
I. Integrated Ecosystem Management

1 The Ecosystem Approach as applied to the Wadden Sea

1.1 INTRODUCTION

The key message of the Joint Declaration (JD) is that Wadden Sea states will "... continue to manage the Wadden Sea as a single ecological entity for its natural, landscape and cultural heritage values, for the benefit of present and future generations"

The challenge of the Trilateral Wadden Sea Cooperation (TWSC) is to implement ecosystem management of the Wadden Sea Area by applying and integrating relevant EU Directives, as set out in §6 of the Schiermonnikoog Declaration (2005): "... a coordinated and consistent implementation of the European legislation [...] in particular Article 6 (1) of the Habitats Directive [...] and to develop common trilateral strategies for the future management of the landscape and cultural heritage."

The Objectives of the TWSC, as laid down in the JD and § 4 of the Introduction, are particularly relevant for an integrated ecosystem approach.

According to the **Convention on Biodiversity (CBD)**, the ecosystem approach "is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. Application of the ecosystem approach will help to reach a balance of the three objectives of the Convention (conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources). It is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of ecosystems." [CBD, 2000]

In the Preamble to the **Habitats Directive** it is stated "Whereas, the main aim of this Directive being to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements, this Directive makes a contribution to the general objective of sustainable development."

Three central elements in the above definitions are essential for integrated management of human activities:

1. The conservation and protection of ecosystem processes, functions, habitats and species and their interactions;
2. Sustainable human use;
3. Cultural diversity.

According to the first element, human activities in ecosystems must be managed for all aspects of the system, not only species or habitats but also processes and interactions.

The second element acknowledges that sustainable human use must be possible and integrated with ecosystem protection and that cultural diversity is part of an integrated approach.

The remainder of this Chapter addresses these elements in more detail:

Section 1.2 addresses the trilateral Targets and relevant EC Directives (Habitats and Birds, Water Framework, Marine Strategy Framework) from the perspective of an integrated ecosystem management approach.

Section 1.3 deals with Landscape and Culture.

Section 1.4 covers the World Heritage Property Wadden Sea.

Section 1.5 deals with sustainable use, in particular its management in and adjacent to the Wadden Sea Area.

In **Section 1.6**, the overall trilateral policy regarding integrated ecosystem management is formulated.

1.2 EC DIRECTIVES

The 1992 Habitats Directive (HD) deals with specific habitats and species which have their own defined characteristics and are clearly delimited in space. Together with the 1979 Birds Directive (BD), it provides the legal basis for establishing a Europe-wide network of representative protected areas (Natura 2000). The Habitats Directive requires member states to designate specific habitats and habitats for specific species as conservation areas and the adoption of conservation objectives for these habitats and species.

The aim is to achieve favourable conservation status for designated species and habitats. The conservation status of a habitat is favourable if: its natural range and area is stable or increasing; if the specific structure and functions necessary for its long-term maintenance exist and are likely to continue for the foreseeable future; and if the conservation status of its typical species is favourable. The latter is the case if the species concerned is a viable part of its natural habitats on a long-term basis, its natural range is not reduced in the foreseeable future and its habitats remain sufficiently large.

The Water Framework Directive (WFD, 2000) aims at improving the aquatic environment. It requires that Member States take a new, holistic approach to managing their waters. Member states are all required to implement the necessary measures in order to achieve "good ecological status" by 2015 in all rivers, lakes, transitional waters, coastal waters and groundwater. "Good status" for surface waters is defined through biological, hydro-morphological, chemical and physico-chemical Quality Elements. The specific definition of the status of each quality element for each water category is provided in the Annexes to the Directive. Additionally, surface waters also have to have a good chemical status.

The implementation of the Directive and the setting and achievement of good status and other environmental objectives and targets are to be based on a river basin district structure. Management plans and programmes of measures must be developed for each river basin district.

There is a requirement within the Directive for the linkages between surface and groundwater and water quantity and water quality to be taken into account in meeting objectives. There is also a requirement for the integration of the management of water-dependent Natura 2000 sites and river basin plans, and moreover, consideration must be given to the water needs of wetlands.

