

Admiral Danish Fleet HQ,
National Operations, Maritime Environment

Sub-regional risk of spill of oil and hazardous substances in the Baltic Sea (BRISK)

Data Collection Report

June 2010



Part-financed by the European Union
(European Regional Development Fund)



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Document no. 70618-3.1.2.2
Version 1.0
Date of issue 22 June 2010

Prepared ALBL, UKBR, TTAN
Checked MORH
Approved CRJ

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1 Background

1.1 BRISK Project setup

The project is defined in response to an increased concern about accidents and environmental damage in the Baltic Sea due to the significant increase of ship traffic, particularly the oil tanker traffic. Major oil spills can affect the economy of several countries and are hence a trans-national problem. The increased risk of oil spills is of great concern in the whole Baltic Sea region.

The objective of the project is to identify specific proposals for increased co-operation. The project will result in increased preparedness of authorities to respond to medium size oil spills and enhanced sub-regional co-operation. The network of responsible persons will be further developed. The project will promote building partnerships and co-operations among trans-national, national and regional authorities that are responsible for emergency and response operations in the Baltic Sea.

The BRISK project is partly financed by EU's Baltic Sea Regional Programme 2007-2011 with 3.3 million EUR for the period 2009 to 2012. The co-financing varies between 15 % and 25 %, depending on the home country of Project Partner.

The project partnership consists of the national authorities responsible for oil spill preparedness around the Baltic Sea together with HELCOM. The countries involved are: DK, SE, FI, EE, LT, LV, PL, DE, plus HELCOM. Russia is involved indirectly through the BRISK-RU project, which is financed by the Nordic Council of Ministers with 200.000 EUR. A list of the contracting authorities and the contact persons involved is given in the appendix.

The project activities are divided into the following 6 Work Packages (WP):
WP1: Management, responsible: LP (Lead Partner, Denmark)

WP2: Communication and information, responsible HELCOM

WP3: Risk assessment: Common methodology, unified data collection, common risk model, common assessment of risk of pollution and impact, Identification of additional response resources needed, resp.: LP

WP4: Agreements: Development of proposals to remove administrative obstacles to the efficient response, resp.: LP

WP5: Investment plans: Preparation of integral and comparable investment plans for response resources, resp.: LP.

The structure of the project reports is given in below

Table 1-1 Document list of the BRISK project

Document number	Document Title
70618 3.1.1	Method Note
70618 3.1.2.1	Data Collection Note
70618-3.1.2.2	Data Collection Report
70618-3.1.3.0	Model Note,0- Introduction
70618-3.1.3.1	Model Note,1-Traffic
70618-3.1.3.2	Model Note,2- Transport
70618-3.1.3.3	Model Note,3- Vulnerability
70618-3.1.3.4	Model Note,4- Frequency
70618-3.1.3.5	Model Note,5- Spreading
70618-3.1.3.6	Model Note,6- Numerical calculations
70618-3.1.3.7	Model Note,7-Model modification
70618-3.2.1	Model scenarios
70618-3.2.2	Model results
70618-3.3	Response Resources
70618-4	Agreements
70618-5	Investment plans

The present data report is part of the Project on sub-regional risk of spill of oil and hazardous substances in the Baltic Sea (BRISK). BRISK work package 3 consists of the following work steps:

- 1 Method definition
- 2 Data collection (*covered by the present report*)
- 3 Model modification
- 4 Assessment of risk of pollution
- 5 Identification of need for adequate resources
- 6 Existing resources
- 7 Need for additional resources

The work step 2 on data collection is reported in two documents:

- 1 3.1.2.1 Data Collection Note: This note specifies the requirements to the data that are to be provided by the project partners. This note was issued in November 2009.
- 2 3.1.2.2 Data Collection Report: This report describes the data that are received from the project partners by June 2010 as a reply the requirements given in the Data Collection Note. (*covered by the present report*)

Further, the dialogue between the data collecting experts from the Consultant and the project partners that was necessary to actually get the data from the Partners is documented in the Appendix below.

1.1 Scope

Work step 2 (data collection)

Work step 2 (data collection) is based on the preceding work steps 1 (method definition). Its aim is to implement the chosen methodology, i.e. to collect the data that are necessary to carry out the processes and analyses as defined in the methodology (work step 1) and form the basis for the model modification in work step 3 and the risk of pollution (work step 4).

