WWF BALTIC ECOREGION CONSERVATION PLAN

Biodiversity Conservation and Ecosystem-Based Management in the Baltic Sea

WWF´s Indicators for Success in the Baltic Eco-region

The indicators for the Baltic Eco-region was developed on the basis of the Biodiversity Assessment and attempts to express where WWF would like to see the Baltic region within 15 years.

The coastal and marine ecosystems of the Baltic Sea should be in a state to support healthy populations of its characteristic plant and animal species, protecting the uniqueness and the biological dynamics of this evolutionary young area. Human activity must not be allowed to harm the natural and ecological processes, hydrological regimes or water quality of the Baltic Sea and its catchments area.

The high biological productivity of the Baltic Sea needs to be maintained. Its resources must only be used in an ecologically sustainable, socially responsible and economically viable manner that follows the principles of ecosystem-based management. In these circumstances the Baltic Sea will support all life cycles of its characteristic biodiversity and maintain the integrity and functions of its ecosystems.

Governments, communities, civil society and the private sector around the Baltic Sea will need to co-operate to ensure that all uses of the Baltic Sea -- whether for marine production, consumption or recreation -- maintain and increase the natural capital and resilience of the Baltic's coastal and marine ecosystems. Unsustainable lifestyles, consumption, water, land and resource use, according to this vision, will have been halted through a deepened understanding of human dependence on the life-supporting functions and services of the Baltic's ecosystems.

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Executive Summary

Although the Baltic Sea appears on a world map as a small sea, it is the planet's second largest body of brackish water, characterised by a delicate mixture of salt water coming in from the North East Atlantic sea and fresh water coming in from rivers, rainfall and infiltration.

Due to its specific geographical, climatic and oceanographic features, the Baltic Sea is highly sensitive to human activities which are taking place both at sea and in its catchment area, which is home to some 85 million people.

Today the Baltic Sea is one of the most threatened marine ecosystems on the planet. More than 50% of the commercial fish stocks are overfished. Eutrophication affects 70% of all listed biotopes. Moreover, the health and diversity of all marine species are affected by industrial, municipal and agricultural pollution, as well as increased sea and land-based transport, and continued clearing of forests and drainage of wetlands.

WWF has identified the Baltic Sea as one of the priority Eco-regions in Europe. The action plan agreed by WWF and partner organisations in nine different countries includes integrated land, coastal and marine activities to strengthen the local and regional capacity to achieve sustainable ecosystem-based management of the Baltic Sea's resources.

Ecosystem Management is a broad scale approach to biodiversity conservation. It seeks to integrate conservation and development by taking a strategic approach with all stakeholders to develop common goals and mutually supportive activities for the conservation and restoration of natural habitats.

Sustainable management will improve ecosystem health and biodiversity while providing social and economic benefits to farming, coastal and fishing communities and sectors such as eco-tourism.

Global biodiversity loss and the increasing contamination of water worldwide represent one of the key problems for sustainable development in the 21st century. Successfully addressing the water challenge in the coming century will require extra efforts.

WWF is ready to take on the challenge and work together with individuals, communities, governments and the private sector to revive the biological diversity of the Baltic Sea.

Introduction

Historically WWF first focused its efforts on conserving species, but soon recognized that conservation was not merely a matter of preserving individual populations. Animal and plant species cannot be saved in isolation from their surroundings and the resources they depend on for their survival.

WWF's conservation efforts have therefore evolved to focus on the preservation and restoration of natural habitats and large ecosystems, while also addressing the needs of people and local communities.

WWF has also recognised the need for cross-border co-operation in protecting species and their habitats. The global crisis of species extinction and habitat degradation demands a new kind of strategic planning. We must conduct conservation planning over larger spatial scales and longer time frames than ever before.

In order to successfully meet WWF's goals the organisation is undergoing a strategic alignment process and has launched the concept of eco-region conservation (ERC) based on priorities areas set through the Global 200 network.

The mission of the World Wide Fund For Nature (WWF) is to stop the degradation of the planet's natural environment and to build a future in which human beings live in harmony with nature by conserving the world's biological of renewable natural resources is sustainable, and by diversity, by ensuring that the use promoting the reduction of pollution and wasteful consumption.

The WWF Global 200 network is a number of designated areas, known as "eco-regions", warranting action. These areas have been chosen on the basis of multiple criteria, not only reflecting the value of their biodiversity but also the level of threats.

An Eco-region has been defined as "a relatively large unit of land and water that contains a distinct assemblage of natural communities sharing a large majority of species, dynamics and environmental conditions".

One such unit is the Northeast Atlantic Shelf Marine Eco-region – The Baltic Sea is part of this eco-region, which includes the North Sea, the Wadden Sea and the Celtic Shelf. However because of its particularities, WWF also speaks of the Baltic Sea as a separate unit, that is, as the Baltic Eco-region.

The Baltic Sea is unique and highly sensitive, due to significant river runoff, a relatively small sea basin and a limited exchange of the water with the North Sea. The watershed also serves cities, agricultural and forestry areas in nine countries.

Virtually, all Baltic terrestrial activities significantly affect the marine environment. Due to the semi-enclosed nature of the Baltic Sea it is particularly important to also tackle these influences.

Why Eco-Region Based Conservation

Eco-region conservation provides a strategic basis for a new kind of conservation methodology. It is based on thorough biodiversity and socio-economic assessments of the designated areas. Eco-region conservation adopts an ambitious, broad-scale, integrated approach that aims to conserve and, where necessary, restore the biological diversity of an entire eco-region – species, communities, and ecosystem processes – while ensuring that the needs of local and indigenous peoples are met.

WWF strategies and actions aim at achieving the broad goals of:

Representation	all native ecosystem types and several stages across their natural range of variation
Resilience	design and manage the system to be responsive to short-term and long-term environmental changes and to maintain the evolutionary potential of lineage's
Viable Populations	maintain viable populations of all native species in natural patterns of abundance and distribution
Healthy Processes	maintain ecological and evolutionary processes such as disturbance regimes, hydrological processes, nutrient cycles, and biotic interactions

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Implementing Eco-Region Conservation

In order to implement eco-region conservation, background research is needed to explore and better understand the complex linkages between social, economic, political, cultural and biological factors affecting biodiversity. Acknowledging the multiple factors leading to biodiversity loss provides a basis for establishing **conservation strategies with broader visions, larger scales, longer time frames, and greater impact.**

Working at an eco-regional level requires a continuous reshaping of actions and strategies based on emerging information and new tools for conservation management and a commitment to flexibility and the sharing of lessons learned.

Emphasis must be put on collaboration, the development of partnerships, and work with multidisciplinary teams on a wide range of cross-cutting issue

Key Elements of Eco-Region Conservation

Root Cause (and Socio-Economic) Analysis

There is a need to understand and connect micro-level factors to broader socio-economic aspects that influence people to make decisions that run counter to long-term interests and degrade the natural environment.

Thus, a new approach that offers a comprehensive methodology to provide in-depth, multilevel and multidisciplinary analysis of the various socio-economic factors affecting biodiversity was developed by WWF – Root Cause Analysis.

The purpose of a Root Cause Analysis is to better understand underlying factors that drive such biodiversity loss in order to develop appropriate conservation targets, actions and resources.

The Baltic Team identified the five most urgent threats to the biodiversity of the Baltic Sea and Root Cause Analysis was then carried out for each component, resulting in the elaboration of targets and milestones spanning a 10-15 year period.

In order to develop the activities needed to successfully reach the different targets, a stakeholder-and socio-economic analysis was conducted for each of the identified threats.

Eco-Region Action Plan for the Baltic Sea

The Baltic Eco-region Action Plan outlines a set of specific and measurable targets, milestones and activities for the coming 15 years, which are in line with WWF's mission and the Global Target Driven Programmes on marine, fresh waters and toxics issues.

The Action Plan will be revised annually to reflect the changes in the political and socio-economic environment, build upon conservation successes and fill potential gaps in the programme.

Present Situation

Current Structure of the Baltic Eco-region Programme

The WWF Baltic Programme was launched as part of the Europe and Mediterranean Programme in 1992. Today the Baltic Team consists of National WWF offices (NOs) in Denmark, Finland, Germany and Sweden. Poland and Latvia are represented by the WWF Programme Offices in those countries.

Estonia, Lithuania and Russia are represented by long-term partner organisations (Estonian Fund for Nature, Lithuanian Fund for Nature and Baltic Fund for Nature in Saint-Petersburg). The WWF Russian Programme Office is also represented at Baltic Team meetings.

A Baltic Eco-region Programme office was established in September 2003 to lead the delivery of the programme, to facilitate cooperation among NOs and partner organisations in the nine countries surrounding the Baltic Sea and to increase public awareness and support.

Most WWF activities carried out in the Baltic region to date have emerged within national programmes or sub-regional co-operation schemes. These activities have generally been on-the-ground conservation projects with a clearly defined aim and limited in time to one to three years.

The projects have generally been carried out bilaterally within the Baltic Team, with NOs and/or external funding that the collaborating organisations have applied for together. From 2003 on, the Baltic team will focus on developing cross boundary and transnational projects on a regional scale.

Policy Context

There are a large number of regional policy initiatives in the region and the opportunity to participate in the policy field is frequently determined by resource availability and capacity. The programme office will ensure that WWF is represented in relevant political forums at a *regional* and *international* level. The responsibility to represent WWF's interests on the *national* level still lies with the NOs/POs.

Denmark, Finland, Germany and Sweden are currently members of the European Union. Estonia, Latvia, Lithuania and Poland will become EU members on 1 May 2004. This will dramatically affect the political dynamics in the region.

The accession countries are adjusting their economies and administrative and legislative structures to meet the EU criteria by 1 May 2004. All countries around the Baltic Sea, with the exception of Russia, will share the same legal framework.

In light of these developments, continuing co-operation with the Russian government, local authorities and NGOs is vital for environmental management in the Baltic region.

The exclusive competence of the European Union in the agricultural and fisheries sectors influences natural resources management and justifies prompt action from WWF. The Water Framework Directive and the Birds and Habitats Directive are important policy tools for conservation. The

Common Agricultural Policy and the Common Fisheries Policy will play an increasing role for the Baltic Programme as will the REACH directive once it is in place. The Baltic Team is actively working to ensure that these directives are properly implemented at the national level.

Other policy mechanisms and other projects relevant to the Baltic region and which represent priorities for the Baltic Team include:

- to designate the Baltic Sea as a Particularly Sensitive Sea Area (PSSA) under the International Maritime Organization
- to implement an ecologically representative network of marine protected areas (Baltic Sea Protected Areas/BSPAs under Helcom and Natura 2000 under EU legislation)
- to obtain national and regional environmental benefits from the EU accession of the accession countries
- to reduce pollution originating in illegal oil spills and cleaning of ships tanks
- to develop methods for environmental education
- to build capacity for NGOs in Russia, Poland and the Baltic Countries
- to develop and implement the Finnish National Baltic Sea Protection Programme

Photo: A. Frenkel

Biodiversity of the Baltic Sea

A Young and Unique Ecosystem

The Baltic Sea is the world's second largest brackish water basin, with a mixture of sea water from the Atlantic and the North Sea and fresh water from rivers and rainfall. It is semi-enclosed, almost entirely cut off from the Northeast Atlantic. This limits the dynamic exchange of water, which is estimated to take 25 to 30 years.

The same water thus remains in the Baltic for decades, along with all the organic and inorganic matter it contains. Its catchments area is four times larger than the sea itself, involving 14 countries and the home of some 85 million people.

The coastline of the Baltic Sea Region, including the Danish belts and Kattegat between Sweden and the Jutland peninsula of Denmark, is long and diverse. The shaping of the coastline by hydrodynamic processes began about 5,700 years ago with the ending of the Littorina Transgression.

Both the marine and offshore habitats of the Baltic Sea are very young compared to its geological structures. Their evolution was initiated by the melting of the ice sheet of the last glacial period and the associated sea-level rise. This process started 15,000 years ago in the southernmost Baltic Sea and 6,000 years later in the Bothnian Bay between Finland and Sweden.

