



**COMPARATIVE ANALYSIS
OF THE
LANDSCAPE AND CULTURAL
HERITAGE
OF THE
WADDEN SEA REGION**

The Wadden Sea

Waddenzee - Wattenmeer



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1 INTRODUCTION TO THE PROJECT

The Lancewad Project and the follow-up LancewadPlan project co-financed by the North Sea Interreg-Programme have developed:-

- a comprehensive and systematic knowledge of the overall landscape and cultural heritage of the Wadden Sea
- a systematic analysis of the regional values through the regional entities approach and
- a proposal for a strategy to protect, enhance and manage the landscape and cultural heritage

During that process it has been clearly suggested that the landscape and cultural heritage of the Wadden Sea Region, considered in an integrated manner as a cultural landscape, is of exceptional international importance. Indeed, its cultural heritage values are perhaps, as significant in international terms as its natural values. However, unlike its natural values, which have been made subject to a comparative analysis in the framework of the World Heritage nomination, the cultural landscape of the region has never been systematically compared on an international level.

The overall aim of this project is to undertake comparative analysis of the cultural landscape of the Wadden Sea Region to determine how unique it is internationally. It is anticipated that the project will further enhance awareness amongst stakeholders of the unique values of the region. It will assist in establishing future areas for co-operation in a trans-boundary context, focussing on those areas that are of international importance and promoting their sustainable management. Contributing to the establishment of an overall framework which gives the cultural heritage a role in ICZM, and further raising awareness of the special qualities of the cultural landscape of the Wadden Sea Region in an international context.

2 CULTURAL LANDSCAPE DEFINITION

The term "cultural landscape" embraces a wide diversity of responses to the interaction between humanity and its natural environment (von Droste *et al* 1995).

In §47 of the *Operational Guidelines for the Implementation of the World Heritage Convention* (UNESCO 2008) define a cultural landscape as follows:-

Cultural landscapes are cultural properties and represent the "combined works of nature and of man" designated in Article 1 of the Convention. They are illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal.

The Operational Guidelines further subdivide cultural landscapes into three main categories:

1. **Landscapes designed and created intentionally by man.** These include garden and parkland landscapes constructed for aesthetic reasons which are often (but not always) associated with religious or other monumental buildings and ensembles.
2. **Organically evolved landscapes.** These result from an initial social, economic, administrative, and/or religious imperative and have developed their present form by association with and in response to their natural environment. Such landscapes reflect that process of evolution in their form and component features. They fall into two sub-categories (designated for the purposes of this paper i and ii):
 - i - a relict (or fossil) landscape is one in which an evolutionary process came to an end at some time in the past, either abruptly or over a period. Its significant distinguishing features are, however, still visible in material form.
 - ii - a continuing landscape is one which retains an active social role in contemporary society closely associated with the traditional way of life, and in which the evolutionary process is still in progress. At the same time it exhibits significant material evidence of its evolution over time.
3. **Associative cultural landscapes.** These have powerful religious, artistic or cultural associations with the natural elements of the landscape rather than material cultural evidence, which may be insignificant or even absent.

It is these definitions which the Wadden Sea project will apply to the selection and interpretation of the comparative cultural landscapes. The Wadden Sea itself belongs primarily to category 2 and may be regarded as largely falling within 2.ii, although in fact it combines 2.i and 2.ii in a quite complex way (see Section 3 below). In addition through the work of painters and writers, and also through the way it is understood, managed and promoted the Wadden Sea can also be regarded as an associative cultural landscape (category 3).

3 The Wadden Sea region: the outstanding features of the cultural landscape

The Wadden Sea region is the existing and former tidal flat area fringing the southern shore of the North Sea in Western Europe. This coastal land is an international region extending over three countries, forming a part of The Netherlands, the Federal Republic of Germany and Denmark.

The region includes the West-, East- and North-Frisian Islands (including the Danish Islands of Fanø, Rømø and Mandø), the shallow Wadden Sea itself and the predominantly endiked marshlands (*clay-polders*) on the mainland. Its outer limits are the Hondsbossche Zeewering near the Dutch village of Petten in the southwest ($52^{\circ} 46' N, 4^{\circ} 39' E$) and Danish Blåvands Huk ($55^{\circ} 34' N, 8^{\circ} 4' E$) at the north-eastern end. Seaward the 10 metre depth contour in the North Sea can, more or less, be considered as its boundary. Inland the Wadden Sea region's limits are determined by the extent of the clay soils (endiked marshes and salt marshes), resulting in a rather variable physical boundary. In general the marshes, developed on sediments deposited by the sea, are at their broadest in the west, whilst their inward extent

reaches farthest along the banks of the rivers Ems, Weser, Elbe and Eider. In all, this region measures some 22.000 square kilometres, almost equally divided between land (48.5%) and water (51.5%). About 63% (64% of the marshes) of the total Wadden Sea region lies in Germany, whereas the shares of Dutch and Danish parts are about 30% (33%) and 7% (2.5%) respectively.

Table 1: Size (km²) and share of the different parts of the Wadden Sea area

	Denmark	Schleswig-Holstein	Lower Saxony	Netherlands	Total
<i>Wadden Sea</i>	1100	4410	2914	2915	11339(51.5%)
<i>Frisian Islands</i>	190	334	193*	400	1117 (5 %)
<i>Marshes (i.e. clay-district)</i>	247	2078	4051	3179	9555 (43.5%)
Total area	1537(7%)	6822(31%)	7158(32.5%)	6494(29.5%)	22011

* incl. Scharhörn and Neuwerk

All the landforms in the Wadden Sea region have essentially been created from a marine or tidal environment, the influence of fresh water systems in forming the endiked marsh lands (consisting of clay soils) has been marginal. This is true for the islands as well as for the sand banks and tidal flats, for the inlets between the islands, the estuaries, the salt marshes and the endiked marshes or polder lands. In contrast to other deltaic and river-derived coastal areas the tides are the main generators of sediment transport, resulting in a decrease in grain size landward instead of seaward as is the case in fresh water dominated coastal environments.

The former tidal basin in which the western Wadden Sea region originated, developed from about 3800 BC (Sub boreal) behind a barrier that was built up of sand banks shielding the Frisian Islands. Initially the supply of fresh water by rainfall and rivers prevailed and large fens developed. From 1200 BC onwards peat growth stopped, coastal bogs were inundated and ultimately covered by layers of sand or clay. North of the river Eider behind moraine ridges and sand spits (*Nordfriesische Nehrung*) fronting the North Sea from Sylt to Eiderstedt large areas were cut off from marine influence and extensive reed swamps developed. In Dithmarschen on the other hand erosion by the Elbe and Eider rivers during the last Ice Age resulted in much deeper glacial surfaces enabling a rising North Sea to penetrate as far as the moraine heartlands.

The Wadden Sea area however is not only a natural region, it is a cultural entity too. The 'Wad' element of Wadden itself means shallow or fordable place, presumably derived from the possibility, in many places, to cross this sea on foot at ebb-tides. The marshes have a history of more or less permanent habitation reaching back almost 3000 years. What's more, while their landscape may have been initially a product of the sea, it was, nevertheless, humanity that adapted and shaped, destroyed and rebuilt, by deliberate planning as well as through trial and error, these

maritime lands creating the landscape we see today. Many of the techniques of hydraulic engineering and the colonization of moorlands, for which the Dutch have become famous, were developed initially by the population colonising what is now the province of Fryslân (Friesland) and North Holland from the Iron Age onwards. In Carolingian times these 'Frisian' techniques really caught on and were taken to the bogs in the heart of Holland and Utrecht as well as to the banks of the Weser, Elbe and Eider and eventually exported to England (Fens, Hatfield Chase in Yorkshire) and more distant places.

Sea

The Wadden Sea proper is the main coastal feature on the German Bight, that part of the North Sea that is flanked by the northern coasts of the Netherlands and Lower Saxony and the western coasts of Schleswig-Holstein and Denmark. Whereas the Wadden Sea is completely covered by water at high tides, at low tides extensive mudflats and sandbanks emerge, separated from each other by tidal gullies and channels. Twice a day this shallow water-basin is filled by North Sea water entering the tidal inlets between the islands and the estuaries of the rivers Ems, Weser, Elbe, Eider and Hever. The relatively wide expanse of water of the Wadden Sea has the appearance of a lagoon intersected by tidal gullies and mostly separated from the open sea (North Sea) by a string of sandy barrier islands.

This shallow sea is in fact a tidal-flat area and as such the largest of its kind in Europe. The Dutch and German parts of the waters, tidal flats and salt marshes of the Wadden Sea area have been inscribed as a World Heritage Site. As a mesotidal barrier island system with minor river influences fringing a flat and low-lying plain, it can – from a natural perspective at least – only be compared to the non-listed Georgia Bight on the eastern coast of the United States. There are ecological differences between both systems; the Wadden Sea for example has hardly any supply of riverine silts, and is furthermore characterized by contiguous open and bare flats of sand and mud, with salt-marshes confined to its fringes. From a cultural viewpoint the differences are even more striking. The embanked coastal lands (marshes) and islands around the Wadden Sea area together form a cultural landscape that reflects three millennia of intense interaction between humanity and landscape. What is more, the marine parts of the Wadden Sea area, in addition to their natural significance, are of great cultural and archaeological importance. In particular it provides an incomparably rich preservation environment for shipwrecks of all periods, which have the potential to provide significant information on organic cargoes and material culture. There are also extensive inundated cultural landscapes, the western part of the Dutch Wadden Sea as well as the Dollard, the Jade Bay and the North Frisian Wadden Sea being perhaps the best examples.

Islands

Of the total extent of land in the Wadden Sea region (viz. 10.672 square kilometres), roughly one-tenth (1117 km²) is occupied by the 50 or so islands and shoals, of which a little under 30 are more or less permanently inhabited. The islands can be divided into two categories. The larger category, formed by generally sandy dune islands, together comprise a chain of barrier islands stretching from the town of Den Helder (NL) up to Esbjerg (DK) and separating the Wadden Sea from the North Sea. The smaller category of islands lying inside the barrier islands are the so-called *halligen* marsh islands. Mainly built of silt and clay, the majority of these *halligen* can

be found between Sylt and Eiderstedt, in front of the North Frisian mainland. They are partly remnants of a former salt-marsh, destroyed by the sea in 1362 and later. West of the Elbe river the longest barrier islands lie in the west where the tidal range is at its smallest. To the east, the German Bight, and more so the Elbe estuary, act like a funnel causing an increase in the tidal range and consequently an almost total absence of islands; with exception of tiny islands of Scharhörn, Neuwerk, Trischen and Tertius. The same phenomenon occurs in the northern part of the Wadden Sea region going from the Denmark southwards towards the Elbe.

It is not only the islands that act as a protective barrier for the mainland. The Wadden Sea region as a whole owes much of its physical existence to the erosion resistant Pleistocene ridges. They function as points of suspension both for the islands and for parts of the mainland. In prehistoric times erosion was halted by – from west to east – the glacial highs of the Hoge Berg at Texel and the former isle of Wieringen, ground moraines of Oostergo, Winsum, Heveskes, Ostfriesische Geestplatte and the end moraines the Hohe Lieth, the spits (Nehrungen) of Dangast, Michaelisdonn and Schobüll as well as the Pleistocene bluffs at Hjerpsted and those around the Ho Bugt. Nowadays sub glacial moraines on parts of the North Sea floor still function as an impediment to erosion by the sea, such as the Texel Stones or Vlieland Roughs, the Borkum Riff, the Amrum Grund, the Sylt Aussen Grund as well as parts of Horns Rev.

Land

The mainland of the Wadden Sea region covers some 9500 km² and it too was formed and influenced by the sea during the past three millennia. In fact these endiked marshes or polder lands forming the littoral of the Wadden Sea very nearly mark the maximum extent of the influence of the sea since about 2600 BP. All of the marshes (clay-district) were at some time part of the Wadden Sea itself, complete with gullies, shoals, sand banks, mudflats and salt marshes. In places like Central Westergo, Middag-Humsterland, Wangerland and Eiderstedt (Utholm and Everschop) the irregular ditches are the remnants of previous gullies.

The extent of the endiked marshes is itself an indication both of the direct influence, and maximum extent of the sea. As former salt-marshes they as a rule evolved through steady sedimentation under normal tidal conditions, but occasionally much more swiftly and dramatically through catastrophic storm surges. Lying on the western edge of the Eurasian continent at about 54⁰ N implies that the region has a mild maritime climate with a mean annual precipitation of about 750 millimetres. The absence of substantial relief, a prerequisite for the development of a 'wadden sea', together with a precipitation surplus results in a generally rather sluggish natural drainage and in consequence a growth of bogs. Coastal marshes and mostly sandy pleistocene hinterlands (*Geest*) initially were separated by a belt of these well-nigh impenetrable bogs (*venen, Fehne, Moore*, compare *fens* in English) of varying width. These raised bogs originally functioned as an effective barrier to foreign intruders coming from overland. Subsequently the bogs were settled, and destroyed or turned into low-moors as a result of drainage, cultivation, subsidence, compaction or decay. In some cases peat extraction has resulted in the formation of lakes and meres, whilst in other locations the peat has been sealed by a layer of sea clay. The coastal marshes themselves were, and often still are, indented by several estuaries and bays more or less dividing them into peninsulas. North of the Elbe, marshes and *Geest* (as

in Wursten east of the Weser mouth) are often contiguous. The Danish marshes are practically uninhabited. Here, farms and villages were traditionally located on the edge of the moraine land, halfway between the pastures of the marshes and the fields of the Geest.

Occupational history

The salt-marshes from an early stage attracted settlement from the hinterland. People were lured by the high natural fertility of their mineral-rich clay soils, calcareous and lightly textured. These coastal lands moreover were rich in all kinds of fish and fowls. Permanent settlement in the salt-marshes was preceded by seasonal use of the marshes as pasture by people living on the adjacent districts where sandy, Pleistocene deposits were less prone to flooding and more attractive to early settlement despite their poorer soils. To protect their farms against flooding the first settlers, who had established themselves on the highest parts of the marsh (marsh bars and natural levees), from the 5th century BC onwards started to raise their living places by throwing up artificial mounds, the so-called *terpen*, *wierden*, *wurten*, *warften* or *værfter*. Continued subsidence and rising sea levels necessitated a further heightening of these mounds of which quite a few evolved from simple house-platforms into larger village-mounds. In recent years small dikes raised in the 1st century BC which protected one or two fields against summer flooding have been discovered in Westergo. A proliferation of mounds, the use of peat for heating and rainwater for drinking as well as the existence of many treacherous sands and shallows are the most typical features of the Wadden Sea region that figure in the first descriptions of the region by classical authors. North of the Eider the coastal areas, abandoned earlier by Angles and Saxons migrating to Britain, were settled from the 7th century onwards by Frisian immigrants from what is now the Northern Netherlands. Their migration probably was induced by overpopulation and floods as well as the political and economical expansion of Frankish tribes to the south of them. Since the 7th century the area between Eider and Elbe was resettled too. Saxon tribes repopulated Dithmarschen and Eiderstedt and, like their precursors in the 2nd and 3rd centuries AD, threw up artificial mounds on the beach barriers, whilst their Frisian counterparts initially occupied the higher nuclei of Sylt, Amrum and Föhr.

