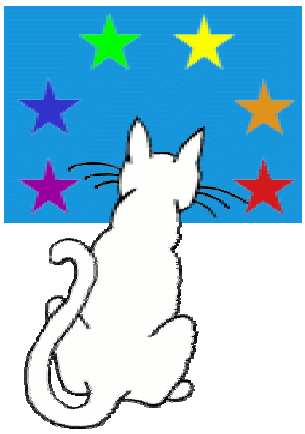

EUROCAT

(EVK1/2000/00510)

REBCAT

CONSORTIUM

THE ELBE CATCHMENT AND RELATED COASTAL AREA: GERMAN BIGHT AND WADDEN SEA

Part C:

SOCIO-ECONOMIC AND INSTITUTIONAL PROFILE

Version:
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Forschungs- und Technologiezentrum Westkueste

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Socio-Economic Profile of the coastal area

impacted by the Elbe river catchment

1. Human Activities in the North Sea area

The North Sea is an area which experiences intensive pressure from human activities. Approximately 184 million people live within the whole North Sea catchment which results in a high degree of pollution from land-based activities entering the North Sea. It needs to be noted in this context that some of Europes most important industrial centres are located within the wider North Sea catchment. Via rivers like the Rhine, the Elbe and the Humber these economic centres are linked with the North Sea (Fig. 1). The number of people living along the North Sea coast varies substantially with season due to tourism and second homes.
The marine environment of the North Sea provides socio-economic values mainly based on biodiversity, renewable and non-renewable resources. Leisure and tourism in the North Sea are also of socio-economic value (Fifth North Sea Conference 2002). Additionally, in the last years, wind as a source for energy receives increasing interest as an economic value and a large amount of offshore windfarms are in the planning stage at the moment. Other issues of socio-economic importance related to the use of the North Sea are the value of the North Sea for the regulation of global change as well as the potential uses of living marine resources for the future development of pharmaceutical products and medicines.
The Progress Report of the Fifth North Sea conference in 2002 in Bergen mentions explicitly the following human activities (pp 23):

- the North Sea is one of the world's most important areas for harvesting fish and shellfish;
- coastal industries of various types are located along the coasts and estuaries of the North Sea, discharging pollutants to marine waters and in some instances requiring large amounts of cooling water;
- the North Sea contains some of the busiest shipping routes in the world, and most of Europe's largest ports are situated on North Sea coasts and rivers;
- the offshore oil and gas industry has become a major economic activity in the North Sea since the late 1960s;
- mariculture for fish and shellfish is undertaken in many of the North Sea States;
- coastal engineering includes damming of rivers, but also beach nourishment, diking and land reclamation;
- tourism in North Sea coastal areas and adjacent land is an important social and economic activity with intense development pressure;
- mineral extraction (sand, gravel and rocks, calcium carbonate (shell aggregates, maerl)) takes place in many North Sea States;
- dumping of dredged material (for maintenance dredging, laying of cables and pipelines), waste from fish processing and inert material of natural origin;
- power generation by tidal or wave energy is limited to a few potential locations, but offshore windmills will increase in number; and
- military uses of the sea in peacetime include fishery protection patrols and NATO exercises.

In the Quality Status Report 2000 on the Greater North Sea, OSPAR identified a list of human pressures and ranked these into the four priority classes A–D according to their relative impact on the ecosystem (OSPAR 2000):

A:

*Highest impac*t: fisheries, trace organic contaminants, nutrients;

B:

*Upper intermediate impac*t: oil and polyaromatic hydrocarbons (PAHs), other hazardous substances, heavy metals, biological impacts;

C:

*Lower intermediate impac*t: litter and disturbance I, dredging and dumping, engineering operations, mariculture, radionuclides; and

D:

*Lowest impac*t: litter and disturbance II.

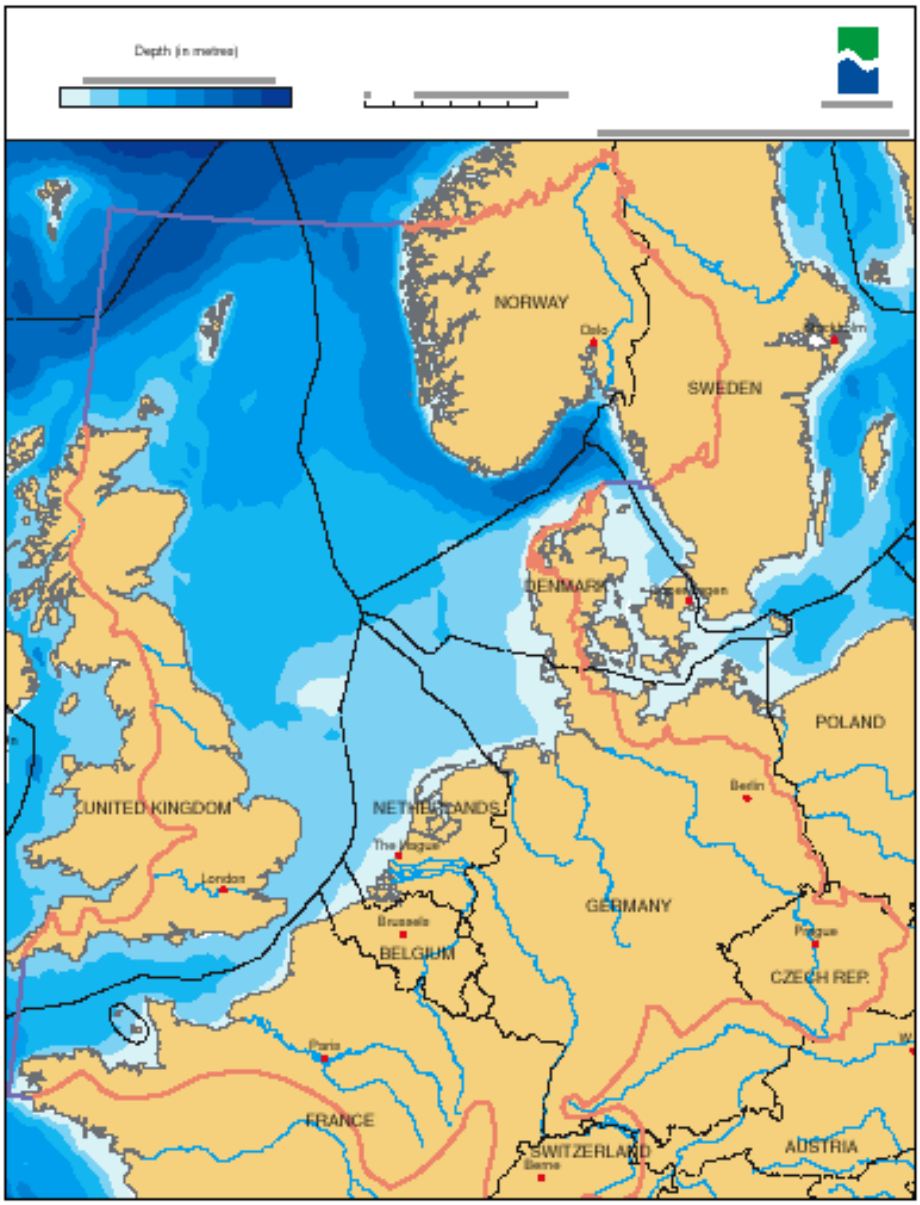


Figure 2.1 *The North Sea and its catchment area. The North Sea comprises the body of water:*
- *southwards of latitude 62° N, and eastwards of longitude 5° W at the north west side;*
- *northwards of latitude 57° 44.8' N from the northern most point of Denmark to the coast of Sweden, and*
- *eastwards of longitude 5° W and northwards of latitude 48°30' N, at the south side.*

Fig. 1: The north Sea and its catchment (Fifth Conference on the Protection of the North Sea 2002)

In addition human activities which contribute to climate change are also recognized as a pressure by OSPAR, but were considered inappropriate for direct comparison with the other human pressures in view of the very broad scope of the causes and effects of climate change.

2. Human Activities in the Schleswig-Holstein Wadden Sea

The following description focuses on the area adjacent to the Elbe river mouth and up north to the German-Danish border. In this area it is most likely to identify detectable impacts of the Elbe outflow. According to the physiographic profile (see: The Elbe catchment and related coastal area: German Bight and Wadden Sea Part B) the receiving sea basin of the river Elbe is the south-eastern corner of the North Sea, the German Bight. The coastal waters which are influenced by the runoff of the river Elbe can be divided into three different water types: the marine waters of the German Bight, the more brackish coastal waters of the northern German Wadden Sea and the river plume of the river Elbe.
This area encompasses the Wadden Sea area of Schleswig-Holstein and administratively the counties (Kreise) Dithmarschen and Nordfriesland which are part of the Federal State of Schleswig-Holstein as potential source of additional pressure and as impact area. It needs to be noted that the coastal waters in the Wadden Sea of Schleswig-Holstein are strongly influenced by the Elbe river system but the terrestrial parts north of the Kiel Canal do not belong to the Elbe river catchment. As a result the Wadden Sea is influenced by several smaller river catchments like the Eider catchment as well as by the Elbe and the energy and matter exchange with other parts of the North Sea (UBA 2001). In addition, human activities within the coastal zone and marine area itself can have similar impacts than activities within the river catchments, making it therefore difficult to identify the origin of impacts and discriminate between catchment related effects and coastal effects in particular.

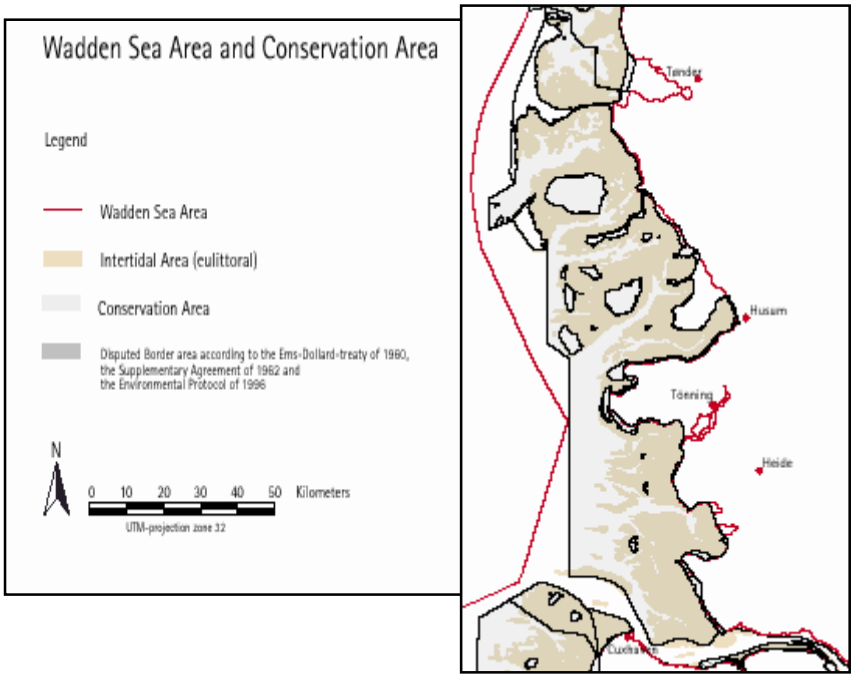


Fig. 2: Schleswig-Holstein Wadden Sea area (adapted from De Jong et al 1999)

2.1 General Characterisation

Generally the area described here is situated outside the axes of European economic development and outside the main traffic fluxes. While the Baltic Sea coast of Schleswig-Holstein potentially serves as the gateway from Western Europe to Scandinavia and is seen as the connection between the metropolitan areas of Hamburg and Kopenhagen/Malmoe, the North Sea coast is bordered by Hamburg as economic centre in the south and the structurally weak Danish North Sea coast in the north. Traffic connections are mainly running in North-South direction while especially in Dithmarschen the connections to the Baltic Sea coast are sparse (even though the distance is just about 100 km), time consuming and the economic links are underdeveloped. On the other hand, common interests and partnerships seem to be well developed between the Wadden Sea States and between Wadden Sea communities but despite several commissions not within the North Sea area in large. A "North Sea identity" comparable to societal identification processes in the Baltic is non-existent up to now.

2.1.1 Demography, settlement structure and land use

In principle Nordfriesland as well as Dithmarschen can be characterized as rural areas with rather weak infrastructure and low population density. Nordfriesland has about 164.000 inhabitants and Dithmarschen about 137.000. This stands for a population density of 80 inhabitants per km^2 for Nordfriesland and 94 for Dithmarschen (compared to 229,4 inhabitants per km^2 in Germany and 175,9 in Schleswig-Holstein). The largest towns are Husum in Nordfriesland and Heide in Dithmarschen, each with about 20.000 inhabitants. As such both counties are classified as rural areas of low population density by the Federal Agency for Spatial Planning (BBR 2000a, Fig. 3).
From the 1970s until 1988 the North Sea coast of Schleswig-Holstein had a negative population development but since then a steady population growth can be observed in both counties (Stock et al 1996). Within the area this development is spatially differentiated. Few areas of growth in tourism and good infrastructure experience population growth (like the islands of Amrum, Foehr and Sylt and the tourism centre of St. Peter Ording at the mainland). Population in the rural villages at the mainland to a large degree stagnates or even decreases.
The land use is characterized by a high level of land used for agricultural production as well as a high level of natural or semi-natural areas while settlements and traffic infrastructure only emcompass a low portion of land use (BBR 2000a, Fig. 4). On the other hand the Spatial Planning Report 2000 (BBR 2000a) expects increasing pressure on land use in the next 15 years from increasing tourism and especially from second homes. This might result in the risk of an uncontrolled urban sprawl in areas of high attractiveness for tourism and recreation.
The Wadden Sea itself is protected as a National Park (excluding the islands, see chapter 2.2.7 for details) but despite this designation characterized by a large mix of several human uses and activities, including parts of the Wadden Sea being used as training and test sites for military purposes and one site for oil production. An overview of uses or planned uses in the German territory waters and EEZ gives figure 5.
In addition it needs to be noted that the German Bight and especially the Elbe estuary are one of the most intensively used shipping routes in Europe (see chapter 2.2.4 for more details) For the areas adjacent to these major shipping routes this implies a comparatively high risk of ship accidents which could potentially endanger the ecological structure of the Wadden Sea as well as tourism as the economic base (see chapter 2.2.6 for details) of large parts of the area. Because of this the region is in favour of announcing the north Sea as PSSA to IMO (which was decided by the environmental ministers at the 5th North Sea Conference in Bergen in 2002).

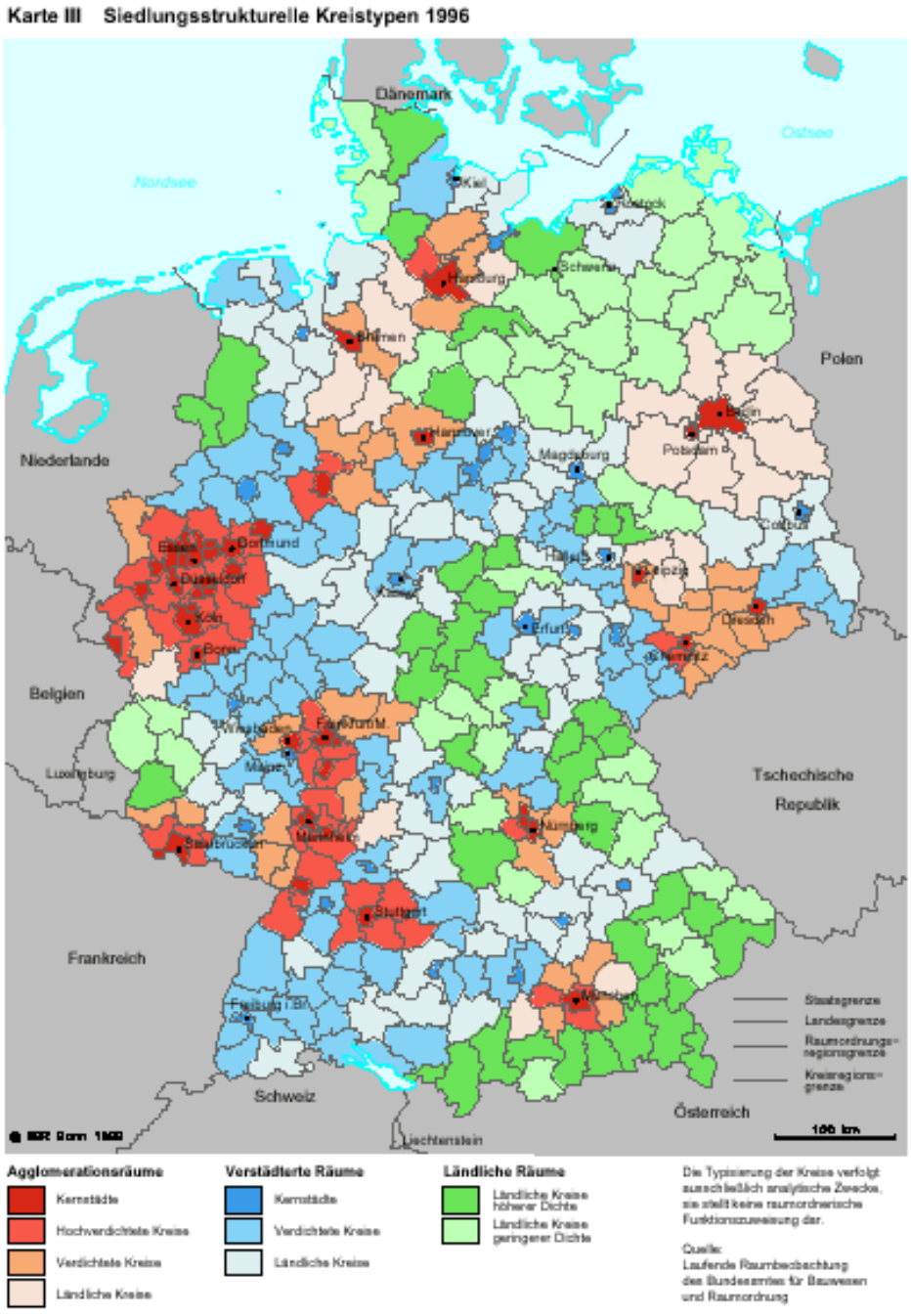


Fig.3: Classification of German counties according to settlement structure (BBR 2000a)