Several changes in the waterbeds of the Baltic Sea, from fresh to salt water conditions, have occurred since then. Due to the Ice Age land upheaval is still an ongoing process along coastal areas, especially in the northern parts of the region. The slow but ongoing land up-lift process (5- 7 mm/y) leads to the formation of particular structures specific to the Baltic region: shallow *flada*s and *glo* lakes, which are inland depressions retaining Baltic sea water as the land rises up.

A Vulnerable Area Under Threat

Since the present natural conditions of the Baltic Sea have existed for a few thousand years only, well-adapted and cohesive biological communities have had little time to develop, which makes them highly vulnerable to changes in the ecosystem.

The species composition of the Baltic Sea (both marine and fresh water species) is poor compared to other aquatic ecosystems. But the productivity of organisms as well as the number of individuals is extremely high, due to shallowness and rich nutrient supplies. The semi-enclosed and shallow form of the basin, combined with its naturally stressed and scarce ecological communities, makes the Baltic Sea a highly sensitive ecosystem.

The health, productivity and biodiversity of the marine environment are mainly threatened by human activities on land. Land-based activities create municipal, industrial and agricultural wastes as well as pollutants transported by rivers and atmospheric deposition.

Eutrophication and high concentrations of toxic substances are major environmental problems affecting the Baltic Sea. Because of the low water-exchange, contaminants - in particular, persistent chemicals - remain in the Baltic Sea for a long time and its ecosystem tends to trap and accumulate hazardous substances. These are then either absorbed into the sediments or accumulated in the food chain right up to fish, marine mammals, and sea birds.

This bio-accumulation causes serious health and reproduction problems to top predators and also to human beings. The imbalance caused by nutrients and their abundance has led to numerous changes in the ecological composition and state of the Baltic Sea.

A Wide Variety of Ecosystems and Habitats

Today the Baltic Sea has a great number of different ecosystems and habitats. These are classified according to salinity, hard or soft seabeds, shallow or deep bottoms, coastal areas or open waters. The Kattegat to the west and the Bothnian Bay to the north represent extremely different aquatic worlds, yet they are both part of the Baltic Sea.

In Kattegat, where glacial deposits have shaped the coast, eroding cliffs and accumulative coasts exist side by side. In the northern parts of the Baltic Sea Area, where bedrock is exposed, land upheaval rates of up to 9 mm annually can be observed and coastal erosion is much weaker. In these conditions large accumulative coastal forms such as spits are not present.

The special conditions in the many and extensive archipelagos of the central and northern Baltic Sea are very different compared to those of the sandy beaches, lagoons and shallow sea grass meadows along the eastern and southern coasts.

Coastal and Marine Habitats

The diverse conditions of the sea have also caused the development of many different inland coastal ecosystems and habitats in the Baltic Sea region. The archipelagos are a typical feature of the Baltic Sea. They represent tens of thousands of islands, skerries (reefs and rocky islands covered by the sea in stormy weather), and rocks, thereby creating seas within seas.

However, the shallow sandy beaches of the Kattegat and the southern Baltic Proper, as well as the soft bays, sand dunes, coastal meadows and lagoon landscapes of the southern and south-eastern Baltic, are also characteristic features of the Baltic geography and biodiversity.

In order to make nature protection easier in the Baltic Marine and Coastal Areas, an all-encompassing biotope classification has been carried out, identifying 133 biotopes (66 marine and 67 coastal) and 13 biotope complexes (containing different biotopes of a similar overall type).

A HELCOM *Red List of Marine and Coastal Biotope and Biotope Complexes of the Baltic Sea, Belt Sea and Kattegat* (Baltic Sea Environment Proceedings No.75, 1998) based on this classification provides the first Baltic-wide assessment of the degree of threat posed to biotopes and biotope complexes by loss of area or by change. This assessment revealed that 88% of the biotopes are “heavily endangered”, “endangered” or “potentially endangered”, but that none of the biotopes are “immediately threatened”.

Fishing and construction threaten most of the marine biotope. The coastal habitats are threatened by recreational activities and by pollution. Coastal meadows and other semi-natural grasslands are threatened by changes in agriculture, especially decreasing grazing.

As a first step towards the establishment of a system of marine and coastal Baltic Sea Protected Areas (BSPAs), **the Baltic Sea States**

provisionally notified 62 such areas under HELCOM Recommendation 15/5 in 1995 (Baltic Sea Environment Proceedings No.63, 1996). It is evident that the provisional list should be extended to include *inter alia* a greater number of purely marine areas, and especially more areas that are offshore. Inventories of marine habitats have not been performed in all Baltic Sea States.

The Natura 2000 network could be an additional valuable framework to perform this task. To date, nine years after the proposal of the 62 Baltic Sea protected Areas (BSPAs), only 5 have been fully implemented (including legal protection and management plan) and reported to HELCOM. Only one country, Lithuania, has implemented all designated areas.

Although a lot of other BSPAs exist in terms of legal protection, in many cases only the terrestrial parts of the areas are protected, while the marine parts are not, and most BSPAs still lack efficient management plans for the marine environment.

Coastal and Marine Species

Due to exceptional salinity conditions, the Baltic Sea is characterised by low species diversity of freshwater and marine origin, and a simplified food web.

The number of macroscopic marine algae in the Baltic marine area decreases from more than 350 species in the Kattegat (with salinity of 23 parts per mille[1]) to less than 90 species in the low-salinity waters of the Stockholm archipelago, where salinity is approximately 5-6 parts per mille.

Further north in the Bothnian Bay all but one of the 32 algal species are freshwater species. The same pattern is seen in fish species. Marine species dominate in Kattegat, while freshwater ones occur in coastal areas.

With a few exceptions, the populations of most marine and coastal birds have increased and species have expanded their areas of distribution during the past 100 years, even if many populations have remained stable from 1980 onwards. Several species, especially cormorants (*Phalacrocorax carbo sinensis*), have dramatically increased their numbers and distribution area.

As a result, increasing conflicts between cormorants and fisheries need to be addressed. Among the factors leading to this situation are last century's mild winters and longer nesting periods, decreases in hunting and egg collecting, eutrophication (creating more food especially for species that eat fish, shells and mussels) and human-created food sources.

Good news in the Baltic is that the concentrations of some environmental toxins, which affected birds during the mid-1900s, such as DDT and PCB, have also decreased in the Baltic Sea in later years. The Baltic white-tailed eagle (*Haliaeetus albicilla*) population has increased. Although the mean brood size of the eagle has stabilised at a lower level than that in the 1950s, its reproductive capacity is now almost as good as then. Eggshell thickness has returned to the pre-1950 levels also in the fish-feeding guillemot (*Uria aalge*).

Among species that have become less common during recent decades in their nesting areas are Baltic Dunlin (*Calidris alpina*), black-tailed godwit (*Limosa limosa*), greater scaup (*Aythya marila*) and lesser black-backed gull *(Larus fuscus*). The recent decreases in numbers of several bird species are caused by shrinking of suitable biotopes (especially coastal meadows) due to human activities, increased disturbance due to boating and other

[1] Parts per thousands

recreation, decrease in the extent of macroscopic shallow-water vegetation due to eutrophication, and increased predation by fox, mink, raccoon dog and some gull species.

The Baltic is an important migratory route, especially for waterfowl, geese and waders nesting in the Arctic tundra. These birds, which rest in the coastal areas of the southern Baltic proper, North Sea and western Europe, move every spring northwards en masse along Baltic coasts to their nesting grounds. The migration of several species is concentrated in a relatively narrow channel in the Gulf of Finland area.

Many of the birds rest in Baltic coasts during the migration. Barnacle geese, for example, stop in northern Germany, Gotland (Sweden) and western Estonia.. A number of key wintering sites for waterfowl and seabirds of North Western Europe are located in brackish waters of the Baltic Sea.

There are two reasons for concern about these wintering birds that aggregate in big numbers in the open sea. Transportation of large volumes of crude oil in the Baltic clearly poses a threat to the bird life from spills and discharges. The quantities of oil released to the sea deliberately are larger every year. Second, development of gill net fishing has created a new threat to the wintering waterfowl.

Baltic seal populations – harbour seals in the southern parts and grey seals in the central and northern most parts, and ringed seals in the northernmost parts – are generally increasing. Lesions of reproductive organs found previously in Baltic seals seem generally to be declining and their health appears to be improving.

However, approximately half the grey seals under 10 years old suffer from chronic intestinal ulcers, with moderate to severe ulcers still common, probably as a result of suppression of the immune system caused by environmental pollutants.

In the Gulf of Finland and in the Archipelago Sea, the status of the ringed seal population is still alarming. It has not recovered its former size and distribution, and health conditions and fecundity have not yet returned to normal. The conflict between seals and fisheries remains serious and needs to be recognised and properly addressed.

The harbour porpoise, the only cetacean breeding in the Baltic Sea, is numerous only in the southern parts of the Baltic Sea, but very scarce in the Baltic Proper. The species is seen occasionally in the Bothnian Bay and in the Gulf of Finland.

An abundance estimate generated in 1995 was of 599 animals (confidence intervals: 200-3300) in the whole Baltic Sea. A new abundance estimate carried out in 2002 suggests that there may be as few as 93 (confidence intervals: 10 – 406) animals remaining in the whole sea.

The most significant threat facing the harbour porpoise is the incidental capture in fishing gear ("by-catches") especially in the southern Baltic, in Denmark, Germany, Sweden and Poland.

Invasion by non-indigenous species in the Baltic marine area has clearly increased in past decades and gives rise for concern, since their long-term impact on the Baltic ecosystems is unpredictable and in many cases has been proven harmful.

The problem is increasing as the tankers shipping oil from Russia enter the Baltic Sea with huge amounts of ballast water. In 1998, 95 species of animals and plants were identified as introduced non-indigenous species in the Baltic marine area and adjacent coastal lagoons, lakes, coastal meadows and other seminatural grasslands. These species include zoobenthos (42), fish (23), phytoplankton (9), phytobenthos (9), nektobenthos (4), parasitic invertebrates (3), zooplankton (3) and mammal (2) and bird (1) species. Approximately 66 of these were invasive.

Threats and Solutions

Main Threats to Baltic Biodiversity

The Baltic Team has identified five major threats to biodiversity in the Baltic Sea Region:

- habitat degradation
- unsustainable fisheries
- eutrophication
- toxics
- climate change

The Team carried out Root Cause Analyses and socio-economic analyses for these five threats and decided to omit climate change from the action plan. For the moment: changes in the Baltic region's climate will ultimately lead to changes in the productivity of the marine and coastal ecosystem but the first and very preliminary assessment revealed a complexity and uncertainties beyond the resources of the Baltic Team to tackle.

For each one of the threats a brief background description has been developed, providing a basis for the targets, milestones and activities that the Baltic Eco-region Programme will commit to.

Beyond the specific action points and solutions presented below, two cross-cutting approaches need to be seriously considered by all stakeholders in order to deliver long term, holistic conservation successes in the region:

Integrated Spatial Planning

The Baltic Sea is an enclosed space where, more than in many other seas of the world, there is an obvious need for co-operation across national borders. These state borders are so close together that a country may be affected by harmful uses of territory within the exclusive economic zone (EEZ) of a neighbour.

During the past decades, pressure on the marine space has increased rapidly, so that the sea has become a patchwork of claimed and reserved areas for different and sometimes very much conflicting interests. For the threats and activities that the action plan identifies as most important, there exists no legal obligation to balance and co-ordinate different demands on the area. Nor does co-ordination take place across the territorial waters or EEZs of neighbouring states.

WWF regards it as essential that different uses and demands made of the Baltic area should be well co-ordinated and managed in a transparent and balanced way in order to achieve sustainable development and safeguard its natural values at the same time.

The concept of integrated spatial planning, covering both the open sea and the coastal zone, is a valuable tool for finding that balance. By this process it is possible to visualise the various interests and demands for space through a multiple-layer mapping system.

