

Newsletter

COBWEB

Communicating
the Baltic together
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Baltic Sea Flora and Fauna

This Newsletter presenting Baltic Sea flora and fauna on the Latvian coast is produced by the Natural History Museum of Latvia as part of the project COBWEB - Communicating the Baltic. During the project museum will: create an interactive exhibition of the Baltic Sea; organize seminars on the Baltic Sea flora, fauna and marine ecological problems; publish newsletters; produce the table-game called "Salmon spawn"; organize a campaign "Baltic Sea"; organize field trips to the Baltic Sea coast and other activities.

The project COBWEB supports environmental interpretation activities, exchange of experiences, exhibitions, research and other activities relating to the environmental problems in the Baltic Sea and the sea coast in general. Partners in the project are universities, public organizations, nature schools and other educational institutions in Estonia, Finland and Sweden and Latvia. In total eleven organizations are taking part.

Baltic Sea mammals

Valdis Pilats

Nearly all of us like to read the articles and regularly watch movies about dolphins and whales, and possibly seals as well. But do you associate these stories with the Baltic Sea? I guess not all of you do. Bigger oceans take the limelight from smaller seas such as the Baltic Sea when we think of marine mammals. The most famous and best known sea mammals from the movies - killer whale and afalina mainly inhabit larger oceans and their surrounding seas.

The Baltic Sea is "hidden" from the sea mammals and it is too "sweet" place to live (because of the water salinity level). Considering that there are 87 known species of whales and dolphins that exist in the world, only one - the "harbour common porpoise" has managed to live in the Baltic Sea. However, seals are better represented - from the 30 plus known species in the world a total of three – the gray, spotted and ringed seal live in the Baltic Sea.

If we were to discuss the diversity of species found there, the otter and American mink come to mind as typical mammals of the sea and in particular inhabitants of the islands on the coastal zone. There are also "migrants" to be found there. Terrestrial mammals such as moose, deer and wild boar have been seen bathing in shallow coastal sea water.

On occasion such mammals have been spotted swimming across the Irbe Strait between Courland and Sarema Island. A story is told that even a bear has managed to swim to Seal Island. There are approximately 20 common species of dolphins and whales that occasionally visit the Baltic Sea for a period, mainly the the western part, and then leave again.

Some mammals can decay because of the inappropriate environment. Along the Latvian coast have been seen Afalina and White Whale, but Fin Whale and Humpback whale have been found dead. The Fin Whale was found 33 years ago near Kauguri but the Humpback whale was noticed only 3 years ago near Skulte. The most likely cause of their death was probably collision with a ship. Nowadays common cause of the sea mammals death can be collision with ships, speed boats and motorboats. Probably the dead whales that have been found along the Latvian coast before the collision with the vessel were exhausted due to the lack of food as there are no proper food resources for the large whales in the small Baltic Sea.

The main reason why we hear so little about the Baltic Sea mammals is "the fight" for resources and that is why they became so rare in our sea. Even in the recent past marine mammals were extensively hunted and used as a resource for fat, meat and skin as well as killed as competitors that also consume fish resources. In the 19th century every year at least three thousand porpoises and tens of thousands seals were hunted. Nowadays the sea mammals death due to the lack of resources has got a new expression: every year hundreds of seals are killed in the modern efficient and gritty fishing gear used in the Baltic Sea (of course, there are also cases when seals tear the nets and eat up the fish, but it is another-longer story).

20th century has come with new troubles for the Baltic Sea mammals—the sea water pollution. It was discovered that the Baltic Sea is polluted with various toxic substances and pesticides that much that it is one of the most polluted seas in the world.



