

Photo: Jan Heuff. The radial terp village of Toornwerd near Middelstum.

Wadden Sea Quality Status Report

Landscape and culture

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This report downloaded: 2018-03-19.

This report last updated: 2017-12-21.

This report should be cited as: Schroor M., Enemark J., Fischer L. & Guldberg M. (2017) *Landscape and culture*. In: Wadden Sea Quality Status Report 2017. Eds.: Kloepper S. et al., Common Wadden Sea Secretariat, Wilhelmshaven, Germany. Last updated 21.12.2017. Downloaded *DD.MM.YYYY*. qsr.waddensea-worldheritage.org/reports/landscape-and-culture

United Nations Educational, Scientific and Cultural Organization

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1. Introduction

Although it were exclusively physical and ecological considerations that during the past 50 years have put the Wadden Sea and its surrounding islands and mainland coast on the map, it is essentially landscape and culture, in which the human aspects of the Wadden Sea Region are reflected. This Wadden Sea Region, apart from the sea, islands and mainland salt marshes as such, embraces also the endiked mainland marshes altogether forming Waddenland. This section gives an overview of developments in the fields of landscape and culture in Waddenland during the past decennium.

2. Status and trends

The area

The Wadden Sea Area measures some 22,000 km² and is situated on the fringe of densely populated north-western Europe, where it constitutes the transitional zone between the European continent and the southern North Sea. The Wadden Sea Area – basically a marine landscape – consists of three elements: The area is almost equally divided between water (51.5 %) and land (48.5 %), the water coinciding with the Wadden Sea World Heritage property, consisting of tidal flats, gullies and salt marshes. The land area (10,675 km²), in the following referred to as "Waddenland", breaks down to about fifty Frisian or Wadden Islands (1,120 km²), sandy and marshy islands separating the Wadden Sea from the North Sea, and the adjacent and diked marshlands on the mainland (9,555 km²).

Landscape types

Within the Waddenland (Figure 1) the following landscape types are discernible:

The islands can be divided into two categories, the larger category being the chain of **sandy barrier islands** (the West-, East- and North Frisian or Wadden Islands) stretching along the coast from Texel in the Dutch province of North Holland to the Skallingen peninsula in Denmark. The smaller category formed by **marsh islands**, the so-called *Halligen,* lying inside the barrier islands in North Frisia (Schleswig-Holstein) belong to this category.

Although in landscape genetic terms the mainland marshes are deposits of the sea and as such constitute the real *Waddenland*, we distinguish between three main landforms.

1. The aforementioned fertile **marshlands** formed in the Holocene by the sea consists of salt marshes and embanked marshes , respectively called 'kwelders' and 'polders' in the Netherlands, 'Groden' and 'Köge' in Germany and 'saltmarsk' and 'koge' in Denmark.
2. The adjacent **geest** sometimes appears in the form of protruding capes (e.g. 'Geestkliffs' like Dangast, Cuxhaven-Sahlenburg, Schobüll or Danish 'bakkeøer' like Hjerpstedt, 'klev' like Emmerlev Klev or isolated hillocks like Hoge Berg on Texel, Wieringen, Eiland van Winschoten, Wingst), but mostly consists of

higher, usually sandy moraines and outwash plains. Of Pleistocene origin, the geest forms an integral part of the Waddenland as stronghold and suspension point against marine erosion. However, apart from the small contact zones, this landform is not treated in this report.

3. The **peat bogs (moors)** are transition zones between marsh and geest, sometimes turned into lakes as a result of human colonization, reclamation and corresponding subsidence, sometimes sealed by a layer of marsh clay.



Figure 1. The islands and marshlands forming the Wadden Sea Region (Image: Meindert Schroor, Waddenzee – Waddenland, 2008).

Extent and population

About 63 % of the Wadden Sea Area lies in Germany, while the Netherlands and Denmark have 30 % and 7 % respectively within their borders. Whereas the German part of the Wadden Sea Region houses 53 % of the population, 37 % live in the Dutch and 10 % in the Danish part. In relation to the land surface the some 1.7 million inhabitants of the Wadden Sea Area constitute a mean population density of 160 persons per square kilometre, lower than the average population densities of the Netherlands (502) and Germany (227), albeit slightly higher than the Danish mean of 130 inhabitants per square kilometre*. However, in comparison with its total surface (incl. water) the actual population density more than halves to a mere 77 persons per square kilometre.

* Next to the Wadden Islands, the surface and population are include the marshes on

the mainland, contrary to the so-called Regional Structure (based on administrative divisions) viz., the three Dutch provinces of (Kop van) Noord-Holland, Fryslân, and Groningen, the 14 German Kreise of Emden, Aurich, Leer, Wittmund, Friesland, Wilhelmshaven. Wesermarsch, Bremerhaven, Cuxhaven, Stade, Pinneberg, Steinburg, Dithmarschen, and Nordfriesland, as well as the four (formerly ten) Danish municipalities of Varde, Esbjerg, Fanø, and Tønder (CWSS, *Quality Status Report 2009*, 5). Based on this circumscription the whole Wadden Sea Area would measure approximately 26.000 km^2.



Figure 2. The village of Ballum (Vesterende) lying on a Pleistocene cape with the salt-marsh in the foreground and the endiked polder of Ballum Enge (left and above) (Photo: Svend Tougaard).

Socio-cultural premises

With or without water surface, the people of this Wadden Sea Region have generally more territory at their disposal than their fellow countrymen in Denmark, Germany, and the Netherlands. Apart from this observation there are more features that distinguish the Wadden Sea region and its inhabitants from their inland counterparts. To begin with, the ingrained, secular agrarian-maritime character of the region forms a clear distinction with its counterpart, the Pleistocene hinterland. Up till the 19th century the poor sandy soils (*geest*) of these inlands were largely characterized by more feudal conditions as well as a more extensive way of farming within the framework of the extended family versus more individualistic way of farming by nuclear families.