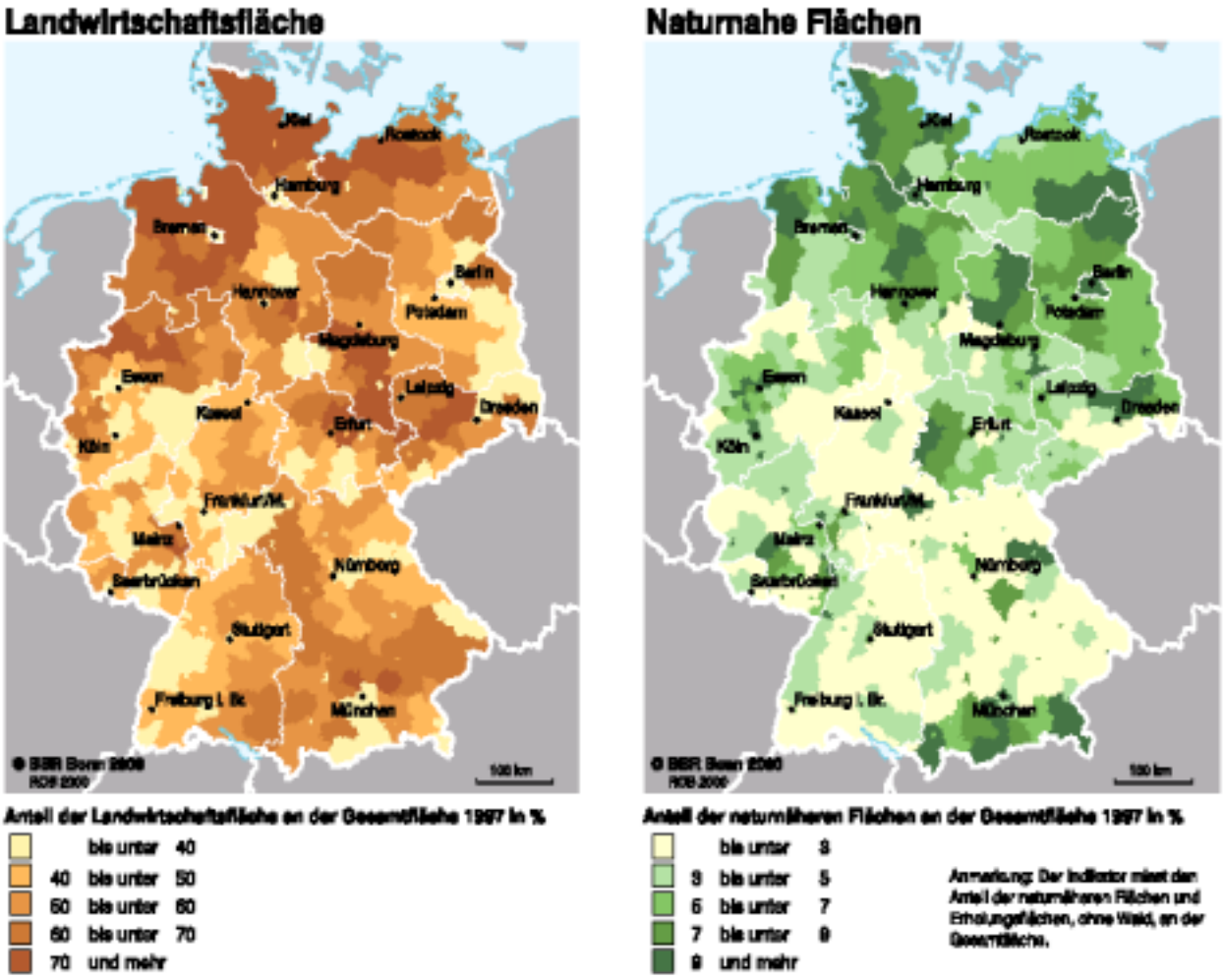


Fig. 4: Degree of agricultural areas (left) and of natural areas (right) compared to the whole area sizeof regions (BBR 2000a).

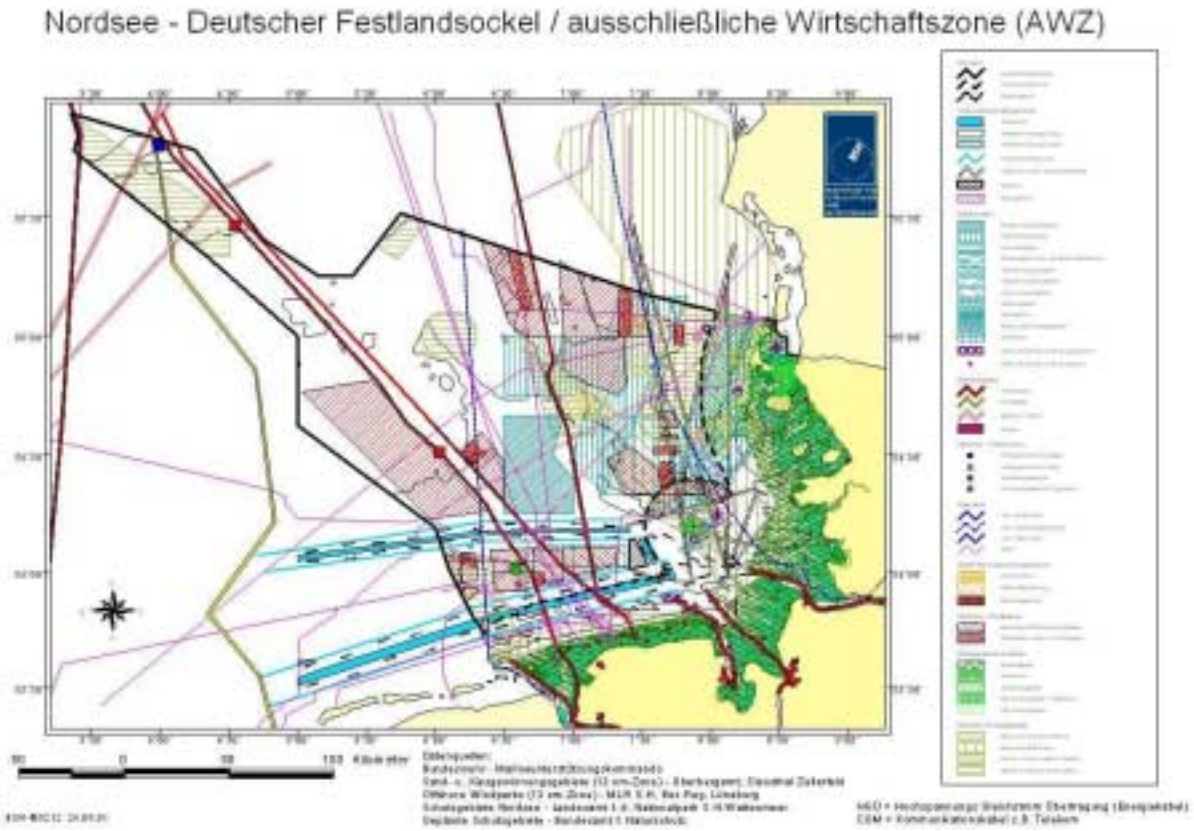
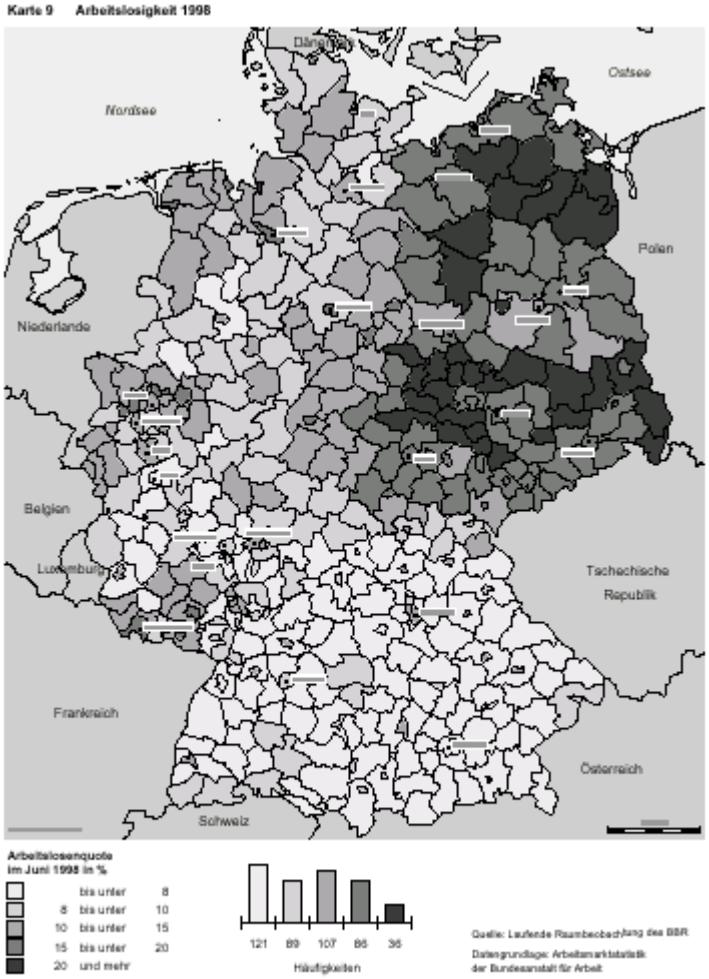


Fig. 5: Human activities and planned activities in the German North Sea (BSH 2001)

2.1.2 Employment and Economic Structure

The North Sea coast of Schleswig-Holstein is diverted from its economic structure. The south of Dithmarschen, especially the industrial area of Brunsbuettel with its harbour near to the Kiel canal and its chemical industry is oriented towards Hamburg while the north of Dithmarschen and Nordfriesland are dominated by a rural structure, tourism as main economic activity and agriculture as dominating land use. This is reflected in the unemployment rate where the more industrially structured Dithmarschen experiences higher unemployment rates than the more service oriented Nordfriesland (Fig. 6). On the other hand, industrial wages in Dithmarschen are higher in average than in Nordfriesland (BBR 2000b).
In addition, coastal activities like fishing, a growing windmill industry and a potential for developing a lively mariculture industry (esp. algae farming and fish farming using closed circulation systems) play an important role in the local agendas for economic development. Large single employers are the oil refinery in Hemmingstedt and a book printing company in Leck, Nordfriesland. Extremely important for regional employment are public administration and related companies in charge for public services.
Fish farming as well as offshore windfarms constitute new coastal activities with high potential for future economic growth, but also are imposing additional and - at least in quantitative terms - largely unknown environmental pressures on the coastal environment. Fishing decreased strongly in its economic importance but is linked to culture and history of the area as well as being important for the image of the region and its attractiveness for tourism. Agriculture (see chapter 2.2.1 for details) is also strongly connected to the history of the area which is characterized by the fight of farmers against the sea for some hundred years. This fight against the sea formed a landscape and a coastline which are dominated by human structures from a history of diking and land reclamation. This history formed the

environmental perception of the people, especially in the small rural villages, which includes very high importance given by locals to coastal defence policy, drainage structures and water management in general.



<u>Fig. 6:</u> Unemployment in Germany in 1998 (BBR 2000b)

Figure 7 shows the importance of tourism for employment along the North Sea coast of Schleswig-Holstein. About 19% of the economic surplus of the region is derived from tourism which is well worth about 9.000 jobs. According to other estimates which take activities into account which benefit from the high number of tourists about 2/3 of the population in the one way or another achieve an income from tourism (Nordseebaederverband 1998). In the contrary traditional activities like agriculture (5%) and fisheries (1%) contribute only marginally to the regional income, although more than in national average. Of high importance for employment and income are public services. The windmill industry is of growing importance for employment and in 2001 had created more than 1.000 jobs, mainly in Husum and its surroundings.

According to the Spatial Planning Report from 2000 (BBR 2000a) the North Sea coast of Schleswig-Holstein will stay a rural area with strong development problems in the future. This is expected especially for the northern part while the southern part might benefit from the neighbourhood of the growing agglomeration of Hamburg (Fig. 8). On the other hand it is also expected that due to high soil quality, the area still will have good income opportunities from agriculture and due to high landscape attractiveness a high potential for tourism. Not valued and not investigated by BBR were economic potentials from wind energy and from aquaculture.

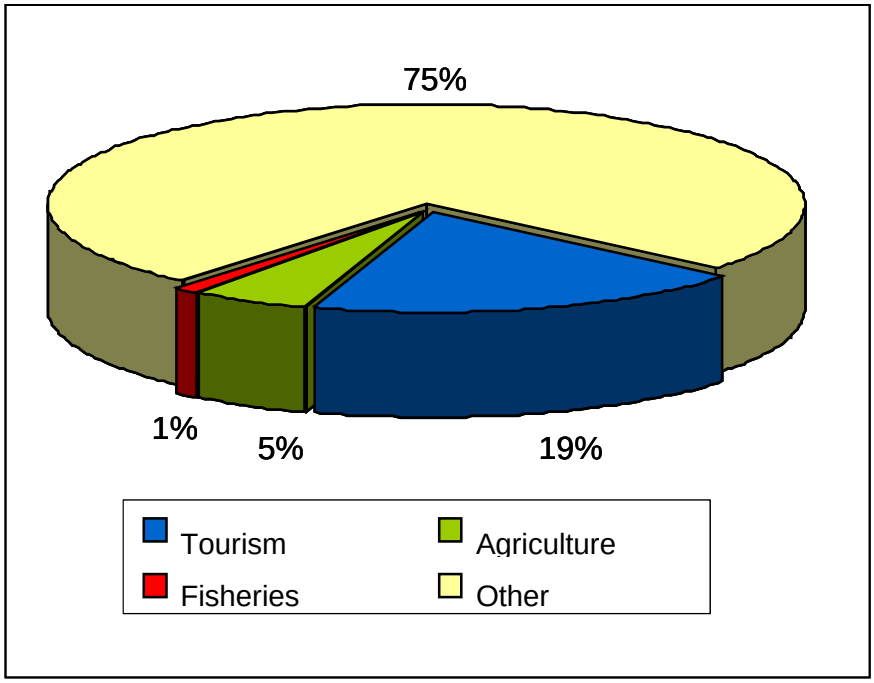


Fig. 7: Economic surplus in the communities adjacent to the National Park (Source: Stock 1996: 41 nach Feige & Möller 1994a undb)

2.2 Core Sectors of importance for coastal pressures and impacts

2.2.1 Agriculture

The conditions for agriculture are good on the fertile marsh soils under favourite climatic conditions along the North Sea coast. In Nordfriesland cattle production, to a large degree organised as an agroindustry is of high importance. In Dithmarschen cabbage which is not regulated by the CAP of the EU plays an important role for farmers as cash crop. Dithmarschen as the largest cabbage production area throughout Europe is competitive on the world market with this product.
Agriculture in the area can be seen as a source of pressure for the coastal waters, mainly as a source of diffuse nutrient inputs into the water. Compared to other areas in Europe it can be expected that agriculture will also be of importance along the North Sea coast in Schleswig-Holstein in the future even if European agricultural policy will be changed. As a result nutrient inputs from agriculture in the coastal area itself will depend on environmental regulations, technological innovation, subsidies for reduction of fertilizer use or other policies for reducing nutrient inputs from diffuse sources.