The sub-report on ship traffic is divided into the following chapters:

- 1 Data on ship traffic and goods
- 2 Data on environmental sensitivity

1.2 Status

This data collection report describes the amount of data that has been collected so far and it will form the basis of the coming work.

Due to changes in project partners and due to expected input from co-operating projects the data will be updated during the course of the project.

Also, some of the collected data are not of the required content, quality and format in order to give the expected information to the risk analysis.

Finally, the integrated picture of the information from different partners will have to be approved by the partners. It is expected that the partners may wish to change or modify their own input once they see how it appears once the data is integrated into a Baltic perspective.

Because of the above it is considered most optimal that the data is described in the present document and that the data itself will be documented in the final report, e.g. by means of a CD.

2 Data on ship traffic and goods

2.1 Method

Reference is made to the Data Collection Note (3.1.2.1) that specifies the amount, quality and format of the required data.

2.2 Status

The status of the data collection on ship traffic and goods is summarised in the Table 2-1 below.

Table 2-1 Summary of the data collection on ship traffic and goods as per 1 June 2010.

	Project Partner									Detailed Description
	DE	DK	EE	FI	LT	LV	PL	SE	HELCOM	
Traffic										
- HELCOM AIS data	-	x	-	-	-	-	-	-	x	2.1
Goods transport										
- Port statistics (<i>not available from EMSA</i>)	x	x	x	x	o	x	x	x	-	3.1
- Passage statistics	x	x	x	x	o	x	x	x	-	3.2
- Goods transport development data and prognoses	x	x	x ¹	x	o	x	x	x	-	3.3
- Passenger transport development data and prognoses	x	x	x	x	o	x	x	x	-	3.4
Vulnerability										
Vulnerability data/maps	o	x	x ¹	(o)	o	x ¹	o	x	-	4.1
Accidents										

	Project Partner									Detailed Description
	DE	DK	EE	FI	LT	LV	PL	SE	HELCOM	
- Additional accidents at sea	x	x	x	x	o	x	x	x	-	5.1
- Oil spill surveillance details	x	x	x	x	o	x	x	x	-	5.2
- Pilotage data	x	x	x	x	o	x	x	x	-	5.3
- Risk reducing measures (RRMs)	x	x	x	x	o	x	x	x	x	5.4
- STS operations & bunkering at sea	x	x	x	x	o	x	x	x	-	5.5
- Fixed objects	x	x	x	x	o	x	x	x	-	5.6
Spreading, fate and containment										
- Equipment and capacity	o	x	x	x	o	x ¹	o	x	-	6.1
- Response modelling parameters	(o)	x	o	x	o	o	o	o	-	6.2
Ice										
- Winter 2008/2009	x ¹	x ¹	x ¹	x ¹	x ¹	x ¹	x ¹	x	-	7
- Average winter	x ¹	x ¹	x ¹	x ¹	x ¹	x ¹	x ¹	x	-	7

o ... required (o) ... possibly required at a later stage

- ... not required x ... obtained

x¹ ... obtained from one of the neighbour countries

2.3 Evaluation

Most of the data is required and only minor gaps are to be filled. Lithuania changed the project partner recently and has therefore not provided data yet.

3 Data on environmental sensitivity

3.1 Status

Environmental vulnerability mapping is part of the project on sub-regional risk of spill of oil and hazardous substances in the Baltic Sea (BRISK). This note presents the data collection and methodology for mapping which has been applied.

3.2 Method

Reference is made to the Data Collection Note (3.1.2.1) that specifies the amount, quality and format of the required data.

The environmental indicators (parameters) represent what in general is understood as "representatives for a good marine environment regarding impacts of oil and hazardous substances".

Data has been collected during spring and summer 2010 from the BRISK partner countries Latvia, Poland, Estonia, Finland, Germany, and Sweden and from HELCOM and BALANCE.

All maps were provided as GIS maps.

The project used the same background data as used in the HELCOM project.

3.3 Data collection progress

The results of the environmental data collection are given in Table 3-1 below.

