

Dune Slack Vegetation

Petersen, J., 1999. Die Dünenalvegetation der Wattenmeer-Inseln in der südlichen Nordsee. Eine pflanzensoziologische und ökologische Vergleichsuntersuchung unter Berücksichtigung von Nutzung und Naturschutz. Husum Druck- und Verlagsgesellschaft, Husum, pp. 205, 78.00 DM

The dunes on the Wadden Sea islands from Texel to Fanø have been investigated during 1994–1999 with respect to the ecology and phytosociology of the dune-slack vegetation, which is the most endangered one of coastal vegetations. On the basis of the results of these investigations, the prob-

lems of nature conservation and management of the dune-slack ecosystems are addressed at both local levels and within the overall Wadden Sea region. For example, recent data is compared with historical time series as recorded from Terschelling in the period 1937 – 1947 and historical forms of land use and their influence on the dune slack vegetations is discussed. In order to preserve the plant communities of moist dune slacks and their biodiversity, a combination of active and passive conservation measures is recommended.

Conferences and Meetings

ECSA-Workshop on Community Ecology of Soft Bottom Mussel Beds

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An international workshop on the ecology of mussel beds with 42 participants from 6 nations was held at the Wadden Sea Station Sylt of the Alfred Wegener Institute for Polar and Marine Research from August 2 to 6. This workshop focussed on the ecology of soft bottom mussel bed communities, which are typical elements of the Wadden Sea ecosystem and the intertidal sandy and muddy shores of the North Sea coasts and their estuaries. The objectives were to update the state of current research by exchanging experience between different "mussel bed ecologists" and to point out the demand of research issues for the future. We aimed at focussing mainly on basic research and discussed advanced aspects or conflicts between mussel bed ecology and fishery only marginally.

To introduce the workshop guests to the local situation, K. Reise and H. Asmus gave an overview on the ecology of mussel beds near the island of Sylt. They showed that mussel beds provide a unique habitat at sedimentary coasts, and they surpass by far their surroundings in terms of species richness, biomass, productivity, trophic transfer and material cycling. Even at the comparatively small spatial scale like that of the Wadden Sea around Sylt, mussels are highly variable and complex in biogenic structure, species composition and species interactions. This was also confirmed by M. Tsuchiya (University of the Ryukyus, Nishihara, Okinawa, Ja-

pan) who presented the ecological characteristics of mussel beds of Japan and East Asia showing that mussel beds are also able to accumulate biodeposits on exposed rocky shores and create a special environment. He further led the attention to the associated fauna causing a higher biodiversity in mussel beds compared to the ambient areas.

The habitat requirements of blue mussels in the Dutch Wadden Sea were described by B. Brinkman (Alterra, Texel, NL). Mussel beds in the 90s showed high preferences for regions with low wave action and moderate flow velocities as well as immersion times less than 50%. Mussel beds are very susceptible to wave disturbance, and thus an increasing storminess will limit mussel bed distribution in sedimentary environments.

On the other hand, mussels affect their ambient physical environment. This was demonstrated by studies with a laboratory flume by L. van Duren et al (NIOO-CEMO, Yerseke, NL). The filtration activity of mussels has modifying effects on the benthic boundary layer structure. Mussel beds create a microturbulent layer beneficial for food retention. This could also be shown by flume studies by J. Widows (Plymouth Marine Laboratory, UK) who demonstrated additionally that mussel beds accumulate and stabilize sediments at high densities, while low densities and disrupted mussel layers may enhance erosion.

Although larval supply is variable, it is rarely a limiting factor in mussel recruitment. However, larval supply seems to be dependent on parental stocks, as a study by C.P. Günther (AWI, Bremerhaven) on larval abundance of mytilid larvae at different places of the boreal east Atlantic (Wadden Sea to the White Sea) showed.

Recent phases of mussel bed declines in the North Sea may have been caused by a combination of overexploitation and natural disturbances. In the Dutch Wadden Sea, A.C. Smaal (RIVO, Shellfish Research Centre, Yerseke, NL) explained that the large dynamics are owed to variability in recruitment success, climate-induced mortality, predation and fishery. Subtidal stocks of wild mussels show great annual variability, and have decreased since 1990 as well. Subtidal stocks of culture plots are more stable. Especially at the Lower Saxony coast, the development of mussel stocks declined to critical values, presented by H. Michaelis (Landesamt für Ökologie, Forschungsstelle, Norderney, DE). G. Nehls (National Park Office, Wadden Sea Schleswig-Holstein, DE) reported that in the Wadden Sea of Schleswig-Holstein, mussel beds covered an area of 1000ha in 1999, which is about one third of the value found ten years ago. He discussed the development of the mussel stock in relation to recent history, the impact of storms, ice and fishery.

