A., Frost H. (2008). *Modelling Combined harvest and effort regulations: the case of the Dutch beam trawl fishery for plaice and sole in the North Sea*. ICES Journal of Marine Science: Journal du Conseil, doi:10.1093/icesjms/fsn057.

Sandal L. K., Steinshamn S. I., Hoff A., (2007). *Irreversible Investments Revisited*, Marine Resource Economics, 22(3), pp 255-266.

Hoff A. (2007) *Second Stage DEA: Comparison of Approaches for Modelling the DEA Score.* European Journal of Operational Research, 181(1), pp 425-435.

Hoff A., Frost H. (2007) *Optimal Vessel Quotas and Capacity of a Danish Trawler Fleet Segment: A Dual Approach*. Marine Resource Economics 22(1), pp 1-14.

Lindebo E., Hoff A., Vestergaard N. (2007) *Revenue-based capacity utilisation measures and decomposition: The case of Danish North Sea trawlers*, European Journal of Operational Research 180, 215-27.

Hoff A. (2006) *Bootstrapping Malmquist Indices for Danish Seiners in the North Sea and Skagerrak*, Journal of Applied Statistics 33(9), 891-907.

Hoff A. (2004) *The Linear Approximation of the CES Function with n Input Variables*, Marine Resource Economics 19 (3), pp 295-306.

Hoff A., Weng P. (2000) *TIMSS Performance Assessment Items – A Formative Evaluation Tool in the Physics Class?*, Editions Scientifiques et Medicales Elsevier.

Hedegård P. and Hoff A. (1994) *Quantum Particles in Periodic Magnetic Fields*, Physica B, 194, 1075-1076.

Conference papers:

Hoff A., Frost H. (2007). Modelling economic response to combined harvest and effort contril in fishery. The XVIII'th Annual Conference for the European Association for Fisheries Economics (EAFE), Reykjavik, Iceland.

Hoff, A., Steinshamn, S. I., Sandal, L. (2005) *A Model for Optimal Investment in Fishing Vessels: The Problem of Varying Investment Costs*. The XVII'th Annual Conference for the European Association for Fisheries Economics (EAFE), Thessaloniki - Greece.

Hoff, A. (2004) *Optimal Quota Configuration for the Fleet of Danish Trawlers below 50 GRT: A Dual Approach*. Presented at the XVIth EAFE conference, Rome - Italy.

Hoff, A. (2003) *Bootstrapping Malmquist Indices for Danish Seiners operating in the North Sea and the Skagerrak in 1987 and 1999*. Presented at theXVth Annual Conference for the European Association of Fisheries Economics (EAFE), Brest – France.

Lindebo, E., A. Hoff and N. Vestergaard (2002) *Economic and physical measures of capacity: A comparative analysis of Danish trawlers*. Presented at the IIFET 2002 conference, Wellington - NZ.

Hoff, A. and Vestergaard, N. (2002) *A Comparison, Employing DEA Analysis, of Capacity Frontiers for Different Fishing Fleet.* Presented at the XIV'th annual EAFE conference, Faro – Portugal.

Reports and Working Papers

Hoff A., Frost H. (2006) *Economic Response to Harvest and Effort Control in Fishery*, Institute of Food and Resource Economics, Report 185.

http://www.foi.life.ku.dk/upload/foi/docs/publikationer/rapporter/rapport_185.pdf

Economic Performance of Selected European Fishing Fleets in 2007 – The Potential Economic Impact on Selected Fishing Fleet Segments of TACs Proposed by ACFM and Reviewed by SGRST for 2007 (EIAA-model calculations). Annex 3 in: *Economic Performance of EU fleets and Assessment of the Impact of ACFM Advice*, Report of the Scientific, Technical and Economic Committee for Fisheries (STECF) 2007.

http://stecf.jrc.cec.eu.int/meetings/sgeca/0604/stecf-aer-eiaa.pdf

Economic Performance of Selected European Fishing Fleets in 2006 – The Potential Economic Impact on Selected Fishing Fleet Segments of TACs Proposed by ACFM and Reviewed by SGRST for 2006 (EIAA-model calculations), The Scientific, Technical and Economic Committee for Fisheries (STECF), 2006.

http://stecf.jrc.cec.eu.int/meetings/plenarynov2005/EIAA-reallyfinalfromhans.doc

Hoff A., Frost H. (2005) *Efficiency and Skipper Skill in the Danish Fishing Fleet*, Institute of Food and Resource Economics, Report 177.

http://www.foi.life.ku.dk/upload/foi/docs/publikationer/rapporter/nummererede%20rapporter/2005/177.pdf

Hoff A. (2003) *Stochastic Data Envelopment Analysis: A review*. In: Pascoe S., Mardle S. (eds.) *Efficiency analysis in EU fisheries: Stochastic production frontiers and Data Envelopment Analysis*. Centre for the Economics and Management of Aquatic Resources (CEMARE), University of Portsmouth, Report 60.

Hoff A., Vestergaard N. (2003) *Second Stage DEA.* In: Pascoe S., Mardle S. (eds.) *Efficiency analysis in EU fisheries: Stochastic production frontiers and Data Envelopment Analysis*. Centre for the Economics and Management of Aquatic Resources (CEMARE), University of Portsmouth, Report 60.

Jensen F., Hoff A., Vestergaard N. (2003) *Technical Efficiency of the Danish Seiners: Multi-Output Data Envelopment Analysis and a Comparison between the Technical Efficiency Scores obtained by the Data Envelopment Analysis and the Stochastic Production Frontier Approach.* In: Pascoe S., Tingley D., Mardle S. (eds.) *Multi-output measures of technical efficiency in EU fisheries*. Centre for the Economics and Management of Aquatic Resources (CEMARE), University of Portsmouth, Report 62.

Hoff A., Jensen F., Vestergaard N., Andersen J. (2003) *Second Stage DEA for Danish Seiners in the North Sea/Skakerrak 1987-1999.* In: Pascoe S., Tingley D., Mardle S. (eds.) *Multi-output measures of technical efficiency in EU fisheries*. Centre for the Economics and Management of Aquatic Resources (CEMARE), University of Portsmouth, Report 62.

Hoff A. (2003) *Stochastic Data Envelopment Analysis: Review and Application.* In: Pascoe S., Tingley D., Mardle S. (eds.) *Multi-output measures of technical efficiency in EU fisheries*. Centre for the Economics and Management of Aquatic Resources (CEMARE), University of Portsmouth, Report 62.

Rodgers P., Coppola G., Frost H., Gambino M., Hoff A., Jorgensen H. P., Nahrstedt B., Placenti V. (2003) *The Relationship between Fleet Capacity, Landings and the Component Parts of Fishing Effort*. Institute of Food and Resource Economics, Report 151.

Hoff, A., Nahrstedt B., Jørgensen H. P. (2002) *Estimation of Produktion Functions on Fishery: A Danish Survey.* University of Southern Denmark, Dept. of Environment and Business Ec., working paper 33/02.

Hoff A. (2002) *The Translog Approximation of the Constant Elasticity of Substitution Production Function with more than two Input Variables*. Institute of Food and Resource Economics, Working Paper no.14/2002.

http://www.foi.life.ku.dk/upload/foi/docs/publikationer/working%20papers/2002/14.pdf

Vestergaard N., Hoff A., Andersen J., Lindebo E,, Grønbæk L., Pascoe S., Tingley D., Mardle S., Guyader O., Daures F., van Hoof L., de Wild J. W., Smith J. (2002) *Measuring Capacity in Fishing Industries using the Data Envelopment Approach*, Final Report EU-Study 99/00.

Hoff A. (2001) *Børns holdninger til fysik og kemi – belyst gennem TIMSS undersøgelsen.* Danish National Institute for Educational Research, DPI nr. 2001.04 (in Danish).

Weng P. og Hoff A. (1999) *Evaluering i matematik og naturvidenskabelige fag i folkeskolen – på grundlag af praktiske opgave*. Danish National Institute for Educational Research, DPI nr. 199.38 (in Danish).

Hoff A. (1999) *Myth or Reality: What can TIMSS teach us about gender differences in the Danish science and math education? An introductory survey*. The Royal Danish School of Educational Studies, 99.1.

Hoff A. (1997) *Radon Transport in Fractured Media : Laboratory Experiments and Modelling*. Ph.D. report, Risø National Laboratory, Risø-R-975(EN).

Hoff A. (1995) *FRACTRAN : A Model of Soil Gas and Radon Transport in Fractured Media.* Risø National Laboratory, Risø-I-914(EN).

Hoff A. (1994) *A Numerical One-Dimensional Radon-Tracer Experiment.*, Risø National Laboratory, Risø-I-817(EN).

Hoff, A. (1994) *Ladningstransport i periodisk varierende elektriske og magnetiske felter*, Speciale-rapport,Niels Bohr Institutet for Astronomi, Fysik og Geofysik.

Anni Huhtala

CURRICULUM VITAE

Name	Anni Hannele Huhtala
Date and	October 15, 1963
Place of birth	Rovaniemi, Finland
Address	MTT Economic Research, Agrifood Research Finland Luutnantintie 13 00410 Helsinki, Finland
Phone	+358-9-560 80
Telefax	+358-9-563 1164

Degrees	University of Helsinki, M.Sc., Economics, 1989 University of California at Berkeley, Ph.D., Agricultural and Resource Economics, 1994 Helsinki School of Economics, Docent, Environmental and Resource Economics, 2000
Leadership training	Nordic Learning, MiL Institute, Stockholm, Sweden, 1998/99
Present position	*Professor* of Environmental Economics, MTT Economic Research, Agrifood Research Finland (2008/02-)
Previous positions	*Professor* of Environmental Economics, MTT Economic Research, Agrifood Research Finland (fixed term 2002/05-2008/01) *Head of Division*, Environmental Economics, National Institute of Economic Research, Sweden (1998/08-2002/04) *Junior Fellow*, Academy of Finland/ Finnish Forest Research Institute (1996/08-1998/07) *Acting Professor* of Economics, University of Lapland (1995/08-1996/07) *Teaching Assistant* (5 months), University of Lapland (1993) *Graduate Student Researcher,* UC Berkeley/Doctoral Studies with Grants from the Yrjö Jahnsson Foundation and the Academy of Finland, UC Berkeley (1991-1994) *Graduate Student* with a Grant from the Yrjö Jahnsson Foundation, Finnish Postgraduate Program in Economics (1990-1991)

Research Associate, Tiedekauppa r.y./Ministry of the Environment (1988-1989)

Research Assistant, Pellervo Economic Research Institute (1986-1988)

Secretary and Treasurer, Finnish Society of Economic Research (1987)

Visits

Visiting Scholar, UC Berkeley, Department of Agricultural and Resource Economics, October-December 2007