The aim of the Marine Strategy Framework Directive (MSFD, 2008) is to achieve or maintain good environmental status in the marine environment by the year 2020 at the latest. It requires the development and implementation of strategies to (a) protect and preserve the marine environment, prevent its deterioration or, where practicable, restore marine ecosystems in areas where they have been adversely affected; and (b) prevent and reduce inputs in the marine environment, with a view to phasing out pollution, so as to ensure that there are no significant impacts on, or risks to, marine biodiversity, marine ecosystems, human health or legitimate uses of the sea. It requires the application of an ecosystem-based approach to the management of human activities and the integration of environmental concerns into the different policies, agreements and legislative measures which have an impact on the marine environment. Table 1 provides a brief comparison of the four Directives.

EC Directives and the ecosystem approach

The above Directives are the main legal instruments for implementing an ecosystem approach but are not ideal for this purpose. This is due to three main factors:

1. Structural differences between the three Directives;
2. Inherent deficiencies within each Directive;
3. Differences in national implementation.

The first factor is related to the broad time span over which the Directives have been developed. This has resulted in substantial differences in structures, making it difficult to integrate the three instruments at the administrative level.

Factor 2 relates to the development history of the three Directives. The differences in

contents reflect important developments in nature and environment policies over almost three decades, starting with a sectoral approach (Birds Directive) and ending with a much more integrative approach (MSFD).

Table 1: Comparison of EC Habitats and Birds Directives (HD, BD), Water Framework Directive (WFD) and Marine Strategy Framework Directive (MSFD).

	BD + HD	WFD	MSFD
General objective	Favourable conservation status	Good ecological status / potential & good chemical status	Good environmental status
Indicators	Habitat (range, structure and function, characteristic/ typical species) Rare species (population, range, maintenance)	Biological (species composition and abundance) hydro-morphological, chemical and physico-chemical Quality Elements	Biological, physical and chemical characteristics, pressures and impacts Environmental targets and associated indicators
Reporting unit	Habitat type, species	Water body	Marine regions
Scale	Per country / bio-geographic area	River basin district	Marine (sub)regions (overlap with WFD)
Time	2007 ¹ , 2015 ¹	2015 ² , 2021 ²	2020 ²
Management plan	N2000 management plan (Art. 6)	River basins management plan (Art 13, 11)	Programme of measures (Art. 13)

¹ Reporting re. HD; ² Reaching Status

As a result, the Directives apply principally different concepts. The HD was the first of the integrative framework directives and focuses on the protection of individual habitats and not on ecosystems as a whole with their different interacting habitats and species.

The WFD has a more integrative approach, but focuses mainly on the status of designated water bodies and not on key ecosystem processes. Biological quality elements are essential to define the status of surface water bodies according to the WFD, but only certain aquatic species are covered, e.g. not birds or mammals.

The MSFD is the "most integrated" Directive. Its relevance for an integrated ecosystem approach for the Wadden Sea ecosystem has not yet been analysed in detail.

Factor 3 is particularly relevant for the management of the Wadden Sea ecosystem, being a transboundary protected area. Because EU Member States implement framework directives at the national level (subsidiarity principle), differences may arise in the designation of areas covered by the directives, as well as conservation and protection aims.

For the Wadden Sea, the various national conservation objectives for habitats and species and the definition of good ecological status have proved to be highly comparable. Moreover, within the EU framework, work is ongoing to further harmonise and tune national implementation, as well as monitoring and assessment methodologies under the above mentioned Directives. This includes e.g. an intercalibration process under the WFD.

There are, however, also some important differences and inconsistencies (see list below).

Habitats and Birds Directives

a. Differences in the designation of Wadden Sea typical habitat and species types

- NL has designated the tidal and offshore area as types 1110 (sandbanks which are slightly covered by seawater all the time) and 1140 (mudflats and sandflats are not covered by seawater at low tide) only. Germany and Denmark have also designated types 1130 (estuaries), 1150 (coastal lagoons), 1160 (large shallow inlets and bays) and 1170 (reefs).*

(*Following the recent clarification on the common definition of 1170 at EU level, the designation of eulitoral mussel banks as reefs in Germany will be revised at the next revision of the standard data forms.)

- There is much variation in the designation of bird species: only 25% of all relevant bird species is commonly designated.

