



Nostra Project – Baseline study

Kvarken Strait



Source: Nostra website



March 2014

Disclaimer:

The views expressed in this report are purely those of the authors and may not necessarily reflect the views or policies of the partners of the NOSTRA network. The methodological approach that was applied during the baseline study is presented in the final report of the study. The analysis that is provided in this report is based on the data collected and reported by the Nostra partners, a complementary literature review conducted by the consultants, and the results provided by the methodological toolkit developed in the framework of the baseline study.

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Limitations of the analysis:

The consultants faced a limited amount of data. In general, the analytical results provided in this report represent mainly the perspective of the Swedish side of the strait, since Finnish partners have only commented on the results in hindsight.

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1 General presentation of the strait



1.1 Geographical area

The Kvarken Strait is the narrowest part between Sweden and Finland in the Gulf of Bothnia. The distance from coast to coast is about 80 km and between the outermost islands only about 25 km. The Kvarken divides the Bothnian Bay in the North from the Bothnian Sea in the South and forms a shallow underwater threshold in the Gulf of Bothnia¹. (Figure 1)



Source: Kvarken Council in Finland and Sweden

Figure 1: Maps of the Kvarken Strait

The deepest spot in the narrowest part of Kvarken is only about 25 m. On the Finnish side there is a large archipelago with many islands many of them have permanent inhabitants. The coastline and the shores are shallow and as the land rising is about 0.8 mm every year the scenery in the archipelago changes rapidly. The Ostrobothnian mainland is low with small rivers and fertile soil. On the Swedish side, the archipelago is smaller and the shores are steeper. Especially in the Southern part of Västerbotten and in Örnköldsvik in the High Coast area, the archipelago is quite different than in Finland¹.

The geographical available data for the Kvarken strait is summarised in Table 1. The data for land covers the counties of Ostrobothnia, Southern Ostrobothnia and Central Ostrobothnia in Finland and the County of Västerbotten in Sweden. The geographical boundaries of the region are classified by the HELCOM conversion for the region named Kvarken (or the Quark). The seascape area is calculated by adding 10 km on-shore which gives a total area of 1,158,000 ha (= 815,500 ha of water bodies + 342,700 ha of land).

¹ NOSTRA website: <http://www.nostraproject.eu/>

Table 1: Key geographical data

Key geographical data	Unit	Kvarken Strait
Landscape area	Ha	6,717,000
Seascape area	Ha	1,158,000
Length of coastline	Km	4,200
Maximal depth of the strait	M	24
Width of the strait	Km	80 (Umeå - Vaasa)
Urbanized areas	km ²	N/A

Source: Toolkit filled by Länsstyrelsen Västerbotten County in Sweden

1.2 Level of urbanisation

1.2.1 Cities

Both Finland and Sweden define a settlement statistically and administratively as a locality that consists of a group of buildings with at least 200 inhabitants. Based on this definition there are some 250 settlements in the Bothnian coastal municipalities and approximately same number of smaller localities, among which Umeå and Vaasa are the two major cities located on the two sides of the Kvarken strait with more than 50,000 inhabitants (Plan Bothnia, 2011). The present study includes 12 cities with more than 10,000 inhabitants in the Kvarken region, three of which are located in the Västerbotten county of Sweden, including Umeå, Lycksele and Skellefteå; and the other nine municipalities are located in Ostrobothnian County of Finland, including Vaasa, Jakobstad, Kokkola, Seinäjoki, Kauhava, Kurikka, Lappo and Kauhajoki. The two largest cities, Umeå and Vaasa are closest "connected" to the strait.

1.3 Infrastructure

The main man-made infrastructures for the Kvarken region include different types of existing or planned infrastructures, such as ferry ports, shipping channels, and windpower sites.

1.3.1 Ports

In the Kvarken region, both Vaasa and Umeå ports are included in identified ports in the Bothnian Sea that form part of a 'strategic port network'². In the entire Bothnian Sea, it is expected that the sizes of current ports will expand (in size), due to the growing size of vessels using the ports. This means the ports will need deeper and wider fairways, as well as new cargo handling equipment.

Enjoying a highly strategic location, the **Port of Vaasa** is currently engaged primarily in the import and export of fuel, agricultural products and products from the chemical and timber industries³. The port boasts expertise and resources for handling freight from the region's extensive energy and metal industries. Through its shipping route to Umeå, the Port of Vaasa offers the northernmost year-round passage over water between two nations, connecting the E12 European Highway all the way from Russia to the Norwegian Atlantic coast.

² The Baltic Transport Outlook report for 2011

³ See : <http://nordiclogisticcorridor.com/ports/>

The **Port of Umeå** is Sweden's northernmost port with year-round access. The port is strategically located to provide the shortest, most logical route over the Bothnian Sea⁴. The port's location in the narrowest section of the Bothnian Bay, South of the Holmöarna islands, guarantees favourable ice conditions. This gives the port unique opportunities to handle traffic during the winter. Strategically positioned in the most expansive part of Northern Sweden, the Port of Umeå lies in close proximity to the E4 and E12 European Highways in addition to rail connections serving the Northern Main Line (Norra Stambanan) and the Bothnia Line (Botniabanan). Umeå is also Sweden's northernmost container port, a key component of the Nordic Logistic Corridor initiative, primarily due to its status as the only port North of Stockholm offering ferry services which create an East-West corridor.

Vaasa and Umeå will form a joint port company from the beginning of 2015.

For the city of Vaasa a review of the port operations was necessary since the Finnish cities must incorporate their ports by the end of the year 2014. Umeå was the obvious partner because the towns are already jointly maintaining the Kvarken ferry traffic in the form of the jointly-owned shipping company Wasaline Ltd. Vaasa and Umeå ports complement each other, as Umeå is a traditional wood products export port, while the port in Vaasa in turn is a port of entry for solid and liquid fuels for the energy production and transport sectors.

Vaasa and Umeå ports are strategically important links in the Nordic Logistic Corridor transport route from the Norwegian ports of Mo i Rana and Mosjøen on Atlantic coast to St. Petersburg. Both the Norwegian ports are located outside of the sulphur directive area and, consequently, their importance will continue to grow strongly from the beginning of 2015.

1.3.2 Transportation

Transportation in the region exists in the form of both crossing and passing through the strait. Every year, a large number of cargos pass through the Kvarken Strait to transport raw material reserves from the mining, forest and steel industries located in Northern Sweden and Finland⁴ to the EU markets. In term of crossing, the Motorway of the Baltic Sea is a part of Trans-European Transport (TEN-T) network, connecting priority ports, such as Vaasa and Umeå. (Figure 2) The ferry traffic between Finland and Sweden across the Kvarken Strait is currently ran by a Finnish shipping company, named Wasa Line (earlier Oy Vaasa-Umeå Ab and Vaasanlaivat/Vasabåtarna). There has been a tentative discussion to construct some physical fixed links to connect the two sides of the strait, which is however not foreseen to be likely, at least in the short-or medium-term (i.e. 50 years from now).



Figure 2: Motorways of the Baltic Sea, (Trans-European network, TEN-T)

1.4 Social and economic Background

These parts of Sweden and Finland are areas with high growth rates, hosting several large, international companies. **The regions of Umeå and Vaasa are among the most dynamic and fastest growing regions in their respective countries.** The labour market and higher education availability on both sides of the Kvarken Strait are good, but



⁴ Over 90 percent of the EU's iron ore mining takes place in Northern Sweden. Further forest area, the Finnish, Swedish and Norwegian part of the Barents region accounts for total forest area of the EU.

the development is directly linked to the growth in trade and industry. Overall, the Bothnian region as a whole contributes essentially to the national Gross Domestic Product (GDP) of both Finland and Sweden. For instance, the Finnish part of the Bothnian region accounts for 15 per cent of Finland's GDP. This is slightly higher than in Sweden, where the Bothnian region amounts to 10 per cent of GDP⁵. (Figure 3)

As concerns the social context, the Kvarken Region is sparsely populated, especially in Västerbotten⁶ (the Umeå region in Sweden). The population is mostly concentrated in the coast, whereas the population in the inland and in the mountain area is very sparse. In the Swedish part of the cross-border region, there are 15 municipalities in Västerbotten with a total of 250,000 inhabitants.

