BALANCE Conference

Delegate notes

25-26th of October 2007

The National Museum

Ny Vestergade 12

Copenhagen

Denmark

www.balance-eu.org

General information

This information gives the answers to some of the anticipated questions during the conference.

The BALANCE project

The BALANCE project is part-financed by the European regional development fund BSR INTERREG IIIB Neighborhood Programme and partly by the partners. The partnership consists of 27 partners from 9 countries surrounding the Baltic Sea incl. Norway.

Questions – In house information

If you have, any questions during the conference please see Malene Bjarnarson or Jill Nothlev at the registration desk on the 1st floor. If you have any questions regarding the National Museum, please go to the information desk in the lobby. Delegates are welcome to tour the public exhibition of the Museum.

Timing

The conference schedule is tight and we will try to ensure that the conference runs on time to allow the allocated time for the speakers and, as importantly, for discussion. Therefore, please be aware of the time & be seated at the scheduled start of each session.

Conference outputs

The power point presentations will be available shortly after conference on the BALANCE web site (www.balance-eu.org). We will notify you by email when these are available. There is a list of participants at the back of the delegate notes.

Posters

There are a number of posters presented at the conference. Please use the coffee breaks to browse through the stands. There is no separate poster session.

BALANCE products

The individual BALANCE Interim Reports is available at the BALANCE web site (www.balance-eu.org). Please join the BALANCE mail list at balance@sns.dk for news of up-coming reports and newsletters.

Food

Lunch is served as a buffet in the restaurant on the 1st floor across the hall from the conference room. Vegetarian options are available. Please move away from the buffet once you have obtained your food. There will be coffee during the breaks as well as fresh fruit at the afternoon break. There is not organized a conference dinner.

Valuables

If you have anything of value keep it with you i.e. do not leave laptops unattended as there is free access from the public exhibition. There is a wardrobe in the lobby. Check that you have not left anything in the conference room. Please also take any leaflets or reports available.

Welcome to the BALANCE Conference!

Towards marine spatial planning in the Baltic Sea Region

The BALANCE conference aims to bring together those involved in management of marine information, marine landscape & habitat mapping, designation of marine protected areas and marine spatial planning & management. The conference will present an overview of BALANCE activities and products and provide delegates to share information within and outside the BALANCE partnership.

The objectives of the conference will be to present a selection of BALANCE activities and to cover:

Session 1: Data management
- Present and discuss challenges in accessing and harmonizing data in a multi-national region, such as the Baltic Sea

Session 2: Towards marine landscapes in the Baltic Sea
- Present the process of developing marine landscapes in a Marine Region
- Discuss the potential application of broad-scale ecologically relevant maps in marine spatial planning within the Baltic Sea Marine Region

Session 3: Marine habitat mapping in the Baltic Sea Region
- Present a wide range of habitat mapping initiatives in the Baltic Sea
- Discuss future challenges for Baltic Sea marine habitat mapping

Session 4: Towards an ecological coherent network of marine protected areas
- Present the Blue Corridors principle and its relevance for designating an ecological coherent network of Marine Protected Areas in the Baltic Sea and Kattegat
- Present a systematic approach to selecting a representative network of Marine Protected Areas

Session 5: Marine spatial planning and management
- Present the BALANCE template for integrated marine spatial planning
- Present and discuss relevant management tools and GIS solutions

Session 6: Lessons learnt
- R&D projects in a Regional Seas context
- The EU Blue Paper
- Present our wishes to future initiatives

Programme

Day 1: Thursday 25th of October

09:00 **Registration**

Setting the scene…

10:00 **Why do we have a BALANCE?** – Niels Christensen, Director General, The Danish Spatial and Environmental Planning Agency
10:10 **The BALANCE conference** – Mark Duffy, Senior Policy Advisor, Natural England
10:25 **Keynote speaker: Why do Baltic Sea habitats and species need protection?** – Lasse Gustavsson, Executive Director, WWF Sweden

Session 1: Data: Identification, collection and compatibility (Chair: Jan Ekebom**)**

10:50 Data mining and collation: an overview – Johan Nyberg, The Geological Survey of Sweden
11:10 The need for data harmonization in a multinational region – Aarno Kotilainen, The Geological Survey of Finland
11:30 The BALANCE Data Portal – Lars-Kristian Stölen & Tomas Linberg, The Geological Survey of Sweden
11:45 General discussion

12:00 *Lunch*

Session 2: Towards marine landscapes in the Baltic Sea (Chair: David Connor**)**

13:00 Introduction
13:10 Benthic marine landscapes – Zyad Al-Hamdani, The Geological Survey of Denmark and Greenland
13:30 Topographic and physio-graphic marine features in the Baltic Sea – Anu Reijonen, The Geological Survey of Finland
13:50 Application of marine landscape maps – Johnny Reker, The Danish Spatial and Environmental Planning Agency
14:10 Synthesis – Jørgen Leth, The Geological Survey of Denmark and Greenland
14:25 General discussion

14:35 *Refreshments*

Session 3: Marine habitat mapping in the Baltic Sea Region (Chair: Anna-Leena Nöjd**)**

15:05 Introduction
15:15 Mapping of NATURA 2000 habitats – Sandra Wennberg, Metria Miljöanalys
15:35 Where is the fish? Habitat modelling and applications – Ulf Bergström, The National Board of Fisheries, Institute of Coastal Research
15:55 Modelling of submerged aquatic vegetation – Martin Isaeus, AquaBiota
16:15 Modelling of exposed reefs in SE Baltic coastal waters – Darius Daynus, CORPI
16:35 3D-modelling of pelagic cod habitats in the Baltic Sea – Stefan Neufeldt & Kerstin Geitner, The Danish Institute for Fisheries Research
16:55 Synthesis – Grete Dinesen, The Danish Spatial and Environmental Planning Agency
17:10 General discussion

17:30 *Closure for the day*

Programme

Day 2: Friday 26th of October

Session 4: Eological coherent network of marine protected areas in the Baltic Sea (Chair: Dieter Böedeker**)**

09:00	Introduction
09:10	Ecological coherence – Henna Piekäinen, The Finnish Environment Institute & Samuli Korpinen WWF Finland
09:30	Application of the Blue Corridors concept in the Baltic Sea – Georg Martin, Estonian Marine Institute
09:50	Up-stream / Down-stream ordering of habitats along a blue corridors – Jørgen Hansen, The National Environmental Research Institute
10:10	Systematic selection of a representative MPA network – Anna-Sara Liman, WWF Sweden
10:30	Synthesis – Åsa Andersson, WWF Sweden
10:50	General discussion
11:00	*Refreshments*

Session 5: Marine spatial planning and management (Chair: Jesper H. Andersen**)**

11:30	Introduction
11:40	A template for marine spatial planning in the Baltic Sea – Jan Ekebom, The Natural Heritage Service, Finland.
12:00	GIS tools for marine spatial planning and zoning examples – Timo Pitkänen & Martin Snickars, The Natural Heritage Service, Finland
12:20	Stakeholder engagement in marine spatial planning – Christiane Feucht, WWF Germany
12:40	Application of pelagic cod habitat models: a spatial management approach – Thomas Sørensen & Ole Vestergaard, The Danish Institute for Fisheries Research
12:55	Synthesis – Jochen Lamp, WWF Germany
13:10	General discussion
13:30	*Lunch*

Session 6: Lessons learnt (Chair: Hanne Kristensen**)**

14:30	Linking HELCOM activities with RTD activities with special reference to BALANCE – Juha-Markku Leppänen, Helsinki Commission
14:55	The EU Blue Book, Nicole Schafer, EU Commission, DG Fisheries and Maritime Affairs
15:20	Lessons learnt and our wishes for the future – Per Nilsson, University of Gothenburg
15:50	Wrap up & closing remarks – Mark Duffy, Jesper H. Andersen & Johnny Reker
16:00	*Closure*

Session 1: Data: Identification, collection and compatibility
(Chair Jan Ekebom, The Natural Heritage Service, Finland)

Data mining and collation: an overview
Johan Nyberg, The Geological Survey of Sweden

The production of Marine Landscape and Habitat maps requires a large amount of data. Collation of metadata and data is thus very important. Metadata are 'data about data' and are extremely valuable when searching for information as well as when trying to make judgements about its usefulness and quality.

In addition, since resulting maps are not better than the data used to create them, the development of internationally agreed Protocols and Standards is crucial for a consistent approach to mapping programmes and facilitation of data exchange and aggregation. Protocols apply to methods and ensure consistency in survey methodology, consistency in data interpretation, and common methods for extrapolation, interpolation and aggregation of data across spatial scales.

Standards apply to data and ensure quality assurance of data, common terminology and formats, and compatibility of data between different techniques and technologies. Standards and protocols need to be established for each of the main mapping techniques, together with various combinations of techniques.

Here, an overview of existing standards for data collection, management and collation is presented.

