

Handout

Biodiversity basics: Landscapes and natural and cultural heritage

**Block 2 - Understanding Biodiversity: News, Concepts and
New Methods**

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1 The Wadden Sea Landscape

- One of the World's largest tidal habitat, 500 km length, 20 to 40 km width and 15.000 km²
- One of the last widely intact ecological systems in Europe
- None European ecosystem has a higher biological dynamic and species stock
- None European ecosystem occupies more saltwater affected biotopes than the saltmarshes of the Wadden Sea
- None other place of the World accommodates a higher rate of birds per year and surface (10 to 12 million)

1.1 Preconditions and Morphological Genesis

- for the development and persistence of the Wadden Sea system some **preconditions** are necessary:
 - Marine transgression – 0.1 to 0.5 m/century
 - Sufficient fine grained material for sedimentation
 - Tidal currents separate the sediment
 - Sheltered areas behind islands and sand bars
 - Moderate climate with annual average temperature lower 20°C otherwise mangroves

In terms of the **morphological genesis** the North Sea coast is a very young geological structure. It has evolved gradually after the end of the last ice-age under natural conditions influenced by climate and sea. About 20,000 years ago at the height of the last glaciation period the North Sea basin was dry land. The sea level in the North Sea was approximately 130 m lower than today. With the increase of temperature the glaciers melt and filled the ocean basins. Sea level rapidly rises with rates of approximately 2 m per century.

7,500 years ago sea level rise decelerates. Alternating phases of transgression and degression took place. These boundary conditions have shaped the current landscape. Deposits of marine sediments cover the Pleistocene Geest landscape with typical elements of the Wadden Sea landscape:

Intertidal Mudflats: between high and low tide consisting of fine sand, clay and peat

Wet Land: at the height of sea level influenced by brackish water and bogs

Geest: Pleistocene sand and gravel layers located at 2.5 m above sea level

1.2 Human influence

- Beginning of settlement at higher points (beach ridges)
- afterwards building of dwelling mounts
- and dikes or sea walls (11th century)
- The completed and coherent dike line led to a loss of room for retention causing higher water levels at the dikes
- Intensive utilisation of the hinterland causes subsidence of wet areas
- Storm surges were accompanied by extended land losses
- today artificial separation of tidal flats and wet lands by embankments
- Rich textured amphibious transition zone only is squeezed in front of the dike

2 Biodiversity and Conservation

- Geological and hydrological conditions together with human influence create the abiotic framework for in the Wadden Sea ecosystem
- Changing boundary conditions are continuously shaping the characteristic landscape and its habitats
- Those habitats are colonised by a diverse flora and fauna

2.1 Biodiversity of the Wadden Sea

- The Wadden Sea is characterized by high dynamics of tides and morphology, steep gradients of salt and sediment structure and a high permeability for organisms and substances.
- the habitat conditions are characterized by
 - diverse topographic, geologic, physical, and chemical states: and pose a combination of transitional states → characterized by ecotones
 - steep gradients (salt, flooding, sediment) lead to a patched texture of habitats
 - with fast changes in the structure of habitat and micro-habitats
 - This poses immense stress for the organisms:
 - but gets compensated by good food supply and high energetic situation which assist, e.g. migration.
- delivers habitat for large number of species

- 4,800 of the 95,000 species in central Europe exist in the Wadden Sea
- plus 2,500 species of the other habitats (dunes, sand bars, brackish water, estuaries)
- 2,500 aquatic species (sub-, Eulittoral) and 2,300 Supralittoral (saltmarshes)
- Wadden Sea represents 1.8 % of the surface of the North Sea -> species concentration 25 – 30 times larger
- in Saltmarshes species concentration 750 – 900 times larger

2.2 Conservation value

is allocated to several criteria

- Diversity of habitat
- Degree of vulnerability
- Natural characteristic
- Extend of the conservation area
- Ecological sensitivity
- Uniqueness
- Endemism
- Trans-regional significance for other habitats

The Wadden Sea region is protected by several conventions of nature conservation:

Protected Areas in the Wadden Sea Region			
Stage	Convention	Ziele	Umsetzung
International	World heritage Site UNESCO	Linking nature conservation and the preservation of cultural properties	Protection of unique and divers cultural and natural sites
	Biosphere Reserve UNESCO	Linking nature conservation and sustainable development	Reserves with graduated use
	Ramsar-Konvention	Preservation and promotion of wetlands	Reserves with important bird population
EU	FFH-Directive	Conservation of biological diversity, habitat connectivity system	Reserves for species and habitats
	EU Birds Directive	Conservation of wild birds and their habitats	Reserves with important bird population
NL DK, D	Trilateral Wadden Sea protection	Linking use pattern and nature conservation	Organizational structures for research, conservation and utilization
D	Driving scheme	Protection of seals and birds	driving bans
Federal Land	National Park	Conservation of biodiversity and undisturbed natural processes	Reserves with different protection zones

3 Conflicts

- Anthropocentric value allocation is based on the human viability of ecological systems. This reflects the services ecosystem functions can provide. Not the intrinsic value of the ecosystem.
 - Different user perspectives represent claims on those ecosystem functions
 - User perspective is a group of people with comparable claims. Nature Conservation is one important user perspective effecting land use pattern
- Conflicts arise when different user perspectives compete for the use of ecosystem functions

3.1 Potential for conflicts

The potential for conflicts is higher if the value allocation of different user perspectives is concentrated on the same landscape.

3.2 Methods for mitigation

should

- assess the individual assignments
- spatial representation of the results
- stakeholder participation in the search for policy options
- transparency during the process

4 References

4.1 Literature

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4.2 Websites

LANCEWAD - Landscape and Cultural Heritage in the Wadden Sea Region

www.lancewadplan.org

Common Wadden Sea Secretariat

www.waddensea-secretariat.org

National Park Wadden Sea

www.nationalpark-wattenmeer.de

Wadden Sea World Heritage

www.waddensea-worldheritage.org/de

Biodiversity in Europe

ec.europa.eu/environment/nature/biodiversity/intro/index_en.htm