

The Wadden Sea and Climate Change

Trilateral Conference on the Occasion of the 20th Anniversary of the Common Wadden Sea Secretariat (CWSS) Wilhelmshaven, 30 August 2007

Folkert de Jong, Common Wadden Sea Secretariat, Wilhelmshaven

The conference

The aims of the conference were to discuss impacts of global climate change on the Wadden Sea and the Wadden Sea region and to elaborate possible adaptation strategies.

The Conference was attended by some 120 representatives from science, the administration and user groups. The Conference was opened by the Parliamentary State Secretary at the Federal Ministry of Environment, Nature Protection and Nuclear Safety, Astrid Klug. Welcoming words were addressed by Hans-Heinrich Sander, Environment Minister of Lower Saxony, and Eberhard Menzel, Mayor of Wilhelmshaven.

State secretary Klug emphasised that already in an early stage of the trilateral cooperation the importance of the impacts of climate change on the Wadden Sea had been recognised. "The effects of climate change may become visible in a rising sea level, increasing frequency and intensity of storms and a changing ecosystem." Klug said. Minister Sander very much welcomed that the three Wadden Sea states have jointly taken up this very important theme. "Global climate change does not stop at state borders and the impacts can be established very rapidly along the coast."

Sea level rise and sedimentation

One of the main themes of the conference was the question, to what extent the Wadden Sea is able to compensate the expected sea level rise through natural sedimentation.

Professor Burghard Flemming from the Senckenberg Research Institute pointed out that changes in the sediment balance have already occurred along the whole coastline. Global warming and the expected sea-level rise going along with it will, in many parts of the Wadden Sea, result in increased beach erosion, a further loss of fine-grained sediments (and its fauna), and a concomitant loss of salt marshes. From an environmental point of view, the response of the Wadden Sea to an acceleration in sea-level rise should be as little as possible interfered with. Counter measures such as beach nourishment will only have a lasting effect if new sediment from external sources is added to improve the sediment budget. Pumping sediment from one location to another along the coast

may cause temporary relieve but will not improve the situation in the long run. More attention should be given to the creation or remediation of coastal wetlands and small tidal basins on the landward side of the dikes, the "inlets" of which should ideally be controlled adjustable surge barriers.

Professor Morten Pejrup from the University of Copenhagen concluded that an accelerated sea level rise will only "drown" the Wadden Sea tidal flats if the sea level rises faster than the sediment accumulates on the Wadden Sea inter-tidal flats. At the same time, accommodation space for sedimentation increases because salt marsh areas will be inundated, and consequently more sediment will deposit in the Wadden Sea system as a whole. It is possible that the main threat against the Wadden Sea ecosystem in the future will be the dikes. Because the dikes are fixed in their position they will not allow new accommodation space when the sea level rises.

Dr. Albert Oost from the Dutch National Institute for Coastal and Marine Management, (RIKZ):

For parts of a coastal area sufficient sediment supply can be reached by allowing transport by wind or water of sediments in that specific area. Currently, as part of a large restoration plan for the Dutch Wadden Sea measures are developed to increase in such a way the resilience of the barrier islands. There, large parts were dyked by artificial dune rows at the North Sea side and/or sea-dykes at the Wadden Sea side. It is expected that removal of the dykes and increasing sediment transport also results in the re-establishment of the pioneer vegetations and their faunas, characteristic for the coastal environments of the Wadden Sea barrier islands.

New requirements to coastal protection

A second focal point of the conference was the question whether the current coastal protection practice can sufficiently cope with the expected sea level rise and a possible increase in frequency and intensity of storms.

Dr. Jacobus Hofstede from the Schleswig Holstein Ministry of Agriculture, Environment and Rural Areas: In the long-term, with strong SLR (>1 m) and/or higher storm surges, a situation may evolve where traditional coastal flood defence and protection measures become, at least financially, less feasible. Apart from innovative technical solutions, alternative instruments like spatial planning and risk communication may gain more importance. Hence, as one policy response to climate change, a more holistic coastal risk management approach is needed. Integrated coastal risk management considers, in a cyclic manner, the following aspects: prevention, protection, preparedness, emergency response, recovery and review.

