

# Salt marsh data from the 1970s

Kees Dijkema provides habitat maps including GIS data of the Wadden Sea from the 1970s



*Kees Dijkema (standing in the middle with purple coat) and the trilateral salt marsh expert group on Spiekeroog, May 2003.*

From his childhood on Kees Dijkema has been intrigued by the Wadden Sea. During his study at Groningen University he focused on mudflats, benthic diatoms and salt marsh management. His professional career started not only as co-author of the standard book ‘Ecology

of the Wadden Sea’, he furthermore created an overview of all salt marshes in Europe and a habitat map of the Dutch, German and Danish Wadden Sea (including mussel beds and seagrass). Thanks to the knowledge about the ecosystem he gathered in these years (and later), and his experience in the field as wadgids (wadden guide) since he was a teenager, he became an expert on monitoring ecological effects in the Wadden Sea, e.g. the impacts of sea level rise or soil subsidence from gas extraction on Ameland.

Over the years his focus shifted from salt marsh quantity to salt marsh quality. Regarding nature management he is interested in finding practical solutions on the basis of (trilateral) collaboration with the main stakeholders, especially farmers, nature organizations, National Parks, and Rijkswaterstaat, as most important nature managers of Dutch salt marshes. As one of the founding fathers of the vegetation classification program SALT and the TMAP typology of coastal vegetation in the international Wadden Sea, he accomplished an objective interpretation of shifts in vegetation cover and managed to compare trends in vegetation development of salt marshes.



"Kees Dijkema Box" with many historical maps, photos and aerial pictures

So far, his contribution towards the knowledge about the Wadden Sea ecosystem has been enormous already.

## Preparation of the historical maps

The project has been carried out by nature-consult (vegetation: Dr. Jörg Petersen, GIS: H.-P. Dauck) in close cooperation with Kees Dijkema (Alterra) and the Common Wadden Sea Secretariat.

The following working steps were necessary:

1. Data retrieval in cooperation with Kees Dijkema on basis of 42 partial maps (scale 1:100,000; Dijkema & Wolf 1983 and landscape and vegetation maps) as well as original maps and aerial photographs.

These were:

- 1.1. “4 big map sheets, scale 1:100,000”; Landscape and Vegetation Map of the Wadden Sea Islands and Mainland Coastal Areas; K.S. Dijkema, Rijksinstituut voor Natuurbeheer, Texel.
- 1.2. “Map book”; Flora and vegetation of the Wadden Sea islands and coastal areas (Dijkema & Wolf 1983) resp. historical aerial pictures und topographic maps (by K. Dijkema).
- 1.3. “Habitat type maps”; Habitats of the Netherlands, German and Danish Wadden Sea Research Institute for Nature Management, Texel - Veth Foundation, Leiden; 1:100,000.
- 1.4. Additional material delivered by Kees Dijkema
2. Implementation of all data within a GIS project (ArcView) according the trilateral requirements with the working steps of scanning, image editing, geo-referencing and digitalising of maps and historical aerial pictures,
3. Assignment of historic vegetation attributes to the TMAP types on basis of the trilateral TMAP classification of salt marshes and dunes (Wadden Sea Quality Status Report: Bakker et al. 2005 und Petersen & Lammerts 2005),