The Baltic Sea water had become a “cocktail” of heavy metal, various chemically synthesized substances, organochlorine compounds, as well as eutrophying nitrogen and phosphorus compounds. Organochlorine compounds and heavy metals accumulate in the organisms of marine ecosystems. These poisons get into to each subsequent stage of the food chain and reach the highest concentration in the predators tissues. These levels of poisons in the porpoises fat layer can be 10 million times higher than in seaweed. It is proved that the Baltic Sea seals and the prey birds at the top of the food chain have accumulated such amount toxic substances that they cause pathological changes in the body: metabolic diseases, hormonal disorders, weakened immune system; it is also affect animal breeding capacity. In

70–80ies of the last century 80% of seal females failed to rise up a seal offspring. In the beginning of 20th century amount of gray seals had shrunk from about 100 thousands to only few thousands. Accordingly to the records, in 1995 there were only 600 (or even just 200) porpoises living in the Baltic Sea. There is a threat that porpoises recorded in the World Red Book of endangered species list might extinct over the next three generations.

Seals and porpoises has become a symbol of a growing movement for the protection of rare and endangered species in the Baltic Sea. Here we can recall: all water flows to the sea and all of the sea residents need a clean environment. Those people, who take care about the environment at home, also help to protect the sea and its inhabitants.

Baltic Sea mollusks and other invertebrates

Digna Pilate

Currently the Baltic Sea population consists of approximately 2000 different species of animals. It's not much. The low sea salinity level is main reason for rather low biological diversity. Should we compare, the water salinity in the North Sea water is 32-34 ‰, in the Central Baltic Sea 6-8 ‰, but in the Gulf of Riga only 3-6 ‰. There are only few marine animals that can live in such vapid waters. More diverse animals can be found in the Baltic Sea region where the water is more salty. There are only 7 species of marine bivalves, 3 species of snails and 4 species of clams that can be found on the Latvian shore.

Snails have monolithic shell, usually twisted into a spiral. In size 4-6 mm large marine snails - three snail species live on the plants and algae can be found on the sea coast. Laver Spire Snail inhabits the marine coastal waters, usually the sludge. It feeds on algae, mainly green algae and its dead parts. It breeds with eggs. Spire Snail is fresh water species. It settles on a variety of sediments or sludge and lays egg capsules that are attached to rocks.



Birthplace of the New Zealand's Jenkins" Spire Snail is freshwaters of New Zealand. It was brought to Europe by ships or imported for keeping in aquariums. It lives in fresh and salty waters, mainly stays in the coastal sediment, including stones. It feeds mainly on the remains of plants and animals, partly on algae. Young snails are being born alive. The average lifetime of a snail is two years. The New Zealand's Jenkins" Spire Snail is common food for fish.

Shell of the clams has two lids. Clams filter the sea water and consume organic parts filtered from the water or sludge. Tellin is the most common and wide spreaded species in Baltic. Clams of this specie are characterized by a shell colour variation - they can be yellow, pink and white. The shell is less than 2 cm in length. Clams live dug into the 3-6 cm deep soil. Majority of clams live in the 5-10 m depth where more than 500 mussels can inhabit in 1 m². Number of clams has decreased rapidly in the last few years. It is caused by lack of oxygen. The lack of oxygen is caused by the organic substances pollution that stimulates growth of algae which dieing off consumes considerable amount of oxygen. It contributes to the formation of thick rotting sludge layer.



The Baltic telling is not able to live long and decreases in size in such conditions. The clams, particularly their siphons, are main food for several marine fishes. Nipped off siphons are able to regenerate. Lagoon cockles are less common on the Latvian coast. Lamarka Lagoon cockles are up to 5 cm long, but in the Latvian coast can be found only 1 to 1.5 cm long shells. Shell is ribbed in the length. Cockles live in 1 - 5 m depth entrenched in the sand or sludge 5 cm deep. They also can live on the ground. The most dense population of cockles is in 3 meters deep water – 245 cockles/1 m². A cockle filters about 1 litter of water in an hour. The cockles serve as a food for gulls, sea magpies, ducks and fish.