- Variation in designation of fish species under the Habitats Directive.
- b. Differences in the definition of habitat/species conservation objectives
 - Quantified bird conservation objectives in NL and DK. Qualified objectives in D, mainly related to habitat quality.
 - The marine mammal objectives formulated by The Netherlands partly comply with the relevant trilateral Target.
- c. Differences in assessment of size and quality of various habitat types
 - Habitat type 1170 (reefs)
 - Habitat type 1110 (sandbanks which are slightly covered by seawater all the time)
- d. Differences in management policy
 - In NL and DK region-specific Natura 2000 management plans will be developed. In D, the WSP provides the management framework for the Wadden Sea national parks, supplemented by sectoral plans and specific Natura 2000 management plans for bordering sites inside the cooperation area.

Water Framework Directive

- a. Differences in development of WFD reference conditions and classification tools.
 - The development of tools, testing and adaptation of tools as well as fine-tuning is carried out with (partly) different approaches and time scales.
- b. Differences in designation of water bodies
 - Different types and numbers of water bodies (WB): In NL and DK, the Wadden Sea tidal area (intertidal and subtidal) is a single WB. In D, all four WB types have been assigned with a total number of 26 separate WBs (incl. Ems).
 - NL has assigned a 1 sm strip along the Wadden Sea mainland coast as Heavily Modified Water Body (HMWB). In D, only transitional waters are HMWB.
 - DK has no transitional water bodies within its sea territory and has not assigned HMWB in the Wadden Sea Area.
- c. Development of management plans
 - Tuning of WFD and HD not yet carried out (assessment criteria, conservation objectives).
 - Regional differences (e.g. eutrophication) still exist.

Marine Strategy Framework Directive

- a. Differences in application
 - NL complies with the MSFD concerning the articles 2(1) and 3(1) sub a and b. NL will apply the MSFD to the part of the offshore area from the baseline to 3 nautical miles.
 - D and DK will apply the MSFD to the whole Wadden Sea according to Art. 3 (1) of the directive.

The trilateral Target concept

The trilateral Target concept is principally an integrated ecosystem concept and therefore goes beyond the above EC directives. The Target concept fully covers and integrates the Habitats and Birds Directives, the Water Framework Directive and the World Heritage criteria (see Table 2).

The Targets are consistent with the Conservation Objectives and Good Ecological Status approach from the Directives and additionally serve the World Heritage criteria.

The Target concept is, furthermore, a trilateral concept relevant for the whole Wadden Sea Area. It is the common basis for the harmonisation of the different national approaches under the EC Directives.

Table 2: Thematic overlap of Wadden Sea Plan Targets with issues from the EC Directives and the World Heritage criteria

TOPIC	Wadden Sea Plan Targets	Habitats / Birds Directive	WFD	MSFD	World Heritage Criteria
Landscape + Culture	+	-	-		
Water and Sediment	+	(indirectly)	+	+	VIII, IX
Salt Marshes	+	+	+		VIII, IX, X
Tidal Area (eu- / sub-litoral)	+	+	+	+	VIII, IX, X
Beaches and Dunes	+	+	-		VIII, IX, X
Estuaries	+	+	+		VIII, IX, X
Offshore Zone	+	+	-	+	VIII, IX, X
Rural Area	+	+	-		
Birds	+	+	-	+	X
Marine Mammals	+	+	-	+	X
Fish	+	+	+ transitional	+	X

1.3 LANDSCAPE AND CULTURE

The cultural landscape heritage complements the natural and environmental assets in the Wadden Sea. Despite local and regional diversity, the Wadden Sea contains a common history in developing and shaping the landscape, in human survival adaptation strategies and techniques and a unique cultural heritage.

Based upon the WSP 1997, two projects regarding the maintenance and planning of the Wadden Sea landscape and cultural heritage have been carried out (Lancewad and LancewadPlan). These projects emphasized that the management of landscape and the cultural heritage is an issue of integrated spatial planning and the implementation of a trilateral strategy should be carried out by, or in close cooperation with, all administrative levels and with support of the people living and working in the region. The involvement of stakeholders is essential for the wise management of the heritage and, in particular, further integration of natural and landscape management should be an aim.