Different types of mussel beds exist at sedimentary shores. In some regions, natural mussel beds are able to persist continuously over several decades, while in others bare flats and mussel beds may alternate in the course of time. Mussel beds reveal cycles of disappearance and recurrence preferring distinct locations on intertidal flats. Mussel bed layers could be found buried in the sediment. G. Hertweck (Senckenberg Institute, Wilhelmshaven, DE) and G. Liebezeit (Terramare Research Center, Wilhelmshaven, DE) suggested a period of 30 to 35 years for forming those mussel bed layers. The absence of old mussel beds, indicated by bare sediment structures is due to deep sediment reworking or by ice rafting. The occurrence of mussel bed layers buried in sediments may also be an indication of a longer period of mild winters.

Mussel bed communities provide suitable substrates for sessile epibionts and a rich associated fauna. The costs and benefits of such communities were investigated by C. Buschbaum (AWI, Wadden Sea Station Sylt), who measured a 2-fold higher reproductive output of barnacles growing on living mussels to those which are attached to empty shells. Additionally his field experiments showed that barnacles may enhance the recruitment success of

Mytilus edulis. A comparison between hard bottom mussel beds and soft bottom mussel beds was presented by M. Thiel and N. Ulrich (Univ. Católica del Norte, Coquimbo, Chile and IFM Kiel, DE). Based on their investigations they formulated the hypothesis that mussels on hard bottoms primarily provide substrate for the accompanying fauna, while mussels on soft bottoms provide both substrate and food resources.

B. Saier (AWI, Wadden Sea Station Sylt) showed that the low tide line separates mussel beds into two distinct zones, which differ in structure and function. Especially predation by juvenile starfish is high in subtidal areas and therefore escape from predation is rare during the first months in a mussel's life.

Some presentations focussed on fishery aspects of mussel ecology. Mussel fishery changes the physical structure and complexity of the seabed and has a strong impact on coastal ecosystems, where mussels are the dominant component. This was exhibited by P. Dolmer and R. Frandsen (Danish Institute for Fisheries Research, Charlottenlund Castle, DK) for the Limfjorden.

U. Walter (Terramare Research Center, Wilhelmshaven, DE) showed that the seeding density of mussels on culture plots is one important factor determining somatic growth of *M. edulis* and controlling the yield of subtidal mussel cultures. Intertidal mussel beds have decimated since 1988 with incidental large scale spatfall in 1994 and 1999. During the poster session, the technique of long-line mussel culturing was demonstrated by D. Bryant (King's Lynn Fishing Industry Co-operative, Norfolk, UK). This could be an important step towards a sustainable mussel fishery, in that exploiting seed mussels from wild beds and use of large areas of sea bottoms for culture plots could be reduced, especially if this technique is approached off shore. Also other poster presentations showed the environmental impacts and sustainability of mussel cultivation (H. Beadman, University of Wales, Bangor, UK).

Other poster presentations revealed topics from community ecology of mussel beds and species diversity (B. Aspden, University of Plymouth, UK), and sediment deposition (M. Browne, University of Plymouth, UK) to methods of stock assessment (D. den Os, RIVO, Shellfish Research Centre, Yerseke, NL), from settlement of bivalve larvae in relation to flow (I. Hendricks, NIOO-CEMO, Yerseke, NL) to investigations of the valve movement behavior of mussels in a special laboratory device (J. Wolf & H.

Leuchs, Bundesanstalt für Gewässerkunde, Koblenz DE).

A. Wehrmann (Senckenberg Institute, Wilhelmshaven, DE) emphasized in the last oral presentation of the workshop that no common definition exists as what constitutes a mussel bed. He showed that soft bottom mussel beds often consist of an aggregation of two species, *Mytilus edulis* and *Cerastoderma edule*, and that this should be considered in the future.

Additional aspects of mussel bed ecology were touched in discussions. One point was substrate availability: Suitable substrates for attachment are rare outside established mussel beds at sedimentary coasts. Sustainable use of mussel resources should attempt to maintain, restore or provide suitable substrates for juvenile attachment. Another point was the present mussel fishery, which should be open to some modifications due to the ecological characteristics of the mussels and the expected climatic changes. The provision of an off-bottom refuge for juvenile mussels from benthic predators will increase the efficient use of mussel resources and will help avoiding destructive fishery on natural beds of seed mussels. Expected climate changes

with more mild winters and increasing storminess may require the mussel fishery to turn more to off-bottom spat collection. At coasts with mussel beds on intertidal flats, the role of the subtidal populations and drifting mussel aggregates needs further research. The importance of introduced species for the development of the mussel beds should also be a future research issue. At North Sea shores, the introduced Japanese oyster is advancing and capable of displacing mussel beds.