Professor Karsten Reise (Alfred-Wegener Institute, Sylt) recommended to adjust the Wadden Sea

to rising levels of the sea with nourishments of sand. The required sand should be extracted from offshore sites in the North Sea and transported to sediment deficient inshore locations inside the Wadden Sea. This sand should be explicitly used to diversify shoreline configurations in the form of sand bars, sandy hooks and dunes, serving coastal protection as well as biodiversity.

The historical truncation of the habitat spectrum of the Wadden Sea at the landward side has particularly diminished the brackish estuarine transitions. This is exacerbated by the conversion of estuaries into ever deeper shipping canals in order to accommodate ever larger vessels. A possible solution for estuarine restoration and adaptation to sea level rise could be a floating harbour central to several ports of the North Sea, to transfer cargo from large to small vessels or into pipeline connections to the mainland.

Impacts on the Ecosystem

The third main theme of the conference concerned the impacts of climate change on the Wadden Sea Ecosystem.

Professor Reise stated that rapid climate change constitutes a crisis for natural biota. In the Wadden Sea, the most critical zone is at the landward side of the habitat spectrum. Large episodic flood plains have been converted into arable land or freshwater sites. Sequences of shoreline habitats have become replaced by monotonous seawalls. Dunes have become fixed and are losing their characteristic vegetation. With the expected acceleration in sea level rise, transitional habitats of the upper intertidal and supratidal zones may become squeezed out in front of solid coastal defences.

At coasts, survival by adaptation has been most successful in environments rich in gradients and mosaics of habitats. Management should aim to restore original habitat sizes and structural diversity.

Dr. Katja Philippart and Dr. Eric Epping from the Royal Netherlands Institute for Sea Research (NIOZ), Texel: Effects of climate change on the Wadden Sea ecosystem will not only be due to changes in water temperatures and sea level, but also to alterations in rainfall, wind and carbon dioxide levels. Changes in these environmental factors will result in shifts in habitats and species, and in their interactions. This may subsequently impact on ecosystem functioning aspects such as nutrient recycling, primary production, and food web structure, setting new limits to conservation measures and exploitation rates.

Discussion

The plenary discussion, moderated by Prof. Franciscus Colijn of the GKSS research institute, focused on the following questions:

1. Can the Wadden Sea compensate (accelerated) sea level rise;
2. Can we predict changes in the ecosystem;
3. Are adaptations to current coastal protection practices needed.

Re. 1. There were quite different assessments of the ability of the Wadden Sea system to cope with sea level rise, ranging from the more pessimistic view that erosion would certainly affect the islands and the salt marshes, to more optimistic views that the system is robust enough to cope with a sea level rise of up to 40–50 cm until 2100. The latter range is well within the latest IPCC prognosis. It was acknowledged, however, that there are substantial differences between the different tidal basins, which are not clearly understood.

Re. 2. The impacts on the ecosystem are so diverse and manifold that predictions of the expected direction were not considered possible. It was therefore advised to make nature protection and conservation policies and management more flexible, so that adaptation to rapid changes is possible. To this end it was also considered necessary to have a more intensive contact with relevant scientists and to adapt monitoring programmes accordingly.

It was furthermore advised to increase the ability of the ecosystem to cope with changes. To this end, the natural habitat diversity, especially along the mainland coast and on the islands, should be increased.

Re. 3. Although current coastal defence practices can easily deal with the anticipated sea level rise and increase in storminess, several additional and/or alternative practices were proposed and discussed.

Sand suppletion was considered a good method to increase the sediment buffer of the Wadden Sea system. Important questions to be answered are the amounts of sand needed, the suppletion location and impacts on the ecosystem.

Presentations

The conference presentations are available at www.waddensea-secretariat.org