The need for data harmonization in a multinational region

Aarno Kotilainen, Kotilainen, A.T.[1], Reijonen, A.[1], Nyberg, J.[2]

[1]Geological Survey of Finland
[2]Geological Survey of Sweden

Approximately 3 billion people around the world live within 200 km of a coastline (Creel 2003). This growing coastal population and increased activities in coastal and marine areas have threatened the marine environment worldwide, also in the Baltic Sea. To implement ecosystem-based management for sustainable use of the marine resources and protection of marine nature, effective tools are needed. The Marine Landscape and Habitat maps are one of those urgently needed tools. However, to produce this information for the whole Baltic Sea, a large amount of data is needed. Especially in a multinational region, like in the Baltic Sea region, this task is very challenging.

The existing national and international data is numerous, but very diverse. Marine spatial data (geophysical and biological) has been derived using different field techniques during the past decades. Terminology and classifications vary as well, since 10 different circum-Baltic nations (Norway included) have interpreted their own data (e.g. seabed sediment) according to different national classification schemes. Harmonization of national categories to one classification scheme is essential for interoperability. Also, international standards are needed for the data used for the derivation of marine landscape classification and mapping. This is valid also for data collection and management. The importance of international standards for the harmonization of spatial data sets has been acknowledged in several international connections (e.g. The INSPIRE Directive).

Here, we present a BALANCE seabed sediment classification scheme, which consists of five substrate classes and existing standards for data collection, management and collation.

References:

Creel, L., 2003. Ripple effects: Population and coastal regions. In Population Reference Bureau. Retrieved 12:52, October 17, 2007 from http://www.prb.org/Publications/PolicyBriefs/RippleEffectsPopulationandCoastalRegions.asp

Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE). Retrieved 21:19, October 17, 2007 from http://www.epsiplus.net/epsiplus/media/files/l_10820070425en00010014

The BALANCE Data Portal

Lars-Kristian Stölen & Tomas Lindberg, The Geological Survey of Sweden

A GIS Portal or a spatial data portal is the gateway to a spatial data infrastructure (SDI) and act as the broker between users and service providers. Portals allow users to search and browse published services. If the user finds an interesting service, the portal passes the user directly to the service provider. The user can access up-to-date information through a single point of entry and service providers only need to update one location to reach many users. Portals provide tools to search or find spatial information. The spatial search tools may display a map and allow users to define an area of interest. Other search techniques may allow users to select services by querying metadata.

The GIS Portal used in the BALANCE project is implemented using GIS Portal Toolkit 2 developed by ESRI Inc. The GIS Portal offers end user functionality (e.g., searching metadata, sorting results, customizing views and browsing metadata records by categories), administrator functionality (e.g., record administration, advanced searches and sorting) and publisher functionality (e.g., ability to enter metadata, upload documents and remove previously published documents).

The GIS Portal Toolkit allows for some basic localization and customization, but to adopt the overall organization and functionality is more cumbersome and has not been part of the BALANCE project. The localization and customization carried out has focused on creating relevant documentation, a BALANCE start page, and map services covering the project area to be used for geographical searches and background in the map viewer application. Channels or categories have been created for every partner to be used for browsing the content of the Portal. Metadata requirements and basic guidelines on how to create and publish metadata were made available on the Portal to support publishers of metadata.

Since put in production the application has been running very stable with few disturbances. However, there have been some disturbing problems mainly related to uploading of ISO-formatted metadata. After the BALANCE Data Portal had been running during 2006 a user survey was conducted among the partners to evaluate the use of the Portal. The experience of the search and display functionality was in general positive, but there was a disappointment with the number of metadata documents published.

The less than expected number of documents published might in part be explained with the difficulty in publishing metadata created in the ISO-editor in the ArcCatalog™ application which often has made it necessary to use manual entry in the on-line form. A probable explanation is also that it has been up to every partner to decide what resources or data types that should have metadata published on the BALANCE Data Portal, and that the requests for data has found other channels.

This situation focuses on that a lot of work has to be put into organizational issues when running a data portal. The BALANCE Data Portal would probably have benefited from a more formalized cooperation between data producers, data users and Portal administrators.

Session 2: Towards marine landscapes in the Baltic Sea

(Chair: David Connor, The Joint Nature Conservation Committee, UK)

Benthic marine landscapes

Zyad Al-Hamdani, The Geological Survey of Denmark and Greenland

The Baltic Sea is one of the largest brackish water bodies in the world in which human activities (industrial, leisure, resources extraction etc.) are escalating progressively. This causes the deterioration of the Baltic Sea marine environment that eventually affects the habitats in the water column as well as on the seabed. To ensure a sustainable future development of the Baltic Sea region, an eco-system based approach to human activities management is urgently required. A tool for broad-scale mapping of the seafloor was developed through the BALANCE project for promoting a transnational and cross-sectoral approach to marine spatial planning within the Baltic Region.

The tool development was built on a technique proposed by Roff and Taylor (2000) to map the Canadian waters. It is based on using available geological, geophysical, chemical and hydrographic data to map broad-scale marine landscapes in the Baltic Sea. Each marine landscape is individually distinctive and reflects broad-scale species assemblages. Three environmental parameters were used to identify ecologically relevant entities in the Baltic Seabed. These parameters have significant influence on the distribution of the benthic species assemblages. Seabed sediment, photic depth and bottom salinity are the three chosen environmental parameters. Sediment was split into five categories each with a different ecological relevance. The available light at the seabed is the second parameter where the photic zone, where the primary production takes place, is distinguished from the non-photic zone. Salinity was split into six categories reflecting species distribution through out the Baltic Sea.

The combination of the three chosen parameters in a GIS platform enables the production of the benthic marine landscape map for the Baltic Sea. There are sixty distinctive marine landscapes each with a different combination of the overlaid environmental parameters.

This ecologically relevant marine landscape map can be applied as an ecological parameter for broad-scale marine spatial planning, thus contributing to knowledge-based management of our marine environment and long term goal of achieving sustainable economic development within the Baltic Sea region.

Seabed topographic and physiographic marine features of the Baltic Sea
Anu Reijonen and A. T. Kotilainen, Geological Survey of Finland

Three different types of marine landscapes have been identified in Balance: coastal physiographic features, benthic marine landscapes and seabed topographic features. Marine landscape has been considered as generic concept, including the bed-form features. We will present identification of topographic and physiographic features of the Baltic Sea. We will also discuss about challenges encountered and landscape-habitat relation.

Topographic features add information on seabed, its physical complexity and patchiness, to benthic landscapes. Topographic features base on marine geological and bathymetry data. In order to reveal seabed structures we have modelled bed-forms from bathymetry by Benthic Terrain Modeller. Bed-forms were combined with geological data and photic zone. As a result we have identified 18 topographic features from the Baltic Sea (e.g. mound-sand-photic; plain- coarse sediment).

Coastal features characterise coastal areas where seabed and water column are interlinked. Coastal physiographic features are identified on the basis of coastline and bathymetry data. We have defined 5 (7) coastal features from the Baltic Sea (e.g. bay, archipelago) that cover about 15 % of the total study area.

Application of marine landscape maps
Johnny Reker, The Danish Spatial and Environmental Planning Agency

In the approach applied for the mapping of marine landscapes of the Baltic Sea three types of seabed features were identified. These are: the topographic/bed form features map, the physiographic features map, and the benthic features map.

The topographic features are characterising and conceptualising vast areas of the sea normally only illustrated by coarse Navigational Charts, and are providing helpful strategic information as well as visualising on the overall topographic layout of the seabed. The coastal physiographic features characterise the coastal zone. This map represents the region of the sea with the highest concentration of human activities and interests. It is thus highly relevant as a basic layer for integrated coastal management. The seabed features identified by their physio-chemical characteristics are important for providing an overview of the potential distribution and diversity of marine natural values, and if correctly applied, can contribute towards a sustainable development.

The marine landscape maps can be used in connection with human activities and their impact or as a measure for environmental assessments of e.g. the representativity of marine protected areas within an ecoregion. Several EU Directives (EC Habitats Directive, EU Water Framework Directive and the proposed EU Marine Strategy Directive) and regional initiatives (e.g. the Baltic Sea Action Plan) require spatial information of the marine environment. Marine landscape maps provide such transnational information covering the marine ecosystems and where possible care should be taken to identify synergies and promote convergence between EU Directives and the utilisation of the maps.

In order to fully exploit ecological maps for marine spatial planning it is necessary that socio-economic data covering leisure activities, commercial fishing, marine aggregates, shipping, offshore wind farms etc. are made available in compatible data formats. This merging of interests would provide an informed base for a discussion on how large a proportion of a national or regional natural resource/landscape is actually impacted by specific anthropogenic activities. Of course this would require the various sectors to realise that mutual benefits arise from cross-sectoral cooperation rather than "*one sector – one spatial approach*".