Secondly, the marshes differ – albeit in a slightly lesser way – from the intermediate fresh-water dominated peat bogs, the latter having far more regular field patterns due to planned colonization. Moreover, the Wadden Sea Region's decentralized geography of islands and mainland peninsulas, the lack of major urban centres, put against a potentially hazardous environmental background (storms, floods), have had a profound influence on its economic development and thereby indirectly on the

mentality and perceptions of the coastal dwellers. The mentality seems to be reflected in a landscape, whose most outstanding visual characteristic is its wideness, both metaphor for openness and apparent equalizer of social relations. The landscape is marked by a great expanse above a low horizon, traditionally filled with dikes, church towers and – apart from the Danish part – with the tops of the handful elm, ash or poplar trees, lining a winding road or a farmyard, eastward bent by what could be called the 'Wadden trades of trade winds': the prevailing south westerlies.

The Wadden Sea Area thrived on modern, commercial agriculture and maritime trade. At least from the 16th century onwards and up until the middle of the 19th century the region's population density was twice that of the inlands, (40 to 60 inhabitants per square kilometre). In historical sources in majority its residents are designated as Frisian. The residents in general express themselves in cultural key concepts such as an aversion to interference from elsewhere, individualism, the love of freedom, a strong attachment to the physical environment, self-reliance and an egalitarian mind-set, which are often reflected in a certain degree of stiffness and rigidity. Whereas these attitudes seem to be the result of an age-long interaction between man and natural environment, it is evident that every action aimed at the protection and development of the Wadden Sea Area, in regard to the World Heritage theme or other, needs to take these human factors into consideration. Only then the preservation of the important natural values of the Wadden Sea and its adjacencies will reach the hearts and minds of the local population, a prerequisite for success. The integration of the natural and cultural landscape is therefore imperative.

Genesis and readability of the cultural landscape

The overarching (global) importance of the Wadden Sea Region as a cultural area

During the past millennium, human engineering has had an increasing impact on the Wadden Sea Area. During late medieval as well as early modern times, human activities like reclamation, peat-digging, salt extraction, diking, dredging, port construction have had, together with climate changes (e.g. more precipitation and storms from 1170 onwards), a profound effect on the topography of the area. The northern parts (around the so-called *Halligen*) as well as the westernmost parts of the Wadden Sea (between Texel and Harlingen) are in fact drowned landscapes and the result of previously named injudicious interventions. Already in the 8th century, Frisians from the southern part of the Wadden Sea Region migrated to the west coast of Schleswig-Holstein and Southern Jutland taking with them their techniques of land management.

Much of the techniques of hydraulic engineering and the colonization of moorlands, for which the Dutch became famous, were developed initially, that is from Carolingian times onwards, by Frisians who lived in and around the western Wadden Sea in what

is now the province of Fryslân (Friesland) and West Friesland (part of North Holland province). From there these practices were taken to the moors in the heart of Holland and Utrecht and subsequently from the 12th century onwards to the banks of the Weser (Hollerland), Elbe (Kremper- and Wilstermarsch, Altes Land) and Eider and eventually exported to England (Fens, Hatfield Chase), France (Marais Poitevin) and Poland (Vistula delta).

From a cultural perspective the Wadden Sea Region has been a laboratory of water management and environmental coping for at least 2500 years. One of the essential characteristics of the area is its insular character, including not only the islands but also the marshes on the mainland, divided by inlets and estuaries into peninsulas. Compared to coastal areas elsewhere, urbanization was limited; the wealth of the land meanwhile expressed in myriads of villages, fortified houses (stinzen, Steinhäuser); from the 1600s transferred into mansions (that have disappeared nowadays) as well as distinguished farmhouses. There is hardly a part of Europe where man has had such a profound and long-lasting influence on the lay-out of the land. Metaphorically the cultural history of the Wadden Sea Region unfolded in the eye of a Western European storm that dominated the global political, economic, cultural and innovative scene from the 16th century up till the beginning of the 20th century. Until 1870 the Wadden Sea Region was a supplier of tonnage and crews, of dairy produce, grains, building materials (bricks), and even of luxury goods (tiles, silver) to the commercial metropolises (Amsterdam, Bremen, Hamburg). At the same time it was a catchment area for migrants and seasonal workers from the hinterland, attracted by the prosperity, the demand for labour and the high wages of the marshes. The fact that this traditionally prosperous early modern area, more or less overtaken by time, ended up in the lee of commercial and industrial concentration has contributed to the continuing presence of many cultural and historically valuable artefacts and landscapes.

Archaeology

Most of the scenic background of this area of outstanding quality has been created in a marine or tidal environment from the end of the last Ice Age (*Weichselien*, about 10,000 years ago) onwards. Compared to other deltaic and riverine coastal areas, the shaping of elements of the Wadden landscape has been marginally influenced by fresh water. Instead, the tides were the main forces of sediment transport, with the corollary that further inland with a lessening of tide strength smaller soil particles were deposited. This sedimentation direction is opposite to the process in fresh-water-dominated coastal environments. Thus, the oldest human habitation in the marshes is found on higher grounds deposited more recently (e.g. natural levees like marsh bars),

usually consisting of light sandy calcareous and well drained clay soils, lying in the immediate vicinity of the coast. In Denmark the earliest habitation clung to the edges of the boulder clay immediately bordering the marshlands (Grønnegård, Myrthue). Not only the Wadden Sea property, but the fringing lands themselves belong to the most dynamic landscapes in Western Europe. In fact, the area as a whole forms a constantly changing 'monument' of topographical shifts and changes. As such it is a fine example of the interaction between man and his natural environment, allowing us to learn the ways in which our ancestors coped with their environment and used their experience to face still current challenges such as climate change and sea-level rise. Seen from this perspective, to protect and develop the cultural and historical qualities of the surrounding Wadden Sea Region is as important as protecting and developing its marine World Heritage heart itself.