During the first millennium AD the salt marshes belonged to one of the densest populated parts of Western Europe. In the 7th and 8th centuries the land west of the Weser, called Frisia, was in fact the trading hub of Western Europe. At the north-eastern end of the Wadden Area Ribe and nearby Haithabu (Hedeby/Schleswig) formed major centres in the chain of trade between the North Sea (including the Northern Atlantic) and the Baltic regions. Commerce resulted in growing prosperity as well as an increasing population. Starting in the western parts from about 900 onwards the accent on overseas trading shifted to the settling and cultivation of the inland raised bogs. Though Viking traders and raids dealt a severe blow to Frisian trading, it most certainly was growing population pressure that evoked this movement inland. Together with the Ile de France and the loess districts in Southern Belgium and the Rhineland, the Wadden Sea region was at that time the most densely populated part of Western Europe.

Subsequently the salt-marshes were adversely affected by a number of environmental pressures. To begin with, there was the growing amount of fresh water unleashed from shrinking inland bogs that as a result of colonization and cultivation

were rapidly losing their water buffering capacity. Parallel and elongated parcellation boundaries still survive as evidence of the colonization of the adjacent moorlands, in addition numerous lakes are evidence of digging and dredging of salinated peat from below the clay-layer in order to procure salt. Little or no relief was provided by sluggish drainage that together with the intermingling of salt and fresh water led to a generally brackish environment and endemic malaria in many places. All these developments contributed to a specific occupational history. Mounds testify to the permanence of living and working on the salt marshes and, during the Roman period, the first experiments in embanking just one or two fields by means of small dikes in order to protect the crops against summer-floods.

At the start of the second millennium AD, a warmer climate resulted in a higher storm frequency and more precipitation. In order to cope with a growing amount of salt and fresh water, the 10th century saw the appearance of the first ring dikes in Westergo. Chains of dikes protecting larger areas, than just a few fields, soon appeared in other parts of the Wadden Sea region. Technologies in embanking the coastal salt marshes as well as developing the inland bogs were developed in the Western Wadden area and from there exported initially to the heart of Holland, then to the North German coastal bogs and eventually into Great Britain. Culverts (*pomp, pump*) were developed to lead the surplus of water through the dikes. Portages were used to let ships cross dikes at all gauges. The sluice (*zijl* or *Siel*) evolved from the culvert and made possible the passage of ships at equal tides. Locks were introduced from the end of the Middle Ages and combined the benefits of both sluices and portages. From the late 12th century onwards Cistercian and Norbertine monasteries proliferated in the area, often taking a lead in manning and organizing the struggle against the waters.

Since the end of the 12th century the Wadden Sea area nonetheless has suffered great losses of land. The flood of 1362 (*Manndränke*) destroyed the moorlands behind the coastal spit of North Friesland. These and other floods made heavy inroads, especially in the areas west of the Elbe. Zuiderzee, Lauwerszee, Dollard and Jade Bay were a result of a growing storm frequency, reclamation and cultivation blunders and often mismanagement of dikes and other waterworks. Everywhere in the region wheels of breaching ponds give further evidence of the struggle with the sea. Loss of land in one place often meant accretion at other spots through the transport of sediment. So the bays of the Marne (south of Harlingen), Bordine or Middelzee, Lauwers, Hunze, Fivel, Campen, Sielmöncken, Harle, Ahne, Heete could be reclaimed as well as parts of the *Köge* and halligen north of the Elbe. Larger inroads of the sea, such as the Zuiderzee, the Dollard or the Jade Bay were only partly recovered.

The great similarity of toponyms through the Wadden Sea region is a further proof of their mutual geographical kinship. To name only a few: *ried, rijt, ritt* or *vliet* and *fleth, lek, leek* and *lak* for streaming water. *Zijl* or *Siel* for sluice, *keeg, kaag, koog* and *kog* for land (formerly) outside the dikes. All in all the embankment history of the area is unique in the way that it extends over at least a thousand years.

Political and economic history

In the Middle Ages most of this coastal area was known as Frisia (Friesland), especially the area west of the river Weser (including Land Wursten east of that river)

as well as the land between the river Eider and the town of Tønder. The Frisians could long preserve their autonomy thanks to the geographical qualities of their homeland, being indented by broad inlets and fringed toward the hinterland by hardly penetrable bogs and peatlands. Even the so-called Frisian kingdom in the Early Middle Ages that stretched from modern Belgium into Denmark; was less a coherent territory, centrally ruled by one king, than a collection of rather small political entities, each having their own king and political centre, with Westergo probably at its heart. The relative isolation toward its hinterland, the commercial success of farming in this fertile, though hazardous environment, a well-nigh constant struggle against the elements and the insular character of its constituent parts, created a tradition of independence and self-sufficiency in its people, evolving already in pre-Modern times into a rather autonomous and individualistic society.

Central rule exercised from Carolingian times by emperors and kings through dukes and counts soon eroded, giving way from the 12th century onward to autonomous republics, self-governing districts under a farming elite, that were often descendants of the old ruling classes. The adjacent Saxon peoples shared much the same qualities. In fact the independent farmers republic of Dithmarschen in 1559 was the last part of the Wadden Sea region that was conquered and integrated in the Danish duchy of Holstein. From the 19th century onward, the integration of the Wadden Sea region into three larger national political entities, The Netherlands, Germany and Denmark has led to the increasing marginalization of the area. Since about 1860 a relative economic and demographic contraction has taken place. It was caused by a shift of economic activities and population away from the area to newly developed economic centres such as the Rhine-Ruhr area, the Randstad Holland and the area around Copenhagen, as well as to nearby centres like Hamburg and Bremen and, last but not least, by emigration to overseas destinations. Until very recently the area has been neglected. Centrally guided systems of education have resulted in the domination of national themes and curricula focused on the more populated and central parts of the nation, though differently in Germany than in the Netherlands ('Holland') or Denmark. Regional themes, issues and histories were overwhelmed and replaced by their national counterparts. Concentration on the economically more successful and urbanized parts of the nation-states, pushed regional ideas and languages into a marginal corner of folklore, being considered something from an ancient and backward past. Developments like these contributed to a rather defeatist self-perception in many parts of the region too.

Trading, overseas and inland shipping and commercial farming were the cornerstones of wealth in the Early Modern Wadden Sea region, up till the middle of the 19th century one of the wealthiest parts of Western Europe, not to mention the world. Trading companies, such as the Dutch East India Company, had enormous importance not only in the Netherlands and the wider Wadden area, but also in the Far East. In and around towns manufacturing industries flourished. Albeit less rich and urbanized than adjacent Holland or Flanders, the Wadden area, especially its western parts, nevertheless attracted a lot of seasonal as well as permanent migrants from the Upper Saxonian, Westphalian, Hessian and Prussian hinterlands. They came here to work as mowers, brick-makers, fishermen, boatmen, textile-workers, peat-cutters, whalers, or else tried to sell their home-made textiles as hawkers and often settled down in the towns as small tradesmen and shopkeepers.

The world-wide chain of clothing-stores C & A for instance, was established in 1841 by Westphalian textile traders in the Frisian town of Sneek.

Together with workers from the area itself the migrants played an essential role in developing the adjacent peat bogs into the fen colonies of Friesland, Groningen and Ostfriesland that became a model for fen colonies elsewhere in Western Europe. The Frisian Islands and adjacent parts of the mainland before 1800 were the main providers of skippers and other crew in the Baltic trade that was dominated by Amsterdam ship-owners.

The cultural heritage of the area in many ways reflects its history as an early-modern society, firmly based upon a modern, commercial agricultural economy of dairy-farming, cattle-breeding and cereal production and on other commercial activities such as inland shipping, fisheries, brick- and tile-making, the production of ceramics and textiles, luxury-goods or peat-cutting, as well as the processing of local or imported primary products like cheese, butter, salt, sweets, sugar, coffee and tea.

Apart from the natural beauty of the islands, the Wadden Sea itself and the salt marshes, it is the occupational history of coping with salt *and* fresh water that most strike the eye. This is reflected in scores of artificial mounds. Furthermore it is the numerous dikes as well as duck-decoys, canals, locks and other waterworks in the area that strike the eye. Not to mention the architectural heritage reflected in hundreds of villages with their medieval churches, in towns with beautiful town-halls and merchant-houses, or in spacious and often pompous farm-houses in the countryside. There were also – though most of them demolished during the 18th and 19th centuries – hundreds of nobles houses (*stinzen, states, borgen*). In addition numerous works of art and craftsmanship reflect the former wealth of the Wadden Sea region. Quite a few scientists, discoverers, philosophers, artists etc. of world fame were born around the Wadden Sea: Rudolph Agricola, Willem Barents, Abel Tasman, Gemma Frisius, Rembertus Dodonaeus, Hans Vredeman de Vries, Peter Stuyvesant, Balthasar Bekker, Tiberius Hemsterhuis, Theodor Mommsen, Jacob Riis, Mata Hari, Maurits Escher, Henri Nannen, Theodor Storm, Sir Lawrence Alma Tadema to name only a few. Indeed, the greatest sports event in the Netherlands, the 200 km Eleven Cities Skating Tour (*Friese Elfstedentocht*) is – on average once every seventh year – held on the mainland in the Wadden Sea region on the canals and lakes of the Dutch province of Fryslân.

Character of the Wadden Sea region

The Wadden Sea region is the geographical outcome of the struggle of an 'amphibious' society (having both an agrarian and maritime character) with and within a rich and fertile, though hazardous, maritime environment. The landscape has been created by the interaction of nature and humanity. The Wadden Sea region is unparalleled in the world in that it is a unique example of a transgressive coastal landscape with a long occupational history. Just like the Frisian islands themselves, the Wadden mainland is an archipelago of districts traditionally separated from each other by estuaries, bays and inlets. Although this has resulted in regional and local differences, the Wadden Sea area nevertheless forms **one contiguous, coherent landscape** with a history that can be traced back some 3000 years. Its occupational history is on balance the successful outcome of three millennia of water management in a rich and fertile, albeit rather dangerous natural environment. Thousands of

dwelling mounds, thousands of miles of dikes (including many wheels or breach ponds), ditches and canals, scores of locks, sluices and polder windmills, characteristic field patterns that reflect both former salt marsh gullies and the colonization and reclamation patterns, as well as thousands of picturesque villages and harbour towns and often sumptuous historical farm houses testifying the age-old innovative character of dairy and arable farming in the region. Together they furnish the marshes and islands of the Wadden Sea region.

The physical traits of all parts of the Wadden Sea region are very much the same, a flat and open land of broad horizons broken by islands, bays, lakes, canals and ditches. A land of 'beyond and across', in brief a region of shores, having both a great natural beauty and cultural content that compared to other parts of Western Europe is quite untouched as well as unique, not least because of its sheer size, stretching for some 500 kilometres along the southern shores of the North Sea. A land under lofty skies, mirrored by the ever present water, its great and indispensable natural value, combined with its cultural richness; contribute to the particular character of this unique eco-cultural niche of Western Europe.

Conclusion

The **Wadden Sea region**, with some 22.000 square kilometres, worlds largest transgressional cultural coastal wetland site, consists of three parts:

1) The actual **Wadden Sea** (11.339 km²), a Conservation Area consisting of water, tidal flats and salt marshes, of which the Dutch and German parts have been nominated for placing on the World Heritage List as a natural area of Outstanding Universal Value. Although the Wadden Sea is primarily a natural area, it nonetheless contains some very important cultural heritage features. The scores of ship-wrecks dating from Mediaeval and Early Modern Times in the western Wadden Sea (Dutch) are on the tentative list. In the northern Wadden Sea there are many inundated archaeological traces of agriculture and salt mining.

The *Wadden Land* (10.672 km²), is divided into the *Frisian Islands* (1117 km²) and the *endiked former salt-marshes or polders* (9555 km²) forming the clay district on the mainland, forms a cultural landscape created on the interface of land and sea. Being an amphibious landscape it constitutes an unique example of a transgressive coastal region with a long occupational history of nearly three millennia. As such it is the result of the interaction of physical developments (a Holocene landscape under a relatively strong sea level rise) and intentional as well as unintentional human actions.

2) The 50 or so **Frisian Islands** together can roughly be divided into two categories. The larger category formed by the generally sandy islands, together forming a chain of barrier islands from Den Helder (NL) at the south-western end of the Wadden Sea region up to Esbjerg (DK) at its north-eastern end. The smaller category of islands, lying inside the barrier islands and off the North Frisian coast are the so-called halligen marsh islands, that are partly remnants of a former salt-marsh destroyed by the sea. Apart from separating the Wadden Sea from the North Sea, the islands with

their age-old agrarian-maritime societies form the most dynamic eco-cultural frontier zone of the Wadden Land.

- 3) The **marshes** have been settled uninterruptedly since 600 BC.
 - a) Thousands of dwelling mounds, and miles of ditches (partly of a natural, partly of an artificial origin) up till today give archaeological and visual evidence of an occupational history reaching back nearly 3000 years.
 - b) Since about 1000 AD intentional water and landscape management by means of dike systems have resulted in the embankment of large salt marsh areas. Dike and water management under transgressive maritime conditions having its origins here, in an area lacking substantial relief and therefore characterized by a sluggish natural drainage. It was exported to the western central parts of Holland, and from there to the Elbe- and Wesermarshes, to Poland, Russia, France and England.
 - c) Sea-level rising on the one hand and the subsidence of the inland moorlands as a result of their cultivation from Carolingian times put the inhabitants in constant jeopardy. Apart from the constant danger of floods they had to adapt to an increased inflow of fresh water to the marshes from the subsided inland bogs. Moreover they had to face a constant threat of diseases related to a increasing brackishness of their environment (endemic malaria etc.).
 - d) The insular character of the region combined with a relative isolation toward the hinterland, together with the commercial success of farming in a fertile, hazardous environment created a tradition of independence and self-sufficiency. During the Middle Ages this coastal society found its political and social expression in the so-called Frisian freedom, evolving already in pre-Modern times into a rather autonomous and individualistic society. One of the material consequences is the enormous density of villages (parishes) with their still existing medieval churches as well as hundreds of nobles houses (*stinzen, states, borgen*) most of them demolished.
 - e) Last but not least: The Wadden area and its mainly Frisian inhabitants stand at the basis of the Dutch idea – developed in pre-modern times – of triumphing over the forces of nature, by conquering the sea.

4 OVER-ARCHING COMPARATIVE CRITERIA

There are no detailed guidelines as to how to undertake a comparative analysis exercise (von Droste 1995, Scazzosi 2004, Turner 2006), with even the Operational Guidelines from the World Heritage Committee being both short and general in nature (WHC, 2008). The World Heritage Centre has however published an analysis of the first 10 years of World Heritage Cultural Landscapes (Fowler, 2003 and 2004) which provides some indication as to how other cultural landscape studies have addressed the problem (see also Mitchell in von Droste *et al* 1995). The issue is how to define the special qualities of a place (see Section 3), and then to seek other places with similarities to these.

