

The Diversity of Life in the Baltic Sea



Did you know that...

...as recently as 15000 years ago, the Baltic Sea was entirely covered by a continental glacier?


Today, the Baltic Sea is a brackish water basin inhabited by a diverse mixture of freshwater, brackish water and saltwater organisms. The low-salinity water constitutes a challenging environment to both freshwater and saltwater organisms, and many of these species thus live at the limit of their tolerance in the Baltic Sea: the salinity is too high for freshwater species and too low for real marine species. This makes the organisms vulnerable to disturbance caused by man.

...about 6000 different species are known from the Baltic Sea?

The Baltic Sea stretches over some 1500 km from north to south, and the climate, salinity, and degree of eutrophication varies a lot with area. Due to these great differences in environmental conditions, the species composition of different areas varies widely. Some species, of course, occur all over the Baltic Sea.

...new arrivals, called alien species, both contribute to and potentially threaten the Baltic Sea biodiversity?

In the past 200 years, over 100 alien species have arrived in the Baltic Sea. Of these, 70 have liked the place and stayed here permanently. The new arrivals enrich biodiversity, if they do not displace the native species. Often the changes caused by alien species are not immediately apparent in the ecosystem and only after many years we understand the damage to the native ecosystem caused by them.



We want to protect the biodiversity and the health of the Baltic Sea. Our governments and the European Union also proclaimed this goal. They have therefore developed a set of legislations to regulate the sustainable use of the sea, and the protection of its biological diversity.

They also have agreed to **constantly observe** the health of the Baltic Sea by each country monitoring the state of biodiversity in its waters, the water quality but also the factors that can influence or harm the natural environment. Monitoring enables us to timely react to various threats.

In order to protect the marine biodiversity, we need to know about species and biotopes, threats to them, their health as well as environmental changes impacting them. Indicators help us easily and efficiently assess the health of the ecosystem.

Biodiversity indicators are an important tool on which monitoring and surveillance systems can be built. The decision makers of the Baltic Sea States are discussing a core set of indicators that can be used by all countries. The MARMONI Project has contributed substantially to the development of these biodiversity indicators.

Our Project **identified 48 indicators** to evaluate the health of the Baltic Sea telling you about ...

Our project developed INDICATORS

to evaluate the health of the Baltic Sea telling you about ...

... **PHYTOPLANKTON**, microscopically tiny plants, some of which switch between being animal or plant.



Photo: Heidi Hällfors, Finnish Environmental Institute

Phytoplankton is a very heterogenic group of organisms with different size and way of living. They are generally considered comparable to plants, because they, like ordinary plants, capture the sun's energy and use it to fuel their growth and activities. However, some phytoplankton species do not utilize sunlight, but prefer to eat their comrades, and others yet function as either plants or animals depending on the situation!

...**ZOOPLANKTON**, the daily routine of swimming up and down, every day.

This activity is called diel vertical migration. One of the reasons for migrating is that it is safer for zooplankton to come up to shallow waters to feed at night while it's dark out, when their predators cannot see them so easily. During daytime, it's better to hide in the deeper darker waters. However, some phytoplankton species have got the hang of this, and to avoid becoming zooplankton food, they swim in the opposite direction: upwards in the daylight hours, and into the depths during the night.



Photo: Astra Labuce, Latvian Institute of Aquatic Ecology

...**ALGAL BLOOMS** that can be seen even from space.



Photo: MODIS satellite image (NASA)

Phytoplankton blooms can color the sea and shore almost any color of the rainbow: green, yellow, turquoise, brown, violet or even red. Some species are lethally toxic. Single phytoplankton individuals are so small that they can only be seen with the help of a microscope, but algal blooms can be seen even from space. Consequently, also satellites are used to observe the extent of algal blooms in the Baltic Sea.

...**BALTIC CLAM**, which knows how to surf along the seafloor.

These common bivalve molluscs hoist their sail of mucus and surf away on near-bottom currents. They can travel a distance of almost 1 km/day. Like for us humans, also for Baltic clams surfing tends to be a sport of juveniles, rather than the old and grey.



Photo: Tiia Möller, Estonian Marine Institute

...the **ROUND GOBY**, an alien species in the Baltic Sea.



Photo: Lauri Saks, Estonian Marine Institute

The round goby is a small bottom-dwelling fish, with large, protruding eyes and a characteristic black spot on the dorsal fin. It is native to Central Eurasia, but has as a shipboard stow-away expanded to North America and different parts of Europe. In the Baltic Sea, this alien species was first found in 1990. The round goby is salt-tolerant and can live in both, fresh and marine waters.

... **FLOUNDERS**, a third of which are left-sided.



Photo: Kaire Kaljurand, Estonian Marine Institute

After hatching, flounder larvae look like "normal fish" having one eye on each side of its head. Before the first autumn, both eyes are usually shifted to the right side of the fish and what appears to be its upper surface is in reality its right side. However, a third of flounders are left sided. The reason for this is unknown. The juvenile flounders are typically found in shallow sandy bottoms and the population density can be estimated by a beach seine.

... the size of female **FISH**.

Large pikeperch females are more fecund because the number of eggs produced annually increases exponentially with length in most fish species. Their eggs also tend to be larger and contain more yolk sac reserves giving a greater chance of survival to larvae. Thus, old and large females are highly valuable for e.g. pikeperch populations in the Baltic Sea. It has often been suggested that fishermen should release the largest individuals and focus the fishing efforts on medium-sized individuals.



Photo: Esa Lehtonen, Finnish Game and Fisheries Research Institute

...Penguin analogues of the Northern hemisphere – the **AUKS**.



Photo: Leif Nilsson, Lund University

They are able to fly in the water. Auks spend much more of their time in water than on land. They can feed at any depth where they can find fish flocks and they have the ability to dive up to 120 m below the surface. They only come to land in order to breed.

...**SEADUCKS** dive deep for their favorite food.

Seaducks can dive more than 20 meters to reach their preferred food – mussels. Each species of seaducks specializes on specific size of mussels. Three of the Baltic seaduck species (Velvet Scoter, Steller's Eider and Long-tailed Duck) are under global conservation concern; many thousands of them die in fishnets every year when diving to their forage places.



Long-tailed Duck

Photo: Ainārs Auniņš, Latvian Fund for Nature

...**MACROALGAE**, that causes the characteristic scent of the sea.



Photo: Tiia Möller, Estonian Marine Institute

The fresh, tangy seaside smell is caused by a molecule called dimethyl sulphide, which arise due to the activities of water plants, seaweed and phytoplankton as well as bacteria that live in the sea and on the sea shore. When rotting, seaweed and algal blooms wash up to the shore, they give off a proper stink – another kind of characteristic sea odor.

MARMONI stands for „Innovative Approaches for Marine Biodiversity Monitoring and Assessment of Conservation Status of Nature Values in the Baltic Sea“ (LIFE09 NAT/LV/000238).

The MARMONI project was kicked off to a start in October 2010 and continued full speed until March 2015. During these 4.5 years, we, 70 enthusiastic persons from 17 institutions in Latvia, Finland, Sweden and Estonia, worked toward inventing and testing new methods and indicators for the monitoring and assessment of biodiversity in the Baltic Sea. The ultimate goal of our work was to help protect the irreplaceably valuable Baltic Sea.

The purpose of this brochure is to bring to your attention the fascinating life in our sea. For information on our project goals and results, please visit the MARMONI web site at <http://marmoni.balticseaportal.net>

MARMONI consortium



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