The potential uses and applications of the marine landscape maps are many. The intention with the examples presented here is only to provide food for thoughts for potential users and is not in any way exhaustive or meant to show the full picture and relation to e.g. implementation of policy documents. It will be up to the EU Member States, and neighbouring countries such as Russia, to develop the full application of this type of information for the marine environment.

Together, the three types provide a broad-scale spatial overview of the complexity and diversity of the marine environment in the Baltic Sea and provide environmental managers and planners with valuable information for implementing an ecosystem-based approach to management.

Synthesis
Jørgen Leth, The Geological Survey of Denmark and Greenland
Please refer to the presentation available at www.balance-eu.org.

Session 3: Marine habitat mapping in the Baltic Sea Region

(Chair: Anna-Leena Nöjd, The Finnish Environment Institute)

Mapping of NATURA 2000 habitats

Sandra Wennberg, Metria Miljöanalys

The EU Habitat Directive is a Community legislative instrument in the field of nature conservation. Eight subtidal habitats are present in the BALANCE pilot area 3; 1) Sublittoral sandbanks (1110), 2) Estuaries (1130), 3) Coastal lagoons (1150), 4) Large shallow inlets and bays (1160), 5) Reefs (1170), 6) Baltic esker islands (1610), 7) Boreal Baltic islets and small islands (1620) and 8) Boreal Baltic long narrow inlets (1650). All but 1650 are mapped.

The methods used are a combination of raster analyses, overlay and Boolean selections. Data used in the analysis are general maps (land, sea, lakes, rivers, elevation, land cover), nautical charts, wave exposure and bottom substrates. The results are one GIS-layer per habitat that may overlap each other. The methods are very direct, quite easily harmonized over national boarders and well suited for this type of mapping. The resulting maps give managers overview, makes it possible to compare area coverage (e.g. protected/ unprotected) and to do large scale planning of the coastal sea.

Where is the fish? Habitat modelling and applications

Ulf Bergström[1], Göran Sundblad[1], Lena Bergström[1], Alfred Sandström[2]

[1] Swedish Board of Fisheries, Institute of Coastal Research.
[2] Swedish Board of Fisheries, Institute of Freshwater Research.

Young fishes are often dependent on certain habitats for their survival, and protecting these habitats may be crucial for maintaining healthy stocks. An important step in providing sufficient protection for such essential fish habitats is reliable large-scale habitat mapping. Spatial predictive modelling, where statistical models relating species occurrence to environmental variables are coupled to geographic information systems (GIS), offers a cost-efficient way of producing this kind of large-scale maps. This approach was used for high-resolution mapping of spawning and nursery areas of a number of common coastal fishes in the large, complex, Swedish-Finnish archipelago area in the Northern Baltic Sea.

Generalized additive models (GAM) were fitted to describe the relationship between fish occurrence and habitat variables. The modelling results show that using only a few environmental predictors, maps that capture the main patterns of occurrence can be generated. Besides being directly utilised in spatial planning by nature conservation and fisheries management authorities, the maps produced have been used in an interregional evaluation of the level of protection of fish habitats. It is concluded that the Natura 2000 habitats have the potential to protect essential fish habitats, but that the current network within this 30.000 km^2 archipelago area is not ecologically coherent with regard to the species studied.

Modelling of submerged aquatic vegetation
Martin Isæus, AquaBiota Water Research

Submerged vegetation has successfully been modelled within BALANCE pilot areas 1 (the Skagerrak), 3 (the Stockholm Archipelago Region) and 4 (The Gulf of Riga and Lithuanian coast) using the same modelling method named GRASP. Akaikes information criterion (AIC) was used as a method for model selection in all studies. In this presentation Bladderwrack *Fucus vesiculosus*, eelgrass *Zostera marina* and Charophytes modelling was compared geographically wihin the Baltic SeaRegion. This is done by using BALANCE results from 3 countries complemented with some extra modelling results from Sweden and Norway. We found that *wave exposure* was the predictor that was chosen most frequently in the model selection, in all cases when available. *Depth* was chosen as a predictor in 8/9 cases. *Slope* was also frequently selected, although the factor is very scale-dependent and has to be used with care. *Marine geology*, substrate, is not often mapped at a detailed level suitable for vegetation modelling. Therefore a variety of solutions were chosen to overcome this lack of important input data. Geology was selected less frequently by AIC, probably a consequence of the poor geology layers that did not improve the models much.

Within the BALANCE project it was also investigated if data on macroalgae from the Norwegian monitoring program was suitable for spatial modelling. This was examined by comparing predictions of kelp *Laminaria hyperborea* based on only monitoring data to predictions based on a much larger data set. It was concluded that the monitoring data was not useful for spatial modelling since the geographical distribution of field stations did not cover the full range of important environmental gradients. However, the modelled prediction of kelp based on the large dataset is a map layer useful for coastal management since kelp forests are known to be a diverse and valuable marine habitat in Norway.

Several spatial predictions of phytobenthic plant species will be shown and discussed during the presentation, as well as methodological aspects and future steps.

Modelling of exposed reefs in SE Baltic coastal waters

Darius Daunys[1], Bärbel-Müller Karulis[2], Jonne Kotta[3]

[1]Coastal Research and Planning Institute, Klaipeda University, Lithuania
[2]Latvian Institute of Aquatic Ecology, Latvia
[3]Estonian Marine Institute, Tartu University, Estonia

Adequate protection of valuable habitats within NATURA 2000 network highly depends on knowledge of their spatial distribution. Therefore development of tools aiming at prediction of marine habitat distributions directly meets the needs of nature conservation by providing information for spatial planning.

Modeling of reefs' spatial distribution has been carried out in three areas of the BALANCE project Pilot Area 4 (eastern Baltic). The same multivariate statistical approach (GAM with a binomial distribution of a response variable) was used for modeling of reefs formed by perennial macrophyte species (red algae *Furcellaria lumbricalis* or brown algae *Fucus vesiculosus*). Bathymetry, sediment composition and exposure were common environmental variables included in the models, however different approaches have been used to quantify these parameters. For instance, due to limitations in applicability of classical fetch approach in exposed coastal waters, orbital wave velocity at the seabed and different slope measures were tested. Different categories of sediment were also used in the models depending on data availability.

The results showed exposure being the most significant factor explaining reef occurrence in more exposed areas of the eastern Baltic (along the Latvian and Lithuanian coast in the Baltic Proper), whereas depth occurred to be of primary importance in more sheltered waters (along the Saaremaa Island in the Gulf of Riga). Models explained from 30% (in more sheltered waters) to 50-60% (in more exposed waters) of the total deviance and this resulted in 13-27% of false predictions. Although predictive capability of the models differed between areas, generally they tend to overestimate the distribution areas of reefs.

These modeling exercises clearly demonstrated high potential of deterministic modeling in the habitat mapping activities. They were also effective in proving the level of our understanding of the marine habitat ecology. On the other hand, models showed high sensitivity to the quality of the input data, therefore increase in accuracy of spatial predictions can be reached if higher resolution of sediment and bathymetry data will become available. Nevertheless, lower resolution models may still be useful in other areas with similar environmental conditions in order to gain background knowledge on potential distribution of reefs.

3D-modelling of pelagic fish habitats in design of dynamic fishing closures

Stefan Neufeldt & Kerstin Geitner, The Danish Institute for Fisheries Research, Technical University of Denmark.

Baltic cod in decline

High fishing pressure and unfavourable environmental conditions have rendered the Baltic cod population at historically low levels and the stock has in recent years been considered outside *"biologically safe limits"* by the International Council for the Exploration of the Sea (ICES 2007). The recruitment of cod is low due to low oxygen and salinity conditions since the mid-1980's as a result of eutrophication and lack of inflow of saltwater to the Baltic Sea, causing increasingly unfavourable conditions for cod reproduction, including oxygen related egg mortality. In addition, increasing predation pressure on cod eggs by sprat has contributed substantially to the low cod recruitment levels. The Bornholm Basin is currently the only large, active spawning ground for cod in the Baltic Sea. On this basis, the EU Commission has implemented a number of closed areas and seasons for Baltic cod fisheries to maximise the spawning success of Baltic cod .

To assist in determining optimal location, size and timing of closed areas in the Bornholm region, models and GIS-visualisations have been developed to describe the location and annual variability of cod pelagic habitats, including spatial and temporal dynamics of different life-stages.

2D-mapping of cod life stages in the Baltic Sea and Bornholm Basin

Basic 2D-visualisations were conducted of the seasonal variation of ambient hydrographic conditions for different life stages of cod as well as cod eggs and larvae, distribution of adult cod based on catch per unit effort data from trawl surveys, as well as the ratio between female and male cod. Interpolation between sampling points was performed for the different variables to optimise the visual interpretation of data.