The Wadden Sea Area has a long history of settlement. Whereas the earliest human presence during the last Ice Age hardly had any impact on the present landscape, the evidence from Palaeolithic and Mesolithic times has almost certainly been preserved under thick layers of Holocene sediments. Prehistoric artefacts from the latter periods regularly wash up on the shores of the islands. Other more recent Prehistoric (Neolithic) finds have been recovered in various places in the Wadden Sea Area, e.g. on the islands of Texel, Föhr and Sylt (Denghoog), near Delfzijl (megalith Heveskesklooster) as well as on the Eiderstedt peninsula. The find were mostly hunting camps, though gradually evolving into (semi-)permanent settlements. This littoral landscape has been inhabited permanently, although not always continuously in the same places, for at least 2,500 years. The Wadden Sea Area is therefore not simply a natural region, but also a cultural entity, whose history of more or less permanent habitation reaches back almost 3,000 years. Moreover, while its natural landscape is basically a product of the sea, it nevertheless was man that adapted and shaped, destroyed and rebuilt, deliberately as much as unintendedly, these maritime lands up to their present state. Many scenic and archaeological relics have been preserved, the latter mainly thanks to the humid conditions of the soil in general, as well as having been drowned, covered and thereby 'sealed' by more recent deposits. In the past decade there has been a reduction in the number of excavations. Excavations have mostly been limited to sites to be affected by building plans, whereas research has been limited to cartographic analysis, field exploration and the elaboration and interpretation of earlier finds.

Dwelling mounds

In regards to visible elements, thousands of dwelling mounds (*terpen, Wurten*) belong to the oldest remaining artefacts of human intervention in the Wadden area and they literally dot the landscape. The area, in which mounds occur, stretches from the Ballum Enge near Skærbæk in the northeast, to the Schagen area near Den Helder in the southwest, right through North Frisia, Eiderstedt and Dithmarschen, the Elbmarshes, Butjadingen, East-Frisia, Groningen and Fryslân. The most prolific areas being the island of Pellworm as well as Eiderstedt, Wursten, Butjadingen, Wangerland, Krummhörn, Middag-Humsterland and Westergo. These mounds date as far as to the times before the embankments (i.e. 300 BC-1000 AD). Though between 1840 and 1940 – especially in the Netherlands – many mounds have been excavated for their fertile and mineral-rich soil, even in the Dutch part of the Wadden Sea Region many have remained, some unaffected. In addition, remnants of mounds have a lasting influence on the landscape through their contours and subtle heights, while their subsoils still provide us with a lot of archaeological and historical information. The mounds usually have a clear link with the field patterns surrounding them and must

be considered in their context. In the initially salty Wadden environment fresh water was scarce and rainwater was collected in ponds (fethings) on top of the mounds, in later times often the place where the church was built. Nowadays the summer polders along the north coast of Fryslân contain many artificial circular fresh water pools (dobben) surrounded by a ring-dike. The majority of the approx. 700 villages in the marshes developed on or around a mound, their oldest structure more or less dictated by these artificial heights. The biggest town in the marshes (Leeuwarden) even developed on and around three mounds.



Figure 3. The radial terp village of Toornwerd near Middelstum (Photo: Jan Heuff).

Dikes, polders, field patterns and drainage

Starting in the 10th century, building dikes replaced the construction of mounds, turning tidal marshes (salt marshes of *saltings*) – some of them already inhabited for more than a thousand years – into diked marshlands, intersected and drained by a system of ditches and freshwater lakes. Initially these were small ring dikes protecting individual polders (e.g. in Central Westergo, Humsterland, Eiderstedt and the Köge north of Husum), but sooner or later they developed into complete systems of linear dikes and by and large into the formidable sea walls of today. In many places complete systems of deserted dikes, spare and other back dikes, some still in operation, have been preserved. Together with locks, sluices, culverts, windmills, coastal defence works (palisades, basalt slopes, groynes), dike passages, pools reminding of us of former dike breaches ('wheels'), as well as circular canals and dikes around reclaimed lakes, they provide us with indispensable information about the evolution of the cultural landscape.



Figure 4. Wadden Sea dike near Sexbierum. The small lake is the result of clay-digging for dike heightening (photo: Meindert Schroor).

In (former) estuaries like the Marne, Middelzee (It Bildt), Lauwerszee, Fivel, Dollard (Rheiderland), Leybucht, Harle, Maade, Schwarzes Brack, Bottschlott, successful and successive dikes with their sluices (zijlen, Siele) often accompanied by sluice villages are proof of the achievements made in embanking. Thereto, the majority of these early modern polders were very successful from an agronomical and commercial perspective. Conversely, the Wadden Sea Area also contains many examples of failure. Traces of drowned villages, field patterns and farm sites are proof of the ever-changing balance and often perilous interaction between the coastal dwellers and the waters that surrounded them. In North Frisia (1362), as well as in and around the Jade (1219-1362) and Dollard (1454-1509) estuaries, the sea broke through marsh bars that surrounded and protected cultivated moorlands, subsequently and swiftly destroyed by the sea.

On the ends of some of the islands sand dikes (*stuifdijken*) that look like a long line of dunes dominate the horizon. The oldest are the Oldenbarnevelt dike (1610) connecting Callantsoog to Huisduinen (Den Helder) and the Zanddijk (1630), which united Eierland and Texel. More recent sand dikes are found on Vlieland, Terschelling, Schiermonnikoog and Wangerooge. On and near the Frisian Islands traces of many a lost village as well as historical cultivated land are archaeological proof. Sometimes drowned field patterns still are visible at ebb tide. The Wadden Sea Area further contains many lost (Bosch, Bant, Buise) or heavily damaged islands such as Strand, of which Nordstrand and Pellworm remain. In various places on the mainland seemingly whimsical ditch patterns not only reflect former salt marsh creeks, but in some cases Roman and early medieval field patterns, too. It such cases, the ditches either have been covered by more recent marine sediments (e.g. the so-called *legen* east of the former Middelzee), or were integrated in more recent ditch patterns (e.g. between Bolsward and Workum, in Butjadingen and Eiderstedt).

It is not only geological and archaeological evidence that proves the presence of former

islands and coastlines. Near the surface traces of occupation, drowned fields and ditches have been detected along the Weser and in the Jade estuaries. On the North Sea beaches as well as in the foredunes (e.g. on Borkum, Baltrum, Langeoog, Vlieland and in the North Frisian Wadden Sea) traces of cultivation from the past (*Kulturspuren* at Rummelloch) are sometimes visible after gales or simply at low tide. Other examples are traces of old villages (e.g. Sier, Westerburen and Billdorf) on the western heads of Ameland, Schiermonnikoog and Juist that became or still are visible through remnants of furrows, ditches and wells or by means of bricks, tiles and shards. Elsewhere such as around Harlingen, west of Moddergat, in the Westermarsch, between Bensersiel and Neuharlingersiel, the direction of parcelling on the mainland shows that old agricultural land was lost to the sea.