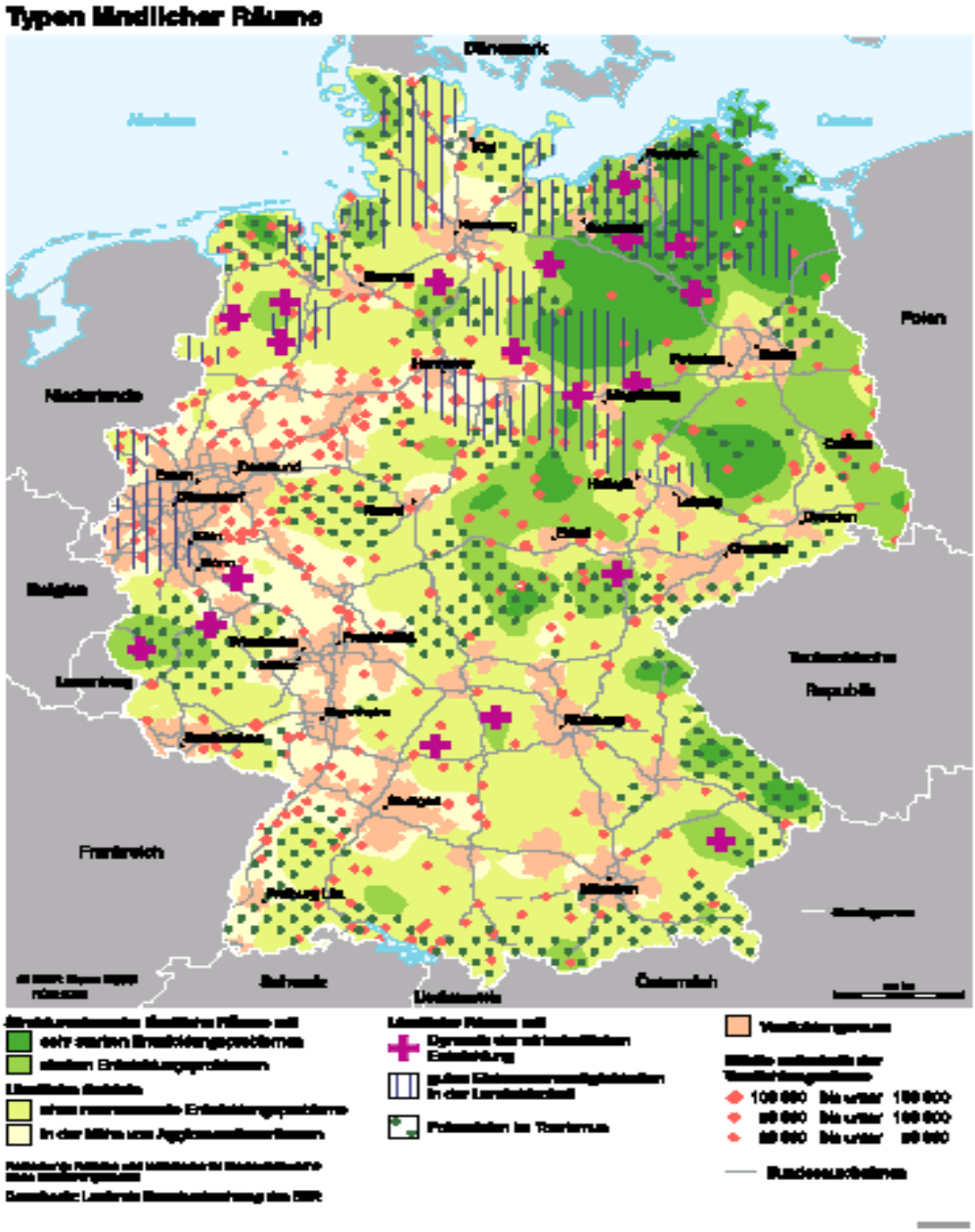


Fig.8: Types of rural areas according to the Spatial Planning Report 2000 (BBR 2000a)

2.2.2 Fisheries

According to the OSPAR Quality Status Report for the North Sea from 2000, effects of fisheries, including industrial fishing and shell-fisheries, occur at all levels in the ecosystem (from benthos to mammals). The main impacts of fisheries vary from one type to another, but in general are (OSPAR 2000):

- removal and discarding of target species;
- seabed disturbance;
- discarding and mortality of non-target species.

These impacts are widespread and are ecologically important. The removal of target species impacts the whole North Sea to varying degrees. At present, 30 – 40% of the biomass of commercially exploited fish species in the North Sea is caught each year. Despite some recovery in recent years, there is concern about the stocks of herring and cod, which are outside Safe Biological Limits (OSPAR 2000).
Within the German part of the Wadden Sea Area, shrimp fishery is carried out with trawlers normally using two beam trawls (9 -12 m wide and weighing 500-900 kg). Dutch shrimp fishers are not allowed to fish with beams longer than 9 m. In the German part,the shrimp catch of some 10,000 t equals a value of 20-30 million Euro. In Schleswig-Holstein, 107 vessels (1996) are involved in shrimp fishery (De Jong et al 1999).

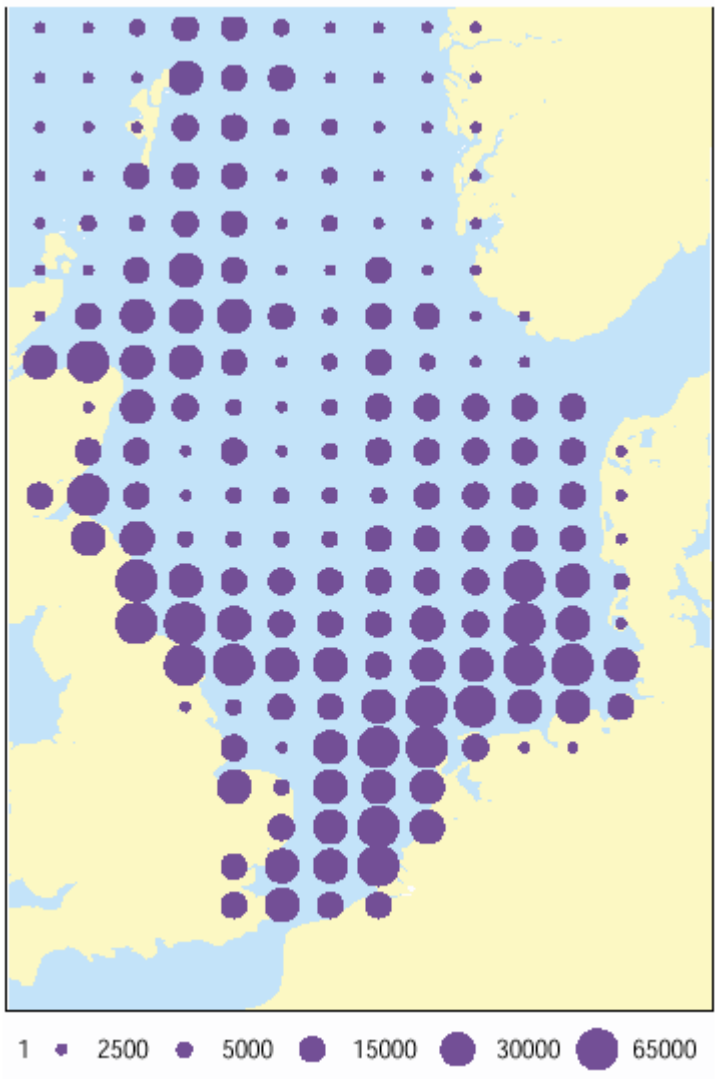


Fig. 9: Spatial distribution of mean fishing effort (1990–95) for bottom trawling (in average hours of fishing per year and per square of 1 degree longitude x 0.5 degree latitude). Source: redrawn from Jennings et al. 1999 (from OSPAR 2000).

Fisheries generally needs to be seen as a pressure to the biological resources and thus the biological integrity of the North Sea ecosystem. Potentially it is also an activity being impacted by eutrophication and land based pollution from the river catchment, but in practice there is no evidence for ecological impacts from pollution on fish stocks. In fact according to all investigations the pressure on fish stocks has to be related to overfishing and thus the fishing sector itself.

In addition fisheries is also impacted by other human activities in the coastal area (potential restrictions due to construction of offshore windfarms, restrictions due to nature conservation).
Economic pressure on fishermen comes from overfishing, but locally the economic problems of fisheries are increased by strong competition and by missing cooperation between the fishermen themselves which results in low power in the market and low influence on pricing.

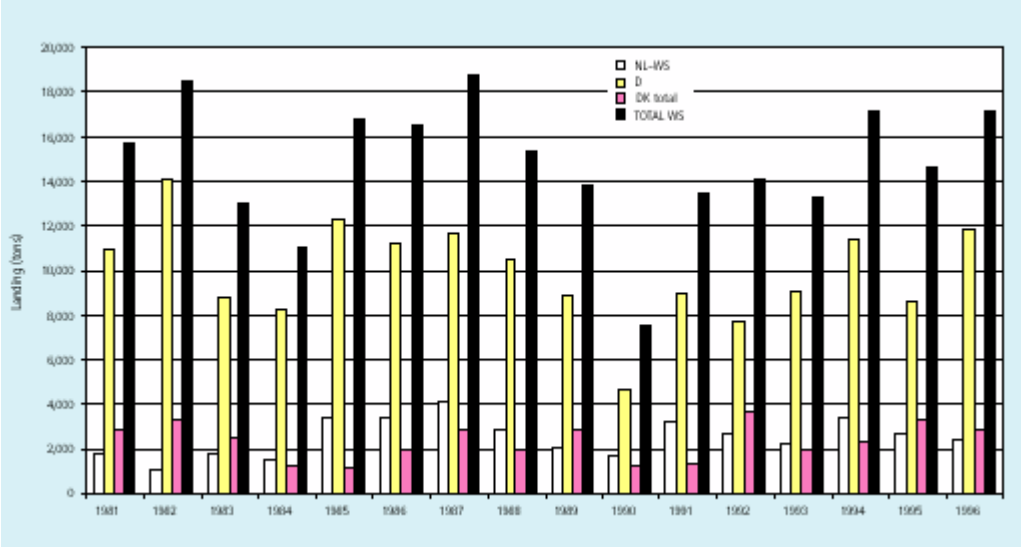


Fig. 10: Total landings of shrimps for human consumption in the Wadden Sea countries in tons (De Jong et al 1999)

2.2.3 Mariculture

Currently mariculture is of low importance for the Wadden Sea area, especially in Schleswig-Holstein due to strong regulations as a result of the establishment of the National Park in 1995. Main activity in this field up to now is mussel culture which is strongly regulated. Currently there are licences for 8 vessels for mussel fisheries in Schleswig-Holstein. The plot size for mussel lots in Schleswig-Holstein covers 28 hectares which will be reduced until 2016 according to an agreement between the State government and the mussel farmers to 20 hectares.
In the context of EUROCAT mussel cultures are an activity which is impacted by water quality. On the other hand, mussel cultures impose restrictions on shrimp fisheries and pressures on natural mussel beds which are fished for seed mussels.
For the North Sea at large mariculture is of larger importance. Generally, mariculture is undertaken in many of the North Sea states, although in Belgium and Sweden on a negligible scale (OSPAR 2000). Table 1 gives an overview of mariculture production in the North Sea area. The Netherlands and Germany practise commercial shellfish farming only in the marine area. Mariculture may introduce to the environment nutrients (only 25% of the nutrients found in fish feed are converted into biomass (UBA 1996, cited in De Jong et al 1999)), organic matter, antifouling agents, biocides, anti-biotics and other pharmaceuticals and colouring agents (OSPAR 2000). In addition, farmed individuals may escape, resulting in potential threats to native species. These potential effects might lead to environmental pressures on the ecosystem structure. Thus, while maricultures depend on the water quality on one hand, they exert environmental pressures themselves on the other hand.

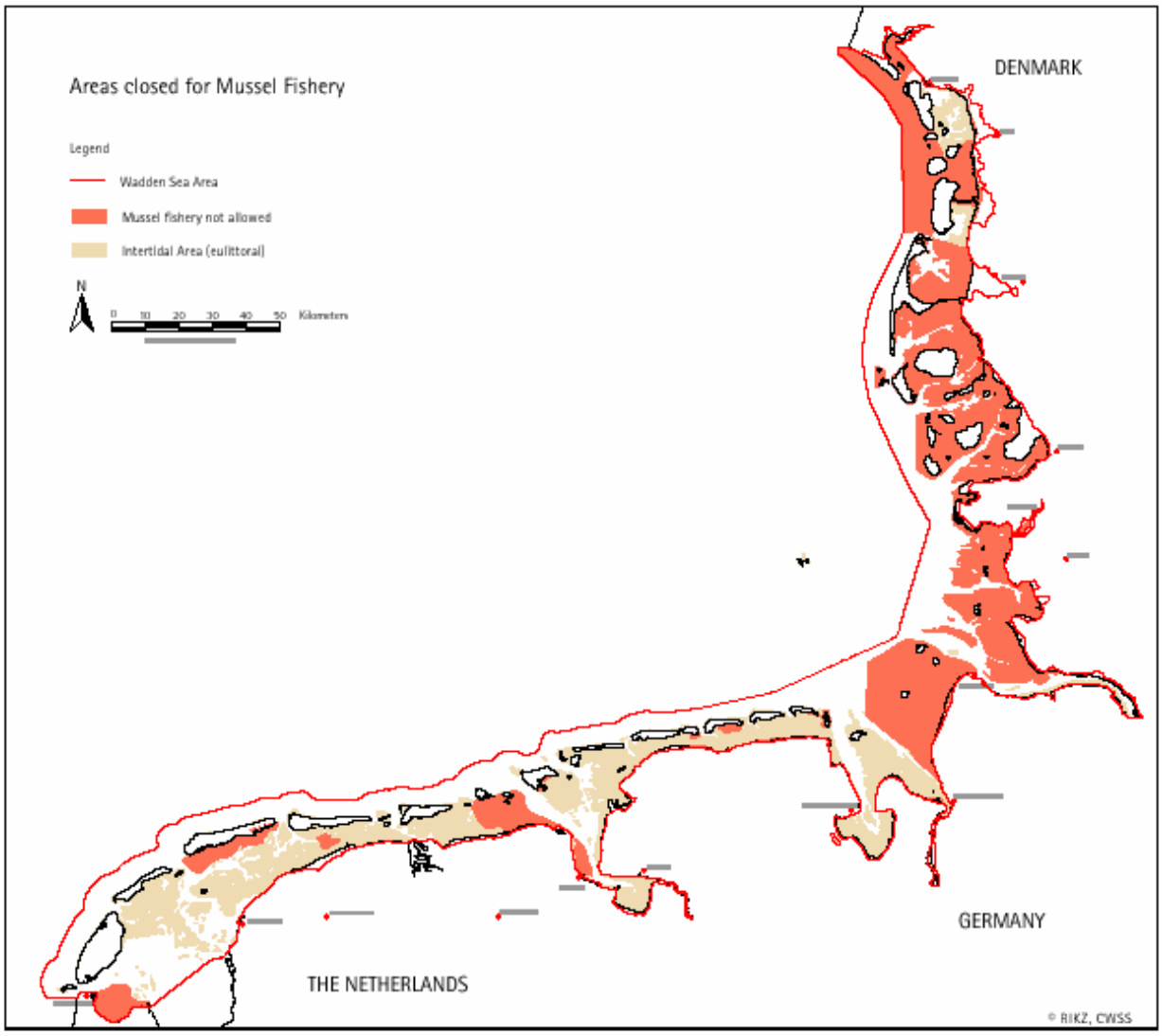


Fig. 11: Areas closed for mussel fisheries in the Wadden Sea (De Jong et al 1999)

Table 1: Mariculture production in the North Sea (OSPAR 2000)

	Rainbow trout	Salmon	Blue mussel	Oysters	Scallops	Clams
	(t)	(t)	(t)	piece (p) or tonnes (t)	(p)	(t)
Denmark (1996)	667	-	59.602	-	-	-
France	589	650	41.000	48.000 t	-	-
Germany (1996)	-	-	38.802	75 t	-	-
Netherlands	-	-	95.000	17.000.000 p	-	-
Norway (1996)*	12.000	120.000	180	530.000 p	90.000	-
United Kingdom (1996)	11.400	27.700	7.700	14.000.000 p	3.000	12
Sweden (1996)	< 100	-	1.800	-	-	-

* Preliminary data from 1996 published by Directorate of Fisheries 1997

2.2.4 Shipping and Harbour Development

The North Sea contains some of the busiest shipping routes in the world. In 1996 about 270 000 ships entered the main 50 ports in the North Sea and Channel area (OSPAR 2000). Daily, more than 400 ships pass through and 600 ships cross (including 200 ferries) the Strait of Dover. In 1996 there were 37 055 shipping movements transporting 48 million tonnes of cargo between the North Sea and the Baltic via the Kiel Canal (OSPAR 2000). Most of Europe's largest ports are situated on North Sea coasts and rivers, namely Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp, Le Havre, and London. Container transfer in the main ports increased by 120% in the last ten years (Table 2). Approximately half the shipping activity in the Greater North Sea consists of ferries and roll-on/roll-off vessels on fixed routes.

Table 2: Development of market shares in container t ransfer (OSPAR 2000).
Source of data: Wirtschaftsbehörde Hamburg (1998).

	1985		1990		1997		
	Quantity	Market share	Quantity	Market share	Quantity	Market share	Increase in quantity
	(1000 TEU)	(%)	(1000 TEU)	(%)	(1000 TEU)	(%)	1985-97 (%)
Rotterdam	2.655	43,9	3.666	43,7	5.340	40	+101
Hamburg	1.159	19,1	1.969	23,5	3.337	25	+188
Antwerp	1.243	20,5	1.549	18,5	2.969	22,2	+139
Bremen ports	998	16,5	1.198	14,3	1.705	12,8	+71
TOTAL	6.055		8.382		13.351		+120

TEU = 20 ft container equivalent unit

The structure of sea transport has changed considerably in the last 15 years with container transport (table 2). As a result of more and more global economic structures and globally distributed production the exchange of goods and transport by ships increased (Fig. 12).
Figure 12 and table 3 which compares ship's calls and goods transhipped in the main ports of the Wadden Sea demonstrate that while the number of ships generally decreased, the total volume increased. This indicates an increase in the average ship size.
Shipping creates pressures on the marine environment due to discharges of oil and wastes, cleaning and venting tanks, air pollution, loss of cargoes containing harmful substances (50% of goods carried at sea can be described as dangerous), discharges of ships' ballast water which may contain non-indigenous species, and the use of anti-fouling paints containing biocides (OSPAR 2000).
One of the main pressures from increasing ship traffic is the risk of accidents. In the Greater North Sea, eleven accidents occurred in 1994 and six accidents occurred in 1995 where pollution of the seawater was recorded (world wide 101 in 1994 and 86 in 1995) (Quell and Klimsa, 1997, cited in De Jong et al 1999). In 1998, the 'Pallas' caught fire off the coast of Jutland and finally ran aground near the German island of Amrum in the Wadden Sea of Schleswig-Holstein, spilling an estimated 244 m^3 of heavy fuel oil causing the death of about 16 000 overwintering birds (De Jong et al 1999). Even though this was finally not a major impact for the ecology of the Wadden Sea it demonstrated the potential of risk for the area, the ecology as well as the economic structure with tourism as main source of income.
Another risk from shipping is lost cargo. The Netherlands registered lost containers with various types of cargo on five occasions. In one case the 'Sherbro' lost 88 containers, 5 of which contained the pesticides 'Apron Plus' and 'Ridomil Plus', and 'Apron Plus' packages from this accident washed up on the Dutch and German coasts (De Jong et al 1999).