On this basis it is easier to discuss potential uses and nature conservation in a transparent way and decide on the most sustainable zoning, e.g. for transportation routes or for core areas of a PSSA or for areas for wind power installations that will not conflict with fishery use, no-take zones and MPAs.

This comprehensive approach through spatial planning can be a useful tool to implement the vision of how to manage the Baltic area in the future and to make this vision understood to stakeholders and the public.

The Baltic Sea States should be encouraged to adopt the overarching principle of spatial planning in their national and Baltic-wide decisions on the use of the sea area.

Ecosystem-Based Management

Although there is no commonly accepted definition of ecosystem-based management, the principles are widely recognised as providing a new management approach, fully applicable to fisheries.

Ecosystem-based management of fisheries makes ecological sustainability its primary goal, as well as recognising the critical interdependence between human well-being and ecological health. It is a crucial concept to apply in the Baltic context in order to develop economically viable and ecologically sustainable fisheries.

Habitat Degradation

The variations in environmental conditions (salinity, sea depth, hard or soft substrates and various coastal types) in the Baltic Sea Area have created a variety of habitats, some of them rare or unique. The use of the watershed by nine densely populated and highly industrialised countries with their large urban areas, industries, agriculture, shipping, ferry traffic and fisheries, has had and still has a profound impact on Baltic coastal and marine ecosystems and habitats.

The WWF Baltic Team has identified the most vulnerable habitats and also the most urgent threats to coastal and marine habitats in the region. To halt the biotope loss, action needs to be taken at various levels in society, i.e. in economic, political and social arenas and forums.

Biotope Classification and Assessment

Compared to terrestrial habitats, marine habitats are relatively poorly studied and classified. In order to facilitate nature protection in the Baltic marine and coastal areas, an all-encompassing biotope classification has been carried out by HELCOM, identifying 133 biotopes (66 marine and 67 coastal) and 13 biotope complexes (Red List of Marine and Coastal Biotopes and Biotope Complexes of the Baltic Sea, Belt Sea and Kattegat (Baltic Sea Environment Proceedings No.75, 1998)).

The marine and coastal biotopes in the HELCOM Red list are divided into the following main categories:

- pelagic marine biotopes
- benthic marine biotopes
- terrestrial biotopes
- coastal lakes, pools and *glo* lakes
  (see “A Young and Unique Ecosystem” for a description of glo lakes)
- selected biotopes of riverine and river mouth areas

The HELCOM Red List based on this classification provides the first State-by-State and Baltic-wide assessment of the degree of threat posed to biotopes and biotope complexes by habitat loss or change, i.e. threats to biodiversity, species interactions, ecological processes and environmental conditions. **The Baltic-wide assessment revealed that 88% of the biotopes are “heavily endangered”, “endangered” or “potentially endangered”,** but that none of the biotopes are “immediately threatened”.

An indication of which human activities who are most harmful to biotopes is provided by the number of adverse impact entries for each activity in relation to specific biotopes on the HELCOM Red List. The most common threat factors are pollution, eutrophication, construction (mainly local) and fishing, affecting respectively 75% (pollution), 70% (euthrophication), 57% (construction) and 47% (fishing) of all listed biotopes.

All marine biotopes are threatened by change due to eutrophication or pollution in at least one Baltic Sea State. Each of these threats accounts for 24% of the scores in the marine biotope/threat matrix. Fishing and construction threaten 74% and 70% of the marine biotopes, respectively. Of the coastal biotopes, 61% are threatened by recreational activities and 51% by pollution.

The WWF Baltic Team focuses on the following biotope complexes as the most vulnerable:

- rocky shores
- sandy shores
- moraine shores
- flat coasts subject to intensive land upheaval
- fjords/fjord-like bays
- lagoons, including *Bodden*, barrier lagoons and *fladas (see "A Young and Unique Ecosystem" for a description of fladas)*
- large spits of sand and/or gravel separating a lagoon from the sea
- riverine areas under brackish water influence by the sea
- estuaries and river mouth areas
- archipelagos
- solitary islands
- esker islands
- deep-sea bottoms
- shallow offshore banks *(including sandbanks and reefs)*

Special attention needs to be devoted to the last category (deep-sea bottoms). In aquatic habitats, hypoxia or anoxia (lack of oxygen) constitutes the most extreme environmental catastrophe. All higher organisms that cannot escape such conditions eventually die.

In ecosystems affected by eutrophication, increased oxygen consumption rates would make deep water and deep bottoms the most threatened habitats. This is particularly true for deep coastal basins, which are isolated from each other by extensive shallow areas.

Although oxygen depletion in near-bottom waters has always been a natural part of the ecological processes in the Baltic Sea, its present extent is unprecedented, and recovery of bottoms is now remarkably slower. This has caused large-scale, detrimental impact to the bottom dynamics of the Baltic Sea basin.

Natura 2000/ Emerald Network in the Baltic Sea Area

In May 2004 all Baltic Sea Countries, except Russia, will be members of the European Union and thus need to follow the EU Directives. An important international instrument for habitat conservation is the EU Habitats Directive.

The Directive includes a far-reaching and ambitious programme known as Natura 2000 for the establishment and conservation of a network of protected sites throughout the EU Member States. Annex 1 of the Directive describes eight open sea habitat types (1110 –1180) as worthy of protection in the EU.

Seven out of these eight threatened habitats have been identified in the Baltic Sea. The description of another habitat type (1140 Mudflats and sandflats not covered by seawater at low tide) has been much debated by marine biologists, since there are no real tides in the Baltic Sea.

This habitat type, with high water-level variance, has been identified in some Baltic Sea States and omitted in others. Habitat type 1180 (submarine structures made by leaking gases) is quite rare in the Baltic Sea but is found in the southern part (Denmark). Submersed sandbanks (1110) and reefs (1170) should be given special attention, as they often constitute highly productive and valuable offshore habitats.

Compared to terrestrial habitats the inventories of marine habitats for establishing the Natura 2000 network have so far been carried out far less intensively. Although the classification of marine habitats seems to be too simple to fit to the Baltic Sea with its 66 marine habitat types, the possibilities for implementing the EU Habitats Directive are currently not being used to their full extent. The Baltic biotope classification is still taking place and the European Environmental Agency is working on modifying the EU's EUNIS (European biotope classification) system to the Baltic.

A Marine Expert Group has been established under the EU Habitat Committee to develop a common understanding of the provisions of Natura 2000 relating to the marine environment in order to facilitate the designation and future management of these areas by the Member States.

The marine habitat types such as sandbanks, reefs and submarine structures made by leaking gases will get a new definition to better fit in all European sea areas: The Baltic, The Mediterranean and The Atlantic. WWF has a representative in this Group.

In addition, Natura 2000 consists of SPA (Specially Protected Areas) according to the EU Birds Directive (1979). Although a large number of SPAs have already been designated in EU Member States and selected by accession countries, many Important Bird Areas of the Baltic Sea, as described in Inventory of Coastal and Marine Important Bird Areas in the Baltic Sea (Birdlife International, 2000) remain without legal status.

Further opportunities for habitat preservation through the network of protected areas in the region come from the Emerald network, specifically oriented towards involving non-EU States in the Natura 2000 process. Expansion of the Emerald network has a special significance for the Baltic Sea Region where areas large enough to maintain wilderness and undisturbed ecological processes still remain adjacent to the Russian Federation. Through this process, habitat preservation and restoration efforts can be harmonised throughout the whole Baltic region and unified and comparable registering and monitoring of habitats will be achieved.

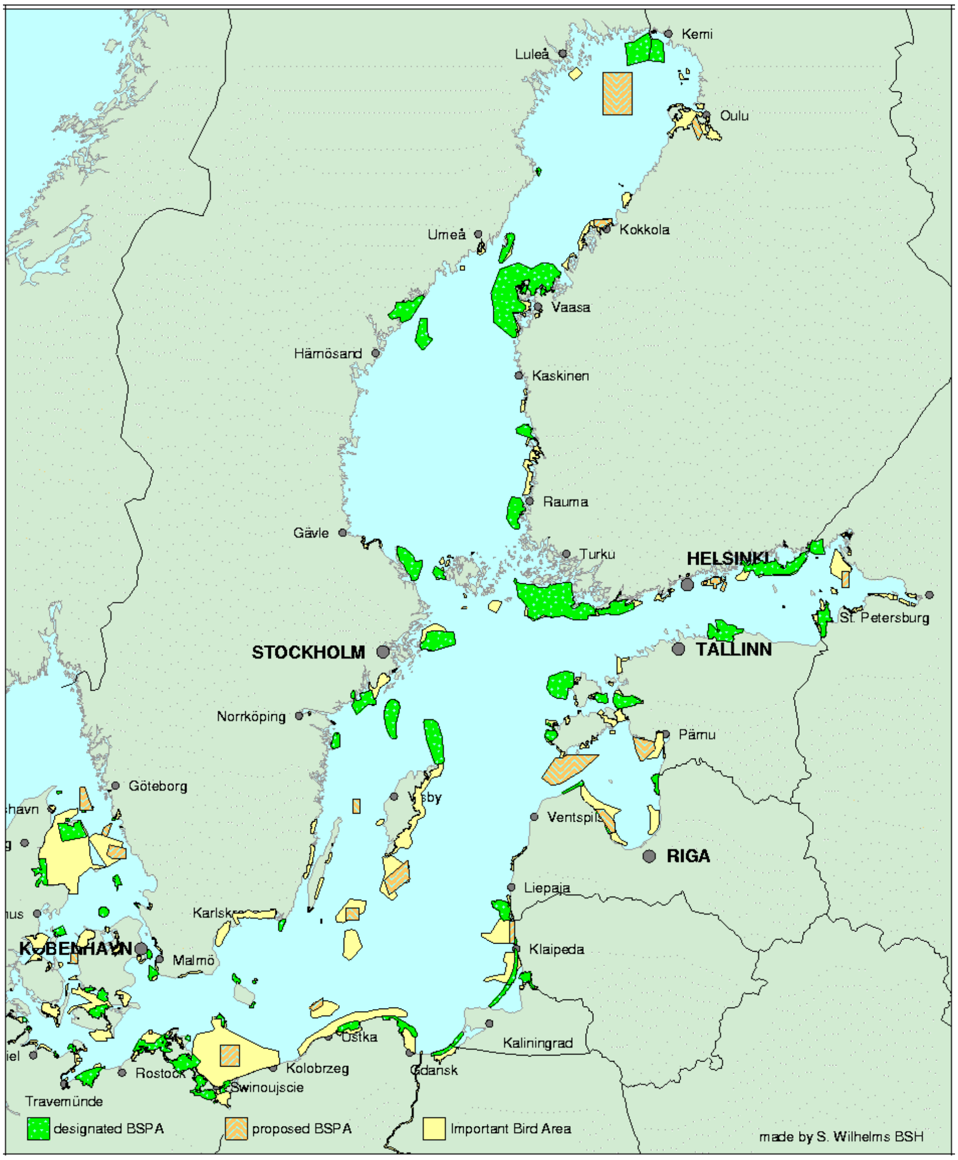

Figure 2. Regional distribution of designated BSPAs, proposed BSPAs and IBAs.

Other Policy Tools

The Ramsar Convention also offers a legally binding instrument for protection of coastal areas shallower than six metres. All Baltic Sea states have ratified the Ramsar Convention, and several wetland areas have been designated. The African-European Waterbird Agreement under the Bonn Convention is another instrument used to protect coastal and marine areas available for migrating waterfowl.

Coastal Wetlands and Lagoons

The fate of Baltic coastal wetlands and coastal lagoons, particularly those in the western parts of the region, provides a striking example of negative human impacts on the Baltic ecosystem. The Baltic Sea region contains a number of large and complex coastal lagoons and wetland ecosystems.

However, as in most parts of the world, **wetlands and coastal lagoons decreased drastically during the 20th century**. Wetlands have been ditched and drained to meet the demand from expanding modern agriculture and forestry. Wetlands and lagoons have been filled to make room for urban and industrial development, including harbours and marinas. Coastal wetlands, including estuaries, coastal lagoons, coastal wetland meadows, marshlands, wet forests, bogs and swamps, have suffered particularly from human activities.

