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AVAILABILITY OF SEA USE AND PRESSURE DATA IN ESTONIA, LATVIA, FINLAND AND SWEDEN

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Availability of sea use and pressure data in Estonia, Latvia, Finland and Sweden

Disclaimer

The analysis is produced in the frame of the LIFE+ Nature & Biodiversity project "Innovative approaches for marine biodiversity monitoring and assessment of conservation status of nature values in the Baltic Sea" (Project acronym - MARMONI). The content of this publication is the sole responsibility of the Baltic Environmental Forum and can in no way be taken to reflect the views of the European Union.

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1 Introduction

1.1 Aims of the work

The report has been produced within the MARMONI project (Innovative approaches for marine biodiversity monitoring and assessment of conservation status of nature values in the Baltic Sea, LIFE09 NAT/lv/000238), action A1.3: Analysis / stocktaking of existing data on sea uses and impacts on marine biodiversity in Estonia, Latvia, Finland and Sweden.

One of the main aims of the project is to develop a new set of marine biodiversity indicators and elaborate new monitoring concept for assessment of the status of marine biodiversity. This can only be properly done knowing the current situation of existing databases, both on biodiversity and on its pressures, e.g. sea uses that cause those pressures.

The aim of the action was to compile information on the existing data on sea use activities in the project's study areas (i.e. potential pressures on the marine environment and biodiversity) as well as to analyse the availability and potential gaps of the data. The action was implemented from the 1st of October 2010 to 30th of June 2011 and consisted of the following activities:

- Meetings between all project partners to harmonise the data collection approach;
- Meetings and/or interviews with competent authorities in each partner country to get an overview about existing data sets and their availability;
- Analysis and conclusions on a basis of two activities above.

The action provided background information for other project actions: development of a new set of marine biodiversity indicators and elaboration of a new monitoring concept for assessment of the status of marine biodiversity (Action A2), testing the new indicators (A3) and elaborating a common marine biodiversity monitoring and assessment scheme for the Baltic Sea (A5).

The report is mostly based on the collection and analyses of existing metadata information, as well as interviews of sea use experts in each of the project countries.

1.2 Defining the scope of sea use and pressure data

The MARMONI project aims at developing concepts for assessment of the conservation status of marine biodiversity, including species and habitats, and impacts of various human activities. The project is acting in the Baltic Sea in the territorial waters and EEZ of Estonia, Latvia, Finland and Sweden, being focused on the project study areas – Gulf of Riga, Hanö Bight, Coastal area of SW Finland and Gulf of Finland. Therefore the aim was to define the relevant sea uses and impacts and evaluate their relevance and importance for the project study areas.

As the MARMONI project is dedicated to support the implementation of the directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (the Marine Strategy Framework Directive – MSFD) that has indicative list of characteristics, pressures and impacts listed as annex III (Table 1.), that list was taken as a basis for defining the scope for work within action A1.3.

Table 1. Pressures and impacts as set in annex III of MSFD

1.	**Physical loss**	- Smothering (e.g. by man-made structures, disposal of dredge spoil), - Sealing (e.g. by permanent constructions)
2.	**Physical damage**	- Changes in siltation (e.g. by outfalls, increased run-off, dredging / disposal of dredge spoil), - Abrasion (e.g. impact on the seabed of commercial fishing, boating, anchoring), - Selective extraction (e.g. exploration and exploitation of living and non-living resources on seabed and subsoil).
3.	**Other physical disturbance**	- Underwater noise (e.g. from shipping, underwater acoustic equipment), - Marine litter.
4.	**Interference with hydrological processes**	- Significant changes in thermal regime (e.g. by outfalls from powerstations), - Significant changes in salinity regime (e.g. by constructions impeding water movements, water abstraction).
5.	**Contamination by hazardous substances**	- Introduction of synthetic compounds (e.g. priority substances under Directive 2000/60/EC which are relevant for the marine environment such as pesticides, antifoulants, pharmaceuticals, resulting, for example, from losses from diffuse sources, pollution by ships, atmospheric deposition and biologically active substances), - Introduction of non-synthetic substances and compounds (e.g. heavy metals, hydrocarbons, resulting, for example, from pollution by ships and oil, gas and mineral exploration and exploitation, atmospheric deposition, riverine inputs), - Introduction of radio-nuclides.
6.	**Systematic and/or Intentional release of substances**	- Introduction of other substances, whether solid, liquid or gas, in marine waters, resulting from their systematic and/or intentional release into the marine environment, as permitted in accordance with other Community legislation and/or international conventions.
7.	**Nutrient and organic matter enrichment**	- Inputs of fertilisers and other nitrogen — and phosphorus-rich substances (e.g. from point and diffuse sources, including agriculture, aquaculture, atmospheric deposition), - Inputs of organic matter (e.g. sewers, mariculture, riverine inputs).
8.	**Biological disturbance**	- Introduction of microbial pathogens, - Introduction of non-indigenous species and translocations, - Selective extraction of species, including incidental non-target catches (e.g. by commercial and recreational fishing).

For extraction of the sea use list relevant for the MARMONI project also other relevant information was used, including the following documents:

The matrix elaborated within HELCOM framework for evaluations and selection of indicators as well as gap analysis for monitoring efforts (Table 2). As this matrix already contained linkage to MSFD as well as ranking by Baltic Sea Pressure Index (BSPI) it was relevant for selecting the list of sea uses for the study areas of the MARMONI project.

Table 2. List of pressures and their ranking by Baltic Sea Pressure Index (BSPI) within HELCOM screening matrix used as a tool for selecting indicators to assess the status of biodiversity in the Baltic.

Pressure category	Pressure (MSFD, ANNEX, Table 2)	Existing and potential pressure data layer	BSPI rank *
1. Physical loss	**Sealing**	Harbours	31
		Coastal defence structures	33
		Bridges and coastal dams	43
		Wind farms (operational)	
	Smothering	Disposal of dredged spoils	41
		Cables and pipelines (construction)	
		Wind farms, bridges, oil platforms (construction)	51
2. Physical damage	**Abrasion**	Commercial fishery -bottom trawling	10
		Dredging + Sand/gravel/boulder extraction	37
	Changes in siltation	Riverine runoff of organic matter	5
		Shipping (coastal)	23
		Bathing sites, beaches and beach replenishment	34
		Dredging + Sand/gravel/boulder extraction	35
	Selective extraction	Dredging + Sand/gravel/boulder extraction (habitat loss)	36
3. Other physical disturbance	**Marine litter**	Marine litter	
	Underwater noise and other energy	Shipping (coastal and offshore)	15
		Recreational boating + sport	27
		Cables and pipelines (construction)	44
		Wind farms (operational)	49
		Oil platforms	50
		Wind farms, bridges, oil platforms (construction)	52
		Electromagnetic fields	
4. Interference with hydrological processes	**Changes in salinity regime**	Coastal waste water treatment plants	38
		Bridges and coastal dams	40
	Changes in thermal regime	Power plants (warm water outflow)	47
5. Contamination by hazardous substances	**Introduction of non-synthetic substances and compounds**	Atmospheric deposition of Pb	8
		Atmospheric deposition of Cd	11
		Atmospheric deposition of Hg	13
		Riverine load of Zn	14
		Riverine load of Ni	17
		Waterborne load of Pb	18
		Waterborne load of Cd	24
		Waterborne load of Hg	28
	Introduction of radio-nuclides	Discharges of radioactive substances	46
	Introduction of synthetic compounds	Atmospheric deposition of dioxins	16
		Population density (e.g. hormones)	25
		Harbours	30
		Oil slicks / spills	32
		Coastal industry, oil terminals, refineries, oil	42

Pressure category	Pressure (MSFD, ANNEX, Table 2)	Existing and potential pressure data layer	BSPI rank *
		platforms	
		Polluting ship accidents	48
6. Systematic and/or intentional release of other substances	**Introduction of other substances**	Chlorine from electricity cables	
7. Nutrient and organic matter enrichment	**Inputs of fertilisers**	Waterborne discharges of nitrogen	1
		Atmospheric deposition of nitrogen	4
		Waterborne discharges of phosphorus	6
		Aquaculture	19
	Inputs of organic matter	Riverine runoff of organic matter	3
		Aquaculture	20
8. Biological disturbance	**Introduction of microbial pathogens**	Aquaculture	26
		Coastal waste water treatment plants	39
		Passenger ships	29
	Introductions of non-indigenous species and translocations	Shipping	
		Inland canal traffic	
		Aquaculture	
	Selective extraction of species, including incidental non-target catches	Commercial fishery -surface and mid-water trawling	2
		Commercial fishery -bottom trawling	7
		Commercial fishery – gillnets	9
		Commercial fishery -coastal stationary	12
		Recreational fishing	
		Hunting of birds	21
		Hunting of seals	22

Note: *A rank according to the Baltic Sea Pressure Index. Pressures are ranked based on their prevalence, magnitude and perceived severity. This gives an indication of the expert judgment of their "threat to the ecosystem".