Large Soft-Shelled Clam is the biggest clam of the Baltic Sea. It can reach 18 cm in length, but on the Latvian coast usually can be found 4 - 5 cm long, in

white shelled clams. Soft-Shelled Clam is characterized by very long siphons – the shell is about ¼ of the length of the siphon. Grown up animals live dug into the soil in 30-40 cm depth; the young individuals live more shallow. Density of the grown up clams is about 15 / 1 m². Clams live about 19 years. The clams consume about 10 times less oxygen than other mollusks as they live in deeper waters. Moreover, they are able to regulate their breathing – the oxygen consumption increases fivefold under the good conditions. Historically this clam died out in Europe during the Ice Age, but survived in North America. For the first time after the Ice Age in the Baltic Sea it was found in 18th century. Soft-Shelled Clam is considered as an introduced specie. North Blue mussel resides in shallow coastal waters on various underwater objects, attached to them with a special fan shaped horny substance treads – bsisus threads.

Thus the clam can spend all its entire life - about 8 - 10 years, in one place. The clam is about 2 - 3 cm long on the Latvian coast, but in saltier places can grow up to 11 cm. Shell size also depends on water temperature and quantity of food. Blue mussel is adapted to the tides and cold winters. The mussels can survive - 10 °C frosts for several days. The mussels are food for waterfowl, fish and marine invertebrates. The mussels is a valuable food source for people as well, their meat contains various minerals, A, B, C and D vitamins, 8-11% protein and 0,8-1,5% fat. Northern mussels are grown in special farms for food supply. The mussels can accumulate heavy metals and various disease-causing bacteria in their bodies as they inhabit in the coastal waters that are often dirty and contaminated.

White limestone tiles can be found along the Lithuanian border seacoast after strong storms in the sea. They are called sepia tiles, as they are excess of cuttlefish which is likely carried into the sea currents from other locations. Cuttlefish is Cephalopoda mollusk that does not live in the Baltic Sea. Sepia does not have a shell. In old times the ink was extracted from the cuttlefish. These animals have a special ink gland releasing substance that puddles water and allows sepia to avoid an enemy. These molluscs are brisk hunters.

At the end of summer and in autumn a great number of jellyfish are washed ashore. Two jellyfish species, Moon Jelly (*Aurelia aurita*) and Lions Mane Jelly (*Cyanea Capillata*) are common in coastal waters of the Gulf of Riga and the Baltic Sea.

During this season the mature jellyfish complete the propagation and subsequently die in large quantities. Usually it is Moon Jelly (*Aurelia aurita*). This gel-substance and bell-shaped body of jellyfish, living in the Baltic Sea and the Gulf of Riga, never reaches 20 cm in diameter. The second species, Lions Mane Jelly, is brought by the North Sea currents into the Baltic Sea and drawn as far as the coastal area of Latvia. It is inadvisable to take this jellyfish in hands because the released prickly threads from its cells can hurt human's skin and make pain. Jellyfish are predatory animals; they prey on different small sea creatures, e.g., shellfish, mollusc larvae and fish fry. Jellyfish capture its prey with tentacles at first and then poison it.



From crustaceans mainly sea acorns (*Cirripedia*), greve (*Mesidothea*) and Amphipods are common in the Baltic Sea along the coastal area of Latvia. These animals are of a great importance to fish and other marine animals to feed on. Sea-acorn is a sedentary animal covered with white calcareous scoop-shaped arranged plates. They settle down on various underwater objects and animal remains, thus forming a compact accumulation.

Of the 3 greve (*Mesidothea*) species the big greve (*Mesidothea*) is the most common one. It is about 9 cm long that can be found in large quantities in sandy and muddy grounds within the depth of 20–40m. Amphipods are swimming sideways. They stay near sandy bottoms under the stones. There are 9 species of them in the Baltic Sea.

Almost a hundred of alien species of plants and animals inhabit the Baltic Sea. Chinese crab (*Eriocheir sinensis*) is such a migrating species that lately occur in fishing nets and has penetrated in Europe through ballast waters of the fishing vessels. Chinese crab damages fishing nets and the fish inside nets as well dams or embankments that during the storms protect the inland against floods.