Trade, ports and shipwrecks

Trade is and has been a major factor in constituting 'Wadden society', already starting with the early medieval Frisian commerce. The late medieval Hanseatic League was more or less its successor, primarily established in a number of towns on the edge of the Wadden Sea Region: Hamburg, Stade, Buxtehude, Bremen, Groningen, Bolsward and Stavoren. From the 16th century onwards the Hanseatic League was overtaken by the rapidly expanding ports on the western (Holland's) shore of the Zuider Zee (Amsterdam, Enkhuizen, Hoorn, Medemblik), as well as by harbours in the Wadden Sea Area itself like Emden and Harlingen. Tönning, Dokkum and Ribe, also very monumental, but were less prominent. The latter two were eventually cut off from the sea. In the heydays of Amsterdam as the hub of global commerce (17th and part of the 18th century) the Wadden Sea Region – constituting the bulk of the so-called *Kleine Oost* (German Bight) – was *the* purveyor of skippers, commanders, crew in general as well as ships, all fully involved in the *moedernegotie* (mother trade) between the Dutch Republic and the Baltic Sea. Sandy often shallow inner and outer deltas as well as the roadsteads of Texel and Vlieland, gateways to the Wadden Sea and Zuiderzee as well as to the Weser and Elbe rivers, were true ship graveyards, which makes them extremely important archaeological hot spots. Smaller ports, in some cases fortified naval strongholds, developed in the Dutch part of the Wadden Sea Region (Oudeschild, West-Terschelling, Delfzijl) and alongside the Weser and Elbe rivers like Carlstadt, Glückstadt and Tönning (1644-1714). Two other types of ports can be discerned: The so-called *zijlhavens* or *Sielhäfen,* small harbours located at the *zijlen*, *Siele* (discharge sluices), were mostly in use as fishing ports*. Strategically induced naval and trading ports were created (or expanded) by government mainly in the 19th and 20th century near or right on the North Sea coast, like Den Helder, Wilhelmshaven, Bremerhaven, Cuxhaven, Esbjerg and Eemshaven.



Figure 5. The village of Huisduinen seen from fort Kijkduin (1811-1813) with the Lange Jaap lighthouse (1878) and the Marsdiep with island of Texel in the distance (Photo: Meindert Schroor).

Part of the harbours and shipping were several constructions such as lighthouses (e.g. Brandaris Terschelling, Alter Leuchtturm Borkum, Leuchtturm Arngast, Hoge Weg, Roter Sand, Leuchtturm Neuwerk, Westerhever), harbour-lights and seamarks like the Grote Baken or Emder Kaap (Great Beacon, an iron framework structure) on Rottumeroog and the two so-called Kugelbaken at Borkum and Cuxhaven. Lifeboat-barns, tide gauge houses and e.g. the buoyage-shed on the island of Terschelling belong to this category too. Also breakwaters like groynes and piers, dams (e.g. the abandoned 19th century Ameland Dam or the Mandø Ebbevej and Rømø Dam, besides training walls such as Geise Leitdamm Emden, Pollendam Harlingen, the Nieuwe Dam in West-Terschelling, dams on Minsener Oog) and land reclamation works in general are artefacts on the verge of harbour works and coastal defences.

In addition, inland shipping played a major role in the marshes and adjacent lands up till the 1930s. Thousands of kilometres of canals with associated bridges, former towing-paths alongside canals, locks and lock-keeper's houses, inns and warehouses are evidence of the importance of inland water transport throughout the marshlands.

*Most of the harbours in the Wadden Sea Area initially developed around a sluice of dam in a salt marsh creek of canal, but gradually developed broader functions.

Farm-houses and fortified houses

The most widespread farmhouse in the Wadden Sea Area is the *Gulfhaus,* followed by the *Hallenhaus*, a half-timbered steading house, more common in the peat and sand districts. The so-called 'Friese schuur' (Frisian barn) build around the haystack or grain storage forms the actual nucleus of the Gulfhaus with its gulfbarn (Gulf derived

from the Frisian word ‘golle’ meaning storage section in a barn). All the functional parts of the farm lie in line with each other. The Gulfhaus includes several types such as the Dutch-Frisian head-neck-trunk farmhouse, the Groningen/East Frisia Oldambtster type (Ostfriesenhaus), where the broad shed at the back more or less shrinks stepwise to a much smaller forefront used as dwelling house, as well as the different variants of the ‘cloche’ farmhouses, the *stolp* (North-Holland), *stjelp* (Fryslân) and *haubarg* (Eiderstedt and a few remaining in Dithmarschen), where dwelling and business parts are under one roof. Variants of the head-neck-trunk farmhouse are the T-square farmhouses from the Bildt area and the Hoogeland head-trunk farmhouse type. North Frisia has its own farm type, the Uthländisches Haus, a small narrow bay house, mostly built on a west-east axis with a joist-supported inner frame structure, separated into a stable and a living area. The stable door is located in the middle of the stable that runs the length of the building, much like the Terschelling-type of farmhouse. The North Frisian and Danish types sometimes have parallel barns connected by means of angular annexes. A particular aspect of the mutual maritime cultural and economic contacts of yesteryear is reflected in the so-called *Pesel*. The walls of many of these best rooms in North Frisian and Danish Wadden islands farmhouses are lined with decorative tin-glazed earthenware tiles dating from the 17th till early 19th century. Most of these tiles were produced in the West-Frisian town of Harlingen, centre of tile and brick-production in the Wadden Sea Area, in which many whaling commanders and skippers maintained close contacts.



Figure 6. Haubarg, a typical farm house in Schleswig-Holstein (Photo: Walter Raabe).