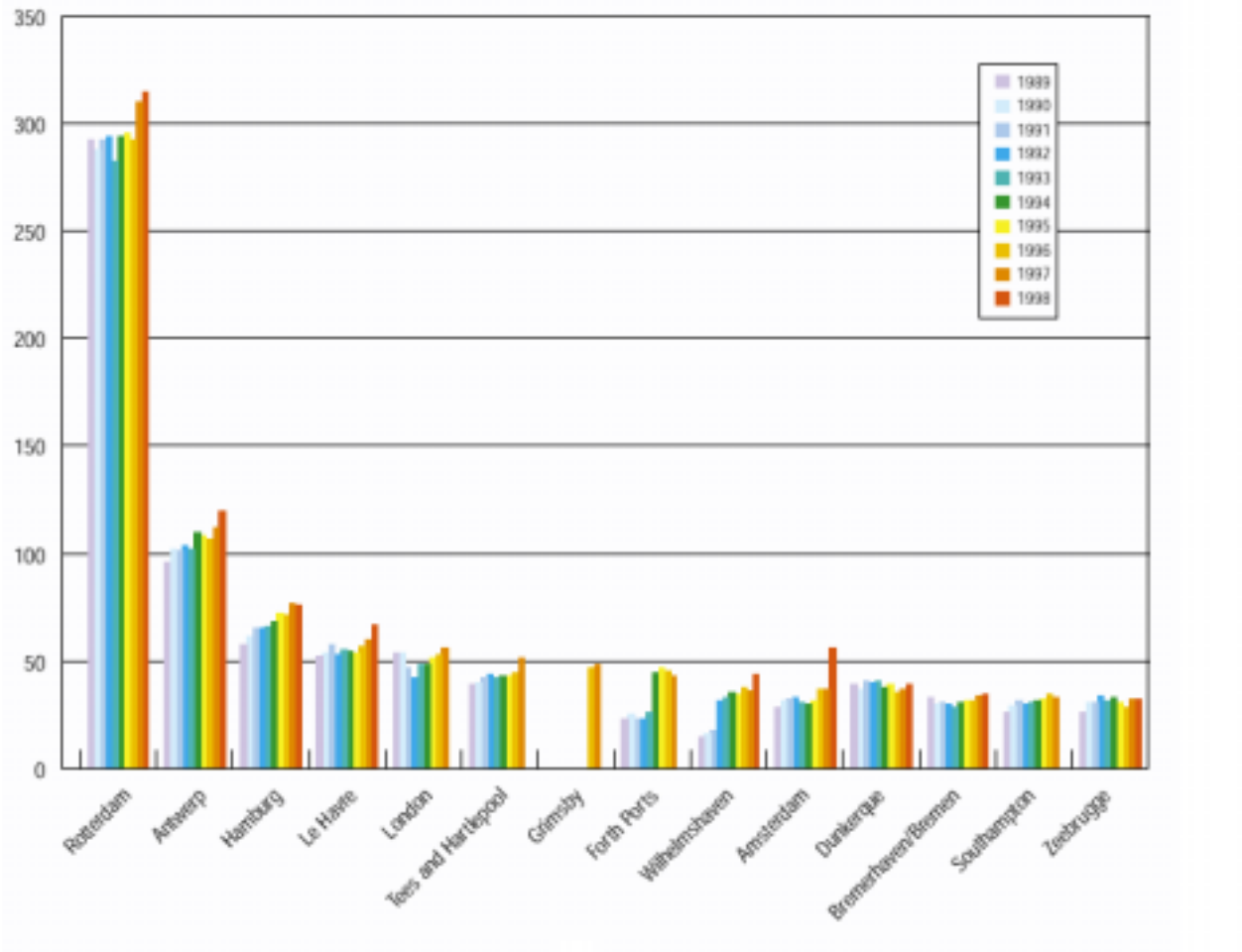


Fig. 12: Development in shipments (10 million t) in North Sea ports from 1984 to 1998 (OSPAR 2000).

In addition the development towards larger vessels stimulated decisions to deepen the Elbe and Weser estuaries which creates additional changes in the physiographic environment and in the ecological system. The Elbe river will be deepened over a length of 96 km (Wedel-Cuxhaven)to an average depth of 16 m. As a result the port of Hamburg will be accessible for ships with a depth of 12.3 m (presently 12 m),meaning a tide-independent approach.

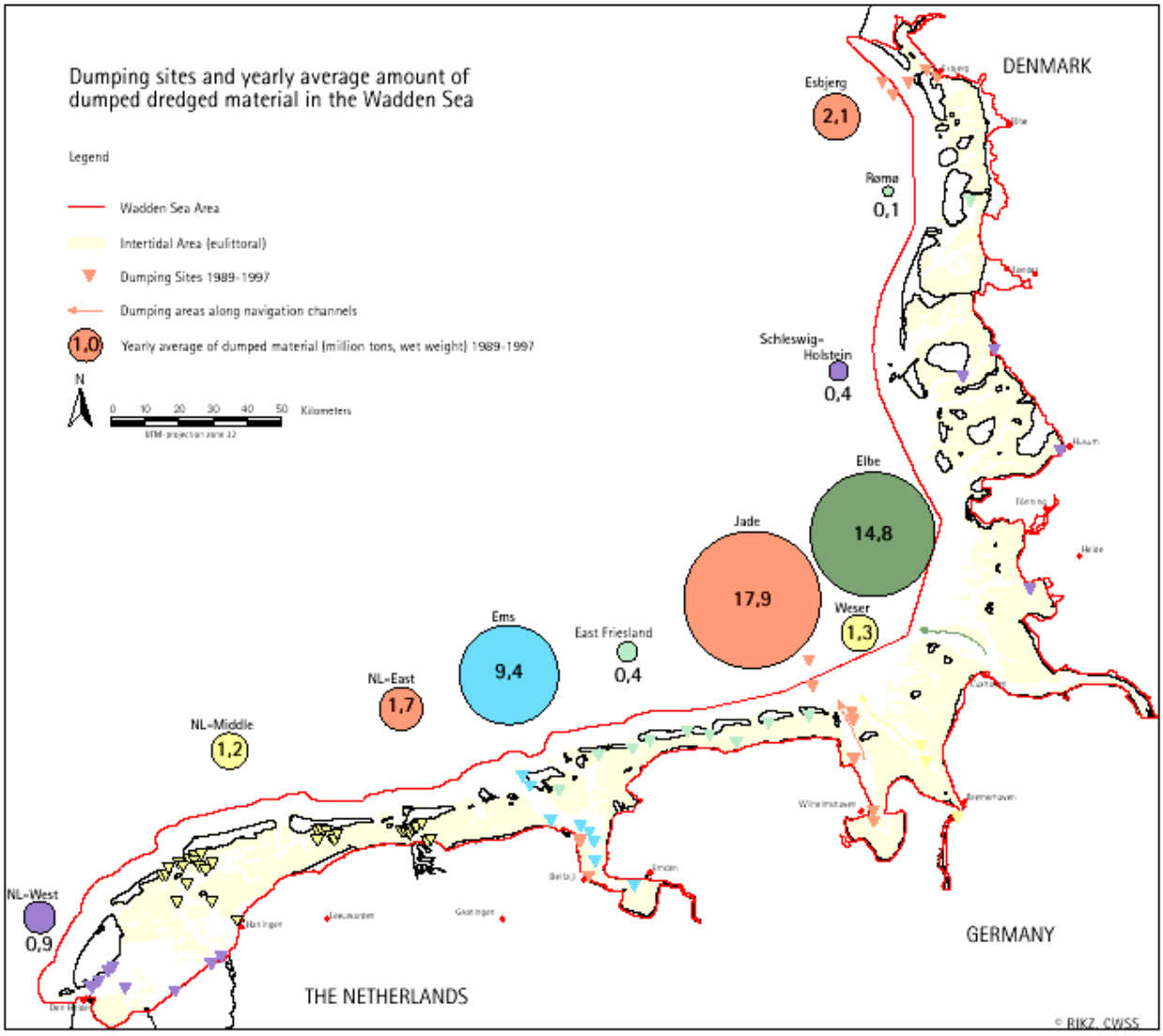
Table 3: Ships' calls, ships' volume and transshipment in main Wadden Sea ports 1989-1996. Volume in GT. Figures in italics: Esbjerg: ships' volume in GRT. German ports: ships' volume in NRT. GRT (Gross Register Ton) and NRT (Net Register Ton) are units in which the volume of a ship is expressed (One Register Ton equals 2,73 m 3). As of 1994, it is mandatory to indicate the volume by the dimensionless unit GT. There is no conversion factor from RT to GT (De Jong et al 1999).

	1989	1990	1991	1992	1993	1994	1995	1996
Calls (Incoming)								
Harlingen		1,197	1,246	1,285	1,181	952	357	
Delfzijl/Eemshaven		3,116	3,005	2,854	2,070	1,334	1,218	
Emden	2,301			2,487				2,243
Wilhelmshaven	789			1,495				1,553
Bremerhaven	4,381			4,320				5,418
Bremen	5,421			4,297				2,913
Hamburg	12,727			12,750				11,489
Esbjerg			2,998	2,675	2,134	2,011	1,808	2,020
Volume (x 1000)								
Harlingen		1,043	1,109	1,217	1,321	1,395	815	
Delfzijl/Eemshaven		5,105	4,911	4,836	4,004	3,731	3,205	
Emden	*3,194*			*2,594*				4,053
Wilhelmshaven	*6,529*			*13,355*				14,675
Bremerhaven	*28,605*			*27,659*				34,273
Bremen	*15,200*			*11,890*				9,368
Hamburg	*54,760*			*59,545*				61,182
Esbjerg			*8,900*	*9,302*	*8,506*	*8,850*	13,270	11,924
Transshipment (x 1000 tons)								
Harlingen		295	320	319	391	474	495	
Delfzijl/Eemshaven		3,141	2,682	2,750	2,902	2,756	2,685	
Emden	3,023			1,673		2,038	2,181	2,360
Wilhelmshaven	14,499			31,576		34,527	33,066	36,122
Bremerhaven	15,077			13,605		13,304	15,102	14,563
Bremen	14,825			13,646		14,560	14,185	13,842
Hamburg	53,857			59,858		62,524	65,995	64,455
Esbjerg			3,790	4,333	3,728	3,879	4,028	3,317

2.2.5: Dumping of dredged material and waste

Dredged material dumped at sea consists primarily of material removed to keep navigation channels clear or removed in the course of coastal construction engineering projects. The material may also be used for beach nourishment, land reclamation or for salt marsh preservation (OSPAR 2000). A total of 88 million t from internal and external waters were dumped in the Greater North Sea in 1996 (OSPAR 2000). The amounts of dredged material dumped into the Wadden Sea Area varied between 31 million t and 67 million t/yr (wet weight) during the period 1989 to 1997 with an average of 48.5 million t/yr. In average, 44.1 million t/yr were dumped into the German part of the Wadden Sea, 3.9 million t into the Dutch and 2.1 million t into the Danish Wadden Sea (De Jong et al 1999). The dumping sites and the average amount for each region are shown in Figure 13. Because maintenance

dredging is the main source of dumped material, the amounts depend mainly on natural variation of sedimentation and resuspension processes which explains why no trend in the amounts of dredged material dumped into the Wadden Sea can be observed. Values above 50 million t were reported in the years 1993, 1994 and 1995.The amount decreased to about 40 million t/yr in 1996 and 1997 (De Jong et al 1999).



<u>Figure 13:</u> Map of dumping sites and yearly averages of dumped material (tons wet weight) per region (period 1989- 1997) (De Jong et al 1999).

Generally, dumping of waste or other matter is prohibited by the OSPAR Convention. Dredged material is an exception as is waste from fish processing, inert material of natural origin and - until the end of 2004 - vessels or aircraft (OSPAR 2000). The annual OSPAR Reports on Dumping of Wastes at Sea present an overview of the number of permits issued for most of the dredged materials concerned.

In the past a wider range of material, including sewage sludge and industrial waste had been disposed in the North Sea. The dumping of industrial wastes was phased out in 1993 when the last few UK licences for disposal at sea of liquid industrial waste and fly ash expired. Incineration of liquid industrial waste on special incinerator vessels in the North Sea and the dumping of waste from the production of titanium dioxide were terminated in 1989 (OSPAR 2000). According to the OSPAR Status Report for the North Sea, discharges from the titanium dioxide industry which are mainly relevant for estuarine waters in France and UK (Seine, Humber and Tees) are still permitted under the EU Council Directive 92/112/EEC.

2.2.6 Tourism

The economic importance of tourism for the area was outlined in chapter 2.1.2. The number of overnight stays in the Schleswig-Holstein Wadden Sea regions of Nordfriesland and Dithmarschen since 1985 shows a substantial increase of more than 40% (Figure 14). It appears that the numbers have stabilized in recent years. A substantial number of overnight stays takes place in private accommodation facilities with less than nine beds which are not included in official statistics. In the Schleswig-Holstein Wadden Sea region, about 38% of the overnight stays take place in such private facilities,and a further 14% are private visits or second-house users (Stock *et al*.1996). In effect, the actual number of overnight stays is roughly twice the number of the official statistics (De Jong et al 1999).

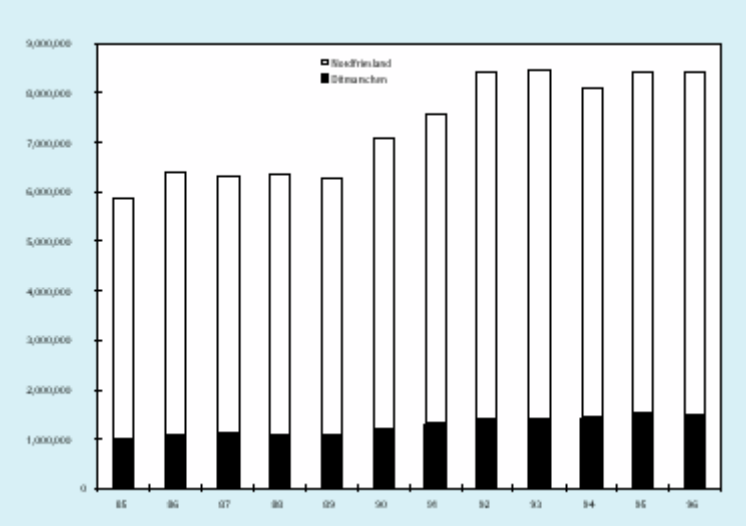


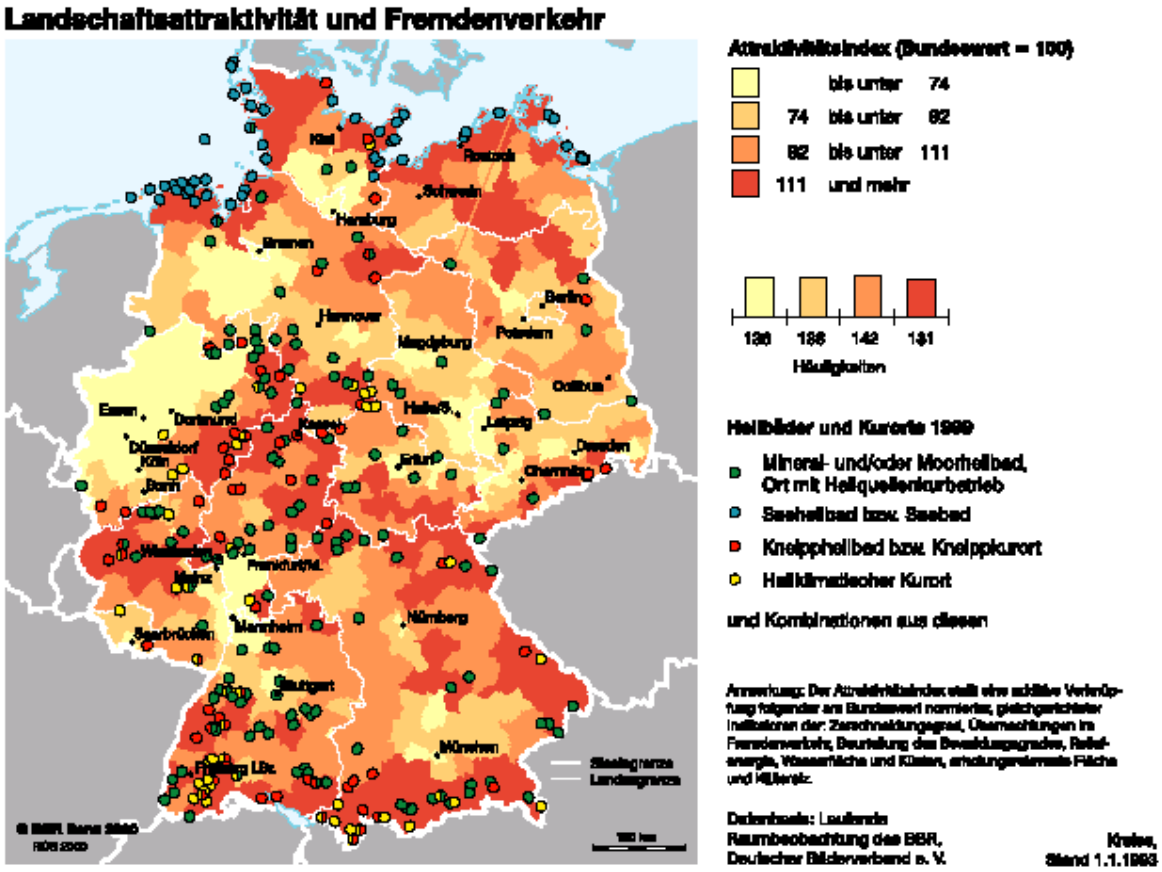
Fig. 14: Development of overnight stays in Dithmarschen and Nordfriesland (from Stock et al. 1996 and De Jong et al 1999)

For the whole trilateral Wadden Sea area official overnight stays are documented in table 2. These numbers underline that tourism is one of the main income sources in most parts of the Wadden Sea region.