Another was the matrix developed within "The Marine Life Information Network – MarLIN" that is an initiative of the Marine Biological Association of the UK (MBA) (Table 3; http://www.marlin.ac.uk/marinenaturaleffects.php).

The matrix linking maritime activities and environmental factors:

- indicates the environmental factors that are likely to be affected by maritime activities;
- provides a link between maritime activities and the change in environmental factors against which sensitivities have been assessed;
- is generic rather than definitive;
- only addresses the construction and operational phases of activities;
- does not indicate the magnitude or significance of an environmental effect;
- does not address indirect or cumulative effects;

- ❖ is intended for guidance only.

The list of maritime and coastal activities and environmental factors in table 3 is derived from the Marine Conservation Handbook (Eno, 1991), amended by Cooke & McMath (2001) and discussed with the Marine Information Team (JNCC), and the MarLIN Biology & Sensitivity Key Information Sub-programme technical advisory group.

Table 3. Linking maritime and coastal activities to environmental factors. Matrix by the Marine Biological Association of the UK.

Coastal & Maritime Activities / Events	Sub-activities / events	Environmental factors																										
		Physical								Chemical									Biological									
		Substratum loss	Smothering	Suspended sediment	Desiccation	Changes in emergence regime	Changes in water flow rate	Changes in temperature	Changes in turbidity	Changes in wave exposure	Noise disturbance	Visual presence	Abrasion/ Physical disturbance	Displacement	Synthetic compound contamination	Heavy metal contamination	Hydrocarbon contamination	Radionuclide contamination	Changes in nutrient levels	Changes in salinity	Changes in oxygenation	Introduction of microbial pathogens/parasites	Introduction of non-native species	Selective extraction of target species	Selective extraction of non-target species
Aquaculture	**Fin-fish**		R	R			R		R		P	P	R		R				R		R	R	R		
	Macro-algae		P	P			P		P		P	P							P		P	R	R	R	R
	Predator control										R	R			P										
	Shellfisheries		R	R			R		R		R	R	R		R				R		R	R	R	R	R
Climate change	**Current change**						R	R	R										R	P		R	R		
	Sea level change				R	R	R			R										R						
	Temperature change				R			R	R										R		R	R	R		
	Weather pattern change				R			R														R	R		
Coastal defence	**Barrage**	R	R	R	R	R	R		R	R	R	R	R	R	P	P	P		R	R	R				
	Beach replenishment	P	R	R	R	R	R		R	R	R	R	R	R	P	P	P		R		R				
	Groynes	P	P	R	R		R		R	R		R		P							P				
	Sea walls/ breakwaters	P	P	R	R	R	R		R	R		R		P							P				
Collecting	**Bait digging**	R	R	R	R				R		R	R	R	R										R	
	Bird eggs										R	R	R											R	
	Curios										P	P	R	R										R	R
	Higher plants	R		R			R				R	R	R	R					R					R	R
	Kelp & wrack harvesting	R		R	R		R		R	R	R	R	R	R					R		R			R	R
	Macro-algae	R			R		R				R	R	R	R	P									R	R
	Peelers (boulder		R		R	R	R				R	R	R	R										R	

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	turning)																									
	Shellfish	R	R	R	R				R		R	R	R	R										R	R
Development	Construction phase	R	R	R	R	R	R	P	R	R	R	R	R	R	P	P	P	P	R	R	R					
	Artificial reefs		P	R			R		R	R					P	P	P		R		R					
	Communication cables		P	R			R		R			R														
	Culverting lagoons			R	R	R	R	R	R	P									R	R	R					
	Dock/port facilities		R	R			R	P	R	R	R	R	R	R	R	P	R	P	R	P	R	R	R			
	Land claim	R	R	R	R	R	R		R	R									R	R	R					
	Marinas		R	R	R	P	R	P	R	R	R	R	R	R	R	P	R		R		R	R	R			
	Oil & gas platforms		R				R		R		R	R	R		R	R	R		R		R					
	Urban			R					R		R	R	R		R	R	R		R	R	R	R				
Dredging	Capital dredging	R	R	R	R	R	R		R	R	R	R	R	R	P	P	P	P	R	P	R					
	Maintenance dredging	R	R	R					R		R	R	R	R	P	P	P	P	R		R					
Energy generation	Nuclear power generation		P	R				R	R		R	R			R	P		P	R	P	R					
	Power stations		P	R				R	R		R	R			R	R	P		R	P	R					
	Renewable (wind/tide/wave)		P	P	P	P	R		P	R	P	P			R		P				P					
Extraction	Maerl	R	R	R			R		R		R	R	R	R					R		R			R	R
	Rock/ minerals (coastal quarrying)	R	R	R					R		R	R	R	R	R	R	R		R		R					
	Oil & gas		R								R	R			R	R	R		R		R					
	Sand/ gravel (aggregates)	R	R	R			R		R	P	R	R	R	R	P	P	P	P	R		R					
	Water resources (abstraction)				P	P	R												R	R	R					
Fisheries/ shellfisheries	Benthic trawls (e.g. Scallop dredging)	R	R	R					R		R	R	R	R	P	P	P		R		R			R	R
	Netting (e.g. Fixed nets)										R	R	R	R										R	R

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	Pelagic trawls											P	P												R	R		
	Potting/ creeling		R									R	R	R	R										R	R		
	Suction (hydraulic) dredging	R	R	R					R			R	R	R	R	P	P	P		R		R			R	R		
Recreation	Angling											R	R	R	P										R	R		
	Boating/ yachting								P			R	R	R		R	P	R		R		R	R	R				
	Diving/ dive site											R	R	R	R										R			
	Public beach											R	R	R						P								
	Tourist resort			R					R			R	R	R		R	R	R		R		R						
	Water sports											R	R	R		R	P	R										
Uses	Animal sanctuaries											P	P	P						P			R	P				
	Archaeology	R	R	R					R			R	R	R	R	P	P	P		R		R					R	
	Coastal farming		R	R					R			R	R	R		R	P	R		R		R	P					
	Coastal forestry		R	R					R			R	R	R		R	P	R		R		R						
	Education/ Interpretation											R	R	R	R										R	R		
	Military											R	R	R		P	P	P	P									
	Mooring/ beaching/ launching		R	R			R		R			R	R	R	R	R	P	R					R	P				
	Research	P										R	R	R	P	P	P	P		P			R	P	R	P		
	Shipping		P	R					R			R	R	R	R	R	R	R	P	R		R	R	R				
Wastes	Fishery & agriculture wastes		R	R					R							R				R		R	R				
	Industrial effluent discharge		R	R					R							R	R	R		R		R						
	Inductrial/ urban emissions (air)			P					P							R	R	R										
	Inorganic mine and particulate wastes		R	R					R					R		P	R	P	P	R		R						
	Land/ waterfront		R	R					R							P	P	P		R	R	R						

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	runoff																											
	Litter and debris		R											R		P	P	P										
	Nuclear effluent discharge			R					R								R			R								
	Sewage discharge		R	R					R							R	R	R	P	R			R	R				
	Shipping wastes		P	R					R							R	R	R		R			R	R	R			
	Spoil dumping		R	R					R					P		P	P	P	P	R			R					
	Thermal discharges (cooling water)			R				R	R							R	R	P				P	R	P	P			
Other	**Removal of substratum**	R	R	R	P	P	P		R		P	R	R	R	R	P	P	P			R			R					

Note: probable effect – R; possible effect - P

'Probable effect' means that the activity is known to change the relevant environmental factor in most cases.

'Possible effect' means that the activity is likely to change the relevant environmental factor in some cases or in particular locations or situations.

For example it is highly 'probable' that:

- ❖ capital dredging will result in the removal of sediment and hence substratum loss;
- ❖ a coastal barrage will affect the hydrographic regime of the affected area and hence emergence and water flow rate; and
- ❖ sewage discharges with high BOD and organic content will change the level of nutrients and oxygen concentration in the receiving waters

Similarly, it is 'possible' that:

- ❖ benthic trawls or dredging activity will resuspend sediment and hence release contaminants within the sediments, where contaminated sediments occur.

The matrix identifies the probable effects of maritime activities in most cases. However, all eventualities cannot be considered in a study of this kind, and the matrix should be interpreted as generic guidance and should not be considered comprehensive. A detailed study of the magnitude or significance of the

environmental effects on an activity (or project proposal) is site dependant and the province of an environmental impact assessment.