TMAP_CODE	TMAP_TYPE	VEGETATION	FFH_CODE	Mapcode	Legend	YELLOW DUNE LANDSCAPE
X.3.1	Elymus farctus type	Elymo-Agrophyretum, Horkenyo-Agrophyretum juncei	2110	Aa		Pioneer vegetation on embryonic dunes and nitrophilous vegetation with Elymus farctus (= Agropyron junceum) and Elymus arenarius (see other features)
X.4.1	Ammophila arenaria type	Elymo-Ammophietum, Ammocalamagrostis baltica-veg., Potentillo- Leynetum arenariae (Potentillo-Elynetum)	2120	Aa		Pioneer vegetation with Ammophila arenaria on the coastal dune ridge and on secondary windblown dunes (see other features)
GREY DUNE LANDSCAPE						
X.5.1	Corynephorus canescens type	Viole-Corynephorietum, Corynephoron-veg.	2130	Gc		Lichen steppe with Corynephorus canescens on dry dunes
X.5.2	Koeleria arenaria type	Tortulo-Phleietum, Phleo- Tortuletum, Festuco- Galletum, Aretum praecox, Koelerion-veg.	2130	Gk		Closed grasslands with Agrostis tenuis, Carex arenaria, Festuca tenifolia, Galium serot and various mosses on dry dunes
DUNE HEATH LANDSCAPE						
X.6.1	Empetrum nigrum type	Heracio-Empetretum, Polypodio-Empetretum	2140	He		Heath with Empetrum nigrum on dry and moist decalcified dune areas
X.6.2	Calluna vulgaris type	Heracio-Empetretum - dom. Calluna vulgaris	2150	Hc		Heath with Calluna vulgaris and Empetrum nigrum on dry and moist decalcified dune areas
DUNE SCRUB LANDSCAPE						
X.7.1	Hippophae rhamnoides type	Hippophaeo-Sambucetum nigrae, Salici arenariae- Hippophietum	2160	Bh		Pioneer scrub with Hippophae rhamnoides on young calcareous dunes and in the brackish zone
X.7.1	Hippophae rhamnoides type	Hippophaeo-Sambucetum nigrae, Salici arenariae- Hippophietum	2160	Ba		Scrub with Sambucus nigra, Hippophae rhamnoides (and Crataegus monogyna) on young calcareous dunes
X.7.2	Salix repens agg. type	dry Salix repens agg.-veg., Pyrolo-Salictetum, Rosa spinossissima-Salix arenaria-veg.	2170	Gi		Dwarf shrub vegetation with Salix arenaria on dry dunes
X.7.2	Salix repens agg. type	dry Salix repens agg.-veg., Pyrolo-Salictetum, Rosa spinossissima-Salix arenaria-veg.	2170	Gr		Dwarf shrub vegetation with Rosa pratincola on dry dunes

Overview on the TMAP assignment with historic dune vegetation units

4. Production of GIS shape files with the results of the classification as attribute data and delivery to the trilateral TMAP database
5. Technical revision and adaptation of the GIS data in cooperation with Kees Dijkema
6. Delivery of the map catalogue (PDF and GIS data)

### **Sand dunes and salt marshes 1976; 1:100,000.**

Landscape and vegetation and maps of the Danish, German and Dutch Wadden Sea islands and mainland coastal areas:

Dijkema, K.S. 1983. Landscape and vegetation map of the Wadden Sea islands and mainland coastal areas 1:100 000 1976. In: K.S. Dijkema & W.J. Wolff (eds), Flora and vegetation of the Wadden Sea islands and coastal areas. Balkema, Rotterdam; 4 sheets.

Dijkema, K.S. 1983. Inventory of landscape and vegetation. In: K.S. Dijkema & W.J. Wolff (eds), Flora and vegetation of the Wadden Sea islands and coastal areas. Balkema, Rotterdam; chapter 5.1; 85-116. [Report in zip-file: "1983 Inventory of landscape and vegetation.pdf"](#)

Dijkema, K.S. 1983. Outline of landscape and vegetation types. In: K.S. Dijkema & W.J. Wolff (eds), Flora and vegetation of the Wadden Sea islands and coastal areas. Balkema, Rotterdam; chapter 5.2; 116-133. [Report in zip-file: "1983 Outline of landscape and vegetation types.pdf"](#)

Dijkema, K.S. 1980. Towards a vegetation and landscape map of the Danish, German and Dutch Wadden Sea islands and mainland coastal areas. Acta Bot. Neerl. 29: 523-531.