1.4 WORLD HERITAGE PROPERTY

In 2009 the nominated Wadden Sea of The Netherlands, Niedersachsen and Schleswig-Holstein was inscribed in the World Heritage list.

The inscription of the Wadden Sea as **World Heritage Property** is based upon the following criteria

- Criterion VIII: "outstanding examples representing major stages of Earth's history, including the record of life, significant ongoing geological processes in the development of landforms, or significant geomorphic or physiographic features"
- Criterion IX: "outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals"
- Criterion X: "contain the most important and significant natural habitats for *in situ* conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation"

These criteria are fully covered by the trilateral Targets, as shown in Table 2.

1.5 SUSTAINABLE USE

The trilateral Wadden Sea Cooperation applies the concept of sustainable use as defined by the Convention on Biological Diversity in protecting and conserving the ecological integrity of the Wadden Sea ecosystem, thus supporting lasting economic prosperity and social well-being.

There are several approaches and instruments applied within the Wadden Sea Region through which sustainable use is developed and promoted. It concerns Integrated Coastal Zone Management (ICZM), zoning instruments, the Man and Biosphere (MAB) approach as well as many examples of interaction with stakeholders

1.5.1 Integrated Coastal Zone Management

Integrated Coastal Zone Management (ICZM) is a concept for achieving sustainable use in the coastal area. In the recommendation of the EU Council and Parliament on ICZM (2002/413/), member states were asked to prepare national ICZM strategies based upon the following principles:

1. A holistic approach and strategic planning (land-sea approach);
2. A long-term perspective;
3. A long-term process;
4. Reflecting local/regional conditions;
5. Working with natural processes;
6. Participative planning;
7. Involvement of all layers of government;
8. Coherent use of a combination of instruments.

Following the ICZM Recommendation, most EU Member States have prepared national strategies for ICZM. At the 10th Wadden Sea Conference, Wadden Sea states agreed to contribute to their national ICZM strategies in a trilaterally coordinated way, in consultation with the Wadden Sea Forum (Sch.D. §13).

In §4c of the Joint Declaration, ICZM is listed as one of the areas of cooperation of the TWSC.

1.5.2 Zoning

Zoning is a management instrument, partly implemented by law, to balance nature protection and human use of the Wadden Sea in space and time. Zoning covers regulations and measures related to specified geographical areas in the Wadden Sea Area to avoid and/or to alleviate conflicting interests in space and time within a protected area. This also includes temporal or permanent closure of areas.

In each country, zoning regulations for specific activities like agriculture, hunting, fisheries or tourism are implemented. Additional general zoning systems are in force in the three countries, regulating several human activities in the whole Wadden Sea Cooperation Area.

Comparing the different approaches to zoning, it appears that some similarities exist with regard to the zoning systems, although, in a formal sense, different protection regimes are implemented in The Netherlands, the three German Federal States and in Denmark.

1.5.3 Man and Biosphere

Biosphere Reserves are protected areas of representative terrestrial and coastal environments or a combination of both, which are designated according to international guidelines in the framework of the UNESCO "Man and Biosphere" (MaB) programme for the worldwide net of Biosphere Reserves (UNESCO 1996). Biosphere Reserves are model regions in which people's life and economic activity are in compliance with nature. The protection of nature is closely linked with sustainable use.

The Wadden Sea has been designated a Man and Biosphere (MAB) Reserve under the UNESCO Man and Biosphere Program by The Netherlands and the German states. Whereas the MAB-Reserve in the Dutch, Niedersachsen and Hamburg part is almost identical with

the Conservation area, the MAB Reserve in Schleswig-Holstein also includes five Halligen islands as a development zone. In Niedersachsen, the uninhabited parts of the islands are included and the designation of a development zone landward of the dikes outside the National Park is in progress.

1.5.4 Danish National Park

The Danish Wadden Sea Area, including the islands and parts of the hinterland on the mainland, has been designated as National Park. Besides nature conservation and preservation of the cultural and landscape heritage, the aim is also to stimulate and promote commercial but sustainable activities like tourism and recreation. Moreover, it leaves space for the development of the more traditional industries (agriculture and fishery). It is intended that the "National Park Wadden Sea" will be a valuable contribution to regional development in the Danish Wadden Sea and serve as an example of ICZM.