To this end a list of comparative areas has been assembled, largely from those wetland sites defined either as World Heritage Sites or as Ramsar sites, and which have a clear cultural landscape dimension. In preparing the list (see below) it has

already become evident that in dealing with a cultural landscape such as the Wadden Sea many other places have some of the cultural landscape qualities which make the Wadden Sea special, but few have all. The differences may therefore prove to be as important as the similarities.

For the purposes of this comparative analysis and in order for the comparisons to have clear validity, and also to narrow down the field of wetlands to a more manageable level, two **over-arching criteria for selection** were used to establish the list of places for comparison:-

1) that the landscapes should be coastal wetlands

and

2) that the coastal wetlands have cultural landscapes which demonstrate attempts to adapt the environment – by the creation of embankments, dikes, polders etc.

The application of these over-arching selective criteria to the World Heritage Site (WHC 2009) and Ramsar lists (Ramsar 2008) has led to the production of the list of comparative cultural landscapes (see Section 5) that are considered to bear some or many similarities to the Wadden Sea. However, a consequence of using these over-arching criteria is that the coastal wetlands selected are largely from the northern hemisphere and from a ‘western’ cultural tradition. In addition application of these criteria also mean that a number of the world’s most notable wetlands, such as the marshlands of Iraq and the Florida Everglades, do not qualify for comparative purposes as both are freshwater marshes.

5 COMPARISON OF CULTURAL LANDSCAPES

As a first step in the comparative analysis, a survey was made of the readily available literature, both published and on the internet, for coastal wetland sites that largely complied with the over-arching selection criteria: that the landscapes should be coastal, and show evidence for adaptation of the land to human purposes (part 4 above). A summary history of each comparative site was prepared, with particular emphasis on water management strategies (Appendix 1 summarised in Table 2).

Table 2: Comparative coastal-wetland sites complying with the over-arching selection criteria (see also Appendix 1)

	NAME	COUNTRY	SIZE (Km ²)	PHYSICAL LANDSCAPE	SUMMARY	WHS/RAMSAR DESIGNATION
1	Sundarbans	Bangladesh/India	2725	Delta, intertidal area with extensive mangrove cover	Tidal delta occupied by fishing tribes until the 11 th century. Post 1200 AD the dryland side converted to wet-rice cultivation, the water-logged forests retained as hunting-parks for local kings.	WHS (criteria ix and x) Ramsar site (Banglad

						esh)
2	New Brunswick/ Nova Scotia dykelands	Canada	173	Salt-marsh and reclaimed marsh	In 1604 French settlers established a colony. The first dykes in the Province were constructed in the 1630's, using technologies already practiced in France. Dykelands played a central role in the area's agriculture until the early 1920s.	Ramsar site
3	Neretva Delta	Croatia/Bosnia	200	Delta, cultivation ridges, marshes, lakes, rivers	Historically, the economy of the delta concentrated on hunting, fishing and cattle, and was dependent on the cycles and movement of water. First land reclamation dates to the 1880s. Further reclamation in the 1960's, created an arable landscape.	Ramsar site
4	Baie du Mont Saint- Michel	France	576	Bay, estuary and rocky island	The granite island of Mont St-Michel lies in a broad bay surrounded by former coastal marshes. The monastery of St Michel was built in 966 by Benedictine monks. Polderisation of the marshes created salt-marsh meadows used since the 11 th century for grazing.	WHS (criteria i, iii and vi) Ramsar site
5	Camargue	France	200	Extensive shifting estuarine marsh, the delta of the River Rhône.	Originally an island the Camargue was exploited by the Romans and in the medieval period for salt production and as grazing. In the 16-17 th centuries large estates were held here by merchants from Arles with free-roaming livestock. Land reclamation began in 1859.	Ramsar site
6	Essequibo	Guyana	8000	Drained coastal marsh	A marshy coastal plain about 25-35km wide, most of which is below mean high tide. The area was occupied by Arawak tribes, who had a farming, hunting and fishing economy. The first European settlers were the Dutch in 1620s. Between 1655 and 1680 a sea wall was built and a network of drainage channels constructed.	-
7	South Caspian lowlands	Iran	1800	Beaches, marshes, ponds and rice paddies	A landscape of freshwater lakes and marshes, brackish lagoons, irrigation ponds and rice paddies. Extensively cultivated over millennia, as well as providing an important hunting and fishing resource..The area has been urbanized for more than 5000 years and was a significant trading centre, and is now a tourist destination.	Ramsar sites
8	Po Delta	Italy	520	Reclamation of marsh	The Regional Park of the Po Delta is entirely below sea-level. Fossil dunes correspond to	Ramsar site

					ancient coast lines. Roman settlers were the first to attempt to manage the water with further reclamation taking place in the medieval period. Systematic and widespread water management took place in the 16 th century.	
9	Curonian Spit	Lithuania/Russia	330	Elongated sand-spit	An 89km sand spit, formed about 5,000 years ago. From c. 800 to 1016, it was the location of Kaup, a major pagan trading centre. The Teutonic Knights occupied the area in the 13 th century. Increasing deforestation in the 18 th century led to the dunes taking over the spit and burying whole villages. The 19 th century saw large-scale re-vegetation and reforestation projects.	WHS (criteria v)
10	Danube Delta	Romania	3124	Delta – reedbeds, fossil dunes, marsh and water	One of the largest wetland systems in Europe. The delta had a large range of natural resources, attracting settlement from the Neolithic period onwards. It became a link between the Mediterranean world and northern and eastern Europe. Large scale canalisation work began in 1862, and continued throughout the 20 th century. Reed was intensively harvested during the Communist era. From 1960 onwards large areas have been drained and converted.	WHS (criteria vii, x), Ramsar site
11	Doñana National Park	Spain	542	Sand dunes and coastal marshland	Since 1262 Doñana has been the favourite hunting reserve of Spanish kings. Wood gathering, charcoal production, cattle-grazing, beekeeping and fish farming occur within the Park.	WHS (criteria vii, ix, x)
12	The Wash and its maritime-influenced hinterlands	UK	2450	Bay, estuary and coastal marsh	An area of inter-tidal mudflats, estuaries, former marsh and fenland on the east coast of England. There are submerged land surfaces offshore. The Romans made the first attempts of land drainage, followed by the monastic institutions from the 7 th century onwards. The 16 th and 17 th centuries major reclamation began, aided by imported Dutch engineering knowledge. The 18 th century saw further improvements to the drainage technologies. The area has been transformed to a highly managed arable landscape.	Ramsar site
13	Greater Thames Estuary	UK	2000	Estuary, extensive sand flats,	The Greater Thames Estuary includes several smaller estuaries, sand and mud flats and	Large parts of the

				coastal marshes and marsh islands	banks, coastal marshes and marsh islands. The whole area has been a major zone of contact between Britain and the Continent for millennia. Land reclamation began in the medieval period, with a further period of major land reclamation in the 17 th century utilising Dutch knowledge and technology. The impact of London is paramount in the economy and history of the estuary.	Greater Thames Estuary are Ramsar
14	Romney Marsh	UK	100	Coastal marsh, shingle bank, marsh islands, estuary	Reclamation seems to have begun in the 9 th century, with further reclamation in the mid-12 th century following storm damage. There was extensive storm damage in the late 13 th and 14 th centuries, with the marsh being re-colonised in the late 15 th century.	Ramsar site
15	Cape Cod, Martha's Vinyard, Nantucket and the Elizabeth Islands	USA	8000	Sand spit and low-lying terminal moraine islands	Sand spit and islands on the north-east coast of US. Cape Cod was amongst the first places settled by Europeans in North America, with three towns founded in the 1630s. Intensive land use led to dune encroachment. The area also developed as fishing and whaling centres. By the end of the 19 th century the area became a summer holiday destination.	-

On completion of the text for these comparisons each site was scored under 7 criteria that were drawn out from the analysis of the cultural significance of the Wadden Sea (see Section 3). The main points of comparison are presented in Tables 3 and 4.

- 1) TIME-DEPTH - How old are the human elements of the landscape that reflect the processes of adaptation?
Scoring: 1= Evidence for human occupation is present and maybe quite early, but does not relate to adaptation of the landscape; 2 = Post-1500; 3 = pre-1500; 4 = Prehistoric
- 2) INTEGRITY OF CULTURAL LANDSCAPE - A measure of the wholeness and intactness of the cultural heritage and its attributes, including the survival of physical features, relationships and dynamic functions. How well do the elements that make up a particular landscape survive – eg if an area has a history of embankment how extensive is their survival?
Scoring: 1= Low; 2 = Medium; 3 = High; 4 = Exceptional
- 3) LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE – How well is the cultural landscape understood? - Are there surviving monuments and associated documentation, has archaeological fieldwork or other forms of research on the cultural landscape been undertaken, has this been published?

- Scoring: 1= Low; 2 = Medium; 3 = High; 4 = Exceptional*
- 4) DEGREE OF ADAPTATION OF THE NATURAL ENVIRONMENT – How far is the cultural landscape an adaptation of the natural environment?
Scoring: 1= Low; 2 = Medium; 3 = High; 4 = Exceptional
- 5) ASSOCIATIVE CULTURAL SIGNIFICANCE - What role does the cultural landscape play in the culture of the mind – is it an area famous for its influence on artists or writers, noted for its beauty or familiarity or for its role in folklore or identity ?
Scoring: 1= Low; 2 = Medium; 3 = High; 4 = Exceptional
- 6) EXTENT OF CULTURAL LANDSCAPE - What size is the cultural landscape area ?
Grading of significance: 1= 0-20,000 ha.; 2 = >20,000-200,000 ha.; 3 = >200,000-1,000,000 ha.; 4 = 1,000,000+ ha.
- 7) AUTHENTICITY - based upon the WHC Operational Guidelines (2008) - how far is the cultural landscape truthfully and credibly expressed through a variety of attributes including: form and design, materials, use and function, traditions, techniques and management systems; location and setting, language, and other forms of intangible heritage
Scoring: 1= Low; 2 = Medium; 3 = High; 4 = Exceptional

The 15 comparative sites and the Wadden Sea itself were then scored against these criteria (Appendix 1 and Tables 3 and 4).

Table 3: Comparative criteria scoring

	Name	Country	Time-Depth	Integrity of Cultural landscape	Level of archaeological and documentary evidence	Degree of adaptation of the natural landscape	Associative cultural significance	Extent of cultural landscape	Authenticity	Total
-	Wadden Sea	Netherlands/ Germany/ Denmark	4	4	4	4	4	4	4	28
1	Sundarbans	Bangladesh/ India	1	2	2	2	4	3	4	18
2	Nova Scotia dykelands	Canada	2	2	3	4	1	1	2	15
3	Neretva Delta	Croatia/ Bosnia	2	4	4	4	3	1	3	21
4	Baie du Mont Saint-Michel	France	3	4	4	2	4	2	4	23
5	Camargue	France	2	4	4	2	2	2	4	20
6	Essequibo	Guyana	2	2	2	4	1	3	2	16
7	South Caspian Lowlands	Iran	4	3	2	4	3	2	3	21
8	Po Delta	Italy	3	4	4	4	4	2	4	25
9	Curonian Spit	Lithuania/ Russia	2	2	4	4	4	2	3	21
10	Danube Delta	Romania	2	3	3	2	4	3	3	20
11	Doñana National Park	Spain	1	4	2	1	2	2	4	16
12	The Wash	UK	3	4	4	4	2	3	2	22
13	Greater Thames Estuary	UK	3	3	4	3	4	3	2	22
14	Romney Marsh	UK	3	4	4	4	2	2	4	23
15	Cape Cod,	USA	2	2	2	3	3	3	3	18

Table 4: Comparative sites ranked by score

	NAME	COUNTRY	TOTAL
-	Wadden Sea	Netherlands/Germany/ Denmark	28
8	Po Delta	Italy	25
4	Baie du Mont Saint-Michel	France	23
14	Romney Marsh	UK	23
13	Greater Thames Estuary	UK	22
12	The Wash	UK	22
3	Neretva Delta	Croatia/ Bosnia	21
9	Curonian Spit	Lithuania/ Russia	21
7	South Caspian Lowlands	Iran	21
5	Camargue	France	20
10	Danube Delta	Romania	20
1	Sundarbans	Bangladesh/ India	18
15	Cape Cod, Martha's Vinyard, Nantucket and the Elizabeth Islands	USA	18
11	Doñana National Park	Spain	16
6	Essequibo	Guyana	16
2	Nova Scotia dykelands	Canada	15

Time depth

Both the Wadden Sea and the South Caspian lowlands score high in this category. They each have long histories of human occupation, and more significantly in the context of water management for the purposes of agriculture and flood management. In the Wadden Sea the earliest settlements raised on artificial mounds above the floods date to the 5th century BC, and there is evidence for water management in the form of dykes from the 1st century BC, with large-scale works from the 10th century AD onwards. In the South Caspian lowlands in Iran the coastal wetlands have also been cultivated for millennia, largely in the form of seasonally flooded rice paddies, served by a network of channels, canals and artificial pools.

Slightly lower in the scores for time-depth are the Po Delta in Italy, the Baie du Mont Saint-Michel in France and the Wash, Greater Thames Estuary and Romney Marsh in the UK. These were all drained in the Roman or medieval periods.

The Po Delta has a long and impressive history of land reclamation and water management, with its origins in the Roman period, further reclamation taking place in the medieval period, largely by monastic institutions although the systematic organization of water management within the delta was largely 16th century in date. The polderisation and management of the Mont St Michel marshes is largely 10th-11th century in date. The Greater Thames Estuary, The Wash and Romney Marsh, all in the UK, have considerable similarities to the Wadden Sea. The Greater Thames

Estuary contains important Palaeolithic remains and there is settlement evidence from the Neolithic onwards. Embankment and drainage of the extensive salt-marshes began in the medieval period in a largely piecemeal fashion, but the main period of land reclamation began in the 17th century utilizing Dutch knowledge and technology and continued in an intermittent fashion until the end of the 19th century. In the Wash, as in the Po Delta, it was the Roman period that saw the first attempts at land drainage. Subsequently monastic institutions undertook large scale drainage works from the 7th century onwards. The 16th and 17th centuries saw the process of large-scale coastal reclamation begin, aided by imported Dutch engineering knowledge. Romney Marsh is sited on the southern coast of England, Reclamation of the marshland had begun in the 9th century and continued until the mid-12th century. There was extensive storm damage in the late 13th and 14th centuries, and the marsh was re-colonised in the late 15th and 16th centuries. Although the Greater Thames Estuary, The Wash and Romney Marsh are all notable coastal marsh areas, with long and complex histories, a significant portion of their landscape history and development is dependent on the introduction of land reclamation knowledge and technologies that originated in the Wadden Sea area, and adjacent parts of the Netherlands.

The reclamation of the Essequibo in what was formerly Dutch Guyana, and also in the Nova Scotian dykelands, both date to the period of European colonisation of the New World in the 17th century and like the UK sites are dependent on the importation of technologies developed in the Wadden Sea area. The reclamation of the Neretva Delta, the Camargue and the Danube Delta is relatively recent in date (the second half of the 19th century).