Dijkema, K.S., H. Doing & E. van der Maarel 1993. Dry coastal ecosystems of the Danish, German and Dutch wadden islands. In: E. van der Maarel (ed.), Ecosystems of the World 2A. Dry coastal ecosystems, polar regions and Europe. Elsevier, Amsterdam; 245-269.

### **Detailed examples of salt marsh vegetation and management; 1:10,000.**

16 sites in the Netherlands, German and Danish Wadden Sea:

Dijkema, K.S. 1983. The salt-marsh vegetation of the mainland coast, estuaries and Halligen. In: K.S. Dijkema & W.J. Wolff (eds), Flora and vegetation of the Wadden Sea island and coastal areas. Balkema, Rotterdam; chapter 6.3; 185-220.  
[Report in zip-file: "1983 The salt-marsh vegetation of the mainland coast estuaries and Halligen.pdf"](#)

**Tidal flats, mussel beds, sea grass beds and salt marshes 1977; 1:100,000.**

Habitats of the Netherlands, German and Danish Wadden Sea:

Dijkema, K.S., G. van Tienen & J.G. van Beek 1989. Habitats of the Netherlands, German and Danish Wadden Sea 1:100,000. Veth Foundation/Research Institute for Nature Management, Texel. 24 maps + 6 p.

Dijkema, K.S. 1991. Towards a habitat map of the Netherlands, German and Danish Wadden Sea. Ocean and Shoreline Management 16: 1-21.

[Report in zip-file: “1991 Towards a habitat map of the Netherlands German and Danish Wadden Sea.pdf”](#)

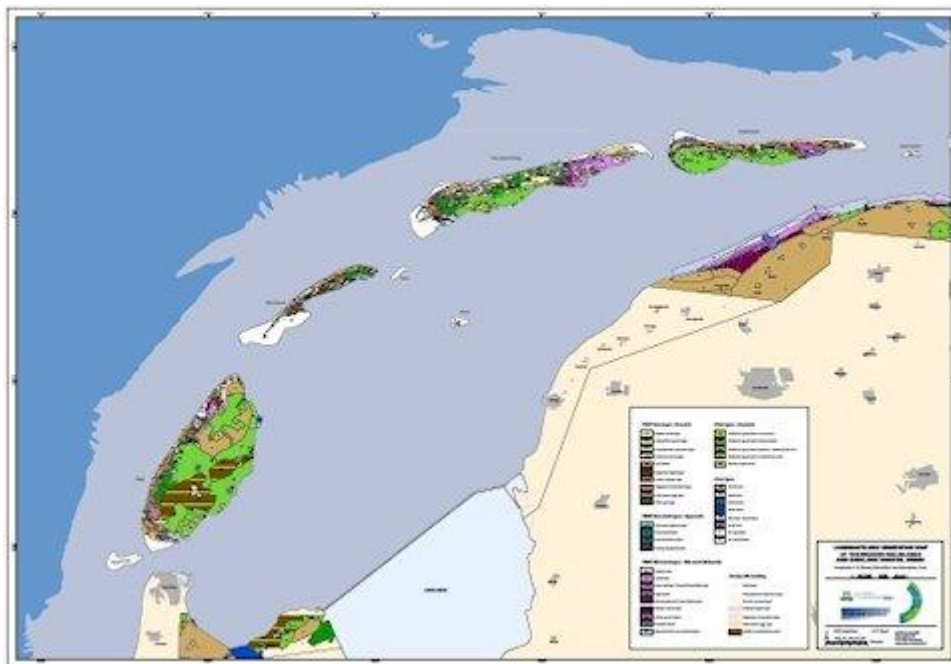
Dijkema, K.S. 1990. Habitatkaart van de internationale Waddenzee. Waddenbulletin 1990, 2: 100.

Dijkema, K.S. 1990. A habitat map of the entire international Wadden Sea. Wadden Sea Newsletter 3/4-1990: 27-32.

