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Spatial modelling of coastal habitats

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It is expected that in the near future changes will take place in the white dunes and beaches as a result of climate change, policy responses to climate changes (more frequent sand nourishments) and increasing recreational pressure. Many beaches and dunes along the Dutch North Sea shores are defined as Natura 2000-areas. Although important parts of the dunes have been mapped, particularly on the Wadden islands, the spatial distribution of important pioneer habitat types of beaches and white dunes is not clear. These habitat types play an important role in natural ('soft') coastal defense mechanisms. In order to protect them, it is important to have a good overview of their present distribution. Here, we propose a method for mapping beach and white dune habitats of the sandy coast of the West Frisian islands.

Objectives:

1. Mapping habitat types, their area and spatial distribution along the sandy coast.
2. Natural succession of habitat types taking into account climate changes, coastal protection measures, and human use of the coast (e.g. tourism)

The main habitat types of importance are:



- Open sea and tidal areas:

1140 Mudflats and sand flats not covered by seawater at low tide

- Atlantic and continental salt marshes and salt meadows:

1310 *Salicornia* and other annuals colonizing mud and sand
1320 *Spartina* swards (*Spartinion maritima*)
1330 Atlantic salt meadows (*Glaucopuccinellietalia maritima*)

- Sea cliffs and shingle or stony beaches

2010 Annual vegetation of drift lines



- Coastal and inland dunes:

2110 Embryonic shifting dunes
2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)
2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)
2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenaria*)



Methods and materials:

1. Process:

- Spatial analysis of:
- DEM (Digital Elevation Model)
 - Digital aerial photographs
- With:
- Remote sensing techniques
 - Spatial analysis tools
 - Additional (visualization) tools

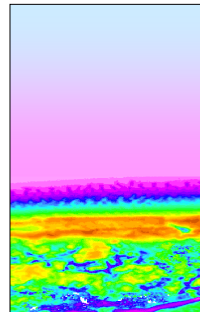
2. Fieldwork for calibration by systematically going along the beaches:

- Localization of habitat types
- Field check
- Species composition of habitat
- Gain knowledge about how to map the habitat digital



Aerial photographs

Year: 2006 & 2008
Type: False colour
Resolution: 50x50 cm & 25x25 cm
Source: Rijkswaterstaat



DEM

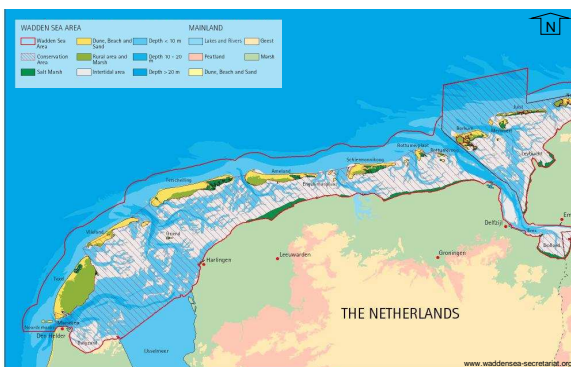
Year: 2006
Spatial resolution: 1 x 1 meter
Source: Rijkswaterstaat

Results:

Digital habitat type map of the West Frisian island shore from the mean low tide level to the white dunes

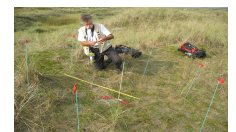


Research area (West Frisian islands)



Linking science with policy

- Insight in ways to enhance Soft Coastal Defence
- Mapping underexposed habitat types (white dunes, beaches, foreshores)
- Towards beach reserves
- Natural and artificial dunes
- Disseminating and popularizing project output
- TMAP, QSR, natural succession in habitat areas



Further information:

Spatial analysis will be carried out by
Geo-Information Centre
Ecological survey will be carried out by
Landscape Centre

Alterra, Wageningen UR