During the late Middle Ages, large parts of the Frisian Wadden Sea Areas can be characterized – politically and judicially – as a feud society. Members of the rural gentry often behaved as petty warlords, operating – especially west of the Weser river and in Dithmarschen – from large numbers of fortified houses (*stinzen* of *Steinhäuser*). The frequency of such buildings can be explained by high population densities on fertile soils. During more peaceful times, under the aegis of a more centralized government (East Frisia from 1464 onwards, Fryslân 1498, Land Wursten

1525, Groningen 1536 and Ditmarschen 1559) many of these small strongholds disappeared. Only a few medieval house-mounds (*stinswieren*) remained. During the 16th and 17th century, however, quite a few *stinzen* were rebuilt or extended into far more luxurious manors often of castle-like allure. Except for a few house-mounds in Fryslân and the fortified stone-houses of Schierstins (Veenwouden) and Steinhaus (Bunderhee) most of the aforementioned medieval strongholds vanished, though many traces can be found subsurface as well as in fragments of buildings and sometimes – be it partly reconstructed - even above surface (i.e. Sibethsburg, Wilhelmshaven). Some of the manors still exist, e.g. Poptaslot, Menkemaborg, Fraeylemaborg, Lütetsburg, Dornum, Gödens, Esens, Schloβ Husum and Schackenborg (Møgeltønder).

A special form of agricultural activity, both an expression of the proximity of the sea and the wealth of fresh water within the dikes, are the duck decoys. As the coasts of the Wadden Sea and the nearby canals and lakes are important migration paths of birds, the capture device for waterfowl is found on the islands (Terschelling still has seven decoys) as well as in the marshes and adjoining fenlands on the mainland. Introduced from the western parts of the Wadden Sea in the 16th century, the decoy basically consists of a pond surrounded by trees. One to four fenced trapping tubes stretch from the pond, all of them ending in a catching net. The few tens of remaining decoys out of several hundred still constitute eye-catching elements in the open landscape.

Churches, churchyards and monuments

A glance on early modern maps proves that the areas along the Wadden Sea – particularly west of the Elbe estuary as well as on the North Frisian Islands and Eiderstedt – were far more densely populated than their neighbouring areas inland. Maps made by Van Deventer (1545), Fabricius & Van Doetecum (ca. 1600) and Claes Jansz Visscher (1628) exhibit a no less than stunning contrast between the hundreds of parishes (often symbolized by their churches) in the marshes set against an almost 'empty' hinterland. While many of these village-churches have survived together with their often beautiful organs in the protestant tradition thanks to slower economic growth after 1870. However the continued secularization and demographic contraction of today threatens their existence. An inventory of the churches in the Dutch province of Fryslân revealed that several hundred – often monumental – churches have become redundant and as such are prone to decay.

Existing and disappeared churches often include churchyards, cemeteries often containing monumental and historical tombstones. On nearly all the Frisian Islands we find headstones dedicated to sailors and fishermen that refer to the intense and sometimes dramatic relationship with the sea. Further categories of cemeteries that deserve attention are the Jewish burial grounds and graveyards for drowned persons. The first types can frequently be found in secluded places and they symbolize a population category, whose wide presence was more or less the expression of the erstwhile prosperity of the marshes. The second type, in majority on the islands, were intended for the burying of usually unknown persons such as drowned sailors and passengers of stranded ships, expressing the ambivalent and capricious relation between man and the sea.

The most famous monument linked to the fight against the sea, de *Stenen Man* (Stone Man) of 1576, stands on the sea-wall south of Harlingen and is dedicated to the Spanish governor Caspar de Robles (1527-1585), who forced the unruly Frisians to restore their dikes after the floods of 1570-1574. It is one of a host of monuments dedicated to stranding's, floods (including stones marking highest water levels), dike

breaches and loss of local fishing fleets and seamen.

Old industries and modern industrialisation

Although the Wadden Sea Region has a mainly rural, or at least far from industrial image, industry nevertheless has played a role in the past. Processing of imported raw materials (e.g. salt, textile, wood, sugar-refining) concentrated in and around towns like Harlingen and Emden. There, just as in the other towns of Friesland, luxury crafts like silver- and goldsmith and watch-making thrived away from metropolises like Amsterdam and Hamburg. The clay-districts also counted a great many industries based on local raw materials like clay and shells. Throughout the marshes dozens of brickworks lined the rivers and canals, some managing to stretch their existence up till the 1990s. The greatest concentrations of brickworks could be found along the banks of the rivers Elbe, Weser and Ems as well as along the Damsterdiep and Winsumerdiep in the Groningen Ommelanden and the banks of the Harlingertrekvaart. There, together with the Bolswardervaart, on the periphery of Harlingen, the greatest industrial concentration of the marshes could be found, formed by ribbons of industrial mills (sawmills, mustard mills, oil mills, trass-mills, bark-mills for tanning), lime-kilns and shipyards. Throughout the whole Wadden Sea Region dozens of shipyards, catering for a large inland and coastal sailing fleet, flourished. This industry peaked in the 19th century, when the adjacent fen-colonies west and east of the river Ems took over the function of the marshes as *the* supplier of ships and crews. In his famous work on German agriculture (1897) the French agronomist Georges Blondel described them) as 'une pépinière d'excellents matelots et d'excellents ouvriers des constructions navales' (a nursery of excellent seamen and ship-builders).

Nowadays modern industry has taken a hold on many parts of the Wadden Sea coast. Refineries, great halls of shipyards, chemical plants, incineration plants, power stations, container terminals, tall chimneys and storage sheds dominate the horizon in and around Den Helder, Harlingen, Eemshaven-Delfzijl, Emden, Wilhelmshaven, Bremerhaven, Cuxhaven, and Esbjerg. Together with almost industrial-looking wind farms they have a great impact on their environment, not only by day, but also by night (e.g. light pollution), not to mention the high-rise buildings (flats, apartments, hotels) behind the dikes or in the dunes e.g. in Delfzijl, on some of the East- and North-Frisian islands (Borkum, Norderney, Westerland), and the highest structure of 22 stories located in mainland Büsum.