*Visiting Researcher***,** United Nations University, World Institute for Development Economics Research (UNU-WIDER), January-May 2007

Visiting Researcher, Tilburg University, Department of Economics, September-December 2006

Visiting Researcher, Umeå University, Department of Economics, September 1997-February 1998

Reviews and expert statements

Committees, councils, review panels

Panel for the evaluation of research at the Department of Economics, Swedish University of Agricultural Sciences (SLU)	Member of the review panel	May-Oct 2007
Committee for the evaluation of research at the Government Institute for Economics Research (VATT)	Member of the committee	May-Aug 2007
The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS)	Member of the expert panel for Economy, society and regional development	May 2005-
The Finnish Cultural Foundation	Member of the review panel for agriculture and forestry	Nov 2004-Jan 2005
Swedish Council for Planning and Coordination of Research	Member of the review panel for a MISTRA research program	May-Aug 1998

Reviewer, opponent

Dalarna University College	Reviewer, Professor	Feb-Aug 2007

Swedish University of Agricultural Sciences	Member, grade committee, PhD examination	Jun 2007
	Reviewer, Associate Professor	Aug 2003
University of Joensuu	Opponent, PhD defence	May 2002
University of Helsinki	Reviewer, PhD thesis	Sep 2007-
	Reviewer, PhL thesis	Nov 2003
	Opponent, PhD defence	Sep 1999
University of Oulu	Opponent, PhD defence	Aug 1997

Scientific Journals

Agricultural and Food Science	Member of the Editorial Board	March 2004-
Finnish Economic Papers	Editorial Secretary	Feb-Aug 1987

Referee for

Ambio, Ecological Economics, Environmental and Resource Economics, Environmental Science and Policy, Environment and Development Economics, European Journal of Operational Research, European Review of Agricultural Economics, Journal of Agricultural Economics, Journal of Economics, Journal of Economic Dynamics and Control, Journal of Environmental Economics and Management, Journal of Environmental Management, Journal of Forest Economics, Journal of Public Economics, Resource and Energy Economics; Resources, Conservation and Recycling

Teaching

Introductory Economics, Intermediate Microeconomics, Advanced Macroeconomics, Environmental Economics, Economics of Tourism (University of Lapland, Department of Economics); Lectures on Environmental Economics, Agricultural Policy & the Environment (University of Helsinki, Faculty of Social Sciences and Faculty of Agriculture and Forestry; Swedish University of Agricultural Sciences, Department of Economics; Örebro University, Department of Business, Economics, Statistics and Informatics)

Christoph Humborg

Christoph Humborg

Baltic Nest Institute (50%) and Department of Applied Environmental Science (50%)

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S-10691 Stockholm

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Personal

Date of Birth: **16.11.1963 in Münster, Germany**

Marital Status: married, three children

Nationality: German

Home Address: Lavettgränd 10, 18768 Täby, Sweden

Education

Stockholm University

2004 **Associate Professor (Docent) in Biogeochemistry**

Christian-Albrechts University Kiel, 1987-1995

1995 **Ph.D. in Biological Oceanography**

1991 Master in Biological Oceanography

Associate Professor (Docent) *Department of Applied Environmental Science, Stockholm University*, Sweden, **2004-present**

- **Contract holder** of a **FORMAS** (Swedish Research Council) financed study on "THE AQUATIC CONDUIT IN TAIGA AND TUNDRA ECOREGIONS – A SINK OR SOURCE FOR ATMOSPHERIC CARBON?", 1 800 000 SEK-**2008-2010**
- **Contract holder** of a **VR** (Swedish Research Council) financed study on "THE AQUATIC CONDUIT IN TAIGA AND TUNDRA ECOREGIONS – A SINK OR SOURCE FOR ATMOSPHERIC CARBON?", 1 950 000 SEK-**2008-2010**
- **Contract holder** of a **VR** (Swedish Research Council) financed study on "Export and sequestration patterns of terrestrial organic carbon in coastal boreal environments of Northern Sweden – implications for the redistribution of soil carbon and oceanic carbon storage", 1 250 000 SEK-**2005-2007**.
- **Contract holder** of a MISTRA (Swedish Foundation for Strategic Environmental Research) financed study on "Drainage basin models linked to cost-effective measures" ((http://mare.su.se), 1 050 000 SEK-**2006-2007**
- **Scientific and administrative co-ordinator** for the EU project SIBER (EVK3-CT-2002-00069) (http://siber.ecology.su.se), with 9 European institutes involved, 1 400 000 €-**2004-2005**
- Participant in the EU project ELME (European Lifestyle and Marine Ecology) (http://www.elme-eu.org), 110 000 €-**2004-2006**
- **Contract holder** of a MISTRA (Swedish Foundation for Strategic Environmental Research) financed study on "Drainage basin models linked to cost-effective measures" ((http://mare.su.se), 1 150 000 SEK-**2004-2005**

Former positions:

Assistant Professor, *Department of System Ecology*, *Stockholm University*, Sweden,

- **Contract holder** of a **MISTRA** (Swedish Foundation for Strategic Environmental Research) financed study on "Drainage basin models linked to cost-effective measures", 1 150 000 SEK-**2003**
- **Scientific and administrative co-ordinator** for the **EU** project SIBER (Silicate and Baltic Sea Ecosystem Response; EVK3-CT-2002-00069) (http://siber.ecology.su.se), with 9 European institutes involved, 1 400 000 €-**2002-2003**
- **Contract holder** of a **VR** (Swedish Research Council) financed study on "Recent weathering of silicon in Northern Sweden – Implications for dissolved silicate runoff and ocean productivity", 600 000 SEK-**2002-2003**
- **Subcontract holder** of a **SEPA** (Swedish Environmental Protection Agency) financed study on "Biological Nutrient Retention and Changes in Aquatic Food Webs through River Damming in Northern Sweden" -**2001-2003**
- **Contract holder** of a **NFR** (Swedish Natural Science Research Council) financed study on "Nutrient retention in reservoirs of Swedish rivers" in Kalixälven and Luleälven, 900 000 SEK-**2000-2001**
- Model analyses of nutrient retention in Baltic estuaries (Szczecin Lagoon, Kuronian Lagoon Riga Bight, Gulf of Gdansk and Neva Estuary) within a MISTRA sponsored research project **MARE (Marine Research on Eutrophication)-1999-2002**

Post Doc Fellow, *Baltic Sea Research Institute, Rostock University*, Germany-**1995-1998**

- Running the coastal zone management research project **„Oder Basin-Baltic Sea Interactions**" (financed by the Volkswagen Foundation), 1 100 000 DM-**1997-1999**
- Working for the **EU project EROS 2000** „The Interactions between the Danube River and the north-western Black Sea Shelf"-**1996**
- Logistic co-ordination of the METEOR cruise M32/3 and SONNE cruise SO117 within the frame of the IGBP core project „**Joint Global Ocean Flux Studies" (JGOFS)** in the Arabian Sea-**1995 and 1997**

Positions of Trust

- Board member, Department of System Ecology, Stockholm University-**1999-2002**
- Member of the FORMAS evaluation committee "Marin Miljö"-**2005, 2006**
- Board member Stockholm Marine Research Center-**2006-**

Supervisor for Ph.D. Students

- Mona Johansson (Stockholm University) "*Ciliates in marine food webs - Seasonal dynamics and patch exploitation*", 1999-2002 (**Dissertation**: October **2002**).
- *Erik Smedberg (Stockholm University)* "Changes in Coverage and Types of Vegetation in River Catchment areas – Implications for Land-Sea Fluxes of Nutrients and Main Elements*", **2001-(Licentiate: 2005)***
- *Hanna Eriksson (Stockholm University)* "Large Scale Nutrient Biogeochemistry of the Baltic Sea Watershed – A Modeling Perspective*", **2003-(Licentiate:2006)***
- *Vanja Alling (Stockholm University)* **"**Export and sequestration patterns of terrestrial organic carbon in coastal boreal environments of Northern Sweden – implications for the redistribution of soil carbon and oceanic carbon storage", ***2005-***

Editorial work

Associate editor ***Journal of Marine Systems*-2005-**

Co-editor In: Ittekkot, V.; Unger, D.; **Humborg, C**.; Tac An, N. The Silicon Cycle_Human perturbations and impacts on aquatic systems. ***SCOPE 66*** (Island Press, Washington D.C.), pp 252.

Guest editor: Silicon and the Baltic Sea (Journal of Marine Systems), in press

Scientific Publications 2003-2008

2008

Artioli, Y., Friedrich, J., Gilbert, A.J., McQuatters-Gollop, A., Mee, L.D., Vermaat, J.E., Wulff, F., Humborg, C. , Palmeri, L., Pollehne, F. 2008. Nutrient budgets for European seas: a measure of the effectiveness of nutrient reduction policies. **Mar. Pol. Bull**. accepted

Sferratore, A., Billen, G., Garnier, J., Smedberg, E., Humborg, C., Rahm, L. Modelling nutrient fluxes from sub-arctic basins: Comparison of pristine vs. dammed rivers 2008 **J. Mar. Syst.** DOI:10.1016/j.marsys.2007.10.012

Humborg, C., Rahm, L., Conley, D.J., Tamminen, T., von Bodungen, B. Long-term Si decrease in the Baltic Sea - A conceivable ecological risk? 2008 **J. Mar. Syst.** DOI:10.1016/j.jmarsys.2007.10.014

Pastuszak, M., Conley, D.J., Humborg, C., Witek, Z., Sitek, S. Silicon dynamics in the Oder estuary, Baltic Sea 2008 **J. Mar. Syst**. DOI:10.1016/j.jmarsys.2007.10.013

Humborg, C., Smedberg, E., Rodtiguez Medina, M., Mörth, C.-M. Changes in dissolved silicate loads to the Baltic Sea - The effects of lakes and reservoirs 2008 **J. Mar. Syst**. DOI:10.1016/j.jmarsys.2007.10.014

Conley, D. J., Humborg, C., Smedberg, E., Rahm, L., Papush, L., Danielsson, Å., Clarke, A., Pastuszak, M., Aigars, J., Ciuffa, D., Mörth, C.-M. Past, present and future state of the biogeochemical Si cycle in the Baltic Sea 2008 **J. Mar. Syst**. DOI:10.1016/j.jmarsys.2007.10.016

Smith, B., Aasa, A., Ahas, R., Blenckner, T., Callaghan, T., de Chazal, J., Humborg, C., Jönsson, A.M., Kellomäki, S., Kull, A., Lehikoinen, E., Mander, Ü., Nõges, P., Nõges, T., Rounsevell, M., Sofiev, M., Tryjanowski, P., Wolf, A. Climate-related change in terrestrial and freshwater ecosystems. in: BACC Author Group, Assessment of Climate Change for the Baltic Sea Basin 2008 **Springer-Verlag,** Germany pages:474 pp. ISBN:978-3-540-72785-9