1.5.5 Wadden Sea Forum

The Wadden Sea Forum (WSF) was established in 2002, following a decision at the 9th Trilateral Governmental Conference 2001 in Esbjerg. The WSF acts as a cross-border stakeholder forum and an independent body consisting of representatives of Agriculture, Energy, Fisheries, Industry and Harbour, Nature Protection and Tourism, as well as local and regional authorities from The Netherlands, Germany (Niedersachsen and Schleswig-Holstein) and Denmark.

The Ministerial Declaration of the 10th Trilateral Governmental Conference 2005 in Schiermonnikoog reinforces the importance of stakeholder participation and recognizes that the achievement of the Guiding Principle of the Cooperation "can only be obtained in cooperation with those who live, work and recreate in the area and are willing to endow its protection". Geographically, the WSF deals not only with the Wadden Sea Area but with the wider Wadden Sea Region.

In its report "Breaking the Ice" (2005), the WSF developed a vision, agreed upon by all its members, that supports the protection of the Wadden Sea Area and emphasizes:

"The Wadden Sea Region has a strong identity, which is rooted in the cultural heritage, the typical Wadden Sea landscape features and the unique, from a world wide perspective, Wadden Sea nature area. The Region has a natural biodiversity and decreasing concentrations of polluting substances.

The Region is characterized by dynamic urban centres and a vital rural community with a balanced population structure and good public facilities. The Wadden Sea Region offers room for entrepreneurship and economic activities make optimal (i.e. sustainable) use of the specific advantages of the Region, in particular the location by the sea, the nature potentials and the positive population development.

In general people like to live in the Wadden Sea Region. For the Wadden Sea Area, which is the area covered by the Trilateral Cooperation on the Protection of the Wadden Sea, the trilateral Targets represent the ecological objectives. The Area has an unspoilt beauty, is understood as a joint heritage of the entire Region and the ecological Targets are respected by all sectors."

From 2006 the WSF defined the following goals:

- to oversee, stimulate, support, facilitate and evaluate the implementation of the WSF strategies and action plan for sustainable development
- to exchange information on experiences and best practice with regard to the Wadden Sea Region and foster sustainable development within it;
- to bring together the sectoral interests of its members;
- to exchange views on general themes and topical issues;
- to prepare advice on issues related to sustainable development and integrated coastal zone management;
- to initiate and implement projects and actions on topical issues;
- to serve as a consultation body for governments.

In 2008 a Memorandum of Understanding (MoU) was concluded between the WSF and the Trilateral Wadden Sea Cooperation (TWSC) recognizing the importance of a close cooperation. The MoU is based on the mutual acknowledgement by the WSF and the TWSC of the Shared Principles including the Guiding Principle, the Shared Vision and the Targets as laid down in the Wadden Sea Plan, respecting the existing protection levels and ensuring sustainable economic development and quality of life. According to the MoU, WSF serves as an independent trilateral advisory and consultation body to the TWSC and prepares relevant statements and background information. It will be consulted and prepare advice on matters regarding sustainable development of the Wadden Sea Region and will be consulted in the framework of the development of the Wadden Sea Plan, the draft Declaration of the 2010 Wadden Sea Conference, national ICZM strategies and other issues of relevance for the Wadden Sea Region in as far as this is within the mandate of the TWSC. Several joint projects have been agreed upon. Among them are the further development of ICZM and sustainability indicators, the elaboration of a guidance document for a trilateral Goose Management Plan, cooperation on shipping safety issues, including container shipping, and support for and promotion of the Wadden Sea World Heritage Property among the sectors and stakeholders. Finally, the WSF will stimulate and support the cross-border and cross-sector dialogues and will discuss and integrate, to the extent possible, relevant input to the regional Wadden Sea advisory bodies and submit the results to the TWSC on a regular basis.

