



## **Spatial planning as an integrative instrument in coastal protection management**

Andreas Jeschke

Institute for Chemistry and Biology of the Marine Environment Oldenburg, Germany

### **Abstract**

Several stretches of dikes in Lower Saxony are not high enough and have to be strengthened. Additional coastal protection activities will be necessary on account of the rising sea level. As a result, increasing spatial problems will follow because every coastal protection measure needs space and the increasing demand for clay occupies further space too.

The coastal region has a mainly rural structure with an economic focus on farming and tourism. Especially the present land use with residential and industrial areas behind the dikes along the Weser estuary makes it impossible to raise the dikes again and again. Also, due to the nature conservation regulations, the raise of dikes at the seaward side is basically out of the question.

Spatial planning is of great importance because of its integrative nature. It is able to support the control of land use, the reservation of areas and the avoidance of undesirable developments. It will help to gain enough time to launch a social discussion about the future strategy in coastal protection and to evolve regionally adapted solutions.

The development of buffer zones with rear second dike lines combined with adapted land use including farming, tourism and water management is one possible variant and may become a component of a sustainable and reasonable coastal protection strategy in Lower Saxony.

### **1 Spatial structure in the coastal zone of Lower Saxony**

The coastal area of Lower Saxony is a structurally weak region with a focus on grassland farming and tourism. The spatial dominance of agriculture is visible in the actual land use. Despite a low population density, a lot of buildings are located along the dikes and impede land-sided coastal protection measures. A further topographic feature are the tidal rivers Ems, Weser and Elbe with impacts to the hinterland up to 100 km away from the coastline. Their tidal range has increased because of human interferences from 0.5 m up to 4 m during the last century.

Additionally to several inland areas, the seaward sided polder areas are part of different conservation areas like the National Park "Niedersächsisches Wattenmeer", Special Protection Areas under the EU Birds Directive and Special Areas of Conservation under the EU Habitats Directive. Several other valuable areas for breeding and resting birds are situated along the whole coast.

The sectoral and spatial links between the relevant authorities are poor developed at the different administrative levels. Therefore, spatial planning is the most integrative approach in managing the spatial development of the coastal zone. Spatial planning for the inland areas in Lower Saxony focuses on agriculture and tourism whereas reserved areas for nature conservation lay at the seaward sided areas.

Many coastal counties (Landkreise) in Lower Saxony have no valid Regional Planning Programme (Regionales Raumordnungsprogramm), so that a planning gap appears between the Federal State Planning Programme (Landes-Raumordnungsprogramm) and the Land Use Plans (Flächennutzungspläne) of the communities. Special areas for coastal protection are not reserved in the spatial planning programmes, only general statements can be detected. However, the draft of the spatial con-

cept for the coastal waters of Lower Saxony (Raumordnungskonzept für das niedersächsische Küstenmeer) contains some concrete rules of coastal protection subjects.

Different spatial regulations and plans compete in the coastal zone. Additional spatial demands will arise through planned projects like the Jade-Weser-Port in Wilhelmshaven and the autobahn A22 with the need for compensation areas.

## **2 Problems in coastal protection planning**

At present, the coastal protection in Lower Saxony is on a high level although 22 % of the main dike line need to be strengthened. The dike boards as self-governing public corporations have the main responsibility for improvement and maintenance of the coastal protection system in Lower Saxony. Their long tradition gives the dike boards a strong regional lobby and great social power. They are responsible for the coastal protection system with the main dike, the foreland and the second dike line which exists for 23 % of the main dike line.

Improving measures at the main dikes lead to spatial conflicts. Often, there is little space in built-up areas and the raise of dikes at the seaward side has to be rejected for reasons of nature conservation. Missing social consensus concerning the implications of ecological aspects, increasing costs in combination with decreasing funds, an accumulation of values in built-up areas and limited resources of clay and sand are further problems of coastal protection measures. Technical limits in dike raising occur especially along the tidal rivers.

Coastal protection is of high importance for the life and the economy on the coast of Lower Saxony. Since the first protection measures, the strategy of coastal protection has been adapted during the last 1,000 years to the changing general set-up and the societal demands. During the last decades, ecology has become an aim of society and as a result an important parameter of planning. This leads to spatial conflicts as coastal protection and ecology partly require the same areas. Additionally, the forecasted increasing sea-level rise of 0.5 m per century has to be considered. Spatial problems will grow because the necessary increased efforts in coastal protection will demand further areas.

## **3 Results**

A discussion about a new adjustment of the coastal protection strategy in Lower Saxony is necessary. The actual master planning provides for coastal defence on the existing dike line. Managed retreat, staggered systems and/or settlement limitations with a shift from dike line to dike zone fixing might be other forms of coastal defence measures beside the rising of dikes. A flexible, sustainable and payable strategy should be the aim; safety aspects, economy and ecology should be regarded.

One essential feature of a future-oriented coastal protection strategy is the risk management. The damage potential and the probability of failure are parameters to determine risk potentials and to define priority areas. Risk analysis can be used to gain the acceptance of the inhabitants and the stakeholders in the run-up to planning.

