

Intensified agricultural land use in the coastal zone, fishery, increased eutrophication and pollution have modified the communities of plants and animals of the Wadden Sea. The global climatic change and a rising sea level will further influence the Wadden Sea. It is a challenge to make ecological predictions.

Growth rhythms in macroalgae, both diurnal and seasonal, are analysed with regard to an endogenous control by biological clocks and their synchronisation by the day-night pattern and the annual course of daylength. As an application, daylength is manipulated with the goal of improving and controlling the yield of alginates, agar or protein content. Outdoor seawater tanks with temperature and daylength control are used for this purpose of experimental mariculture.



▲ The sea stickleback (*Spinachia spinachia*), a typical fish of the Wadden Sea (photo: B. Hussel, H. Asmus)

Logistics

Laboratories are equipped with instruments for marine chemical analyses, and for the study of pelagic and benthic samples modern optical instruments including a scanning electron microscope are available. Marine organisms are cultivated in temperature- and light-regulated rooms, supplied with running seawater. A library and a lecture room are available for workshops, meetings and classes.

A research catamaran 'Mya' takes out students and scientists into the coastal waters.

Two guest houses offer accommodation for guest scientists, participants of workshops, student classes, as well as for research students during their stay at the Wadden Sea Station Sylt.



▲ 'Mya' (photo: Manthei)

▶ Title: Wadden Sea Station Sylt (photo: Alfred-Wegener-Institut)



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Wadden Sea Station Sylt

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Wadden Sea Station Sylt

The investigation of biological and ecological processes of the coastal region plays a central role in environmental research. The often conflicting measures of coastal protection and engineering, nature conservation, fishery, agriculture and tourism in the coastal zone all influence plant and animal communities. The resulting changes in the coastal ecosystem need a scientific analysis on which a proper coastal zone management should be based.

The main objective of the Wadden Sea Station Sylt is marine ecological research in the Wadden Sea and in adjacent shallow waters. The aim is to investigate important ecological processes, to analyse changes in the coastal ecosystem and to compare these alterations with those in other coastal areas of the world.

The Wadden Sea Station in List on the island of Sylt has been founded in 1924 to study the decline of oyster stocks and to explore means of cultivation. In 1937 the small laboratory for oyster research was expanded to the Wadden Sea Station, an island station of the Biologische Anstalt Helgoland on the northernmost tip of the island of Sylt. This station was transferred to the harbour of List in 1949. Today a complex of modern laboratories is situated here with research facilities for about 30 scientists and technicians. Additional rooms for courses and meetings are available. Since 1998 the Wadden Sea Station is part of the Alfred Wegener Institute for Polar and Marine Research (AWI), situated in Bremerhaven.

The scientific mission of the station is an understanding of the ecological processes in coastal areas, such as the interactions between land and ocean, biodiversity and dynamics of communities, and exchange processes between communities and their environment. Mechanisms of adaptation and regulation in plants and animals are investigated.



▲ Scientists working in the mud flat (photo: B. Hussel)

The experimental cultivation of marine macroalgae is in progress. The investigation of long-term trends in the ecology of the Wadden Sea and the North Sea in concert with a worldwide intercomparison forms the basis for an assessment and prediction of the effects of human impacts on the coastal ecosystem.

Research Programme

Situated at the interface between North Sea and Wadden Sea, this research station is destined for the investigation of exchange of organisms, dissolved and particulate material between the land, the Wadden Sea and the ocean. Import-export balances indicate trends in the ecosystem. The ecological research started in the Sylt-Rømø area as early as in the middle of the 19th century, with the investigation of oyster beds by Karl Möbius. He developed the still valid community concept (biocoenosis). This study together with other historical investigations forms the basis for a comparison with the present-day situation.

The research of the Wadden Sea Station is focused on the ecosystem of the Wadden Sea and the adjacent shallow water area of the North Sea.

A long-term monitoring of physical, chemical and biological parameters has been established in 1975 and continued since then. In this way trend analyses and intercomparisons with other coastal areas are possible. Detailed experiments are conducted to find the causes of changes in the timing and species composition of plankton blooms.

In these shallow and highly dynamic areas, phytoplankton is washed onto the tidal flats and is available for benthic organisms. This is one important feature for the development of rich and diverse benthic communities in the Wadden Sea. In field studies the functioning of different benthic communities as material sinks or sources is investigated. Seagrass beds and mussel banks modify tidal currents, increase particle trapping and stabilize sediments. Effects of the mussel fishery and causes for the present decline of seagrass beds are studied.

Interactions between coastal organisms and their trophic relations such as grazing, detritus feeding, suspension feeding, predation or parasitism are studied intensively. Several exotic species have been introduced into the Wadden Sea and their ecological consequences are evaluated.