Table 4: Total number of overnight stays for the Wadden Sea region (De Jong et al 1999) Sources: Denmark: Amternes Vadehavssamarbejde (Ribe Amt), Schleswig-Holstein: Stock et al., (1996), Lower Saxony: Marencic et al. (1996), Netherlands: Ministerie van Verkeer en Waterstaat (1996b).

Region stays in million	No. of overnight	Year
Danish Wadden Sea region (islands of Fanø, Mandø and Rømø, city of Ribe)	2.5	1995
Schleswig-Holstein Wadden Sea region Nordfriesland and Dithmarschen	16.9	1991
Niedersachsen Wadden Sea region (islands and mainland municipalities)	21.4	1993
Dutch Wadden Sea region (islands and mainland municipalities)	12	1993

For the future it can be expected that tourism will stay one of the economic potentials of the area. Compared to the Baltic Sea coast in Mecklenburg-Vorpommern the growth rates in tourism are low or even stagnate. In general, high growth rates in the future cannot be expected. Policy for tourism development tries to identify and develop special offers for specific target groups and to improve the quality of tourism products along the North Sea coast in Schleswig-Holstein. Another factor for tourism is the quality of the landscape and experience of nature which is part of the image of the North Sea region in the perception of tourists. (Fig. 14).



Karte 83
Die Karte zeigt den Zusammenhang von – anhand mehrerer Indikatoren gemessener – Landschaftsattraktivität und dem Fremdenverkehr. Es wird deutlich, dass die attraktivsten Landschaftsräume an der Küste, in den Alpen und Voralpen, den Mittelgebirgsregionen und Seenlandschaften sind. Gleichzeitig konzentrieren sich hier auch die Heilbäder und Kurorte.

Fig. 14: Attractiveness of the landscape and tourism (BBR 2000a)

Tourism has a seasonal pattern and the stress upon the ecosystem is consequently unevenly distributed over the year. For example, in the National Parks of the Wadden Sea, 75 – 90% of all overnight stays are booked for the period April-October. In Germany and Denmark the number of overnight stays per year amounts to more than 20 million. This number is very unevenly distributed between the local communities. Figure 15 shows that the hot spots are the islands and the villages St. Peter Ording and Buesum at the mainland.

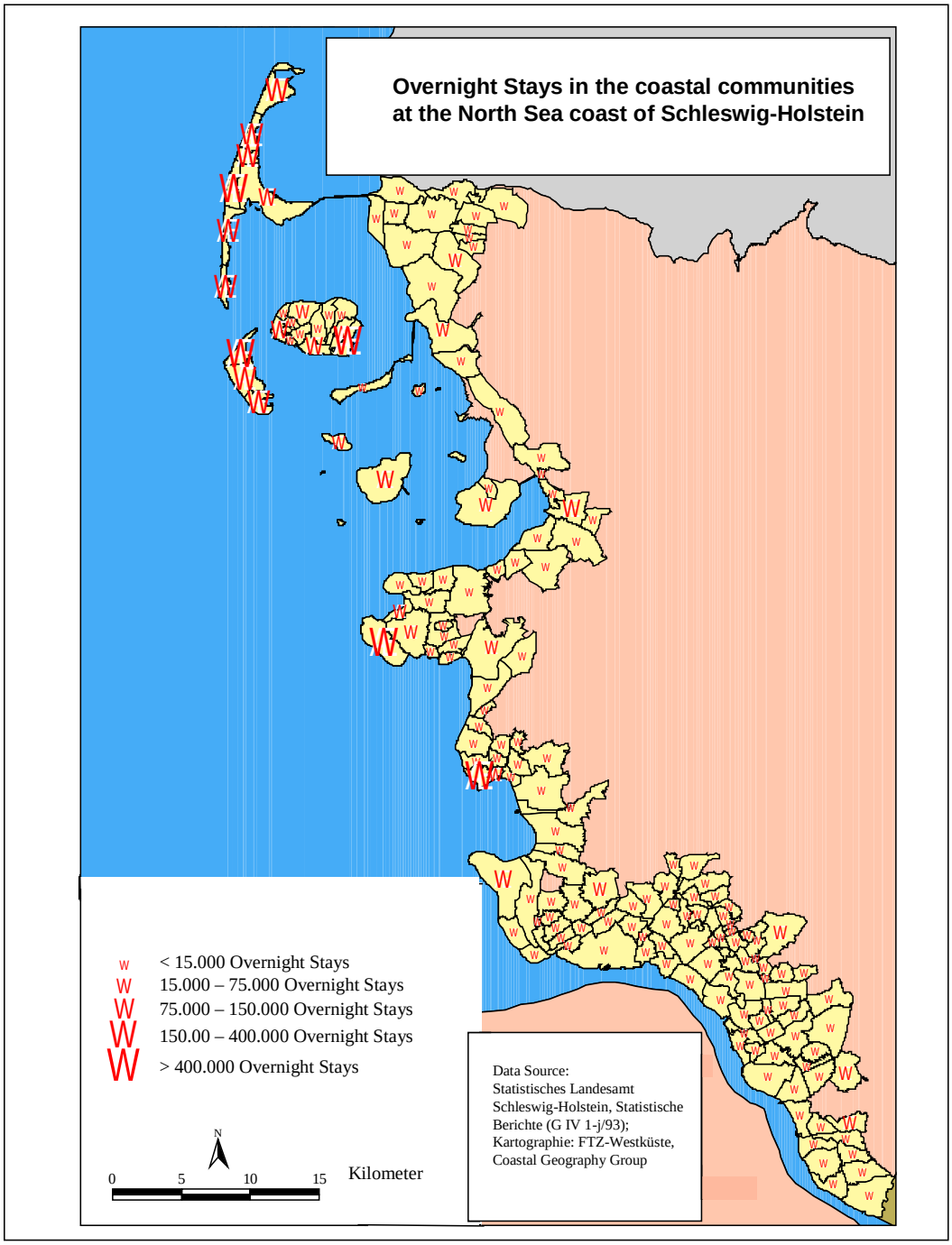


Fig. 15: Overnight stays along the North Sea coast of Schleswig-Holstein

Recreation can mean more pressure on the dynamic processes of the dunes, for example because of the construction of recreational housing and because of the large number of visitors walking in dune areas. Disturbance of breeding, feeding or resting birds is one of the main impacts of tourism beside the use of space for buildings and tourism infrastructure. Another effect is littering of the beaches and marine waters. Because touristic hot spots in Germany are all connected to waste water treatment plants which are designed for the seasonal pattern of tourism areas (are able to handle the amount of waste water produced by tourists during summer), waste water from local sources can be valued as a problem for local bathing spots in single cases but not as a pressure for the Wadden Sea ecosystem as a whole.
Beneath being a potential source of environmental pressures, tourism is also a sector which receives a negative impact from decreasing environmental quality. Bathing is the major activity in which all tourists are interested. Thus, bathing water quality and beach quality are major indicators for the decision of tourists to visit a specific region. Also negative reports about environmental quality in general, about illnesses of seals, oil accidents, algal blooms, marine pollution and similar events create a negative image for regions depending on tourism.

2.2.7 Nature Protection

Most of the German Wadden Sea area is designated as national park under the responsibility of the federal states Schleswig-Holstein, Niedersachsen and Hamburg in accordance with the Federal Nature Conservation Act. These National Parks are also designated as Biosphere reserves under the UNESCO Man and Biosphere programme. Designation as a World Heritage site are under discussion but there is deep mistrust in the local population, especially in Germany and Denmark. In the Elbe estuary as well as in the Ems-Dollard area at the Dutch border additional areas are designated as nature reserves.
The Schleswig-Holstein Wadden Sea National Park was established in 1985 by state law. This law was amended in October 1999. In comparison with the 1985 law the amended law entails in particular a seaward extension of the National Park, a new definition of the protection objective and the introduction of a new zoning system. The kind and location of all allowed human activities are primarily determined by the zoning concept (De Jong et al 1999). Thus the National Park imposes restrictions for human activities and commercial use of the area. This provokes strong resistance of some user communities against the National Park which reached a peak during the public discussion about the changes in the new law from October 1996 to beginning 1999.
The border of the National Park towards the mainland and the coasts of the islands is marked by a line which runs at a distance of 150 m seaward of the dikes, geest and dunes. Offshore the National Park is bordered by the 3 sea-mile limit. A whale protection area off the islands of Sylt and Amrum is bordered by the 12 sea-mile limit.
The National Park is divided into two zones (Figure 16), in which different activities are allowed. The core zone (Zone 1) covers about 36% of the National Park, encompassing coherent tidal basins. In this zone public access is principally prohibited. Exceptions like tidal flat walking routes and commercial fishery are specifically mentioned in the law. Within the core zone an area of 12.500 ha south of the Hindenburg causeway has been designated as a zone in which all resource use has been fully prohibited. It is only allowed to navigate in the zero use zone on marked shipping lanes. This “no-use” area covers about 3% of the National Park area (De Jong et al 1999).

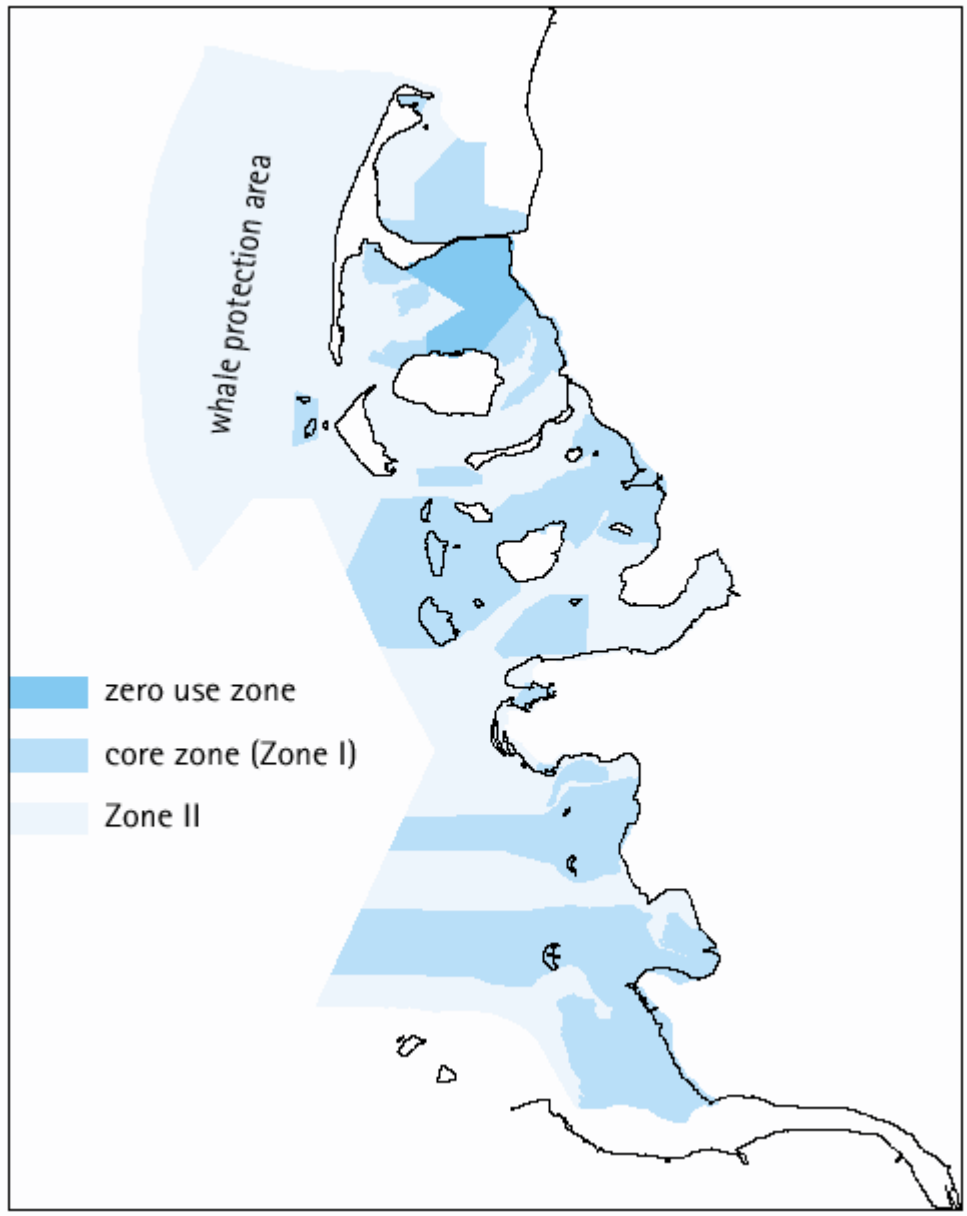


Figure 16: Zones in the National Park Schleswig-Holsteinisches Wattenmeer (De Jong et al 1999)

Starting with the first trilateral Danish-German-Dutch Governmental Conference on the Protection of the Wadden Sea 1978 in The Hague trilateral management of the Wadden Sea became a formal framework. The formal basis is provided by the Joint Declaration on the Protection of the Wadden Sea signed at the Third Wadden Sea Conference in Copenhagen in 1982. This declaration is a declaration of intent of the countries to consult each other in order to coordinate their activities and measures to implement a number of legal instruments like the Ramsar Convention, the Bonn Convention, the Bern Convention, EC Birds Directives and other relevant directives (De Jong et al 1999).
Aim is the comprehensive protection of the Wadden Sea region as a whole including its fauna and flora. The Guiding Principle of the trilateral Wadden Sea policy is 'to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way' (Esbjerg Declaration 1991). This Principle is directed towards the protection of the tidal area, salt marshes, beaches and dunes (Leeuwarden Declaration, 1994). An overview of theses habitats is given in figure 17.

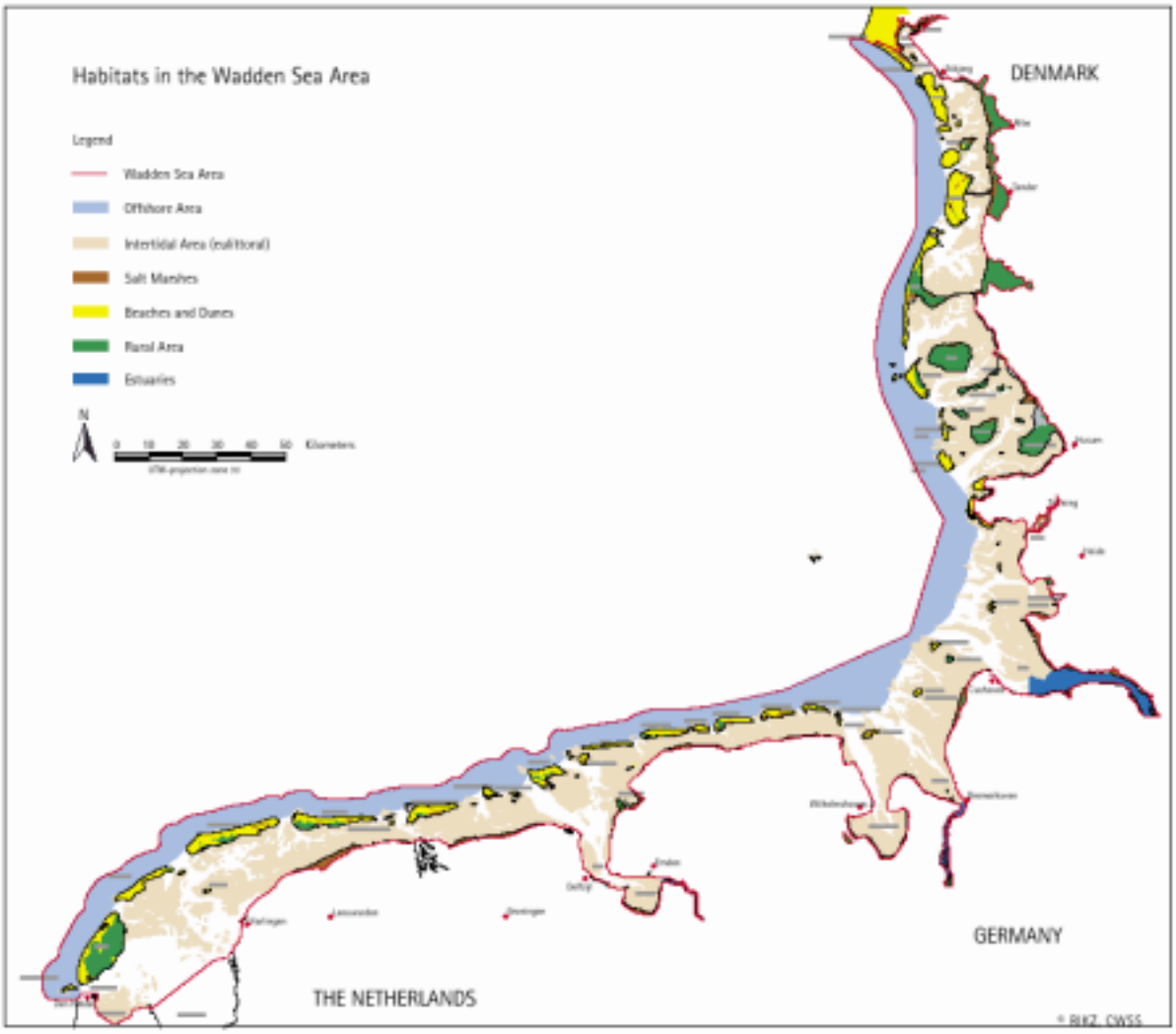


Figure 17: Habitats in the trilateral Wadden Sea area (De Jong et al 1999).

There are many interactions between the Wadden Sea, the North Sea and the bordering mainland. The Wadden Sea as a coastal area is an important nursery area for North Sea fish and some species of marine mammals. On the other hand, the quality of water, sediment and marine habitats of the Wadden Sea is to an important degree affected by the North Sea and activities in river catchments (De Jong et al 1999). Because of this, trilateral policy regarding pollution as well as species and habitat protection is related to the progress within the framework of the North Sea Conferences and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention, Paris 1992) which entered into force on 25 March 1998.