3. Assessment

Recent developments on the aspects of cultural heritage and landscape have been evaluated according to the following, partly overlapping criteria:

Identity

Substantial parts of the mainland marshes are plagued by demographic and economic decline ('krimp', 'Rückgang', 'befolkningnedgang'). This process undermines the viability of the area and in the end threatens the acceptation and continuing identification of the resident population with this region to whom the cultural unity is

anything but self-evident! At the moment a Wadden identity as such does not exist. However, an ownership of the local populations of the Wadden Sea's *World Heritage* site is an absolute prerequisite for its success and for the management of ecological, economic, social and cultural values that go with it. A sound awareness of the local population, as well as politicians and entrepreneurial stakeholders about cultural heritage values is vital for the preservation, development and sustainable use, but not self-evident. Contemporary socio-economic and budgetary problems in the Netherlands excite some politicians to use the money of the Dutch Waddenfonds, a fund intended for the restauration of natural and cultural historical values of the Wadden Sea Area, in trying to combat the effects of economic decline. In July 2016, a liberal parliamentarian suggested financing regular maintenance and renovations of the Afsluitdijk locks out of the Waddenfonds. Furthermore, the reigning coalition installed in May 2015 in provincial estates of Fryslân have expressed their concern about the loss of agricultural land, taking no more fertile land at its destination in favour of nature development projects. After all, too far-reaching nature development objectives could jeopardize support of a local population affected by wide-scale unemployment, exclusion and degradation of social services.



Figure 7. Monument on the Afsluitdijk (Enclosing Dike) dedicated to Cornelis Lely (1854-1929), designer of the Zuyder Zee plan (1891) and as Minister of Public Works (1913-1918) responsible for the adoption of the plan (1918) (Photo: Gouwenaar/ Wikimedia Commons).

A related problem is the ongoing gentrification of the islands, being a real threat to both islanders and tourists. One of the consequences is a growing lack of affordable housing for the children of island-dwellers. In addition, a longer stay on the islands has become too expensive for people on a tight budget from the adjacent northern mainland, traditionally the bulk of the public that visited the islands and cherished the Wadden Sea. They often have to limit their stay to a day out, while vacation houses and cottages are bought up, which limits the period that these houses are rented and consequently decrease spending at the local shops, cafes and restaurants. Also, environmentally friendly forms of recreation like camping seem to go down in favour of large-scale facilities such as hotels, apartments and summer resorts (e.g. Landal

Green Parks). Developments such as the latter also enhance the already strong effect induced by various concentrations of recreational cottages in the dunes, e.g. on the West-Frisian islands, the islands of Sylt (Kampen, List), Rømø and Fanø as well as on the Danish mainland coast near Blåvands Huk (Blåvand, Oksby).

Variety

Vigilance is required with regard to the variety of the cultural landscapes that are typical for the Wadden Sea region. The current process of impact on the landscape of economic and infrastructural developments is more insidious than manifest. In the Netherlands the upcoming change of paradigm, heralded by a new comprehensive Environment Law (originally intended for 2018, but meanwhile postponed for at least two years), implies a change from permission planning to development planning. This could mean the end of spatial planning and monumental protection as the most important tools for the conservation and enhancement of cultural heritage and landscape values. Even now town and village extensions frequently have uncontrolled negative effects on historical field patterns. Currently, industrial areas built haphazardly, new infrastructure (e.g. spacious bypasses), as well as town and village extensions cutting through old field patterns and landscape structures, such as former river beds, marsh creeks and old settlements are in fact insidious attacks on the cultural landscape. Thereby, the soil archive is threatened by digging new lakes as as water buffers or for the purpose of creating attractive urban environments, like newly dug ponds, touted as enhancers of luxurious building schemes.



Figure 8. The Hattstedtermarsch in North Frisia between Hattstedt and Bredstedt shows its diverse occupational history through varied parcelling structures and manifold dikes (Photo: Walter Raabe).

Apart from such urban expansions, agricultural developments are affecting the cultural heritage and landscape values as well. The remaining variety in cultural landscapes is jeopardized constantly by standardization and scaling of agricultural

practises and buildings. Since the 1960s, vernacular farm houses have been and still are being replaced by structures that are dictated by general (sometimes even global) standards on farming architecture, building-materials and efficiency both by their form and function. Nor is separate ownership of the farmstead and the buildings a guarantee for maintaining historical values. Everywhere in the Wadden Sea Area, especially in the western marshlands, traditional field- and parcelization systems were rationalized through re-allotment, scaling, land consolidation often by means of filling up old ditches, smoothing ditch banks, filling trenches and stubbing up treelines bordering fields. Meadows, traditionally characterized by their herbal variety, were mostly stripped of their original vegetation and replaced by the monoculture of perennial ryegrass. Programs aimed at reducing grey geese as well as barnacle geese have been implemented in their protected areas by nature organizations to retain support among the rural population. In the meantime the growth in the number of geese is mainly due to the highly fertilized adjacent meadows. In addition, variety is reduced by the widespread practises of deep drainage wiping out traces of habitation (e.g. sites of lost villages, disappeared cemeteries and home sites).

History

Though the historical awareness in the Wadden Sea Region is traditionally high, especially on the islands, as islanders are deeply attached to their birthplace, and through Frisian consciousness, a more general awareness based on the Wadden Sea and its marshes is well-nigh lacking. Besides, the identification of the population is still more towards the national states, provinces or even former principalities than towards the Wadden Sea Region.

Apart from this meta-level consciousness, historical knowledge is, like elsewhere, limited, usually going back no more than three generations and focused on big events. The following example, which simultaneously can be used in coping with the subsidence of peatlands, as well as in anticipating climate change, will suffice. The ongoing higher and more irregular precipitation figures, especially when coinciding with adverse winds and tides, require an increased buffering capacity and storage of water inland. Such measures are controversial, as people are hardly aware of the fact that before the middle of the 20th century such a storage capacity actually existed in major parts of the lower marshlands (Sietlände) and the adjacent peatlands. Large parts of the lower marshlands were not drained at all in winter and as such were always inundated during that season, offering excellent skating rinks. Moreover, farmers used to appreciate the small layer of sediment the winter water deposited. These winter inundations had a less known but beneficial side effect in limiting the subsidence of peat- and marshlands.