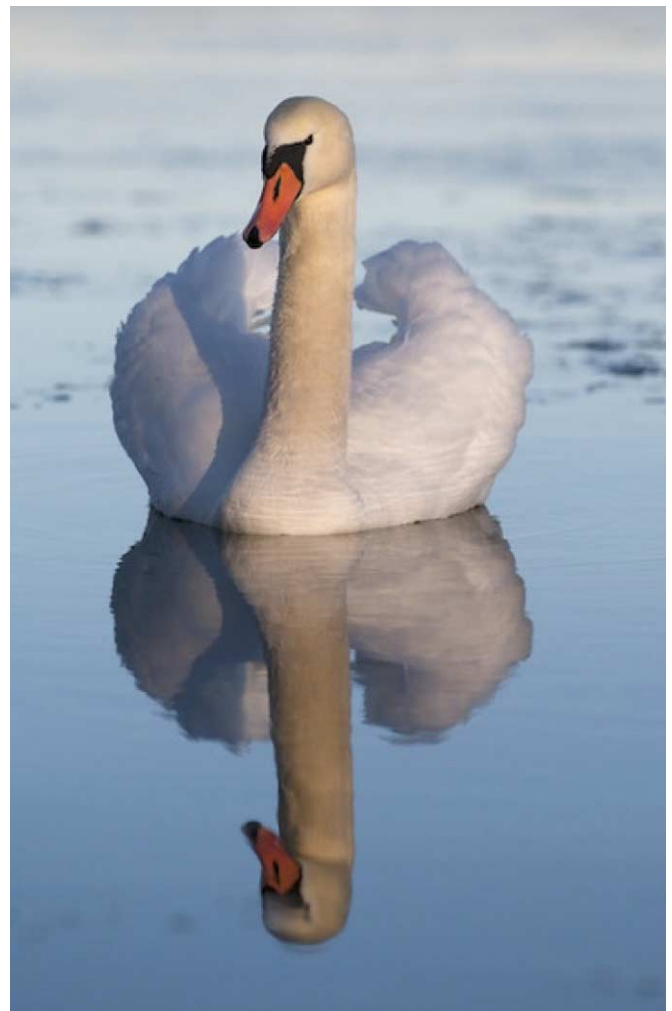
Marine Birds in the Baltic Sea

Dmitrijs Boiko

Alterations in nesting bird populations

The nesting of birds in southern and western parts of the Baltic Sea is quite diverse. Birds flock in several grounds (sites) of southern part of the Baltic Sea thus their concentration there is very dense. In northern part birds have flocked more equally because of a lot of dispersed small islands in the sea.

Over the last century the increase in number of several marine and riparian bird species like cormorant, eider (*Somateria mollissima*), common black-headed gull (*Larus ridibundus*), great black-backed gull (*Larus marinus*), and kayak or common gull has been observed.



Over the previous century several species have expanded their habitat and now they flock more northwards, e.g.: Saaremaa duck, eider (*Somateria mollissima*), common black-headed gull (*Larus ridibundus*), herring gull (*Larus argentatus*), carpian tern (*Sterna caspia*), little tern (*Sterna albitrons*), common murre or common guillemot (*Uria aalge*), but pied avocet (*Recurvir ostra avosetta*) and sandwich tern (*Sterna sandvicensis*) have even started nesting there.

Not all bird species have had good times. In southern parts of the nesting grounds dunlin (*Calidris alpina*) and greater scaup (*Aythya marila*) as well as previously most common black-backed gull (*Larus fuscus*) and black-headed gull (*Larus ridibundus*) occur more rarely. Recently mute swan (*Cygnus olor*), barnacle goose (*Branta leucopsis*), greylag goose (*Anser anser*) and cormorant (*Phalacrocorax carbo*) are most often seen birds in the Gulf of Finland.