After analysis of different marine activities and pressure/impact matrixes above, on a basis of relevance for indication of the conservation status of biodiversity as well as for indicaton of the (good) environmental status through biodiversity indicators, the following extracted result was compiled to be used for constructing the metadatabase and interview form for the MARMONI project (Table 4).

Table 4. List of sea uses having relevance for MARMONI study areas for which metadata was collected and for which interviews were performed with linkage to MSFD pressures, BSPI ranking and effect on biodiversity according MBA matrix.

	Sea use	MSFD	BSPI	MBA
Use of resources	1. **Fishing and other harvesting** (commercial (trawling, other); non-commercial (nets, angling, other); fisheries areas, sensitive fish areas, fish shellfish growing waters, closed fishing areas; algae harvesting areas, etc.)	**2, 3, 8**	**2, 7, 9, 10, 12, 15, 23, 27**	**53 R 11 P**
	2. **Aquaculture** (fish and shellfish farm areas, etc.)	**7, 8**	**19, 20, 26**	**30 R 11 P**
	3. **Hunting**	**8**	**21, 22**	**-**
	4. **Extraction areas** (mining, harbours, ports, traffic lines)	**1, 2**	**35, 36, 37, 41**	**94 R 23 P**
Use of marine environment	5. **Shipping** (marine traffic of tourist boats, transport boats, leisure boats, fishery boats; traffic separation, reporting areas, anchorage areas, vessel routes, shipping density, transportation / shipping routes, etc)	**2, 3, 5, 8**	**15, 23, 27, 29, 48**	**22 R 4 P**
	6. **Harbours, ports and terminals** (Port Limits, exclusion zones, pollution control zones)	**1, 3, 4, 5, 8**	**29, 30, 31, 40, 42, 43, 51, 52**	**61 R 10 P**
	7. **Technical installations and constructions** (wind farm development areas, tunnels, bridges, dams, offshore oil and gas platforms and pipelines, cables)	**1, 3, 4, 5, 6**	**33, 40, 42, 43, 44, 49, 50, 51, 52**	**77 R 25 P**
	8. **Disposal sites**, standing approvals for dispersants	**1, 2, 5, 7, 8**	**3, 5, 14, 17, 32, 38, 39, 41, 46, 47**	**81 R 31 P**
	9. **Military activities**	**2, 3, 5**	**35, 36, 37, 42, 46, 48**	**3 R 4 P**
	10. **Recreation areas** (bathing and swimming sites, leisure boating, scootering, surfing, wind sliding, diving, etc.)	**2, 3, 5, 8**	**25, 27, 29, 34**	**69 R 9 P**
Pollution	11. **Coastal activities** (point-pollution from factories, power-plants, loading activities in ports, sewage water discharge etc)	**4, 5, 7, 8**	**3, 14, 17, 38, 39, 42, 46, 47**	**59 R 14 P**
	12. **Agriculture** (diffuse pollution)	**7**	**1, 3, 4, 6**	**17 R 2 P**
13.	**Environmental protection (Nature protection areas, protection zones, limitation zones, animal sanctuaries, etc)**	**-**	**-**	**6 P**

Note: Colours are indicating the strength of direct impact on marine biodiversity as estimated according to the MSFD Annex III, BSPI ranking and MBA effect matrix counts: white – very low or no direct impact or not evaluated; green – low direct impact; yellow – medium direct impact; red – high direct impact.

Table 4 above also shows the importance of data existence for one or another sea use. The sea uses with the highest impact are **extraction areas, technical installations and disposal sites.** The next group is shipping, harbours, ports and terminals, but also military activities and recreation as well as coastal point pollution sites. Although diffuse pollution from agriculture has very low direct impact, it is indirectly affecting marine environment and should therefore be also under control. Analysis of the table 4 is also showing that the most and highest impact on marine biodiversity is coming from the use of marine environment through impacting habitats and living space of species, rather than direct use of resources. That result is similar to terrestrial environment, where the highest impact on biodiversity is coming from land use leading to decline in quantity and quality as well as fragmentation of habitats and living space.

On the other hand, data on activities causing direct biological disturbance – especially hunting, fishing and aquaculture but also coastal activities, recreation as well as shipping and harbours, ports and terminals – can be very important. People dealing with those activities are also the potential cooperation partners for possibly sustainable and cost-effective data collection and monitoring.

Sea uses having perhaps the highest importance considering the impact on biodiversity within the project study areas may be the following (evaluation is based on the sea use impact evaluations above, metadata existence analysis below and also on interviews):

- Gulf of Riga: the most important is data on fishery (use of resources) and shipping (use of marine environment), but also technical installations and constructions;
- Hanö Bight: the most important is data on pollution, but also coastal activities (use of marine environment);
- Coastal area of SW Finland: the most important is data on recreation, pollution and environmental protection
- Gulf of Finland: the most important is data on shipping (use of marine environment) and fishery (use of resources), but also technical installations and constructions.

Still, it will need deeper analysis and therefore all the sea uses listed above should be taken into account for all the project study areas.

1.3 Application of sea use data for marine biodiversity assessment

For marine biodiversity assessment, the sea use data can be applied either through giving additional biodiversity data or supply of impact/threat data. Sea use activities are also directly or indirectly related to the ecosystem services provided by marine ecosystems and may affect both the amount and quality of the provided services. Therefore, biological data in combination with sea use data provides information for cost-benefit analysis for the sustainable use of the marine environment by estimating how the use of the sea affects the ecosystem services it provides. Such a cost-benefit analysis, which includes valuations of marine ecosystem services, can also provide a basis for explaining ecosystem based sustainable planning and management of sea uses. It helps to explain why planning and management that includes biodiversity data collection can be more cost effective in the long run than "business as usual", which is based only on economic interests and not taking biodiversity assessment data enough into account.

In the case of the use of marine living resources (fishery, hunting, aquaculture), additional data on biodiversity can be obtained in a form of direct source data or by-catch data. On the other hand, due to fear for decreased quotas and/or other increases in management restrictions many experts believe that data reported directly from end-users may be of poor quality or even falsified. Thus, it is important that unbiased assessment of fish and game animal populations are made through regional monitoring programmes.

In the case of the use of marine environment as well as the use of non-living marine resources (shipping, harbours, constructions, mining, etc.) data can usually be obtained through data collected directly during activity planning phase, within environmental impact assessment processes or as by-product data of activities as a result of environmental monitoring required by the obtained environmental permits (e.g. species found within shipping or harbours activities etc.).

In the case of point-pollution data it is mainly a matter of mandatory monitoring activities required by environmental permits, where biological objects are often used as indicators or objects that carry pollutants and are therefore the subject for laboratory analysis. For diffuse pollution it is more difficult, but may be connected to overall estimations of ecosystem service generation. Data collection should therefore target activities that cause diffuse pollution (sources could be situated deep inland, far away from the coast, whereupon the amount of pollution reaching marine environment should be estimated).

2 Data on the use of resources

In order to elaborate an indicator and monitoring scheme that would enable the assessment of the (favourable) conservation status of biodiversity components as well as of the (good) environmental status, it is very important to take into account data on sea use activities directly exploiting biological resources or their living environment. This chapter is giving a short status overview on existing sea use databases, based on metadata collected within action A1.3.

2.1 Fishing and other harvesting

This sea use has both direct and indirect impact on biodiversity. The main direct impact is selective extraction of species, including incidental non-target catches (by-catch) but also physical damage of habitats through bottom-trawling. Indirect impacts are related to shipping activities, causing for example changes in siltation, underwater noise as well as introduction of non-indigenous species and translocation.

On the other hand, fishing and shipping sector are both potential co-operation partners to be involved in monitoring activities. This can be a cost-effective way to obtain data for marine biodiversity assessment, as fishing and shipping routes are usually quite conservative and their exploitation is usually well driven by client oriented needs that is ensuring continuation of activity.

According to the collected metadata, the following relevant national level data is existing:

Country	Number of databases	Commercial fishery data	Recreational fishery data	Regular collection	Spatial data	Freely accessible
Sweden	1	Yes	Yes	Yes	Yes	No
Finland	2	Yes	Yes	Yes	Yes	Partly
Estonia	4	Yes	Yes	Yes	Yes	No
Latvia	2	Yes	No	Yes	Yes	No

Although data access will need either contract or resources, fishery data seems to be well available in all partner countries of the MARMONI project – 9 databases were reported in total. Spatial aspect seems to be best in Sweden and data organization in Finland. It should be still investigated if variables in those fishery databases are relevant for elaboration of biodiversity indicators, but their relevance as background data is clear.