Figure 3

The Ostrobothnian counties, with 57 municipalities in the Province of Western Finland, have 450,000 inhabitants. More than 100,000 of these have Swedish as their native language and many of the 350,000 persons who speak Finnish also know Swedish.

The socio-economic information for the Kvarken Strait is summarised in the table below:

Table 2: Key socio-economic data

Key population data	Unit	Finland, Ostrobothnian County	Sweden, Länsstyrelsen Västerbotten County
Number of inhabitants in the landscape area¹	(x 1000)	450	250
Population by mother tongue¹	%	28.6% Swedish native speakers; 71.4% Finnish native speakers	100% Swedish
GDP per capita in the region	€/capita/year	Ostrobothnia 36 000 ⁶ Southern Ostrob. 28 000 ⁶ Central Ostrob. 33 000 ⁶	36 000 EURO, 2011) ²
Employed	%	-	31.1% ³
Unemployment rate in the region	%	Ostrobothnia 8,3% ⁷ Southern Ostrob. 10,2% ⁷ Central Ostrob. 8,8% ⁷	6.6% ³
Unemployment rate in the country	%	9,0% ⁷	6.5% ³

⁵ Plan Bothnia, 2011

⁶ The Kvarken Region consists of the counties of Ostrobothnia, Southern Ostrobothnia and Central Ostrobothnia in Finland and the County of Västerbotten and the city of Örnsköldsvik in Sweden. For the purpose of the present study, only Västerbotten County in Sweden and Ostrobothnian County in Finland are considered.

⁷ Statistics Finland, Unemployment rates by region (2011) 2013/I -2014/I

Source: 1. data derived from the Kvarken official website; 2. http://www.scb.se/en_/Finding-statistics/Statistics-by-subject-area/National-Accounts/National-Accounts/Regional-Accounts/Aktuell-Pong/11088/Behallare-for-Press/368277/; 3. Toolkit data provided by Länsstyrelsen Västerbotten County, 4. <http://www.tem.fi/files/38564/JOULU13.pdf>, 5. http://www.stat.fi/tup/suoluk/suoluk_tyolama.html, 6. http://www.kase.fi/tilastot/lataa-julkinen.php?filee=Aluetalous/BKT_per_asukas.xls

1.4.1 Main economic activities

The main economic activities in the Kvarken Strait are summarised in Table 3.

Table 3: Main economic activities

Type of activity	Finland, Ostrobothnian County	Sweden, Västerbotten County
Maritime transport of goods	√	√
Maritime transport of passengers	√	√
Ports (fisheries and trade)	√	√
Onshore energy production	-	-
Onshore production of renewable energy	-	√
Onshore industry and infrastructure	√	√
Onshore agriculture	√	√
Industry	√	√
Tourism	√	√

Tourism in the Baltic Sea region is one of the fastest growing industries. As a whole, it brings in 90 billion Euros a year and employs around 2 million people.⁸ In the Kvarken strait, it is estimated that there are about 150 000 tourists crossing the strait every year. There are significant amount of Finnish tourists travelling annually across the strait for tourism, business, shopping, alpine skiing, vacation and hunting. Tourism hunting concerns mainly the hunting of birds in the forest area of the Västerbotten County, whereas the local residents are involved in the traditional elk/moose hunting activities. The system for getting hunting license and permit for renting a land area for elk/moose hunting is not easy for foreigners.

A rough estimation indicates that tourism sector alone may contribute to at least 189 million Euros to the regional economy, which consists of 5.3 million Euros⁹ of revenues generated simply from the tariff of ferryboat and 282 million Euros from hotel expenditures due to overnight stays.

⁸ Plan Bothnia, 2013

⁹ The ferryboat revenue is estimated based a 35€ tariff for one-way ticket for 150 thousand passengers to cross the strait by ferryboat.

The main estimated indicators for tourism are summarised in the table below:

Table 4 : Estimated indicators of tourism

Estimated indicators of tourism	Finland, Ostrobothnian County	Sweden, Länsstyrelsen Västerbotten County ¹⁰
Number of nights (all type of accommodation) (,000)	Ostrobothnia 421 ¹	1,540
	Southern Ostrob. 696 ¹	
	Central Ostrob. 166 ¹	
Average spending /per night (€)	100	100
Share of all foreign tourists, %	Ostrobothnia 17.3% ¹	N/A
	Southern Ostrob. 5.1% ¹	
	Central Ostrob. 10% ¹ -	
Share of total expenditure of all foreign tourists, %	N/A	N/A

Source: 1 http://www.stat.fi/til/matk/2013/12/matk_2013_12_2014-02-20_tau_004_fi.html

Maritime traffic intensity in the Bothnian Sea and Bothnian Bay is low compared to the rest of the world. The main commodities handled by Bothnian ports are wood products, ores, minerals, oil, coal, chemicals (including hazardous substances) and steel, due to the fact that Sweden and Finland are among the world leaders in exports of wood and wooden products. 70-80 per cent of their products are exported within the EU11, many of which are shipped from the North to the South of Bothnian Sea through the narrow Kvarken (the northern Quark) Strait between Vasa and Umeå. According to the Baltic port list of 2011¹², forest industry products such as paper, pulp and sawn wood, together with ores and metal waste are among the largest commodity groups transported to and from Bay of Bothnia ports in the North of the Bothnian Sea. Total traffic in the Bothnian Sea ports amount to around 28 million tonnes of cargo. An additional 35 million tonnes of cargo are shipped through the Bothnian Sea to the ports of Bothnian Bay to the North. The one transport line that takes also passengers is the Kvarken Strait (Plan Bothnia, 2013) (Figure 4). The Kvarken ferry link is absolutely vital for the continuous cooperation and unity across the strait. The ferry across the Kvarken Strait is floating infrastructure, a part of the E12 road from the Atlantic coast to Russia. Currently, the Kvarken ferry link has attracted the attention of the European Commission as an important "missing link" in the Northern European transport network, for which the Kvarken Region has been granted TEN-T financing for the Midway Alignment project in order to strengthen the Kvarken ferry transport concept (the total budget for Stage 1 of the project is approximately 20 million EUR)¹³.

¹⁰ Data from toolkit provided by Västerbotten County, Sweden

¹¹ Erik Gløersen. 2009. Strong, Specific and Promising. Towards a Vision for the Northern Sparsely Populated Areas in 2020. Nordregio Working Paper 2009: 4. Stockholm, 2009