Cormorant (*Phalacrocorax carbo*) again occur in Finland, recently it has become a common bird in the Gulf of Finland. To great extent it is explained by the reduced utilization of chemicals in agriculture because of that the nesting conditions for cormorants and other predatory birds improve and at the same time the increase in bird number is facilitated as well. Several positive factors have made an impact on birds' life, e.g., mild winters that prolong the nesting period. People also collect less eggs and hunt on birds less. Due to eutrophication there is more food for those birds that forage for fish and mollusks.

The Baltic Sea – a wintering ground and migration route

The Baltic Sea is a significant area for bird wintering. In this site there are wintering about 9 million birds: black-throated diver, auks, duck, eider, goose, swan, seagull, et.al.. The wintering grounds are located in southern and south-western shallow ice-free coastal part of the Baltic Sea. The most significant wintering site is the seashore of Germany in the delta of the Oder. Large colonies are wintering in Kattegat, the south of Gotland, the Gulf of Riga and in the Sound of Irbe. The Baltic Sea is a significant migration route for anseriformes (duck, goose, swan) and waders (dunlin, Kentish plover), the last nesting in arctic tundra. Also passeriformes birds as tits and goldcrest

migrate along the coast and also across the sea. The smallest birds of Latvia-the goldcrests, being ringed at Pape field station, on the following day are already in Sweden. It means that over one night they have crossed the Baltic Sea.

In order to study the migration of passeriformes birds several bird ringing field stations have been launched at: Ribchij (Kaliningrad area), Ventas Ragas (Lithuania), Pape (Latvia), Kabli (Estonia).



Who endangers birds in the Baltic Sea?

The decrease in specimen number of several species is the result of people's action because of which the areas of coastal meadows extinct due to recreational activities on the seashore. Eutrophication causes decrease in amount of macroscopic plants of the shallow coastal waters. A range of predatory animals like

American mink, fox and raccoon dog, and consequently the birds like herring gull (*Larus argentus*), great black-backed gull (*Larus marinus*) have increased in number thus respectively endangering birds.

An interesting study on interconnection between the number of cormorants and utilization of chemical DDT was carried out in Sweden. All over the region of the Baltic Sea success in cormorant's propagation in 1970s was per 1/5 lower than in 1950s. The situation started to improve in 1980s, and since 1990s it annually grew per 7.8%, and gradually reverted to the level of 1950s that was before the decrease in bird number.

Cormorants were one of the species that indicated to the contamination level in the Baltic Sea. If the monitoring of successful nesting was performed before, the decrease in bird number of 1950s and the DDT impact on habitat would be detected earlier. Cormorants of the Baltic Sea region feed on fish, marine birds, and seals. As a species at the top of the food chain, cormorant was one of the first species whose changes in its number were noticed, this fact indicated to bad quality of feed as well as to the problems in the Baltic Sea.

The Swedish scientists have also noticed that a lot of wild birds in the region of the Baltic Sea die from paralysis provoked by deficit of vitamin B1. Nevertheless, it should be clarified what provokes the deficit of vitamin B1.

The Baltic Sea Fish

Evalds Urtans



are spawning in coastal area. Compared with its size gudgeon is a very greedy species resisting low oxygen saturated waters, gudgeon is capable to live in waters of great contamination. Increase in population is mainly related to small amounts and recurrent presence of wild enemies – cod, perch, sander and turbot – in the shallow coastal waters. The coastal fishery is a traditional profession and means of subsistence for coastal inhabitants. In the reign of the Soviet Union the coastal area of the Baltic Sea was

Around a 100 of different fish species, including 42 inland, fresh water species, inhabit the Baltic Sea. The Baltic Sea fish species are divided into groups according to their origin and habitat:

Marine fish, e.g., cod, herring, sprat, spend all their life in the sea; they are the main species for Latvia's fishermen in sea fishery.

Migrating fish mature and feed in the sea, but spawn in fresh waters (anadromous), e.g., vimba, salmon, salmon trout; eel is the solely fish species (catadromous) that grows and develops in fresh waters, but migrates for spawning to the Atlantic Ocean.