Integrity of the cultural landscape

Eight sites (the Wadden Sea, Mont Saint-Michel, Po Delta, The Wash, Romney Marsh, the Neretva Delta, the Camargue and Doñana National Park) all score highly on the basis of the integrity of their cultural landscape; that is on how well the cultural heritage and its attributes survive. Of these the Wadden Sea, Mont Saint-Michel, the Po Delta and the Doñana are all World Heritage Sites, the Wadden Sea and the Doñana were inscribed on the basis of their natural heritage, and Mont Saint-Michel and the Po Delta on the basis of cultural heritage. The global importance of Mont Saint-Michel largely rests on the architectural and historical significance of the Abbey, with the reclaimed marshland merely playing a supporting role; in addition the extent of the reclaimed marshland is very much smaller than that of the Wadden Sea. The Po Delta does have extensive surviving evidence for the many phases of occupation and water-management; however the delta largely formed from fluvial deposits and practically no tidal influence, factors which profoundly influence the nature of the land reclamation. The Wash and Romney Marsh both have significant surviving expanses of cultural landscape dating from the medieval and early post-medieval period. The cultural landscape of the Neretva Delta and the Camargue, which in both cases survives well, is largely 19th century in date. The Doñana National Park was a former royal hunting-park and as such has retained a largely natural appearance.

Level of archaeological and documentary evidence

Nine sites (the Wadden Sea, Mont Saint-Michel, the Po Delta, The Wash, Romney marsh, the Greater Thames Estuary, the Neretva Delta, the Camargue and the

Curonian Spit) have high levels of archaeological and documentary evidence. Documentary evidence survives, in the form of maps, surveys, the records of monastic and other land-owning institutions and in some cases of the surveyors and engineers who undertook the reclamation work. Archaeological fieldwork; coupled with palaeoenvironmental and landscape studies, have added to this understanding of the origins and development of these areas. There are surviving archaeological deposits features and monuments, ranging in date from the prehistoric period to the recent past. In some cases extraordinary levels of preservation are present due to the good preservation of archaeological sites and deposits beneath or within alluvium often in waterlogged conditions. These include shipwreck sites reflecting trade in action and buried settlement sites. This is particularly true of the Wadden Sea and is also demonstrated in The Wash where the Fens have buried entire prehistoric settlements, preserving important organic evidence within the peat, similarly the shifting sand dunes of the Curonian Spit engulfed entire medieval villages virtually intact.

Degree of adaptation of the natural environment

The degree of adaptation of the natural environment varies considerably within the study group. Nine sites score highly (Wadden Sea, Po Delta, The Wash, Romney Marsh, Neretva Delta, Curonian Spit, Nova Scotia dykelands, South Caspian Lowlands, Essequibo), demonstrating considerable modification of the landscape through water management methods such as canals, dykes and other forms of drainage, the modification of building and settlement construction methods to adapt to a landscape prone to flooding, and in the case of the Curonian spit the management of a shifting dune landscape through tree-planting and the construction of barriers.

The natural environments of the Baie du Mont Saint-Michel, and The Wash, Romney Marsh and the Greater Thames Estuary, Essequibo and Nova Scotia, bear the closest resemblance to that of the Wadden Sea, both in terms of the influence of the tide on the landscape and the presence of extensive tidal mud-flats, salt-marshes and low-lying islands. The methodologies used to adapt these environments to human use all bear considerable similarities to those used in the Wadden Sea, and indeed largely derive from methodologies and technologies developed in the Wadden Sea area.

The Po and Neretva deltas also demonstrate considerable degrees of adaptation of the natural environment, however in both cases the water that is being managed is largely fluvial in origin and the tidal influence from the Adriatic is negligible, factors which profoundly influence the nature of the land reclamation.

In the case of the South Caspian lowlands, where there is a long history of adaptation of the natural environment, there are also notable differences with the Wadden Sea. In particular the Caspian Sea is virtually tideless and is brackish in nature rather than true salt-water. The area is however affected by frequent changes in sea-level, these can be both dramatic and rapid, acting in synchronicity with the discharge of the Volga river. The predominant agricultural produce is rice, involving the regular, planned flooding of the rice-paddies with fresh-water, unlike the Wadden Sea where the drainage is managed so as to remove the water from the fields, and prevent salt water flooding.

The Sundarbans and Doñana are both World Heritage Sites on the basis of their natural criteria and outstanding examples of wetland environments. However they are both examples of land that was set aside as royal hunting reserves, and are therefore preserved as a largely wild landscape, albeit for the purposes of human enjoyment. Part of the South Caspian lowlands, the Miankeleh peninsula, was also used as a hunting-reserve by the Safavid dynasty from the 16-19th centuries.

The elongated sand-spit that comprises the World Heritage Site of the Curonian Spit bears comparison with the islands of the Wadden Sea. Here too is a landscape based on sand, already profoundly influenced by the wind and currents, where the impact of human activities in the form of deforestation or over-grazing can have devastating effects on an already shifting landscape. The movement of the dunes, in turn burying existing settlements and forming new land, and the efforts of man to stabilise an inherently unstable landscape is a feature of both areas. The same comparison can also be made with the peninsula of Cape Cod and the archipelago of islands known as the Outer Lands, comprising Martha's Vineyard, Nantucket and the Elizabeth Islands. The islands and the Cape are all terminal glacial moraines, together with marine deposits and sand dunes derived from fluctuating sea levels and coastal erosion and deposition. On Cape Cod, as with the Curonian Spit and to an extent some of the Wadden Sea islands intensive land use led to overgrazing and deforestation, resulting in erosion, loss of topsoil and the encroachment of dunes on to farmland.

Associative cultural significance

Part of the cultural significance of the Wadden Sea and adjacent parts of the Netherlands is as the progenitor of land reclamation methodologies and technologies. These technologies were linked to the concept of a struggle against the sea and the taming of nature which became a dominant attitude over the last few hundred years. The exportation of these from the Wadden Sea and adjacent parts of the Netherlands to the rest of the world is evident. The three UK sites discussed here, in the Essequibo, in what was formerly Dutch Guyana, and also in the Nova Scotian dykelands, where the technologies were learnt by the French from the Dutch and then exported to the new French colony of Acadia, the debt to technologies and ideas developed in the Wadden sea is evident. The Wadden Sea, seen as a natural system, can be regarded as the only landscape in central Europe which can be compared with the ecological and environmental value of the High Alps. That natural value is matched by the cultural significance of the landscape of the Wadden Sea area, including the mainland marshes. These contributed to the development of 'modern' aesthetics in the age of enlightenment and the aesthetics of the sublime. Whilst during the 19th century the historical and cultural significance of the Wadden Sea tended to be confined to national and romantic thinking, especially in Germany, there was a parallel development of a wider appreciation of the aesthetic value of the landscape. Painters and writers give testimony to that, particularly in the first half of the 20th century. This new dimension to the cultural history of the Wadden Sea adds to its significance, and was a fore-runner to the development of tourism in the area.

Many of the comparative sites also played an important role within trading networks. The Wadden Sea provided access to the German interior through the Ems, Weser, Elbe and Eider rivers and the Hanseatic cities of Bremen and Hamburg, as well as markets around the North Sea and further afield. Similarly the economy of the

Greater Thames estuary is dominated by the economic pull of London and the markets first around the North Sea. The South Caspian lowlands were also significant for a central position between two trading centres, being an important stage along the Silk Route linking the Far East to Europe. The area also contained a number of ports linking the Persian Empire with the other countries bordering the Caspian Sea. The Danube Delta also played an important role in the circulation of goods and artefacts, becoming a link between the civilisation of the Mediterranean world and northern and eastern Europe. The Po Delta played a similar role in linking the great trading and cultural centres of Venice and Ferrara with the rest of the Mediterranean and through the Silk Route eastwards to India and ultimately China.

The Cape and the Outer Islands, in particular Nantucket, like the Wadden Sea Islands, also developed as fishing and whaling centres, an economy that is reflected in their built heritage of whaling-captains houses and in the physical remains of whale-bones and whale-bone related artefacts.

In addition the 19th century saw the development of the Wadden Sea islands and the Cape Cod and Outer islands as tourist destinations, although the development of the Wadden Sea island as a tourist destination precedes that of its American counterpart, with the first resort opening in 1797 on Norderney. It was not until the end of the 19th century that improved rail transportation made the towns of Cape Cod Cape and the islands accessible to Bostonians and the area became a summer holiday destination. The Curonian Spit and the Greater Thames Estuary also became major internal tourist destinations.

Extent of cultural landscape

The Wadden Sea is considerably larger than any of the other comparative sites, dwarfing most of them. In total the inter-tidal mud-flats, reclaimed marshes and islands comprises an area in excess of 22,000 km². The extent and relative coherence of the Wadden Sea is an important factor in its international significance. By comparison the Sundarbans cover 2725 km² and the three UK sites, the Greater Thames Estuary, The Wash and Romney Marsh, which have considerable physical and cultural similarities to the Wadden Sea, taken all together cover only a fifth of the area of the Wadden Sea.

Authenticity

This measure is based upon the World Heritage Operational Guideline (2008), and it examines how far the cultural landscape is expressed through a variety of attributes. These include the form and design of the landscape or settlement or features within it, the materials used, the use and function of the landscape and how that relates to the past, the role of traditional techniques and management systems, the cultural landscape's location and setting, as well as language and other forms of intangible heritage.

The Wadden Sea is the area where the technologies were developed to reclaim land from the sea, an idea which was exported across the world. What makes it's cultural heritage special or authentic is the extent and completeness of the surviving cultural landscape, its long occupational history and its central position in the southern North Sea between two trading zones (the Baltic Sea and the Atlantic Ocean). In addition it

has its own Frisian identity, reflected in language, customs and place-names. Mont Saint-Michel, Po Delta, Romney Marsh and the Camargue have a high level of authenticity expressed in a similar way to the Wadden Sea, but on a much smaller scale. The Sundarbans and Doñana also have a high authenticity but in those cases the authenticity is of a natural landscape with minimal adaptation.

Discussion

In summary, although the Wadden Sea area can be compared to a range of other cultural landscapes, and shares with them many similarities, it also has its own unique qualities. It is considerably the largest of the landscapes studied, and represents one of the extensive and well preserved cultural landscapes within it, much of which survives. Its history of reclamation and management is also much older than many of the comparator sites, indeed it is in a sense the progenitor for many of the other comparative landscapes described here, and that is a particularly important part of its significance.

Almost 70 percent of the world's population lives on sea coasts, and river valleys and lakeshores have also formed a natural focus for settlement, therefore the percentage of human populations living in proximity to large bodies of water is actually even greater. The importance of the relationship between human settlement and economy and watery environments cannot be overestimated. In studying the water management in historic societies distinctions have been made between hydraulic civilisations, which controlled water flow and managed flooding, drainage and irrigation with dykes, dams and canals and aquatic civilizations, which exploited the annual cycle of river flood and adjusted to its excesses by, for example, building their houses on stilts. In Asia both methods can be observed, with the hydraulic methods more prevalent inland, where water was more seasonal and needed to be controlled in order to be brought more efficiently to irrigate the best agricultural land. In contrast, the aquatic civilisations tended to inhabit the deltas and floodplains where water was abundant as it moved to the sea.

In Europe hydraulic culture has become the norm; during the Roman period extensive water management was undertaken in various parts of the empire. However, starting in the Late Middle Ages, it was in the Wadden Sea area and adjacent parts of the Netherlands to the south and west, that water management became truly dominant. A development which affected both the economics, physical form, and mental outlook, first of Europe and later the world. Methods of land claim, dike construction and water management in the Wadden Sea area, and the associated enormous economic progress, were initiated here by the Dutch. These techniques were then exported to the whole Wadden Sea area and subsequently to other countries around the North Sea and elsewhere in Europe. As new European colonies were established in the Americas, Africa and Asia this hydraulic technology was exported and, at first glance, the world wide historical impact of the Wadden Sea area is most easily seen in the engineering processes which have transformed the landscape. Particular examples of the physical impact of this can be seen in many of the places examined in this comparative study, briefly outlined above, (see also fuller descriptions in Appendix 1).

However, it is in the less immediately obvious effects on human consciousness that the extraordinary cultural importance of the Wadden Sea lies. Viewed in that way the water management techniques developed in the Wadden Sea can be compared with the development of telescopes, of mining techniques, or the railways. The historical development and great success of water management techniques in the Wadden Sea region has had a major influence in transforming the way in which humanity understood its relationship to the natural world in general, and the sea in particular. The development of water-management technologies was largely a matter of making a virtue of necessity and was dependent on a preceding history of trial and error and responding to changing parameters (such as the cultivation of inland bogs, followed by their subsidence, the mixing of fresh and salt waters, higher water levels as a result of building dikes etc.). However the success of the dike-builders and water-managers and the substantial profits created by their efforts, the control of nature and exploitation of its resources produced profound emotional and intellectual effects. It created both a feeling of triumph, in a struggle against the sea/nature and a sense of security; a feeling that human ingenuity could create a secure and profitable landscape from 'wild' marshland and tidal water. This attitude survived despite major flood events, and indeed the floods themselves may have reinforced these attitudes, certainly the reclamation of tidal areas and marshes has tended to be viewed as one of antagonism; a struggle or battle between people and the sea. Flood events were conceptualised as an attempt by the sea to take back its land, an invasion that had to be repelled.

6 SUGGESTIONS FOR FUTURE CO-OPERATION

The long standing concept of our relationship with the sea as one of defence and struggle, which has dominated our understanding for centuries, has in the last few decades begun to change. In a sense the historic role played by the Wadden Sea, in the past both in the shaping of human consciousness and in the practical application of new techniques of water and land management, could be replicated in the present with regard to the way we understand and manage the cultural and natural heritage of coastal wetland landscapes. There is a growing recognition that the widespread adoption of the 'hydraulic vision' and the great effectiveness of hydraulic technology, has been a major factor in the loss of wetlands worldwide, a loss estimated to be as much as 50 percent of what once existed. At the same time there is an appreciation both of the landscape value of what has been created, and indeed the natural value provided by, for instance, damp grassland and brackish water habitats in drainage dykes. The long established concept of the struggle against the sea and victory over nature is being replaced by the establishment of an approach based on symbiosis, a perception that there is a need to work with nature and the sea rather than struggle against or tame them. There are many reasons for this, although prominent amongst them is climate change and responses to it; for instance one of the most obvious changes in the Wadden Sea over the last few decades is the appearance of wind turbines, which is directly related to that issue.