Table 3-1 Summary of the collection of environmental data, June 2010

Human use features	Fish farms	✓	✓	⊕	⊕	✓	✓	✓	✓	Element don't exist in country
	Coastal summer cottage areas	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	
	Archipelago settlement and housing	⊕	⊕	⊕	⊕	⊕	✓	⊕	⊕	
	Coastal cities	✓	✓	✓	✓	✓	✓	✓	✓	
	Ports/harbours/marinas	✓	✓	✓	✓	✓	✓	✓	✓	
Protected areas	Coastal and marine national protected areas	⊕	⊕	✓	✓	✓	✓	⊕	✓	⊕
	Coastal and marine UNESCO	✓	✓	✓	✓	✓	✓	✓	✓	
	Coastal and marine BSPA	✓	✓	✓	✓	✓	✓	✓	✓	
	Ramsar areas	✓	✓	✓	✓	✓	✓	✓	✓	
	Coastal and marine Natura 2000 (SPA)	⊕	⊕	⊕	✓	✓	✓	⊕	✓	
Fauna	Marine Mammals	⊕	⊕	✓	✓	✓	✓	⊕	✓	⊕
	Moulting areas for sea birds	⊕	⊕	⊕	⊕	⊕	⊕	⊕	⊕	
	Breeding areas for sea and shore birds	⊕	⊕	⊕	✓	⊕	✓	⊕	⊕	
	Staging areas for migrating sea and shore birds	⊕	⊕	⊕	✓	⊕	✓	⊕	⊕	
	Wintering areas for sea and shore birds	✓	✓	✓	✓	✓	✓	✓	✓	
	Spawning and nursery areas for fish	✓	✓	✓	✓	✓	✓	✓	✓	
Flora	Fucus and <i>Furcellaria lumbricalis</i> distribution	⊕	⊕	✓	✓	⊕	⊕	⊕	⊕	⊕
	Seagrass meadows	✓	✓	✓	✓	✓	✓	✓	✓	
Coastal types and marine habitats	Threatened/declining marine habitats	⊕	⊕	⊕	✓	⊕	⊕	⊕	⊕	⊕
	Gravel /shingle beaches	⊕	⊕	⊕	✓	⊕	✓	⊕	✓	
	Sandy beaches (natural)	⊕	⊕	⊕	✓	⊕	✓	⊕	✓	
	Underwater sand banks	✓	✓	✓	✓	✓	✓	✓	✓	
	Shallow inlets and bays	✓	✓	✓	✓	✓	✓	✓	✓	
	Coastal lagoons	✓	✓	✓	✓	✓	✓	✓	✓	
	Estuaries	✓	✓	✓	⊕	✓	✓	✓	✓	
	Coastal Wetlands/meadows	⊕	⊕	⊕	✓	✓	✓	⊕	✓	
	Boulder reefs off non-rocky shores	⊕	⊕	✓	✓	✓	⊕	⊕	⊕	
	Rocky shores and stone reefs	⊕	⊕	✓	⊕	⊕	✓	⊕	✓	
Land	Lithuania	Russia	Latvia	Poland	Estonia	Finland	Germany	Sweden	✓	

3.3.1 Lithuania

Data from Lithuania has not been collected yet since Lithuania changed partner organisation and the new partner was accepted too late to be able to contribute.

The new Lithuanian Partner, CORPI (Klaipeda University) has later on provided the data that was necessary to carry out the analysis.

3.3.2 Russia

Data from Russia has not been collected yet since Russia is not a Project Partner. It is expected that data from Russia will be received through a parallel project, BRISK-RU, that is initiated with external funding from Nordic Council of Ministers. Via BRISK-RU, environmental data was received in terms of GIS maps via the Russian Partner CNIIMF, who engaged specialists from other institutes and companies to supplement their own specialists on specific fields.

3.3.3 Latvia

Data from Latvia has been provided by the Marine and Inland Waters Administration, State Environmental Service in Riga, Latvia.

3.3.4 Poland

Data from Poland has been provided by the Maritime Institute in Gdansk, Department of Operational Oceanography, Poland.

Data from Poland has been provided by the Maritime Office in Gdynia.

3.3.5 Estonia

Data from Estonia has been provided by the Police and Border Guard Board, Maritime Pollution Response Service in Tallinn, Estonia.

3.3.6 Finland

Data collection from Finland has been provided by the Finnish Environment Institute, Environmental Damage Division in Helsinki, Finland.