In order to achieve successful fertilisation and development of eggs, the Baltic cod is dependent on sufficient oxygen and salinity levels, and to a lesser degree temperature, in the water column at specific times of the year, i.e. salinity > 11 psu; oxygen > 2 ml/l and temperature > 2° C. The water volume that fulfils these threshold limits is termed the 'reproductive volume'. 2D-visualisations were developed to indicate the annual distribution of water masses with favourable hydrographical conditions for cod egg survival based on hydrographic data measured through CTD (salinity, temperature, oxygen) profiles between 1994 and 2005. These maps indicate that the majority of the Baltic Sea provides little or no favourable spawning habitat for cod. In contrast, successful cod spawning is possible in the Bornholm Basin, underlining the current importance of the Bornholm Basin as the only large, active spawning ground for Baltic cod.

3D-mapping of cod spawning habitat

3D-mapping was carried out to describe the dynamics of the 'reproductive volume' of the Baltic cod, i.e. the water volume with favourable conditions for cod egg survival. Maps were developed to indicate the annual variability of observed distribution of different cod life stages (egg, larvae, adult) against modelled favourable environmental conditions. Three dimensional pelagic habitat maps for each specific life stage have been modelled applying known thresholds in temperature, salinity and oxygen using 3D-hydrographic model outputs, as well as to *in situ* measurements of CTD data, for given time intervals.

The 3D-maps show that the reproductive volume varies from year to year according to changing environmental conditions, with successful spawning habitat size depending largely on varying levels of inflow of saline, oxygen rich water from the North Sea into the Baltic Sea during Spring, mostly as a result of westerly or southwesterly winds during winter.

Application in area-based management of Baltic cod

Results provide evidence of a strong habitat association, i.e. that bathymetric and hydrographic factors significantly influence the spatial distribution of different life stages of Baltic cod during the spawning season. This information can be used to design fishing closures that reflect the dynamic nature of the habitat that is the object of protection.

Reference:

ICES 2007. Report of the ICES Advisory Committee on Fishery Management, Advisory Committee on the Marine Environment and Advisory Committee on Ecosystems, 2007. Book 8. The Baltic Sea.

Synthesis - Marine Habitat mapping in the Baltic Sea Region

Grete Dinesen &, Anna-Leena Nöjd[2]
[1]The Danish Spatial and Environmental Planning Agency
[2]The Finnish Environmental Research Institute

In the project BALANCE, the aims of mapping of marine habitats were to evaluate the requirements, availability, and applicability of 1) existing environmental and biological data, 2) GIS analyses for spatial detection of EC Natura 2000 Annex 1 habitats, and 3) spatial modelling for prediction of geographical distribution of selected species of algae, plants, invertebrates and fish species.

The case studies, carried out in four pilot areas, show that scale matters - we need to consider variation in space (grain size, extent) and (time). 1) Data on basic geological and physiographic features are often not available at the scale needed (appropriate grain size and extent), and data on biological features do not cover the gradients and extent needed. 2) GIS analyses are appropriate for mapping of physiographic and geological features, and make it possible to capture several of the Natura 2000 Annex 1 habitats, but not all. Mapping of e.g. sand banks and reefs requires validated, high resolution (grain size of 0.1 m^2) maps of topography and substrate. 3) Spatial predictive modelling is a cost-efficient way to develop fine grained, large extent distribution maps of habitats of marine organisms. The extent (i.e. area covered) of the maps depends on biological data covering the full range of the environmental gradients. Spatial biological data as well as fine grained data on substrate and topography are needed to produce valid maps applicable for management. Predictive modelling should be used to establish the distribution of species of ecological importance. When combining all maps, the resulting master map should cover the extent of the entire Marine Region. Achieving the latter requires a classification system common to the Baltic Sea region be developed.

Three messages to take home:
First, development of an ecological functioning marine protected areas network (e.g. Natura 2000), requires adoption of a holistic approach to protection and management of nature and it's services. It is advocated that nature conservation and fisheries management is integrated through close, cross-sectoral cooperation. Such integration could facilitate further the development of common marine spatial planning systems.

Second, collection of marine data should be harmonized between bordering countries, and be integrated into existing monitoring programs to ensure best value for money. Guidelines of a common approach to mapping and modelling of each marine habitat in the Region should be developed.

Thirdly, a habitat classification system common to the Baltic Sea region should be developed, compatible with systems of adjacent seas. The system should cover all organism of importance and be developed using a bottom-up approach, as the inner Danish waters 100 years ago, but using modern sampling techniques and statistical methods, as for the marine waters of the UK recently.

Session 4: Eological coherent network of marine protected areas in the Baltic Sea
(Chair: Dieter Böedeker, The German Federal Agency for Nature Conservation)

Ecological coherence of the Baltic Sea MPA network
Henna Piekäinen, The Finnish Environment Institute & Samuli Korpinen WWF Finland

Ecologically coherent networks of protected areas, also in the marine area, are required by many international conventions. As a result, networks of marine protected areas (MPAs) have been established also in the Baltic Sea. The network of Natura 2000 areas are required by the EC Habitats and Birds Directives and the network of Baltic Sea Protected Areas (BSPAs) are required by the HELCOM recommendation 15/5. Although ecological coherence of the Natura 2000 network is a requisite set in the Directives, the ecological coherence of the current Natura 2000 network has so far not been assessed.

The aim of our work was to develop practical criteria and a first set of tools that can be used repeatedly to assess ecological coherence of the Baltic Sea MPA networks. We adopted four central criteria from the previous work carried out in developing criteria for ecologically coherent networks of MPAs. In order to be ecologically coherent the network should 1) be *adequate* in terms of MPA size, shape and quality to fulfill its aims, 2) ensure *representativity* of the features (species, habitats or landscapes), i.e. include all features it is aiming to protect, 3) include *replicates* of each feature to ensure natural variation of the feature and to give insurance against catastrophic events, and 4) ensure *connectivity* by enabling dispersal and migration of species within and between MPAs.

In order to take a step forward, we turned these theoretical criteria to measurable units to develop tools to assess ecological coherence of the Baltic Sea MPA networks. When assessing the Natura 2000 network, our primary aim was to look at Special Areas of Conservation (SACs), which aim to protect benthic habitats, and secondarily Special Protection Areas (SPAs), which aim to protect avian fauna and forbid actions endangering bird species in the area. Currently, biological data available in the Baltic Sea is scarce and therefore benthic marine landscape maps produced in the BALANCE project were used as proxies of biological communities in the assessment. However, as also maps of marine habitats listed in the EU Habitats Directive were produced for a pilot area, we took the opportunity to test the tools developed also with these habitat maps.

We found that at the Baltic Sea scale the Natura 2000 network covered sufficiently (over 20% coverage) only 18% of the benthic marine landscape types. Particularly all the non-photic landscape types need considerably more protection, meaning that new SAC sites should be designated especially to the offshore areas. The size distribution of the SACs was biased to small sites and the situation did not improve significantly when the SPA sites were combined to the SAC network. On the other hand, replication of the landscape patches within the network was generally very good, which results most likely from the natural patchiness of the Baltic Sea marine landscapes. The connectivity assessment was carried out with 25km distance for widespread benthic marine landscape types and with 1-100km distances for sets of marine landscape types, combined according to requirements of selected species. The assessment with 25-100km distances showed that most of the landscape patches were well connected, but as expected, short-distance dispersers (1km dispersal distance) have poor connectivity within the current network.

The present assessment of ecological coherence of the Baltic Sea MPA networks is a first attempt in the region and due to its large scale and the coarse resolution of the datasets used the results should be evaluated as a general overview and the first step towards further assessments. The use of proxies of biological communities can be used as a first approach, but in order to improve the assessment, better ecological data is needed. We also acknowledge that several aspects were not considered in the assessment, such as quality of the habitats (e.g. water quality, oxygen depleted areas, areas of strong human impact), currents and other water movements aiding propagule dispersal among habitat patches or life histories of species assessed. These are important considerations in the future assessments. Nevertheless, this assessment already shows that there is still a lot to be improved in the current marine Natura 2000 network in the Baltic Sea.

Reference:

Piekäinen, H & Korpinen, S (eds.) 2007: Towards an Assessment of Ecological Coherence of the Marine Protected Areas Network in the Baltic Sea Ecoregion. Balance Interim Report No 18.

Application of the Blue Corridors concept in the Baltic Sea

Georg Martin, Estonian Marine Institute,

(Co-authors: Anita Mäkinen, Åsa Andersson, Grete E. Dinesen, Jonne Kotta, Jørgen Hansen, Kristjan Herkül, Kurt W. Ockelmann, Per Nilsson, Samuli Korpinen)

The assessment of coherence and connectivity of MPA networks in the Baltic Sea requires the identification of possible ways of improvement of the current situation. This could be achieved either by enlarging the amount of the sea area covered by MPA network or improving the connectivity between the protected habitats by establishment of a so called "Blue corridors" system covering the entire sea area.