Regarding fishery interviews, three responses were received – one from Sweden and two from Estonia. The Swedish respondent seems to be from data collector side and one of the Estonian respondents from administration and the other from data holder side. All respondents are in charge of and participate in international reporting and refer to EU directives. According to the answers the cooperation possibilities for monitoring seem to be promising. However, these results are only reflecting the possible situation in two countries out of four. And the situation can be more complicated due to the changes taking place in Sweden from the 1-st of July 2011, including liquidation of the board of fisheries. Much is still unclear regarding data management in Sweden.

2.2 Aquaculture

Similarly to fishing, also aquaculture has both direct and indirect impact on biodiversity. But the specific impacts are quite different – the main direct impact of aquaculture is biological disturbance, e.g. introduction of microbial pathogens and non-indigenous species and translocation of species. An important impact of aquaculture is also enrichment of the marine environment with nutrients (input of fertilizers) and organic matter. Compared to fishing activities the impact of aquaculture is evaluated as more important, due to its un-controlled biological impact, which carries more risks for the marine ecosystem than physical damages caused by fishery.

Concerning the data collection and monitoring purposes as well as relevance for the study areas, aquaculture is not as important as fishing activities. As point-pollution sources, the fish farms still have to be considered as potential source of different biological disturbance occurring in the marine ecosystems. It is very important that those farms have well established precautionary measures and early warning systems in place.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	1	Yes	Yes	Partly
Finland	1	Yes	Yes	Partly
Estonia	0			
Latvia	0			

Aquaculture data availability is showing a well distinguished situation between Sweden-Finland and Estonia-Latvia. The latter ones neither have data on marine fish farms, nor is the activity as such that common yet. Marine aquaculture does not exist in Latvia, partly due to unfavourable natural conditions. A few marine fish farms have existed in Estonia in the past but currently they are not working anymore. For Sweden and Finland data seems to be well available, but access needs either contract or resources. The spatial aspect seems to better in Sweden.

2.3 Hunting

Direct impact of hunting on marine biodiversity in the Baltic Sea can be limited with marine mammals and birds. Whaling in Baltic Sea is prohibited and also seal hunting is restricted – hunting of the endangered Ringed seal is prohibited but limited hunting of the Grey seal is allowed in Finland and Sweden. There have been some attempts to set up controlled Grey seal hunting also in Estonia, in Kihnu Island area as part of traditional way of living but the process is on-going. The main focus of the current activities can be set on marine bird hunting.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	1	Yes	Yes/No	Partly
Finland	1	Yes	?	No
Estonia	0			
Latvia	0			

There was only one database reported and it was from Finland. But from interviews there was a response from Sweden with a reference to SEPA database, so it was also considered as a real result on data existence. Likely the respondent is referring to one of these databases where only the number of animals shot per sea area is included. Unfortunately that response was the only one. General data on hunting in Sweden is available on county level but hunting of seals and other marine animals is very restricted. In Latvia hunting of sea birds is negligible, and the statistics does not display it separately. In Estonia hunting of sea birds is existing and also data is collected in quite large numbers (by species and hunting regions), but from current data (which is included in the overall game monitoring database) it is not possible to extract data on hunted seabirds in certain marine areas.

2.4 Extraction of mineral resources

If the three sea uses analysed above are related to the use of biological resource, having therefore mainly a direct but usually not very strong impact on biological components, then extraction of mineral resources has a direct impact on biodiversity through physical loss and damage of habitats. Causing abrasion and changes in siltation, it impacts mainly the benthic biodiversity but through food-webs also the pelagic biodiversity.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	1	No	Yes	No
Finland	1	No	Yes	Yes
Estonia	2	No	Yes	Partly
Latvia	1	No	No	Partly

Data on extraction areas seems to be well shaped spatially, but due to somewhat project based approach it might be not so well usable for monitoring and indicating purposes. In some countries, e.g. Latvia, extraction of marine mineral resources is still a future perspective, and nowadays only dredging activities for shipping needs are taking place.

Concerning the interviews there was no response from the sector of mineral extraction in any of the countries. It confirms that activity is probably not very much developed and data is collected on a project by project basis. For example in Sweden, mineral extraction is not done from marine areas. The first permit in Sweden was issued to replace sand to an eroded beach (putting back the same sand) in 2011, so in general it could be said that mineral extraction in marine areas is prohibited in Sweden (therefore also no database is needed).

3 Data on the use of the marine environment

While the previous chapter described database existence and situation regarding the usage of the marine resources having quite direct impact on biodiversity through its exploitation, the current chapter is focusing on more indirect pressures deriving from the usage of the marine environment. The activities analysed in this chapter influence marine biodiversity through impacting the living environment of the species and thereby causing sometimes a significant impact on more sensitive species and their habitats. Usage of the marine space can sometimes have a very strong local impact on sensitive marine habitats, for example in disposal sites or locations of technical installations and constructions.

3.1 Shipping

Compared to fishing and other direct use of marine resources, shipping has mainly indirect impact on biodiversity, but direct impact on habitats. Shipping is impacting habitats through changes in siltation and introduction of synthetic compounds as

well as species through underwater noise, energy disturbance, introduction of non-indigenous species and translocations of species with the ballast water.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	4	Yes	Yes	Partly
Finland	1	No	Yes	Yes
Estonia	2	Yes	Yes	Partly
Latvia	5	Yes/No	Yes/No	Partly

As data on shipping is needed and used also for commercial purposes, it is usually regularly collected and has a good spatial coverage. This is reflected also in the high number of databases reported as containing the shipping data – 12 databases in total. The situation seems to be somewhat better in Sweden and Latvia than in Estonia and Finland. On the other hand accessibility of Finnish data is better than others.

There was only one interview response from the shipping sector and it was from Latvia – the country having also the highest number of shipping databases reported. Along with fishery, shipping seems to be the most important sea use for the project study areas Gulf of Riga and Gulf of Finland.

Still, it must be noted that shipping data is often contained in databases established for other purposes, like fishery, harbours or pollution control. This is understandable considering the close connection of shipping to harbours, ports and terminals as well as dredging and other sea use related to the marine infrastructures.

3.2 Harbours, ports and terminals

List of impacts of harbours, ports and terminals includes sealing, changes in salinity regime, selective extraction of benthic material, introduction of synthetic compounds and non-indigenous species as well as their translocations.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	2	Yes	Yes	Yes
Finland	1	No	Yes	Yes
Estonia	1	Yes	Yes	Partly
Latvia	2	Yes/No	Yes/No	Partly

Databases on harbours, ports and terminals are usually in spatial data format and under administration of either environmental or transportation sector or both. There was any database reported for only harbours, ports and terminals data. Usually data is included in the general marine spatial data portals, shipping,

maritime, navigation, extraction or disposal sites databases. Data accessibility seems to be quite good, but the potential for using the data for biodiversity indicators and monitoring should be further investigated.

As harbours, ports and terminals have usually obtained environmental permits for everyday business, it should also be investigated what kind of monitoring requirements those permits are containing. In some cases such permits include mandatory monitoring of species and habitats (e.g. sea birds, fish, seals, benthic habitats) within and/or in the vicinity of the aquatory of the harbour. How much such monitoring is covering for example non-indigenous species, should also be checked.

There was only one interview respondent from the harbours, ports and terminals sector, but this respondent was ready for practical cooperation on monitoring of biodiversity and also referred to such requirements set by the environmental permits. Therefore, for better cost-effectiveness of biodiversity monitoring, the administrations of harbours, ports and terminals as the key-stakeholders in marine commercial shipping sector should certainly be involved into cooperative monitoring schemes of marine biodiversity.

3.3 Technical installations and constructions

The impacts of technical installations and constructions include physical loss of habitats (both sealing and smothering), underwater noise and other energy, changes in salinity regime, introduction of synthetic compounds and other substances. This type of the sea use has one of the highest direct impacts on marine biodiversity.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	1	Yes	Yes	No
Finland	0			
Estonia	2	Yes	Yes	Partly
Latvia	2	Yes	Yes	Yes

As technical installations and constructions are not very widely distributed in the Baltic Sea area, there is also not much data yet. Usually the databases are containing spatial data for planning constructions and databases are kept either by the environmental authorities or transportation authorities for navigation safety. Situation on data existence seems to be somewhat better in Estonia and Latvia, but could be more strongly regulated in Sweden and Finland. Data is collected regularly and is spatially well available, but accessibility seems to be not so good.

There was only one interview respondent involved with technical installations and constructions from Estonian administration. As there are not many of such constructions developed and built yet, it is therefore very important that stakeholders dealing with that sea use are included in monitoring and research planning at the earliest possible stage.