Savchuk, O.P., Wulff, F., Hille, S., Humborg, C., Pollehne, F. The Baltic Sea a century ago — A reconstruction from model simulations, verified by observations 2008 **J. Mar. Syst**. DOI:doi:10.1016/j.jmarsys.2008.03.008

2007

Brink, J., Humborg, C., Sahlberg, J., Rahm, L., Mörth, C.-M. Weathering reates and origin of inorganic carbon as influenced by river regulation in the boreal-arctic region of Sweden 2007 **Hydrol. Earth Syst. Sci. Discuss**. vol:4 pages:555-588 DOI:www.hydrol-earthsyst-sci-discuss.net/4/555/2007

Mörth, C.-M., Humborg, C., Eriksson, H., Danielsson, Å, Rodriguez Medina, M., Löfgren, S., Swaney, D.P., Rahm, L. Modelling riverine nutrient transport to the Baltic Sea – A large scale approach 2007 **Ambio** vol:36 pages:124-133

Wulff, F., Savchuk, P., Sokolov, A., Humborg, C., Mörth, C.-M. Management options and effects on a marine ecosystem: Assessing the future of the Baltic 2007 **Ambio** vol:36 pages:243-249

Eriksson, H., Pastuzak, M., Löfgren, S., Mörth, C.-M., Humborg, C. Nitrogen budgets of the Polish agriculture 1960 - 2000: implications for riverine nitrogen loads to the Baltic Sea from transitional countries 2007 **Biogeochemistry** vol:85 pages:185-168 DOI:10.1007/s10533-007-9126-y

Humborg, C., Mörth, C.-M., Sundbom, M., Wulff, F. Riverine transport of biogenic elements to the Baltic Sea-past and possible future perspectives 2007 **Hydrol. Earth Syst. Sci**. vol:11 pages:1593-1607 DOI:www.hydrol-earth-syst-sci.net/11/1593/2007/

2006

Humborg, C., Pastuszak, M., Aigars, J., Siegmund, H., Mörth, C.-M., Ittekkot, V. Decreased silica land-sea fluxes through damming in the Baltic Sea catchment - significance of particle trapping and hydrological alterations. 2006 **Biogeochemistry** vol:77 pages:265-281 DOI:10.1007/s10533-005-1533-3

Humborg, C., Rahm, L., Smedberg, E., Mörth, C.-M., Danielsson, Å. Dissolved silica dynamics in boreal and arctic rivers: vegetation control over temperature? in: **SCOPE 66:** The Silicon Cycle-Human Perturbations and Impacts on Aquatic Systems (Ittekkot, V., Unger, D., Humborg, C., Tac An, eds.) 2006 **Island Press**, Washington pages:53-69 ISBN:1-59726-114-9

Smedberg, E., C. Mörth, D. P. Swaney, Humborg, C. Modeling hydrology and silicon-carbon interactions in taiga and tundra biomes from a landscape perspective: Implications for global warming feedbacks 2006 **Global Biogeochem. Cycles** vol:20 pages:GB2014, 1-15 DOI:10.1029/2005GB002567

Ittekkot, V., Unger, D., Humborg, C., Tac An, N. (Eds.) **SCOPE 66**: The Silicon Cycle-Human Perturbations and Impacts on Aquatic Systems 2006 **Island Press**, Washington pages:261 pp ISBN:1-59726-114-9

Ittekkot, V., Unger, U., Humborg, C., Tac An, N. The perturbed silicon cycle. In: **SCOPE 66**: The Silicon Cycle-Human Perturbations and Impacts on Aquatic Systems (Ittekkot, V., Unger, D., Humborg, C., Tac An, eds.) 2006 **Island Press**, Washington pages:245-252 ISBN:1-59726-114-9

Ittekkot, V., Unger, D., Humborg, C., Tac An, N. Introduction. In: **SCOPE 66**: The Silicon Cycle-Human Perturbations and Impacts on Aquatic Systems (Ittekkot, V., Unger, D., Humborg, C., Tac An, eds.) 2006 **Island Press**, Washington pages:1-2 ISBN:1-59726-114-9

Voss, M., Deutsch, B., Elmgren, R., Humborg, C., Kuuppo, P., Pastuszak, M., Rolff, C., Schulte, U. River biogeochemistry and source identification of nitrate by means of isotopic tracers in the Baltic Sea catchment 2006 **Biogeosciences** vol:3 pages:663-676

DOI:www.biogeosciences.net/3/663/2006/

2005

Smith, S.V., Swaney, D.P., Buddemeier, R.W., Scarsbrook, M.R., Weatherhead, M.A., Humborg, C., Eriksson, H., Hannerz, F. River nutrient loads and catchment size. 2005 **Biogeochemistry** vol:75 pages:83-107 DOI:10.1007/s10533-004-6320-z

2004

Humborg, C., Smedberg, E., Blomqvist, S., Mörth, C.-M., Brink, J., Rahm, L., Danielsson, Å., Sahlberg, J. Nutrient variations in boreal and subarctic Swedish rivers: Landscape controle on land-sea fluxes. 2004 **Limnol. Oceanogr.** vol:49 pages:1871-1883

Humborg, C. Dissolved silicate dynamics in subarctic Swedish rivers: a comparison between an nearly pristine and a regulated river. 2004 **Oceanis** vol:29 pages:123-138

2003

Humborg, C., Å. Danielsson, B. Sjöberg, Green, M. Nutrient land-sea fluxes in oligotrophic and pristine estuaries of the Gulf of Bothnia, Baltic Sea. 2003 **Estuar. Coast. Shelf Sci.** vol:56 pages:781-793

Witek, Z., Humborg, C., Savchuck, O., Lysiak-Pastuszack, E., Grelowski, A. Nitrogen and phosphorus budgets of the Gulf of Gdansk. 2003 **Estuar. Coast. Shelf Sci**. vol:57 pages:239-248

Ittekkot, V., Humborg, C., Rahm, L., TacAn, N. Carbon Silicon Interactions. In: **SCOPE 61**: Interactions of Major Biogeochemical Cycles: Global Change and Human Impacts (Melillo, J.M., Field C.B., Moldan B.) eds.) 2003 **Island Press**, Washington pages:311-322

Annex IV. Short CVs for leaders of WPs, WTs and partners

Lars Bo Jacobsen

Curriculum Vitae for Lars-Bo Jacobsen

Institute of Food and Resource Economics

Faculty of Life Sciences

University of Copenhagen

Rolighedsvej 25

1958 Frederiksberg C

+45 35 33 68 00

E-mail: lars-bo@foi.dk

Date of birth: 2th of June 1965

Education: M.Sc. in economics, University of Copenhagen, 1988-95.

Position: Research Fellow

Fields of interest:

Construction and use of Computable General Equilibrium models (CGE or AGE model) with particular emphasis on the agricultural sector. Construction of agricultural specific input-output tables. Assessment of the sectoral and economywide consequences of various policy scenarios concerning e.g. environmental and legal issues using CGE models.

Selected publications:

Jacobsen et. al. (2008) *Pesticide Reducing Instruments - An Interdisciplinary Analysis of effectiveness and optimality*. Critical Issues in Environmental Taxation, Oxford University Press

Henriksen et. al. (2007) *Environmental benefits and social costs - an example of combining Bayesian networks and economic models for analysing pesticide management instruments*, Nordic Hydrology, 2007; Volume 38, 4-5:351-371, IWA Publishing.

Jacobsen et. al. (2006) Sector- and economy-wide effects of terminating the use of anti-microbial growth promoters in Denmark. *Food Economics – Acta Agricult ScandC, 2006; 3: 1-11*

Lars-Bo Jacobsen. (2005) *Prospect for organic farming in Denmark*. Proceedings from the NJF-Seminar 369: *Organic farming for a new millennium -status and future challenges*. NJF Report Vol. 1 No 1 2005

Lars-Bo Jacobsen (2004). *Organic production in a dynamic CGE model – Effects of the 2003 reform of the CAP*. 7th Annual Conference on Global Economic Analysis, June 17-19, 2004 Washington D.C., USA

Frandsen, Søren E. and Lars-Bo Jacobsen *(2003) Assessing the economic cost to society of a reduction of the use of pesticides in Danish agriculture - A CGE Model Analysis*, in Wolffhechel, Hanne (Ed) *Proceedings of the Crop Protection Conference for the Baltic Sea Region – 28th-29th April 2003 IOR Congress Centre*, DIAS Report – Plant Production no. 96 December 2003, Danish Institute of Agricultural Sciences.

Jacobsen, Lars-Bo (2003), *Do support payments for organic farming achieve environmental goals efficiently?* Proceedings from the OECD Workshop on Organic Agriculture, Washington DC, 23 – 26 September 2002. Organic Agriculture – Sustainability, Markets and Policies, Published by OECD and CAPI publishing 2003.

Niels Kaergaard, Soren Frandsen, Aage Jorgensen, Jens Erik Orum, Lars-bo Jacobsen, Alex Dubgaard (2002), *The economics of pesticides in Danish agriculture*, Paper presented at the X Congress of the European Association of Agricultural Economists. Zaragoza (Spain) 28 - 31 August 2002.

Philip Adams, Lill Andersen, Lars-Bo Jacobsen (2002), *Structural forecasts for the Danish economy using a dynamic AAGE model,* Paper presented at the X Congress of the European Association of Agricultural Economists. Zaragoza (Spain) 28 - 31 August 2002.

Berit Hasler, Jorgen Jensen, Bjarne Madsen, Martin Andersen, Henrik Huusom, Lars-Bo Jacobsen (2002), *Regional socioeconomic impacts of livestock regulation: An integrated modelling approach,* Paper presented at the X Congress of the European Association of Agricultural Economists. Zaragoza (Spain) 28 - 31 August 2002.

Philip Adams, Lill Andersen, Lars-Bo Jacobsen (2002), *Does timing annoucement matter? Restricting the production of pigs with a dynamic CGE model* Paper presented at the X Congress of the European Association of Agricultural Economists. Zaragoza (Spain) 28 - 31 August 2002.

Annex IV. Short CVs for leaders of WPs, WTs and partners

Kaj Mantzius Hansen

Kaj Mantzius Hansen, PhD, Scientist, Midttoftevej 12, 2605 Brøndby, Denmark.

Born 06.03.74. Married. Three children.

University of Aarhus, National Environmental Research Institute (NERI), Department of Atmospheric Environment, P.O. Box 358, Frederiksborgvej 399, 4000 Roskilde, Denmark; Tel (+45) 46301872, Email: kmh@dmu.dk.