A blue corridor can be considered as a channel or a route of particular importance for the population exchange between locations and of importance for the maintenance biogeographical patterns of species and communities. Blue corridors are shaped either by biological mechanisms thus describing the possible route, or the route of choice of migrating motile organisms or the corridors can be shaped by physical factors when biota is transported passively. In the context of planktonic dispersal, passive transport, blue corridors should refer to non-random biogeographical patterns of benthic organisms established by routes of dispersal via currents.

Identification of the relevant scales of variability in space and time is a prerequisite to understanding factors and processes generating patterns in biotic and abiotic components of ecosystems. Different processes operate at different spatial scales and that processes operating at small scales can influence large-scale patterns.

There are both supporting and rejecting evidence for the "Blue corridors". The support or objection depends on the role active behaviour the organisms are expected to show. Models based on passive behaviour predict high connectivity between MPAs, whereas active behaviour seems to lead to retention in the upstream area. Thus, the connectivity of the areas seems to depend on the characteristics of the organisms and, if one is active, on the choice on the organism to disperse downstream.

The conversion of continuous habitat to small isolated patches (i.e. habitat fragmentation) generally decreases the reproductive output, movement, survival, and population size of many species. Scientific evidence show that fragment size influence species loss, small fragments lose species at a higher rate than larger fragments, corridors reduce rates of species loss, but only in medium-sized fragments, corridors enhance re-colonization of medium-sized fragments, the preferential movement in corridors is species specific.

Baltic Sea species show large spatial dispersal at larval phase and, in case of migratory or pelagic species, at adult phase. How this connects different areas to each other remains still largely unknown, because many larvae can be confined to certain nursery areas close to the spawning area by active use of local water circulation patterns rather than passively drift by the currents. Also the semiplanktonic strategy, suggested that planktonic larvae may retain near shoreline or littoral bottom and, thus, population mixing is probably not a rule and the connectivity of areas weak.

International research and experiences show that the maintenance of genetic variation can be a conservation or resource management goal in itself. Furthermore, genetic information is also together with ecological and life-history data a powerful tool when designing MPAs.

There are plenty of international examples of involvment of connectivity matters in MPA planning but this approach has so far been very weakely implemented in the Baltic Sea area. Application of "Blue corridor" principle in wide-scale spatial planning can contribute to considerable improvement of the situation.

Modelling the mean state of hydrography and blue corridors in the Kattegat and Baltic Sea

Jørgen L.S. Hansen, Johan Söderkvist, Jørgen Bendtsen, Karsten Dahl, , The National Environmental Research Institute

Hydrographic input to the Marine Landscape maps, and model simulations of the spreading of tracers in the Baltic Sea, Kattegat are presented. The hydrographic input show climatological distribution of temperature and salinity at the bottom in the Baltic Sea. The hydrography is created from a combination of observations at several monitoring stations, and model computations, using a three dimensional hydrodynamic model. Furthermore is the interconnection between nine different stone reefs is presented. The "Blue corridors" concept is implemented by studying the release of tracers in the Kattegat – Belt Sea region. The tracer experiments for the Baltic Sea are focused on spreading routes for a six month period, simulating transport over a period of more than one generation of planktonic life stage. The tracer released in Kattegat have a decay rate of 0.2 per day, simulating mortality. The tracer experiment in the Kattegat show the spreading pattern from reef habitats on a weekly time scale.

Systematic selection of a representative MPA network

Anna-Sara Liman[1], Åsa Andersson,[1] Annette Huggins[2], [1] WWF Sweden, [2] The Nature Conservacy

The importance of establishing representative and coherent networks of MPAs have been underlined by e.g. the Convention on Biological Diversity. Regional agreements within HELCOM and the European Union further state the importance of establishing a coherent network of marine protected areas in the Baltic Sea. A systematic approach to site selection has been recommended by conservation experts as it maximises the chance of creating MPA networks that meet the conservation criteria and objectives, ensures a transparent and defensible process while making efficient use of available resources. Despite this, a regional systematic approach to site selection has so far been lacking in the Baltic Sea. The designation process has been very slow and often done on an ad-hoc, site by site basis without regional coordination.

The BALANCE project has introduced and tested a systematic approach to select a network of marine protected areas which aims to represent the full range of biodiversity and ecosystem functions in the Baltic Sea and at the same time attempts to minimise the cost and impact on other interests. The computer based decision support tool MARXAN was used to demonstrate the selection of a representative network of marine protected areas representing a minimum of 20 percent of all benthic marine landscapes in the Baltic Sea as well as adequate amounts of some selected species and habitats. Scenarios demonstrating a lower and a higher representation target (10 and 30 percent representation of all benthic marine landscapes) were also considered. One of the main principles has been to build on already existing MPAs by selecting new sites that complement already designated sites under the Habitats Directive.

The result presented should be seen as a first step in a continuously improving and iterative MPA-planning process, aiming towards a coherent, well managed network of sites representing the whole range of marine biodiversity in the Baltic Sea. A regional systematic approach to selecting a representative network of sites is required for a successful implementation of regional agreements and international obligations but it is also a key component in a broad scale ecosystem based spatial planning process in the Baltic Sea.

We could conclude that it is possible to apply a broad scale systematic approach in the Baltic Sea region. We believe that a regional approach must be systematic and we can therefore not see any defensible reasons to go back to selecting protected areas site by site. Using decision support tools such as MARXAN secure an efficient process and increase the likelihood that the selected network make efficient use of available resources and satisfy the whole range of ecological and socio-economic goals.

Synthesis

Åsa Andersson,WWF Sweden.

Please refer to the presentation available at www.balance-eu.org.

Session 5: Marine spatial planning and management

(Chair: Jesper H. Andersen, DHI Water • Environment • Health)

A template for marine spatial planning in the Baltic Sea

Jan Ekebom, The Natural Heritage Service, Finland.

The goal of marine spatial planning (MSP) and zoning is to facilitate sustainable use of marine resources, areas and services, including addressing conservation targets related to marine biodiversity and geodiversity. To assist development of integrated transnational MSP, BALANCE has developed a cyclic MSP-template with the view to provide a common planning framework that takes into account regional ecosystem features. The template integrates a range of information from different sources, in particular GIS layers of marine landscapes, habitats and species, numerical biodiversity assessments via MARXAN, and data layers showing different sea uses (areas with specific human activities, natural resources and potential commercial interests).

The BALANCE marine spatial planning template is set up to address the EU’s Habitats Directive, Water Framework Directive, the proposed Marine Strategy Framework Directive and EU ICZM recommendation, as well as recommendations of HELCOM.

The template, which is intended as a first regional model for the marine spatial planning, consists of five overall phases, with a series of successive, practical steps facilitating the entire planning process, for example guidance on timing and level of stakeholder involvement. In the suggested planning process, different human activities and use of marine areas area are categorised into four zones with varying level of management regulation. The spatial extend of these zones are shown on a map, while the management regulation of each zone are described in a related table.

The MSP template makes it possible to apply the ecosystem approach to management of human activities in the marine environment when developing a marine spatial plan for the target area.

GIS tools for marine spatial planning and zoning examples
Timo Pitkänen & Martin Snickars, Metsähallitus, Natural Heritage Services, Box 94, 01301 Vantaa, Finland

A GIS tool can be defined as a series of steps that process spatial data using GIS software and aim at creating new data sets or visualising existing data as informative maps. The tools should be functional within the ecosystem based approach to management and include processing of single or several sets of biophysical and socio-economical factors including overlays of these, *e.g.* distribution of focal species, Habitats Directive Annex I habitats, location of harbours or assessment of areas vulnerable to human activities. Developing and collating information of these tools has been a central theme for WP4, as many of the data sets needed to support MSP have not been available to date. By including existing data sets and various assessment layers produced using the GIS tools, zoning examples for selected areas have been created to visualise the outcome on maps.

The tools should also provide indices that quantify the management performance. Indicators of the temporal and spatial changes in the biological and socio-economical status of a marine area are needed, *e.g.* in long-term studies or between separate zones with different use regulations. The management performance evaluation will provide information on the management effects on sea resources and uses. The indicators should match the goals and objectives that are optimally set as quantifiable targets within the MSP, and the result of the evaluation may help in setting new goals for an updated cyclic MSP.

The developed GIS tools have been collated to a 'recipe-book' that offers detailed step-to-step instructions and important references how to perform the analysis, also for those with basic knowledge on GI systems. The recipes include *e.g.* tools for predicting marine noise (figure), dredging sites and benthic heterogeneity. It should be highlighted that the recipes only are examples and a first approach on how to use GIS information in MSP, and thereby they may need modification to suit other situations and data. Further development is encouraged.