Dijkema, K.S. 1992. Habitats of the Netherlands, German and Danish Wadden Sea: an outline map 1:100,000. In: N. Dankers, C.J. Smit & M. Scholl (eds), Proceedings of the 7th International Wadden Sea Symposium, Ameland, The Netherlands, 22-26 October 1990. Neth. Inst. Sea Res., Publ. Ser. 20; 239-242.

Salt marsh publications Texel 1975-2012, Kees Dijkema & Willem van Duin, RIN, IBN, ALTERRA, IMARES vs 1.3

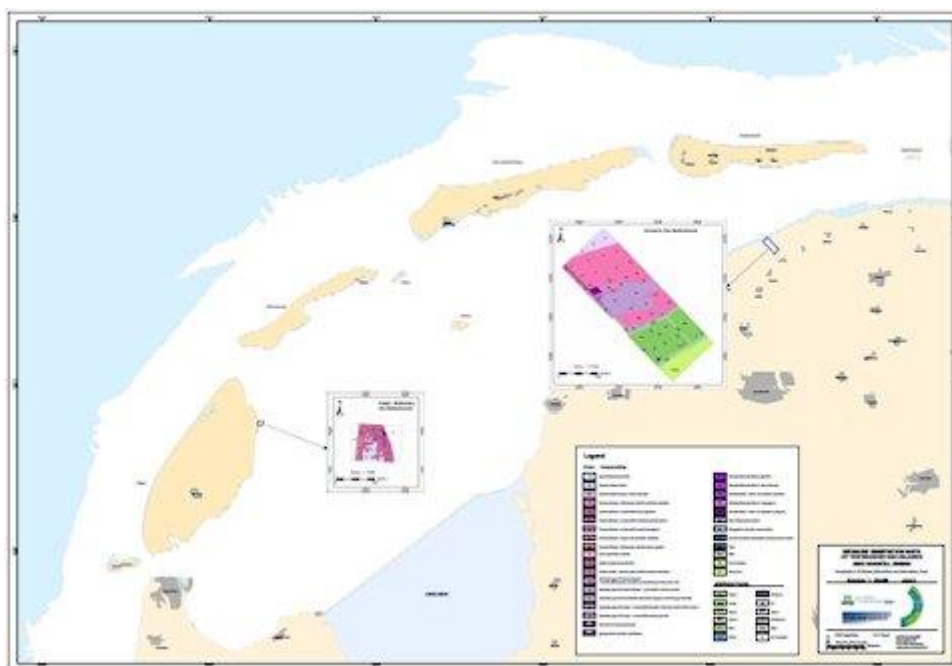
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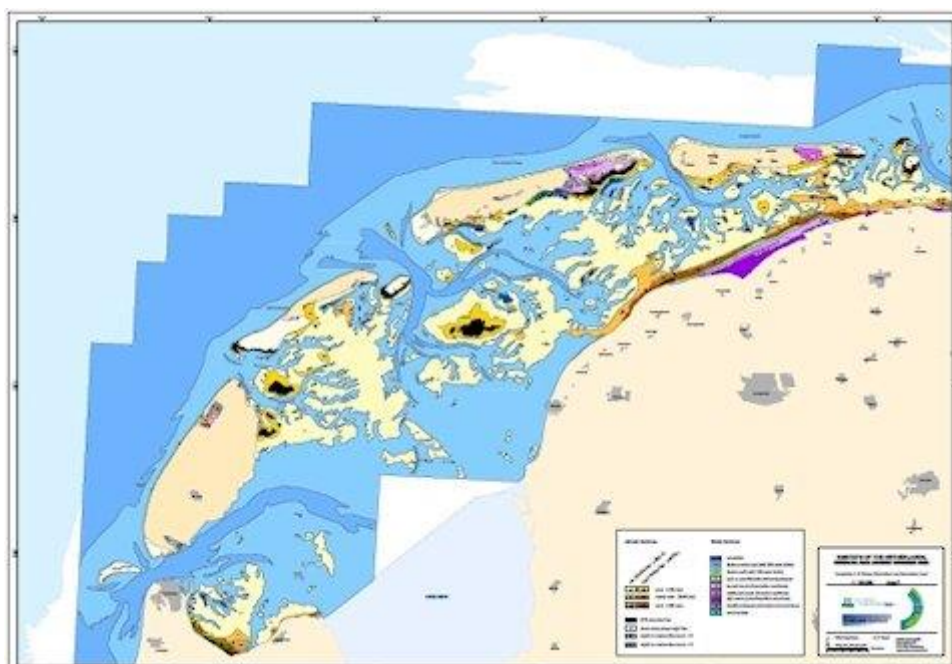
*Sand dunes and salt marshes 1976;1:100,000.*