3.4 Disposal sites

The impacts of disposal sites include smothering, abrasion, changes in siltation, selective extraction, contamination by hazardous substances or enrichment with nutrients and organic matter, depending on the disposed material. That sea use can have very high direct impact on biodiversity, depending on specifics of the disposed material. Even in case of inactive material like sand, habitats at the disposal site will be completely destroyed. Therefore it is very important to collect as much data as possible on that sea use.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	0			
Finland	1	No	Yes	Yes
Estonia	2	Yes	Yes	Yes/No
Latvia	1	No	Yes	Yes/No

That particular sea use in Baltic Sea area is closely connected to shipping activities and harbours, ports and terminals, where dredging activities occur. Although the table does not show any database in Sweden, there are still existing data on historical military dumping grounds. All available data sets contain spatial information and are well accessible. Similarly to technical installations, data is kept either by environmental authorities or transportation authorities for navigation safety.

3.5 Military activities

The impacts of military activities include physical damage and related audio-visual as well as electro-magnetic disturbance of direct military exercises as well as contamination with hazardous substances.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	1	No	No	Yes
Finland	0			
Estonia	1	Yes	Yes	No
Latvia	3	Yes	Yes/No	Yes/No

As military activities in the Baltic Sea area can be divided into currently ongoing and already ended activities, also data is usually divided accordingly and is reflecting the direct impact of activities (military exercises, de-mining etc.) and impact deriving from historically dumped chemicals (pollution risk when extracting or constructing in such areas). For that reason there are listed three databases for Latvia, one of them is actually includes information on chemical pollution risk areas and is not directly

connected to the currently ongoing military activities. Also the Swedish and Estonian reported database contains data on locations of old dumped mines. It means that the only country that has reported on database of military exercise areas is Latvia.

There were two interview respondents from military sector, one from Finland and the other from Estonia. They both confirmed that military data was not publicly accessible and was highly classified.

3.6 Recreation areas

List of direct impacts of recreation areas includes changes in siltation, marine litter, underwater noise and other energy, introduction of synthetic compounds and microbial pathogens.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	2	Yes	Yes	Partly
Finland	1	No	Yes	Yes
Estonia	1			
Latvia	1	Yes	No	Partly

There were two responses to interviews from people dealing with recreation, one from Latvia and other from Estonia. The existing data on recreation areas includes mainly information on location of the recreation areas and also bathing water quality and pollution risks (both directed mainly more to human health security than to biodiversity wellbeing). All countries that reported database existence had separate databases for recreation areas and their water quality. For Estonia there was also an interview response indicating the reporting on bathing water quality. It is interesting that the recreational data is not always freely accessible.

4 Data on pollution

The current analysis focused mainly on sea use activities that are directly affecting marine biodiversity and could be a source for or support data collection for marine biodiversity indicators as well as for monitoring purposes. Therefore pollution as such is relevant through contamination with hazardous substances affecting biological objects as well as through eutrophication that affects both habitats and species composition of marine biodiversity. Pollution data is currently not divided between economic activities, but just into two packages – coastal point pollution and coastal non-point pollution. The latter one is mainly considered as pollution coming from agricultural activities and not as air pollution from point sources.

4.1 Coastal point pollution

The list of direct impacts of point pollution includes changes in salinity and thermal regime, contamination by hazardous substances, enrichment with nutrients and organic matter and introduction of microbial pathogens. Most of these impacts are not directly affecting the biodiversity components, but through contamination.

Therefore it is important that effective early warning systems are established for detection of such pollution impacts. The existence of well-shaped databases is very important to get the reference values and design proper monitoring programmes.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	3	Yes	Yes/No	Partly
Finland	1			
Estonia	3	Yes	Yes/No	Yes
Latvia	1	Yes	No	Yes/No

The highest number of databases containing coastal point pollution data was reported by Sweden and Estonia, but none of those databases were directly and only addressing coastal point pollution. While in Sweden the data is collected more on pollution recipients – contaminants in biota and contaminants in sediments, in Estonia the data is focussing on potential pollution sources – databases of environmental permits and hazardous enterprises. Latvian data is focused on waste water discharges. All data available is regularly collected, but not much spatial data is available. Also accessibility is not always free.

Concerning interviews on coastal point pollution, there was only one response from Estonia referring to Estonian Environmental Register data that includes also point pollution information for waste water discharges.

4.2 Non-point pollution (agriculture)

List of direct impacts of non-point pollution from agriculture can only be limited to enrichment with nutrients and organic matter. The main result of that impact is eutrophication of the coastal sea and consequent substantial changes in habitat and species conditions. As eutrophication of the coastal zone of the Baltic Sea is recognised already many years as a growing problem, the urgent measures both on monitoring and managing it should be taken.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	3	Yes	Yes/No	Partly
Finland	0			
Estonia	0			
Latvia	0			

Only Sweden has reported to have databases containing data on coastal non-point pollution. Data is regularly collected and includes also spatial data.

No interview responses on coastal diffuse pollution were received.

5 Data on protection of the marine environment

The current analysis estimated only negative impacts. Marine protected areas can have only a few negative impacts that may occur in the animal (mainly birds) sanctuaries acting as concentration points for species. The impacts that may occur include noise and visual disturbance, changes in nutrient levels as well as introduction of pathogens and non-indigenous species. But pressure strength of all of those impacts is much lower than of other, human activities.

According to the collected metadata, the following relevant national level data exists:

Country	Number of databases	Regular collection	Spatial data	Freely accessible
Sweden	1	Yes	Yes	Yes
Finland	1	Yes	Yes	Yes
Estonia	3	Yes	Yes/No	Yes
Latvia	1	Yes	Yes	Yes/No

Database existence on environmental protection was reported by all of the countries. Finland reported data somewhat late and therefore that entry is not present in technical report of action as well as in metadata table as annex of technical report. Respondents for interviews from Finland were all, except one related to environmental protection issues. The respondents mentioned such Finnish databases like Pohje for macrozoobenthos, VEHA for macrophytes and Hertta for water quality as well as WISE, as water information system kept by the European Environment Agency. All data is mentioned also being georeferenced. So, it can be concluded that all the project countries have well designed databases on marine environmental protection, having regular collection of data as well as spatial data. Most of those databases are also quite freely accessible, but some restrictions may appear.

6 Data by countries

6.1 Sweden

Metadata for Swedish sea use databases includes information on 12 databases that cover 11 of 13 sea uses listed above. The current data collection did not succeed to get data on hunting and disposal sites. Information on disposal sites generally exists in Sweden at municipality level. General data on hunting is available on county level but hunting of seals and other marine animals is very restricted in Sweden. Still, hunting database was mentioned by one respondent within an interview. Likely the respondent is referring to one of these databases where only the number of animals shot per sea area is included.

At the same time there are 4 databases containing data on shipping. 3 databases contain data on coastal point and non-point pollution and 2 on harbours, ports and terminals as well as recreation areas.

The collected Swedish metadata can be highlighted as more pollution oriented and spatially well available.

At the same time there is seldom free access to Swedish data. Data on non-point pollution was only reported by Sweden and by none of the other countries.

6.2 Finland

The metadata on Finnish sea use databases includes information on 10 databases that cover also 10 of 13 sea uses listed above. The current data collection did not succeed to get data on technical installations and constructions, military exercises as well as coastal non-point pollution. At the same time there are 2 databases containing data on fisheries.

Finnish metadata can be highlighted as well reflecting to data on use of resources. Also in quite many cases the databases can be freely accessed.

6.3 Estonia

The metadata on Estonian sea use databases includes information on 12 databases that cover 10 of 13 sea uses listed above. The current data collection did not succeed to get data on aquaculture, hunting and non-point pollution. At the same time there are 4 databases containing data on fishery. 3 databases contain data on coastal point pollution and environmental protection. 2 databases contain data on extraction of mineral resources, shipping, technical installations and constructions as well as disposal sites.

Estonian metadata can be highlighted as well reflecting to data on use of fish resources. Still, access to fishery databases is partly restricted.

6.4 Latvia

The metadata on Latvian sea use databases includes information on 11 databases that cover 10 of 13 sea uses listed above. The current data collection does lack data on aquaculture, hunting, extraction of mineral resources and non-point pollution. There are certain reasons for that. Marine aquaculture does not exist in Latvia, mainly due to unfavourable natural conditions (open coastline with moving sandy bottoms). Hunting in the sea areas is not very popular. The hunting bag of sea birds is negligible, and the statistics does not display it separately. Although some mineral resources may play a role in the future (e.g. sand, iron-manganese concretions, oil), the current extraction is limited only with dredging activities in port aquatories and shipping routes. Although Latvia regularly reports on non-point pollution, research is very scattered and sporadic. None of those sea uses were mentioned also by any of the respondents of interviews. At the same time there are 5 databases that contain data on shipping. Most of them are integrated with various international databases to ensure ship traffic control and safe navigation. 3 databases contain data on military exercises. 2 databases contain data on fishing, harbours, ports and terminals as well as technical installations and constructions.