Stakeholder engagement in marine spatial planning
Christiane Feucht, WWF Germany

Stakeholder engagement is an essential part in marine spatial planning. It is a characteristic of the “Good Governance” concept as defined by the World Bank and United Nations and can have many benefits for the management and conservation of the environment. In the Baltic Sea marine area, governance takes place at different scales and governments and authorities are accountable for enabling stakeholder engagement to different extents. The more effective and encompassing this hierarchical administration and planning system works – and that includes adequate stakeholder engagement at all scales – the more likely it is to achieve a good environmental status of the Baltic Sea through good governance.

Therefore, BALANCE has put a strong focus on stakeholder engagement in marine spatial planning and offered ways for taking this aspect of planning properly into account in the Baltic Sea Region and also in other European regional seas in the future. The integrated elements are legally required to different extents in many countries or recommended in EU directives and international conventions including HELCOM. There are many reasons for and benefits from exceeding the legally required minimum and enable participation. Generally, there are two distinct approaches: the formal approach allowing the legally required minimum and the cooperative approach enabling active participation. Stakeholder engagement has to be carefully assessed, planned and facilitated. Using different tools such as strategic communication or e-participation improves effectiveness. However, even though stakeholder engagement is highlighted in BALANCE, the extent of engagement has to be weighed case by case and engagement activities have to be tailored to the specific situation.

Application of pelagic cod habitat models: a spatial management approach
Thomas Sørensen & Ole Vestergaard, The Danish Institute for Fisheries Research, Technical University of Denmark

Area-based approaches to management of marine living resources are currently largely implemented through static fishing closures or ‘boxes’, which at times do not adequately take into account inherent ecosystem variability and larger-scale changes in environmental forcing. This presentation will present perspectives on spatial and temporal management of Baltic cod integrating ecosystem variability in models of pelagic cod habitats.

From a marine spatial planning perspective, the main human activity to consider in the Bornholm Basin of the Baltic Sea (BALANCE Pilot Area 2) is offshore commercial fishing for a variety of species, in particular the Baltic cod (*Gadus morhua*). However, due to high fishing pressure, unfavourable environmental conditions, as well as an increased predation on cod eggs by sprat, the Baltic cod stock is at an historical low and considered outside biologically safe limits by ICES, jeopardising both the ecological balance and future cod fisheries.

As a result of the widespread anoxia in large parts of Baltic Sea, the Bornholm Basin has become the only larger active spawning area for the Baltic cod. In an effort to manage this important area, the EU Commission has over the last decade implemented a series of seasonal fishing closures in the Bornholm Basin to protect the spawning cod biomass during late summer. However, new studies suggest that location and timing of these closures are not providing effective protection for the entire spawning habitat.

Optimal timing and location of closed areas varying in area- and seasonal coverage according to changing ecosystem conditions can be defined through hydrographical models projecting the spatial and temporal boundaries of cod pelagic habitats. In fisheries management terms, such cod spawning area is defined as an *essential cod habitat*, i.e. a specific habitat essential for the growth and development of specific cod life-stages. The spatial extent of the water column offering successful fertilisation and development of cod eggs is dependent on specific threshold concentrations of oxygen, salinity and temperature, also referred to as the ‘reproductive volume’. 2D- and 3D-visualisations of the cod reproductive volume shows that this varies greatly from year to year, largely determined by saline water inflow from the North Sea to the Baltic Sea during winter. Thereby, ecosystem models predicting the optimal timing and location of summer cod spawning closures based on the previous years winter inflow is discussed as a tool to assist more targeted cod spawning closures. The concept of real-time closures will be introduced.

In order to achieve sustainable Baltic cod populations, protection of every ‘essential fish habitat’ underpinning different cod life-stages, is required, as otherwise positive effects of for example spawning closures may be outweighed via bycatch of juvenile cod in distant nursery areas, or other deterioration of the nursery areas through marine constructions. Application of information on known cod nursery areas in the central Baltic obtained from interviews with local fishermen will be presented and discussed.

Lastly, due to the stratification of the water column in the Baltic Sea, characteristic vertical fish distributions are observed in the Bornholm Basin, with cod occupying the bottom habitat below the halocline, and sprat and herring located nearer the surface above the halocline, can be observed. Based on this, a conceptual vertical zoning concept is discussed, suggesting selective sprat fisheries in surface waters, while enforcing summer cod spawning closures near the bottom, which would potentially both reduce the predation on cod eggs by sprat, while also maintaining a level of fisheries in support of local economies.

Synthesis

Jochen Lamp, WWF Germany

Please refer to the presentation available at www.balance-eu.org.

Session 6: Lessons learnt

(Chair: Hanne Kristensen, The Danish Spatial and Environmental Planning Agency)

Linking HELCOM activities with RTD activities with special reference to BALANCE

Juha-Markku Leppänen, Professional Secretary, Helsinki Commission

Helsinki Commission or HELCOM is the governing body of the Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention) signed by the nine riparian countries and the European Community. HELCOM is a management organisation developing common objectives and actions to protect the Baltic Sea from all sources of pollution as well as to restore the marine environment. Based on the 2003 joint HELCOM/OSPAR ministerial decisions, HELCOM is implementing the ecosystem approach to management of human activities impacting the sea. Sound management should be based on best available scientific information. Consequently, HELCOM acts as a bridge between management and science e.g. by producing targeted and timely assessments.

The outcomes of RTD projects can be a source of information for developing HELCOM's management advice. HELCOM is able to be a partner in RTD projects. However, HELCOM is usually an end-user of the project deliveries. For such purposes a letter of support, to be attached in an application, is often requested. Sometimes HELCOM is also invited to participate in a steering group of a RTD project. In such cases, HELCOM is usually represented by a member of the Secretariat or a chairperson of a relevant HELCOM working group.

For the RTD projects, HELCOM is providing a permanent, functioning network which can be used for advisory and other stakeholder purposes. The HELCOM network consists of the Heads of Delegation representing political/management level, the HELCOM Working Groups representing expert level, and HELCOM Projects representing scientific level. HELCOM has also a direct link to the implementing authorities in the Contracting Parties.

However, even if the potential for mutually beneficial co-operation between HELCOM and RTD projects is clear such relationships have not been problem-free in the past. In many cases HELCOM is included in the potential end-user just to justify project funding. Often no information has been received from projects after HELCOM has sent letter of support, even if the project has received financing. Despite the fact that HELCOM is defined as the main end-user in the project plan, the way this is ensured is not always properly defined. Further, due to the lack of proper communication during the implementation phase, the end products may be less useful to HELCOM.

In order to avoid the aforementioned problems, consistency with HELCOM processes (presently the HELCOM Baltic Sea Action Plan) should be aimed at, the steering group should have an active role already in the early phase of the project implementation, timetables and products should be planned jointly, effective communication should be guaranteed, and timely access to the products should be self evident.

In the case of the BALANCE, the HELCOM needs have been taken into account, e.g. concerning marine spatial planning, as ICZM, definition of marine landscapes and habitat maps, assessing the ecological coherence of the existing MPA network met the objectives of BALANCE dealing with nature conservation and sustainable development of the ecosystem through spatial planning.

In addition to the mutual interests, HELCOM has been regularly informed about the progress of the project by the project managers and partners and a member of the HELCOM Secretariat has attended the Steering Group. Finally, the Project has organised jointly with HELCOM a workshop to define practical criteria for assessing the ecological coherence of the Baltic Sea MPAs. It is expected that many BALANCE end-products can be used by HELCOM, if accepted by the Contracting Parties.

The Eu Blue Book
Nicole Schafer, EU Commission, DG Fisheries and Maritime Affairs
Please refer to the presentation available at www.balance-eu.org.

Lessons learnt and our wishes for the future
Per Nilsson, University of Gothenburg
Please refer to the presentation available at www.balance-eu.org.

.