¹² Plan Bothnia, 2013

¹³ <http://www.kvarken.org/projects/midwayalignment/>

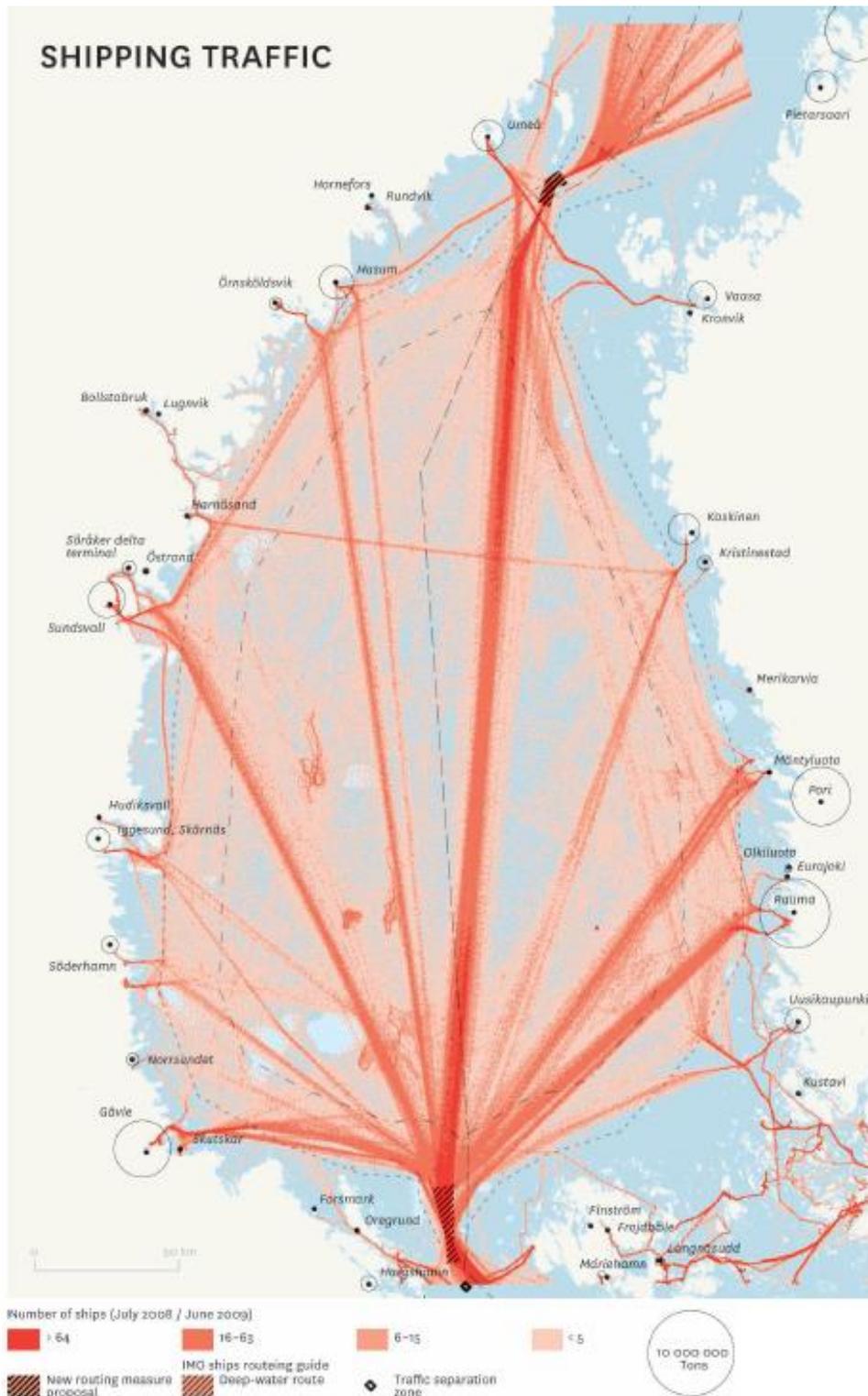


Figure 4: Shipping traffic in the Kvarken Strait

(Source: Plan Bothnia, 2013)

In terms of employment, in 2008, jobs could be found mainly in services, manufacturing and the primary and secondary sector in the Bothnian region. Within the services section, public administration, education, health and social work are the most important types of jobs in the Swedish part of the Bothnian region.

▪ **Västerbotten County, Sweden**

The economic activities in Västerbotten are extensive, including intensive agriculture, wind mill, camping sites by the sea (an attraction particularly for the Norwegian tourists), paper-pulp mill, steel factory, forestry, hunting. In the region, economic active population are mainly distributed among the two most important sectors, social service (73%) and manufacturing (23%). A very small proportion of the population (3%) is employed in agriculture and forestry sector, and about 1% of the employment is not identifiable. (Figure 5)



Figure 5: Economic active population by sector in Västerbotten County, 2008 (%) (Source: Länsstyrelsen Västerbotten County, 2010)

▪ **Ostrobothnian County, Finland**

Jobs within services are providing employment opportunities to the vast majority of people in Ostrobothnian county, but also manufacturing jobs are economically important in the Finnish side (Figure 6). Industry/Manufacturing in Ostrobothnia accounts for 30 per cent of the employments, compared to a national average of 22 per cent.

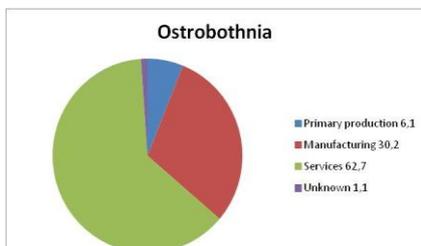


Figure 6. Economic active population by sector in Ostrobothnia, 2011 (%) (Source: Regional Council of Ostrobothnia)

2 Significance and sensitivity of biodiversity and natural environment in the strait

2.1 Remarkable landscapes

The Bothnian Sea is a clearly delineated sub-basin of the Baltic Sea shared by Sweden and Finland, one of the largest bodies of brackish water in the world and is also shallow, young and highly dynamic¹⁴. The topography of the Bothnian Sea is characterised by a shallower area in the Swedish waters of the South-West, with several banks around 20m depth, as well as a deeper depression running in a light curve from the South to the North. The Baltic Sea provides a special living environment in terms of its relatively narrow but unique biota, which includes both sea and fresh water species¹⁵. In the past 10000 years, the area has been experiencing a rapid rising of the land beneath it, around 0.5 to 1 mm per year, caused by the depression created by last ice age. Consequently, the surface area and the depth of the sea are slowly diminishing and more land is being created along the coast, which affects the formation of marine and coastal ecosystems in the region. (Figure 7)

- **Västerbotten County**

Nature in the Västerbotten County is represented by rocky land elevation shores, coniferous forests, wetlands, rivers and mountains.

- **Ostrobothnian County**

The Kvarken Archipelago is a joint cross-border natural heritage on UNESCO's World Heritage List¹⁶. The area received the World Heritage status because it is the best place in the world in which to witness land uplift. The Kvarken Archipelago possesses a genuine geological value since the rapid rate of the land uplift is one of the highest observed worldwide and is a key area for understanding the processes of land uplift caused by the melting of the ice sheet following the ice age. Unique traces, or glacial depositional landforms, of the ice age can also be observed in the Kvarken archipelago. These landforms contribute to the variety of the landscape in the region. There are designated areas for nature protection and for cultural values. Because of the fragmented geology of the coastline and the seabed, biodiversity on the coast is relatively high and several subtypes of coastal waters could be identified according to different sub-ecosystems.



Figure 7: Shallow areas in the Kvarken Strait (Source: Plan Bothnia. (2013))

¹⁴ HELCOM (2013)

¹⁵ Kuronen *et al.* (2008)

¹⁶ <http://whc.unesco.org/>

2.2 Biodiversity and natural environment in the strait

Because of its history and its brackish water, the Baltic Sea is characterised by a relatively low number of plant and animal species compared to more saline waters. The brackish water is too salty for most freshwater species and too fresh for most marine species. The salinity gradient goes hand in hand with a climatic gradient with up to six months of ice cover, a productive season of 4–5 months in the Northern Gulf of Bothnia, and an 8–9 month (almost double) productive season in the Southern sounds near its entrance. The species that have found their way into brackish waters tend to be slower growing and smaller in size than in their original habitats, irrespective of whether their original habitats are marine or freshwater. This is at least partly a result of the fact that the environment is suboptimal for them. Thus, the Baltic Sea environment and its biological diversity are unique¹⁷.

2.2.1 Remarkable ecosystem or habitat types

As mentioned previously, in the Kvarken archipelago, there is clearly observable traces of the last ice age. Currently, the land uplift in the area is approximately 8 mm per year, which means that new land is rising above the water surface every year¹⁸. The nature in the Kvarken archipelago therefore continuously changes over time and leaves traces on both plant and animal life in the area.

A typical and characteristic feature of the landscape and nature in Kvarken are coastal lagoons, so-called flads and gloes. As a result of the land uplift, shallow bays are cut off from the sea to eventually form lakes. Another distinguishing feature of the area is the primary succession forest. The forest and vegetation, which is the first to grow on the uplifting land, looks different depending on how long the land has been above the water surface.