[Maps in zip-file: “Sand dunes and salt marshes 1976 5maps.zip”](#)

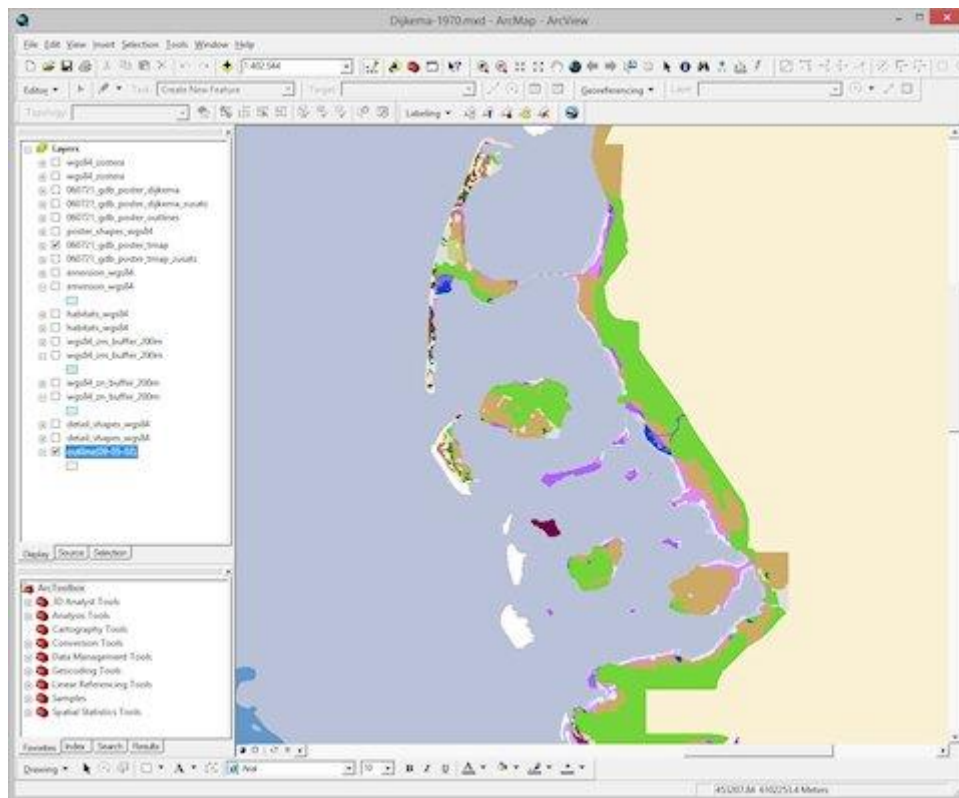




*Detailed examples of salt marsh vegetation and management; 1:10,000.*  
[Maps in zip-file: “Detailed examples of salt marsh vegetation 5maps.zip”](#)



*Tidal flats, mussel beds, sea grass beds and salt marshes 1977; 1:100,000.*  
[Maps in zip-file: “Detailed examples of salt marsh vegetation 5maps.zip”](#)



*GIS data on Tidal flats, mussel beds, sea grass beds and salt marshes*  
Data in zip-file: “1970s GIS data and methods.zip”