List of Participants (of 25th of October 2007)

No.	Name	Title	Organisation	Country	e-mail
1	Abildtrup, Christian	Geologist	NCC Marine Aggregates A/S	Denmark	CAB@ncc.dk
2	Alanen, Ulla	Geologist	The Geological Survey of Finland	Finland	Ulla.Alanen@gtk.fi
3	Al-Hamdani, Zyad	Senior Geophysicist	The Geological Survey of Denmark & Greenland	Denmark	azk@geus.dk
4	Andersen, Jesper H.	BALANCE project manager	DHI Water - Environment - Health	Denmark	jha@dhi.dk
5	Andersson, Åsa	Ms	WWF Sweden	Sweden	asa.andersson@wwf.se
6	Anneer, Gunnar	Ph.D	County Administrative Board of Stockholm	Sweden	Gunnar.Aneer@ab.lst.se
7	Askehave, Ole	Geologist	Askehave Consultants	Denmark	ole@askehave.dk
8	Bäck, Anette	Ms	Natural Heritage Services	Finland	Anette.Back@metsa.fi
9	Berezina, Nadezhda A.	PhD	Russian Academy of Sciences	Russia	nber@zin.ru
10	Bergström, Lena	Marine Ecologist	Swedish Board of Fisheries, Institute of Coastal Research	Sweden	lena.bergstrom@fiskeriverket.se
11	Bergström, Ulf	Marine Ecologist	Swedish Board of Fisheries, Institute of Coastal Research	Sweden	ulf.bergstrom@fiskeriverket.se
12	Bjarnarson, Malene S.	Ms	The Danish Forest and Nature Agency	Denmark	msk@sns.dk
13	Blanner, Peter	Marine Biologist	WWF Denmark	Denmark	p.blanner@wwf.dk
14	Boedeker, Dieter	Marine Biologist	The German Federal Agency for Nature Conservation	Germany	dieter.boedeker@bfn-vilm.de
15	Bonetti, Jarbas	PhD	University of Santa Catarina	Brazil	Jarbas.Bonetti@ifremer.fr
16	Carlén, Ida	Ms	AquaBiota Water Research	Sweden	ida.carlen@aquabiota.se
17	Connor, David	Mr.	The Joint Nature Conservation Committee	England	david.connor@jncc.gov.uk
18	Dahl, Karsten	Msc	The National Environmental Research Institute	Denmark	kda@dmu.dk
19	Dahlander, Josefin	Ms	The Swedish Ministry of Environment	Sweden	josefin.dahlander@environment.ministry.se
20	Daynus, Darius	Ph.D	CORPI	Lithuania	darius@corpi.ku.lt
21	Dencker, Jørgen	Mr.	Vikingeskibsmuseet	Denmark	TTJ-Dencker@mail.tele.dk
22	Dinesen, Grete	Ms	The Danish Forest and Nature Agency	Denmark	grd@sns.dk
23	Duffy, Mark	Dr.	Natural England	England	Mark.Duffy@naturalengland.org.uk
24	Elfwing, Tina	Ph.D	University of Stockholm	Sweden	tina@ecology.su.se
25	Feucht, Christiane	Ms	WWF Germany	Germany	feucht@wwf.de
26	Geitner, Kerstin	GIS specialist	The Danish Institute for Fisheries Research	Denmark	kjg@difres.dk
27	Göke, Cordula	GIS specialist	The National Environmental Research Institute	Denmark	cog@dmu.dk
28	Gravesen, Peter	Statsgeolog	The Geological Survey of Denmark & Greenland	Denmark	pg@geus.dk
29	Gregory, David	Senior scientist	The National Museum of Denmark	Denmark	david.john.gregory@natmus.dk
30	Gustavsson, Lasse	Director	WWF Sweden	Sweden	Lasse.Gustavsson@wwf.se
31	Haldin, Jannica	Ms	Natural Heritage Services	Finland	jannica.haldin@helsinki.fi
32	Hansen, Jørgen	Biologist	The National Environmental Research Institute	Denmark	joh@dmu.dk
33	Hansen, Lone Reersø	Biologist	The Danish Spatial and Environmental Planning Agency	Denmark	loreh@lbst.dk
34	Hansson,Lars	Mr.	SMHI	Sweden	Lars.Hansson@smhi.se
35	Helmig, Stig	Msc	The Danish Forest and Nature Agency	Denmark	sah@lbst.dk
36	Herkül, Kristjan	Senior scientist	Estonia Marine Institute	Estonia	Kristjan.herkul@sea.ee
37	Hill, Cathy	Ms.	County Administrative Board of Stockholm	Sweden	Cathy.Hill@ab.lst.se
38	Huggins, Annette	Ms	The Nature Conservacy	England	aehuggins@conservation-gis.org
39	Isaeus, Martin	Managing Director	AquaBiota Water Research	Sweden	martin.isaeus@aquabiota.se
40	Jensen, Jørn Bo	Senior scientist	The Geological Survey of Denmark & Greenland	Denmark	jbj@geus.dk
41	Jensen, Lars Bie	Mr.	Dong Energy, Renewables	Denmark	labie@dongenergy.dk
42	Johansen, Martha Marie	Ms	Dong Energy, Renewables	Denmark	mmjoh@dongenergy.dk

43	Johansen, Uwe	Mr.	WWF Germany	Germany	Johannsen@wwf.de
44	Jöbron, Anna	Ph.D	IVL Swedish Environmental Institute	Sweden	anna.joborn@ivl.se
45	Kindström, Merit	Ms.	County Administrative Board of Stockholm	Sweden	Merit.Kindstrom@ab.lst.se
46	Korpinen, Samuli	Mr.	WWF Finland	Finland	samuli.korpinen@wwf.fi
47	Kotilainen, Aarno	Dr.	The Geological Survey of Finland	Finland	aarno.kotilainen@gtk.fi
48	Kotta, Jonne	Senior scientist	Estonia Marine Institute	Estonia	jonne.kotta@sea.ee
49	Kristensen, Hanne	Head of Division	The Danish Spatial and Environmental Planning Agency	Denmark	hkr@lbst.dk
50	Lamp, Jochen	Mr.	WWF Germany	Germany	lamp@wwf.de
51	Larsen, Bengt	Mr.	National Boardof Housing, Building and Planning	Sweden	bengt.larsen@boverket.se
52	Larsen, Birger	Geologist	The Geological Survey of Greenland and Denmark	Denmark	bil@geus.dk
53	Larsen, Hanne K.	Biologist	Greenpeace	Denmark	hkaergaa@nordic.greenpeace.org
54	Leppänen, Juha-Markku	Professional secretary	Helsinki Commission	Finland	Juha-Markku.Leppanen@helcom.fi
55	Leth, Jørgen	Ph.D	The Geological Survey of Denmark & Greenland	Denmark	jol@geus.dk
56	Lindegarth, Mats	Mr,	Tjärnö Marine Biological Laboratory	Sweden	mats.lindegarth@marecol.gu.se
57	Liman, Anna-Sara	Ms.	WWF Sweden	Sweden	anna-sara.liman@wwf.se
58	Lindlad, Cecilia	Ms.	The Swedish Environmental Protection Agency	Sweden	Cecilia.Lindblad@naturvardsverket.se
59	Martin, Georg	Senior scientist	Estonia Marine Institute	Estonia	Georg.martin@sea.ee
60	Mueller-Karulis, Baerbel	Ms.	Latvian Institute of Aquatic Ecology	Latvia	baerbel@latnet.lv
61	Muller, Mattias	Mr	Trelleborgs Municipality	Sweden	Mattias.Muller@Trelleborg.se
62	Neumann, Christian	Mr.	WWF Germany	Germany	christian.neumann@wwf.de
63	Neuenfeldt, Stefan	Biologist	The Danish Institute for Fisheries Research	Denmark	
64	Nilsson, Per	Dr.	University of Gothenborg	Sweden	per.nilsson@tmbl.gu.se
65	Nilsson, Therese	BALTIC MASTER	Region Blekinge	Sweden	Therese.Nilsson@regionblekinge.se
66	Nilsson, Thomas	Mr.	The Swedish Ministry of Environment	Sweden	thomas.nilsson@environment.ministry.se
67	Nothlev, Jill G.	Biologist	The Danish Forest and Nature Agency	Denmark	xjg@sns.dk
68	Nyberg, Johan	Geologist	The Swedish Geological Survey	Sweden	johan.nyberg@sgu.se
69	Nygard, Lotta	Ms.	Länsstyrelsen i Västernorrlands Län	Sweden	Lotta.Nygard@y.lst.se
70	Nygaard, Kari	Research Director	Norwegian Institute for Water Assessment	Norway	kari.nygaard@niva.no
71	Nöjd, Anna-Leena	Msc	The Finnish Environment Institute	Finland	Anna-Leena.Nojd@ymparisto.fi
72	Olesen, Hans Jacob	Biologist	The Danish Institute for Fisheries Research	Denmark	
73	Orav-Kotta, Helen	Senior Scientist	Estonia Marine Institute	Estonia	Helen.oravkotta@sea.ee
74	Paulomaki, Hanna	Ms	Helsinki Commission	Finland	hanna.paulomaki@helcom.fi
75	Pawlak, Janet	Ms.	MEC Consulting Aps, environmental consultant	Denmark	jpawlak@dahm.dk
76	Pedersen, Eva Maria	Biologist	The Danish Institute for Fisheries Research	Denmark	
77	Pedersen, Søren Anker	Ph.D	ICES, EMPAS Project	Denmark	sorenap@ices.dk
78	Perus, Jens	Mr.	The Kvarken Council	Finland	jens.perus@kvarken.org
79	Petersen, Ib Krag	Senior Scientist (birds)	The National Environmental Research Institute	Denmark	ikp@dmu.dk
80	Pyhälä, Minna	Ms	Helsinki Commission	Finland	minna.pyhala@helcom.fi
81	Piekäinen, Henna	Msc	The Finnish Environment Institute	Finland	Henna.piekainen@ymparisto.fi
82	Pitkanen, Timo	Mr.	Natural Heritage Service	Finland	Timo.Pitkanen@metsa.fi
83	Populus, Jaques	Mr.	IFREMER	France	jaques.populus@ifremer.fr
84	Ravn, Thomas	Head of Division	The Danish National Survey and Cadastra	Denmark	thrav@kms.dk
85	Reijonen, Anu	Geologist	The Geological Survey of Finland	Finland	anu.reijonen@gtk.fi
86	Reker, Johnny	BALANCE co-ordinator	The Danish Spatial and Environmental Planning Agency	Denmark	jyr@lbs.dk
87	Rostin, Liis	Ms	Estonia Marine Institute	Estonia	Liis.rostin@sea.ee