Even though originally deposited by the sea, it is the embankments through which the marshlands have become what they are. Dikes form an indispensable though jeopardized part of our cultural landscape, especially the sequent dikes that very often have been removed, the former Dollard dikes being the most striking and disappointing examples. Whether in the Danish koge, the North Frisian köge, in the polders west of the Elbe estuary or on the islands, dikes are the most striking and visible evidence of the interaction between man and nature. Also, there exists an age-old tradition of reclamation of the salt marshes that has only recently made way for nature conservation and development. Parts of the local population mistrust the goals set by conservationists and authorities, all the more so when accompanied by budgetary cuts. Dynamic coastal management on some of the islands provides a similar example with comparable reactions. Though provably beneficial from an ecological perspective, islanders very often consider such schemes as jeopardizing

their safety, their traditions and their ways of living, mistrusting ecological goals to be disguises to financial cuts on coastal defence. Islanders see governmental cuts on safety budget under the pretext of ecological diversification, while their beaches and dunes are receding day by day.

Scenery

Although there is a lot of overlap with the three preceding targets, at least five of the most visible elements traditionally dominating the landscape, e.g. churches, farmhouses, ditches, dikes and traditional windmills can be treated under this heading. In a predominantly very open Wadden Sea landscape, interventions have a considerably greater visual impact than in wooded, small-scale intimate landscapes. Degradation of the horizon through decay of these traditional elements is an ongoing threat. Plans to manage and restore churches have often become redundant through secularization. An ageing population is increasingly jeopardized by the creeping impoverishment of large parts of the region. A comparable process is more or less troubling farm houses. Many traditional farm buildings since 1970 have lost their agricultural use. Quite a few could be saved thanks to a meaningful conversion to another function. However, the ongoing economic decline seems to jeopardize their survival. Many historical field patterns have already disappeared and can only be discerned on old topographical maps as well as in colour differences on satellite of aerial photographs. Excavation of ancient dikes can be considered as a direct attack on the settlement history of the Wadden Sea Area. When for instance the (West-) Frisian water board scrapped the oldest back-dike, the Slachtedyk, from its maintenance register, decay threatened. It was saved through adoption – in 2000 – by the provincial nature conservancy board 'It Fryske Gea' that has broadened its objective to include protecting cultural-historical elements.

Though they may be useful and necessary ecologically, wind and solar energy farms as a rule imply a direct attack on the cultural landscape, threatening the basic values of the Wadden landscape in the marshes as well as on the islands: namely space, openness and landscape.

Quality of scenery also extends to darkness. Dark nights belong to the additional benefits of a relatively sparsely populated area. Industrial clusters along the coast, brightly lit roads, wind turbines with their warning lights and greenhouse areas constitute an attack on darkness. Although these concentrations and phenomena provide many necessary (often low-skilled) jobs perfectly fitting to the area's labour force, light pollution at night should be mitigated as much as possible by turning off lights as well as using blackout curtains in greenhouses.

4. Recommendations

Mental attitudes and the integration of sciences

In February 2010, an Interdisciplinary Symposium in List/Sylt stated that "Natural processes and societal actions are inseparably interlinked in the Wadden Sea Area. These linkages incorporate the whole area: the sands, the tidal flats, the islands as well as the marshes and swamps of the hinterland". Adaption will be one of the key words in coping with the ongoing and oncoming environmental changes, as it has been in the past. By developing and implementing innovative concepts of coastal management the

symposium stated that “national and regional differences have to be taken into consideration”. The mental attitudes and positions of the region’s inhabitants as well as the different users of the coastal area are also a key factor. This as well as interdisciplinary research bringing natural and engineering sciences together with social and cultural sciences have been neglected too often in the past. Plans to tackle complex problems that face the area now and in the near future need to be communicated in an understandable way to the local populations.

Monitoring the cultural landscape

The trilateral project *Lancewad* (1996-2001) delivered an initial inventory of the cultural-historical elements and structures in the Wadden Sea Area and shed light on a number of cultural connections and similarities. It would be very useful if this database was made accessible on the internet, even if the data were gathered more than fifteen years ago. Moreover, it is absolutely necessary to proceed with the inventory by developing it further and elaborating it into a monitor more or less in accordance with principles formulated at the workshop “Indicative Mapping of the Maritime Heritage of the Wadden Sea” that took place in September 2012 in Husum, Germany. Whereas this project aims to focus on the three categories of drowned prehistoric landscapes, historic cultural landscapes and maritime archaeology, it is imperative to extend it to the historical landscape as a whole and its constituting cultural-historical elements. The human sciences have a considerable research backlog compared to the natural sciences. This is in part the result of the complexity of human behaviour, whereas natural sciences can count on substantial funding by multinational companies and public institutions for basic research as well as on the urgency of medical and ecological issues.

Be that as it may, a continuous GIS-monitoring of the cultural historical landscape is imperative and should rest on dedicated geological and pedological models (for the purpose of knowledge of the subsoil), on digitalizing and analysis of old and new maps as well as of compiling and modelling digital data on archaeology, historical engineering and water management, architectonics, art history of the Wadden Area, spatial structures (field systems, town and village plans and patterns), historical and contemporary land-use, as well as on contemporary, demographical and sociological data. The data should be digitally accessible for everyone on the internet.

Combining new techniques with old knowledge

Whereas new technologies are spreading rapidly across the world, old techniques and ideas are often discarded and forgotten. Sometimes even so-called new techniques can be characterized as a reinvention of the wheel. Old knowledge is knowledge too! It is therefore absolutely imperative to create and host a database. This database will contain digitized old books and maps or books and articles considered lost and forgotten on parts of – or subjects in any way relating to – the Wadden Sea Area, regardless of the language they were published in, nor the year in which they were published. Records and other documents of interest should be available digitally in due course to pool the knowledge of the Wadden Sea Area. A first start has been made with the so-called Waddenbibliotheek (Wadden Library) hosted at *Tresoar*, the Frisian Historical Centre in Leeuwarden.

Standardization and scaling

It is necessary to monitor town and village expansions and their effect on the cultural landscape. Often agricultural developments affect the cultural heritage and landscape values as well. The still existing variety in cultural landscapes is constantly threatened by standardization and scaling of agricultural practises and buildings.