Education: *PhD in Environmental Science and Geophysics*, University of Copenhagen, Denmark (2006). *M.Sc. in Glaciology and Geophysics*, University of Copenhagen, Denmark (2001).

Employment: *Scientist* (2005-) Department of Atmospheric Environment, National Environmental Research Institute, University of Aarhus.

Research: Atmospheric short- and long-range transport modelling and integrated high-resolution forecasting of weather and air pollution in general. Modelling of atmospheric transport and environmental fate of persistent organic pollutants (POPs) both with focus on large scales and on individual environmental processes, especially the processes describing the exchange of POPs between air and snow.

Publications: Seven published journal articles, co-author on one paper in press and two in review. Author and co-author of ten papers in conference proceedings, eight scientific reports, seven popular articles. Presenter of six poster and 18 oral presentations at workshops and conferences and co-author on 12 poster and 25 oral presentations at workshops and conferences.

Teaching: Assisting teacher of several courses during studies.

International experience: University Centre in Svalbard (UNIS), Longyearbyen, Svalbard, Norway (Jan.-Jun. 1999). Alfred Wegener Institute for Marine Research, Bremerhaven, Germany (). Environmental Organic Chemistry and Ecotoxicology Research Groups, Lancaster University, Lancaster, UK (Mar.-Aug. 2003).

Selected publications:

1. Hansen, K. M., J. H. Christensen, J. Brandt, L. M. Frohn and C. Geels, 2004: "Modelling atmospheric transport of α-hexachlorocyclohexane in the Northern Hemisphere with a 3-D dynamic model: DEHM-POP". *Atmospheric Chemistry and Physics*, 4, 1125-1137.

2. Hansen, K. M., Prevedouros, K., Sweetman, A., Jones, K. C., and Christensen, J. H., 2006: "A process-oriented inter-comparison of a box model and an atmospheric chemistry transport model: insights into model structure using α-HCH as the modelled substance". *Atmospheric Environment*. 40(12), 2089-2104.

3. Hansen, K. M., Halsall, C. J., and Christensen, J. H., 2006: "A dynamic model to study the exchange of gas-phase POPs between air and a seasonal snowpack". *Environmental Science & Technology*. 40(8), 2644-2652.

4. Hansen, K. M., J. H. Christensen, J. Brandt, L. M. Frohn, C. Geels, C. A. Skjøth, and Y.-F. Li (2008), Modeling short-term variability of α-hexachlorocyclohexane in Northern Hemispheric air, *J. Geophys. Res.*, 113, D02310, doi:10.1029/2007JD008492.

1. Hansen, K. M., C. J. Halsall, J. H. Christensen, J. Brandt, C. Geels, L. M. Frohn, and C. Ambelas Skjøth. "The effect of snow on the fate of α-HCH in a dynamic multimedia model". *Environmental Science & Technology*, 42(8), 2943–2948.

CV, Johanna Mattila

Degree information:

-PhD, 1992, environmental biology, Åbo Akademi University, Finland

-Docent (associate professor), 1996, experimental marine biology, Åbo Akademi University, Finland

Current position:

1997-, Head of the station, Husö Biological Station, Åbo Akademi University, Finland

Previous positions:

-2005-2006, acting professor, Environmental biology, Åbo Akademi University, Finland

-2002-2004, CEO, Water and Environment Research of SW Finland, Finland

-2000-2001, acting professor, Environmental biology, Åbo Akademi University, Finland

-1995-1997, post doc, Dauphin Island Sea Lab & University of South Alabama, USA

Major research projects:

-EU Life algae, Mattias Sköld (coordinator), EU Life, 1997-2001

-Environmental status in shallow bays (Miljötillstånd i grunda havsvikar), Kerstin Wallström (coordinator), EU Interreg IIA, 1998-2000

-Water quality of the Åland archipelago, Johanna Mattila (coordinator), EU, 2002

-Production of juvenile fish in shallow bays (Fiskyngelproduktion i grunda havsvikar), Johanna Mattila (coordinator), EU Interreg IIIA, 2002-2005

-BEVIS, A joint decision support system for effective water protection measures in the archipelagos of Turku-Åland-Stockholm, EU Interreg IIIA, 2004-2007

-VELMU (the Finnish Inventory Program for the Underwater Marine Environment), principal investigator of the sub-project 'Research and education' 2005-(2014)

-Structure and function of the pelagic food web in the Lumparn area, Åland, northern Baltic Sea, Baltic Sea 2020, 2008-(2010)

Supervision of PhD students:

-Alfred Sandström, 2004, principal supervisor, Åbo Akademi University, Finland

-Kajsa Rosqvist, (2008), principal supervisor, Åbo Akademi University, Finland

-Martin Snickars, (2008), principal supervisor, Åbo Akademi University, Finland

-Matias Scheinin, ongoing, principal supervisor, Åbo Akademi University, Finland

-Noora Mustamäki, ongoing, principal supervisor, Åbo Akademi University, Finland

Major scientific assignments:

-committee member (Finland) of the Baltic Marine Biologists 2002-

-member of the scientific evaluation panel FORMAS, Sweden (aquatic ecology 2002-2007 & biodiversity 2002)

-member of the board of management for the Finnish Graduate School in Environmental Science and Technology (EnsTE), 2004-

-scientific reviewer for Great Lakes Fishery Commission (USA), 2004 & 2006,

and the Estonian Science Foundation 2007-2008

-scientific reviewer of four PhD-theses in Finland, member of the evaluation panel (betygsnämnden) of four PhD dissertations in Sweden,

-official opponent at MSc Jari Hänninen's (University of Turku, Finland) and MSc Gustav Almqvist's (Stockholm University) dissertations

-scientific reviewer of PhD Jari Hänninen's application for the degree of 'associate professor' (dosent)

Editorial assignments

-Boreal Environment Research, scientific editor (hydrobiology) 2000-

-Hydrobiologia, quest editor, Proceedings from the Baltic Sea Science Conference 2003, Helsinki

-peer reviewer: Acta Oecologia, Aquatic Ecology, Canadian Journal of Zoology, Estuaries, Fishery Bulletin, Evolution Ecology, Gulf of Mexico Science, Journal of Fish Biology, Journal of Sea Research, Hydrobiologia, Marine Biology, Marine Ecology, Marine Ecology Progress Series, Oecologia, Ophelia, Estuarine, Coastal and Shelf Science

Publications

-ca 50 scientific papers and project reports

-ca 300 monitoring reports

-ca 30 publications of popular science

CURRICULUM VITAE

Dr. Jürgen Meyerhoff

Research Fellow
Institute for Landscape Architecture and Environmental Planning, Chair in Environmental and Land Economics, Technische Universität Berlin (Berlin Institute of Technology)

EB 4-2, Straße des 17. Juni, 10623 Berlin, Germany
phone: +49 30 314 73 322, fax: +49 30 314 73 517
e-mail: meyerhoff@imup.tu-berlin.de

Education

- Ph.D. in Environmental Planning, Technische Universität Berlin, 2004
- M.A. in Economics (Diplom-Volkswirt), Freie Universität Berlin, 1994

Professional Experience

- Research fellow, Berlin Institute of Technology, since 1997
- Institute of Ecological Economic Research, Berlin, 1989 - 1997

Visiting Scientist

- The Centre for Social and Economic Research on the Global Environment (CSERGE), University of East Anglia, Norwich, August – November 2001
- Department of Rural Economy, University of Alberta, Edmonton, January – Mai 2005

Main Research Interest

- Environmental valuation (forest biodiversity, river ecology, water quality, coastal wetlands, public parks)
- Meaning of environmental valuation in decision making
- Cost-benefit-analysis

Selected Publications

- Meyerhoff, J., U. Liebe, V. Hartje. Benefits of biodiversity enhancement due to nature-oriented silviculture: evidence from two choice experiments in Germany. *Journal of Forest Economics* (accepted for publication)
- Meyerhoff, J. and U. Liebe (2008). Do protest responses to a contingent valuation question and a choice experiment differ? *Environment and Resource Economics* 39(4): 433-446.
- Meyerhoff, J., N. Lienhoop, P. Elsasser (Eds.) (2007): Stated preference methods for environmental valuation: applications from Austria and Germany. Metropolis.
- Meyerhoff, J., A. Dehnhardt (2007): The European Water Framework Directive and economic valuation of wetlands: the restoration of floodplains along the River Elbe. *European Environment*, Vol. 17(1): 18-36.
- Scholten, M., Anlauf, A., Büchele, B., Faulhaber, P., Henle, K., Kofalk, S., Leyer, I., Meyerhoff, J., Purps, J., Rast, G.& Scholz, M. (2005): The River Elbe in Germany - present state, conflicting goals and perspectives of rehabilitation. Archiv für Hydrobiologie Supplement 155 (1-4): 579-602.
- Meyerhoff, J. (2006): Stated willingness to pay as hypothetical behaviour: can attitudes tell us more? *Journal of Environmental Planning and Management* 49(2): 209-226.
- Meyerhoff, J. & Liebe, U. (2006): Protest beliefs in contingent valuation: explaining their motivation. *Ecological Economics* 57(3): 583-594.
- Meyerhoff, J. (2004): Non-use values and attitudes: wetlands threatened by climate change. In Getzner, M., Spash, C. L. & Stagl, S. (eds.) Developing Alternatives for Valuing Nature. London

Marmar Nekoro

Personal details

Name: Marmar Nekoro

Date of birth: 7 May 1981

Contact: marmar.nekoro@stockholmresilience.su.se, +46 73 707 85 31

Degrees and education

2006-2008 MSc in Marine and Freshwater Ecology, Department of Systems Ecology, Stockholm University (SU). Thesis: *Ecosystem services provided by the Baltic Sea blue mussel,* Mytilus edulis *(L.) - using simulation to predict consequences of population dynamics.*

2002-2005 Advanced undergraduate studies in e.g. Marine and Freshwater Ecology, Natural Resource Management, Ecology, Aquatic Management, Departments of Ecology and Systems Ecology, SU

2003-2004 Undergraduate studies in Marine Biology and Marine Ecology, Gothenburg University.