In the light of current moves towards a sustainable approach to flood risk and landscape management, the Wadden Sea could play a considerable role in shaping that change, both in conceptual and practical terms. The Wadden Sea is already

highly regarded for its approach to conservation, particularly nature conservation, and it could play a leading role both in the development of the new conception of our relationship with the sea and its practical application. The extraordinary cultural heritage of the Wadden Sea can play a key role in such a process. One area in which it would be particularly useful to move forward would be in developing a more integrated approach to conservation of the natural and cultural heritage. Such an approach bringing together sectorial interests might well be something perhaps best initiated at the transnational level. There is a need for conservation and management to be strengthened and broadened in concept, scope and practice. This would need to include a sustainable approach to the natural and cultural heritage and to incorporate both the marine environment of the Wadden Sea, and the 'dry' areas - in effect the Lancewad area. These two parts of the Wadden Sea can be summarised as follows:-

Wadden Sea	
Marine zone (outside sea dykes)	Terrestrial zone (inside sea dykes)
Primarily a natural landscape with a strong cultural heritage interest.	Primarily a cultural landscape with a strong natural heritage interest.

Of prime importance for the cultural heritage is the Wadden Sea landscape, which lies inside the sea dykes, including the dykes themselves, marshes, fields, farms villages, towns and, of course the islands; that has formed the prime focus of this comparative study. However, a critical part of the Wadden Sea's cultural heritage lies in, or rather under the sea itself, in the form of a rich maritime heritage of wrecks and hulks, potentially containing important archaeological remains relating to the development of European maritime dominance (Schroor 2008). In addition there are, in places, remains of earlier settlements and their farmed landscapes that now lie on or under the mudflats of the intertidal zone. Further out into the North Sea there are remains of very ancient inhabited landscapes in the sub-tidal zone. Thus whilst the natural heritage interest of the marine zone is very evident and clearly demonstrated by the recent designation of a large part of the Wadden Sea as a World Heritage Site, the significance of the cultural heritage should not be underestimated. For instance the range of well preserved wrecks of great importance for our common maritime heritage in the western Wadden Sea has led to it's inclusion on the tentative list of the Netherlands as a Cultural Site. Similarly the submerged prehistoric landscapes and archaeological sites of the southern North Sea have recently been described as representing '...a common European cultural heritage, but also one that is of world-wide significance.' (Peeters *et al* 2009). As marine spatial planning develops and greater efforts are made to characterise, inventorise, manage and conserve the cultural heritage of intertidal areas, the Wadden Sea can play an important role. This is likely to operate in two ways, at the transnational and national level, through engagement with measures and organisations that are already beginning to consider such issues for the southern North Sea area, and at the regional and local level through the development of such processes in the Wadden Sea region itself. It hardly needs saying that if the Wadden Sea is to make its full contribution in this regard careful co-ordination will be required.

Returning to the cultural heritage of the Wadden Sea which lies outside the present tidal limits, a critical factor will be maintaining not only what is best, but what is most

characteristic, in the cultural landscape. The conservation, management and interpretation of particular marshland landscapes, buildings or archaeological sites is vital. However, these need to be understood as part of a wider whole – a component part of the Wadden Sea, only in that way can the full value of particular places be revealed, here again the Lancewad project provides a sound framework within which to work. This issue features prominently in a recent report on the *Provision of Public Goods Through Agriculture in the EU* which states ‘Agricultural landscapes are composite entities, a reflection of topography and the physical environment, comprising a cultural, archaeological and built heritage as well as an ecological infrastructure....’ (Cooper *et al* 2009). Overall conserving the cultural heritage of the Wadden Sea will depend on the maintenance of a pattern of mudflats, salt marshes, islands, dykes, marsh pastures and traditional buildings. Clearly to achieve that will require the participation of people who live and work in the area. Any change in how we understand our complex relationship with the sea and with water management will be critical to the long-term future of the cultural and natural heritage of the area.

The recently published *Integrated Research Agenda of the Dutch Wadden Academy* (Kabat *et al* 2009) identifies a range of research essential for understanding the cultural heritage of the Wadden Sea:-

Research into systems for documenting, evaluating and selecting cultural history Values:

- What are the strengths and weaknesses of existing cultural history knowledge systems? What measures lead to greater quality, more supervision and improved accessibility of information and knowledge? How can these knowledge systems be of assistance in monitoring the degradation of the region’s heritage?
- What best practices are suitable or should be developed for the preservation and meaningful development of the region’s heritage in terms of archaeology, man-made landscape and built environment?

Underlying conditions:

- Answering the above questions requires an interdisciplinary approach in which archaeology, socio-economic history, the history of ideas, the economic sciences, historical anthropology and cultural anthropology play a part. In many cases, there will be a need for participatory, action-oriented forms of research.
- The Wadden Sea Region’s research agenda for social science and cultural history requires the active and serious involvement of residents and visitors.
- As regards archaeological and historical research, it can generally be stated that there is a need for a cross-border approach that takes account of the international nature of the Wadden Sea Region and therefore also provides a framework for comparative research on European wetlands.’

These aims represent an important range of research which would clearly be of considerable value and certainly highlights the need for integration. However, with regard to the cultural heritage of the Wadden Sea much is already known and understood. Whilst further research is clearly vital, there is already a need for better integration of cultural and natural heritage both in terms of spatial planning and more general issues of landscape management. With regard to that, the work of the Lancewad project and in particular the cultural entities which that project developed, provides a firm foundation. Whilst the pattern of the landscape itself and the

vernacular architecture are of great importance, it may be that it is the rich variety and extent of archaeological remains in the Wadden Sea area that will require particular emphasis, in terms of spatial planning and management. Since such remains often lie below ground, they are out of sight, and can be all too easily overlooked in terms of spatial planning and conservation.

The existing LancewadPlan strategy *The Wadden Sea Region: A Living Historic Landscape* can provide the framework for progress. It may now be necessary to review progress made since its publication, prioritise the strategy's recommendations and develop a programme for active implementation of the strategy. The recently published *World Heritage Cultural Landscapes Handbook for Conservation and Management* (UNESCO 2009) sets out eight key stages of a management process, whilst this is clearly aimed at World Heritage sites aspects of its approach may be more generally applicable. The eight stages are:-

- 'Stage 1 Getting agreement on the approach and planning the work
- Stage 2 Understanding the cultural landscape and its values
- Stage 3 Developing a shared vision for the future
- Stage 4 Defining management objectives and assessing opportunities and challenges – using management plans to organize and coordinate
- Stage 5 Identifying options and agreeing on management strategy
- Stage 6 Coordinating the implementation of the management strategy
- Stage 7 Monitoring, evaluation, and adaptive management
- Stage 8 Deciding when to renew/revise the management strategies and the management plan'

In view of what has already been achieved in the Wadden Sea it may be, particularly in terms of trans-national cooperation, that the focus should now be on Stages 4 -6, perhaps especially 5 and 6.

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APPENDIX 1: COMPARATIVE SITES

BANGLADESH / INDIA

1. The Sundarbans National Parks

The Sundarbans National Parks, which comprise mangrove forests, deltaic islands, waterways and intertidal mud-flats straddling the border between India and Bangladesh. The Sundarbans is one part of the world's largest delta, formed from sediments deposited by three great rivers, the Ganges, Brahmaputra and Meghna, which converge on the Bengal Basin. The land is moulded by tidal action, resulting in an intricate network of interconnecting waterways, sand dunes above the high-water mark and transitory tidal mud and sand islands. Apart from Baleswar River the waterways carry little freshwater as they are cut off from the Ganges, the outflow of which has shifted progressively eastwards since the 17th century. The area is known for its wide range of fauna, including the Bengal tiger, 260 bird species and other threatened species such as the estuarine crocodile and the Indian python. The National Parks represent approximately half the original area of mangrove that existed 200 years ago, the other half having been cleared and converted to agricultural land since 1770 (Hussain and Archarya 1994).

The alluvial deposits are geologically very recent and very deep. Much of the present tidal delta only stabilized as late as 5th – 7th century AD. However, in India the Baghmara Forest Block near the coast contains the ruins of a city built by the Chaand Sandagar merchant community approximately 200-300 AD. The indigenous inhabitants of the delta were the Pods and the Chandals, tribes whose economic basis was largely dependent upon fishing. Early settlement on the deltaic island was dependent on and limited by the presence of freshwater, but archaeological evidence indicates that they were occasionally occupied or utilized. The process of human settlement within the delta region continued until the 11th century, when shifting river channels and epidemics seemed to have forced settlers to abandon the area for a while. Post 1200 AD, beginning with the period of the Bengal sultanate (1204-1575), the history of the Sundarbans is one of continuous conversion on the inland side of the forest to wet-rice cultivation. The remaining forest areas were leased out by local kings, largely for hunting. During the Mughal Empire, Raja Basand Rai and his nephew took refuge in the Sundarbans from the armies of Emperor Akbar in the late 16th century. The buildings they erected at Netidhopani on the east bank of the Matla river, where the ruins are still evident, subsequently fell to Portuguese pirates, salt smugglers and dacoits in the 17th century. During the 16th-18th centuries the Ganges changed course from the original Hugli channel to combine upstream with the Brahmaputra. As a result, much of the Sundarbans faced increased salinity and this gradually affected the flora and fauna of the area. The era also witnessed devastating cyclones, like the one in 1584, which is reported to have claimed about 2 million lives. Human occupation ceased on the islands in the 17th century, reportedly due to pirate attacks. Proprietary rights were obtained from the Mughal Emperor, Alamgir II, by the British East India Company in 1757 and the area was mapped by the Surveyor General of the British East India Company by 1764. The Sundarbans was the first mangrove forest in the world to be brought under scientific management. Systematic management of this forest tract started in the

1860s after the establishment of a Forest Department in the Province of Bengal, in India. There are approximately 2.5 million people living in the small villages on the edge of the Sundarbans. The national park area provides a livelihood at certain seasons of the year for an estimated 300,000 people, working variously as woodcutters, fishermen, and gatherers of honey, golpatta leaves and grass. Fishermen come in their boats from as far away as Chittagong and establish temporary encampments at various sites along the coast, where they remain until the approach of the monsoon season in April before returning to their homes. The Sundarbans is now a World Heritage Site, extending across the southern coasts of India and Bangladesh. A UN Development Programme project on *Bio-diversity Conservation in Sundarban – a two-country approach* was prepared in 2003-4, but has not been implemented to date.



GoogleEarth image of part of the Sundarbans

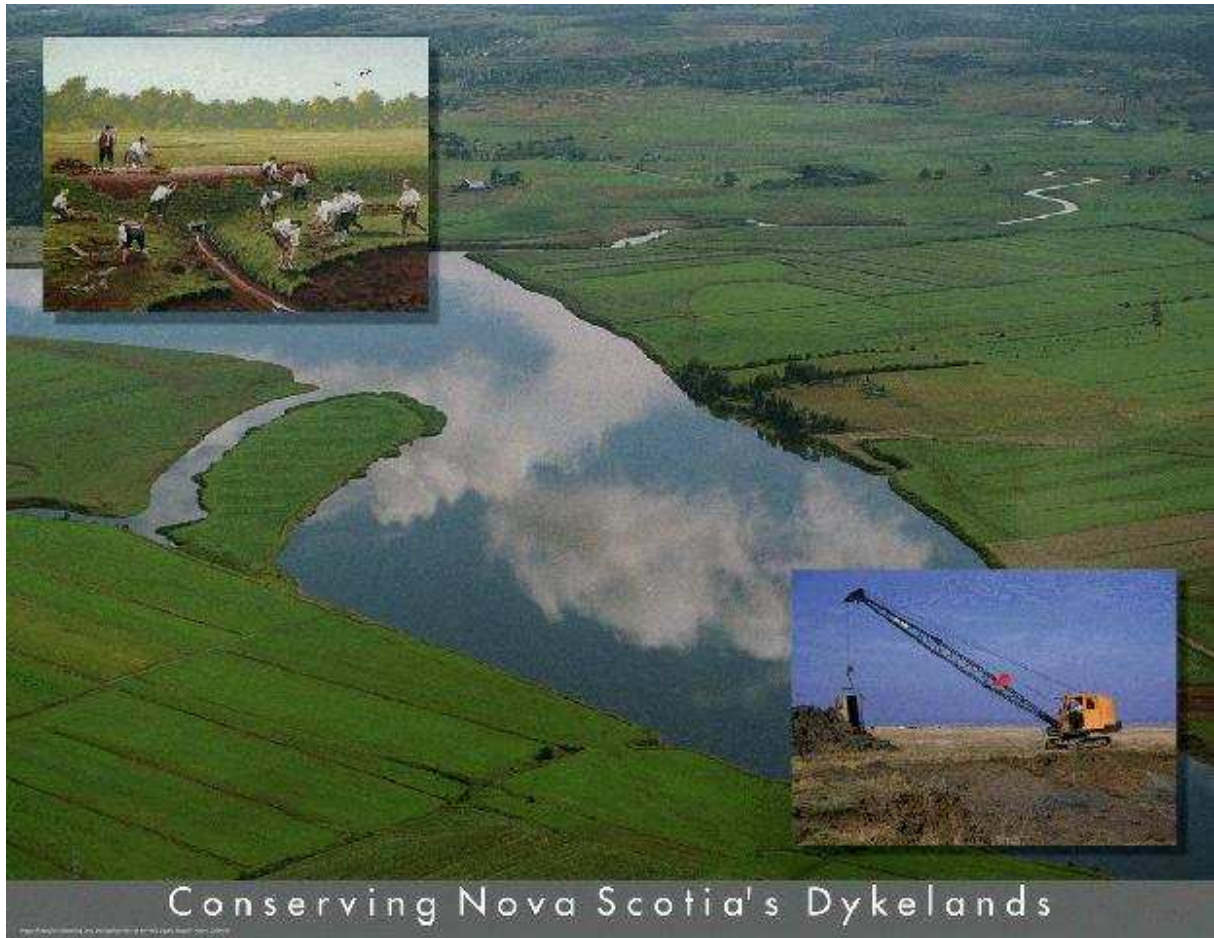
TIME-DEPTH	Since at least the 5th-7th AD, intermittent occupation, but little adaptation of the landscape	1
INTEGRITY OF CULTURAL LANDSCAPE	Partial – due to ever-shifting nature of the natural landscape	2
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Some excavation, but much early material now deeply buried or lost, good documentary evidence	2
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Largely a natural resource, harvested rather than managed	2
ASSOCIATIVE CULTURAL SIGNIFICANCE	World Heritage Site (Natural), internationally famous for its natural beauty.	4
EXTENT OF CULTURAL	272,510 ha. (in National Parks)	3

LANDSCAPE		
AUTHENTICITY	Survives as a largely wild area, continuing traditions of management	4
	TOTAL SCORE	18

CANADA

2. The Nova Scotia Dykelands

The Canadian province of Nova Scotia is located on the eastern seaboard. It formed part of territory the Mi'kmaq nation when the first European colonists arrived. In 1604 French settlers established a colony at Port Royal, known as Acadia. The first dykes in the Province were constructed by the Acadians near Annapolis Royal in the 1630's, using dyking technologies already practiced in France. The new settlers moved quickly to build dykes along the outer marsh areas. These dykes were built with a trench or 'key' cut to stabilize the dyke and prevent water from seeping along the sod layer under the dyke and then the dyke was constructed above of earthen sods. The land inside was drained by a system of ditches combined with an ingenious one-way water gate or culvert called an *aboiteau*, which allowed fresh water to run off the marshes at low tide but which prevented salt water from flowing onto the dyked farmland as the tide rose. The Acadians farmed the drained natural meadows and marshes, rarely clearing the upland forest for agricultural purposes. They also continued to cut their salt hay on the seaward side of the dykes, and stacked it to dry on wooden platforms built just tall enough to raise the salt hay above the level of the highest seasonal tides. After the Acadians were expelled by the British in 1755, they were replaced by the New England Planters, Yorkshire farmers, and the United Empire Loyalists. Each new group of settlers enclosed new areas of salt marshes, which were used primarily for pasture and hay production. Dykelands played a central role in Nova Scotia agriculture until the early 1920s. With the increasing use of the internal combustion engine replacing the need for horses, the demand for hay was greatly reduced. By 1948 the dykes had deteriorated to such an extent that large tracts of dykeland had reverted once again to salt marsh. In 1949, the Maritime Marshlands Rehabilitation Act was introduced by the Canadian government to prevent the loss of additional dykeland. Today, the Nova Scotia Department of Agriculture and Marketing maintains 240 km of dykes that protect approximately 17,300 hectares of dykeland.