Figure 8. Land uplift phenomena observed in the Kvarken strait (<http://www.kvarkenworldheritage.fi/the-kvarken-archipelago/nature/habitats/>)

A substantial part of the world heritage area belongs to the Natura 2000 network, which aims to protect and conserve important habitats and species in the EU. The Kvarken archipelago is also one of the Baltic Sea Protected Areas¹⁹.

¹⁷ HELCOM (2013)

¹⁸ <http://www.kvarkenworldheritage.fi/the-kvarken-archipelago/nature/habitats/>

¹⁹ HELCOM (2013)

Table 5: Main habitat types of the Kvarken Strait (Source: data from the NOSTRA toolkit)

Land cover (CORINE Land cover Nomenclature)		Finland, Ostrobothnian County	Sweden, Västerbotten County
Artificial surfaces	Urban fabric	√	√
	Industrial, commercial and transport units	√	√
	Mine, dump and construction sites	√	√
	Artificial non-agricultural vegetated areas	√	√
Agricultural areas	Arable land	√	√
	Permanent crops	-	-
	Pastures	√	√
	Heterogeneous agricultural areas	-	-
Forest and semi-natural areas	Forests	√	√
	Shrub and/ or herbaceous vegetation association	√	√
	Open spaces with little or no vegetation	√	√
Wetlands	Inland wetlands	√	√
	Coastal wetlands	√	√
Water bodies	Lakes	√	√
	Rivers	√	√

Migratory routes for species

The Kvarken Archipelago (KA) is on an important migratory route and offers excellent breeding habitats for birds²⁰. There are important Baltic populations of black guillemot (6,000 pairs, a quarter of the Baltic population) and razorbill (1,000 pairs); also Caspian and Arctic terns, whitetailed eagle (35 pairs), osprey and great scaup²¹. Thousands of roughlegged buzzards and cranes also migrate through. Marine mammals living in the KA are typical for the Baltic region such as grey and ringed seals. As with the plants, the mild climate encourages many southern species of animals, which come to their northern limit of distribution here.

²⁰ Toolkit - Länsstyrelsen Västerbotten county

²¹ <http://www.kvarken.fi/assets/Svenska---pdf/IUCN-Technica-Evalution-Kvarken.pdf>

2.2.2 Protected areas

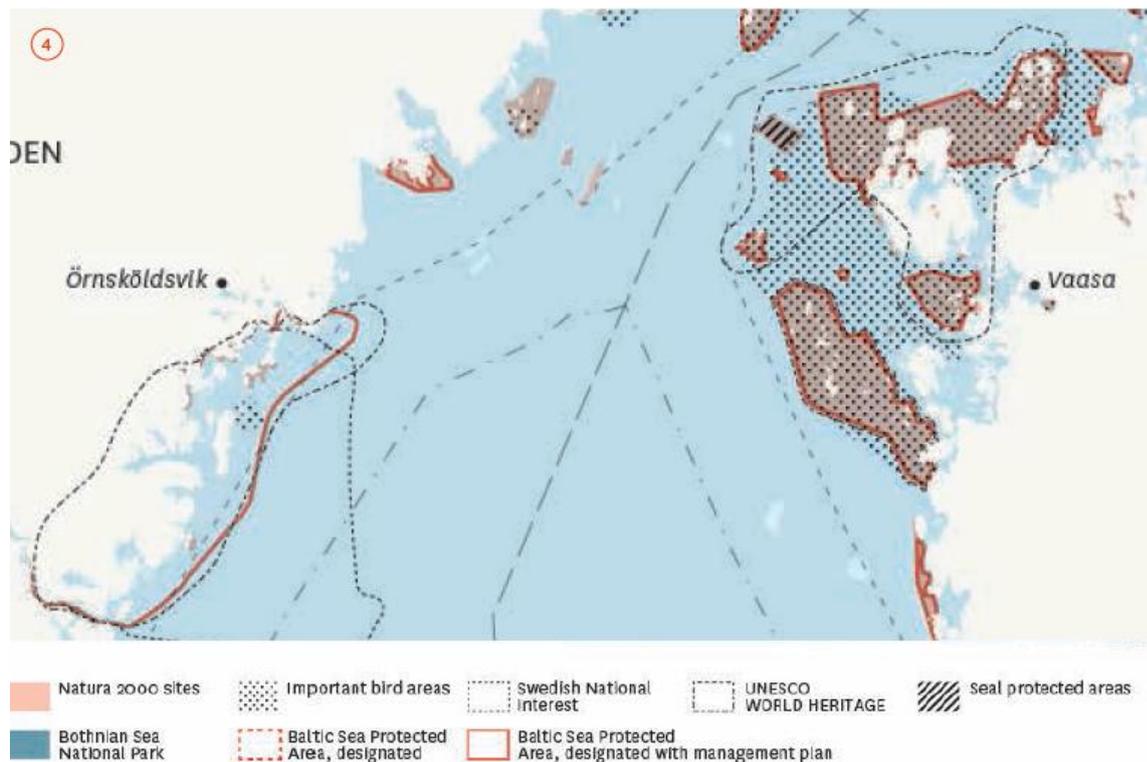
▪ Kvarken Strait

Nature is an important resource for many people in the form of fishing, hunting, reindeer herding and tourism. A number of sites in the Bothnian Sea have been designated as protected areas. They can be divided into three main groups: national or EU designations, international designation and other areas. In the Kvarken strait, national parks and other national designations are based on international treaties and are usually less directly enforceable by national courts.

Together with the large shallow banks on the Finnish side, the High Coast in Sweden, becomes a part of a global family of **46 Marine World Heritage** on the UNESCO world heritage convention..

The HELCOM Baltic Sea Protected Areas are established on the basis of the Helsinki Convention²². It is important to note that there is a large degree of overlap. Many areas are listed both under the Natura 2000 as well as Baltic Sea Protected Areas (BSPA) networks. There are also other areas without formal protected status, which however can be regarded as 'priority areas' for future conservation action, such as Important Bird Areas (IBAs) and parts of the Swedish national interest areas.

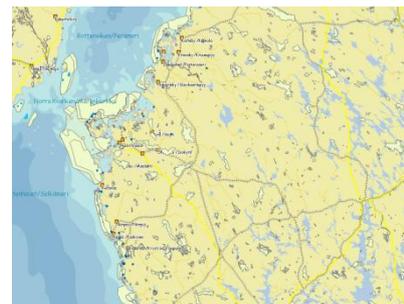
Taking marine protected area as an example, altogether 16 sites in the strait are designated as EU Natura 2000 sites, currently protected under either Habitat or Bird Directives, or both. Among these 16 Natura 2000 protected sites, 14 are also sites of national interests, following the IUCN criteria; and some are of international interests, including IBAs, UNESCO and HELCOM. Altogether about 22 % of the marine area (seascape) is actually protected.



Source: Plan Bothnia. (2013)

²² HELCOM(2010), Towards an ecologically coherent network of well-managed Marine Protected Areas – Implementation report on the status and ecological coherence of the HELCOM BSPA network. Baltic Sea Environment proceedings. 124B, 143pp

Taking the Västerbotten County (Sweden) as an example, there are several different ways to protect and preserve especially valuable nature by observing the environmental code. About 14 per cent of the land area of Västerbotten County comprises protected nature. However, about 93 per cent of the protected area



Source: Länsstyrelsen Västerbotten County, 2010

lies above the limit for Alpine Forest. One of Sweden's four nationally protected rivers runs through the Västerbotten county, the River Vindel. There are two bird sanctuaries in the county, namely Röbbäcksslätten and Lessejaure and a national park in the county, namely Björnlandet (bear country) in Åsele Municipality. In addition, other forms of protected nature also exist in the area, including for example, 236 natureReserves and 360 biotope protection areas. The county contains 249 sites included in the EU network of protected nature- Natura 2000, most of which are also nature reserves (236 out 249, corresponding to a total area of 827,885 hectares). Amongst all others, Vindelfjällen Nature Reserve in the municipalities of Sorsele and Storuman, with its 560,000 hectares, is the largest nature reserve in northern Europe²³. The purpose of protecting nature is not only to preserve plants and animals, but also to provide opportunities for recreation and outdoor life. The County Administrative Board or the municipality decides on the creation of nature reserves. The regulations in the different reserves can differ depending on what is to be protected.

