

Status Report for the Marine Environment of the Sound



The Sound Water Co-operation

A new report from the Sound Water Co-Operation combines environmental data for the Sound region (Öresund region). The conclusions of the report are that the water quality in the Sound region has improved in several areas, but also that the studies have been so dispersed in time and space that the drawing of general conclusions can be difficult.

Authorities in both Sweden and Denmark have co-operated to monitor the state of the aquatic environment over a number of years. “The Status for The Marine Environment of the Sound” is the most recent report from the Sound Water Co-Operation, which combines environmental data and assesses the water quality of the Sound.

Although the water quality in the Sound region has improved in several areas, it still does not fulfil the targets proposed by the Sound Water Co-Operation.

The report combines the results from the measurements in the Sound from recent years with the target proposals, which the Sound Water Co-Operation has formerly published as basis for a debate about the planning processes performed by local authorities.

The report conveys the results with many pictures and in a non-technical language in both Danish and Swedish, and the summaries of each chapter has been translated into English for this version.

The Sound Water Co-Operation is a co-operation between Swedish and Danish authorities in the Sound region. The Co-Operation has been active since 1995 and includes sixteen parties: Counties and local councils. The Sound Water Co-Operation works to achieve a good marine environment through a wide dissemination of information about the conditions in the Sound and to provide a forum for discussions and for exchange of scientific information.



Further information may be obtained at www.oresundsvand.dk or with The Sound Water Co-Operation, c/o The Environmental Protection Agency, City of Copenhagen, Kalvebod Brygge 45, PO Box 259, DK 1705 Copenhagen V. Telephone: (+45) 33 66 58 50.

Summaries of the chapters of the report:

How is the Sound doing?

The Sound contains a rich community of plants and animals, and the water is generally clear and clean. The Sound Water Co-Operation has made proposals for water quality criteria for the Sound. However, when we summarise all measurements from the Sound during the period 1997 till 2001 and compare them with the criteria proposed in *Nye mål for Øresund?* (New Targets for the Sound?), we must conclude, that the Sound does not fulfil the targets. We have come part of the way, but much work remains to be done to secure a good aquatic environment in the Sound.



Photo, Roskilde County.

The Load to the Area of the Sound.

Both Swedish and Danish national targets regulate the load of the nutrients nitrogen and phosphorus to the area of the Sound. The discharges of phosphorous compounds from the industry and from the water purification plants have been grossly reduced during the last 15 – 20 years. The discharges of nitrogen compounds on the other hand have not been reduced in a similar way. This must happen if the coastal waters shall fulfil the targets.

The Flowering Plants of the Sound.

Both the maximum depth to which eelgrass can grow and the depth at which actual populations exist are important, and targets have therefore been proposed. In the northern part of the Sound the eelgrass grows down to a depth of 9 metres, whereas the depth limit is lower in the southern part of the Sound. Only a few areas fulfil the targets to day. Targets for biomass and for shoot density, which are measured in Sweden, have not yet been proposed.

The Large Algae, the Macro Algae.

The number of algal species decreases naturally from more than 30 species per transect in the northern part of the Sound to a little below half this number in the southern part of the Sound. This happens because of the differing salinities of the water. The number of algal species fulfils the target to day. The number of species seems, however, to fall a little during the measuring period, but the decline is mainly due to a loss of annual species. The species composition indicates that a positive development is under way for the algae in the Sound.

The Benthic macro fauna of the Sound.

The character of the benthic macro fauna varies a lot in the Sound. For the coastal parts of the Sound data exist that indicate very affected conditions in 1997 – 2001, while other results indicate unaffected conditions. The development seems to be positive in the Bay of Køge. The development in the open parts of the Sound point to improved environmental conditions in 1997 –1999 for three of the deep sampling stations, while a certain worsening has taken place in the most recent years 2000 and 2001.



Yarrell's blenny; looks a little like an eelpout or a butterfish, but has little "bushes" above the eyes. Photo: Birgit Thorell, Øresundsakvariet.



Common seals with grey seals in the background. The seals leave the water all the year round, but one finds them on land particularly during the breeding season and when they shed their fur. Photo: Jonas Teilmann, NERI, Denmark.

Fishes in the Sound

The Sound has a very rich fish fauna. More than 75 different species of fish have been found. Cod and herring are the best known, but many other interesting species are found.

Marine Mammals in the Sound.

Three seal colonies and several other localities where seals may be seen are found in the Sound. The seal epidemic in 2002, however, reduced the populations. The common seal and the grey seal are the species commonly found in the Sound.

Both harbour porpoises and common dolphins are also found in the Sound and they were observed many times in the area in recent years. Other whale species such as white nose, pilot whale, white whale, narwhal, bottlenose whale, minke whale and fin whale have also been observed in the Sound area.

Organic Environmental Poisons.