However, in the eastern and south-eastern parts of the Baltic region due, inter alia, to less intensive agriculture and forestry over large areas, and the closing of extensive coastal regions for military and other reasons, countries have maintained a greater wealth of undisturbed or less affected lagoons and wetland areas of various types.

Semi-Natural Coastal Habitats

Notwithstanding the many negative impacts in the Baltic Sea region, a considerable number of terrestrial and marine habitats and ecosystems have remained in a relatively undisturbed state. In the northern and eastern parts, pristine and non-exploited coastal stretches can still be found.

Also, there are still very rich, valuable semi-natural coastal habitats in some sub-regions. Semi-natural grasslands in the archipelagos of Sweden, Finland and Estonia are extremely valuable from a wider biodiversity point of view with highly endangered species.

The low-lying parts of the Baltic coastline, often covered by grassland (various types of coastal meadows, coastal wetlands etc.), are of great importance for the annual migration of millions of geese, swans, cranes, ducks and waders along the so-called North East Atlantic flyway.

Coastal meadows have existed in the Baltic Sea Area for thousands of years and comprise distinct plant and bird communities which are now threatened by abandonment and lack of management. Several vertebrates as black-tailed godwit, Baltic Stint, Ruff and natterjack toad have become rare.

New economic incentives have to be developed to ensure continuous and sustainable management of semi-natural areas.

Important Bird Areas and Wintering Areas of Seabirds

A 1994 survey of offshore wintering birds in the Baltic region shows that 39 areas meet the criteria of holding at least one percent of the total North Western European population of a single bird species (Durinck et al.1994. Important marine areas for wintering birds in the Baltic Sea). Ten of these areas are of significant, and four of outstanding international, importance for the subsistence of the fauna of wintering birds in Northern Europe[2].

Furthermore, the need for special management of these areas was established. Their importance must be considered when deciding about the Baltic network of protected coastal and marine areas. Any degradation of these habitats, including pollution through oil spills, will have disastrous consequences for bird populations.

A study published by Birdlife International in 2000 identified Important Bird Areas (IBAs) for the Baltic Sea. It identified **170 IBAs in the Baltic Sea Area**, 5 of them on offshore banks, 1 in the sub-littoral zone, 118 in the littoral zone, 35 in combined littoral – sub littoral zones and 11 in lagoons.

Bladder Wrack (*Fucus vesiculosus*) Communities

Bladder wrack (Fucus vesiculosus) is a flagship species of macroalgae in the Baltic Sea. This perennial, belt-forming distinct large brown algae can be found in the coastal zone from the Kattegat up to the Bothnian Sea. Bladder wrack belts form the basis for an ecosystem rich in species and are of great importance for the structure and function of the coastal zone and the Baltic Sea system as a whole. They provide habitat for a variety of marine species – epiphytes, filter feeders, grazers, browsers, mobile invertebrates and fish.

Bladder wrack in the Baltic Sea occurs in the upper sub littoral zone. Between the 1940s and the 1980s the depth limit of its dispersal decreased from 11m to 7–8m along the Swedish coast. Since then, it has increased again by 1m.

Along many parts of the Finnish and Estonian coasts bladder wrack disappeared at the end of the 1970s and the depth distribution decreased along most open shores. Partial recovery has taken place, but the bladder wrack does not reach the same depths as it did previously.

Coastal and Offshore Areas

Other valuable and productive habitats/ecosystems, such as shallow marine hard-bottom areas, are of great importance in several respects. They are important for their rich marine biodiversity, and as spawning and nursing grounds for many fish species, including species of commercial importance to both local and regional fish productivity and fisheries.

Some of the areas are also of international importance as wintering areas for diving ducks.

As early as 1993 a joint Baltic Marine Biologists (BMB) and WWF working group identified a network of coastal and offshore areas in need of protection. It also underlined the necessity to include identified terrestrial areas to develop larger, more comprehensive protected areas.

The group classified two principal types of marine areas that should be considered for protection are:

Non-threatened areas in their natural state

Habitats of high ecological value as well as high biodiversity would have represented the ideal, but in reality no such areas can be found anymore in the region.

Therefore areas which are "sustainable" used and not directly threatened by pollution sources in the vicinity should be included.

Areas that still hold their natural plant and animal communities, but where the variability of the

[2] Szczecin and Vorpommern Lagoons (Germany/Poland), Pomeranian Bay (Germany/Poland), Gulf of Riga (Latvia/ Estonia) and Northern Kattegat (Danmark/Sweden)

ecosystem has increased, should also be part of the protected marine areas.

Areas requiring efforts to restore them

They include heavily polluted areas and/or areas, in the vicinity of major pollution sources (such as discharges of municipal or industrial wastewater) or mouths of large rivers.

Areas exploited by humans in a way that affects the habitat and threatens its organisms come into this category.

Similarly, where biodiversity has decreased and plant and animal communities are dominated by opportunistic species, protection is required.

For all such areas, which used to be of high ecological value and of importance to society, all possible efforts should be made to restore them.

A system of initially 62 Baltic Sea Protected Areas (BSPAs) was proposed in the 1994 HELCOM Recommendation 15/5, but the proposed selection includes only very few purely marine areas.To be representative of the whole Baltic Sea it is evident that the provisional list should be extended to include inter alia a greater number of purely marine areas, and especially more areas that are offshore.

In an expert report (Hägerhäll & Skov), in 1998, 24 additional/offshore areas were proposed to be included in the BSPA-network (but they have still not been officially included). To date, none of them have been fully implemented and reported to HELCOM.

In Sweden, three offshore BSPAs in the EEZ (beyond 12 nm) have been designated as NATURA 2000 sites, but there are still no management plans in place and these areas are not officially reported to HELCOM. Also in Denmark, some offshore areas (beyond 12 nm) have been designated as NATURA 2000 sites, but so far there are no management plans in place and they are not reported to HELCOM.

Through its working group on nature conservation and coastal zone management (HELCOM Habitat), the Commission aims at conserving natural biotopes and species. And also protecting the biological diversity and ecological processes; managing and using coastal and marine resources sustainable; and promoting the development of Integrated Coastal Zone Management, e.g. for coastal lagoons and wetlands.

An ecosystem-based approach is promoted in developing strategies for the management of marine resources of coastal and offshore waters, favouring broader, long-term management practices instead of a short-term, sectoral approach. Common concepts and visions for integrated coastal zone management are being developed.

In 1994, the Baltic Sea States adopted HELCOM Recommendation 15/1 for protection of the coastal strip outside urban areas and existing settlements. The strip is taken to extend at least 100–300 metres from the mean water line, both landward and seaward. Within this strip, permission for actions that permanently change the nature and landscape should only be granted in exceptional cases.

Intensive forestry and farming are to be restricted. A zone of at least three km from the mean water line should be established as a coastal planning zone. In this zone major construction projects must be preceded by a land-use plan, including an environmental impact assessment.

So far, this Recommendation has largely been implemented for the terrestrial parts of the strip, and most countries have established a coastal planning zone (or regard the whole country as a planning zone). Also, most countries in the region implement restrictions on intensive forestry in the coastal strip, whereas various incentives are used to hamper intensive farming in these areas.

Non-Indigenous Species

Non-native species to the Baltic Sea have in several cases caused drastic changes in the aquatic communities and food webs. Until now, however, these changes have so far not occurred among the determinant species of plant communities.

Nevertheless, remarkable changes have been observed in food-webs, where Zebra mussel (*Dreissena polymorpha),* Fishhook waterflea *(Cercopagis pengoi)* and red gilled mud worm (*Marenzelleria viridis),* for example, have taken over ecological niches until recently filled with native species. Therefore the invasion of alien species is a matter of growing concern and stricter control should be taken over ballast water discharges from ships.

Root Causes

Roughly 85 million people live within the drainage area of the Baltic Sea, and in one or the other way they all have an impact on the sea. The Baltic is an industrialised and dynamic region. Large urban areas, industries, agriculture, shipping, ferry traffic and fisheries significantly affect Baltic coastal and marine ecosystems and habitats.

Major cities, as well as ports, airports, loading areas, etc. are located in the coastal zone. The vast majority of the population lives in coastal zones, and pressures on coastal and marine ecosystems are increasing. Tourism in coastal zones is expanding as well, and new infrastructure (marinas, holiday parks, hotels, etc.) is being built to meet these demands.

Activities from the past still affect the environment today. Many river mouth areas along the Swedish coast still suffer the negative impacts of mercury and pentachlorophenol from early industrialisation. Many shallow offshore areas are still suffering from the effects of habitat degradation caused by extraction of stones and boulders to build harbour quays.

Although discharges of nutrients have decreased, even the residual concentrations of nitrogen and phosphorus are high enough to result in eutrophication and algal blooms for decades to come because of the internal loading process under anoxic circumstances.

Several salmon populations have been brought to extinction from loss of habitats, physical obstructions in salmon rivers that hinder adult fish from reaching their spawning grounds, and the impact of fishing.

The majority of activities that are valued in economic and social terms cause biotope change or loss. Most important of these activities are:

- large-scale, industrial agriculture;
  (*meaning land reclamation, intensive use of fertilisers and toxins, changes in land use, decreases in traditional farming)*
- construction of new commercial harbours and hydro construction;
  (involving dredging, dumping of dredged material, increased ship traffic and pollution)
- development of coastal areas for recreational activities;
  (causing habitat degradation

and loss, increased littering and pollution)

- urban and industrial developments;
  (with manifold effects)
- unsustainable fisheries and aquaculture;
  (over fishing, bottom trawling, eutrophication)
- large-scale shipping;
  (including intense ferry traffic)
- road traffic;
  (increased pollution and nutrient load, wear on and fragmentation of habitats)
- mineral, oil and gas extraction and transport;
  (prospecting, mining, dredging and ship accidents)
- industry;
  (pollution from heavy metals, POPs, dioxin, oil)
- unsustainable forestry practices;
  (large-scale clear cutting, leakage of nutrients, plantation forestry, impact on watersheds)
- water regulation;
  (drainage, re-routing, extraction, land reclamation)
- military activities;
  (wear on and disturbance of habitats)
- coastal defence;
  (dyking, stabilisation of sand)
- nuclear industry
  (caesium discharges, heat pollution, transportation of radioactive wastes)

Baltic habitats are threatened by increased mobility and transport infrastructure both on land and on water. Growing traffic increases the risk of accidents, as well as the negative effects of oil spills, pollution and airborne emissions. In addition, motorways in the coastal zone and islands, such as Baltic Bridges and the increasing passenger ferry traffic have negative effects on bird migration (Rügen, Fehmarnbelt).

Growing and uncontrolled tourism in valuable habitats and protected areas is another important threat. A growing issue is the establishment of infrastructure to promote tourism and the resulting disturbance to wildlife and habitats. In densely populated areas a variety of leisure activities are not sustainable channelled. These kinds of issues demand participatory management approaches in combination with awareness-building and lead to precaution and respectful behaviour.

The offshore wind industry is on the threshold of establishing itself as a new major coastal industry. Offshore wind parks contribute to curb global climate change and are therefore welcomed by WWF. However, the uncoordinated establishment of offshore installations can negatively impact marine ecosystems. There is therefore a need for broad and integrated consultations at an early stage of the spatial development process to ensure careful decision-making based on the precautionary principle. For this purpose a comprehensive and integrated spatial planning and decision-making scheme encompassing the territorial waters and the exclusive economic zones of the Baltic Sea States and neighbouring countries is a high priority for WWF.