Spatial planning is of great importance during the planning of the coastal area. It is of integrating nature and able to support the control of land use, the reservation and development of areas for coastal protection measures. It helps to avoid undesirable developments in endangered zones.

Clay deposits have to be examined as well as secured and concepts for a follow-up use have to be developed. Moreover, areas for further spatial coastal protection measures should be reserved. The installation of buffer zones with rear second dike lines can be a variant for a flexible coastal protection strategy according to the local and spatial reality. Combinations of land uses like farming and nature conservation may be one way to future accepted forms of multiple land use, for example as counter-vailing and compensation areas. Also different, flood compatible types of land use such as clay depot, water reservoir, recreation area, fish farming and/or natural area are conceivable. In any case, a regionally adapted multiple land use has to be pursued.

## 4 Discussion

Because of similar problems and objectives, the adaption of planning schemes for inland high water such as the fixing of flood areas, the reduction of damage potentials and other protection measures may lead to sustainable solutions.

In any case, the interests, the perception and the acceptance of the local stakeholders and inhabitants as well as the tradition and historical development of living in the coastal zone are key elements in the process of information and participation. It is necessary to raise the public awareness and to realise and assess the increasing risks due to the increasing sea-level rise. The inclusion of the dike boards is very important because of the great esteem and confidence of the inhabitants. Advanced civil participation can be enabled and promoted through strategic environmental assessments which will be part of any spatial planning in the future.

Aspects of Integrated Coastal Zone Management (ICZM) should be considered in the planning of a new coastal protection management in Lower Saxony. A comprehensive and long-termed approach, participatory planning, combination and flexible use of different instruments with regard to natural processes as well as flexible and multileveled management methods according to the principles of ICZM should be applied. Central aims are:

- Broad consultation of all relevant stakeholders
- Consideration of interests, look for alternatives
- Involvement of the inhabitants
- Comprehensive planning
- Economic benefits and nature conservation as an advantageous combination
- Regional adapted solutions
- Development of win-win-solutions with profit for all parties.

## References

- Adriaanse, L., Koehorst, B. & Stroeve, F.M. (2003): Dijk met Bereik. Samenvatting van het Pilotplan. Rijkswaterstaat, Nederland
- Bezirksregierung Weser-Ems (1997): Generalplan Küstenschutz für den Regierungsbezirk Weser-Ems
- Bezirksregierung Weser-Ems (2003): Raumordnungskonzept für das niedersächsische Küstenmeer (ROKK). Unveröffentlichter Entwurf, Stand: 28.05.2003
- Hofstede, J. & Probst, B. (2002): Integriertes Küstenschutzmanagement in Schleswig-Holstein. [http://www.eucc-d.de/pdf/sh\\_kuestenschutz\\_plan.pdf](http://www.eucc-d.de/pdf/sh_kuestenschutz_plan.pdf)
- Kannen, A. (2000): Analyse ausgewählter Ansätze und Instrumente zu Integriertem Küstenzonenmanagement und deren Bewertung. Dissertation an der Christian-Albrechts-Universität zu Kiel
- Kunz, H. (1994): Aufgaben und Strategien des Küstenschutzes. Niedersächsisches Landesamt für Ökologie – Forschungsstelle Küste
- Kunz, H. (1996): Bisheriger und zukünftiger Küstenschutz im Kontext eines integrierten Küstengebiet-Managements - Beispiele aus dem Weser-Ems-Raum. Vechtaer Studien zur Angewandten Geographie und Regionalwissenschaft, Band 18
- MI S-H (2003): Integriertes Küstenzonenmanagement in Schleswig-Holstein. Innenministerium des Landes Schleswig-Holstein
- MLR S-H (2001): Generalplan Küstenschutz Schleswig-Holstein. Ministerium für ländliche Räume, Landesplanung, Landwirtschaft und Tourismus des Landes Schleswig-Holstein
- NWP (2002): Water, Climate and Risk Management. Summary of the Report on the Dutch Dialogue on Water and Climate. Netherlands Water Partnership. [www.waterandclimate.org](http://www.waterandclimate.org)

- Projektgruppe (2000): Projektgruppe „Verbesserung des Verfahrensmanagements im Küstenschutz“. Abschlußbericht Oktober 2000. Niedersächsisches Landesamt für Ökologie
- Schirmer, M. & Schuchardt, B. (2003): Ästuare und Klimawandel. In: Warnsignale aus Nordsee und Wattenmeer, Hrsg.: Lozán et. al., Wissenschaftliche Auswertungen, Hamburg
- WWF (2003): Leitlinien für einen naturverträglichen Küstenschutz. WWF Deutschland

**Address**

Andreas Jeschke  
Institut für Chemie und Biologie des Meeres (ICBM)  
Carl von Ossietzky Universität Oldenburg  
Postfach 2503  
26111 Oldenburg  
Germany

E-mail: [cangjeschke@compuserve.de](mailto:cangjeschke@compuserve.de)