1.6 TRILATERAL POLICIES

1.6.1 The overall policy objective is to further develop a consistent integrated trilateral management approach to the Wadden Sea ecosystem, based on the status of protected areas there and including sustainability of uses, aspects of the landscape and cultural heritage and the integrity of the World Natural Heritage Property. To this end the implementation of relevant EC Directives will be harmonised as far as possible, in particular with regard to differences in national conservation objectives that may, in the medium or long term, aggravate differences in protection level and/or conditions for sustainable use. More specific policies, relevant to harmonisation, are in the Target chapters.

1.6.2 In line with the existing protection regimes, sustainable use will be further improved by stimulating relevant initiatives and projects, including the further development and improvement of ICZM and sustainability indicators, in close cooperation with the Wadden Sea Forum and other relevant stakeholder organisations.

1.6.3 An overall Sustainable Tourism Development Strategy for the Wadden Sea World Heritage Site will be developed, in order to meet the request of the World Heritage Committee, the Hamburg Wadden Sea National Park, and the Danish National Park, pending formal approval by its forthcoming board. As a first step, a Wadden Sea Communication and Marketing Programme 2010-13 will be adopted.

2 Overarching themes

This chapter concerns climate change, alien species and shipping safety – three themes relevant to all Wadden Sea habitats and for which it is essential to apply an integrated ecosystem approach.

A number of activities, the most prominent ones taking place outside the Wadden Sea Conservation Area, potentially affect the Wadden Sea ecosystem, but are essential for the regional economy and conditions for people living in the area or visiting as tourists. These activities are coastal flood defence and protection, energy generation, shipping and the related (maintenance) dredging of the shipping routes and harbour developments.

For example, the increasing energy production in the Wadden Sea Region, both onshore and offshore, will have several side-effects, such as increasing ship traffic in the coastal sea and cable crossing through the conservation area. Air pollution may increase as well as interference with bird flyways. The increasing ship traffic in general results in increased dredging and harbour extension.

As far as relevant these activities are covered in the respective Target chapters. All activities likely to have a significant effect on the Wadden Sea ecosystem, either individually or in combination with other plans or projects, are subject to licensing following an impact assessment in accordance with the stipulations of the Habitats Directive.

Also, coastal defense may be regarded as an overarching theme which is essential for the safety of the inhabitants while also having impacts on the Wadden Sea ecosystem. Aspects of coastal flood defense and protection are included in the section on Climate change.

2.1 CLIMATE CHANGE

2.1.1 Status and assessment

Climate change will have an impact on Wadden Sea habitats and species, the safety of its people and on cultural heritage and sustainable use. The impacts may become manifest in two ways: first through changes in physical, chemical and biological parameters such as sea level rise, erosion or sedimentation, water temperature, acidity and species composition, *i.e.* fish; and second, through human responses such as coastal flood defence and protection measures.

Changes will affect valuable natural and cultural heritage assets throughout the Wadden Sea. The combined impacts of these changes on the ecosystem are so diverse and numerous that predictions of the expected direction of change are very difficult and in some cases impossible to foresee. Major concerns exist with respect to latest projections on sea level rise that range between 0.5 and 1.3 m for this century. Thus it should be anticipated that, in the long term, not enough sediment will be imported and redistributed by natural processes to maintain present ecological functions. Nature protection, coastal flood defence and protection, cultural heritage and conservation policies and management must therefore become more flexible, so that adaptation to change is possible. This is particularly relevant in the implementation of conservation objectives under the Habitats and Birds Directives and the ecological quality requirements of the Water Framework Directive.

2.1.2 Trilateral Policies

An integrated approach is required. As a first step, a Trilateral working group on Coastal Protection and Sea level Rise (CPSL) was established in 1998, in which experts from coastal and nature protection, and since 2005 spatial planning, have worked together.

A long-term trilateral strategy on increasing adaptability to the effects of climate change will be developed, with a view to protecting the people living in the region and conserving the natural, landscape and cultural heritage qualities of the Wadden Sea.