Latvian metadata can be highlighted as well reflecting to data on shipping and other use of marine environment. Also access to those databases seems to be usually quite well available.

7 Overall evaluation of the data sets

From table 5 below it can be concluded that less data is available on hunting and non-point pollution and also on marine aquaculture, but latter is actually due to the fact that the activity is currently missing in Latvia and Estonia.

Table 5. The number of databases per country in the sea use metadatabase of the MARMONI project.

Country	Fishing	Aquaculture	Hunting	Extraction of mineral resources	Shipping	Harbours, ports and terminals	Technical installations and constructions	Disposal sites	Military activities	Recreation areas	Coastal point-pollution	Non-point-pollution	Environmental protection	TOTAL	Number of databases	Number of sea uses covered	Missing	% of sea uses covered
Sweden	1	1		1	4	2	1		1	2	3	3	1	**20**	12	11	2	85
Finland	2	1	1	1	1	1		1		1	1		1	**11**	10	10	3	77
Estonia	4			2	2	1	2	2	1	1	3		3	**21**	12	10	3	77
Latvia	2			1	5	2	2	1	3	1	1		1	**19**	11	10	3	77
TOTAL	**9**	**2**	**1**	**5**	**12**	**6**	**5**	**4**	**5**	**5**	**8**	**3**	**6**		**45**	**13**	**0**	

The situation is better regarding shipping and fishing data, followed by coastal point pollution data and harbours, ports and terminals as well as environmental protection. Also data on extraction of mineral resources, recreation, technical installations and constructions as well as military activities seem to be quite well available. Disposal sites data might need some improvement.

Number of databases reported was highest for Sweden (12 databases) and also coverage of sea uses in these databases (11 sea uses, 85%). Lowest number of databases was for Finland (9). Still all countries resulted to cover more than half of sea uses and differences are not very big. Sea uses coverage is given in Figure 1 below.

The number of databases reported was the highest for Sweden (12 databases) and also the coverage of sea uses in these databases (11 sea uses, 85%). The data on more than half of the listed sea uses exists in all of the project partner countries and the differences are not very big. The share of sea uses covered by the reported databases by project countries is given in the Figure 1 below.

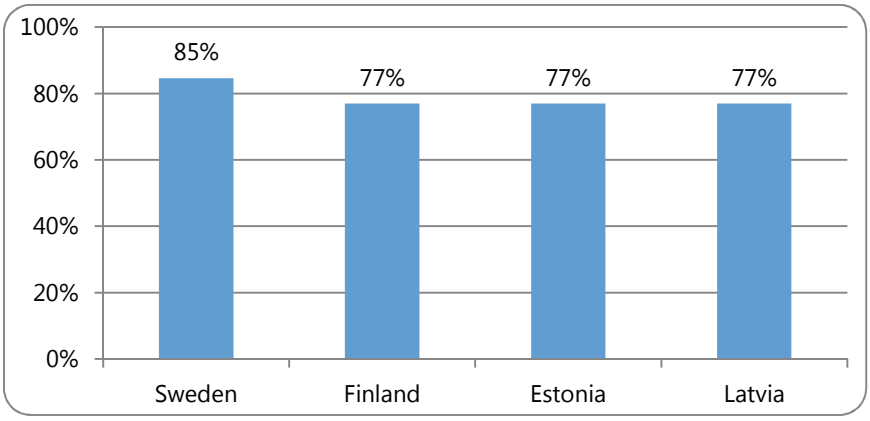

Fig. 1. Share of sea uses covered by reported databases by project countries.

Data seems to be better available for fishery and shipping, including related harbours, ports and terminals. Less data seems to be available for hunting and non-point pollution.

While Sweden seems to have better data on pollution and Finland for the general usage of marine resources, Estonian data is more focused on fishery and Latvian data on shipping activities.

Spatially the data seems to be covering both, coastal and open sea areas. Only 9 cases out of 45 were referring only to coastal and very few only to open sea areas.

Information or access to data is online available or partly available for more than half of the databases, but access seems to be freely available only for one quarter of databases, most of them from Sweden.

Most of the databases have ongoing data collection behind. Only 6 of the reported databases are not ongoing anymore and 2 of them are still keeping the possibilities to be restarted again.

Concerning the potential impact, 13 cases out of 45 refer to habitat destruction and 23 to species disturbance, most of other cases are not evaluated.

8 Results of the expert interviews

The expert interviews covered somewhat smaller scope of sea use activities than the collected metadata (look Figure 2).

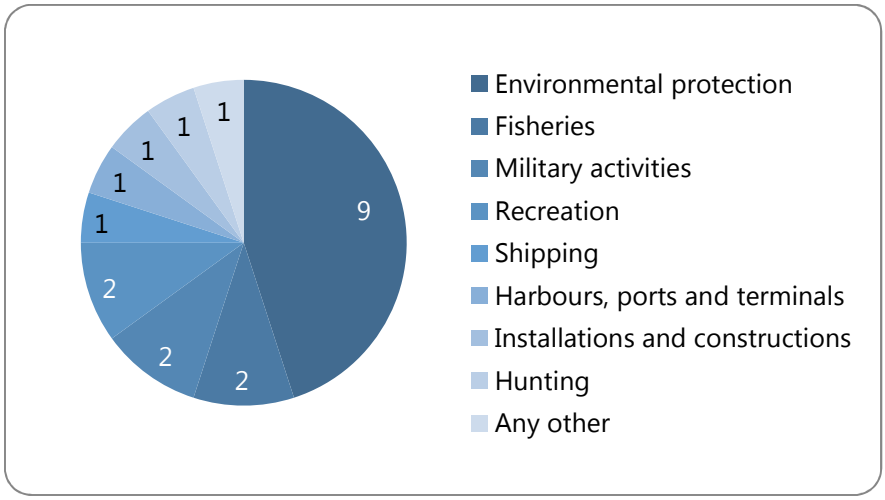

Fig. 2. Share of sea uses represented by expert interview respondents

Large portion of persons dealing with environmental protection among the interview respondents is also showing that there is still strong need for better cooperation between environmental and other sectors. Other somewhat larger proportions of respondents were dealing with fisheries, military activities and recreation. The first is perhaps showing the prevalence of that sea use in the marine environment, the second perhaps good military discipline in responding, but the third is a bit surprising as recreation was not so well included in metadata collection.

One of the questions asked from respondents was if they perform any monitoring and what kind. Results were again quite promising - monitoring activities are performed by more than half of the responded experts (Figure 3).

The most of the respondents performing monitoring activities are from the environmental protection sector, but some were also from fishery and shipping as well as one from recreation sector.

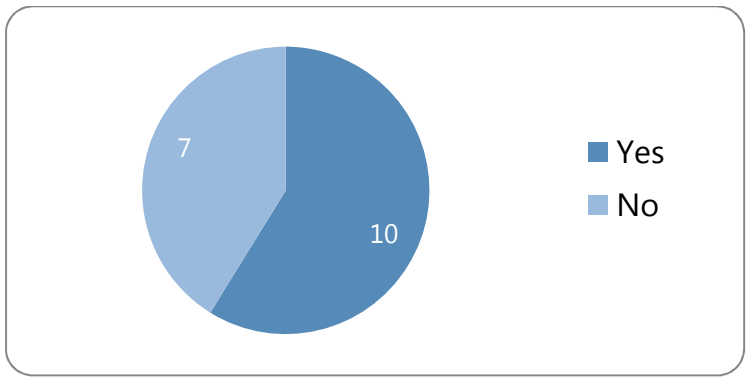

Fig. 3. Share of respondents on a basis of monitoring performance (do you perform any monitoring?).

Other question asked was on willingness to cooperate regarding monitoring activities on biodiversity monitoring. Results are again quite promising, as more than one third of the respondents are willing to cooperate (Figure 4).