The Wadden Sea Conference in 1997 in Stade recognised the fact that the quality of the Wadden Sea Area may be influenced significantly by activities taking place outside or pollution stemming from sources outside the Wadden Sea Area (De Jong 1999). These problems are outside the management responsibility of the trilateral policy and outside of the relevant management agencies like the National Park administrations.

2.2.8 Offshore Extraction Activities

Marine aggregate extraction is a growing sector in a number of North Sea countries. According to ICES (1992, cited in OSPAR 2000) aggregate extraction provides up to 15% of some nation's demands for sand and gravel. Most commercially usable deposits of sand and gravel are found in the shallower regions the North Sea. An overview of sand extraction sites in the Wadden Sea area is provided by figure 18. In 1996, about 40 million m^3 were extracted from the sea, compared to 34 million m^3 in 1989. The exploitation of sand and gravel often has negative impacts on fishing interests, the benthic flora and fauna, coastal protection and on the physical properties of the seabed (OSPAR 2000). Most countries report increasing concerns about the extraction of aggregates ICES 1997 cited in OSPAR 2000).
According to the OSPAR Quality Status Report 2000 the number of platforms for oil and gas exploration increased between 1990–92 and 1996–98 from 300 to 475 and oil production almost doubled (Figure 19).
Oil exploration occurs mainly in the northern parts of the North Sea in the United Kingdom and Norwegian waters. Gas deposits are exploited mainly in the more shallow southern regions in the United Kingdom, Netherlands and Denmark as well as in Norway. There are also several gas and oil production platforms in the Wadden Sea, the platform Mittelplate being just in front of the coast of Schleswig-Holstein and within the National Park area. Due to the development of oil and gas production also the length of pipelines in the North Sea has considerably increased.
Offshore oil and gas installations are significant sources of hydrocarbons. Heavy metals, PAHs and production chemicals are discharged via produced water which is only treated to remove oil. These inputs have increased substantially (OSPAR 2000). According to OSPAR the reason is the increasing age of the oil and gas fields. All waste from offshore installations is returned to land.

Country	1996	Average per year (1992–7)
Belgium	1 444 629	1 833 333
Denmark	3 700 000	5 083 333
France *	590 000	2 200 000
Germany	1 100 000	
Netherlands	23 200 000	17 366 666
Norway **	86 111	118 333
Sweden #	0	5 917
United Kingdom **	9 500 000	13 600 000
TOTAL	39 620 740	

1996 data from ICES (1997).
* Data from France.
** m^3 estimated from tonnes.
\# Since 1992 no sand and gravel extraction occurs in the Swedish part of the Kattegat and Skagerrak area due to environmental reasons.

Table 5: Quantities of sand and gravel (m 3) taken from marine sources in 1996 and average for 1992–7 (OSPAR 2000). Source of data: ICES (1997), OSPAR (1998b).

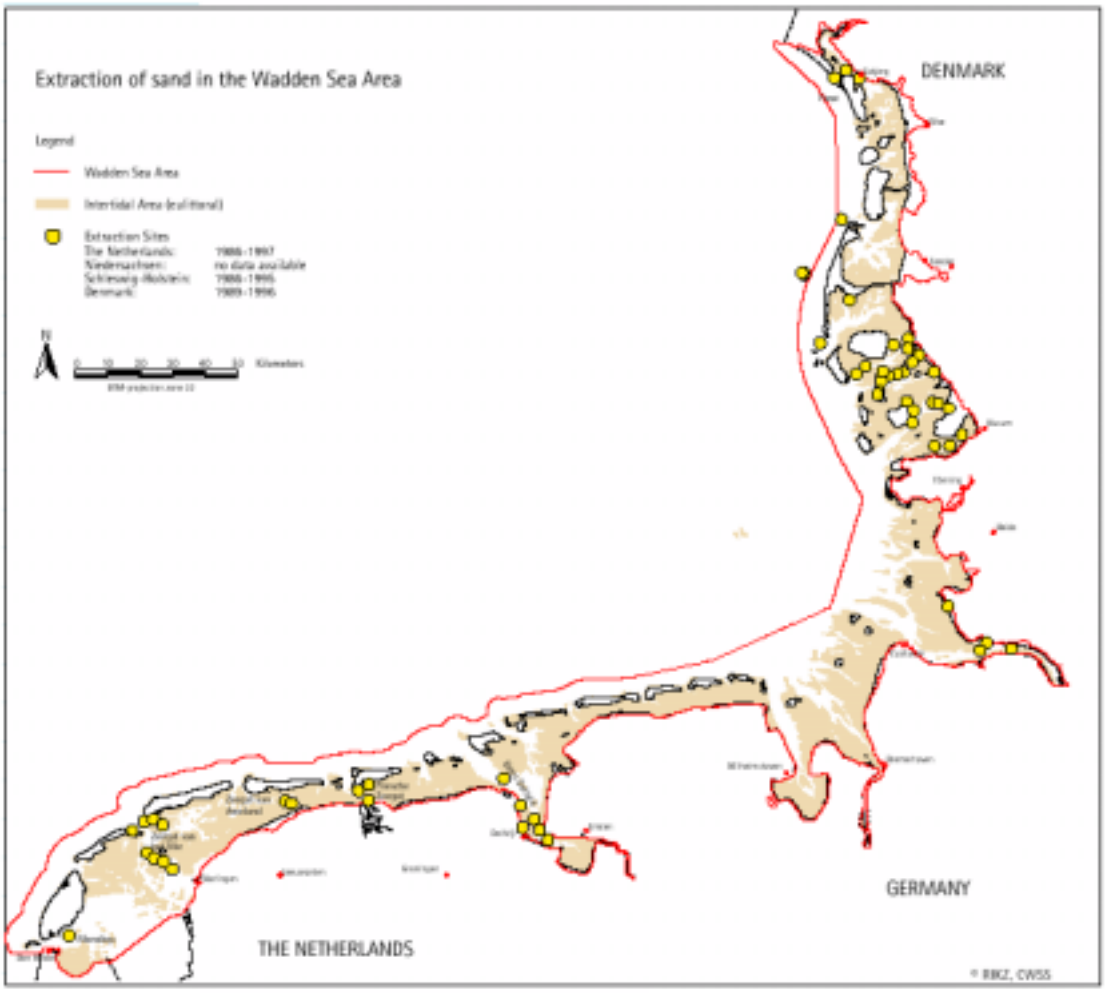


Figure 18: Sand extraction sites in the Wadden Sea (De Jong et al 1999).

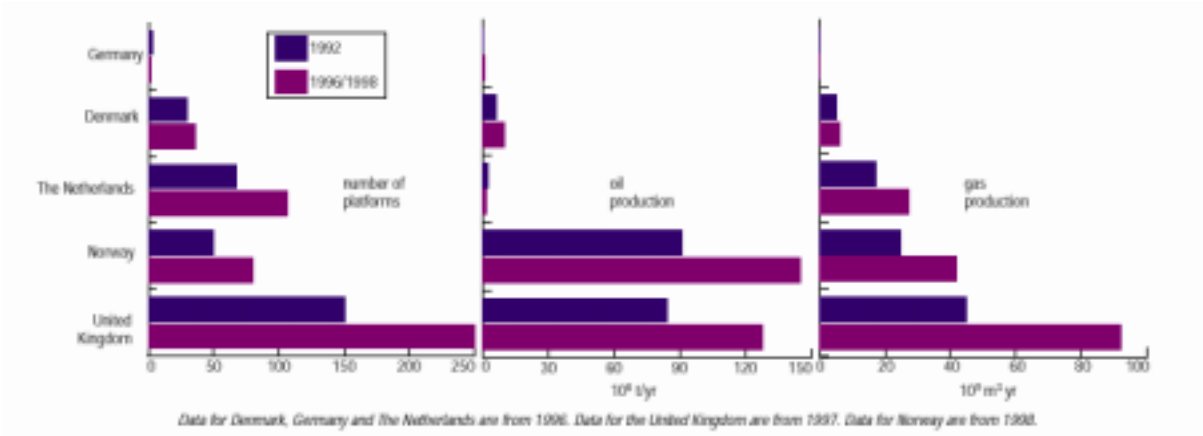


Figure 19: Comparison of offshore activities in 1990–92 (North Sea Task Force, 1993) with those in 1996–98 (OSPAR 2000).

2.2.9 Coastal Defence

Coastal defence work and land reclamation is a common activity in the Greater North Sea, particularly around its shallow southern and eastern margins. Settlements along the Wadden Sea coast and on islands are especially vulnerable to storm surges and endangered by the impacts of sea level changes. Most of the Schleswig-Holstein mainland coast is protected by dikes. Small exceptions are a short stretch on the Eiderstedt peninsula and a stretch north of Husum where the Pleistocene core borders the sea. Along a length of about 10 km, divided over three locations, the coastal defense scheme consists of hard material. The island of Pellworm is completely, Sylt and Föhr partly protected by dikes. Amrum which is a Geest island has one small dike stretch of about 1 km.
Salt marshes form important elements of coastal protection especially because they protect the foot of the dike against erosion. Safeguarding and maintenance of the salt marshes is therefore regulated in the Water Act of the Federal State of Schleswig-Holstein. Since 1993 (with the enactment of the new Federal State Nature Conservation Law) all salt marshes became subject to nature protection, thus creating a conflict between nature conservationists and coastal defence experts. According to the Nature Conservation Law, salt marshes in front of the dike with exception of the first 150 m, must be managed with priority for nature protection except when public interest is affected (De Jong et al 1999). A joint working group which included all relevant institutions from nature protection as well as coastal defence has agreed upon a salt marsh management plan which now forms the base for all management decisions. Responsible for the overall salt marsh management are the Land-and Water management institutions of the west coast of Schleswig-Holstein and the National Park Agency.
On sandy coasts, natural dunes play a major role in coastal protection. In several cases, dunes are protected against erosion by hard structures. However, this may lead to destruction of the natural beach through increased sediment deposition at some locations and enhanced erosion elsewhere. The present tendency is to use soft engineering approaches, such as artificial beach replenishment (OSPAR 2000). In Schleswig-Holstein, beach replenishment is carried out on the island of Sylt (1996: 1.03 million m^3 , 1997: 0.7 million m^3 and 1998: 0.07 million m^3).
Coastal land reclamation and diking change the physical environment, especially hydrographic and sedimentation patterns which may affect spawning areas, biological diversity and wildlife. But all major land reclamation activities belong to the past. At the North Sea coast of Schleswig-Holstein no plans for additional reclamation activities exist. The last reclamation site is Beltringharder Koog which had been finished in 1987. Main environmental pressures from coastal protection regarding the marine environment is the extraction of sand, clay and gravel as construction material and the general effect that coastal defence structures do not allow natural processes to proceed landwards (controlling and steering of landward effects of natural processes principally is the sense of coastal defence structures as they are designed to protect settlements, economically used areas and investments against floods). This might lead to a squeezing effect on salt marshes under the conditions of sea level rise.

2.2.10 Offshore Windfarming

According to the Federal Maritime and Hydrographic Agency (BSH) there are altogether 29 licensing procedures for Offshore windfarms within the German EEZ ongoing at present. Impacts of these large constructions of more than 100 single windmills are largely unknown up to now. For the requested licences investigations covering shipping security as well as the impact on the marine environment are needed and partly under preparation. The standardized investigation concept of the BSH encompasses (BSH 2002):

- Investigation of the spreading of benthos, fish, birds and marine mammals two years before commencement of construction;
- Seasonal variabilities of the occurrence and if necessary the behaviour of sea organisms by continuous observation and through monitoring during construction as well as operating phases with standardized procedures;
- Determination of risk analyses regarding compliance of the planning with the interests of navigation and/or how large the potential endangerment is;
- Simulations of the changed landscape which is of high importance for the tourism sector and affected communities.

Offshore windfarms in the EUROCAT context need mainly to be seen as a source of additional pressures on the marine environment. This includes the construction phase as well as the maintenance phase. Change in turbidity and reduced light penetration can reduce eutrophication effects, on the other hand direct impacts from the construction of offshore windfarms either from sediment movements or from noise on benthos, birds and marine mammals cannot be neglected. In addition these windfarms include restrictions for other uses like shipping and fisheries.
Economically it needs to be noted that the wind industry is of high regional importance, 1/3 of all jobs in this industry in Schleswig-Holstein are located in Nordfriesland (more than 1200 in April 2002). One of the strongest arguments in favour of offshore windfarms is their potential to reduce CO_2 and their positive impact on the German contribution to the international climate agreements.

INSTITUTIONAL AREA CHARACTERIZATION

1 Governance system, relevant treaties and environmental policy targets

1.1 National and international Legislation and Policies

Large parts of the impact area and all (with few exceptions) of the Wadden areas are designated as national park and also protected under different additional international protection categories. The main policy instrument for the management of this area is the Trilateral Agreement between the Netherlands, Germany and Denmark. The following text is to a large degree adopted from the Wadden Sea Quality Status Report 1999.
The Guiding Principle of the trilateral Wadden Sea policy is 'to achieve, as far as possible, a natural and sustainable ecosystem in which natural processes proceed in an undisturbed way' (Esbjerg Declaration, 1991, § 1). This principle is directed towards the protection of the tidal area, salt marshes, beaches and dunes (Leeuwarden Declaration, 1994, § 8).
In addition, seven Management Principles have been adopted which are seen as fundamental to decisions concerning the protection and management within the Wadden Sea Area (Esbjerg Declaration, 1991, § 3):

- the Principle of Careful Decision Making, i.e. to take decisions on the basis of the best available information;
- the Principle of Avoidance, i.e. activities which are potentially damaging to the Wadden sea should be avoided;
- the Precautionary Principle, i.e. to take action to avoid activities which are assumed to have significant damaging impact on the environment, even where there is no sufficient scientific evidence to prove a causal link between activities and their impact;
- the Principle of Translocation, i.e. to translocate activities which are harmful to the Wadden Sea environment to areas where they will cause less environmental impact;
- the Principle of Compensation, i.e. that the harmful effect of activities which cannot be avoided, must be balanced by compensatory measures; in those parts of the Wadden Sea, where the Principle has not yet been implemented, compensatory measures will be aimed for;
- the Principle of Restoration, i.e. that, where possible, parts of the Wadden Sea should be restored if it can be demonstrated by reference studies that the actual situation is not optimal, and that the original state is likely to be re-established;
- the Principles of Best Available Techniques and Best Environmental Practice, as defined by the Paris Commission.

The trilateral conservation policy and management aims to conserve and develop the full scale of habitat types which belong to a natural and dynamic Wadden Sea. Each of these habitats needs a certain quality (natural dynamics, absence of disturbance, absence of pollution), which according to trilateral policy can be reached by proper conservation and management. The quality of these habitats shall be secured by striving towards targets which have been agreed upon for six habitat types: Salt Marshes, Tidal Area, Beaches and Dunes, Estuaries, Offshore Area and Rural Area. Targets on the quality of water and sediment are valid for all habitats. In addition, supplementary targets on birds and marine mammals have been adopted, as well as targets on landscape and cultural aspects (WSP, Chapter I, § 8). Within this scheme user interests have to be weighed on a fair and equitable basis.
In addition the conservation policy is guided by several EU guidelines concerning nature protection and environmental management. The Council Directive 79/409/EEC 1979 (EC Bird Directive) aims at the protection of all species of naturally occurring birds in the territory

of the member states. According to the Bird Directive, member states have to classify the most suitable territories for the conservation of these species as special protection areas (SPAs). In Germany, the Niedersachsen, Hamburg and the Schleswig-Holstein part of the trilateral conservation area has been designated as.

The Council Directive 92/43/EEC 1992 (EC Habitat Directive) aims at the conservation of habitats of wild flora and fauna in the member states. In the framework of the Habitat Directive, the aim is to establish a coherent ecological network, NATURA 2000. NATURA 2000 will consist of Special Areas of Conservation (SACs) designated according to the Habitat Directive, and the SPAs of the Bird Directive. The designation of SACs will be undertaken in the forthcoming years and major parts of the trilateral conservation area are expected to be included in NATURA 2000.

In addition, major parts of the Wadden Sea have been designated as Ramsar sites. In Germany, the Wadden Sea Ramsar sites is basically the German conservation area and a number of areas on the islands and the adjacent mainland.

Biosphere Reserves are protected areas of representative terrestrial and coastal environments which have been internationally recognized under the Man and Biosphere (MAB) Program of the United Nations Educational, Scientific and Cultural Organization (UNESCO) MAB Program for their value in conservation and in providing the scientific knowledge, skills and human values to support sustainable economical development. The German and the Dutch parts of the Conservation Area have been designated as Biosphere Reserves.

There is an ongoing discussion about nominating the conservation area as a natural and/or cultural World Heritage under the respective UNESCO programme. The decision had been delayed at the last trilateral conference in Esbjerg and is now scheduled for the next conference in 2003.

The trilateral Wadden Sea policy has notified that the quality of water, sediment and marine habitats of the Wadden Sea is to an important degree affected by the North Sea and activities in the river basins of adjacent rivers. In order to include these interactions with the river catchments

For these reasons, the trilateral policy and management regarding pollution, species and habitat protection issues are closely related to developments within the framework of the North Sea Conferences, and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention, Paris 1992, entered into force on 25 March 1998). It was recognized at the Wadden Sea Conference in 1997 that the quality of the Wadden Sea Area may be influenced significantly by activities and pollution taking place outside the Wadden Sea Area. Therefore there is agreement to address external impacts through the reduction of inputs of nutrients, hazardous substances and oil (Stade Declaration, 1997, §§ 13-17).