The knowledge of organic environmental poisons in the Sound is rather limited. Relatively few substances have been examined, and the data series are often short. Most investigations were undertaken at Helsingborg and at Copenhagen. The conclusion that the environmental targets for the Sound are not fulfilled can, however, already be drawn. Organic tin compounds are for example found in concentrations that are harmful to organisms living in water, and substances, which have been forbidden for a long time such as DDT and PCB, have been detected in various organisms.

Heavy Metals.

The load of heavy metals and their effect on organisms has generally decreased in the Sound region. This is due to improved purification methods and to reduced inputs from the industries. A few studies in Malmö and Helsingborg show, however, that substantial contamination by metals may still occur locally. So severe contamination with organic tin compounds has been found at Höganäs that damage to the hormonal systems of sensitive species may be expected. Very high concentrations of lead, copper and mercury have been found in the harbour areas of Copenhagen. More studies must be undertaken in the harbour areas as well as in the vicinity of harbours in order to establish a picture of the total load by metals in the Sound region.

Nutrients in the Water.

A reduction of the contents of nutrients in the water has taken place in the Sound region during the last 20 years. The contents of phosphorous compounds have been grossly reduced and fulfil the national targets in the Danish plan for the aquatic environment, whilst the contents of nitrogen compounds still remain a problem. The Sound Water Co-Operation has established desirable regional targets, which have been fulfilled for phosphorus, though not for nitrogen.

Plant Plankton in the Sound.

The seasonal variation of the plant plankton has in principle been normal; a unique early winter bloom occurred, however, in 1997, whereupon the spring bloom did not occur. An accumulation of blue green algae occurs from time to another in warm summers. This may cause irritation among people who bathe and swim.

Filamentous Algae.

Filamentous algae are a part of the natural species composition in the sea. The algae cause problems when they occur in large amounts particularly for the bottom dwelling animals and plants, for the fishing industry and for swimmers and other visitors to the beaches.



Filamentous algae on a perennial brown alga (*Fucus serratus*). Photo: Roskilde County.

The Oxygen Conditions in the Sound Area.

The oxygen conditions in the Sound area were good during the most recent 5-year period in the areas with shallow water. No oxygen depletions were measured. Oxygen depletions have, however, been found every year at the deeper stations since 1998.

The Sound area therefore does not fulfil the targets.

During the late summer of 2002, however, the whole northern and central parts of the Sound area were badly hit by the worst oxygen depletion in memory.

Bathing Water in the Sound Area.

The bathing water in the Sound area has generally been of a fine quality in the most recent five-year period. Problems with spillages from the sewers have only occurred in a few years and at few locations. Blooms of toxic blue green algae occurred in 1997 and in 2001 and bathing could not be advised in certain areas.

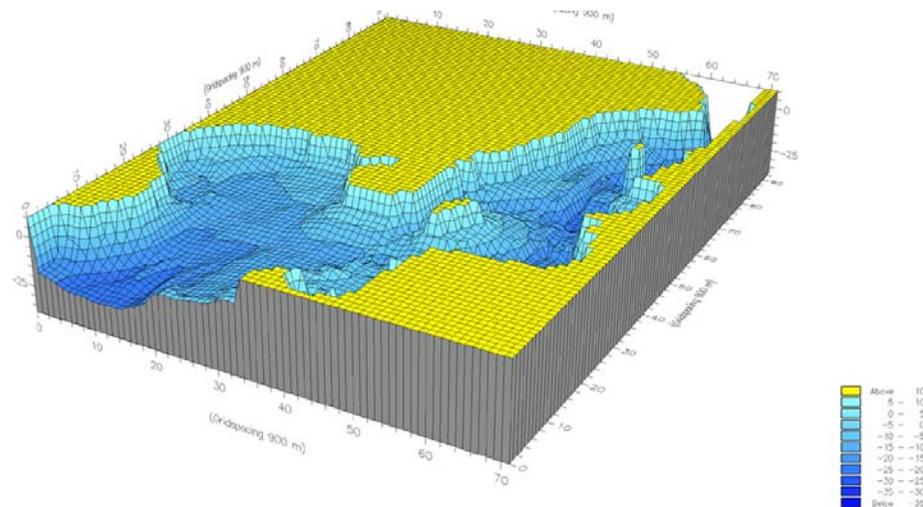


Photo: The Environmental Protection Agency, City of Copenhagen.

Model Development and Model Results.

The purpose of the model established by the Sound Water Co-operation is to assess the effect to be expected, if various coastal discharges are changed and if the amounts of nutrients in the water coming from the Baltic Sea and from the Kattegatt are changed. What is needed to achieve the proposed environmental targets for the Sound?

The conclusion of various model scenarios is that the state of the aquatic environment in the open parts of the Sound is mainly determined by the quality of the water that comes from the Kattegatt and the Baltic Sea, while it can be clearly demonstrated that changes of the nutrient inputs from Denmark and Sweden cause changes in the near shore environment. The model is better at describing the open parts of the Sound. If one wants to model the effect of local improvements, then a refinement of the grid upon which the model is based, is required.