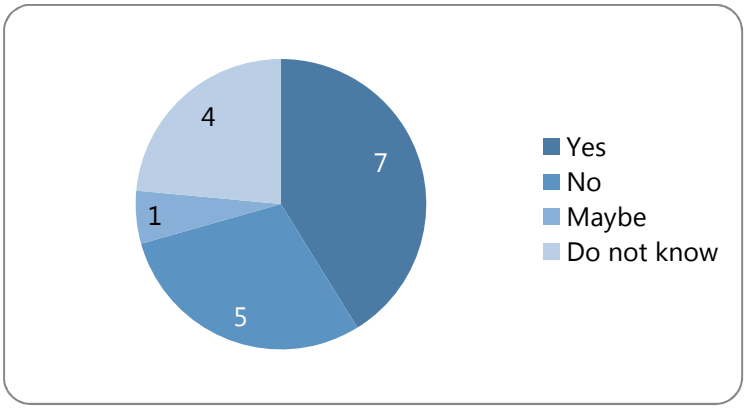

Fig. 4. Share of respondents on a basis of willingness to cooperate regarding biodiversity monitoring (are you ready to be involved in/or allow your facilities for marine biodiversity monitoring?).

It is also very promising that among the respondents willing to cooperate were beside environmental protection respondents also representatives of fishery, harbours, ports and terminals, military and coast guarding activities.

9 Suggestions for improving the data sets and their administration

Sea use and pressure data is already quite promising for all project countries. Still the data and its administration have a lot of improvement needs and possibilities. From the spatial aspect there are huge number of existing data layers in different databases around countries and many of them are also online available, but within different web pages and tools. Therefore first and biggest improvement possibility is actually **full implementation of the INSPIRE directive**. If all spatial data that is referred in currently collected metadatabase would be interoperably added into one web environment, it would certainly be unique basis for any kind of planning and management activities.

Second suggestion is basing on interlinkage of existing data. Currently there are quite many scattered databases that contain similar variables through which different databases can be interlinked. For instance location data or time data etc. can be the basis for such interlinkage that can help to sustain costs for monitoring, assessment etc. in the future.

From previous points cooperation needs are rising. It can still be noticed that although there are scattered databases in different institutions that contain similarities in data, there is very little interest or attempts to cooperate and share data. Cooperation, especially on a basis of spatial planning and other spatial activities, like monitoring or research is essential for sustainable purposes.

At national administrative level is very important to use and propose nationally designed databases in order to collect and compile data that at local – municipal or county level, within local research or development projects. This also makes it easier to control that data is entered into the database in the same way and ensure that metadata information is gathered at the same time.

10 Conclusions

Current action aimed to compile existing data on sea use activities in the project's study areas, i.e. potential pressures on the marine environment and biodiversity. Almost one database per sea use per country for that aim is quite reasonable result. Analysis of collected data did also show good presence of such important data as data on shipping and fishery, but further analysis is needed on variables basis for those and also other sea use based databases. Improvement should be done in pollution and recreation data collection as well as disposal sites data. In some countries, like Estonia improvement is also needed on aquaculture and hunting data.

Expert interviews, although the interviewed amount and response percentage was not very high the results were quite promising. More than half of the respondents are involved in monitoring activities and more than one third are ready to cooperate on monitoring of biodiversity.

So, there is a good basis for going on into further, more deep analysis of data in order to design commonly well understandable and easily detectable biodiversity indicators that can be monitored in cooperation with different sea users with purpose to reach as much as possible sustainable management of Baltic marine environment.

11 Acknowledgements

We would like to thank the national experts in Estonia, Finland, Latvia and Sweden for their kind participation in the expert interviews and/or were involved in data collection and analysis.

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13 Annex 1. Metadatabase on sea use related information

	ENGLISH TITLE	COUNTRY	SEA USE	SPECIFIC SEA USE	POTENTIAL IMPACT	VARIABLES	AVAILABILITY	ONLINE	INSTITUTION
1.	**Water map**	Sweden	Coastal activities, recreational fishing areas, bathing sites, recreation areas	WFD, status classifications	Algae	Classifications of nutrient levels, contaminant levels, secchi depth, ecological status	Possibly GIS layers after agreement	http://www.gis.lst.se/vattenkartan/	Swedish River Basin District Authorities
2.	**National aquaculture database**	Sweden	Aquaculture	Aquaculture	Fauna, flora	Aquaculture locations, amounts cultured	Possibly GIS layers after agreement	http://www.gis.lst.se/fisknet/	Swedish Board of Fisheries
3.	**Swedish county maps**	Sweden	Environmental protection	MPAs, national interest objects and areas - energy production, mining, recreation		Locations and areal cover of MPAs and national interests	Possibly GIS layers after agreement	http://gis.lst.se/lanskartor/	Collaborative effort from all County boards
4.	**Environ-mental data portal**	Sweden	Shipping	AIS derived information on commercial shipping intensity. Harbours and jettys	All types potentially impacted	Shipping intesity, harbours, marinas, jettys	Available via web interface	http://gpt.vic-metria.nu/GeoPortal/	SEPA
5.	**Swedish Transport Agency shipping data**	Sweden	Shipping	AIS derived information on commercial shipping intensity. Shipping lanes	Fauna, flora	Shipping intesity, harbours, shipping lanes	Possibly GIS layers after agreement/ puchase		Swedish Transport Agency, maritime division
6.	**Coastal oilspills**	Sweden	Shipping	Oil spills	Fauna	Estimated volume of spill, length, width, lat-long	Available via HELCOM	http://maps.helcom.fi/website/mapservice/index.html	Swedish Coast Guard
7.	**Geographical data portal**	Sweden	Potentially all: this is a metadatabase with information			Pollutant concentrations in sediments, Houses, roads, coastal erosion, gamma radiation	Some freely accessible, some after agreement, some may be	http://www.geodata.se	Geodata-sekretariatet

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			on all geographic data from Swedish authorities				purchased		
8.	**Areas with old mines and dumped explosives in Swedish waters**	Sweden	Military activities	Dumping grounds		Areas	Available via web	http://www.sjofartsverket.se/sv/Infrastruktur-amp-Sjotrafik/Sjogeografisk-information/Minor/Riskomraden/	Swedish Maritime Administration, Swedish Navy
9.	**Contamin-ants and metals in biological material (non-human)**	Sweden	Coastal activities	Contaminants in biota	Fish, inverte-brates	Pollution loads in biota	Available via web interface	http://www3.ivl.se/miljo/db/IVL_biota_registersida.htm	IVL, Swedish Environmental Institute
10.	**Sediment monitoring**	Sweden	Coastal activities	Contaminants in sediments		Pollution loads in sediment samples	Available via web interface	http://vvv.sgu.se/sguMiljoOvervakning/web/sgu_MV_mo_sediment.html	Swedish Geological Survey
11.	**WaterInformationSystem Sweden**	Sweden	Coastal activities, agriculture	WFD, status classifications		Classifications of nutrient levels, contaminant levels, secchi depth, ecological status	Available via web interface	http://www.viss.lst.se/	Swedish River Basin District Authorities
12.	**Swedish nutrient emission data**	Sweden	Coastal activities, agriculture	Data used as input for HELCOM Pollution Load Compilation 5	Fauna, flora	Estimations on Nitrogen and phosporous emissions from Swedish waters	Available via web	http://www.smed.se/	Consortium: IVL, SCB, SMHI and SLU
13.	**Commercial Marine Fishery**	Finland	Fishing	Commercial fishery	Fish, seals	Cathes (kg) and fishing efforts (fishing days and number of gear used) of commercial fishery. During	Data on the catches of single fishermen is confidental but		Finnish Game and Fisheries Research Intitute

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						the few recent years, data on seal by-catch has been collected, too, but reliability of this data has not yet been evaluated.	various summary statistics (e.g. based on the 'statistical rectangles') can be delivered.		
14.	**Recreation-al Fishery**	Finland	Fishing	Recreational fishery	Fish	Cathes (kg) and fishing efforts (fishing days and number of gear used) of recreational fishery	Data on the catches of single fishermen is confidental. Summary statistics based on regions (areas of Employment and Economoc Development Centres) are published. The sample size does not allow more detailed summaries.		Finnish Game and Fisheries Research Intitute
15.	**Fish production in aquaculture in Finland - database**	Finland	Aquaculture	The production (weight) of fish in the farms	Coastal eutrophy	The production (weight) of fish in the farms (by regions)	Data on the production of single farms is confidental but various summary statistics can be delivered.		Finnish Game and Fisheries Research Intitute
16.	**Hunting in Finland - database (including seabirds and grey seal)**	Finland	Hunting	Hunting for seabirds (e.g. *Cla hye, Som mol, Ans ans*) and grey seal	Waterfowls and seals	Number of target animals caught (by species and regions)	Data on the catches of single hunters is confidental but various summary statistics can be delivered.		Finnish Game and Fisheries Research Intitute