Coping with decline and exclusion

Demographic and economic decline undermine the viability of an area and are a menace to the acceptation and continuing identification of the resident population with this region to whom the cultural unity is anything but self-evident! With a growing number of often lengthy unemployed people exclusion threatens and an increasing aversion among the local population to embraces the goals of the Wadden Sea plans. Tackling these problems requires constant attention.

A related problem is the ongoing gentrification of the islands, being a real threat to both islanders and tourists. One of the consequences is a growing lack of affordable housing for the children of island-dwellers. On the other hand a longer stay on the islands has become too expensive for people on a tight budget from the adjacent northern mainland, traditionally the bulk of the public that visited the islands and cherished the Wadden Sea. Measures should be taken to mitigate the effects of these ongoing processes.

Climate challenges

Apart from higher sea-levels and more and heavier storm surges, climate change also implies far more and much more irregular precipitation. Whereas the reinforcement of dikes barely meets resistance of the local populations, dynamic coastal management (e.g. wash-overs, opening of summer polders) meets more resistance but is gradually being accepted. More resistance is met in the low lying marshes and adjacent fenlands. Yet, here an increase of groundwater levels seems to be inevitable for the sake of buffering excess water as well as to halt irreversible subsidence of the ground. Past experiences may be helpful in the (probably inevitable) adoption of these measures.

Awareness

The awareness of the cultural historic dimension of the Wadden Sea Area, not only at political and administrative levels, between human and natural scientists, but also among the regional and local public, is a prerequisite for the success of conserving and developing the special qualities of the Wadden Cultural landscape. Its fragmentation does not make that easier. However, we increasingly realize that the landscape of the Wadden Sea Area and the history that goes with it, is a very narrow and precious edge and heritage of and on the European continent and as such forms a cultural unity that deserves protection, not in the least as the physical and human embedding of the Wadden Sea World Heritage site. It implies that the cultural history of the Wadden Sea in all its variation has to be presented as a coherent, comprehensive story. In this we can learn a lot from the experience our ‘ecological’ colleagues have built up during the past half century in their efforts to put the protection of the Wadden Sea on the

agenda. Transnational cooperation, providing information at all levels from village-venues till lecture rooms, monitoring and protection are essential to achieve that goal. A first step on the scientific plane was taken in December 2016 by means of an international symposium on Cultural Heritage in the Wadden Sea Area to be held in Husum, Germany.

An increasing awareness about the unity of the Wadden Sea Area also implies a stronger bond of mutual sharing. Apart from its importance from an economic and infrastructural view, a quick recovery of the Ems railway bridge (*Friesenbrücke*) in the line from Groningen to Leer can have a strong symbolic value in enhancing the unity of the Wadden Sea Area.

5. Summary

A sound awareness of the local population, as well as politicians and entrepreneurial stakeholders about *cultural heritage values* is vital for the preservation, development and sustainable use, but not self-evident. Protecting, enhancing and developing the landscape values and cultural heritage in a marine, decentralized landscape like the Wadden Sea Area still has a long way to go. Large parts of the mainland are plagued by demographic and economic decline, a process undermining the viability of the area and jeopardizing the acceptation and continuing identification of the resident population in this region of the upcoming challenges whereas the cultural unity is anything but self-evident to its inhabitants. Even today a Wadden-identity as such does not exist. Ownership of the local populations of the Wadden Sea's *World Heritage* site is, however, an absolute prerequisite for its success and for the management of ecological, economic, social and cultural values that go with it.

Vigilance is required with regard to the *variety of the cultural landscapes* that are typical for the Wadden Sea region. All the more so because the current process of impact on the landscape of economic and infrastructural developments is more insidious than manifest. The still existing variety in cultural landscapes, for example, is threatened constantly by standardization and scaling of agricultural practises and buildings

A more *general awareness* based on the Wadden Sea and its marshes is more or less lacking, as the population still base their identity more towards the national states, provinces or even former principalities than towards the Wadden Sea Area. Moreover, parts of the local population mistrust the goals set by conservationists and authorities, particularly when accompanied by budgetary cuts. In this regards, dynamic coastal management on some of the islands provides a similar example with comparable reactions.

The most manifest expression of the condition of the Wadden-landscape can be found in its visible elements that traditionally dominate the landscape, e.g. churches, farmhouses, ditches, dikes and traditional windmills. In a predominantly very open Wadden Sea landscape, interventions (industrial zones, modern wind-mills, 'industrial' farms greenhouses, town and village expansion schemes) have a considerably greater visual impact than in wooded, small-scale intimate landscapes. The degradation of the horizon through decay of its traditional qualities like openness and nocturnal darkness is an ongoing threat and has to be challenged.

Plans to tackle complex problems that face the area now and in the near future need to be communicated in an understandable way to the local populations. Contrary to the past experience, it is necessary to bring together more interdisciplinary research and

integration between natural and engineering sciences on the one hand with social and cultural sciences on the other hand.

A continuous GIS-monitoring of the cultural historical landscape is imperative. The data have to be digitally accessible for everyone on the internet.

Demographic and economic contraction and decline form a potential threat to the acceptation and continuing identification of the resident population with the goals of protecting the Wadden Sea World Heritage. As said before, the cultural unity of the area is anything but self-evident! With a growing number of often lengthy unemployed people exclusion threatens and an increasing aversion among the local population to embraces the goals of the Wadden Sea plans. The ongoing gentrification of the islands constitutes another though parallel potentially threatening development to both islanders and tourists from the adjacent mainland. Tackling these problems requires constant attention.

The ongoing climate change is both a threat and a challenge and, depending on the type of threat and the manner of approach, interpreted differently. Whereas the reinforcement of dikes barely meets resistance of the local populations, dynamic coastal management meets more resistance but is gradually being accepted. Past experiences may be helpful in the (probably inevitable) adoption of measures.

In the end, protecting the landscape and cultural heritage of the Wadden Sea Area in all its variation has to be presented as a coherent, comprehensive story. In this cultural historians can learn a lot from the experience 'ecological' colleagues have built up during the past half century in their efforts to put the protection of the Wadden Sea on the agenda. Interdisciplinary as well as transnational cooperation, providing information at all levels from village-venues till lecture rooms, monitoring and protection are essential to achieve that goal.

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