2000-2002 Undergraduate studies in Biology, Chemistry and Ecology, SU

Selected Positions

2007 – Present	Administrator, "Baltic System Tools for Ecological-economic evaluation: a refined Nest-model project" (BalticSTERN), The Beijer Institute of Ecological Economics, The Royal Swedish Academy of Sciences.
2006 - Present	Course coordinator, "Världens eko" (Perspectives on Sustainable Development), Stockholm Resilience Centre, SU.
2006 – 2007	Course assistant, Masters course "Natural Resource Management, Governance and Globalization" (NGG), Centre for Transdisciplinary Environmental Research (CTM), SU.
2006	Consultant/Project leader, "Development and implementation of methodology for surveys of juvenile large freshwater mussels", County Administrative Board of Skåne.
2004 - 2006	Consultant/Project leader, Surveys of endangered large freshwater mussels, County Administrative Board of Södermanland.
2005	Project assistant, EU-project "Governance and Ecosystem Management for the CONversation of BIOdiversity" (GEM-CON-BIO), CTM, SU.
2005	Consultant/Project leader, Survey of endangered large freshwater mussels, Municipality of Hässleholm.
2004 - 2005	Coordinator, CTM: s student group, CTM, SU.
2004	Project leader, Survey of urban large freshwater mussels, Department of Systems Ecology, SU.

Selected Workshop experiences

Workshop (Organizer): BalticSTERN & Subproject 3 in Economic Marine Information, Swedish Environmental Protection Agency/Stockholm Resilience Centre, 19-20 September 2007.

Workshop (Organizer): Food web modeling including fisheries economy – a BalticSTERN WP2 workshop, Stockholm Resilience Centre, 22-23 November 2007.

Workshop (Organizer): BalticSTERN - Baltic System Tools for Ecological-economic evaluation: a refined Nest-model project, Stockholm Resilience Centre19-20 September 2007.

Workshop (Invited speaker): Large freshwater mussels in Scandinavia. Natural Museum of History, Gothenburg 21-22 February 2006.

Workshop (Organizer): "Governance and Ecosystem Management workshop", Governance and Ecosystem Management for the CONversation of BIOdiversity, GEM-CON-BIO), The Royal Swedish Academy of Sciences, Stockholm, 14-16 September 2005.

Selected Publications

Matz, C., **Nekoro**, M., Sundström, H., Tapper, J. & Wendin, A. 2003. *Stormusslor – hur har urbanisering förändrat artsammansättning och populationsdynamik? – en studie i Stockholmsområdet*, Department of Systems Ecology, Stockholm University.

Nekoro, Marmar & Sundström, Helena; 2005, *Stormusslor i Kilaån 2004 och 2005. Utbredning av tjockskalig målarmussla och flat dammussla - hotstatus samt åtgärdsförslag till bevarande i Kilaådalen, Södermanlands län,* County Administrative Board of Södermanland, Rapport 2005:8. ISSN: 1400-0792.

Nekoro, Marmar & Sundström, Helena; 2005; *Stormusslor i Södermanlands län 2005 - Inventering av potentiella lokaler för tjockskalig målarmussla och flat dammussla i Södermanlands län*, County Administrative Board of Södermanland, Rapport 2005:9. ISSN: 1400-0792.

Nekoro, Marmar, 2007, *Ecosystem services provided by the Baltic Sea blue mussel,* Mytilus edulis *L. – using simulations to predict the consequences of population dynamics,* Master degree thesis, Department of Systems Ecology, Stockholm University.

Nekoro, Marmar; *Metodutveckling och inventering av juvenila musslor - Skåne län 2006*, County Administrative Board of Skåne. In press 2008.

Nekoro, Marmar & Sundström Helena, *Inventering av musselfaunan i Almaåns vattendragssystem 2005 - Förekomst av flodpärlmussla och tjockskalig målarmussla samt förslag till åtgärder för bevarande inom Almaåns vattendragssystem,* Municipality of Hässleholm. In press 2008.

Bohman, B., Svedén, J., **Nekoro**, M. & Nilsson, H., 2006, *Fotavtrycken vi lämnar efter oss – en liten guide om hur du kan minska din miljöpåverkan*, The Swedish Society for Nature Conservation.

Medial appearances

Interviewed by radio and by numerous news papers.

Languages

Persian (mother tongue), Swedish (fluent written and spoken) English (fluent written and spoken), German (basic command), Italian and Spanish (some knowledge).

CURRICULUM VITAE – HENRIK ÖSTERBLOM

Personal Details

Name:	Henrik Österblom
Date of birth:	May 28, 1973
Nationality:	Swedish
Family:	My wife Kajsa and two children: Fred (five) and Mina (two)
Address (home):	Äppelblomsvägen 115, SE-139 32 Stockholm, +46 8 612 12 41
Address (work):	Stockholm Resilience Centre, Stockholm University,
	SE-106 91 Stockholm, +46 8 674 76 64
E-mail:	henrik.osterblom@stockholmresilience.su.se

Doctoral Degree

2006 Ph.D. in Marine Ecology, Stockholm University

Title of thesis: "Complexity and Change in a Simple Food-Web – Studies in the Baltic Sea (FAO Area 27.IIId)." Supervised by professors Sture Hansson and Ragnar Elmgren.

Present position

Policy Officer/Researcher, Baltic Nest Institute, Stockholm Resilience Centre, Stockholm University

Employed until December 2009. Forty (40) per cent of my time is devoted to research.

The Baltic Nest Institute hosts the Nest-model, designed to give scientific advice for reduction of eutrophication in the Baltic Sea. The Nest-model is a unique decision-support system that can be used as a policy tool to guide regional management of the Baltic Sea, in close co-operation between the riparian countries and the European Union. In addition to performing research that develops the model, my role is to act as a bridge between the scientific and political communities in the implementation process.

Previous employments

April 1998-ongoing: (120 months, part time)

Project coordination of the Stora Karlsö research project

Starting as a field assistant in 1998, I have since then taken part in coordinating and developing the WWF-financed ecosystem research conducted at this site, together with a colleague. This work constituted the majority of my Ph.D. thesis.

Aug 2003-March 2007: (43 months, part time)

Special Advisor in the secretariat for the Swedish Environmental Advisory Council (SEAC), Ministry of Sustainable Development

SEAC give advice to the government on environmental issues and I was responsible for issues relating to sustainable management and use of natural resources, e.g. the resilience of ecosystems and the ecosystem approach. The work consisted of arranging meetings with the minister of environment, the council members and relevant guest speakers, and authoring reports based on the council members knowledge and reference literature (see list of reports below). The main topic covered were environmental consequences for global ecosystems of future economic growth scenarios as well as European and Swedish marine policy.

Jan 2004-May 2006 (29 months, part time)

Ph.D. student at Stockholm University, Department of Systems Ecology

Studies of marine ecosystems interactions and global marine management issues. Supervised by professors Sture Hansson and Ragnar Elmgren.

Aug 2002-June 2003 (10 months, part time):

Member of the Commission on the marine environment, Ministry of Environment

The Commission on the marine environment was appointed by the Swedish government to provide advice on all relevant marine environmental issues. I was appointed together with four other members and my main responsibility was to develop the concept of the ecosystem approach.

June 2000-Dec 2002 (30 months, part time):

1st assistant, Swedish Museum of Natural History

Research on ecosystem interactions, data-base management GIS-mapping/analysis

Scientific qualifications

Scientific publications

Eleven published articles in peer reviewed journals. I am the lead author of seven of these articles.

Commissions

I have been a referee for Global Change Biology, Ecosystems (twice), Aquatic Biology, Environmental Management and Ornis Fennica

Other

I have supervised or co-supervised the production of masters' thesis for six students

Longer visits abroad

2006-2007 Three months vacation in Southwest USA (with my family)

2002 Three months vacation in South East Asia (with my wife)

2000 Six months travelling in South America (Patagonia, Bolivia and Peru)

1996-1997 One year university exchange studies in Canada, studying marine biology in British Columbia (Bamfield Marine Station) and conservation biology (University of Alberta, Edmonton).

1989-1990 One year high school studies (junior year) in USA (Louisville, Ky) 1977 One year in USA (Cincinnati, Ohio) with my parents and sisters

Language skills

English: Very good, *Spanish:* Good, *French:* Fair, *Russian:* Very limited

Annex IV. Short CVs for leaders of WPs, WTs and partners

Bo Riemann

Education: Ph.d. Univ. Aarhus 1973, Dr. Sc. Univ. Copenhagen 1989 (Thesis: Bakterieplanktonets økologi: studier af biomasse, aktivitet, produktion og betydning i kulstofkredsløbet).

Recent appointment: Director of Research Department, NERI, AU, 1996-; Adj. Prof. Univ. of Roskilde, 1997 -.

Recent leadership and awards: Chairman of the board of "Sound Environmental Monitoring and Control Group – SEMAC" 1996-2001. Coordinator of several EU projects (SAFE, MEICE, CHARM, CREAM), partner of 6 EU projects, and a large number of national research projects. Awarded Environmental Price of 250.000 Dkr. from Aase and Ejnar Danielsens Foundation in 2007.

Supervision and teaching: Teaching limnology , oceanography and ecotoxicology at Univ. Copenhagen, University of Aarhus, and Roskilde University. Co-organizer for EU-MAST Ph.D. Advanced Study Course "Concepts and Models of Marine Microbial Food Webs" 1998. (Co)-supervisor of > 18 MSc and 6 Ph.d.

Reviewing: Reviewer for 13 international journals. Referee for National Science Foundation, U.S.A., the British, the Norwegian and the Czechoslovakian Research Councils, The Israel Science Foundation, the Commission of the European Communities - MAST I, The European Science Foundation, and The Danish Strategic Research Council. Member of United Nations Environment Programme, Scientific expert in the Scientific and Technical Panel (STAP) since 2007.

Scientific papers: > 90 international publications in international refereed journals and book chapters since 1977; 25 articles/reports in Danish. **> 3100 ISI Web Citations**, June 2007.

Research interests: Extensive experience in ecological and ecotoxicological studies on freshwater and marine environments. Aquatic ecology, food-web interactions and modelling with special reference to production, flux and fate of organic matter in pelagic communities.

Three papers: Holm-Hansen, O. & Riemann, B. 1978. Chlorophyll a determination: improvements in methodology. Oikos 30: 438-447. **459 ISI cites;**

Riemann, B., Bjørnsen, P.K., Newell, S. & Fallon, R. 1987. Calculation of cell production of coastal marine bacteria based on measured incorporation of ^{3}H-thymidine. Limnol Oceanogr. 32: 471-476**. 185 ISI cites;**

Riemann, B. & Søndergaard, M. 1984. Measurements of diel rates of bacterial secondary production in aquatic environments. App. Environ. Microbiol. 47: 632-638. **122 ISI cites.**

Baretta-Bekker, J.G., Baretta, J.W., Hansen, A.S. & Riemann, B. 1998. An improved model of carbon, and nutrient dynamics in the microbial foodweb in marine enclosures. Aquat.Microb. Ecol.14: 91-108. **40 ISI cites.**

Daiva Semeniene

1. Date of birth: 14 November 1959

2. Nationality: Lithuanian

3. Civil status: Married

4. **Education:** PhD Economics ((Economic evaluation of Lithuanian fresh groundwater supplies) from The Institute of Economics, Lithuanian Academy of Sciences (1990)

MSc Economics from Vilnius University (1977—198

5. Language skills: (1 = excellent - 5 = basic)

Language	Reading	Speaking	Writing
Lithuanian, English, Russian	1	1	1
Turkish	5	5	5

6. Membership of professional bodies: European Association of Environmental and Resources Economists (EAERE)

7. Other skills: Fully computer-literate (Microsoft office software)

8. Present position: Director, Centre for Environmental Policy

9. Years within the firm: 9

10. Key qualification: During her over 20 years of professional career, Dr. Semėnienė has gained extensive knowledge and practical experience of various instruments for the implementation of environmental policy. She has worked as an economist and institutional expert on many international EU approximation projects and has extensive public administration experience from 5 years senior employment with Ministry of Environment in Lithuania, where she worked with design and introduction of new economic instruments, as well on the development of bankable projects with national and international financing institutions.