The vast majority of the German Wadden Sea Conservation Area is constituted by the national parks designated by the responsible federal states Schleswig-Holstein, Niedersachsen and Hamburg in accordance with the Federal Nature Conservation Act. Additional areas are the nature reserves in the Ems-Dollard and the Elbe estuary.

The Schleswig-Holstein Wadden Sea National Park was established in 1985 by state law, which was amended in October 1999. In comparison with the 1985 law the amended law entails in particular a seaward extension of the National Park, a new definition of the protection objective and the introduction of a new zoning system. The National Park is now bordered on the mainland and along the coasts of the islands and hallig islands by a line which runs at a distance of 150 m seaward of the dikes, geest and dunes. Offshore the National Park is bordered by the 3 sea-mile line, including a whale protection area off the islands of Sylt and Amrum bordered by the 12 sea-mile line.

The National Park is divided into two zones, in which different activities are allowed. The core zone (zone 1) covers about 36% of the National Park. Public access is prohibited with

the exception of *e.g.* tidal flat walking routes, and commercial fishery. Within the core zone an area south of the Hindenburg causeway of 12,500 ha has been designated as a zone in which all resource use has been fully prohibited. It is only allowed to navigate in this zero use zone on marked shipping lanes. The zero use area covers about 3% of the National Park area.
Generally zoning is the key instrument used for management of human activities in the National Park area. All activities not explicitly mentioned in Section 6 of the National Park Law are prohibited and the kind and location of activities is primarily determined by the zoning concept.
The Hamburg Wadden Sea National Park was established in 1990 by state law, too. The National Park covers the Hamburg part of the Wadden Sea including the islands Neuwerk, Scharhörn and Nigehörn and covers an area of approximately 100 km^2. The National Park is divided into two zones in which different activities are allowed: The core zone, zone 1 covers 70% of the area; admittance is prohibited and a number of activities, including commercial ones such as fishery, are prohibited. Zone 2 covers the remaining 30% and includes the island Neuwerk, a smaller area around this island and the area situated directly on the mainland side. Small scale activities are generally allowed in this part.
Another legal foundation for coastal management in the Wadden Sea area is the Water Framework Directive (2000/60/EEC). The implementation of this directive which is just starting will be a long-term process which aims to achieve good ecological and chemical quality of European waters, as judged by common assessment criteria. The WFD will be converted into Federal State legislation by a new water regime and water law which the government of the Federal state of Schleswig-Holstein hopes to finish by end of 2003. In order to reduce point sources such as introduction by waste water treatment plants, the Federal state government has supported the upgrading of treatment plants since 1988. According to the Environmental Ministry a further reduction of the nutrient load, in particular emissions into the territorial waters and lakes, must be reached by reduction of the diffuse sources, especially from agriculture. For the decrease of the diffuse sources into waters the ministry is developing an investment and support program which is in a draft stage at the moment.
Mining and national shipping routes in the national park are managed by national laws (BbergG; WaStrG) under the responsibility of federal agencies. For shipping within the National Park a specific “Befahrensverordnung” for national park areas for which the Federal Ministry of Transport, Building and Housing in coordination with the Federal Ministry for the Environment is responsible provides the legislative base.
While within the national waters legislation of the Federal States (except for shipping and mining), administered by the relevant Federal State agencies, applies, human activities in the EEZ are managed under the framework of the United Convention on the Law of the Sea (UNCLOS). For the German EEZ the responsible administering agency is the Bundesamt für Seeschifffahrt und Hydrographie (BSH, Federal Maritime and Hydrographic Agency) under supervision of the Federal Ministry of Transport, Building and Housing in cooperation with the mining authorities and the federal environmental authorities.
Approvals for activities in research, mining and construction are required under the German regulations governing activities in the waters and airspace of the German continental shelf. Relevant activities are valued against important public interests. Important public interests are, e.g., the operation and effectiveness of facilities for shipping and aids to navigation, use of shipping routes and airspace, navigation, fisheries, flora and fauna, the laying, operation, and maintenance of submarine cables and pipelines as well as oceanographic and other scientific research, health of the ocean, and the security of the Federal Republic of Germany.
In June 1995, the law implementing the UN Convention on the Law of the Sea entered into force under which approvals granted for the laying and operation of cables and (power cables and communication cables) transition lines are subject to the regulations of the Federal

Mining Act (BbergG). These are issued by the responsible mining authorities (for the North Sea: Oberbergamt Clausthal-Zellerfeld). After an approval has been granted, the project is subject to supervision by the BSH, which may issue orders to ensure proper implementation if required. Federal officials (of the Federal Waterways and Shipping Administration, Federal Border Guard, customs and fisheries supervising authorities) carry out on-site supervision to ensure compliance with the orders.
The BSH is also responsible for approvals concerning the construction, operation, and use of facilities (structures, artificial islands) in the Exclusive Economic Zone (EEZ) of the Federal Republic of Germany whose purpose is the production of energy from water, wind, and currents or other commercial uses, e.g. the operation of sales facilities or recreational uses as regulated by the Seeanlagenverordnung (SeeAnlV - marine facilities ordinance).

1.2 Major local, regional and national institutions, actors and planning activities

In the federal structure of Germany the responsibilities for spatial planning as well as environmental planning are split across several levels of governance. For detailed planning at the local level (land use plans, green structure plans, structure plans, landscape plans) the responsibility is at the local level (community, municipality, NUTS 4), for some issues at the level of the counties (NUTS 3), while the preconditions and policy targets are developed in regional plans and landscape programs at the level of the larger regional planning units. In Schleswig-Holstein these larger planning areas encompass usually two counties and do not form own administrative units. The plans are developed by the responsible Federal State agencies. On the Federal State level (NUTS 2) the more general spatial planning targets as well as environmental targets are developed, guided by principles and guidelines from the national level (NUTS 1) which serve as frameworks. On the level of the Federal State of Schleswig-Holstein beneath the Environmental Ministry, the Ministry for Agriculture, Tourism, Rural Areas and Regional Planning is one of the most important actors.
The responsibility of local communities and municipalities does not include the coastal waters. These are under the administration of sectoral agencies of the Federal State or – in case of the national shipping routes or areas under military use – the Federal Ministry of Transport, Building and Housing and its subordinated agencies or the Ministry of Defence.
For all kinds of coastal management in the Wadden Sea of Schleswig-Holstein some sectoral policies/activities play an overriding role. These issues (National Park, Coastal Defence, Shipping and Offshore Windfarms) are in short discussed in the following section.
The Management targets of the Wadden Sea in Schleswig-Holstein are primarily guided by the National Park objectives which aim to protect the Wadden Sea for future generations, while the traditional interests of the local population are safeguarded at the same time. Further, nature is allowed to take its course so natural processes are meant to develop freely, while visitors are allowed to experience this natural environment and to find relaxation. The estuary salt marshes (rivers Godel, Eider, Elbe) are partly protected by nature sanctuaries. There, as in the National Park management targets are guided by the targets set by nature conservation.
The foundation of the management targets in the National Park is the National Park Law (NPG) from 1985 in its modified version from December 1999. The management targets of the EC bird and FFH directives are in line with the general nature protection objectives (de Jong et al 1999). The Bird Directive aims at the conservation of the natural environment as far as it is related to bird wildlife in Europe. Especially the migrating species are a target group since they form a common, transboundary European heritage (Council directive 79/409/EEC). The FFH Directive is hosted under the general target of the EU to protect the natural habitats and the animal and plant wildlife. The directive aims to protect biological diversity, with the

option to consider the economical, social, cultural and regional requirements (Council directive 92/43/EEC). For the future the WFD, aiming at good ecological and chemical status of interior and coastal waters will become important for the management of the National Park.
With a coastline of 1.190 km, large areas of Schleswig-Holstein are subject to potential flooding. This is especially valid for the North Sea coast, where humans can only live permanently if an effective coastal protection is ensured. As such, coastal protection receives highest priority from the federal government as well as in the perception of local inhabitants. The legal framework for coastal protection is the water law (§§ 62 ff) of the Federal State of Schleswig-Holstein.
The technical concept for the coastal protection and flood protection is represented in the master plan for dyke reinforcement and coastal defence, originally set up in 1963, which contains all relevant data, the technical planning and costs of intended measures. This master plan was updated in the years 1977 and 1986 and is at present again under revision. The new revised version is intended not only to represent an updating of the assessment bases, but also includes measures regarding improved public participation, concerning impacts of possible climatic change and consideration of other goals for the coastal area.
The base for the approval of Offshore windfarms in the EEZ is formed by the Seeanlagen-verordnung (SeeAnlV - marine facilities ordinance). Responsible is the Federal Maritime and Hydrographic Agency (BSH). The possible impact on the environment of planned offshore wind parks will be examined in the future on basis of a uniform requirement profile. A new standard investigation concept, which was developed by the BSH together with external environmental and nature protection experts, is expected allow an optimal evaluation of the nature areas based on current knowledge. At present there are altogether about 30 licensing procedures in the German EEZ ongoing. For these requests there is a need to analyse whether and to what extent the requested wind energy plants impair shipping security and the marine environment. The standardized investigation concept will encompass:

- Investigation of the spreading of benthos (shells of cancers, worms etc.), fish, birds and marine mammals two years before commencement of construction;
- Seasonal variabilities of the occurrence and if necessary the behavior of sea organisms by continuous observations and through monitoring during construction as well as operating phases with standardized procedures;
- Determination of risk analyses regarding compliance of the planning with the interests of the navigation and/or how large the potential endangerment is;
- Simulations of the changed landscape which is of high importance for the tourism sector and affected communities

As the integrity of the Wadden Sea remains vulnerable to the impact of international maritime activities, the ministers of Denmark, the Netherlands and Germany decided at the 9th trilateral Wadden Sea Governmental conference in Esbjerg 2001 to submit an application to the IMO for the designation of the Wadden Sea as PSSA (Particularly Sensitive Sea Area). This danger according to a feasibility study commissioned by the CWSS is valid, both in terms of the volume of maritime traffic using the southern North Sea and due to the fact that the Wadden Sea naturally functions as an importing system with a water circulation that contains contaminants in a zone a few dozen kilometres wide along the coast. Evidence suggests that the Wadden Sea coast is adversely affected by operational marine pollution as well as being vulnerable to accidental pollution impacts (de Jong et al 1999). The most likely origin of such pollution is the adjacent North Sea, which is one of the most frequented sea areas worldwide. A large oil or chemical spill would have potentially disastrous and long-term effects on the Wadden Sea ecosystem as well as on fishing and tourism as the economic base of the area.

1.3 Major intergovernmental agreements and actors

UNCLOS (from www.unep.ch/seas/main/legal/llos.html)
The United Nations Convention on the Law of the Sea establishes national sovereignty over marine resources lying within coastal waters. Although it exercises the greatest rights within 12 miles of the coast, lesser controls apply to waters of the 200-mile exclusive economic zone (EEZ).
The treaty was drafted in 1982, adopted in 1983, and entered into force in 1994. By establishing property rights that apply to the species and habitats found within coastal waters, the treaty provides countries with some incentive to better manage these resources. It obligates Parties to protect and preserve the marine environment by cooperating regionally and globally, and to adopt laws and regulations to deal with land-based sources of marine pollution. It also provides a framework for establishing maritime zones and for regulating fishing and marine scientific research.

IMO (from www.imo.org)/MARPOL
IMO is a technical organization of the UN and most of its work is carried out in a number of committees and sub-committees. The Maritime Safety Committee (MSC) is the most senior of these. IMO is primarily concerned with the safety of shipping and the prevention of marine pollution, but the Organization has also introduced regulations covering liability and compensation for damage, such as pollution, caused by ships.
The Marine Environment Protection Committee (MEPC) was established by the Assembly in November 1973. It is responsible for co-ordinating the Organization's activities in the prevention and control of pollution of the marine environment from ships. During the next few years IMO introduced a series of measures designed to prevent tanker accidents and to minimize their consequences. It also tackled the environmental threat caused by routine operations such as the cleaning of oil cargo tanks and the disposal of engine room wastes - in tonnage terms a bigger menace than accidental pollution. The most important of all these measures was the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78, from www.bsh.de).
MARPOL, which is applicable world-wide, covers not only accidental and operational oil pollution but also pollution by chemicals, goods in packaged form, sewage, garbage and air pollution. It consists of the Articles, which contain general regulations and definitions, and five Annexes dealing with different types of marine pollution by ships. The Convention and Annex I entered into force in 1983, followed by the other Annexes at later dates. Annex IV has not yet entered into force. The Annexes concern the following sectors:
Annex I: Regulations for the Prevention of Pollution by Oil
Annex II: Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (i.e. chemicals transported by chemical tankers)
Annex III: Regulations for the Prevention of Pollution by Harmful Substances carried by Sea in Packaged Forms, or in Freight Containers, Portable Tanks or Road and Rail Tank Wagons
Annex IV: Regulations for the Prevention of Pollution by Sewage from Ships
Annex V: Regulations for the Prevention of Pollution by Garbage from Ships

The text of the following listing is adopted from the Global International Water Assessment (www.giwa.net):

Convention for the Protection of the Marine Environment of the North-East Atlantic, OSPAR (www.ospar.org)
The OSPAR Convention of 1992 replaces the 1972 Oslo Convention and the 1974 Paris Convention, but Decisions, Recommendations and all other agreements adopted under those

Conventions will continue to be applicable, unaltered in their legal nature, unless they are terminated by new measures adopted under the new Convention. Executive body of the new 1992 OSPAR Convention is the OSPAR Commission. See OSPAR information on Ministerial meetings, Contracting Parties, Rules of Procedure, Strategies & Action Plan (see below), Meetings and Documents, Publications, the Quality Status Report (see below), etc. At the 1998 Ministerial Meeting of the OSPAR Commission the Ministers adopted the Sintra Statement (www.ospar.org/eng/html/md/sintra.htm) setting out the political impetus for future action by the OSPAR Commission with a view to ensuring the protection of the marine environment of the North-East Atlantic.

North-East Atlantic Fisheries Convention (www.unep.org/gopher/un/unep/elipac/intl_leg/treaties/tre-0220.txt)

The Convention was adopted in 1959 and entered into force in 1963. The objective of the Convention is to ensure the conservation of the fish stocks and the rational exploitation of the fisheries of the North-East Atlantic Ocean and adjacent waters.

The origins of the North East Atlantic Fisheries Commission (NEAFC) lie in the former Permanent Commission, founded in 1953 and formed under the 1946 Convention for the Regulation of Meshes of Fishing Nets and the Size Limits of Fish. In the early 1960s it was considered that the Commission needed a wider range of powers to regulate for the effects of the technological advances in fishing methods. In 1963 the North East Atlantic Fisheries Commission (NEAFC, www.neafc.org)) was formed under the North East Atlantic Fisheries Convention to succeed the Permanent Commission. In addition to the powers of the Permanent Commission, NEAFC could also establish closed fishing areas and seasons, and regulate catch and fishing effort.

North Sea Conferences (http://odin.dep.no/nsc)

The Fifth International Conference on the Protection of the North Sea will be held in 2002. Previous Conferences took place in 1984, 1987, 1990, 1993, 1995 and 1997. These Conferences are political events for a broad and comprehensive assessment of the measures needed to protect the North Sea environment. The results are recorded in the Conference Ministerial Declarations (http://odin.dep.no/md/html/conf/declaration/).

Bonn Agreement (www.bonnagreement.org)

An international agreement by North Sea coastal states, together with the EC to: offer mutual assistance and co-operation in combating pollution; execute surveillance as an aid to detecting and combating pollution and to prevent violations of anti-pollution regulations. The Bonn Agreement is a network of professionals with responsibility for adequate pollution response. The members of the Bonn Agreement are Belgium, Denmark, European Community, France, Germany, the Netherlands, Norway, Sweden, the United Kingdom of Great Britain and Northern Ireland.

International Convention for the Protection of the Rhine (www.iksr.org/icpr)

The Convention will replace the 1963 Bern Convention and form the basis for the future co-operation between the Rhine states. Information also on the International Commission for the Protection of the Rhine, ICPR, the Rhine (characteristics and state); the co-operation; various action plans (salmon, measures against flooding); surveillance, etc.

Joint Declaration on the Protection of the Wadden Sea (http://cwss.www.de/declaration.html)

This declaration describes the trilateral Cooperation of the Wadden Sea between the Netherlands, Germany and Denmark which is administered by the Common Wadden Sea

Secretariat (CWSS) for the Trilateral Cooperation on the Protection of the Wadden Sea The web site of the CWSS includes information on the Wadden Sea area itself, on the trilateral co-operation; the Trilateral Wadden Sea Plan; Environmental Impact Assessments; Monitoring and Assessments; Management, Publications; etc. Wadden Sea Conferences at the ministerial level have been held regularly since 1978. See also the 1999 Wadden Sea Quality Status Report (see below).

International Council for the Exploration of the Sea, ICES (www.ices.dk)
ICES is the oldest intergovernmental organisation in the world concerned with marine and fisheries science. Since its establishment in Copenhagen in 1902, ICES has been a leading scientific forum for the exchange of information and ideas on the sea and its living resources, and for the promotion and coordination of marine research by scientists within its member countries. Since the 1970s, a major area of ICES work as an intergovernmental marine science organization is to provide information and advice to Member Country governments and international regulatory commissions (including OSPAR and the European Commission) for the protection of the marine environment and for fisheries conservation.

UN Economic Commission for Europe, ECE (www.unece.org)
The Environment and Human Settlements Division is part of the secretariat of the UN ECE. It brings together economists, scientists, urban planners and other experts, and organizes the regular intergovernmental meetings of the Committee on Environmental Policy, the Executive Body for the Convention on Long-range Transboundary Air Pollution (www.unece.org/ env/lrtap), the Meeting of the Parties to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (www.unece.org/env/water) and the Committee on Human Settlements. At these meetings, government representatives from Europe, North America, Central Asia and Israel address environmental and human settlements issues, such as environmental impact assessment, air and water pollution, urban renewal or land registration.