Conserving Nova Scotia's Dykelands

The Nova Scotian dykelands ()

TIME-DEPTH	Post-1630s reclaimed landscape	2
INTEGRITY OF CULTURAL LANDSCAPE	Sea-walls, dykes and <i>aboiteau</i> survive – although tracts of drained marsh have been lost to sea	2
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Limited archaeological work, survival of landscape elements, documentary evidence associated with Acadians	3
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Adaptation of marshy coastal landscape through hydro-engineering works	4
ASSOCIATIVE CULTURAL SIGNIFICANCE	Noted in regional context for its surviving historic landscape	1
EXTENT OF CULTURAL LANDSCAPE	17,300 ha.	1
AUTHENTICITY	Partial survival of once large extent of drained marsh, actively managed for preservation of cultural and natural landscape	2
	TOTAL SCORE	15

CROATIA/BOSNIA

3. Neretva Delta

Neretva Delta covers about 20,000 ha of which 12,000 ha are in Croatia and the remainder in Bosnia. The area contains a variety of habitats, comprising marshes and lagoons, lakes, beaches, rivers, limestone hills, mountains, cane fields and wet meadows. The Neretva is this largest river of the eastern part of the Adriatic basin. After the last glaciation rising sea-levels covered the karst landscape (a stony limestone landscape dissected by fissures, pot-holes and depressions) as far as 21km inland. Gravel and sediments carried downstream by the Neretva River were deposited in the flooded valley, filling up the karst depressions to form the fertile deltaic marshes and lakes remained. Solitary hummocks of karst limestone protrude from the alluvium.

The Lower Neretva valley has a rich monumental heritage dating back over several thousand years. The conversion of wetland into fertile land and the establishment of transportation routes to the hinterland created the conditions for the development of settlement. Many prehistoric fortifications and settlements as well as tumuli are sited along the Neretva River. This area seems to have been inhabited by Illyrian tribes in the Iron Age. In the 4th century B.C., the Greeks founded a trading port here, which developed into the market town of Narona, today Vid, near Metkovic. All over the delta around Narona there were suburbs and estates, now covered by marsh. Narona was an administrative centre under the Romans, surviving monuments include the city walls with towers, Roman villas, mosaics, and the Temple of Augustus. Temple. Christianity can be traced in the Lower Neretva valley as far back as from the middle of the 5th century. Early Christian sacral monuments include St Vid's Basilica with its baptistery. The medieval monuments are scarcer. During the Turkish invasion at the end of the 15th century, several churches were destroyed and the memory of that turbulent time is kept alive by the impressive fortress Norinska Kula at the junction of the Norin and Neretva River. Due to frequent wars in this area, no significant monuments from the time when the area was ruled by Venice are left standing. The economy of the delta had concentrated on hunting, fishing and the raising of cattle. Everything depended on the cycles and movement of water, with the primary means of communication being the traditional boat known as the '*trupa*'. The first form of land reclamation dates to the 1880s, and comprises the '*jendecenje*', where the land is drained by the digging of channels and the resultant upcast used to raise the land surface between the channels, producing a characteristically stripy fieldscape pattern. Also in the 1880s the Neretva River was straightened and canalised to make a navigable waterway. Further extensive land-reclamation works were undertaken in the 1960's. The prevailing wetland landscape became an arable landscape, of vines and fruit-tree plantations.



Jendecenje strips visible on GoogleEarth

TIME-DEPTH	Prehistoric onwards, adaptation of landscape largely 19 th century	2
INTEGRITY OF CULTURAL LANDSCAPE	Buried prehistoric and classical landscapes, partial survival of the <i>jendecenje</i> system	4
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Archaeological and documentary evidence, exceptional preservation of buried sites	4
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Development of the <i>jendecenje</i> agricultural system	4
ASSOCIATIVE CULTURAL SIGNIFICANCE	Ramsar site, noted for its Roman archaeology and natural beauty and biodiversity.	3
EXTENT OF CULTURAL LANDSCAPE	20,000 ha.	1
AUTHENTICITY	Survival of prehistoric and Roman monuments, <i>jendecenje</i> method of agriculture, local building traditions	3
TOTAL SCORE		21

FRANCE

4. Mont St-Michel Bay

This area comprises bay, mud-flats and island of Mont St-Michel with its abbey and village. The small granite island of Mont St-Michel stands within a broad bay surrounded by former coastal marshes, these have been polderised over the centuries to create pasture. The bay, located between Normandy and Brittany, in northern France has a very high tidal range and in low tide the waters recede to reveal extensive mud and sand flats. The island was occupied in the 6th and 7th centuries AD as an Armorican stronghold of Romano-Breton culture before being sacked by the Franks. The monastery of St Michel was built in 966 by Benedictine monks, on the site of an 8th century church, it subsequently developed into one of the great sites of medieval Christian architecture. The Norman and Gothic Abbey shows considerable ingenuity in adapting construction methodologies to the cramped and difficult site.

The island was previously connected to the mainland via a thin natural land-bridge which was revealed at low tide. In 1879 the land-bridge was converted into an engineered causeway with consequent effects on the silting patterns in the bay, which were compounded by the canalization of the Cousenon River. Polderisation of the marshes on the landward side of the bay created salt-marsh meadows used since the 11th century for grazing, *agneau de pré-salé* (salt meadow lamb) is a local specialty. Covering 40 sq. km they are the largest salt-marshes on the French coast. The tidal-flats are an important natural resource for migratory and over-wintering birds. A project is currently underway to remove the accumulated silts and make Mont St-Michel an island again.



Aerial view of Mont Saint-Michel and the tidal flats (Wikipedia photo)

TIME-DEPTH	Since at least the 6 th century AD, the Abbey dates to 966 AD, adaptation of landscape since the 11 th century.	3
INTEGRITY OF CULTURAL LANDSCAPE	Survival of medieval abbey and village, salt-marshes	4
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	High – historical documents, excavations, architectural recording, numerous secondary sources	4
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Polderisation of coastal marshes	2
ASSOCIATIVE CULTURAL SIGNIFICANCE	High – internationally famous historic monument, important centre of Christian civilisation, subject of many paintings, World Heritage Site	4
EXTENT OF CULTURAL LANDSCAPE	57,589 ha.	2
AUTHENTICITY	High – cultural landscape expressed through buildings, landscape and cultural setting	4
TOTAL SCORE		23

5. The Camargue

The Parc Régional de Camargue was established as a national park and nature reserve in 1972 covers 820 km². The Camargue is the delta of the River Rhône, sited on the Mediterranean coast between Languedoc-Roussillon and Provence. With an area of over 930 km² it is one of western Europe's largest river deltas, with exceptional biological diversity. Much of the area is under water, inland salt water lakes (*étangs*). Approximately a third of the Camargue is either lakes or marshland, with the remainder comprising pastures, dunes and salt flats.

In prehistoric times the Camargue was an island, and there is evidence for occupation of the area, including an oppidum. It was later exploited by the Romans for salt production (there are a number of surviving Roman monuments, including watch-towers) and in the medieval period by Cistercian and Benedictine monks for both salt and as grazing. In the sixteenth and seventeenth centuries large estates were held here by merchants from Arles with free-roaming herds of cattle, sheep and wild horses. Throughout these periods the Rhône Delta drifted and moved, as demonstrated by the marooning of the coastal port of Aigues. The first attempts to tame the Camargue and create farmland are relatively modern. A sea dike was constructed in 1859, limiting the tidewaters in south Camargue. A decade later an embankment was constructed along the river to control flooding that had frequently submerged the Camargue. These dikes and embankments created land fit for farming, but cut off the Camargue from its supplies of fresh and sea water, and from the silt provided by flooding. As soon as the sea dike was built, wealthy men started creating new *manades* (traditional Camarguese estates for the rearing of fighting bulls). Further irrigation ditches were dug after the Second World War, permitting the reclamation of more land and the cultivation of rice. The consequence of this change is that the Camargue's rich wildlife now requires careful and expensive management of the water resources that support it. Pumping, irrigation and draining stations dot the landscape along with a network of drainage channels throughout the delta.



Traditional building on the Camargue, the pole at the left of the photo enabled the rancher to climb up and oversee the animals (Wikipedia photo)

TIME-DEPTH	Occupation from prehistory onwards, active water-management from 1859	2
INTEGRITY OF CULTURAL LANDSCAPE	Good – prehistoric, Roman and medieval monuments, post-medieval estates and landscape features	4
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Good – archaeological surveys and excavations, historic buildings, documentary evidence	4
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Adaptation of marshy coastal landscape through hydro-engineering works is relatively late (19 th century)	2
ASSOCIATIVE CULTURAL SIGNIFICANCE	Noted for its surviving wetland landscape and wildlife and agricultural practises	2
EXTENT OF CULTURAL LANDSCAPE	82,000 ha.	2
AUTHENTICITY	Good – distinctive landscape with associated culture, customs, architecture and management	4
	TOTAL SCORE	20

GUYANA

6. Essequibo

The coast of Guyana is bordered by a plain about 25-35km wide, most of which is below mean high tide. The area was occupied by Arawak tribes, who had a farming,

hunting and fishing economy. The first European settlers were the Dutch, with the Dutch West India Company establishing the Essequibo colony in 1621. This was a trading-post 25km upstream on the Essequibo River, other settlements followed, usually a few kilometres upstream on the major rivers. Initially the intention was to trade with the indigenous people, but soon changed to the acquisition of land. Between 1655 and 1680 a sea wall was built to reclaim land from both the sea and the freshwater swamps. An interlaced network of drainage channels was constructed and at the seaward end *kokers* (culverts/sluice gates) were installed allowing the land to be drained at low tide. Plantations were laid out in strips running inland and a dam and network of irrigation canals built to supply water for the farmland and settlements. The labour for the construction and maintenance of these plantations was provided by imported African slaves. The British took over the rule of Guyana in 1796 and it remained in their hands until independence in 1966. Today more than 90% of Guyana's population live on the coastal plain and the investment in drainage and other land development projects has continued.



GoogleEarth image of the Essequibo plantation strips and drainage channels

TIME-DEPTH	Prehistoric occupation, post-1655 reclaimed landscape	2
INTEGRITY OF CULTURAL LANDSCAPE	Sea-walls, canals and plantation strip-fields survives, ruins of colonial forts and a few old timber-buildings – modern building encroaching, especially along seaward side and new drainage works	2
LEVEL OF ARCHAEOLOGICAL AND	Limited archaeological work, good survival of some landscape and built heritage elements, documentary evidence associated	2

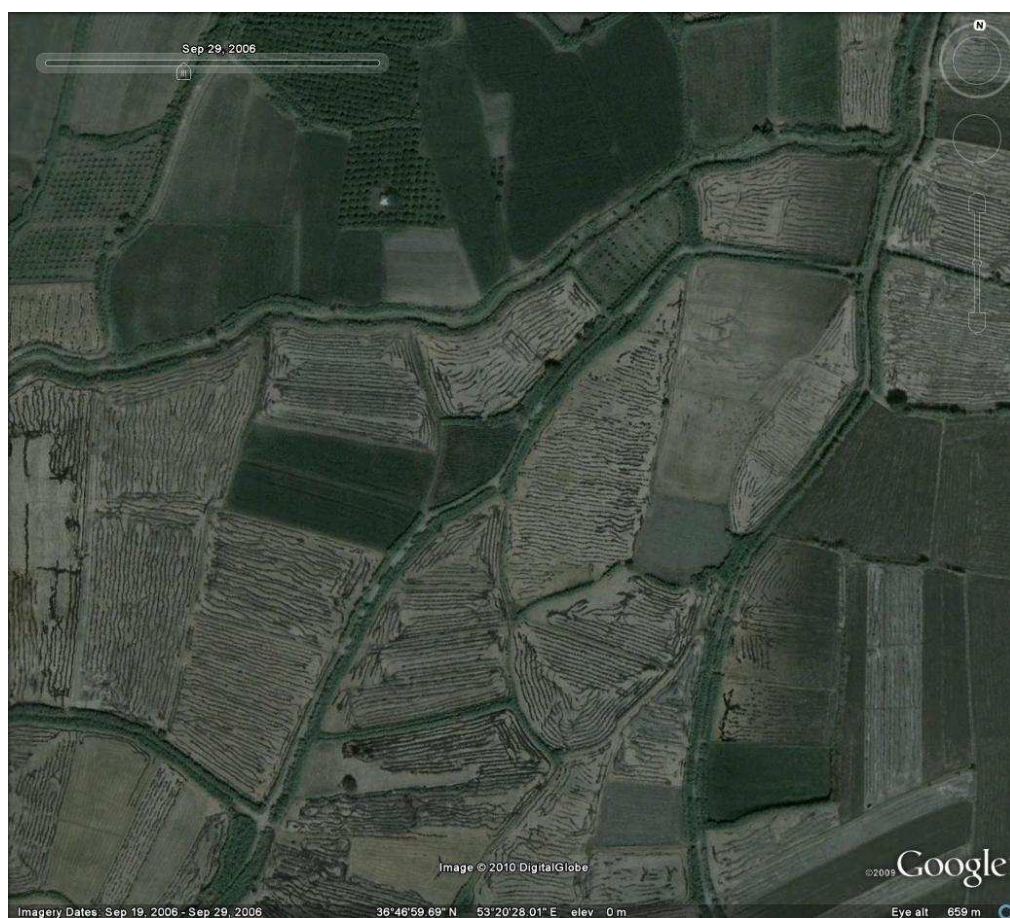
DOCUMENTARY EVIDENCE	with Dutch West India Company, plantations and British rule	
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Adaptation of marshy coastal landscape through hydro-engineering works	4
ASSOCIATIVE CULTURAL SIGNIFICANCE	Noted in a national context for its surviving historic structures – Dutch forts, plantation architecture. Example of imported Dutch technology	1
EXTENT OF CULTURAL LANDSCAPE	c. 800,000	3
AUTHENTICITY	Distinctive historic landscape with associated architecture and management	2
TOTAL SCORE		16

IRAN

7. South Caspian lowlands

In northern Iran there are extensive marshes around the southern edge of the Caspian Sea in the districts of Gilan and Mazandaran. Here there are extensive freshwater lakes and marshes, brackish lagoons, irrigation ponds (ab-bandans) and rice paddies stretching for over 700km along the Caspian shore. The two largest wetlands are the Anzali-Mordab complex in the south-west and the Gorgan Bay/Miankaleh Peninsula in the east. The former comprises a complex of shallow, freshwater lakes with extensive reed-beds and surrounding flood-meadows, while the latter is a large shallow brackish lagoon with extensive seasonally flooded sedge marshes and tamarisk thickets, almost completely cut off from the Caspian Sea by the 60 km long Miankaleh Peninsula.

