

Origin of Ecological Wadden Sea Research Around Sylt

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The Wadden Sea Station Sylt, since 1998 a part of the Alfred Wegener Institute Foundation for Polar and Marine Research, looks back upon 75 years of biological research in the coastal zone. On 11th of October 1999, the institution celebrated its 75th anniversary. Wim J. Wolff presented a lecture on "The ecology of the Wadden Sea on the occasion of the 75th anniversary of the Wattenmeerstation Sylt". This was the prelude to the international workshop "Intercoast". It was also a reason to remember the early origin of Wadden Sea research around the island of Sylt.

After intensive research on the declining stocks of oysters in 19th century, a laboratory to investigate the local oyster population was founded on the island of Sylt in 1924.

130 years from now, the "Prussian Ministry for agricultural affairs" asked Karl Möbius, professor of zoology at the University of Kiel, to investigate the fiscal oyster beds. The results should help to prevent a collapse of the prospering oyster business. Schleswigsche Oesterlinge – a local name for the Sylt oysters – were very famous at that time. To the service of diplomacy, they were shipped to St. Petersburg to offer them to czarina Katharina II at her birthday banquet. The trade of this expensive delicacy increased particularly as transports by railway became common practice. As a consequence over-exploitation became a serious threat to the oyster population in the North Sea. This called Karl Möbius to the scene and he set a milestone to biological science. Taking the oyster beds of the Sylt area as an example he proposed 1877 a scientific concept of an ecological community. Today the community concept is still an important cornerstone of ecology. This science of the relationship between organisms and their environment was beginning to evolve at that time. With this community concept, the oyster beds of the Sylt area became well known in science. Möbius also defined the still valid principle of sustainable development, which came to a renaissance in our days. He expressed this well with the following sentence: "If the oyster beds were to remain permanently productive for the general benefit of the citizen of a state as well as for the advantage of the inhabitants of the coast, then the extent of oyster fishing should not be determined by the requirements of the consumers and by the prices of oysters, but only by their annual incre-



ment of growth." However, this valuable knowledge was ignored and overexploitation of oysters continued and subsequently the formerly important oyster business came to an end in 1925.

Before this happened, Arthur Hagmeier visited Sylt in summer 1912. As a member of the Biologische Anstalt Helgoland he wrote: "With the kind permission of the director of the Biologische Anstalt Helgoland I devoted a great deal of my vacations to support breeding experiments in the oyster basins on behalf of the oyster fishery enterprise held on lease." Hagmeier noticed that most of the larvae died, since they were unable to settle on sandy bottoms. After a short period of planktonic life, larvae need a firm and clean substratum for settling. In the sandy and muddy Wadden Sea, shells of adult oysters were most suitable for them to start life at the sea floor. However, these shells became limited because oysters were sold including shells. Hagmeier thought that breeding oysters in closed basins could probably prevent high losses of larvae. His effort in breeding oysters was interrupted by the First World War, but in 1924, he succeeded in establishing a laboratory for oyster research and investigations of the Wadden Sea in List on the island of Sylt. Here Germany's "most northerly microscope" was installed and this was the start of a continuous research of the Wadden Sea over the next 75 years.

Some years after the dramatic decrease of oysters in the Wadden Sea a new fundamental change of the Wadden Sea ecosystem, the loss of subtidal seagrass beds could be observed and recorded by

Fishing of oysters with the oyster dredge on board of the steamboat Gelbster at the Ellenbogenbank in the year 1924.

the new established Wadden Sea station. The botanist Wilhelm Nienburg was a pioneer describing, in 1924, the distribution and zoning of the intertidal plants of Königshafen. He found a dense stock of seagrasses covering nearly the total intertidal area and he mapped a dense subtidal seagrass bed of an area of nearly 80 ha, 1-2 m below the low-tide line. When in 1930 the first observations of a parasitic slime mould, presumably introduced from the American Atlantic coast, were reported from the English channel, Erich Wohlenberg started his investigation of this subtidal seagrass bed. In 1932, this seagrass bed was intact and healthy, but in 1933, it was infected with the so-called wasting disease, and the plants died within the course of one year. The leaves were lost, and subsequently waves and currents could affect the bottom of the meadow. The dense web of roots and rhizomes was exposed to the hydrodynamic forces and the sediment was eroded to a large extent. After this mass mortality of plants, 40 000m³ sand were flushed from the former seagrass bed. Erosion continues until now and a recovering of the subtidal eelgrass stock has not occurred.

These investigations around the island of Sylt are some of the earliest scientific reports of the Wadden Sea ecosystem. Today they are the baseline for the documentation of the far reaching changes in this part of the coast. Not only oyster and eelgrass suffered, also the soft coral "dead men's fingers" (*Alcyonium digitatum*), the small sea anemone (*Sagartiogeton undatus*) and the small sea urchin (*Psammechinus vulgaris*) are rare

or extinct in our days.

During the last 75 years, research in the Wadden Sea revealed by an array of dramatic examples that ecological disasters have irreversible consequences, thus it is necessary to keep a sharp eye on this variable ecosystem. Research of biological and ecological processes in the coastal zone is today a central part of environmental research. In the coastal zone, different and controversial interests such as coastal protection, nature conservation, fishery, agriculture and tourism encounter and questions arise concerning the stress tolerance of the communities. These questions can only be answered by the use of well-aimed scientific investigations. However, if coastal research is shifting too much to applied sciences, there is a serious danger that basic research disappears from our sight. The understanding of the coastal ecosystem can only be amplified and improved by regarding and synthesising new inputs of basic research, whereas the specific knowledge how to prevent environmental problems needs this fundamental understanding. The Wadden Sea Station Sylt attains an important function to continue in basic research, to investigate the fundamental ecological processes, to observe the coastal ecosystem of the North Sea and to compare this with other coastal regions around the world.

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