Fresh water fish, e.g., pike, silver bream, roach, tench also inhabit coastal waters because they are capable to resist the water salinity.

Irrespective of the ecological groups of fish there is a relatively sufficient amount of fish species like flounder, smelt, stickleback, sander, sabrefish, twait shad that have ability to adapt to varied environmental conditions, i.e. to exist, forage, spawn in the sea and fresh waters. Since 2004 a rapid distribution of gudgeon, a new invasive species from the Black Sea, has been observed in the Baltic Sea. They feed on molluscs and eggs of fish that

concurrently the border of the USSR therefore any activity on the coastal area, including fishery, was strictly limited or forbidden. After regaining Latvia's independence the coastal fishery as well as the forgotten traditions and lifestyle were renewed. However, recently the coastal fishery, the only and constant source of incomes, recently has become the profession for solely a small part of fishermen. People are mainly involved in fishery not to forget the old traditions and to get some extra income.





Algae and plants in the Baltic Sea

Egita Zviedre

Should we imagine, how the Baltic Sea or the Gulf of Riga coast looks like, the most common image that comes into the mind is sandy or pebbly beach where plants mostly grow in sand dunes, and almost none in the water. Only after stronger winds some algae may be thrown out on the shore and in the shallow water, released from the rigid substrate. It is known as "sea dung" and it has an important role to play in nature. In the course of time the washed out algae start to decompose and release strong odor that makes it difficult to stay nearby.

The waders – birds whose long legs and beaks are suitable for food search exactly in such locations find some food in the washed out algae. The washed seaweeds usually are removed from the beaches, where many people relax. However, people have to take care of the coastline ensuring that it is not destroyed or transformed in general, and also maintain the natural localizations with all characteristic plant and animal species.

The sea would not be able to function properly without plants and algae. The thick sea plant groves are excellent places to hide as well as to breed and rise up a new generation, found by many marine invertebrates and fish. Algae and plants themselves are a great vegetarian meal for vegetarian food loving animals.

The green coastal meadows, where the beaches are not sandy, spread out around Ainazi, in Mersrags and Berzciems. These coastal areas are biologically very valuable not only because on the coast, but also in the water one can find various algae and plant species.

Macroscopic algae make the main formations in the Baltic Sea and Riga Gulf Coast water. Bladder wrack (*Fucus vesiculosus*) and red seaweeds (*F. lumbricalis*) are most common in the deeper waters. Green algae are often common in the shallow waters closer to the shore, fixed to the various underwater objects. Often you can see Cladofora as a thick, green hair decorating stones or other objects in the water, and Enteromorpha as well. More common is Enteromorpha, which reminds green intestine flowing in the water. Overgrown bays and shallow waters are places where Charophytes grow, fixed among rocks and other plants of the substrate. Charophytes are very ancient organisms. Their fossils are found in the Devonian sediments. Two genera Charophytes – Chara and Prolifera grow in Latvian territorial waters.