88	Roszkowska, Katarzyna	Chair HELCOM HABITAT	Chief Inspectorate for Environmental Protection	Poland	k.roszkowska@gios.gov.pl
89	Ryabchuk, Daria	Dr.	A.P.Karpinsky Russian Geological Research Institute (VSEGEI)	Russia	Daria_Ryabchuk@vsegei.ru
90	Sandström, Alfred	Marine Ecologist	Swedish Board of Fisheries, Institute of Coastal Research	Sweden	alfred.sandstrom@fiskeriverket.se
91	Schafer, Nicole	Ms	EU Commission, DG Fisheries and Maritime Affairs	Belgium	
92	Skov, Henrik	Marine Ecologist	DHI Water - Environment - Health	Denmark	hsk@dhigroup.com
93	Snickars, Martin	Marine Ecologist	The Finnish Natural Heritage	Finland	Martin.Snickars@metsa.fi
94	Sparrevohn, Claus	Biologist	The Danish Institute for Fisheries Research	Denmark	
95	Spiridonov, Michail	Dr.	A.P.Karpinsky Russian Geological Research Institute (VSEGEI)	Russia	Michail_Spiridonov@vsegei.ru
96	Stage, Bjarne	Biologist	The Danish Institute for Fisheries Research	Denmark	
97	Strake, Solvita	Researcher	Latvian Institute of Aquatic Ecology	Latvia	solvita@hydro.edu.lv
98	Stölen, Lars-Kristian	Geologist	The Swedish Geological Survey	Sweden	Lars-Kristian.Stolen@sgu.se
99	Sundblad, Göran	Marine Ecologist	Swedish Board of Fisheries, Institute of Coastal Research	Sweden	goran.sundblad@fiskeriverket.se
100	Söderkvist, Johan	Ph.D, Modeller	The National Environmental Research Institute	Denmark	johs@dmu.dk
101	Sørensen, Thomas	Marine Ecologist	The Danish Institute for Fisheries Research	Denmark	tks@difres.dk
102	Teilmann, Jonas	Senior scientist	The National Environmental Research Institute	Denmark	jte@dmu.dk
103	Tidlund, Annika	Senior Scientist	University of Stockholm	Sweden	annika@ecology.su.se
104	Törnroos, Anna	Ms	Natural Heritage Services	Finland	anna.tornroos@abo.fi
105	Törnqvist, Oscar	Mr.	Metria Miljöanalys	Sweden	Oscar.Tornqvist@lm.se
106	Tullrot, Anita	Ms	Tjärnö Marine Biological Laboratory	Sweden	Anita.Tullrot@tmbl.gu.se
107	Vestergaard, Ole	Mr.	The Danish Institute for Fisheries Research	Denmark	osv@difres.dk
108	Wennberg, Sandra	Ms	Metria Miljöanalys	Sweden	Sandra.Wennberg@lm.se
109	Wichmann, Henrik	Mr.	The Danish Spatial and Environmental Planning Agency	Denmark	hew@lbst.dk
110	Wieland, Kai	Mr.	The Danish Institute for Fisheries Research	Denmark	
111	Wilson, Margaret	Ms	The Norwegian Geological Survey	Norway	Margaret.Wilson@NGU.NO
112	Young, Sarah	Marine Ecologist	The Joint Nature Conservation Committee	England	Sarah.Young@jncc.gov.uk
113	Zhamoida, Vladimir A.	Dr.	A.P.Karpinsky Russian Geological Research Institute (VSEGEI)	Russia	Vladimir_Zhamoida@vsegei.ru
114	Zhang, Jingji	Baltic Nest Institute	The National Environmental Research Institute	Denmark	jz@dmu.dk
115	Zweifel, Ulla Li	Dr., HELCOM BIO	University of Kalmar	Sweden	ullali.zweifel@hik.se

About the BALANCE project:

These delegate´s notes is from the final conference of the BSR INTERREG IIIB project "BALANCE".

The BALANCE project aims to provide a transnational marine management template based on zoning, which can assist stakeholders in planning and implementing effective management solutions for sustainable use and protection of our valuable marine landscapes and unique natural heritage. The template will be based on data sharing, mapping of marine landscapes and habitats, development of the blue corridor concept, information on key stakeholder interests and development of a cross-sectoral and transnational Baltic zoning approach. BALANCE thus provides a transnational solution to a transnational problem.

The work is part financed by the European Union through the development fund BSR INTERREG IIIB Neighbourhood Programme and partly by the involved partners. For more information on BALANCE, please see www.balance-eu.org and for the BSR INTERREG Neighbourhood Programme, please see www.bsrinterreg.net

The BALANCE Report Series includes:

BALANCE Interim Report No. 1 "Delineation of the BALANCE Pilot Areas"
BALANCE Interim Report No. 2 "Development of a methodology for selection and assessment of a representative MPA network in the Baltic Sea - an interim strategy"
BALANCE Interim Report No. 3 "Feasibility of hyperspectral remote sensing for mapping benthic macroalgal cover in turbid coastal waters of the Baltic Sea"
BALANCE Interim Report No. 4 "Literature review of the "Blue Corridors" concept and its applicability to the Baltic Sea"
BALANCE Interim Report No. 5 "Evaluation of remote sensing methods as a tool to characterise shallow marine habitats I"
BALANCE Interim Report No. 6 "BALANCE Cruise Report - The Archipelago Sea"
BALANCE Interim Report No. 7 "BALANCE Cruise Report - The Kattegat"
BALANCE Interim Report No. 8 "BALANCE Stakeholder Communication Guide"
BALANCE Interim Report No. 9 "Model simulations of blue corridors in the Baltic Sea"
BALANCE Interim Report No. 10 "Towards marine landscapes of the Baltic Sea"
BALANCE Interim Report No. 11 "Fish habitat modelling in a Baltic Sea archipelago region"
BALANCE Interim Report No. 12 "Evaluation of remote sensing methods as a tool to characterise shallow marine habitats II"
BALANCE Interim Report No. 13 "Harmonizing marine geological data with the EUNIS habitat classification"
BALANCE Interim Report No. 14 "Intercalibration of sediment data from the Archipelago Sea"
BALANCE Interim Report No. 15 "Biodiversity on boulder reefs in the central Kattegat"
BALANCE Interim Report No. 16 "The stakeholder - nature conservation's best friend or its worst enemy?"
BALANCE Interim Report No. 17 "Baltic Sea oxygen maps"
BALANCE Interim Report No. 18 "A practical guide to Blue Corridors"
BALANCE Interim Report No. 19 "The BALANCE Data Portal"
BALANCE Interim Report No. 20 "The reproductive volume of Baltic Cod – mapping and application"
BALANCE Interim Report No. 21 "Mapping of marine habitats in the Kattegat"
BALANCE Interim Report No. 22 "E-participation as tool in planning processes"
BALANCE Interim Report No. 23 "The modelling *Furcellaria lumbricalis* habitats along the Latvian coast"
BALANCE Interim Report No. 24 "Towards a representative MPA network in the Baltic Sea"
BALANCE Interim Report No. 25 "Towards ecological coherence of the MPA network in the Baltic Sea"
BALANCE Interim Report No. 26 "What´s happening to our shores?"
BALANCE Interim Report No. 27 "Mapping and modelling of marine habitats in the Baltic Sea"
BALANCE Interim Report No. 28 "GIS tools for marine planning and management"
BALANCE Interim Report No. 29 "Essential fish habitats and fish migration patterns in the Northern Baltic Sea"
BALANCE Interim Report No. 30 "Mapping of Natura 2000 habitats in Baltic Sea archipelago areas"
BALANCE Interim Report No. 31 "Marine landscapes and benthic habitats in the Archipelago Sea"
BALANCE Interim Report No. 32 "Guidelines for harmonisation of marine data"
BALANCE Interim Report No. 33 "The BALANCE Conference"

In addition, the above activities are summarized in four technical summary reports on the following themes 1) Data availability and harmonisation, 2) Marine landscape and habitat mapping, 3) Ecological coherence and principles for MPA selection and design, and 4) Tools and a template for marine spatial planning. The BALANCE Synthesis Report "Towards a Baltic Sea in balance" integrates and demonstrates the key results of BALANCE and provides guidance for future marine spatial planning.