There is evidence for human occupation in the Mazandaran area since the Palaeolithic period. The coastal wetlands have been extensively cultivated over millennia, as well as providing an important fishing and wild-fowling resource. Recent excavations in Goher Tippe provide proof that the area has been urbanized for more than 5 thousand years of civilization, and the area is still one of the most densely populated zones in Iran. The current landscape comprises twisting roads and water courses, with the agricultural sub-divided into long thin fields. Rice has been the pre-eminent crop since 1,000 BC, with the use of rice-paddies since about 100 BC. A characteristic landscape feature of the area is the 'ab-bandan', a small, man-made reservoir or flooded rice paddy with a luxuriant growth of underwater vegetation. These shallow wetlands, varying in size from 3 ha to 1,000 ha, were originally built as temporary water storage areas for irrigation during the dry summer months. However, many also serve as private reserves for duck-trapping during the winter months and some have been built specifically for this purpose. Another characteristic feature are the 'damgah', small ponds created specially for duck-trapping. The Miankeleh peninsula was used as a hunting-preserve by the Safavid dynasty from the 16-19th centuries and Shah Abbas had a little palace on the peninsula. The area provided an important stage along the Silk Route, linking the Far East to Europe, as well as containing a number of important ports linking Iran with the other countries bordering the Caspian. The area is a tourist centre due to its cooler climate and long sandy beaches.



Rice paddies on the South Caspian lowlands (GoogleEarth)

TIME-DEPTH	350,000 BC onwards, urbanisation since 3,000 BC, adaptation of landscape c. 100BC	4
INTEGRITY OF CULTURAL LANDSCAPE	Survival of areas of rice-paddies, lagoons and irrigation ponds, increasing modern development along coast	3
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Have not been able to establish evidence-level with any clarity - although on Silk Route, ancient history of urbanisation, use as a summer resort	2
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Reclaimed marshes, drainage and irrigation channels, irrigation reservoirs and duck-trapping ponds	4
ASSOCIATIVE CULTURAL SIGNIFICANCE	Noted for its physical beauty, historical links with the Silk Route and distinctive culture.	3
EXTENT OF CULTURAL LANDSCAPE	180,000 ha.	2
AUTHENTICITY	Ancient historic landscape with associated architecture and land management techniques	3
TOTAL SCORE		21

ITALY

8. Po Delta

This comprises the Po Delta Regional Parks of Veneto and Emilio-Romagna provinces. The area is entirely below sea-level (from 1 to 3 meters). The Po Delta has been formed over millennia by the sediments deposited by Italy's largest river and redistributed by the action of the sea and the wind. Fossil dunes correspond to former ancient coast lines, in total eight have been identified, each one dating to a different epoch, from 1,000BC to 1600 A.D. Roman settlers were the first to attempt to manage water in the region, and by the 1st century AD the land was assigned to war veterans and drainage of the area began. Evidence for these Roman settlements can still be seen, in particular in the street-plan of surviving towns and in the square shape of the original plots of land (centuriation). In the centuries that followed the fall of the Roman Empire no significant effort was made to protect or maintain the water management systems and the area largely reverted to forest and marsh with human settlements were limited to just a few elevated "islands". In the second half of the 11th century various religious orders began the work on reclaiming the plains through deforestation. The need to manage water resources led to the creation of *consortia* of landowners to defend the territory from flooding in 1100 AD. However, a systematic and widespread organization of water management did not really take place until the 16th century with both the Venetian Republic and the Duke of Ferrara undertaking large-scale drainage schemes, including the creation and maintenance of a network of channels and sluice-gates to lead the water towards the sea. In approximately 200 years, from 1604 to the end of the Republic of Venice (1797), the mouth of the River Po advanced about 26 km seawards. New settlements were founded on the reclaimed land. However the new Delta lands proved a source of conflict between Venice and the Holy See (1640-4), and again in the 18th century (battles in which also the Austrians and the French took part). These disputes led to the localization of the border along Po di Goro between Venice and the Holy See first and then between the Veneto and Emilia afterwards. Between the 19th and 20th century, the human action in the Delta deeply shaped the environment. It is in these 19th and 20th centuries that, after Porto Viro Cut-Off, the territory underwent the most important changes. In 1827, Po di Maistra was partially closed. Between 1840 and 1872 the main branch of the Delta was Po delle Tolle, while afterwards it was replaced by Po della Pila. Large wetlands were drained and the ancient dune systems were almost completely levelled: only a few dune areas survive today, among them Massenzatica Dunes, in the province of Ferrara, and some dunes between Rosolina and Volto, in the province of Rovigo. The introduction of dewatering pumps in the 19th century led to drastic changes to the landscape. However, the mechanical reclamation activities required huge capital expenditure, encouraging the development of large landed estates on the drained lands. The result was a countryside dominated by large areas characterized by a regular structure, with long channels and straight roads, a few trees, and a limited number of inhabitants.

Ferrara and part of the Po delta is a World Heritage Site. There are also two regional parks in the Po Delta, one in Emilia-Romagna and the other in Veneto, the former was established in 1988 and the latter in 1997. Between then they comprise natural features while also preserving important evidences of the history of the delta,

including archaeological sites, towns and villages, churches, castles, villas and farms, buildings linked to the land reclamation activity, salt pans, and navigable channels.



GoogleEarth grid-like fields and straight canals overlying relict water channels in the Po Delta

TIME-DEPTH	Lines of buried coast-line dating from prehistoric period onwards, landscape management from the Roman period onwards	3
INTEGRITY OF CULTURAL LANDSCAPE	Elements of Roman centuriation survive, also medieval, Renaissance and post-medieval water management	4
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Survival of archaeological and built heritage sites and some landscape elements. Documentary evidence.	4
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Adaptation of marshy coastal landscape through hydro-engineering works, embankment of the many branches of the Po	4
ASSOCIATIVE CULTURAL SIGNIFICANCE	Part is World Heritage Site (cultural designation), close association with historical, architectural and technological developments	4

EXTENT OF CULTURAL LANDSCAPE	78,600 ha.	2
AUTHENTICITY	An outstanding planned cultural landscape which retains its original form to a remarkable extent.	4
TOTAL SCORE		25

LITHUANIA/RUSSIA

9. Curonian Spit

Elongated sand-spit. The Curonian Spit stretches from the Sambian Peninsula, part of the Kaliningrad Oblast, Russia to the south to its northern tip, which is separated by a narrow strait from the port city of Klaipėda, Lithuania. The northern 52 km long stretch of the 98km long spit belongs to Lithuania, the remainder to Russia. The width of the spit varies from a minimum of 400m to a maximum of 4km. It was formed about 5,000 years ago. From c. 800 to 1016, it was the location of Kaup, a major pagan trading centre. The Teutonic Knights occupied the area in the 13th century, building the castles at Memel, Neuhausen and Rossitten. In the 16th century, a new period of dune formation began. Increasing deforestation, due to overgrazing, logging and the building of boats during the Russian siege and occupation of Königsberg and East Prussia between 1757 and 1762 led to the dunes taking over the spit and burying whole villages. In response the Prussian government in 1825 sponsored large-scale re-vegetation and reforestation projects. As a consequence, much of the spit is now covered with forests. In the 19th century the Curonian Spit was inhabited primarily by Curonians, (Kursenieki) with a significant German minority in the south and a Lithuanian minority in the north. In the past the economy was dominated by fishing, tourism now plays an important role.



Sand-dunes on the Curonian Spit (Wikipedia photo)



GoogleEarth image of the Curonian Spit

TIME-DEPTH	Neolithic period onwards, management of the sand-dunes since the 19 th century	2
INTEGRITY OF CULTURAL LANDSCAPE	Landscape now largely wooded due to reforestation and stabilisation schemes	2
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Good survival of archaeological remains (buried under dunes) and built heritage sites and some landscape elements. Documentary evidence.	4
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Adaptation of landscape management practices to shifting dune landscape	4
ASSOCIATIVE CULTURAL SIGNIFICANCE	World Heritage Site (cultural designation), noted for its beauty	4
EXTENT OF CULTURAL LANDSCAPE	33,021	2
AUTHENTICITY	Much of original landscape buried, current appearance largely 19 th -20 th century, traditional building-forms, unique setting	3
	TOTAL SCORE	21

ROMANIA

10. Danube Delta

The Danube delta is one of the largest wetland systems in Europe (64.7 sq. km is Ramsar site), comprising a low alluvial plain, mostly covered by wetlands and water. Characterised by reedbeds and floating reed islands, and a maze of canals, streams, lakes and ponds lined with white willows and poplars, with bands of fossil dunes supporting forests and sandy grasslands. The average altitude is 0.5m, with 20% of the territory below sea level, and more than half not exceeding one meter in altitude. Dunes on the most extensive strand-plains of the delta (Letea and Caraorman strand-plains) stand rather higher (12.4 m and 7 m respectively). The Danube branches into three main arms into the delta, the Chilia, Sulina, and Sfântu Gheorghe. At the mouths of each arm depositional processes ensure that the delta continues to grow.

The modern delta began forming after 4,000 BC in a gulf of the Black Sea, when the sea rose to its present level. The gulf itself formed during the Holocene period. A sandy barrier blocked the Danube gulf where the river initially built its delta. Upon filling the gulf with sedimentation, the delta advanced outside the barrier-blocked estuary after 3,500 BC, building several successive lobes; the St. George I (3,500-1,600 BC), the Sulina (1,600-0 BC), the St. George II (0 BC to present) and the Chilia or Kilia (1600 AD to present).

The delta has always generated a large and varied range of natural resources, attracting settlement to even the most isolated and far-flung sandbanks (Bell *et al* 2001). Evidence for Neolithic settlement have been found on the Chilia Veche and Stipoc sandbanks. The Chilia sandbank has also revealed early Bronze Age graves dating to the late 3rd-early 2nd millennium BC. Here the dead were laid in deep pits, in the foetal position, covered with a layer of red ochre, and sometime accompanied by objects, usually pottery. They represent the first incursions from the North-Pontic steppe of a culture of nomadic shepherds, the Yamnaya. They were followed by further wave of nomadic pastoralists (the Bugeac Culture), who crossed the fluvial-maritime sandbanks of Letea and Caraorman, settling on the southern bank of the St George Arm of the Danube, on the summits of the Dobrudja horst of Murighiol.

The natural wealth and geographical position gave the Danube delta global importance in the circulation of goods and artefacts, becoming a gateway and a bridge between the civilisation of the Mediterranean world and northern and eastern Europe. It was here that the great sea routes intersected with those on dry land. The area developed a legendary role in the mythology of the region. The delta also served as a defence for the areas behind, with Philip of Macedon, Zapyrion, governor of Thrace, and even Alexander the Great being forestalled by its complexities as a battleground. Fishing remained the mainstay of the delta economy, combined with the exportation of grain and timber to the southern cities of the Mediterranean world. These links have been confirmed by archaeological discoveries on the fluvial-maritime sandbanks of Caraorman and Letea, and by chance discoveries brought to the surface by dredgers or by sea waves following sudden storms.

Archaeological remains on the Letea sandbank also date from the turbulent times of the early Middle Ages, as well as the site of a late Byzantine port settlement. In 1479, Stephen the Great ordered, for the defence of Moldavia, that a new and powerful fort

be built on a non-flooding sandbank, situated between the Sulina and Chilia Arms. Eight hundred masons and sixteen thousand labourers worked on the construction. However, the ambitions of the Ottoman Porte in the Danube Delta were so great that Bayazid II concentrated all his forces in order to conquer the place. His interest in exploiting the region was obvious from the fact that, after his victory in 1484, he established regulations for administering the resources of the Danube Delta. At the same time, he ordered that the emir (a functionary who collected taxes) should record all the shops and everything that might be available for hire. The Danube maintained its importance as a link with the territory on the left bank of the river, traversed by the old trade routes into Hungary, Poland and other countries of Central Europe, following the Ottoman conquest. In 1812, following the Russo-Turkish War the borders of the Ottoman and Russian Empires were set by Kilia and Old Stambul Channels of Danube, and in 1829 by Georgievsky Channel. In 1856 which ended the Danube Delta together with two districts of Southern Bessarabia, was included in the Principality of Moldavia, following the end of the Crimean War. In 1878, following the defeat of the Ottoman Empire, the border between Russia and Romania was again marked by Kilia and Old Stambul Channels.

Large scale works began in the Danube Delta in the second half of the 19th century, with the canalisation of the Sulina arm in 1862, and they continued throughout the 20th century. These straightening of the main river arms, as well as the digging of various secondary channels throughout the body of the delta have had a serious impact on the ecosystem. Reed was intensively harvested during the Communist era, and the regime had plans for the transforming the delta into a large agro-industrial zone. Although the first modern agricultural exploitation dates from 1939 (Ostrovul Tâtaru), it was from 1960 onwards that large areas been drained and converted, to the detriment of the wetlands. As of 1991 agricultural land in the delta surpassed 100,000 ha, and more than a third of its surface has been affected by crop cultivation, forest plantation or fish-farming.



Old mill at Letea in the Danube Delta (Spiridon Manoliu, Wikipedia)

TIME-DEPTH	Successive fossilised coast-lines from Neolithic period onwards, but large-scale landscape adaptation is mainly 19 th century onwards	2
INTEGRITY OF CULTURAL LANDSCAPE	Archaeological sites, historic buildings, although large-scale modern agricultural changes to historic landscape forms	3
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Excavated and buried archaeological remains, built heritage sites and some surviving landscape elements. Documentary evidence.	3
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Large-scale water management and land-reclamation dates to the later 19th and 20th centuries, previously settlement made use of naturally-occurring higher ground and harvested natural resources	2
ASSOCIATIVE CULTURAL SIGNIFICANCE	World Heritage Site, famous for wetland habitat and as cross-roads of cultures and route into Europe	4
EXTENT OF CULTURAL LANDSCAPE	647,000	3
AUTHENTICITY	Historic landscape elements compromised by modern agriculture, but also survival of areas of natural landscape, local building-styles and cultural groups	3
	TOTAL SCORE	20

SPAIN

10. Doñana National Park

A landscape of coastal marshlands and shifting sand dunes situated on quaternary deposits. Almost half the reserve area comprises swamps on flat clay soil filled with muddy sediments (marismas) with features including natural river channels, springs and pools. The marismas flood in winter creating ideal conditions for large flocks of migrating birds. Doñana has a known history of over 700 years. Since 1262 Doñana has been the favourite hunting reserve of Spanish kings - Alfonso X, Ferdinand II, Charles V, Philip II, Philip IV, Philip V and Alfonso XIII. It was granted to the Dukes of Medina Sidonia in 1300 who preserved it as a hunting park for 500 years. El Palacio de Doñana was once owned by the Duchess of Alba where she was painted by Goya. From 1737, stone pines were planted widely, but the clearance of coastal junipers later in the century destabilized the sand dunes which became increasingly mobile. Wood gathering, charcoal production, cattle-grazing, beekeeping and fish farming occur within the Park and twenty-five families, mostly park staff, live inside it. There is a religious festival at El Rocio, increasingly under the control of the Park administration to safeguard conservation, which brings large crowds of pilgrims every spring.