3.3.7 Germany

Data from Germany has been provided by the German Coastal States and the Maritime Emergencies and Marine Pollution Response, Central Command for Maritime Emergencies (CCME) in Cuxhaven, Germany.

3.3.8 Sweden

Data from Sweden has been provided by the Swedish Coast guard HQ, Response Department, in Karlskrona, Sweden.

3.4 GIS data quality and cautions

If GIS information is available the respective specifications are given in brackets.

3.4.1 Coastal and marine Natura 2000 Special Protection Areas (SPA)

The map of coastal and marine Natura 2000 Special Protection Areas (SPA) consists of data from Denmark, Estonia, Germany, Latvia, Poland, Finland and Sweden.

3.4.2 Ramsar areas

The map of Ramsar areas consist of data from HELCOM, Estonia, Germany, Latvia, Poland, Finland and Sweden.

3.4.3 Coastal and marine Baltic Sea Protected areas (BSPA)

The map of coastal and marine Baltic Sea Protected areas (BSPA) consists of data from HELCOM (data from May 2010). According to HELCOM most of the BSPAs are also Natura 2000 sites but not all Baltic Sea Natura 2000 sites have (yet) been nominated as BSPAs.

3.4.4 Coastal and marine UNESCO Biosphere Reserves

The map of coastal and marine UNESCO Biosphere Reserves consists of data from HELCOM.

3.4.5 Coastal and marine national protected areas

Coastal and marine national protected areas consist of data from Estonia, Germany, Latvia, Poland, Finland and Sweden.

3.4.6 Wintering areas for sea and shore birds

The map of wintering areas for sea and shore birds consist of data from HELCOM, Finland, Poland and Sweden.

3.4.7 Seagrass meadows

The map of seagrass meadows consist of data from HELCOM, Latvia, Finland and Poland.

3.4.8 Spawning area for fish with demersal eggs

The map of spawning area for fish with demersal eggs consists of data from Poland of spring and autumn spawning herring and potential spawning grounds of bream, perch, roach and pike-perch.

3.4.9 Nursery areas for fish on shallow water

The map of nursery areas for fish on shallow water consists of data from Poland of potential nursery grounds and feeding grounds.

3.4.10 Offshore spawning areas for fish

The map of offshore spawning areas for fish consists of data from HELCOM of spawning and nursery areas for cod and sprat and data from Poland of potential spawning grounds of plaice and flounder.

3.5 Further process

As stated in the introduction above, the present environmental data collection is a working document that will be modified and changed according to the joint process towards a common understanding of the state of the environmental sensibility in the Baltic Sea.

It is therefore expected that gaps will be filled in, that information will be modified and that new information will be added in order to arrive a description of the environmental parameters that can be accepted around the experts in the Partner organisations of the Baltic Sea countries.

4 Use of GIS

4.1 Background

Application of GIS in the BRISK-project (Sub-regional risk of spill Baltic Sea) is a central element in data and results presentation. This applies both to traffic data and results from the dispersion calculations of spills.

The methods used in this project build on experiences and principles developed in a previous project for the Ministry of Defence on risk of pollution in Danish waters.

GIS is also used for mapping environmental parameters. This is described in the mapping report. Traffic density is also mapped using a GIS grid. This is described in the traffic analysis report.

This note is a technical status of the progress in the work related to the use of GIS for mapping overall environmental sensitivity, political borders, hydrographical and meteorological zones and presenting results of spill simulations.

4.2 General GIS specifications

The BRISK GIS uses the same projection as used in the HELCOM web-GIS. It builds on the European three-dimensional reference system ETRS89 and a Lambert Azimuth Equal Area Projection.

The GIS platform used is MapInfo.

4.3 Spill Analysis

A grid with a resolution of 2 km x 2 km is used for the overall spill analysis and sensitivity mapping. The grid is generated using the GridMaker-tool to map-info. The specifications for the grid are shown in Table 4-1.

Total no. cells	451.529
Sea cells	111.495

Coast cells	17.996
Land cells	322.038
Resolution	2 km x 2 km
Rows	739
Columns	611

Table 4-1 Specifications for the spill analysis grid.

Each cell in the grid contains information on:

- Row and column index
- Cell type (-1 = Seaborder, 0 = Sea, 1 = Coast, 3 = land)
- Hydrographical zones (sea area),
- Meteorological zones
- Agreement zones
- Environmental vulnerability (Scale not defined yet)
- The data structure for the table ends up as described in Table 4-2.