Through her years of consultancy and research work she has experience from all stages of project cycle management and well developed skills in communications, presentation and participatory working methods. As a consultant she has assisted ministries and municipalities in Estonia, Bosnia and Herzegovina, Cyprus, Croatia, Latvia, Lithuania, Poland, the Slovak Republic and Turkey in developing environmental financing strategies which included financing demand and supply analysis, preparation of municipal investment programmes and affordability analysis. She has also been involved in water pricing and cash flow analysis in CEE countries, development of environmental indicators in the Baltic States. Dr. Semėnienė has been working intensively on the preparation of feasibility studies for the EU ISPA / Cohesion funds and other financing institutions in compliance with EU/IFI funding requirements, especially focusing on financial economic and institutional analysis. She has recently been deeply involved in the implementation of the Water Framework Directive, especially focusing on economic analysis and environmental costs and benefits assessment, including contingent valuation surveys.

11. Selected projects related to water sector and cost / benefit analysis:

Croatia	February 2007 – February 2008: Team leader. EU funded project: Project Pipelines and Finance in Bulgaria, Croatia, Romania and Turkey. Responsible for the development of Environmental Financing Strategy in Croatia, with COWI Anadolu, Turkey
Cyprus	January 2006 – April 2008: Consultant. CyPEG_SAVE EPIQ II (The Cyprus Partnership for Economic Growth). Capacity building and technical assistance focused on sustainable financing of water, wastewater, and solid waste; with IRG, USA.
Estonia	January-May 2000: Team leader. Water pricing in selected Accession Countries to the EU, current policies and trends, analysis of water sector related economic information, with Krakow Academy of Economics for EC.
Lithuania (selected projects)	January – May 2008: Economic Marine Information. Two sub-projects on 1) Review of scientific and other kind of information about economic effects of a changed marine environment of the Baltic Sea, and 2) Survey of the tourism industry representatives on the impacts of changed Baltic Sea environment on their activities so far and in the future. Funded by Swedish Environmental Protection Agency, together with Enveco Miljoekonomi AB, Sweden. January – July 2007: Team leader: Project for the Ministry of Environment of Lithuania: Development of pollution charge tariffs for stationary and mobile pollution sources for years 2010 – 2014. October 2006 – February 2008: Component leader. EU Transition Facility project Procurement of Services for the Institutional Building for the Nemunas River Basin Management. Responsible for the economic analysis related issues according to WFD, with DHI, Denmark. October 2006 – December 2006: Economist. Assessment of different approaches to implementation of the IPPC Directive and their impacts on competitiveness. Description of the European glass industry and impacts of IPPC implementation. With Carl Bro, Denmark. August 2006 – June 2007: Consultant: Capacity building on the assessment of environmental and resource costs as support to the implementation of the European Union Water Framework Directive in the Baltic Member States, funded by Dutch government, with BEF. July – November 2006: Team leader. Preparation of National Green Procurement Programme, for the Lithuanian Ministry of Environment. February 2006 – to date: Consultant: Assessment of the monetary values of environmental and resources costs for water services. Development and Testing of Practical Guidelines for the Assessment of Environmental and Resource Costs and Benefits in the Water Framework Directive. Specific targeted project of the Sixth Framework Programme, EC. With VU-IVM, Netherlands January-December 2000, January – November 2003: Consultant. Transposition and implementation of the EU Nitrates Directive; Phase I and II in Lithuania, cost assessment and financing strategy, with Scanagri, Denmark. January 2002-June 2003: Consultant. Preparation of Plungė Wastewater Treatment Plant, Sewerage network and Water Supply System Rehabilitation Project for ISPA Support, economic and financial analysis, with Techniplan, Italy. July 2001- April 2002: Consultant. Financial analysis of the ISPA project for the Vilnius Water Supply company, AAPC. January-December 2001, January –December 2003: Leader of economics sub-team. Transposition of the EU Water Framework Directive and Elaboration of a National Strategy for the Management of Water Resources in Lithuania, economic analysis of water uses, cost recovery, pricing policies, phases I and II, with Carl Bro, Denmark. April 2001- April 2003: Consultant. Co-operation Projects in the River Nemunas Drainage Basin. Swedish Environmental Protection Agency.
Slovak Republic	May 2000 – October 2001: Team leader. Assist the Slovak Republic in the preparation of an integrated EU approximation strategy in the environment sector (cost assessment and financing strategy in the water sector), with Carl Bro, Denmark.
Turkey	March – May 2006: Institutional expert / financial expert / economist. Preparation of Tekirdag Water and Wastewater Project Feasibility Study. Institutional and financial/economical analysis of the investment project, with COWI-Anadolu, Turkey. November 2003 – November 2005: Component leader / institutional expert / economist. Environmental Heavy Cost Investment Planning. Assist the Ministry of Environment and Forest of Turkey in the preparation of directive specific investment plans and six feasibility studies, with COWI, Denmark.

12. Profession Experience Record:

Date from - date to	Location	Company	Position	Description
Dec 2005 – to date 1999 – Nov 2003	Vilnius, Lithuania	Centre for Environmental Policy	Director	Management of the Centre's activities. Participation in various national and international projects related to EU environmental policy and economics, institutional aspects, development of feasibility studies
Nov 2003 – Nov 2005	Ankara, Turkey	Centre for Environmental Policy	Consultant	Work as a foreign institutional expert / economist in the Environmental Heavy Cost Investment Planning project in Turkey. Leader of the planning component for more than 20 EU directives. Participation in the preparation of financial economic analysis for five feasibility studies.
1996 - 1998	Vilnius, Lithuania	Harvard Institute for International Development	Policy Analysis Expert	Central/Eastern Europe Environmental Economics and Policy project: Participation in projects & working groups related to environmental policy making, project development and economics.
1990 - 1995	Vilnius, Lithuania	Dept. Environmental Protection, later Ministry of Environmental Protection	Economist / Head of Economics and Programming Div.	Work related to economic instruments in the environmental protection field. Managing activities of the division related to policy making in the field of natural resources use and environmental pollution control as well as development of bankable projects with national and international financing institutions.
1982 - 1990	Vilnius, Lithuania	Institute of Economics, Lithuanian Academy of Sciences	Natural Resources Management Div.	Research and Policy Development. Economic evaluation of natural resources with a specific emphasis on groundwater resources.

Annex IV. Short CVs for leaders of WPs, WTs and partners

Tore Söderqvist

Date of Birth: 2 July, 1963; Sex: Male; Marital Status: Unmarried; live together with Kristina Laitinen since 1991; Nationality: Swedish. E-mail address: tore@enveco.se.

University degrees

Associate Professor of Economics [docent i nationalekonomi] (2003); Ph.D. (Economics) [ekonomie doktor], thesis: "Benefit Estimation in the Case of Nonmarket Goods. Four Essays on Reduction of Health Risks Due to Residential Radon Radiation" (1995); Licentiate of Economics [ekonomie licentiat], thesis: "Measuring the Value of Reduced Health Risks: The Hedonic Price Technique Applied to the Case of Radon Radiation" (1991); B.Sc. in Economics and Business Administration [civilekonom]; thesis: "Miljöavgifter och pantsystem för kvicksilverhaltiga batterier" ["A Deposit-Refund System for Mercury Batteries"] (1988). All degrees at Department of Economics, Stockholm School of Economics.

Positions

2004-: Research Director and Chairman, Enveco Environmental Economics Consultancy Ltd. [Enveco Miljöekonomi AB] (www.enveco.se).

1998-2006: Research Associate [forskarassistent], Beijer International Institute of Ecological Economics, The Royal Swedish Academy of Sciences (www.beijer.kva.se); 1 Oct 2004-31 March 2006: 25% of full time; 1 Oct. 1998-30 Sep. 2004: 100% of full time.

1996-1998: Researcher (on a project basis), Beijer International Institute of Ecological Economics, The Royal Swedish Academy of Sciences (www.beijer.kva.se).

1988-1995: Research Assistant, Department of Economics, Stockholm School of Economics (www.hhs.se).

Selected projects

2007-2008: The Economic Value of Ecosystem Services Provided by the Baltic Sea: Existing Information and Gaps of Knowledge, Subproject 3 in Economic Marine Information, funded by the Swedish Environmental Protection Agency; Consultant.

2007-2008: Guidelines for Economic Impact Assessment with a Focus on the Cultural Environment, funded by the Swedish National Heritage Board; Consultant.

2007: The Benefits of a Baltic Sea Action Plan. Subproject 1 in Economic Marine Information, funded by the Swedish Environmental Protection Agency; Consultant.

2007-: Economic Assessment for the Environment, research program funded by the Swedish Environmental Protection Agency; Consultant.

2007-: Science and Policy Integration for Coastal System Assessment (SPICOSA), research program funded by EC FP6; Consultant.

2006-2008: Guidelines for Applying Multi-Criteria Analysis as a Tool for Achieving Sustainable Remediation of Polluted Areas, funded by the Swedish Environmental Protection Agency; Consultant.

2006-2007: Cost-Benefit Analysis as a Tool for Prioritization of Remediation Measures for Polluted Areas, funded by the Swedish Environmental Protection Agency; Consultant.

2005-2007: Economic and Social Consequences of Eutrophication, Contaminants, Oil Spill and Reduced Coastal Fisheries in Skagerrak, funded by Forum Skagerrak II; Consultant.

2006-2007: Governance and Ecosystems Management for the Conservation of Biodiversity (GEM-

CON-BIO), funded by EC FP6; Consultant (subcontractor to Stockholm University).

2006: Nordic Environmental Valuation Database, funded by the Nordic Council of Ministers; Consultant.

2006: Guidelines for Economic Analysis of Programme of Measures in the Water Framework Directive, funded by the Swedish Environmental Protection Agency; Consultant.