The Way Forward

The most important conservation activities that we have identified as priorities for future work in the Baltic region are linked to eutrophication, fisheries and toxins. These threats will be considered separately below. Other important actions are:

- establishment and implementation of a network of representative and well managed coastal and marine protected areas (e.g. BSPAs and Natura 2000) in the Baltic Sea
- establishment of the Baltic Sea as a Particularly Sensitive Sea Area (PSSA) under the International Maritime Organization (IMO); influence on the EU Common Agricultural Policy negotiations to include identified priorities for the Baltic Sea Eco-region; influence on the development of EU's marine strategy
- halt infrastructure plans/development and other harmful activities that might lead to severe habitat degradation
- to monitor the development of recreation and tourism

Shipping

The spectre of a severe oil accident in the Baltic Sea is omnipresent. In the case of a serious oil tanker accident, all coasts of the Baltic Sea would be threatened, economic activities could be spoiled for years and the unique and precious nature of the Baltic region irreversibly damaged.

A large number of islands, shipping routes difficult to navigate, slow water exchange and long annual periods of ice cover all make the Baltic Sea particularly sensitive to the effects of international shipping. At the same time the **Baltic Sea has some of the busiest maritime traffic in the world**.

Over the last few decades the maritime traffic in the Baltic has not only increased, but also the nature of the traffic has changed rapidly. One important development is the increase of oil transportation due to new oil terminals in Russia and more and larger tankers.

WWF's goal in the Baltic is to promote sustainable shipping respectful of the sensitive environment of the Baltic Sea. International collaboration is as crucial for environmentally sound shipping as it has been for nature conservation. Establishing the Baltic Sea as a Particularly Sensitive Sea Area (PSSA) under the IMO could be an important step to achieve both environmentally friendly shipping and nature conservation across the region.

A Major Threat to Marine Biodiversity and Human Settlements

The Baltic Sea has always been an important sea transport route. Today it represents a strategic route to transport oil from the large terminals in Estonia, Finland, Latvia, Lithuania and Russia.

Oil transportation has doubled in the past six years and it is expected to increase to up to 160 million tonnes by 2010 as a result of the building of new oil harbours in Primorsk and in Vysotsk (Russia). Apart from oil tankers, chemical tankers, containers and bulk carriers of often more than 100,000 tons sail through the narrow straits of the Baltic Sea, and their lanes are also often crossed by fast passenger ferries and pleasure boats.

The increase in oil and chemical transportation is creating higher risks of an oil accident, especially in those areas with narrow and shallow straits and banks (such as the Sound, the Great Belt, the Kadet Trench between Germany and the Danish Falster, the Baltic Proper and the Gulf of Finland).

In the northern Baltic Sea an annual ice cover makes shipping extremely difficult. Statistics on shipping accidents indicate that winter is the most dangerous time for oil shipping. The most serious danger is caused by ships in poor technical condition, without standardised ice classification or with inadequately trained crews.

The latest serious oil spill in the Baltic Sea was in 2001 when the Bulk Carrier Tern and the tanker Baltic Carrier collided in the Kadet Fairway. Approximately 20,000 seabirds were contaminated.

Further, the case of the Chinese freighter Fu Shan Hai that foundered off Bornholm in Denmark in the beginning of June 2003 illustrates the need for increased control and tougher rules for shipping in the Baltic Sea. More than 1,000 tons of crude oil and 65,000 tons of potassium chloride were spilled when the freighter Fui Shan Hai sank. She was loaded with 1,700 tons of heavy fuel oil and fertiliser from Latvia to China when she was rammed by the container ship Gdynia.This accident demonstrated the risks involved in shipping and transporting dangerous chemicals, even though in this case the cargo was a relatively non-toxic fertiliser.

Environmental Impacts of Shipping and Oil Spills

An oil or chemical accident could have disastrous effects on the vulnerable Baltic Sea, especially on fish spawning areas and breeding and resting areas for birds and marine mammals, such as seals and the endangered harbour porpoise. Thousands of breeding and wintering water birds would be the first victims of an oil spill.

The shallow offshore banks in the southern Baltic Sea are of international significance for several species of wintering sea birds. For example, more than 25% of the European population of long-tailed ducks spend the winter on Hoburgs Bank. Studies have shown that as many as 100,000 long-tailed ducks are affected by oil every year in this area alone due to illegal discharges of oil by vessels that traverse the international shipping lane through the Baltic Sea.

Oil smothering of birds is the greatest threat to bird populations as oil-smothered birds lose their insulation and die of hypothermia or drowning. An oil slick hitting the haul-out areas of seals would be especially catastrophic during the breeding season.

Other harmful environmental impacts caused by international shipping in the Baltic Sea include higher levels of noise, waves, currents and pressure effects. Introduction of exotic species via ballast water is an additional environmental effect of increased oil shipping.

Socio-Economic Impacts of Shipping and Oil Spills

Fisheries, aquaculture, tourism and recreational activities are sectors that rely on a clean and unspoiled Baltic Sea. **An oil slick hitting the beaches** containing summerhouses or hotels **would be a blow to the tourism industry**. An extensive oil pollution of fishing grounds could irreversibly destroy the basis for the Baltic fishing industry.

Statistics on Shipping, Oil Transport and Accidents

According to HELCOM RESPONSE (October 2002) the volume of goods transported on the Baltic sea will roughly double between 1995 and 2017. The general cargo and container traffic will even be three-fold.

Doubling of oil transported on the Baltic sea before 2005 – doubling of risks

In the Gulf of Finland the total number of tanker passages was 34,000 in 2000. The Gulf of Finland is an important route for oil transportation (6,360 oil tankers in 2000) as there are several important oil terminals around the Gulf of Finland in Russia, Estonia and Finland and new ones are under construction or planning.

During the past six years oil transported in the Baltic Sea has doubled to about 40 million tonnes per year. It is expected to double again to 80 million tonnes before 2005.

Without additional measures the risk will increase accordingly. Oil and chemical transportation is expected to increase further to 160 million tonnes by 2010. The risk of a major accident in the Gulf of Finland especially is increased by the passenger traffic crossing between Helsinki and Tallinn.

Increased Number of Oil Accidents in the Baltic

According to HELCOM the total number of ship accidents in the Baltic Sea in 2000 and 2001 reached 119, of which 73 were ship groundings, fortunately only one causing oil pollution. During the same time period there were 19 tanker accidents, 12 of them were single hull tankers and 7 double-hull tankers. One of the double-hull tanker accidents caused oil pollution and three of single-hull vessels, respectively. Altogether nine ship accidents resulted in oil pollution in 2000-2001 (HELCOM).

The HELCOM statistics on ship accidents quite clearly indicate that the highest risk for accidents is in the entrances to ports, the Gulf of Finland and the southwestern Baltic, including the Danish straits. Figure 1 illustrates the sites of ship accidents in the whole Baltic Sea in the years 1989-1999.

WWF and its partners welcome the tougher regulations on shipping recently proposed by the EU Commission in the wake of the Prestige disaster. However, they are not enough to save the Baltic Sea. For this reason WWF with its partners think that the whole Baltic Sea, Belt Sea and Kattegat need the status of a Particularly Sensitive Sea Area (PSSA) with proper additional safety measures to put in practice.

What is a PSSA?

A Particularly Sensitive Sea Area (PSSA) is an area with special protection status developed by the *International Maritime Organization* (IMO) to recognize an area's conservation value and socio-economic significance that may be vulnerable to damage by international maritime activities. IMO decides, on the basis of a proposal from the Member Government/Governments, what protective measures should be adopted and put in place in each PSSA.

Guidelines on designating a PSSA are contained in resolution A.927(22) Guidelines for the Designation of Special Areas under MARPOL73/78 and Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas. The latter includes criteria for areas qualifying for PSSA status. The whole Baltic Sea fulfils all the criteria.

The PSSA concept overlaps with existing networks of different marine protected areas, e.g. BSPAs, Natura 2000 areas, etc. PSSA designation should, however, make a significant difference and provide additional value to the protection of Baltic marine nature. The primary distinction is that a marine protected area is an area of sea identified because of its significance for marine nature conservation, whereas **a PSSA is identified both for its ecological, socio-economic and scientific importance and for its vulnerability to shipping.**

The PSSA status is meant to help avoid accidents, intentional pollution and damage to habitats. As noted, upon request of the countries concerned, the IMO can also decide additional protective measures.

There are a variety of shipping management tools which could be used in PSSAs including ship routing systems (traffic separation schemes, areas to be avoided, no-anchoring areas, inshore traffic zones, deep water routes, precautionary areas, recommended routes), ship reporting systems, Vessel Traffic Service Systems (VTS, and Vessel Traffic Monitoring and Information Systems, VTMIS), discharge and emission restrictions.

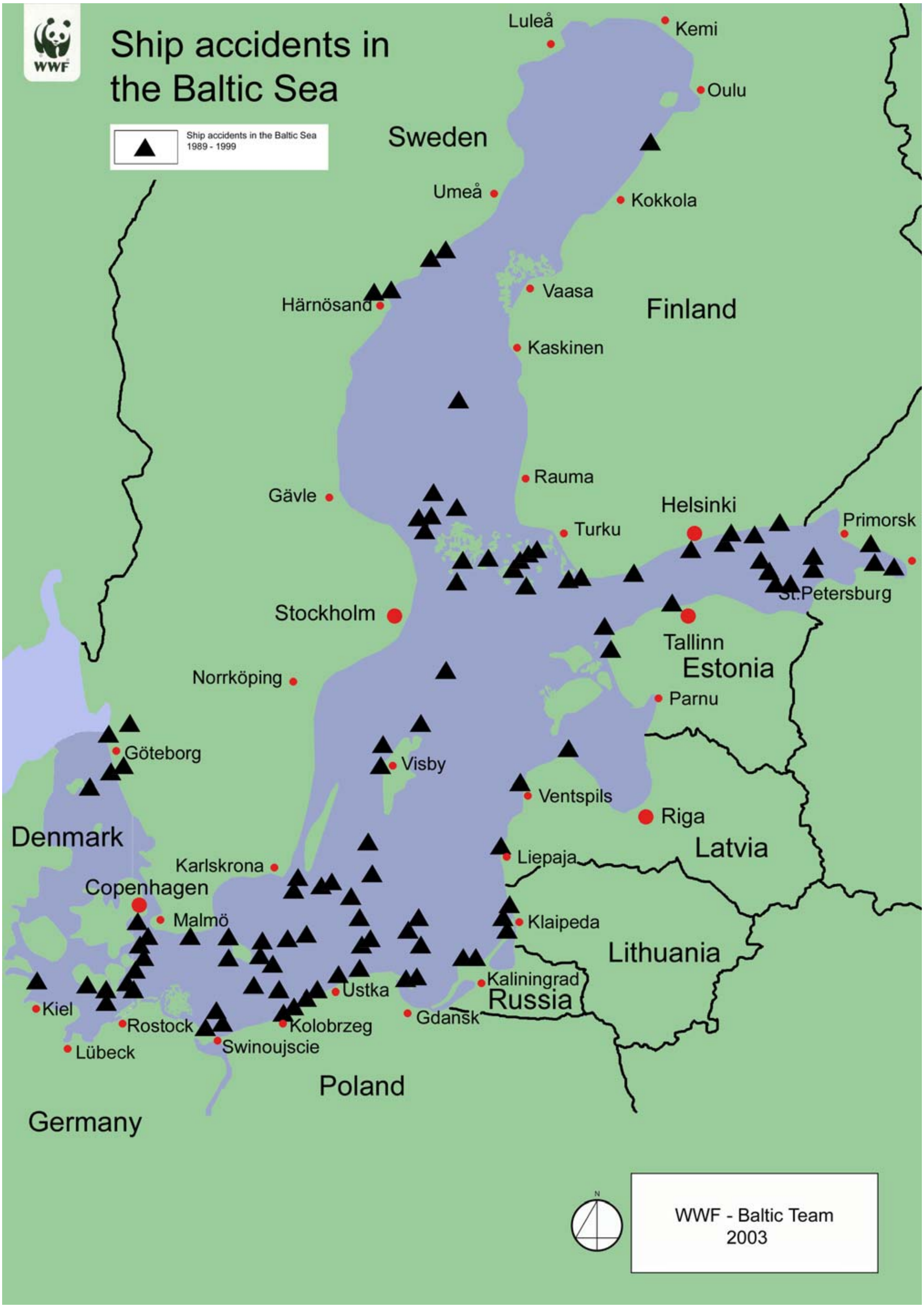

Figure 1. The sites of ship accidents in the Baltic Sea in the years 1989-1999.
(Source: Marine Safety in the Baltic Sea, Report from the Land Parliament of Mecklenburg-Vorpommern (Germany), 2001,Volume 1, page 107 from:HELCOM SEA 2/2001 3.1; 3.01.2001

Further possible measures for PSSAs in territorial seas have to be considered on a case-by-case basis to match the particular circumstances of the area.