Fieldname	Description	Type
Col	Column index (j)	Integer
Row	Row index (i)	Integer
Celltype	Celltype	Integer
Hydro_ID	Hydrographical zone (Sea area)	Integer
Agreement_ID	Agreement zones	Integer
Vulnerability	Scale to be decided	Integer
Met_ID	Meteorological zone	Integer

Table 4-2 Table structure for spill analysis grid

The grid is exported to the spill model as a csv-file (comma separated ascii-file).

Cell type	Cell type has been collected using the Helcom coast dataset. First every cell intersecting land areas are assigned the value 3 in the <i>Cell type</i> field. Then the land areas are converted from a polygon to a polyline theme and all cells within the distance of 500 m from the coastline is assigned the value 1 in the <i>Cell type</i> field. To ensure that the coastline is "closed" a manual check has been carried out.
Meteorological zones	The meteorological zones has been digitized from maps based on the analysis made as described in the Report 3.1.3.5 on Spreading of oil. The coastline from the Helcom database has been used as border to the shore.
Hydrographical zones	The hydrographical zones are a subdivision of the meteorological zones. They have been digitized from maps based on the analysis made as described in the Report 3.1.3.5 on Spreading of oil. The coastline from the HELCOM database has been used as border to the shore.

Agreement zones Existing agreements has been used as basis for defining agreement zones in the Baltic Sea. Several meetings have been held and as an outcome a draft map of agreement zones has been digitized.

4.4 Environmental vulnerability

Method	A number of species and environmental parameters are selected in such a way that they represent what in reasonable terms can be understood as a representation of the main environmental values. The abundance of the parameters mapped for each of six seasons.
Environmental parameters	They include parameters such as international protection areas, fouraging areas of migratory birds, breeding areas of fish, areas with aquaculture (e.g. fish farming), fishing grounds, archipelagos, wadden seas, shallow water areas, bathing beaches, cities and rocky shores. Maps of the abundance of each parameter/species are prepared. Fouraging areas and breeding areas are only vulnerable in certain seasons therefore maps are developed for each season. Further, the following issues are included in the vulnerability assessment: risk for environmental damage during clean up operation and regeneration time of affected organisms and the affected areas.
Vulnerability weight	The parameters are connected to a relative environmental weight for each season. The weight represents the relative variation of the environmental importance of the specific parameter or species in each specific season.
Vulnerability maps	The selection of parameters and species and the respective weights are determined in consensus among the involved experts and represented open and transparently. This way the analysis can be followed by external experts and, if necessary, it can be revised based on a changed prioritisation. The sum of the weighted environmental parameters represents the accumulated environmental

vulnerability to impacts of oil spill or hazardous chemicals for each season. Hence vulnerability maps are prepared for each impact and each season.

Environmental damage Environmental damage is defined as the product between the impact on a specific area (e.g. x kg oil per km² water surface at a given probability) and the vulnerability of the area. The calculated value as such is a hybrid number since it contains the subjective but transparent and systematically developed vulnerability. The damage shall be looked upon as an index for relative and comparative analysis (change of traffic pattern, enhanced response action, etc.).

Appendix 1: Correspondence log

The following correspondence log is established until 21. May 2010.

Land	log of important correspondance
Lithuania	<p>thu 08-04-2010 requirement of data from Dr. Nerijus Blažauskas</p> <p>thu 29-04-2010 mail requirement of data Dr. Nerijus Blažauskas</p> <p>mo 03-05-2010 mail answer from Dr. Nerijus Blažauskas rejecting data delivery due to lack of agreement</p>
Russia	<p>tu 23-03-2010 introductory requirement of data from Gennady Semanov</p> <p>we 24-03-2010 mail answer from Gennady Semanov - Contract not in place</p>
Latvia	<p>tu 23-03-2010 introductory requirement of data from Evija Smite</p> <p>ti 20-04-2010 mail answer from Laura Mazmača with GIS-material: Marine Protected Areas in Latvia</p> <p>we 05-05-2010 mail requirement of more data from Laura Mazmača</p> <p>mo 17-05-2010 mail answer from Laura Mazmača with GIS-material: <i>Fucus</i> and <i>Furcellaria lumbricalis</i> distribution in Latvia; Seagrass meadows in Latvia</p> <p>tu 18-05-2010 mail with answer from Laura Mazmača with GIS-material: Habitats on hard bottoms in Latvia (reefs)</p>
Poland	<p>tu 06-04-2010 mail with requirement of list of data requirements to Juliusz Gajewski</p> <p>fri 16-04-2010 mail answer from Izabela Zelewska with GIS-material: Coastal lagoons; Shallow inlets and bays; Underwater sand banks; Coastal and marine Natura 2000 Special Areas of Conservation (SACs); Coastal and marine Natura 2000 Special Protection Areas (SPA); Ramsar areas; Coastal and marine Baltic Sea Protected areas (BSPA); Coastal and marine UNESCO</p>