2005-2006: Economic and Social Consequences of Eutrophication, Contaminants, Oil Spill and Reduced Coastal Fisheries in Skagerrak, funded by Forum Skagerrak II; Consultant.

2005: Discounting of Long Time Perspectives in Economic Analyses of Measures against Climate Change, funded by the Swedish Environmental Protection Agency; Consultant.

2005: Quality Assessment of Studies Valuing Environmental Change: Tests of Existing Studies, funded by the Swedish Environmental Protection Agency; Project Leader.

2004-2005: The Role of Risk Valuation in Selecting Cost-Effective Strategies for Treatment of Polluted Land, funded by the Swedish Environmental Protection Agency; Consultant.

2004-2005: An Instrument for Quality Assessment of Studies Valuing Environmental Change, funded by the Swedish Environmental Protection Agency; Consultant.

2003: A Survey of Swedish Studies Valuing Environmental Change, funded by the Swedish Environmental Protection Agency; Project Leader.

2002-2006: Ecosystem Services of Coastal Habitats for Fisheries, funded by the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS); Project Co-leader, Researcher.

2001-2006: Marine Biodiversity, Patterns and Processes (MARBIPP), funded by the Swedish Environmental Protection Agency; Work Package on Ecosystem Goods and Services; Researcher.

1998-2004: Sustainable Coastal Zone Management (SUCOZOMA), funded by MISTRA; Project Leader (2001-) and Deputy Project Leader (1998-2000) of research project on economic valuation; Researcher.

1996-1999: Ecological-Economic Analysis of Wetlands: Functions, Values and Dynamics (ECOWET), funded by EU and FRN; Coordinator of Swedish case study; Researcher.

1992-1998: Naturresurs- och miljöekonomi i samband med areella näringar, funded by SJFR; Researcher (1993-1995); Researcher (1996-1998).

1993-1995: The Baltic Drainage Basin Project, funded by SNV; Research Assistant.

1993-1996: Environmental Toxicology, Economics and Institutions, funded by ESF and FRN; Research Assistant (1993-1995); Researcher (1996).

1998-1995: Economic Valuation of Radon Risk Reductions, funded by SNV; Research Assistant.

Publications

One book, 28 peer-reviewed scientific papers, editor of 4 scientific publications, 27 popular scientific texts/government reports, etc., and 2 databases.

Teaching and Training

Organizer of and lecturer at courses at various Swedish universities and university colleges at graduate level and all undergraduate levels, mainly in environmental economics; co-adviser of 1 Ph. D. student; adviser/co-adviser of 15 B.Sc or M.Sc theses.

Heidi Tuhkanen

Curriculum Vitae: Heidi Johanna Tuhkanen

Personal details

Name:	Heidi Johanna Tuhkanen
Address:	Pärnu Mnt. 62A 18, Tallinn 10135, Estonia
Email address:	heidi.tuhkanen@seit.ee
Telephone number:	+372 53020274
Date of birth:	29 September 1975
Nationality:	Finland / USA

Education

2004-2006 **Wageningen University and Research Centre**, Wageningen, The Netherlands
M.Sc. in Urban Environmental Management

Completed subjects include research methods, principles of environmental science, environmental systems analysis, environmental management and industry, urban environmental management, managing urban infrastructure, European study visit in environmental science (Czech Republic), urban environmental infrastructure in developing countries.
Thesis subject: Assessment of decentralized wastewater management systems in Finland. The research identified and assessed the wastewater treatment options for rural areas in Finland to see the feasibility of decentralized sanitation systems. The research consisted of a literature review, stakeholder analysis, identification of drivers and barriers to certain technology choices and assessment of in the field performance for systems.

1994-1997 **American University, The School of International Studies,** Washington, D.C.,

USA, B.A. in International Studies and International Economics

Study Abroad Semesters: Beijing (Fall 1996), Brussels (Spring 1996)

Internships

1-5/1997	Center for Strategic and International Studies (CSIS), Washington, D.C., USA, Research and reporting, The Eastern European Studies Department
2-5/1996	Economic and Social Committee (ESC) of the European Union, Brussels, Belgium Research and monitoring EU legislation in various topics for Member of ESC
5-8/1995	The Economic and Research Service (ERS), USDA, Washington, DC, USA Research and database maintenance in Market and Trade Economics Division

Professional Experience

1/2008-present **Stockholm Environment Institute – Tallinn Centre / Estonian Institute for Sustainable Development (SEIT),** Tallinn, Estonia, Project Manager

Working to develop an Environmental Economics and Accounting Programme, which includes project development, network development, as well as project work mainly related to the marine environment. Leading a Stockholm Environment Institute (SEI) cross-center project to develop a unified strategy on EU funding and EU policy.

5/2006-12/2007 **The Union of Baltic Cities (UBC), Environment and Sustainable Development Secretariat**, Turku, Finland, Project Coordinator (starting 09/2007) and Officer (05/2006-08/2007)

Worked to identify potential national, regional, EU and other funding opportunities for UBC and developing concepts, funding proposals, budgets, and consortiums for projects involving BSR cities. Involved in all aspects of managing a transnational project - SUSTAINMENT - involving the development of effective administrative organisation of sustainable development work within municipalities in the Baltic Sea Region (BSR), including Russia. Responsible for developing interactive online toolkit for SUSTAINMENT project results dissemination.

Project development themes include integrated management systems, cross-sectoral planning, exchange of best practices, stakeholder participation and awareness-raising in the waste management sector. Supported the further development of a twinning project between UBC and the network of local authorities in the Lake Victoria Region of East Africa, including content development, project reporting to funder and drafting of a North-South city-twinning manual.

3-10/2006 **Freelancing**, Turku, Finland, Project development/part-time
Project development related to cultural heritage and sustainable tourism in Estonia through identification of potential funding sources and partners for Wageningen University and Research Centre Tourism and Leisure Department. Client: TreeVelop Projects and Processes, NL

5/2001- **The Pachamama Alliance,** San Francisco, CA, USA

5/2004 Development and Event Manager for international environmental NGO

Accountable for fundraising program which grew over 3 years despite economic downturn. Responsibilities included overseeing and implementing donor relations program, including higher level donors, which total 500 members, maintaining current and developing new donor relationships, securing sponsorship and in-kind donations from private sector, and managing all aspects of community gatherings, volunteer meetings, workshops and a major 600-900 person annual fundraising luncheon. Also initiated grant-writing activities for organization and developed initial funding proposals.

2/2000- **United States Peace Corps,** Zhitomir, Ukraine

2/20001 Business Development Program - Business Educator

As a U.S. government Peace Corps Volunteer, my main role included teaching and developing curriculum (including a practical training course) at a university level business school. In addition, I worked with community-based organizations on grant-writing and organised workshops and seminars on various business topics, leadership, communication, sexual health education and HIV prevention, etc. at the university, local business centers and women's organizations. I also assisted the Consortium for Enhancement of Management Education (CEUME) in planning and executing two training workshops, preparing for their first USAID Review determining extension of project funding, and organizing a Junior Achievement pilot training program for economics teachers.

9/1997- **Conmark Systems, Inc.,** Atlanta, GA, USA

1/2000 Marketing Coordinator and Marketing Manager for SME in pulp/paper industry
Managed public relations, collaborated with strategic partners and company representatives on joint marketing ventures, coordinated participation in trade shows and promotional events, and developed and distributed promotional materials, including the company website. As Marketing Manager, I also developed and managed the marketing budget.

Skills

- Language Skills: Native English Speaker, Fluent in Finnish, conversational in German, basic Russian, beginning Estonian
- Environmental Interests: Certified as Urban Gardening and Composting Educator
- Other: Certified completion of e-Learning course on funding in the 2007-2013 EU Programmes
- Computer Skills: basic layout, website, and online project tool development

Annex IV. Short CVs for leaders of WPs, WTs and partners

Alf Vanags

Alfreds Vanags

b. 28.07.1942

Current position: Director: Baltic International Centre for International Policy Studies (BICEPS)

Education: University College, London, Kings College, Cambridge, London School of Economics

Degrees: BSc(Econ) 1st Class Hons; MSc(Econ)

Recent work experience:

March 2001 to present

Director: Baltic International Centre for Economic Policy Studies, Riga, Latvia

Type of business: research centre

Activities: research and administration

July 2005 to present

NMS Consulting, Riga, Latvia (Director)

Type of business: private consultancy

Activities: research, advice, project coordination

Prior to this I was an academic economist with experience in UK, Canada, Australia, Denmark, China, and the Baltic states and have also worked as a consultant for the World Bank, the UN Economic and Social Commission for Asia and the Pacific, OECD, and the UK Government Economic Service.

The work with BICEPS and NMS Consulting has involved participation, coordination and management of a wide variety of projects. Recent projects include:

- Evaluating the impact of the structural funds in Latvia: Ministry of Finance Latvia (2007-8)
- Optimising the tax benefit system in Latvia (Ministry of Welfare Latvia) (2005 -6)
- Regional Comparative Advantage and Knowledge based Entrepreneurship (RICAFE 2) (EU 6 FP) (2006 -2008)
- Creating a RTD (Research and Technology Development) Investment Policy for Regions in Emerging and Developed Economies (CRIPREDE) (EU 6FP) (2006-2008)
- Creative industries in Latvia (LR Ministry of Culture) (2006-7)
- Employment Initiatives for an Ageing Workforce in the New Member States: Lithuania report (European Foundation) (2006-7)
- Private sector R&D in the new member states: Latvia report (ETEPS) (2006)

Recent publications

'The Development of eServices in an Enlarged EU: eGovernment and eHealth in Latvia' with I. Moore (2008) http://www.jrc.es/publications/pub.cfm?id=1552

"The governance of employment and economic development in the Baltic states" Ch2 in *Baltic Partnerships: Integration, Growth and Local Governance in the Baltic Sea region* ed Sylvain Giguère (OECD 2007)

Chapter on economic and social rights in Latvia in *Democracy Audit of Latvia* President's Strategy Group (updated 2007)

"I-CUE Feasibility study of the microsimulation of the tax benefit system in Latvia" (with Mark Chandler) http://www.euro.centre.org/data/1157622201_21034.pdf

"Inflation in the Baltic states and other EU new member states: Is there a mystery to unravel?" (with Morten Hansen**)** BICEPS Research Report (May 2006) (http://www.biceps.org)

"Challenges of the EU new regulatory framework in electronic communications: an economist's perspective" TeliaSonera Institute Discussion Paper No 3 (October 2005)

"Research policy linkages in the Baltic states: comparative analysis of a natural experiment" (with Alari Purju**,** Sirje Pädam**,** Merlin Müür**,** Julia Alasheyeva**,** Valts Kalnins**,** Mark Chandler**,** and Virmantas Kvedaras) BICEPS Research Report (September 2005) (http:// www.biceps.org)