View across one of the lagoons at Doñana (Technische Fred, Wikipedia)

TIME-DEPTH	1262 onwards as a hunting-park, little landscape adaptation	1
INTEGRITY OF CULTURAL LANDSCAPE	Shifting dune and marsh landscape	4
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY	Palace of Doñana and documentary evidence, little archaeological work,	2

EVIDENCE		
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Largely a natural resource, managed for hunting formerly, now managed for wildlife	1
ASSOCIATIVE CULTURAL SIGNIFICANCE	Royal hunting-park	2
EXTENT OF CULTURAL LANDSCAPE	54251 ha.	2
AUTHENTICITY	Historic hunting-park	4
	TOTAL SCORE	16

UNITED KINGDOM

12. The Wash

The Wash is located on the eastern coast of England, extending between the counties of Lincolnshire, Cambridgeshire and Norfolk. It comprises the estuarine embayment of the Rivers Steeping, Witham, Welland, Nene and Great Ouse, the extensive inter-tidal mudflats and a large area of former marsh and fenland.

The Wash basin was established through the erosive action of major rivers flowing through to the North Sea. The combined effects of a rising sea level and submergence of the land has resulted in a complex sequence of deposits laid down as beds and bands of silt and peat over the past millennia. Settlement of the Wash area began in the Pleistocene, but the main surviving deposits date to the past 6,000 years. Throughout this period the importance of the fen edge is predominant, with settlement and activity positioned on or near the boundary of the dry upslope and the wetland below, in an environment which offered both opportunities and challenges for the early inhabitants.

During the Palaeolithic and Mesolithic periods the fens comprised a well-wooded environment dissected by now-extinct river systems. The evidence for this period is largely now found on the junction between the basin itself and the slightly raised surrounds, with the remainder of the contemporary land-surface now masked by later deposits. The Neolithic is marked by more concentrated occupations along the fen edge and of low islands off the edge, during a time of increased submergence and flooding. By the first millennium BC much of the southern Wash had become a great peat fen and settlement was curtailed, although there is evidence for activity in the form of objects deposited in the marsh. In the period prior to the Romans there was an expansion of settlement again and salt extraction industries were established in areas close to the sea-edge. The Roman period was marked by efforts to organise the fenland as settlements, canals and roads were constructed. However the decline of Roman influence is marked by a reversion to the earlier status quo and it was not until the end of the Saxon period that the great Sea Bank was constructed as the first major defence against the sea. The medieval Wash was fully settled and utilised, and the siltlands in particular were now extensively occupied. Major canals and other communication routes were established. Many of the fenland villages were subservient to major monastic and commercial centres and the abbey records give insight into the contemporary landscape, where animal husbandry and salt-making formed the backbone of the economy. The 16th and 17th centuries saw the process of

coastal reclamation expand greatly, aided by imported Dutch engineering knowledge, using canals, drainage channels, and sea and river embankments. The area changed from a grassland and water dominated landscape to a highly cultivated and managed arable landscape. The 18th century saw further improvements to the drainage technologies, including the introduction of wind pumps, and subsequently steam pumps. With the drainage and reclamation small farmsteads started to appear outside of the historic belts of settlement on the former islands of higher ground, and drove ways, known as ‘The Smeeth’ were created running along the cultivated fields to the coastal marshes, as a consequence most buildings in the open, inland fen are post 1750. It was in the Fens that the phenomenon of the shrinking of moorland due to drainage was scientifically proved, with the sinking of the Holme Post into the ground and its re-emergence after drainage works in the vicinity (Fowler 1933), leading to a change in the paradigm for the occupational history of the Netherlands and hence the Wadden Sea area.



The Wash – field patterns, drainage canals and settlement (Norfolk County Council)

TIME-DEPTH	Settlement sites dating from the Neolithic period onwards, landscape adaptation began in Roman period	3
INTEGRITY OF CULTURAL LANDSCAPE	Survival of medieval villages, post-medieval drainage patterns and fieldscape, buried earlier landscapes	4
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Long history of archaeological fieldwork and research. Extensive documentary evidence for the medieval and post-medieval periods. Many academic and popular publications	4
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Large-scale drainage and land reclamation works, modern landscape is entirely a reflection of this.	4
ASSOCIATIVE CULTURAL SIGNIFICANCE	Noted for its remoteness and bleak beauty	2

EXTENT OF CULTURAL LANDSCAPE	245,000	3
AUTHENTICITY	Survival of cultural landscape of villages, drainage channels and fields, loss of much of wetland landscape elements (reed-beds etc.),, some survival of characteristic local building forms	2
	TOTAL SCORE	22

13. Greater Thames Estuary



Tidal inlets, sea-walls and salt marsh in the Greater Thames estuary. The causeway in the middle distance is of Saxon origin, the low mound in the foreground is a Roman Red Hill, the enclosure around it and raised causeway leading to it reflecting later reuse probably as a stock enclosure (Essex County Council)

The Greater Thames Estuary stretches from Harwich in Essex to North Foreland in Kent and upstream to Rainham on the outskirts of London. It is a large estuarine complex with numerous creeks, extensive sand and mud flats, islands, salt-marsh, and embanked grazing marshes (now mostly converted to arable agriculture). The whole area has historically been a major zone of contact between Britain, continental Europe and the wider world.

The Greater Thames is probably the most important region in Britain for the study of the Palaeolithic, with the Lower Thames terraces noted as particularly suited to

correlation with the deep ocean record and sequences on the present European mainland. It is also a key area for study of past environmental change and its relationship with human activity and the impact of fluctuating sea-levels. The inter-tidal zone as a consequence has special significance both as the interface between the dryland and the maritime activities associated with the estuary and its economy, and because of its waterlogged archaeological deposits. In particular there are extensive areas well-preserved Neolithic land-surfaces.

Settlement in the area was continuous from the Mesolithic and widespread from the Bronze Age onwards, with settlement largely sited on the higher ground, close to the interface between the permanently dry land and the marsh, in order to maximise access to resources. In the later Iron Age and Roman periods extensive salt production resulted in the creation numerous 'Red Hills' low mounds on the marshes composed of the debris from salt manufacture. These mounds were reused for hundreds of years as the location of camp sites for shepherds and dry areas for stock compounds.

The Greater Thames was a centre of oyster production in the Roman period and in the Saxon period very large timber fish-traps, whose remains can be seen at low tide at many locations, were constructed. Throughout later prehistory, the Roman and Saxon periods the marshes were used for grazing. This was on the open saltmarsh, it was not until the medieval period, that the marshes began to be enclosed by 'sea walls' (the local term for dyke) and converted to managed grazing marshes, a process that continued for centuries. There was a major further phase of embankment in the 17th century which in part utilised Dutch drainage expertise. So that by the late 18th century almost the whole of the coastline was fringed by embanked and managed grazing marsh.

Almost every farm in the coastal region was connected to the creeks and estuaries and were often provided with their own wharfs or landing stages. There were also many ports (both large and small), fishing villages with their distinctive weather-board houses. From the medieval period onward London increasingly extended its influence as a major market for food and raw materials and the economy of the estuary responded to this, specialising in sheep, shell-fish and the transportation of raw materials from along the whole of the east coast of England to London. The estuary, as the gateway to London also played a significant defensive role in the history of the nation and this is reflected in the chain of defensive sites along its shores. These include a string of Roman Saxon Shore forts, the Saxon *burhs* and the Viking encampments, as well as many medieval castles, post-medieval forts and Martello Towers and Second World War defensive structures. Proximity to London meant that over the last two hundred years the core of the area along the Thames estuary itself became increasingly industrialised and built up. The influence of London is also apparent in the development of a string of seaside resorts along both sides of the estuary catering for the 'day-tripper'



A timber framed building with plank clad exterior (known locally as weather boarding) typical of the vernacular architecture in the Greater Thames, now a pub this three storey structure was originally a sail loft. (Essex County Council)

Despite these developments much of the area remains essentially rural and until quite recently the extensive grazing marshes were largely intact. However, following the great wars of the first half of the 20th century the maximisation for food production was a high priority and supported first by national and then by EU subsidy the grazing marshes were converted to arable production. It is estimated that around 80% of the grazing marsh around the Greater Thames estuary had been lost, mainly to arable agriculture by 1980.

TIME-DEPTH	Occupation of area c. 400,000 BC onwards, landscape adaptation began in medieval period	3
INTEGRITY OF CULTURAL LANDSCAPE	Survival of areas of drained and embanked marshes, resort towns, military architecture and coastal industries	3
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Long history of archaeological and historical research. Documentary evidence, excavated sites, numerous academic publications	4
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Large-scale land reclamation, coastal industries, settlement	3
ASSOCIATIVE CULTURAL SIGNIFICANCE	Gateway to London, role in British psyche and identity, artistic inspiration	4

EXTENT OF CULTURAL LANDSCAPE	Approx. 200,000 ha.	3
AUTHENTICITY	Survival of cultural landscape of villages, drainage channels and fields, loss of much of the grazing marsh and increased urbanisation	2
	TOTAL SCORE	22

14. Romney Marsh

Romney Marsh in the south-east of England is one of the largest coastal wetlands in Britain. It has a long history of archaeological, documentary, geomorphological and palaeoenvironmental research. The River Rother today flows into the sea below Rye; but until 1287 its mouth lay between Romney and Lydd. It was tidal far upstream, with a wide mouth opening into a lagoon. That lagoon lay behind a large island, which now makes up a large part of the Denge Marsh, on which stood the ports of Lydd and old Winchelsea. In the Roman period Romney Marsh comprised extensive saltmarsh protected by a shingle bank, with a tidal inlet below the Roman fort at Stutfall Castle. The marshes were used for salt-production and seasonal grazing, but there is no evidence that it was in anyway modified through reclamation. The marsh flooded in the early post-Roman period, probably due to rising sea-levels, burying the Roman landscape under alluvium. Early medieval documentation suggest that by the 11th century the marsh was extensively occupied and that reclamation had been undertaken since at least the 9th century. Natural changes occurred to the landscape following a breaching of the shingle bank, leading to the silting up of the old estuary and the abandonment of the port at New Romney. Further reclamation took place in the mid-12th century. There was extensive storm damage in the late 13th and 14th centuries, which is reflected in the alluvial profiles. The marsh was recolonised in the late 15th century and by the 16th century the course of the Rother had been changed to its channel today; most of the remainder of the area had now been reclaimed from the sea. The shingle continues to be deposited, and as a result, many of the medieval ports of the marsh are now far from the sea. Throughout its history, the proximity of the marsh to the European mainland has meant that it has been in the front line whenever invasion has threatened. In AD 892 one such invasion was successful when a Danish fleet of 250 ships sailed into the Rother and took the fortress at Appledore. As a consequence the marsh contains a large number of defensive monuments and structures dating from the Roman period onwards.



View of Romney Marsh from Rye Church (Helen Saunders, Essex County Council)

TIME-DEPTH	Evidence for activity from 6,000 BC onwards, reclaimed 9 th century AD onwards	3
INTEGRITY OF CULTURAL LANDSCAPE	Extensive survival of current and former reclamation works, defensive monuments, buried land surfaces	4
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Long history of archaeological and historical research. Includes documentary evidence, excavated sites and academic publications	4
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Reclaimed former marshland landscape with sea-walls, drainage channels etc.	4
ASSOCIATIVE CULTURAL SIGNIFICANCE	Noted for its shifting landscape, historic towns and smuggling associations. Source of artistic, particularly literary, inspiration.	2
EXTENT OF CULTURAL LANDSCAPE	26000 ha.	2
AUTHENTICITY	Survival of cultural landscape of Cinque port towns isolated farms, drainage channels and fields,	4
	TOTAL SCORE	23

USA

15. Cape Cod, Martha's Vineyard, Nantucket and the Elizabeth Islands

This area comprises the peninsula of Cape Cod and the archipelago of islands known as the Outer Lands, comprising Martha's Vineyard, Nantucket and the Elizabeth Islands. The islands and the Cape are all terminal glacial moraines laid down some 16,000 to 20,000 years ago, as part of the Laurentide ice sheet, together with marine deposits derived from fluctuating sea levels and coastal erosion and deposition. Ancient artifacts, such as Paleoindian projectile points, and shell middens indicate that humans have occupied this land, or at least traversed it for the last 10,000 years. Thousands of archaeological sites exist throughout the Cape and a number of these sites have been scientifically studied. Cape Cod was the home of the Wampanoag tribe for many centuries, these were fishers and farmers. They eventually lost their lands in the 17th century through purchase and expropriation by British colonists, associated with the Plymouth Colony. Cape Cod was amongst the first places settled by Europeans in North America, with three towns founded in the 1630s (Barnstable, Sandwich and Yarmouth). Intensive land use led to overgrazing and deforestation, resulting in erosion, loss of topsoil and the encroachment of dunes on to farmland. By 1800 dunes on the outer Cape had become common and many harbors were filled in with eroded soils. After 1860 agricultural abandonment had begun and by 1950 the area had more forests than at any time since the 18th century. The Cape and the islands, in particular Nantucket also developed as fishing and whaling centres. By the end of the 19th century, as improved rail transportation made the towns of the Upper Cape accessible to Bostonians, the area became a summer holiday destination. At the beginning of the twentieth century many large, shingled "cottages" were built for the Northeastern mercantile elite. The relaxed summer environment offered by Cape Cod and islands was brought to the attention of the whole nation by writers and artists, including Joseph C. Lincoln, who published novels and countless short stories about Cape Cod life.



Dunes at Sandy Neck, part of the Cape Cod's barrier beach (Wikipedia photo)

TIME-DEPTH	8,000 BC onwards, European settlement and landscape adaptation since 1630s	2
INTEGRITY OF CULTURAL LANDSCAPE	Seaside architecture, some 19 th and 20 th century landscape elements surviving	2
LEVEL OF ARCHAEOLOGICAL AND DOCUMENTARY EVIDENCE	Some archaeological excavation, documentary research from 17 th century onwards, historic building research	2
DEGREE OF ADAPTATION OF NATURAL ENVIRONMENT	Development of maritime and whaling culture, distinctive 'resort' architecture	3
ASSOCIATIVE CULTURAL SIGNIFICANCE	Famous for its natural beauty, seaside architecture, literary and artistic associations, whaling history	3
EXTENT OF CULTURAL LANDSCAPE	Approx. 815,000 ha.	3
AUTHENTICITY	Resort architecture, location and setting, but increasing tourism and associated building have caused significant damage	3
TOTAL SCORE		18

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