Not only does a PSSA regulate shipping activity, it also informs the shipping community – i.e. the mariners – of the sensitivity of certain areas of sea. PSSA status would also increase international recognition for the ecological significance of the area.

The Way Forward

The whole Baltic Sea, Belt Sea and Kattegatt should be designated as a PSSA**.** WWF encourages all the Baltic governments to make a decision to apply for a PSSA designation from IMO for the whole Baltic Sea.

Further, in the Baltic Sea the most sensitive areas should be identified as core areas needing additional protective measures.

Additional Protective Measures Needed for the Core Areas in the Baltic PSSA- Selected Specifically and Individually

Our common goal should be to enable a lasting, sustainable coexistence of shipping and nature in the Baltic Sea. For this reason a Baltic PSSA is one of the WWF Baltic Eco-Region targets, since PSSAs do not simply recognize areas of high ecological importance but also protect places of high socio-economic significance and educational value against harmful effects caused by international shipping.

The map of WWF-prioritized core areas needing additional protective measures in the Baltic Sea is given in Figure 2 and the list of additional protective measures in Table 2. The core areas are described in detail in the WWF report “More Maritime Safety for the Baltic Sea”.

AREA MEASURE	1 Kattegat/ Beltsea	2 Polish coast	3 Lithuanian/ Kaliningrad	4 Latvian Waters	5 Got-land	6 Swedish coast	7 Gulf of Finland	8 Archipelago Sea	9 Quark (be-tween Vasa and Umeå)	10 Kemi Area
Compulsory Pilotage	X	X	X	X	X	X	X	X		
Escort towing	X		X	X		X	X	X		
Traffic separation scheme	X				X	X	X	X		
Compulsory Routing	X				X	X	X	X		
Areas to be avoided	X	X	X		X	X	X	X		
Ice classification							X	X	X	X
Speed reduction	X					X	X	X		
Additional protective measures for the whole Baltic Sea										
VTMIS	X	X	X	X	X	X	X	X	X	X
Common coast guard	X	X	X	X	X	X	X	X	X	X
Ports of refuge	X	X	X	X	X	X	X	X	X	X

Table for Figure 2

WWF´s proposed list of additional protective measures needed (marked with X) in various parts of the Baltic Sea. The numbered areas are illustrated in Fig 2.

WWF has stressed the urgent need to ban all single-hull tankers from entering the Baltic Sea within a few years, i.e. before 2010, as decided by IMO in 2003. In addition, illegal oil discharges should be monitored and all national measures (in territorial waters and in the EEZ) and international measures (international waters) should be extended in the Baltic to tackle this problem which today is worse than reported oil accidents.

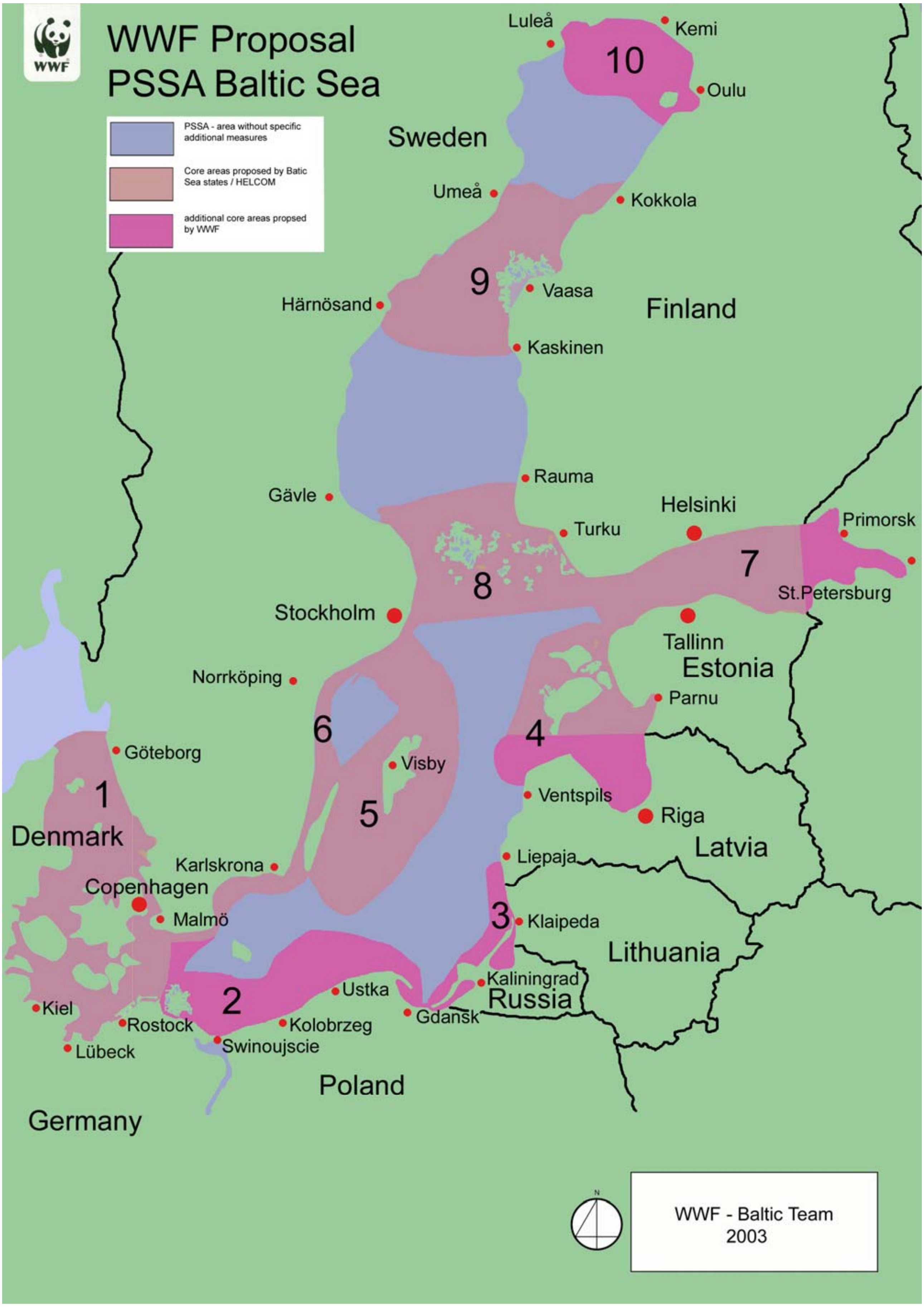

Figure 2. WWF`s proposal concerning the core areas which need additional safety measures in the Baltic Sea PSSA. See also Table for Fig. 2.

Fisheries

Unsustainable fisheries are identified as a root-cause leading to biodiversity loss in the Baltic Sea. Since the Baltic Sea is a semi-enclosed and isolated sea, it is particularly sensitive to human activities. Both the fish stocks and the fishing industry are in crisis and new approaches to subsidies, management and control and enforcement are needed. Fisheries are a complex area both with regard to biology, fishing practices and legislation. Consequently, action has to be taken at various levels.

Natural variations in the environmental conditions and human impacts on the environment have significant effects on fish stocks in the Baltic.

Biological and Geographical Characteristics

The Baltic Sea is a shallow, semi-enclosed sea with several deep basins connected to the North Sea through the Danish Belts and the Sound, Kattegat and Skagerrak. The brackish water of the Baltic flows out at the surface through the Danish Belts and the Sound. Heavy saline water flows as a countercurrent into the deeps, with the result that the Baltic Sea is permanently stratified in its deeper parts, with a saline bottom layer and a less saline surface layer.

The exchange process through the Sound and the Belts is dependent on wind conditions and several years may pass without major inflows of saline and oxygen rich water to the deeper parts of the Baltic. The result is that the saline bottom water in the deeps is stagnant with little renewal for extended periods.

Oxygen is consumed by biological processes in the bottom waters and this process is accelerated by the mineralisation of large amounts of dead organic material e.g. phytoplankton, due to the large inflow of nutrients from the watersheds surrounding the Baltic Sea. The bottom waters are thus depleted in oxygen and, with a longer period without new inflow of saline water, the entire body of saline bottom water may become anoxic. This has occurred for two of the deeps (the Gdansk and the Gotland deeps) and the volume of oxygenated saline bottom water in the third deep, the Bornholm Deep, has been severely reduced.

These conditions severely impact the reproductive success of flatfish, cod, and pelagic stocks in the area, as the volume of the oxygenated water – the spawning volume – often has been the limiting factor for the survival of fish eggs and larvae. Salinity in the Baltic Sea ranges from about two-thirds of oceanic water (in the western Baltic) to nearly fresh water in the Gulf of Bothnia.

This has a major influence on fish stocks. **Marine species, such as cod, herring and sprat are most commonly found in the south-western and central waters. In the north freshwater species such as pike and perch are prevalent** (although salmon and Baltic herring are also economically important). Salmon is an important stock in economic terms for the whole Baltic area and a number of flatfish stocks, i.e. flounder and plaice, are also found in southern Baltic waters. In the northern part of the Baltic, species such as vendice, sea- and river-spawning powan and sea-spawning grayling are found.

Fishing Activities

Commercially, the most important stocks in the Baltic Sea are cod, herring, sprat and salmon. There are also catches in commercial quantities of various flatfishes (flounder, plaice, turbot, dab and brill) and sea trout. Freshwater species (pike and perch) are important in coastal fisheries in the central and northern Baltic. There are commercial eel fisheries in the Southern Baltic (Sweden, Denmark and Poland).

The main fishing for cod in the Baltic is carried out with demersal trawls; high-opening trawls (operating both pelagically and demersally) and gillnets. There has been an increase in gillnet fishing in the 1990s. The share of the cod catch taken by gillnets, for example, has been more than 40% in recent years. Cod in the Baltic belong to two separate populations, the Western and the Eastern, and are managed separately with total allowable catches (TAC) set for each stock. Baltic herring are exploited mainly by pelagic trawls, demersal trawls and, during the spawning season, by trap nets/pound-nets in coastal areas. The main sprat catch is taken by pelagic pair trawling.

Both herring and sprat are used mainly for human consumption when landed in the countries on the eastern Baltic coasts, but for production of fishmeal, oil and mink feed in the countries on the western coasts. The landings of sprat for industrial purposes have increased markedly during the past few years.

Salmon are caught both for recreational and commercial purposes. While feeding in the sea salmon are caught by drift nets and long lines. During the spawning run they are caught along the coast, mainly in trap nets and fixed gillnets.

Even though driftnet fishing has been banned in all EU waters, a rule of exception allows this technique to be used for salmon fishing in the Baltic Sea. Because this technique has a significant level of bycatch, it is highly questionable that this technique can be regarded as sustainable. **WWF wants driftnet fishing to be phased out in the Baltic Sea as soon as possible**.

Fishing for industrial purposes, i.e. for non-human consumption, is a subject of controversy. From the point of view of biology and multispecies balance, the International Council for the Exploration of the Sea (ICES) argues that it is important to harvest herring and sprat in order to allow the cod stock to develop.

The explanation is to be found in an understanding of the interplay between the various species. The two pelagic species feed on cod eggs but form prey for grown cod. When the stock herring and sprat stock are too high, there is no room for the cod stock to develop. On the other hand, the natural mortality of the two species is low due to the low level of the cod stock. For the time being, ICES regards fishing for herring and sprat as a means to help the cod stock to flourish.