1.4 Other actors, initiatives and resources

EU-Demonstration Programme for Integrated Coastal Zone Management
From 1996 to 1999, the Commission operated a Demonstration Programme on Integrated Coastal Zone Management (ICZM) designed around a series of 35 demonstration projects and 6 thematic studies. This programme was aimed to provide technical information about sustainable coastal zone management, and to stimulate a broad debate among the various actors involved in the planning, management or use of European coastal zones.
The programme was intended to lead to a consensus regarding the measures necessary in order to stimulate ICZM in Europe. In 2000, based on the experiences and outputs of the Demonstration Programme (all of which are available online at europa.eu.int/comm/ environment/iczm/demopgm.htm), the Commission adopted two documents:
1.) A Communication from the Commission to the Council and the European Parliament on "Integrated Coastal Zone Management: A Strategy for Europe" (COM/00/547 of 17 Sept. 2000)
2.) A proposal for a European Parliament and Council Recommendation concerning the implementation of Integrated Coastal Zone Management in Europe (COM/00/545 of 8 Sept. 2000)
The Communication explains how the Commission will be working to promote ICZM through the use of Community instruments and progammes. The proposed Recommendation outlines steps which the Member States should take to develop national strategies for ICZM.

NORVISION
Norvision is an advisory document that gives a spatial perspective for the North Sea Region that was represented in the Interreg IIC Programme. Under Interreg IIIB, Norvision will provide a source of inspiration for projects, and aid the harmonisation of spatial planning in the North Sea Region.

INTERREGIIIB (North Sea Programme, www.interregnorthsea.org)
Interreg III is a new Community Initiative for the ERDF (European Regional Development Fund) for the period 2000-2006. It promotes transnational co-operation on spatial development for different areas of the EU, one of these being the North Sea area. INTERREG is one of the most important instruments of the EU to implement its spatial policy targets outlined in the ESDP.

NORCOAST (www.nja.dk/teknik/plan/norcoast/)
NORCOAST was an INTERREGIIC Project that aimed to investigate and promote good practice in coastal zone planning through the study and exchange of experience on transnational coastal issues in the North Sea region. Partners were spatial planning agencies in Denmark, Germany (Lower Saxony), the UK (Scotland, England), Norway, Sweden and the Netherlands.

ELOISE (from http://europa.eu.int/comm/research/eloise/eloise-h.html)
ELOISE is the coordinated European input to the international IGBP core project LOICZ (Land-Ocean Interactions in the Coastal Zone) and represents the research contribution to the EU initiative on integrated coastal zone management. It was in FP4 jointly implemented by the MAST and the ENVIRONMENT AND CLIMATE Programmes and continued under FP5 in Thematic Programme 4 (Energy, Environment and Sustainable Development) in the key actions "Sustainable marine ecosystems" and "Sustainable Management and Quality of Water". EUROCAT itself is also a project under the ELOISE framework.

Interregional Wadden Sea Cooperation (IRWC, www.irwc.ribeamt.dk)
The Cooperation was launced in 1994 and consists of seven regions: Noord-Holland, Fryslân and Groningen, Dithmarschen and Nordfriesland and Sønderjylland and Ribe. At the 3rd Inter-regional Conference in 1997 (Husum) the partners decided to co-operate closely within the fields of conservation and sustainable use of the Wadden Sea Region taking into account the principles of "Integration", "Subsidiarity" and "Sustainability".

The text of the following listing is adopted from the Global International Water Assessment (www.giwa.net):

North Sea Commission (www.northsea.org)
Founded in 1989 to facilitate and enhance partnerships between regions which manage the challenges and opportunities presented by the North Sea. Furthermore, to promote the North Sea Basin as a major economic entity within Europe, by encouraging joint development intiatives and political lobbying at European Union level. The North Sea Commission has determined that its activities must be action orientated, involving co-operation programmes, research activities, funding applications, and joint policy statements which bring positive benefits to the people of the North Sea Basin. It is one of five Commissions under the umbrella of CPMR (the Conference of Peripheral Maritime Regions). See projects (www.interregnorthsea.org) and the NSC Environment Group (www.northsea.org/Groups/Environment/environment.html).

2 Environmental programs and reports

2.1 Action programmes, strategies and research

The text of the following listing is adopted from the Global International Water Assessment (www.giwa.net):

OSPAR Strategies and Action Plan

- The OSPAR Action Plan 1998-2003 (update 2000)
- Strategy with regard to Hazardous Substances
- Strategy with regard to Radioactive Substances
- Strategy to Combat Eutrophication
- Strategy on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area
- Strategy on Environmental Goals and Management Mechanisms for Offshore Activities.

Trilateral Wadden Sea Plan

Adopted at the Eigth Trilateral Governmetal Conference in Stade in October 1997, the WSP entails the common policies, measures, projects and actions of the countries for their joint efforts to fulfill the ecological targets.

Regional Vision for the Rhine Basin (pdf document, www.worldwatercouncil.org/Vision/Documents/RhineBasinDraftVision.pdf).

Regional visions form the basis for effective action, even as elements of a global plan. As a part of the Water Vision project, Regional Consultations (www.worldwatercouncil.org/Vision/regional.htm) were held and resulted in Regional Visions. The objective was to involve the stakeholders of each region in the development of their own regional vision, as the building blocks of the World Water Vision (www.worldwatercouncil.org/vision.htm**)**. Guided by the World Commission on Water in the 21st Century and managed by the World Water Vision Unit hosted by of the UNESCO Division of Water Science, the World Water Vision "aims to develop a massive public awareness of the risks of major water problems as a result of inaction, as well as encourage innovative thinking on how these problems can be tackled. It should encourage and empower people to participate in devising and implementing solutions to these water problems. And it should generate the political commitment to turn this increased public awareness into effective action".

Water Framework Directive

One of the main objectives of Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 is to achieve good status for surface waters and ground-water by establishing a framework for Community action in the field of water policy (Water Framework Directive).

Under Article 5 of the Water Framework Directive, every Member State has to ensure, with the aim of achieving good status, that for every river basin district a review of the impacts of human activities on the condition of the surface waters and groundwater is conducted in accordance with Annexes II and III and is completed not later than four years after the entry into force of the Directive.

Section 1.4 of Annex II requires the identification, for surface waters, of significant point-source pollution and diffuse-source pollution originating from municipal, industrial, agricultural and other installations and activities. Under Section 1.5 of Annex II it is then

requested to assess the susceptibility of the status of surface water bodies to the significant point-source and diffuse-source emissions. If there is reason to expect that a good status will not be achieved in surface waters, the design of both the monitoring programmes required under Article 8 and the programmes of measures required under Article 11 must be optimised. On the basis of these requirements, a connection is established between the emissions and the status of the surface water body.
The emissions are to be minimised on the basis of the best available technology for point sources and the best available environmental practice for diffuse sources. If a Community quality objective/quality standard is not achieved, more stringent emission limits are to be defined accordingly (Article 10, "Combined approach for point and diffuse sources"). Thus the identification and limitation of emissions plays a central role in the Water Framework Directive, but is closely integrated with the status (quality) of the body of water (immissions) as part of a feedback process.

The European Pollutant Emission Register EPER
In accordance with Article 15(3) of Directive 96/61/EC concerning Integrated Pollution Prevention and Control (IPPC Directive), the Commission publishes every three years an inventory of the major emissions and their sources on the basis of the data supplied by the Member States. The specific design of this European Pollutant Emission Register is laid down in the Commission's decision 2000/479/EC of 17 July 2000. According to this decision the Member States have to report to the Commission at three-yearly intervals (starting in 2003 for the reference year 2001 or alternatively 2000 or 2002) about emissions from all facilities engaged in one or more of the activities mentioned in Annex I to the IPPC Directive. The report is to contain information on emissions from facilities of 37 air pollutants and 26 water pollutants.
Among the air pollutants special mention must be made of climate relevant gases, NOx, SOx, heavy metals and particulates, among the water pollutants nitrogen, phosphorus, heavy metals and organochlorine compounds. The threshold values have been estimated on the basis of existing data in the Member States so as to cover approximately 90 percent of the emissions from IPPC installations. The second report by the Member States, containing data on emissions in 2004, is to be submitted to the Commission in June 2006. After the second report the Commission will examine together with the Member States whether annual reporting is desirable.

The Pollutant Release and Transfer Register (PRTR) of the Aarhus Convention
Article 5(9) of the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention) provides for the establishment of a Pollutant Release and Transfer Register (PRTR) by the parties: "Each Party shall take steps to establish progressively, taking into account international processes where appropriate, a coherent, nationwide system of pollution inventories or registers on a structured, computerised and publicly accessible database compiled through standardised reporting. Such a system may include inputs, releases and transfers of a specified range of substances and pro-ducts, including water, energy and resource use, from a specified range of activities to environmental media and to on-site and off-site treatment and disposal sites." Currently the structure, form and content of the "Aarhus PRTR" is negotiated. A proposal for a legally binding PRTR is to be presented for a decision by the Fifth Ministerial Conference "Environment for Europe" Kiev (summer 2003). In order to reach extensive harmonisation, the German negotiating position is that the "Aarhus PRTR" should be based on the European Pollutant Emission Register EPER.

2.2 State of the regional environment reports

European Environment Agency (EEA http://themes.eea.eu.int/Specific_areas/coast_sea/reports)
EEA has published a range of different publications related to the environmental quality of marine and coastal areas, among them the publication Environmental signals.

OSPAR Quality Status Reports, QSR (www.ospar.org/eng/html)
The second version of the OSPAR QSR has been published in December 2000. The QSR also includes Regional QSR for Arctic Waters, the Greater North Sea, the Celtic Seas, Bay of Biscay and Iberian Coast, and the Wider Atlantic.

The text of the following listing is adopted from the Global International Water Assessment (www.giwa.net):

Wadden Sea Quality Status Report 1999
After the "Development Report" of 1991 and the "1993 Quality Status Report" it is the third time that an integrated assessment report of the Wadden Sea has been published. It contains chapters on protection and management, human use, climate, marine chemistry and biology. For the first time dunes, beaches, estuaries and the offshore zone are addressed.

Status of fisheries and related environment of Northern Seas Report (pdf file, www.norden.org/mor/verk_sk/res/fiskeri/ices_report.pdf) prepared for the Nordic Council of Ministers by ICES (February 2000). It discusses sustainability in fisheries, gives an overview of the marine environment, and gives scientific evaluation of all the commercial fish stocks where ICES has an advisory role.

Progress Report of the 5th North Sea Conference (http://odin.dep.no/md/html/nsc/progressreport2002/Progress_Report.pdf)
In order to collect information for the Progress Report to the 5th North Sea Conference the secretariat circulated reporting formats to the North Sea states and observers to CONSSO in December 2000. Large parts of the report are based on the results of the OSPAR Quality Status report.

GEO 2003 State of the Environment: Europe and Central Asia (www.unep.org/geo/geo3/index.html), Global Enviroment Outlook 2003.
GEO is: a global environmental assessment process, the GEO Process, that is cross-sectoral and participatory. It incorporates regional views and perceptions, and builds consensus on priority issues and actions through dialogue among policy-makers and scientists at regional and global levels. GEO outputs, in printed and electronic formats, including the GEO Report series. This series makes periodic reviews of the state of the world's environment, and provides guidance for decision-making processes such as the formulation of environmental policies, action planning and resource allocation.

UNEP-GPA
UNEP issued under the GESAMP Reports and Studies series (No. 71) a report entitled Protecting the Oceans from Land Based Activities which covers the effects of land based activities on the marine environment on a global scale. The preparation of this report has been initiated by UNEP as a contribution to the first intergovernmental review meeting on the progress in the implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA/LBA), planned for November 2001.

German Federal Environment Agency – Water resources Management in Germany – Part 3: Emissions into surface waters and the sea
This report focuses on the implications of new legislative measures such as the Water Framework Directive, the European Pollutant Emission Register (EPER) and the Pollutant Release and Transfer Register (PRTR) of the Aarhus Convention, which has still to be approved. After describing these new legislation, the report summarises the results of the UFOPLAN R&D project "Establishment of an emission inventory for "Water" for the Federal Republic of Germany".

3. DPSIR structure at the North Sea coast of Schleswig-Holstein

Tables 6-8 provide an overview of the general DPSIR structure with a focus on eutrophication as the central issue for investigation in the REBCAT case study. This structure is based on the indicator concept outlined in Deliverable 2.1 (version of October 2001), but adapted to the area described in this report.
Table 6 describes societal drivers and environmental pressures. Pressures in the catchment (not included in this table) consist of several input variables which feed the catchment model MONERIS. For the coastal zone the resulting pressure is described by the river input into coastal waters. Table 7 summarizes important factors to describe the ecological and socio-economic state of the coastal system as well as the impacts on the system. Impacts are valued changes (good/bad) and form the driver for management response (table 8).
For future analytical work a concept is under development which will reduce the number of indicators needed to describe the reaction of the coastal system to changes from riverine input. This concept will be described in an extended version of Deliverable 2.1 in July 2002 and use the DPSIR structure in tables 6-8 as guiding framework for indicator selection.

Table 6: Drivers and Pressures for Elbe river catchment and its coastal zone

Societal Drivers	**Environmental Pressures**	**Environmental Pressures**
General trends affecting catchment and coast	**Coast**	**Coast (continued)**
Food Production	**Riverine input (Elbe, other rivers, coastal area)**	**Offshore Windfarms**
Agriculture	Nitrogen	Area demand for windfarms
Fisheries	Phosphorus	Noise
Mariculture	Silicate	Turbidity
Urbanisation	Sediment	Barrier (for migrating birds)
Demand for waste disposal	**Matter exchange with Greater North Sea**	**Waste Disposal**
Urban Sprawl	Nitrogen	Disposal of sewage sludge
Energy Production	Phosphorus	Release of waste water
Oil and Gas	Silicate	**Recreation and Tourism**
Offshore Windfarms	Sediment	Growth of tourism settlements / urban sprawl
Mobility and transport	**Atmospheric input**	Disturbance of marine mammals
Shipping and Ports	Nitrogen	Disturbance of birds
Air traffic	**Extraction of sand and clay**	Recreational use of coastal (terrestrial) habitats
Public Transport	**Loss or conversion of coastal habitats**	
Individual Transport	**Fisheries**	
Industrial Production	Removal and discarding of target species	
Recreation and Tourism	Removal and discarding of non-target species	
Nature Protection	Disturbance of sea bed	
Coastal Defence	**Shipping and Ports**	
	Capital dredging	
(Governance and Lifestyle) Drivers for Scenario Storylines	Maintenance dredging	
	Port expansion (land demand and new structures)	
(Climate Change) Potential Driver for Scenario Storylines, not used in this case study	Dumping of dredged material	
	Release of ballast water	
	Oil spills and oil losses	
	Chemical spills	
	Oil and Gas	
	Oil losses / oil spills	

Table 7: State and Impact for the Elbe river catchment and its coastal zone

Environmental State (Description)	**Socio-Economic State (Description)**	**Ecological Impact (Valuation)**	**Socio-Economic Impact- (Valuation)**
Coast	**Coast**	**Coast**	**Coast**
General Parameters	**Marine area use**	**Direct Effects**	**Norms and Policy**
Nitrogen conc.	Cultural / social importance	Oxygen deficiency	Non achievement of political nutrient reduction targets (North Sea Conference)
Phosphorous conc.	Socio-economic importance	Non-toxic algae blooms	Non-achievement of ecological and chemical quality targets (WFD, OSPAR)
Silicate	Spatial pattern	Toxic algae blooms	Exceeding thresholds from agreements, treaties and legislation (e.g. Bathing Water Quality)
Carbon (TOC)	Political power / strength	Zoobenthos mass mortalities	Non-achievement of nature protection targets
BOD, COD	**Coastal land use**	Bird mortalities	**Socio-Economic Functions**
Dissolved oxygen in the bottom water	Cultural / social importance	Marine mammal diseases	Reduction of economic benefits from fisheries
Net sedimentation	Socio-economic importance	Temporal loss of spawning grounds	Reduced attractiveness for mariculture development
Turbidity	Spatial pattern	Shift in species composition	Reduced attractiveness for recreation and tourism
Biological Parameters	Political power / strength	**Ecosystem Functions / Ecosystem Integrity**	Reduced aesthetic value
chlorophyll-a		Exergy capture	Reduced scientific information and public learning value
primary production	**Local Demography**	Matter losses	Reduced health value
species composition	**Local social structures**	Cycling	Reduced living quality
macrozoobenthos biomass		Storage capacity	**Direct Effects**
Non-indigenous species		Heterogeneity	Negative image of the area
Nature protection parameters			
Extent of seagrass areas			
Area of coastal habitat			
Area of intertidal habitat			
Area of subtidal habitat			
Habitat diversity			
Protected species			
Industrial Production			
Hazardous substances in sediments, water and indicator species			

<u>Table 8:</u> Potential management responses for reducing pressures and impacts (focus on impacts in the coastal zone and on nutrient reduction to reduce eutrophication)

Catchment	**Coast**
Response	**Response**
Change of Common Agricultural Policy	Formulation of additional Regulations
	Change of the EU strategy on Integrated Coastal Zone Management
Regulation on farming practices	Designation of PSSA
Increased effluent treatment	
Wetland creation	Creation of buffer/sink zones for nutrients
Agri-environmental schemes	Zonation to preserve habitats
Changes in farming practices	Increased conservation areas
Optimisation of the Urban Waste Water Directive	Creation of recreation zones (land and marine)
Optimisation of the Water Framework Directive	Promotion of eco-tourism
	Special areas of conservation
Economic incentives for clean technology use	
Economic incentives for reduced resource use	Improvement of Waste Water Treatment Plants
Improvement of Waste Water Treatment Plants	

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