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17.	**HELCOM map and data service**	Finland	Extraction areas	Dredging sites (harbor maintenance, harbor capital, sea lanes, sand/gravel/boulder/ maerl extraction)	Benthos	Biota, environment, geoscientificInformation	Can be used freely as long as the reference to HELCOM 2009 is visible	http://maps.helcom.fi/website/mapservice/index.html	Helsinki Commission
18.	**HELCOM map and data service**	Finland	Shipping	Average monthly shipping density on the Baltic Sea	Seabirds, mammals	Shipping intensity		http://maps.helcom.fi/website/mapservice/index.html	Helsinki Commission
19.	**HELCOM map and data service**	Finland	Disposal sites	Sites of dredged spoils dumping	Benthos	Quantity and quality of dumped material, biota, geoscientificInformation	Can be used freely as long as the reference to HELCOM 2009 is visible	http://maps.helcom.fi/website/mapservice/index.html	Helsinki Commission
20.	**HELCOM map and data service**	Finland	Recreation areas	Coastal bathing sites in Baltic Sea area	Flora, fauna	Environment, status of the bathing watershealth, oceans		http://maps.helcom.fi/website/mapservice/index.html	Helsinki Commission
21.		Finland	Coastal point pollution						
22.	**Baltic Sea Protected Areas Database**	Finland	Environmental protection	Environmental protection, protected areas, habitats, biotopes, endangered species.		Endangered species, endangered biotopes, endangered biotope complexes, habitats, species, biotope types, biotope complexes	via internet	http://bspa.helcom.fi/	Helsinki Commission
23.	**Vessel Monitoring System**	Estonia	Fishing, trawling		Disturbance or destruction of species and habitats		Data can be requested from Environmental Inspection		Environmental Inspection (Keskkonnainspektsioon), Fish Protection Department
24.	**Environmental register**	Estonia	Fishing	Commercial fishery (coastal as well as offshore)		Fishing areas, fishing permits, catches, fishing equipment		http://register.keskkonnainfo.ee/	Estonian Environment Information Centre

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25.	**Fisheries info system**	Estonia	Fishery	Commercial and hobby fishery	Overfishing, bycatch of fish, birds and marine mammals, disturbance	Fishing licences, catch data	Access (user name, password) to be applied from MoE Fisheries Department	http://kala.envir.ee/	Ministry of the Environment,
26.	**Commercial fisheries database**	Estonia	Fishery	Commercial fishery	Overfishing, bycatch of fish, birds and marine mammals, disturbance	Fishing licences, catch data, fishing quota, register of fishing boats, by-catch data	Database is not public but data can be requested from MoAgri and lots of information available also at home page of MoAgri	http://www.agri.ee/kalamajandus/	Ministry of Agriculture
27.	**Info System of Environmental Permits**	Estonia	Extraction, construction, dumping			Time period and conditions of the permit		http://klis.envir.ee/klis	Environmental Board, Estonian Environment Information Centre
28.	**Mineral deposits (part of the Environmental Register)**	Estonia	Mineral extraction	Mineral (sand, gravel) extraction in sea areas	Destruction of species and habitats	Location of mineral deposits	Online map data available on the map server of the Estonian Land Board	http://xgis.maaamet.ee/xGIS/XGis	Estonian Environment Information Centre
29.	**Naviga-tional maps**	Estonia	Spatial info important for navigation	Anchorage areas, beacons, buoys, daymarks, lights, dumping grounds, depth, fairways, ferry routes, navigation line, recommended traffic lanes, traffic separation schemes; radar range, cables, pipelines, constructions in the sea, harbours,	Disturbance or destruction of species and habitats	Area	Electronic maps (S57 standard, can be transformed to ArcGIS data) can be requested from Maritime Administration (free for state institutions)	Partly available (as a map picture) on the map server of the Land Board http://xgis.maaamet.ee/xGIS/XGis	Maritime Administration (Veeteede Amet)

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				restricted areas etc.					
30.	**Statistics of Port of Tallinn**	Estonia	Shipping	Cargo traffic, ship traffic, passenger transport		Cargo types and volumes, number of passengers	Key figures available online	http://www.portoftallinn.com/facts-figures	Port of Tallinn
31.	**Information on official beaches and quality of bathing water**	Estonia	Recreation			Information on official beaches and quality of bathing water		http://www.terviseamet.ee/keskkonnatervis/vesi/suplusvesi.html	the Health Board in Estonia
32.	**Data on locations of mines**	Estonia	Military			Data on locations of mines	Classified, not available for public		Minstry of Defence
33.	**Hazardous enterprises**	Estonia	Pollution			Location and info on scale of hazard and hazardous chamicals used		http://xgis.maaamet.ee/xGIS/Xgis	Estonian Land Board
34.	**State register of cultural heritage**	Estonia	Protected ship wrecks			Location, info on protection and restrictions, for some wrecks also photos and historical info		http://register.muinas.ee/?menuID=monument&mtab=general	National Heritage Board of Estonia (Muinsuskaitseamet)
35.	**Detailed fishery statistics**	Latvia	Fishery	Industrial fishery	Depletion of fish stock	Total weight for each comemrcial species	Partly available by oral agreement with the contact person		Institute of Food Safety, Animal Health and Environment "BIOR"
36.	**Sea use map (maritime safety informa-tion)**	Latvia	Maritime	Shipping routes, harbour areas, anchorage areas, dumping grounds, ship wrecks, fisheries areas, military practice areas, pipelines, cables marine protected areas, dumped military chemical waste and		Polygon, linear or point structures	Commercial information		Hydrographic Service of Latvian Maritime Administration

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				amunition					
37.	**Ship traffic surveillance**	Latvia	Shipping	Ship movement monitoring, ship data reporting and supervision	Direct and indirect impact on all biological objects in the marine environment	International data management and reporting forms, visualisation of data on sea charts	Restricted use, only through specific procedures		Latvian Coast Guard Service
38.	**Pollution accidents involving oil and hazardous substances**	Latvia	Transport	Shipping	Covering habitats and species by oil and oild products, direct poisoning	Amount of oil and oil products spills	Detailed information available on written request	Reports available http://www.vvd.gov.lv/lv/kontrole/vides-aizsardzibas-kontrole/ostu-akvatoriju-un-juras-piesarnojumu-kontrole	Marine and Inland Waters Administration of State Environmental Service
39.	**Oil and chemical pollution**	Latvia	Pollution	Oil and chemical combating capacity, reporting and response to spills	Direct impact on all biological objects in the marine environment	International and national data sets, visualisation of data sets on sea charts	Restricted use of data sets, public information on Coast Guard webpage	www.mrcc.lv	Latvian Coast Guard Service
40.	**Amount of dreadged material from ports**	Latvia	Transport	Shipping	Destruction of habitats	Amount of dredged material (cubic meters), dumping area (sea or coast)	Available on written request	No	Marine and Inland Waters Administration of State Environmental Service
41.	**Offshore licence areas for the pros-pecting, exploration and production of**	Latvia	Energy	Offshore prospecting, exploration and production of hydrocarbons	Destruction of habitats, disturbance of species	Offshore licence areas for prospecting, exploration and production of hydrocarbons related activities	Available online or on written request	Offshore hydrocarbon prospecting, exploration and production licenses and license areas http://www.em.gov.lv/em/2nd/?cat=30178>	Energy Department of Ministry of Economics

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	hydrocar-bons, Offshore wind farm areas								
42.	**Military practice areas**	Latvia	Military	Military exercise areas	Disturbance or destruction of species and habitats	Area, specific use, time	Available on official request	Not available	Latvian Navy
43.	**Dumped military chemical waste and amunition**	Latvia	Military	Pollution	Poisoning of species	Area, substance, amount	Restricted information, partly available on official request	Not available	Latvian Navy
44.	**Bathing water quality**	Latvia	Recreation	Bathing	Decreasing quality of habitats	Public beach locations, *Escherichia coli*, *Enterococcus*, algal blooming, presence of oil products, surface active agents, litter (visual estimation)	Available on written request	Reports available http://www.vi.gov.lv/lv/vides-veseliba/peldudens/peldudens-monitorings in PDF format	Health Inspectorate of Ministry of Health
45.	**State statistic survey "2-Water"**	Latvia	Coastal activities	Discharges in coastal zone	Decreasing quality of habitats	Wastewater discharges from point sources, treatment level, emissions	Reporting forms for companies and standart summaries are freely available. Non-standard summaries are available commercially on request	Basic data available by on-line registration http://oas.vdc.lv:7779/la/udens/skat/pls (2000-2007); http://www.lursoft.lv/exec?Act=ud2_stat_index (2008-2010)	State limited liability company "Latvian Environment, Geology and Meteorology Centre"

LIFE+ Nature & Biodiversity project **"Innovative approaches for marine biodiversity monitoring and assessment of conservation status of nature values in the Baltic Sea"** (Project acronym -MARMONI).

Please visit the project website: http://marmoni.balticseaportal.net/

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