Status of Stocks

After an increase in the cod stock in the Eastern Baltic Sea due to huge saline water inflow and an expansion in the fisheries in the 1970s and early 1980s, the stock declined dramatically from 1985 to 1992. The fleet capacity and fishing efforts have now been reduced to some extent, but fishing mortality has increased because the stocks declined more than the decline in the fleet capacity. In the early 1990s there was a temporary increase in the spawning stock biomass of the Western Baltic cod stock. This was partly due to improved recruitment but was primarily a result of intensified regulation of fishing effort. After a slight increase in 1994-95, due to the 1993 saline water inflow, the spawning stock of the Eastern Baltic cod decreased again in 1996-1998 to an almost historically low level. The last ten-year's stock has been below the long-term average. So a recovery of the stock can hardly be expected under the present exploitation pattern and tendency for fishing mortality to increase. In the Western Baltic, the most recent assessments have shown that the spawning stock biomass is declining and the fishing mortality is increasing to previous high levels.

ICES therefore recommend the adoption of a precautionary approach, including reductions in fishing effort, if the Eastern stock is to recover on a more permanent basis. This has resulted in a recommended TAC of 0 for Eastern cod in both 2002 and 2003. **It is the second time within recent years that a fishing moratorium on Baltic Sea cod has been suggested**.

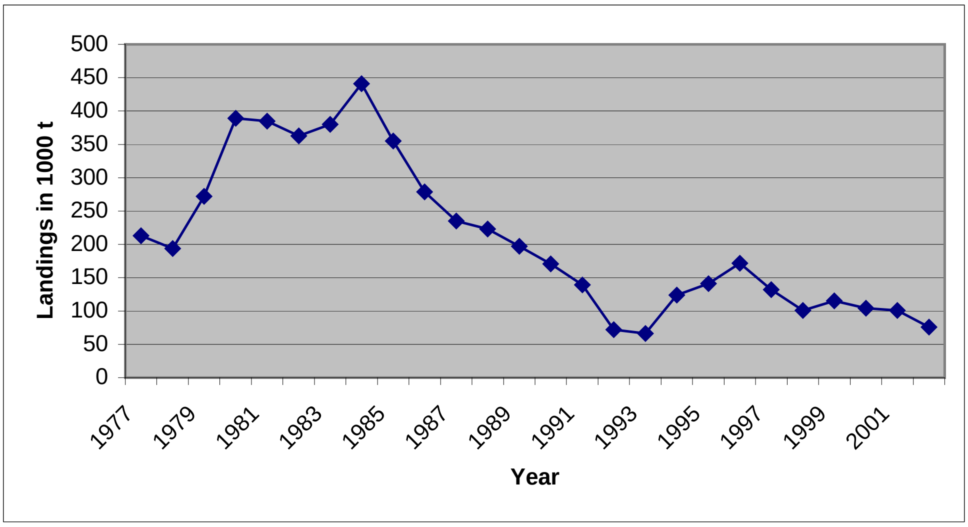

Figure 3: Cod catches in the Baltic since 1977 (ICES 2002a)
Note: The figure given for 2002 is the fishing quota set for this species.

According to ICES the fishing pressure for sprat is stable and is harvested inside the safe biological limits. Due to the decreasing spawning stock bio-mass and increase in fishing mortality on herring in the central Baltic, herring in this area is considered to be outside the safe biological limits.

Because the dioxin content of Baltic herring is above the level considered by EU standards to be safe for human consumption, Finland and Sweden have pleaded for national exemptions under which they are allowed to sell Baltic herring catches to each other and to non-EU countries until the end of 2006 when the dioxin contents in fish will be re-assessed.

Recent research indicates that the Baltic Sea herring is smaller in size today and that the reason is decreasing salinity due to increase in rainfall in the drainage basin. Decreased salinity affects the productivity in the food chain (e.g. altered zoo-plankton communities) and there seems to be a shortage of food for the herring.

The overall complex of wild salmon stock is considered to be outside safe biological limits. There are only 30-40 rivers in the Baltic areas that produce wild salmon smolt. It is estimated that only 10 to 15 percent of smolt production is from wild stock. Since these rivers are the foundations for the long-term recovery of the wild salmon stock, it is of vital importance that their productivity is secured and protected.

Salmon fisheries are supposed to target only reared and released stock. But, because it is impossible to separate wild and reared salmon in offshore fisheries, it should only be permitted to exploit reared fish during the homing migration when salmon approach their release sites near rivers that do not support wild salmon populations.

To save the wild salmon, fishing should only be allowed close to releasing sites (river mouths and rivers) where reared fish migrate and leave wild salmon stocks untouched.

The Baltic salmon action plan, as adopted by IBSFC (International Baltic Sea Fisheries Commission) in 1997, seems to have had some success, as ICES has measured an increase in smolt production in many rivers.

Photo: V. Buzun

Socio-economic Factors

Fish are a naturally renewable resource that feeds us, provides employment opportunities and the locus for cultural patterns and habitations in the Baltic Sea Region. As such it is part of our common heritage.

For many communities around the Baltic Sea, the fishing industry has the potential to continue to be a significant ingredient in the local and regional economy, both as livelihood for inhabitants and also as the basis for general socio-economic development. Additionally, fisheries provide inhabitants and communities with identity and provide remote areas with scenic value.

The severe decline in fish abundance has multiple consequences for local communities. Vessels and industries tend to concentrate in a few large ports outside the Baltic Sea region, where catch options are more diverse and stable. Therefore, a large proportion of the Baltic Sea fish is caught by vessels registered in ports in the North Sea and Kattegat region, resulting in the industries' growing detachment from local economies.

The fish stock is the immediate resource base of fisheries. The productivity of the stock is dependent on the surrounding marine ecosystem and the ecosystem can, therefore, be considered the resource base in a wider sense. Fisheries pursue the resource and are characterised by two features:

- Fisheries rely on natural processes in aquatic ecosystems that develop without any inducement or control by humans. The resource base is thus limited by natural production processes and subject to the natural variability of the resource system.
- The resource basis for fisheries is a common property. Extraction rights for the Baltic Sea resources are divided between the nine States. Since the catch capacity in the region's fisheries carries the risk of over fishing, a great responsibility rests on the management authorities. Thus, in order to secure long-term sustainability in fisheries, it is important to use the precautionary principle, i.e. only resource surplus is harvested.

Fisheries and Sustainability

It is a major challenge to secure both an ecologically and socio-economically sustainable futures for fisheries. Management is a complex field, where many interests and processes are at stake. Thus, a number of interdependent aspects need to be considered:

The resource perspective

where the reproductive capacity of the fish stock is the core issue

The ecosystem perspective

where the continued functioning of the ecosystem as a productive and healthy environment is at stake

The production chain perspective

including impacts due to the generation of pollution and waste in the production process

The socio-economic perspective

where the consequences of over capacity in fisheries are the focus.

There is widespread agreement that international co-operation and enforcement is needed to ensure the sustainable use of the fish resource. Regretfully the existing regulatory framework has contributed with the opposite effect, becoming the root cause of the degradation. Fish stocks are at a historically low level, some stocks even on the verge of collapse. Consequently the employment rate in the fisheries sector is declining.

Fishing activities play a significant role in influencing the balance of the marine ecosystem. With a low abundance of cod, the stocks of herring and sprat will naturally increase. Fisheries also have an unintended impact on the ecosystem. By catch of non-target species – seals, harbour porpoise and birds – is a problem of somewhat unknown proportions.

Fisheries also have an impact on the wider marine environment. Heavy fishing gear is a threat to the seabed environment, in particular areas of seagrass, sandbanks and stone settings. Sustainable fishing is possible but the stocks also need an environment that supports and sustains regeneration.

Fisheries management in the Baltic Sea is the responsibility of the International Baltic Sea Fisheries Commission (IBSFC). On the basis of the recommendations of ICES, total allowable catches (TAC) are adopted and quotas are agreed upon. The accuracy of the various ICES assessments can be questioned, due to a lack of data, and improved scientific advice is required.

Fisheries advice would benefit from a more interdisciplinary and focused approach from both the EU and ICES itself. It is expected that EU in the future will demand advice from other scientific disciplines than marine biology, i.e. economic and socio-economic experts. The European Commission's recommendation for the introduction of Regional Advisory Committees (RAC) is an expression of an interest in enhanced co-operation with stakeholders of different kinds.

It is presumed that Illegal, Unregulated and Unreported fishing (IUU) is a significant problem throughout the region. Especially in Russia and the EU accession countries the level of fisheries control and enforcement is uncertain. It is therefore not clear whether management measures adopted by IBSFC are followed equally by all Baltic Sea states.

National governments and the fishing industries are reluctant to establish adequate infrastructures for control, data collection and fisheries science. Insufficient data is fed into scientific models and reduce the value of the analyses. Accordingly, defective scientific advice is provided to managers, reflecting the quality of the data. In a situation of flawed, false and missing data, the precautionary principle becomes even more important. Thus, the scientific models prompt managers to apply restrictive TAC recommendations in order to protect the stocks.

Regarding the protection of marine habitat, the Natura 2000 process and Emerald network, the EU Habitats Directive and HELCOM designation of Baltic Sea Protected Areas (BSPA) provide an interesting path for future protection of marine habitat. The value of seasonal closures, as means of protecting spawning species, has to some extent been recognised by management authorities.

The three Baltic Sea deeps are recognised as spawning and nursery areas for cod. However, only one is protected by seasonal closure. Areas rich in pelagic species, which provide important feeding areas for cod, have not yet been subject to protection. A network of protected areas based on an understanding of breeding and feeding habits of certain species would increase the likelihood of stock recovery. Furthermore, the errors in scientific prediction and 'spill-over' effect on protected areas are arguments for establishing no-take zones.

Applying the framework adopted at the Intermediate Ministerial Meeting of the North Sea Conference in Esbjerg 1997 (Bergen 2002), the main objectives for fisheries and environmental protection, conservation and management measures for the Baltic Sea would be:

- to ensure sustainable, sound and healthy ecosystems in the Baltic Sea, thereby restoring and/or maintaining their characteristic structure and functioning, productivity and biological diversity
- to achieve sustainable exploitation of the living marine resources, thereby securing a high yield of quality food
- to ensure long term economically viable fisheries
- to establish no take zones.

In order to reduce the unintended consequences of fishing, the International Baltic Sea Fisheries Commission (IBSFC) has over the last years introduced several management measures.

First, multi-annual management plans have been adopted for four commercially important species. The management plans are based on the recommendations of ICES and developed with strong regard to the precautionary principle. The plans run for 10 years to allow stocks to recover and fishermen to anticipate minimum catches for the future.

Second, all IBSFC contracting parties have committed themselves to adopt the bacoma window – a sorting grid that improves selectivity – in demersal trawl fisheries during 2003.

The protection of the Baltic harbour porpoise has been addressed both by HELCOM and by ASCOBANS (Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas), a regional agreement under the Convention on Migratory Species (CMS). After many years of negotiations, ASCOBANS finalised what is know as the Jarstania plan, which was endorsed in 2003. The Jarstania plan is a recovery program for the Baltic harbour porpoise building on mitigation measures and science. The European Commission has also tabled a proposal to minimise the unsustainable impact fisheries have on small cetaceans through incidental catches.

The Way Forward

To achieve sustainability in Baltic Sea fisheries a range of activities are needed. Subsidies leading to over-fishing are a primary threat and must be reoriented in order to promote sustainable fishing. Secondly, consumer awareness must be aroused. New partnerships are needed to promote certification schemes attesting to the sustainability of catches. Thirdly, it is necessary to establish no-take zones and marine protected areas, both to conserve marine habitats and to protect juvenile fish, birds and sea mammals. Finally, all these activities will be in vain if they are vitiated by illegal activities. Therefore, new and strengthened legislation and enforcement are very important.

Eutrophication

Total nutrient input to the Baltic has doubled during past decades. Eutrophication is therefore one of the most serious problems of the Baltic Sea. It has increased the primary production of algae. From time to time it leads to large-scale toxic algae blooms and oxygen deficiency over large areas, not only deep bottoms but also in shallow areas.