2.2.3 Rare and threatened species

Endangered species are identified on what is known as the IUCN and HELCOM red list. In particular, following the IUCN definition²⁴, the following three categories were applied to assess the total number of threatened species in the Kvarken Strait.

CR	Critically endangered	A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.
EN	Endangered	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.
VU	Vulnerable	A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild

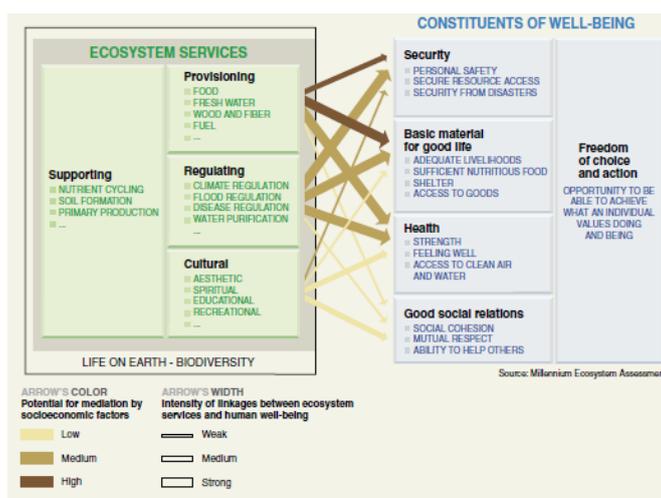
Currently, under the authority of the Swedish Environmental Protection Agency, the Swedish Species Information Centre (ArtDatabanken) devises the Swedish red list. It does not provide automatic protection, but sends an important signal that the species' habitat should be protected or restored. **Total 31 species are reported being threatened in the region**, ranging from vulnerable to critically endangered. These species include for example **salmon(VU), trout (VU) and eel (EN)**.

²³ www.lansstyrelsen.se/vasterbotten

²⁴ IUCN, 2001

2.3 Significance of ecosystem services to the local livelihood

An ecosystem is a dynamic complex of plant, animal, and microorganism communities and the nonliving environment interacting as a functional unit. Ecosystem services are the benefits people obtain from ecosystems. These include *provisioning services* such as food, water, timber, and fiber; *regulating services* that affect climate, floods, disease, wastes, and water quality; *cultural services* that provide recreational, aesthetic, and spiritual benefits; and *supporting services* such as soil formation, photosynthesis, and nutrient cycling²⁵. The figure is taken



Linkages between Ecosystem Services and Human Well-being Source: MEA, 2005: pp vi

from the MEA synthesis report, which depicts the strength of linkages between categories of ecosystem services and components of human well-being that are commonly encountered, and includes indications of the extent to which it is possible for socioeconomic factors to mediate the linkage (for example, if it is possible to purchase a substitute for a degraded ecosystem service, then there is a high potential for mediation.) The strength of the linkages and the potential for mediation differ in different ecosystems and regions. In addition to the influence of ecosystem services on human well-being depicted here, other factors—including other environmental factors as well as economic, social, technological, and cultural factors—influence human well-being, and ecosystems are in turn affected by changes in human well-being.

In the context of NOSTRA project, the contribution of ecosystem services to local livelihoods is assessed through the toolkit, which is based on an in-depth expert interview by asking the regional NOSTRA partners to answer some pre-defined the questions. In the case of the Kvarken Strait, the analytical results provided below represent only the perspective of the Swedish side of the strait, as the Finnish side did not have the research capacity at the time of the interview to provide required data.

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2.3.1 Significance to the local economy

In Västerbotten County, the most important regional economic activities connected to the sea are fishery, aquaculture, tourism, and mostly tourism related maritime transport. These sectors contribute not only to the local economy, but also to the local employment. For instance, in 2009, people employed in the hunting and fishing sectors account for 2.5% of the regional population. Another 2.5% of the population are employed in hotels and restaurants sectors (extracted from facts about Vaterbotten 2010). However, due to the difficulties in obtaining the data by the time when this project is finished, information on the Finish side remains incomplete.

The maritime link through Umeå–Vaasa provides an important connection within the EU from West to East. As a spin-off effect, it also facilitates trade with markets such as Norway, the Baltic countries, Eastern Europe and Russia.

The strong historical and cultural bonds between the Northern regions of Sweden, Norway and Finland go centuries back. The region has shared leadership, trade, communications and culture. Also the family bonds across the borders are strong. Ferry traffic between the countries has existed uninterrupted for more than 50 years. The social exchange across Kvarken is of great importance as individuals are given the possibility to live, work, study or travel freely across the borders.

²⁵ MEA, 2005

2.3.2 Social significance

Various ecosystem services provided by the Kvarken Strait have important contribution to the social welfare. For instance, provisioning services provided by the Kvarken strait support the local livelihood through the provision of fisheries and agricultural products. The ecosystem regulating services, in terms of water regulation and purification, storm control, as well as regulation of physical and mental human health provide important shelters safeguarding the local well-being. Finally, the ecosystem also provides important cultural services that contribute to local population's livelihoods in terms of enhancing their spiritual and inspirational well-being, providing recreational opportunities for tourism and recreational activities, aesthetic beauty, educational opportunities. **Its status as the World Culture Heritage site also provides important cultural identities to the local residents who live in the Kvarken region.**

2.3.3 Cultural significance

Ecosystems services provide cultural significance through outdoor activities and recreation, values in education, and significance of heritage. All of these together with the unique Baltic landscape can enhance both psychological and mental well-being. In particular, the area has important cultural significance due to the existence of the UNESCO World Cultural Heritage. Regarding educational value, protected areas are also used for scientific research and amateur nature studies²⁶.

2.4 Main biodiversity pressures and related impacts

2.4.1 Drivers of pressures on biodiversity in the strait

The Baltic Sea has many challenges with regard to the well-being of its biodiversity. Many of the challenges are of anthropogenic origin but some are also natural. In particular, **the major anthropogenic pressures to the biodiversity in the region include eutrophication environmentally hazardous substances, maritime traffic and overfishing.** Some of these pressures can negatively affect the biodiversity of the Baltic Sea by directly killing or destroying animals and plants or by deteriorating their habitats. As regards natural pressures, one of the essential challenges is caused by climate change, which has increasing impacts on the local biodiversity and ecosystem.

2.4.1.1 Human activities

It has been evident for years that the balance of the Baltic Sea ecosystem is severely threatened by human-induced factors, such as eutrophication and overfishing.

Eutrophication is mainly caused by anthropogenic nutrient pollution due to an extensive use of chemicals by the populations living in the catchment area since the beginning of the industrialisation of the region in the late 19th century. In addition, heavy maritime transport, in particular the cargo ships passing through the strait impose pressures to the local biodiversity and natural habitats. It is estimated to be about 5,000 vessels passing through the strait per year. They are mostly cargos that transport mining and forest products produced in the Northern region of Sweden to the other regions in Europe. Very rare, there are vessels of passenger (tourist ferries) passing through the strait. The maritime transport contributes to **the increasing risk of oil spills and invasive species damaging the strait.** At the moment, several projects have been carried out under the framework of the Helsinki Convention to study the risks imposed by the frequent shipping routes in the area.