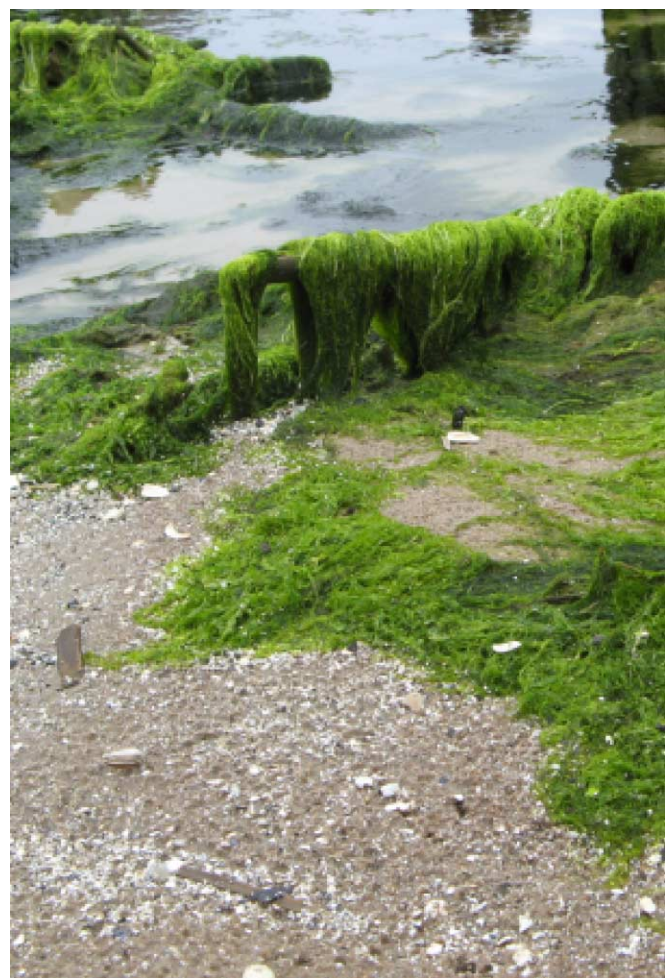
It might be interesting that for the grayish Chara growing in the Baltic Sea are known only female samples. So far search for any male grayish Chara algae has failed. The Fucus often can be found among washed out algae in the Gulf of Riga beaches, but the lumbricalis is frequently washed out on the Kurzeme shores. Unfortunately lumbricalis formations are not resistant to the oil pollution. Strong oil pollution causes extinction of algae and gradually they are replaced by Fucus. Algae color pigments dissolve in different organic solvents, including oil. The brown, pink and violet algae become green if the oil pollution has reached the coast.

Further into the sea and along the coast grow vascular plant. Most of the marine vascular plants from the first glance seem exactly the same – they resemble knotty yarn or just green grass. However, looking more carefully, we can see that they are different. In some places the common is ordinary seaweed, which forms a thick, soft plant layer. In the Southern part of the Baltic Sea, where the plant is often found and also is bigger, it even can be used

as upholster material for the furniture industry. The seaweed growing in Latvia cannot be used for this material. Some of the fresh water species are also able to grow in marine water – slender-leaved Pondweed and fennel Pondweed. Pondweed is similar plant with very rare marine beaked Tasselweed, which would be a real luck to find.

All groups of macroscopic algae have the same functions in the coastal waters marine ecosystem. They are the food substrate, as well as the place to hide and breed for many organisms – microscopic animals, small crayfish and other invertebrates, fish, bacteria and algae. Groves of big algae enrich the water with oxygen and purify it from the contamination. Unfortunately, part of the pollution, especially heavy metals or their compounds, accumulates in the same algae. Animals feeding with these algae get even bigger part of the pollution.

Groves of the big algae and plant are seriously affected by eutrophication – the enrichment of water with nutrients, which promotes “blooming” of the water – expanding of microscopic algae, increasing the areas of pollution resistant species, lacking the oxygen in the sea water. Water pollution destroys the ecosystem stability formed within many years up-bringing many problems, that will have to be solved in not so distant future to ensure our pleasant life along the seacoast.



Sand Dune Vegetation

Vija Znotina

Dune is a sand-hill delivered by winds. Dune is formed from the sand blown by winds that meet some obstacles in its way, for example, a relief protuberance, a stump, a grass tuft or a shrub. The sand hill gradually accumulates in front of the obstacle and behind it. Large quantities of sand and constantly prevalent winds and coarse vegetation are needed to form the dunes.

Unlike the coasts of lakes, there is usually little vegetation on the very seashore; the continually moving sand does not let the plants stabilise and grow, but often cover and bury them. It is quite different on shingle beaches; in particular, in those

sites separated from the open sea by shingle shelves, more vegetation may be common here. Moving from the sea more landwards, the stages in the dune formation may be watched.