Such a strategy

- includes guidance on which policy steps to take for different climate impact scenarios.
- aims to make conservation management more flexible by intensifying contacts with relevant scientists so that the latest research and advice is used to adapt monitoring and management programmes.
- indicates concrete steps towards increasing the adaptability of the ecosystem *i.e.* its ability to cope with changes, the natural diversity, especially along the mainland coast. This will be done in close cooperation with responsible coastal flood defence and protection authorities and in close consultation with all stakeholders, taking into account landscape and cultural heritage features.
- contains pilot projects and research programmes on climate change adaptation of the Wadden Sea, the resilience of the ecosystem and on coastal flood defence and protection, and contains initiatives to share best practice and lessons learnt throughout the Wadden Sea. The focus will be on projects combining coastal and nature protection.
- includes concrete steps towards developing and implementing instruments for flexible spatial planning, integrating the living situation and safety of people, as well as the resilience of the ecosystem, and including landscape and cultural heritage features. These instruments will involve all relevant stakeholders and broad communication of the results in the planning process.

2.2 ALIEN SPECIES

2.2.1 Status and Assessment

The dispersal of organisms is a natural process limited by multiple barriers, among which geographical barriers are the most evident. However, for centuries humans have introduced alien species to new areas where they were previously absent. They might survive and subsequently reproduce in a newly occupied habitat. If they are invasive, they are known or expected to have negative effects on native populations and species, natural habitats and ecosystems.

With increasing global trade, the introduction of alien species, both intentional and unintentional, has increased concomitantly and has increased in complexity. Next to global habitat loss and climate change, this biological globalization has become a key process in altering the biosphere.

At the North Sea coast, many of the introduced species, mainly algae and invertebrates, arrived via international ship traffic, especially in ballast waters, but also in aquaculture. They most often became established within estuaries and on hard substrates, with more than 80 known species. About 52 of them occur within the Wadden Sea and a preliminary assessment of the aliens' impact on the natural biodiversity of the Wadden Sea shows that presently most cause no or only minor impacts.

Of the 52, six have already had or are about to have effects on the composition of the existing biota in the Wadden Sea: cord-grass, Japanese seaweed, bristle worm, American razor clam, American slipper limpet and Pacific oyster.

Terrestrial alien plant and animal species have also found – and will find – their way into the Wadden Sea ecosystem. A well-known example is the (former) introduction of the rugose rose, which has in several places outflanked the original species and vegetation types, and reduced the typical dynamics of some dune habitat types. Of the mammalian aliens, the North American mink, ferret and muskrat have caused changes, *e.g.* in the predation pressure on breeding birds and the safety of sea dikes in some places.

2.2.2 Trilateral Policies

The Trilateral Cooperation will support and intensify efforts to harmonise approaches to the prevention, management and monitoring of aquatic and terrestrial alien species

introductions and will develop a common strategy for dealing with invasive alien species associated with ballast waters and aquaculture. This is also in line with a request from the UNESCO World Heritage Committee.

2.3 SHIPPING SAFETY

2.3.1 Status and Assessment

The consequences of shipping accidents for the Wadden Sea can be immense. In order to raise awareness regarding the vulnerability of the Wadden Sea, the area has been designated as a Particularly Sensitive Sea Area (PSSA) by the IMO in 2002. Its effectiveness has been reviewed in 2010, leading to several recommendations.

The general risk and potential consequences of accidents and the PSSA designation lead to the obligation to maintain and where necessary enhance shipping safety and reduce impacts from shipping on the Wadden Sea. Also further implementation of policies and actions to prevent oil pollution from shipping – both from illegal discharges and from accidents – as well as control and enforcement measures needs to be continued. This is also valid for reducing the exhaust emissions from ships.

2.3.2 Trilateral Policies

Shipping and shipping safety is considered as one of the priority issues for the Wadden Sea Region. This concern has also been raised in the Wadden Sea Forum, leading to 35 recommendations concerning policy and management necessities. These recommendations were reviewed in conjunction with the agreements taken at the Esbjerg Conference. Where not already taken, action is needed at both the trilateral and international level. Specific actions should be focused on:

- spatial planning and shipping safety in the EEZ;
- day-to-day joint cooperation in the framework of the DenGerNeth plan;
- appropriate towing and pollution response capacity;
- the practical implementation of Places of Refuge;
- harmonization of the no-special-fees system;
- aerial surveillance in the relevant coastal areas and the EEZ;
- container shipping and loss of containers.

As an important standard, the safety of shipping in the North Sea Area should be kept at least at the present level, irrespective of which kind of offshore development might occur, and where feasible be enhanced.

