Lower Saxony water Management, Coastal Protection
and Nature Conservation Agency

**POLICY BRIEF**

# BUILDING WITH NATURE: A KEY ELEMENT FOR COASTAL PROTECTION OF SANDY COASTS IN LOWER SAXONY – GERMANY

## Executive Summary

In the German Federal State Lower Saxony, nature based coastal protection measures are an essential element of sustainable risk management for sandy coasts. Besides nourishment of beaches and foreshores, bio-engineering measures are regulary carried out. Coastal protection is based on a clearly defined legal framework and is a statutory task of the Federal State.

Due to the many morphodynamic processes and interactions, the morphodynamic boundary conditions are very complex and vary locally and temporally. The respective legal, spatial planning and social frameworks are also of great importance for the implementation of Building with Nature (BwN) measures.

A joint further development of the system and process understanding as well as the optimisation of suitable BwN measures in the context of the North Sea riparian states. This is also of great and increasing importance in view of the consequences of climate change. In this context, securing the necessary natural resource of sand by means of spatial planning will be of great importance.

## Scope of the Problem

Off the mainland coast of Lower Saxony, the East Frisian Islands are located as sandy barrier islands.

Their economic importance as important tourism locations in Lower Saxony and their nature conservation value require long-term and sustainable planning for the implementation of necessary coastal protection measures.

On the northern sides of the East Frisian Islands, the marginal dunes form a legally defined element which protects the settlement areas against storm surges and secures the existence of the islands. An essential task of risk management in coastal protection is to guarantee the permanent function of the dunes as coastal protection elements. The coastal protection dunes usually only have widths of a few hundred metres. A permanent assurance of the function of the dunes within a designated area is a public task of the State of Lower Saxony. The East Frisian Islands also form an important component of coastal protection for the mainland coast of Lower Saxony because, as part of the coastal protection system, they reduce the sea state load on the mainland coast.

Due to their location, the coastal protection dunes are particularly exposed to the dynamic forces of nature and, together with the offshore foreshores and beaches as well as the sea gates, form a very dynamic morphological system. Caused by the forces of tidal currents and sea states as well as individual events such as storm surges with high water levels and sea states, these areas are subject to permanent, very complex changes. These take place on a large and small scale and also in very different time periods.

For this reason, there is a constant need for precautionary action to ensure the protective function of the dunes in a sustainable manner. The preferred measures are based on an in-depth morphodynamic analysis of the considered foreshore, beach and dune sections in the context of the overall morphological system. The measures are essentially geared to the respective condition and the morphological development perspective and include aspects of tourism usage claims and conservation aspects of nature conservation at an early stage.

To the extent that measures are required to ensure the coastal protection function of the dunes, near-natural measures such as beach and foreshore nourishments, dune reinforcement and bio-engineering measures are preferred, insofar as they represent the most sustainable solution. Especially in the northwestern areas of some islands, however, massive coastal protection measures are indispensable to ensure the objectives of coastal protection. An addition nature-orientated measures such as beach nourishments are used here too.

One focus is on the conservation of coastal protection dunes whose foreshores and beaches are characterised by long-term sediment deficits. Without the addition of sand flushing to the sediment deficits, massive dune erosions would occur in storm surges, endangering the storm surge safety of the settlement areas. An essential goal in the context of the INTERREG BwN project is to improve analysis methods and process understanding through international cooperation in order to further

optimise the inflow locations and techniques. This will be integrated into an improved understanding of the respective governance structures. It is also important to recognise that the morphological framework conditions in the North Sea context as well as regionally and locally are very different and that the respective BwN solutions must therefore be adapted to these questions.

## Policy alternatives

Securing the protection function of the coastal protection dunes is a legal task for the long-term protection of settlement areas against erosion and flooding. These are embedded in overarching spatial planning objectives. Aspects such as urban development, tourism and nature conservation are integrated into the planning processes. A comparison with existing legal frameworks in other federal states shows that the situation in Lower Saxony forms a sound basis for sustainable risk management, which should be further developed in a demand-oriented manner.

The effects of climate change are expected to lead to increasing pressures and the associated increased erosion tendencies. In addition, sediment deficits can occur in the overall system. In order to achieve the protection goals, the need for sand flushing is likely to increase. Their performance should be further improved in a targeted manner both with regard to the respective coastal section and to the development of the overall system in terms of quantity and as a permanent and probably rising cost factor. From a technical point of view, combined measures could also be a complement. In addition, the importance of extracting and supplying sediment from outside the system is expected to play an increased role in sustainable adaptation strategies. Spatial planning aspects in particular also need to be taken into account here.

## Policy recommendations

- The implementation of BwN measures and in particular the supplementation of sediment deficits is a very important prerequisite for the sustainable development of the coastal area of the sandy North Sea coasts and especially of sandy dune islands.
- In the future, especially against the background of climate change, there are many complex questions to be solved with regard to the understanding of the various small and large scale morphodynamic processes, the design of sand flushing and spatial planning.
- The different historical developments and social conditions in the countries bordering the North Sea require specific approaches.
- The implementation of BwN measures within the framework of coastal protection policies requires a viable legal framework and social acceptance.
- The extraction of sediment outside the system in the coastal forefield requires long-term sustainable strategies and concepts due to expected conflicts of use, which must be secured by spatial planning.
- Further, substantial cooperation at the level of the affected states forms an essential, viable technical basis for the further development of BwN measures.

## Recommended Sources:

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