Chapter 8 on Latvia in *From Policy Takers to Policy Makers: Adapting EU Cohesion Policy to the needs of New Member States* Swedish Institute for European Policy Studies (September 2005)

Annex IV. Short CVs for leaders of WPs, WTs and partners

Natalia Volchkova

Natalya Volchkova Nakhimovsky prospect, 47, of. 720, 117418 Moscow, Russia. Phone: +7 (495) 1055002 ext. 227. Fax: +7 (495) 1055003. E-mail: nvolchkova@cefir.ru

Education

1997- 1999	Central Economics and Mathematics Institute, Moscow, Russia
	Postgraduate School
	Degree: Ph.D in Economics (Kandidat Nauk)
	Thesis: “Integration of Financial and Industrial Capital in Transition in Russia”
1996- 1998	New Economic School, Moscow, Russia
	Degree: Master of Arts (Economics) (Diploma cum laude)
1992- 1997	M.V.Lomonosov Moscow State University, Moscow, Russia
	Postgraduate School
	Department of Physics
1986- 1992	M.V.Lomonosov Moscow State University, Moscow, Russia
	Department of Physics
	Degree: Master of Science (Astronomy) (Honors)
	Major: Astrophysics

Work Experience

2007-Present	New Economic School, Moscow, Russia;
	Position: Assistant Professor
2000 – Present	Center for Economic and Financial Research, Moscow, Russia
	Position: Senior Economist
1998- Present	Central Economics and Mathematics Institute RAS, Moscow, Russia
	Department of Mathematical Economics

Position: Researcher

2002-Present	International College of Economics and Finance, Moscow, Russia
	Position: Lecturer in International Economics
1997- 2007	New Economic School, Moscow, Russia;
	Position: Lecturer in courses: Macroeconomics, International Trade, International Trade Policy
2001- 2002	Massachusetts Institute of Technology, Cambridge MA, USA;
	Departments of Economics;

Publications

“The Corporate Governance Role of the Media: Evidence from Russia” (with Alexander Dyck and Luigi Zingales), Journal of Finance (2008)

“Integration of banking and industrial capitals in export-oriented industries” (in Russian), Economic and Mathematical Methods, 2000, 3

“Human Capital, Industrial Growth and Resource Curse” (with Elena Suslova), CEFIR WP 2007

“Evaluation of the consequences of social reforms: monetization of social benefits and housing and communal services reform” (with co-authors), Moscow Public Science Foundation paper series “Independent economic analysis”, #179. M.: MPSF, ICSS, CEFIR, 2006 (in Russian)

“Reasons for Russia's energy dependent industrial structure: Dutch Disease vs. underdeveloped institutions” in “Role of Trade Policy and WTO Accession in Russian and CIS countries economic development”, World Bank, 2005

“Sectoral and regional analysis of industrial electricity demand in Russia” (with Svetlana Egorova), CEFIR WP 2005

“Microeconomic Estimation of the Consequences of Tax Reform” (with co-authors), Moscow Public Science Foundation paper series “Independent economic analysis”, #156. M.: MPSF, ICSS, CEFIR, 2004 (in Russian)

"Down and Up the Stairs: Paradoxes of Russian Economic Growth" (with co-authors) in "The Economic Prospects of the CIS: Sources of Long Term Growth", G. Ofer and R. Pomfred (eds.), Edward Elgar Publishing Ltd., 2004

Policy Projects “Analysis of potential sectoral diversification of Russian and CIS countries export flows on the basis of revealed comparative advantage” for Ministry of Economy of Russia, 2007 (project leader)

“The development of the methodology for quantitative analysis of the effects of trade agreements on international trade flows and competitiveness of Russian economy” for Ministry of Economy of Russia, 2006 (project leader)

“The development of the strategy of Russia-India economic cooperation till 2010”, for Ministry of Economy of Russia, 2006 (project leader)

“Analysis of the Monetary Policy Impact on the Banking Sector Development”, for Central Bank of Russia, 2005

“Sectoral and regional analysis of industrial electricity demand in Russia”, financed by Sweden International development Agency (project leader)

“Social and economic consequences of the Federal monetization reform in Russia” financed by Moscow Public Scientific Fund (project leader)

“Microeconomic Estimation of the Consequences of Tax Reform” financed by Moscow Public Scientific Fund (project leader)

“Methodology Design for Quantitative Assessment of the effect of trade agreements on the economic development and competitiveness of Russian Economy” for the Ministry of Economy and Trade of Russian Federation (project leader)

Grants

2005-2006 Moscow Public Science Foundation

2003-2004 Moscow Public Science Foundation

1997-1998

Center for Institutional Reform and the Informal Sector, (University of Maryland) grant

1998-2000 Economic Education and Research Consortium grant

2001 Global Development Network Explaining Growth Project: CIS country studies.

Languages Russian – native, English – fluent

Research interests Natural Resources, International Trade and Development, Development of Resource Economies, International Trade, Growth Theory, Corporate Finance

Membership American Economic Association

Annex IV. Short CVs for leaders of WPs, WTs and partners

Tomasz Zylicz

CURRICULUM VITAE

BIRTH:

Lublin (Poland); 22 September 1951

EDUCATION:

- Salzburg Seminar, Alumnus (managing environmental risk), 1987
- Warsaw University, Ph.D. (economics), 1979
- University of Wisconsin-Madison, graduate study (economics and mathematics), 1978/79
- Warsaw University, M.A. mathematics (distinction), 1977
- Warsaw University, M.A. economics (distinction), 1974

PROFESSIONAL EXPERIENCE:

- The Harvard Institute for International Development, Harvard University, Central and Eastern Europe Environmental Economics and Policy (C4EP) Project, Project Associate: 1995-1998
- The Beijer International Institute of Ecological Economics (The Royal Swedish Academy of Sciences), Valfrid Paulsson Guest Professor: 1992/1993
- Ministry of Environment

  Adviser to the Minister: 1991-

  Director, Economics Department: 1989-1991
- University of Colorado

  Economics Department, Fulbright Visiting Professor: 1988/89

  Environment and Behavior Program, Research Associate: 1988/89
- University of Wisconsin-Madison

  Economics Department, Honorary Fellow: 1979
- Warsaw University, Economics Department

  Dean: 2005-

  Chair, Microeconomics: 1996-2007

  Director, Warsaw Ecological Economics Center: 1993-

  Lecturer and Professor: 1979-

  Teaching Assistant: 1974-1978

BOARDS (selected)

- Scientific Advisory Committee: International Institute for Applied Systems Analysis (IIASA): 2004-
- Scientific Committee of the European Environment Agency: 2003-
- Polish Forum of Lisbon Strategy, Programme Board: 2002-
- *International Journal of Agricultural Resources, Governance and Ecology* (Inderscience Enterprises Ltd.), Editorial Board: 2000-
- *Ambio* (The Royal Swedish Academy of Sciences), Editorial Board: 1998-
- Center for Environmental Research (Warsaw University), Scientific Board: 1993-2005
- EcoFund Foundation (Warsaw), Supervisory Board, Deputy Chairman: 1992-2006; Chairman 2007-
- *Environmental and Resource Economics* (Springer) Managing Editorial Board: 1990-; associate editor: 1999-

RECENT RESEARCH PROJECTS (sample):

- NEEDS (New Energy Externalities): ISIS, 2004-, (benefits valuation studies)
- METHODEX (Methods of Environmental Externality Assessment): AEA Technology, 2004-, (case study development, agriculture and biodiversity)
- Social and economic conflicts in state forestry management: Institute of Forestry Research, 2000-2002 (economics team leader)
- Costs and benefits of the Lower Vistula Cascade Program: WWF-Poland, 2000- 2001 (economics team leader)
- Effectiveness and efficiency of the National Environmental Fund activities: Warsaw Ecological Economics Center, 2000 (team leader)
- Financing mechanisms for the municipal infrastructure investment: Agency of Municipal Development / World Bank; 1998
- Energy and Environment in Europe: Multiregulation at National and International Levels: ACE project coordinated by the Bremer Energie Institut (BEI); 1997-1999

PAPERS AND PUBLICATIONS (selected)

Costing Nature in a Transition Economy. Case Studies in Poland, Edward Elgar, Chelthenham 2000

"Goals, Principles and Constraints in Environmental Policies", in: H.Folmer and H.L.Gabel (eds.), *Principles of Environmental and Resource Economics. A Guide for Students and Decision-Makers*, Second Edition, Edward Elgar, Aldershot 2000, pp.204-228

"Reforming Environmental and Energy Policies in the Economic Transition Process" (Miroslaw Sobolewski -- co-author), in: Piotr Jasinski and Wolfgang Pfaffenberger (eds.), *Energy and Environment: Multiregulation in Europe*, Ashgate, Aldershot, 2000, pp.22-49

"Environmental Amenities on the Housing Market in Warsaw. Hedonic Price Method Research" (Marta Borkowska, Magdalena Rozwadowska, Jerzy Sleszynski -- co-authors) *Ekonomia* No. 3/2001, pp.70-82

"The Polluter Pays Principle and the Polish environmental funds system", in: Leszek Dziawgo and Danuta

Dziawgo (eds.), *Finance and Natural Environment*, TNOiK, Torun 2003, pp.587-599

"Instruments for water management at the drainage basin scale", *Ecological Economics* 2003, pp. 43-51

Ekonomia srodowiska i zasobow naturalnych, PWE, Warszawa 2004 [*Environmental and Resource Economics* (textbook)]

"Las jako dobro publiczne", *Zagadnienia Ekonomiczne* 1/2004, pp. 29-40 [Forest as a public good]

"Ekonomiczna wycena srodowiska przyrodniczego. Zarys problematyki", *Ekonomia i srodowisko* Nr 1(29) 2006, pp. 7-13 [Economic valuation of the environment. Outline of issues]

"Czy w ekonomii jednostki pomiaru cos znacza", *Studia Ekonomiczne* 3(L) 2006, pp.229-232 [Are measurement units in economics meaningful at all?]

"Sustainability Indicators: An Economists's View", in: Tomas Hak, Bedrzich Moldan and Arthur Lyon Dahl (eds), *Sustainability Indicators. A Scientific Assessment*, Island Press, Washington, DC, 2007, pp. 97-105

"Sustainability in economic theory" in: Bazyli Poskrobko (ed.), *Towards the theory of sustainable development*, Bialystok School of Economics, Bialystok 2007, pp. 109-122

"Godnosc czlowieka a trwalosc rozwoju gospodarczego" in: Barbara Piontek and Franciszek Piontek (eds.), *Zarzadzanie rozwojem: aspekty spoleczne, ekonomiczne i ekologiczne*, PWE Warszawa 2007, pp. 87-101 [Human dignity and economic sustainability]