²⁶ Metsähallitus website - Guidelines for sustainable natural tourism in protected areas:

<http://www.metsa.fi/sivustot/metsa/en/NaturalHeritage/ProtectedAreas/SustainableNatureTourism/Sivut/SustainableNatureTourismInProtectedAreas.aspx>

2.4.1.2 Natural pressures

Throughout the last decades it has also become increasingly clear that climate-induced changes will accelerate in the near future. This may accentuate current human-induced ecosystem changes in the Baltic Sea to hitherto unprecedented magnitudes. Climate change effects to be expected in the Baltic Sea area include increasing temperature and precipitation. That will lead to increased inflow of freshwater through the numerous river mouths along the coast. Since the freshwater conveys pollutants and terrestrial dissolved organic matter, an increased inflow leads to increased loads of pollutants and particles reaching the Baltic Sea. Due to land uplift and subsequent exposure of previous sea bottoms there is occurring a natural leakage of metals and acidic waters into water ecosystems. Leakage starts when formerly anoxic soils are exposed to air and oxidation starts. This problem is more prominent on the Finnish side compared to the Swedish, since sulphate soils are more general there. Besides leakage of metals, natural pressure is exerted on water ecosystems when acid (low pH) drainage waters are flooding in spring after snow melting. This takes place when fish is spawning in estuaries and therefore affects spawning success in some river estuaries. The magnitude of this natural problem may vary depending on future climate (precipitation) and size of agriculture sector (improving existing or new agriculture fields usually require drainage, with subsequent increase of oxidized soils).

Invasive species are a major threat to local ecosystems and biodiversity in general. In the Kvarken Strait, a few invasive species have been introduced accidentally, through the ballast of the ships. Unfortunately also intentional introductions of alien species for hunting have occurred, for example Mink (*Mustela vison*) and Raccoon Dog (*Nyctereutes procyonoides*). These introductions are threatening the nesting bird fauna at the coast.

2.4.1.3 Main impacts and changes in the state of environment

- **Stressed organisms**

The organisms living in the Baltic Sea are subject to a lot of stress: the brackish water is too salty for freshwater species, and too fresh for marine species. Therefore, the Baltic Sea is both unique and fragile.



Figure 9: Organisms living in the Baltic Sea under stress

- **Differences in sensitivity to human-induced disturbance**

The basins around the strait show differences in e.g. freshwater run-off, load of allochthonous dissolved organic carbon (ADOC), hydrography, and food web structure. This leads to differences in the cycling of nutrients and pollutants, which in turn affect system resilience and sensitivity to human-induced disturbance.

3 Responses to pressures and impacts

3.1 Policies

Policies and action plans have been developed at both EU and national levels to react to pressures and impacts caused by various anthropogenic activities and protect biodiversity and natural habitats.

▪ EU policies

As presented previously, the Habitats and Birds directives are widely implemented in the strait, which are also reflected in the compliance of creating Natura 2000 protected areas. In addition, in the Baltic Sea area, the most important policy initiative is the signature of the **Convention on the Protection of the Marine Environment of the Baltic Sea Area** in 1992 (Helsinki Convention), which is an international convention encompassing various measures for the prevention and elimination of pollution of the Baltic Sea. The Convention sets up a Baltic Marine Environment Protection Commission (HELCOM), whose responsibilities are to implement the Convention, make recommendations to the Parties, define pollution control criteria and objectives and promote additional measures in co-operation with respective governmental bodies of the Parties. The Parties also undertake to implement measures to maintain adequate ability and to respond to pollution incidents in order to eliminate or minimize the consequences of these incidents and regularly report to the HELCOM commission on and inform the general public of the measures taken in accordance with the Convention.

▪ National policies

In Sweden, special provisions concerning the protection of animal and plant species found in Chapter 8 of the Swedish Environmental Code (SFS 1998:808) and in the Species Protection Ordinance (SFS 2007:845). Nationally protected nature reserves are established by Chapter 7 of the Swedish Environmental Code (SFS 1998:808). In Finland the protection of animals/plants/nature is incorporated into a number of important legal acts, e.g. Water act (587/2011); Statsrådets förordning om vattenhushållningsårenden²⁷ (1560/2011); Environmental Protection Act (86/2000); Environmental Protection Decree (169/2000); Havsskyddslag²⁸ (1415/1994); Nature Conservation Act (1096/1996) and Land Use and Building Act (132/1999).

3.2 Initiatives and actions

3.2.1 Cross-border initiatives and actions

▪ Integrated management of biodiversity and natural environment

Many projects have been and are being developed under the HELCOM convention and within the framework of regional development plans in the European Union, such as European Grouping of Territorial Cooperation (EGTC) and EU INTERREG programme, and the Kvarken Council (between Sweden and Finland).

²⁷ Some of the legal acts had no English translations at the moment, therefore the Swedish titles are reported here.

²⁸ Idem.

NOSTRA

NOSTRA follows the overall objective of preservation of biodiversity and natural heritage. From exchanges of experiences and best practices, the project aims at studying the necessary governance tools to ensure a sustainable development of straits and to develop their functions as gateways to hinterlands and to external territories around the issues of economic development, transport, tourism and biodiversity.

By searching ways to improve the governance between the two banks of a strait, the aim is to enable the authorities to enhance effective public policies, at the local, national and European levels, that will both allow economic development of the area and preserve the biodiversity.

World Heritage Ambassadors

The Kvarken Council has initiated the project "World Heritage Sites in Cooperation 63° N Lat.", with the purpose of continuing and deepening the cooperation with the Kvarken Archipelago site in Finland and the Höga Kusten site in Sweden. This project is funded by the EU Botnia-Atlantica programme.

NLC CORRIDOR

The Nordic Logistic Corridor is an existing transport and logistics route connecting Norway, Sweden and Finland. All three nations have made extensive regional investment in infrastructure, for example logistics areas and ports, resulting in shortened road transport routes, excellent access to intermodal transport (the use of multiple forms of transport for freight and passengers) and modern cargo handling solutions.

- **Developing knowledge and research**

The following projects are developed with EU funds.

EcoChange project

Since 2010, a five-year research programme EcoChange²⁹ (2010-2014) has been funded to estimate and predict what ecological consequences climate changes, e.g. increased temperature and precipitation will have on the Baltic Sea, and how the Baltic Sea will respond to these consequences.

SUPERB project

SUPERB is a EU Interregional project in the Bothnian Sea between Sweden and Finland. It aims at developing methods and assessing the data need for mapping biological values in Holmöarna and the Kvarken Archipelago, which covers also the Natura2000 area. County Administrative Board of Västerbotten has been involved in this project.

SeaGIS project

The project deals with Cooperation for ecosystem based planning of the marine environment using GIS. The overarching aim of SeaGIS is to produce an increased knowledge base and make it more accessible in order to increase the possibilities of a coordination of ecosystem-based regional holistic planning of marine areas and create a common platform for knowledge storing, planning and future decision making in the Kvarken region.

The main activities carried out under SeaGIS project include:

- Process of administration in marine planning

²⁹ <http://www.umf.umu.se/english/ecochange/>

- GIS-based platform for data and knowledge
- Decision support - Guide
- Project administration and information

FLISIK project

FLISIK is project for Viable Small water bodies in Quark region that began in early June 2011 and is a joint project between Finland and Sweden in the Quark area where the model streams are used to disseminate information and knowledge about water issues in forest environments. The overall aim of the project is to improve the long term viability and condition of all ponds in the Quark region.

- **Sustainable infrastructure and transport**

Midway Alignment of the bothnian Corridor

The Midway Alignment of the Bothnian Corridor, also known as the Kvarken Multimodal Link, is a vital, year-round maritime transport connection between Sweden and Finland. The link connects to three major roads classified by the UNECE as European roads of strategic importance – the E12, the E4 and the E8 – and to the newly built Bothnian Link main railway line. It also supports and complements the Priority Projects and the Core and Comprehensive Network of the European Union.

The **global Midway Alignment (the former “Kvarken Multimodal Link”)** project is upgrading the transport route in order to fulfil national and international requirements for an environmentally and economically sustainable transport system with increased multi-modality and higher transport security. The project includes a complete transport system for both goods and passengers and is initiated by the city of Umeå in Sweden and the city of Vaasa in Finland.

3.2.2 At one-side level

- **The County Administrative Board of Västerbotten, Sweden**

The County Administrative Board devises specific action plans for endangered species (ÅGP) when nature reserves and agri-environmental payments for agriculture are not sufficient. The Swedish Species Information Centre analyses which species are most in need of the action plan, and the Swedish Environmental Protection Agency is responsible for the national coordination of the action plans. The County Administrative Board, however, performs much of the work, both in terms of the development of the action plan and the implementation of various protective measures.