A beach is the first land habitat on the seashore. The beach is that narrow stretch of the land washed by waves. The beach is constantly affected by waves, winds and coastal currents. The Baltic Sea-Rocket (*Cakile Baltic*) and common saltwort (*Salsola kali*) pretty often might be found in the soil of dry, sandy beach. Usually they are separate and lonely specimens, but not a growth. Both of the plants have narrow succulent leaves, but the saltwort with a thorn at the end of its leaves. Blossoms of Sea-Rocket are rosy violet, but of saltwort they are small and hardly noticeable.



The embryo dune is small, about 10–50 cm high sand hill with clusters of salt soil loving plants— sea sandwort (*Honckenya peploides*), marram grass (*Ammophila arenaria*), sea lime grass (*Leymus arenarius*), barley-squirreltail (*Elytrigia junceiformis*) and toadflax (*Linaria loeselii*). The vegetation of fore dune or white dune is very dispersing, here and there with plants; some sites are barren at all. It is the most comfortable area for sunbathing because the dune hill is high enough to provide a shelter; however, the



ground is covered by barren sand. The most often encountered plants are mainly sand-cover resistant Gramineae species - marram grass (*Ammophila arenaria*), chee reed grass (*Calamagrostis epigeios*), sea lime grass (*Leymus arenarius*), rush-lef fescue (*Festuca arenaria*) as well as hawkweed (*Hieracium*

umbellatum) and field warmwood (*Artemisia campestris*). Less common is sea holly (*Eryngium maritimum*), wild pea of seashores (*Lathyrus maritimus*) and *Tragopogon heterospermus*.

It is easy to notice sea lime grass (*Leymus arenarius*), because of its wide and bluish leaves that can prick the bare feet. The leaves of the most common marram grass (*Ammophila arenaria*), are very narrow, they are lengthways folded with a pinkish stalk at the foot of the plant.

The grey sand dune has ceased moving or only a little. The vegetation is formed by moss, lichen, perennial caulescent plants of low height as well as a few trees and shrub. They are dryness resistant species. In dry weather conditions only a small part of plant seeds are capable to braird and develop, therefore the vegetation is sparse.

The ground is covered not only with caulescent plants, but also with various species of moss and lichen from which cladonia is the most beautiful. Cladonia resemble small, grey, red-headed matches. More common moss species of the grey dune are: *Racomitrium canascens* and *Tortula ruralis*, the flowering plants: hawkweed (*Hieracium umbellatum*), sand carnation (*Dianthus arenarius*), dark-red Helleborine (*Epipactis*), sand sedge (*Carex arenaria*), goldmoss sedum (*Sedum acre*), common thyme (*Thymus*), lichen: cladonia and cladina. The grey dune is very unusual and multifari-

ous habitat. For example, more than 80 lichen species have been identified in the Uzava grey dune near Ventspils in North West of Latvia.

The grey sand dune naturally becomes overgrown with pine-trees thus becoming a woody dune. In some parts of the dune there are very old onshore pine woods being defended as a protective zone for centuries.



The old pines may be distinguished by their thick branches with rounded tops, spinned stems and coarse barks. The soil of the dune woods is calcareous. The lime of the very fine shell particles, brought by wind-blown sand, penetrates in the soil. More different lichen species, sometimes even a small orchid – dark-red Helleborine, may be found in the litter of the nearest onshore woods. The more landwards, the more lichen, and soil becomes more acid.

The dune is changing all the time. During storms the embryo dune either washes down or after renews, or later becomes the white dune. The white dune either has been washed down or renewed, or by time has become the grey dune, the grey dune does not exist forever; if the dune is without sand movements, by time it overgrows and becomes the woody dune. The change and ceaseless development of seacoast habitat, being in interaction with natural factors, should be protected.

If you are interested in finding more information on seacoast, dune, plants, animals, their protection and management, see interesting facts in the home page of LIFE-Nature project "Protection and Management of Coastal Habitat": <http://piekraste.daba.lv>.



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