Mussel beds are biotic structures with a high potential to modify and control ecological relevant processes in the ambient ecosystem. Changing these structures by man will have consequences on the total ecosystem, especially on the material cycling, energy flow, species diversity, species interactions, trophic interactions as well as sediment stability and hydrodynamics.

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International Oil Spill 2000

Oil and Hydrocarbon Spills, Modelling, Analysis and Control

2nd International Conference, September 18 - 22, 2000, Gran Canaria, Spain

The occurrence of large oil spills and the subsequent impact on the environment, such as despoiled coasts, oiled birds as well as economic loss from ruined fisheries, has created a growing concern about necessary prevention measures. The Wessex Institute of Technology, Southampton, UK in cooperation with the University of Las Palmas de Gran Canaria, Spain, organized the second conference on Oil and Hydrocarbon Spills to help closing the gap between theoretical developments and practical applications in different topics.

The development of adequate oil spill contingency plans, to ensure that when oil spills do occur they can be dealt with effectively, requires information about a large number of physical, chemical and biologically complex phenomena. Consequently, research results on oil spill modeling, prevention and mitigation methods are an essential tool for engineers and managers involved in contingency planning. At the Oil spill 2000 conference, recent

research aspects in different topics such as oil spill modeling, prevention, behavior, biological impact, control, oil spill detection, oil analysis and cleanup techniques were presented in 28 papers. The conference gathered about 40 researchers, engineers and managers from about 20 countries from all over the world to discuss the state-of-the-art techniques to model, prevent and control oils spills on land and in water bodies.

The proceedings of the conference are published in book form by WIT Press and are available throughout the international book trade:

Rodriguez, G.R. & C.A. Brebbia (eds), 2000. Oil and Hydrocarbon Spills II, Modelling Analysis and Control. Second International Conference Oil Spill 2000, WITPress Southampton, Boston, ISBN: 1-85312-828-7, 246 pp.

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Mortality of Eider Ducks in the Wadden Sea in 1999 - 2000

Available and planned Information and Publications

In the winter 1999/2000, an extraordinary mass mortality of Eider Ducks occurred mainly in the southwestern parts of the Wadden Sea. In the Dutch Wadden Sea, in total about 7,271 dead Eiders were found between November 1999 and June 2000. The mortality in Germany was three (in Schleswig-Holstein) to four and a half times (in Lower Saxony) higher than normal, however, the total numbers are with close to 3,000 Eiders between June 1999 and May 2000 far below the numbers of the Netherlands. In the Danish part of the Wadden Sea, the mortality rate of Eider Ducks was not increased in the winter 1999/2000.

Two expert meetings on Eider mortality took place in the Netherlands to collect all information and results of studies and to discuss the causes of the mass mortality. The first workshop was held at the Netherlands Institute for Sea Research (NIOZ) on Texel on 20 April 2000, and the second one was organized by the Ministry of Agriculture, Nature Management and Fishery in Den Haag on 27th July 2000. In August 2000, a governmental report on all findings compiled by the Expertisecentrum LNV was published as Werkdocument IKC Natuurbeheer No. 186.

On the basis of that, the Dutch state secretary of Nature Management formulated the management implications. Some papers on the Eider mortality for publication in scientific journals are being prepared.

On the occasion of the 10th International Scientific Wadden Sea Symposium in Groningen a workshop on the Eider mortality is planned to be organized by the Dutch Wadden Sea Society on 30.10.2000 (contact: Anky Woudstra, e-mail: woudstra@waddenvereniging.nl).

To give an overview on the Eider mortality to all interested persons in the three Wadden Sea states on what are the relevant scientific findings, possible and proved causes as well as the consequences in view of management the publication of a WSNL special issue on the Common Eider epizootic is planned. According to the current planning, the WSNL special issue will be presented at the end of 2000.

Reference

van den Berk, V.M., S. Dirksen & M.J.M. Poot, 2000. Sterfte onder eidereenden in de Waddenzee 1999 - 2000, een zoektocht naar de oorzaak van massale sterfte van eidereenden in de Waddenzee. Werkdocument EC-LNV nr. 186, Wageningen 2000, Expertisecentrum LNV, Ministerie van Landbouw, Natuurbeheer en Visserij, 71pp.

The governmental report (only in Dutch) can be ordered at the:

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