- **Regional Council of Ostrobothnia, Finland**

Regional Council of Ostrobothnia provides economic support to environmental initiatives and is responsible for land use planning, in which environmental concerns are taken into consideration. Marine spatial planning has looked into with higher interest at the moment and the on-going transboundary SeaGIS project is currently developing tools and increasing knowledge about ecosystem-based planning of the marine environment using GIS. Such tools provide a common platform for knowledge storing, planning and future decision making in the Kvarken region, thereby increase the possibilities of the coordination of an ecosystem-based regional holistic planning of marine areas.

Environmental issues in the strait are mainly on a regional scale and governed by the organizations of *Regional Centres for Economic Development, Transport and the Environment, Metsähallitus*. National policies and strategies as well as national coordination are managed by Ministry of Environment and Finnish Environmental Institute.

- **Integrating biodiversity in land use planning**

In Finland *land use planning* has regulations regarding the conservation of biodiversity and in the case of particular protected areas it's also governed by the *Environmental Protection Act (2000)* and *Land Use and Building Act (132/1999)* .

3.2.3 Environmental initiatives from private - public companies

The regional initiatives for environmental conservation are mainly under the responsible of the regional planning.

4 Governance

4.1 Actors mapping

- **The County Administrative Board of Västerbotten, Sweden**

The County Administrative Board of Västerbotten is a Swedish national authority with supervisory responsibilities. It functions as a link between people and the municipalities of Västerbotten on the one hand, and between the government, Parliament and national authorities on the other. Its aims are to provide good service with open accountability that is based on the rule of law, whereas help private persons and organisations to carry out their tasks regardless of time and place.

- **Örnsköldsvik Municipality, Sweden**

In Örnsköldsvik, there are about 55,000 inhabitants. Politicians and employees of the municipality are working to provide citizens with a good community in many areas. The municipality is also part of the Kvarken Council.

- **Regional Council of Ostrobothnia, Finland**

The Regional Council of Ostrobothnia is one of the eighteen regional councils in Finland. We are a statutory joint municipal authority formed by the fifteen municipalities in the region of Ostrobothnia.

The aim of the country is to build up the necessary conditions for balanced development and economic growth and thereby serve the welfare of the Ostrobothnian people. The development efforts are financed both by national and EU resources. The Regional Council is the primary interest supporter of Ostrobothnia. Its most important goal is to strengthen the competitiveness of the region. To reach that goal the council strives to influence governmental decisions that affect the region.

- **Regional Council of South Ostrobothnia**
- **Regional Council of Central Ostrobothnia**

4.2 Level of cross-border cooperation

Concerning cross-border cooperation in the Kvarken Strait, several platforms and projects have been developed.

- **Political cross-border dialogue platform**

The **Kvarken Council** is a cross-border cooperation association formed by the cities of Vaasa, Kokkola, Seinäjoki and Jakobstad and the three Regional Councils of Ostrobothnia in Finland, as well as the Regional Council of Västerbotten and the city of Örnsköldsvik in Sweden. **The Kvarken Council functions as a non-profit bi-national organisation.** The council is one of eleven official cross-border operators funded by the Nordic Council of Ministers. The Board has 6 members from Finland and 6 members from Sweden. The Kvarken Council was founded in 1972 and has had approximately 100 different cooperation projects in infrastructure, communications, tourism, university cooperation, food, business, education, culture, etc.

The Kvarken Council is registered in Finland, Finnish law is applied. The Council has staff in both Finland and Sweden. The board consists of 6 board members from Finland and 6 board members from Sweden. The board members are higher civil servants and politicians appointed by the member regions. The Chairmanship is circulating between the cities of Vaasa and Umeå, 2 years each.

4.2.1 Main actors involved in the protection and conservation of biodiversity and roles

A mapping of the main actors involved in the Kvarken Strait shows that governmental actors in charge of nature protection play a significant role in influencing the nature protection and conservation in the region. Other governmental actors (not specifically in charge of nature protection) and non-governmental actors can affect the biodiversity governance to certain extent. In the Kvarken region, conservation actions are mostly organised through formal structures, e.g. European Grouping of Territorial Cooperation (EGTC), EU INTERREG programme, and the Kvarken Council, as well as formal networks, e.g. NOSTRA, SUPERB (ongoing) project, SeaGIS (ongoing) project, FLISIK (ongoing) project and NLC.

Governance in the strait is performed in the forms of both formal and informal structures. From the in-depth analysis of the current governance of the strait by various stakeholders involved, a governance mapping is produced to report the governance level for 8 different governance aspects under consideration, i.e. decision-making, influencing, management, advisory, communication/awareness, control and evaluation, research and knowledge sharing.

The map shows that the present governance structure in Kvarken is highly ranked for the following aspects:

- The role of various stakeholders in influencing the governance of the biodiversity and nature environment in the strait;
- The level of communication and awareness about biodiversity and ecosystem conservation; and
- Knowledge sharing (channelled through both formal framework of conventions / initiatives and informal collaborative projects on specific subjects).

This result shows that the administrative bodies (from the ministry level down to the regional level) in Sweden have essential influence in the governance of biodiversity and ecosystem in the strait. The communication level and awareness about biodiversity conservation issues remains at a moderately good level and the transparency of knowledge sharing between different stakeholders is well maintained, although there is still room for improvement.

On the contrary, criteria e.g. management, and control and evaluation aspects receive the lowest score among all the selected criteria, showing that these aspects are the challenging area where more efforts would be needed to improve the current governance of biodiversity and ecosystem in the Kvarken Strait.

5 Conclusions of the analysis

The Kvarken Strait is a geographical area which mixes cities, large infrastructures (mainly ports), and remarkable natural areas.

Social-economic background of the Strait

The Kvarken Strait is a strategically important area for maritime transport in the Northern Bothnian Sea. Most of the forest and mining products produced in Northern Sweden and Finland are shipped to the rest of Europe through the narrow Kvarken Strait between Vaasa and Umeå. In addition, it is also the one transport line in the Bothnian region that also takes passengers across the strait for tourism, family and business reasons. These specific features of the strait have helped to shape the socio-economic characteristics in the Kvarken region, which is dominated by social services and manufacturing sectors, which contribute to the majority employment of the region, accounting for (SE/FI) 73/63% and 32/30%, respectively. A very small proportion of the population (3/6% - SE/FI) is employed in agriculture and fishery sector.

Significance of biodiversity and natural environment in the Strait

In addition to the busy maritime traffic, the Kvarken strait is also famous for its unique landscape value in terms of the land uplifting caused by the depression created by last ice age. This is also the reason that Kvarken is selected for the UNESCO world cultural heritage sites. Together with the shallow topography characteristics of the Bothnian Sea, the surface area and the depth of the sea are slowly diminishing and more land is being created along the coast. This has essential value for studying the formation of marine and coastal ecosystems in the region. Under the HELCOM convention and with funding supports of the European Commission, various projects have been developed for studying the specific marine and coastal biodiversity and ecosystems in the strait, including the EcoChange, SUPERB, SeaGIS, and FLISIK projects. These projects have involved various stakeholders, including universities, research institutes and regional administrative bodies from various countries to investigate together the biodiversity and ecosystems in the Baltic sea, research for solutions to cope with the challenges and pressures that are imposed on the natural environment, and encourage knowledge sharing among different countries in the Bothnian region. Many formal networks between regional governments, such as NOSTRA, were also created to ensure the effective knowledge sharing and conservation of biodiversity in the region.