	<p>Biosphere Reserves; Coastal and marine national protected areas</p> <p>tu 20-04-2010 mail answer from Izabela Zelewska with GIS-materiale: Ports/harbours/marinas; Coastal cities</p> <p>thu 29-04-2010 mail with requirement of more data to Izabela Zelewska</p> <p>mo 10-05-2010 Izabela Zelewska writes that PL can deliver remaining data ultimo March</p>
Estonia	<p>thu 15-04-2010 introductory requirement from Mart Käbin</p> <p>tu 20-04-2010 mail answer from Mart Käbin with GIS-material: boulder reefsoff non-rocky shores; Costal lagoons; estuaries; shallow inlets and bays</p> <p>tu 20-04-2010 answer from Mart Käbin with GIS-material: Coastal wetlands, meadows; Underwater sand banks; Protected areas: Coastal and marine Natura 2008; Protected areas: birds; Protected areas: Ramsar; Protected areas BSPA; Location and extent of protected areas: Nature protection areas; Seal permanent biotopes; preserve areas; future protection areas</p> <p>thu 29-04-2010 requirement for more data from Mart Käbin</p> <p>we 12-05-2010 Mart Käbin writes that Estonia not can deliver more</p> <p>tu 18-05-2010 Mart Käbin writes that EST can deliver more anyway</p>
Finland	<p>we 31-03-2010 Meri Hietala sends agreement from the Finnish Environmental Institute that the data is only for use in the BRISK project</p> <p>mo 26-04-2010 Delivery of GIS-data from Finland: protected_areas; natura_areas; costal meadow_NLS; Archipelago; bathing_beaches; bird_breeding_areas; bird_winter_areas; coastal meadow law; coastal meadow_grid_NLS; Coastal_cities; depth_10m; fish_farms; Halichoerus grypus; marsh_corine; meadows_NLS; migrating sea birds; natura_areas; Phoca hispida botnica; Ports; protected_areas; ramsar; reefs; rocky_shores_exp;</p>

	<p>sandbeach_MH; sandbeach_MH_points; sandbeach_NLSF</p> <p>thu 29-04-2010 requirement of more data from Meri Hietala</p> <p>tu 04-05-2010 Meri Hietala informs that FI not has agreed to deliver more</p>
Germany	<p>mo 26-04-2010 requirement of data from Michael Akkermann</p> <p>To 06-04-2010 reminder to Michael Akkermann by telephone.</p> <p>we 19-05-2010 Michael Akkermann writes that he has urged the people that should deliver data</p>
Sweden	<p>mo 26-04-2010 requirement of data from Bernt Stedt</p> <p>thu 06-04-2010 called Bernt Stedt again pr telephone.</p> <p>thu 06-05-2010 sent mail requireing data to Bernt Stedt</p> <p>tu 11-05-2010 Bernt Stedt informs that he can deliver part of the data ultimo May</p>
BALANCE	<p>Tu 11-05-2010 requirement at Ziad Al-Hamdani from GEUS regarding maps from BALANCE Interim Report no. 10: Towards marine landscapes in the Baltic Sea</p> <p>mo 17-05-2010 Ziad Al-Hamdani sends GIS-data: coastal marine landscape; sediment</p>
HELCOM	<p>tu 11-05-2010 requirement at Minna Pyhälä fra HELCOM reg. maps from BALANCE Interim Report no. 10: Towards marine landscapes in the Baltic Sea</p> <p>tu 11-05-2010 Minna Pyhälä sends GIS-data on coastal marine landscapes</p>