Human and natural pressures exerted on biodiversity and natural environment

The main pressures exerted on biodiversity and natural environment are coming from maritime transport, onshore agriculture and industrial activities, and discharges of urban sewage water directly to the sea. These activities release water and air pollutants that have already significant impacts on the biodiversity and ecosystem. For instance, it is strictly forbidden by the EU legislation to eat salmon fish harvested from the Bothnian Bay area due to the high concentration of chemical compounds called dioxins found in the salmon body. Moreover, maritime transport poses not only higher risks of an oil spill that could contaminate the sea water, but also invasive species that are carried by the ballast water of the ship. These could all have significant impacts on the endemic species in the region and cause the decline of certain fish and bird species. Moreover, climate change is another essential natural pressure that already has observable impacts on the marine ecosystems in the Baltic Sea. In this regard, EcoChange project was launched with the objectives

of improving the understanding of how marine species and ecosystems may react to the changing temperature and studying the coping management strategies that may help ecosystems to adapt to climate change.

Policies, actions and initiatives contributing to an integrated management of biodiversity

The inter-governmental governance of the strait has been well developed through many official cooperation programs between the two countries' regional authorities, e.g. the creation of **Kvarken Council**. The conservation of biodiversity in the strait is mainly subject to the implementation of EU Habitats and Birds directives, which are also reflected in the compliance of creating Natura 2000 protected areas. In addition, in the Baltic Sea area, the most important policy initiative is the signature of the **convention on the Protection of the Marine Environment of the Baltic Sea Area** in 1992 (Helsinki Convention), which is an international convention encompassing various measures for the prevention and elimination of pollution of the Baltic Sea. The Convention sets up a Baltic Marine Environment Protection Commission (HELCOM), whose responsibilities are to implement the Convention, make recommendations to the Parties, define pollution control criteria and objectives and promote additional measures in co-operation with respective governmental bodies of the Parties. The Parties also undertake to implement measures to maintain adequate ability and to respond to pollution incidents in order to eliminate or minimize the consequences of these incidents and regularly report to the HELCOM commission on and inform the general public of the measures taken in accordance with the Convention. These conservation initiatives have already been incorporated into national policies and legislations in Sweden. For instance, in Sweden, special provisions concerning the protection of animal and plant species are found in Chapter 8 of the Swedish Environmental Code (SFS 1998:808) and in the Species Protection Ordinance (SFS 2007:845). The County Administrative Board is the only governance body in charge of marine environment governance. The Finnish environmental legislation is primarily covered through Water act (587/2011); Statsrådets förordning om vattenhushållningsärenden (1560/2011); Environmental Protection Act (86/2000); Environmental Protection Decree (169/2000); Havsskyddslag (1415/1994); Nature Conservation Act (1096/1996) and Land Use and Building Act (132/1999). The governance of marine environment in Finland is divided between two authorities: ELY-keskus and Metsähallitus, both of which receive recommendations from the Finnish Game and Fisheries Research Institute (FGFRI).

5.1 How responses have addressed key pressures on biodiversity and natural environment

The responses that have been implemented in the Strait are mapped on the following tables.

Table 6: Responses to address risks and pressures exerted on biodiversity and natural environment – Kvarken Strait

Activities that take place in the Strait	Adding value to the local livelihood			Exerting risks and pressures, and impacting biodiversity and natural environment	Existing responses to address risks and pressures exerted on biodiversity and natural environment		
	Creating jobs	Creating revenues	Creating Identity & culture		Ostrobothnia (Finland)	Västerbotten (Sweden)	Cross-border
Maritime Transportation (passing through and crossing)	✓	✓		Boat collision and risk of release of hazardous substances transported by boats			<ul style="list-style-type: none"> NLC CORRIDOR Kvarken Multimodal Link
				<i>All pressures / transversal</i>			
Traditional Fishing	✓	✓	✓	Fish stock depletion (limited)			
Agriculture	✓	✓		Contaminating seawater due to the discharged nutrients			
Terrestrial / Coastal tourism	✓	✓		Urban development, artificialisation of land, disturbance of natural balance, destruction of ground vegetation		<ul style="list-style-type: none"> Supporting the development of in-land tourism 	<ul style="list-style-type: none"> Odyssea France-Italy Maritime The parks' trans-border network (RETRAPARC)
Urban planning / territorial planning				Artificialisation of land Coastal development, coastal erosion, impact on marine ecosystems	<ul style="list-style-type: none"> land use planning governed by the Environmental Protection Act (2000). 	<ul style="list-style-type: none"> specific action plans for endangered species (ÅGP) 	
Improving governance between actors and joint strategies					<ul style="list-style-type: none"> Kvarken Council World Heritage Ambassadors 	<ul style="list-style-type: none"> World Heritage Ambassadors 	<ul style="list-style-type: none"> Many projects are developed developed under the HELCOM convention and within the framework of regional development plans in the European Union, such as the framework of European Grouping of Territorial Cooperation (EGTC), EU INTERREG programme.
Biodiversity and marine conservation related research						<ul style="list-style-type: none"> SUPERB project SeaGIS project FLISIK project 	<ul style="list-style-type: none"> Kvarken Council is cofunding many border-regional projects

6 Recommendations for improving an integrated management of biodiversity and natural environment

GOVERNANCE

- Centralisation vs. Decentralisation. The opposite governance structures on both sides of the strait may provide inputs for the two countries' regional authorities to learn from each other. For instance, the regional council of Ostrobothnia in Finland may consider to integrate certain level of centralised decision-making process into their currently decentralised the governance structure. This may help the regional governance to grow capacity in terms of tackling some technical issues emerged in the marine and coastal management. On the contrary, the county administrative board of Västerbotten region may also learn from the Finish side to decentralise the governance structure to improve the efficiency in daily operations and allow top management to focus more on major decisions.
- Support the involvement of private sector: The current governance of Kvarken region is mainly subject to public bodies. However, marine biodiversity and ecosystem integration could be more efficient and effective if the regional authorities could modify the governance to promote synergies of public and private interests, and to allow private sectors to recognise the essential value of biodiversity and marine ecosystem in their long-term business sustainability and take corporate social and environmental responsibility into their internal management decisions.

KNOWLEDGE / CAPACITY BUILDING

- Enhance capacity building: The need for enhanced capacity building is foreseen to balance the knowledge sharing between Sweden and Finland. In addition, the Finnish regional authority may consider recruiting more technical experts to strengthen its capacity for developing more integrated marine and coastal management strategies in the region.
- Carry out basin-specific studies: Basin-specific studies are necessary. The Baltic Sea holds a salinity gradient from North to South, due to lack of saltwater inflow and great freshwater inflow in the North. There are also many different basins and sills with varying living conditions in the Baltic Sea. Therefore, it cannot be regarded as an uniform water mass.

- Develop knowledge exchange between academic researchers (from the local universities) and regional government officers: In addition to the governmental collaborative projects through the HELCOM convention, more frequent knowledge exchange between academic researchers (from the local universities) and regional government officers may help to strengthen the scientific knowledge regarding the ecological value of biodiversity and identify cost-effective options to cope with climate change in the region.

ACTION

- On the Finnish side, stronger inter-governmental collaboration would be needed to generate collective actions for responding to marine coastal management issues, including biodiversity conservation and natural reserve management.
- On the Swedish side, actions might be taken to allow for more decentralised decision making in order to react more quickly to emerging environmental issues in the region.
- Government authorities should develop actions plans and guidance to help business sectors to better understand their business independency with marine biodiversity and ecosystems and the benefits that biodiversity can bring to the business, and encourage business to integrate biodiversity value into their management decisions and environmental compliance. Local governmental may need to put more effort to identify new employment opportunities associated with biodiversity and ecosystems in order to develop win-win solutions to prompt both economic growth and biodiversity conservation in the Kvarken region.
- There is a need to build a common sharing database regarding marine biodiversity in the Kvarken strait.

6.1 Towards the implementation of good practices developed by other NOSTRA partners

During the workshop that took place in Reggio Calabria in February 2014, the NOSTRA partners were asked to identify the best practices developed by other partners of the Network they would like to implement in order to achieve their ideal Strait. However, the partners of the Kvarken Strait did not submit the best practices they may have chosen.

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The Kvarken council: <http://www.kvarken.org/kvarken-council/the-kvarken-region/>