Agriculture is by far the largest source of nitrogen, and also a significant source of phosphorus. Other main sources are airborne pollutants (transport, heating, industry) and untreated wastewater/inadequate treatment from point sources (e.g. industry and towns) as well as dispersed settlements and single households in rural regions.

At the beginning of the last century and into the 1950s, the Baltic was an oligotrophic sea, with low nutrient levels and high water-transparency. Thereafter the change to a eutrophied sea has been rapid. The reason for this change is the increase of nutrients being deposited to the sea both from aquatic runoff and discharges from the atmosphere.

There are two main nutrients causing eutrophication, nitrogen (N) and phosphorus (P). They are deposited to the sea in several different ways. In 2000, about 660,000 tonnes of nitrogen and 28,000 tonnes of phosphorus entered the Baltic Sea via rivers (an increase of four and eight times respectively). **Four large rivers – the Neva, Nemunas, Vistula, and Oder – together accounted for the majority of the nutrient loads entering the Baltic Sea**. More than half of the total waterborne phosphorus load and nearly one-third of the total waterborne nitrogen load originated from Poland. Although a decline in the nutrient loading has been observed in recent years, little change in eutrophic effects has been recorded in the Baltic Sea.

Since the 1970s the problem of eutrophication in the Baltic Sea has received extensive attention from scientists and the mass media. Signs of increasing algae biomass and anoxic bottoms were detected. It was concluded that these changes in the marine environment were mostly anthropogenic, i.e. caused by human activities. Major investments have been made in modern WasteWater Treatment Plants (WWTPs) all around the Baltic Sea. The major problem now is to address the non-point sources such as **agriculture, traffic and single sewage systems, which are some of the most important sources causing eutrophication.**

Ecological Effects of Eutrophication

The imbalance caused by nutrients and their abundance has led to numerous changes in the ecological composition and state of the Baltic Sea. Certain plants and animals thrive, enabling them to increase in number and geographic spread, frequently at the expense of other species. Some of the negative effects of the nutrient overload of the past century include:

- excessive growth of plants and algae – there has been an increase in primary production by 30-70%. Annuals such as green and brown filamentous algae have grown at the expense of the perennial bladder wrack, which in turn has had severe impacts on the littoral ecosystem

- algal blooms, some of them even toxic, are a frequent phenomenon in the Baltic every summer
- a decrease in water transparency by 2.5-3 metres as a result of the increase in biomass of phytoplankton and zooplankton
- an increase in zooplankton by 25%
- an increase of particle flow to the bottom from dead organic material ranging from 70 to 190%
- anoxic bottoms accounting for one-third because the level of decomposition that consumes oxygen and the long intervals between inflows of saline water from the North Sea. Anoxis leads to leakage of nutrients from sediments ("internal loading"), enhancing eutrophication
- changes in composition of fish species in coastal waters and lagoons. Economically less valuable freshwater fish species are thriving
- a decrease in numbers and spread of predatory fish, such as pike, in coastal waters.

Socio-Economic Factors

Five reasons can be identified as the primary causes:

- runoff from agriculture
- untreated wastewater / inadequate treatment from point sources (e.g. industry and towns) as well dispersed settlements and single households in rural regions
- runoff from forests (not analysed here)
- airborne pollutants (transport (traffic and shipping), heating, industry)
- loss of ecological functions.

Agriculture increases nutrients in the environment directly by runoff and drainage from fields, indirectly by emissions to the air of ammonia from fertilisers, manure and farm animals and nitrogen oxides from farm machinery. Agriculture is by far the largest source of nitrogen and a significant source of phosphorus.

Root causes for the excessive use of nutrients are subsidies and the pricing system for agricultural products that include in the calculations the environmental impacts of agricultural practices. In addition, farmers lack knowledge of the complexities of environmental impacts and of how modern agricultural practices directly influence the environment. The motivation for farmers to keep track of nutrients, as well as to minimise their use is not strong enough and too often the application of best agricultural practices is not considered.

Municipal sewage is both a considerable source of nitrogen and the single largest source of phosphorus. Large cities such as Kaliningrad, St. Petersburg and Warsaw still have insufficient wastewater treatment due to lack of prioritisation and investments.

Airborne pollution from transport and industry is the second largest source of nitrogen in the form of oxides. Nitrogen oxides are produced during combustion. More than half of the emissions in Europe is produced by traffic. Most of the rest comes from combustion plants.

Oxides of nitrogen can be carried long distances – thousands of kilometres – by the air.

The distance between source and impact contributes to the complexity of the problem and international co-operation to reduce pollutants is needed. Countries in EU have decided to reduce the levels of nitrogen oxides according to different targets set up in the EU directive on national emission ceilings. This will lead to a 40 percent reduction of nitrogen oxides in Europe by the year 2010 compared with 1990 levels if all countries fulfil their commitments.

Combustion plants and most types of vehicles can be equipped with technology that can remove emissions. To reduce emissions quickly calls for investments in this type of technology. But to be able to reduce emissions to levels that nature and people can tolerate without making major financial or material sacrifices, the use of structural measures to use energy more efficiently and substitute for nitrogen-emitting fossil fuels is also necessary.

The loss of ecological functions – the nutrient retention capacity of wetlands, floodplains, coastal lagoons and free-flowing rivers – has added substantially to the euthrophication problem. Up to 90% of wetlands in the southern part of the Baltic Sea Region have been drained over the past century. State support for drainage and polderisation, regulation of rivers and construction, for example of dams, have been the key reasons for loss of these natural features. The changes have been driven by demands for additional land for farming, protection from flooding and a growing demand for electricity. The lack of market or regulatory mechanisms for assigning value to wetland functions is a major root cause for the loss of ecological functions.

Limiting the Negative Impacts of Eutrophication

Efforts have been made to limit the production of algae and reverse the development of a eutrophied Baltic. **The countries surrounding the Baltic agreed in 1987 to reduce the nutrient flow by 50%. However, only a 30% reduction has been achieved**. There is also a debate on which nutrient it is most important to limit in the marine environments. Therefore there is no clear consensus on which measures should be undertaken.

If only nitrogen is reduced, there will be a high level of phosphorus, which under the appropriate weather conditions can lead to massive blooms of blue-greens i.e. cyanobacteria, due to ability of blue-greens to bind atmospheric nitrogen. If only phosphorus is reduced, algal blooms will still remain a problem.

However most scientists seem to agree that both nutrients have to be limited to achieve a balance in the Baltic. Also, since the sea is of such a diverse composition in different parts of the basin with variations in salinity, oxygen levels, levels of nutrients, species etc., it is suggested that different measures might have to be taken in different parts of the Baltic Sea.

Even though there has been a reduction of the nutrient load to the Baltic by 30%, no change in the levels of nutrient in the sea has been recorded. The Baltic still experiences summers with massive algae growth and turbid water. One explanation is that the system reacts slowly due to the large internal stores of nutrients.

The Baltic is feeding itself with phosphorus coming from the sediments under anoxic conditions/circumstances and nitrogen through (from) cyanobacteria. For example, in the Gulf of Finland researchers have discovered hundreds of km^2 of sea bottom to be anoxic every summer. Also, the residence time for nitrogen and phosphorus is 13 and 6 years respectively, and it will be many years until a change will be noticeable.

The Way Forward

The target we aim for is that eutrophication should not threaten biodiversity and ecological functions in the Baltic Sea. To reach the target we need to act to reduce diffuse nutrient loading from agriculture and airborne nutrients and also from point sources such as sewage water. In many areas a commitment from countries to reduce nutrient loading already exists but there is lack of enforcement and supervision that the rules are obeyed. Developing a clear position and lobbying during the upcoming CAP reform can provide a good opportunity to apply the necessary changes.

Fresh Water - the Link Between Land and Sea

The Baltic Sea is more affected by the fresh water inflow than other, open seas. In fact, the whole catchment area is of importance in understanding the ecological processes and environmental problems in the sea itself. All human activities in the catchment area will to some extent affect the fresh water, which will in turn have an impact on the Baltic Sea. There are several land-freshwater-sea interactions. Fresh water may be regarded as the link between land and sea.

A Catchment Area Perspective

There are two main reasons why the Baltic Sea is very influenced by fresh water:

- the terrestrial part of the catchment area is relatively large compared to the Baltic Sea itself *(approximately 4.5 times larger than the sea with almost 90 million inhabitants)*
- the water retention time of the sea is very long *(approximately 30 years)*

Topography determines structure and the distribution of water. In areas with great topographic variation there are many lakes. In the Baltic Sea catchment area, especially in Finland, Sweden and northern Poland, we find the majority of European lakes and streams. The distribution of wetlands is also governed by topography, although precipitation is another important factor.

Topography also governs the flow of water – slopes speed it up and flatter areas make it move more slowly. The flow of water affects species composition and ecological processes. Salmon (*Salmo salar*) and brown trout (*Salmo trutta*) both require fast-flowing water, while pike (*Esox lucius*) and roach (*Rutilus rutilus)* prefer slow-flowing water.

Vegetation types are important for the ecological dynamics of the catchment area. Forest covers about 50% of the whole catchment area. In the Gulf of Bothnia sub catchment area, forests are totally dominant. The proportion of agricultural land increases southwards. It is the primary land use in Germany, Poland, Kaliningrad and Lithuania.

The dynamics of hydrology (for example recurrent flooding) create characteristic biotopes with a high biodiversity with vegetation types varying from grassland to swamp forest. The riparian area, i.e. zone along the water's edge, is more species-rich than the surrounding landscape, just like any transition zone between different biotopes.

From a European perspective, its boreal running waters, the mires and the large proportion of relatively unaffected freshwater ecosystems are of special interest.

Freshwaters connect different biotopes and function as natural corridors in the landscape, facilitating the movements of plants and animals. Insects fly upstream to lay their eggs or float downstream, as do seeds. Above water, bats hunt for insects and birds use the waterways for guidance during migration. Many organisms spend one part of their lives in freshwater and another in the sea. Salmon (*Salmo salar*) and brown trout (*Salmo trutta*), for example, spend most of their life in the sea but migrate up river to reproduce.

The catchment area of the Baltic Sea comprises several biogeographical zones and therefore includes a wide range of biotopes and species. Fresh water contributes to a high number of species. Lakes and rivers in the region are home to around 70 species of fish. Many Red-Listed species are also found, including ringed seal (*Phoca hispida saimensis, P. h. ladogensis*), sterlet (*Acipenser ruthenus*), and noble crayfish (*Astacus astacus*). The boreal streams host a large part of the European population of freshwater pearl mussel (*Margaritifera margaritifera*), which means that the Baltic catchment is a core area of the world for this vulnerable species. This mussel depends on salmon or brown trout as host for its larvae.

Streams and rivers supply the Baltic Sea with several essential substances. Water is an excellent solvent. Bedrock, soil type and land use will change its characteristics – and in that way the water will mirror the ground it is travelling through. Water also transports dissolved nutrients, organic and inorganic material. But not everything is brought to sea. On its way through the landscape, in lakes and wetlands sedimentation takes place, nutrients are taken up by plants and nitrate is converted into nitrogen gas (denitrification) that results in clearer water with lower nutrient levels. The purification capacity of the different sub catchments is related the occurrence of lakes, wetlands and slow-floating streams.

The Importance of Freshwaters for the Baltic Sea –An Overview

Baltic freshwaters affect the Sea in many ways, including by:

- bringing to the sea nutrients such as nitrogen, phosphorus, and silica, determining primary production in the seawater
- supporting the sea with particles, especially important for the dynamics of the estuaries
- creating estuaries, i.e. the transition zone between freshwater and salt water, which are important bird feeding and nesting areas
- producing salmon and brown trout smolt, thereby determining the population of these species in the sea
- trapping excessive amounts of nutrients and particles.

However, during the last centuries, human activities have affected freshwaters and consequently the Baltic Sea itself.


Photo: A. Frenkel

Human Impact on Freshwaters

The water systems have been modified to suit our use of soil and water resources. Many of these changes have had a negative impact on freshwaters as well as terrestrial ecosystems, and ultimately on the state of the Baltic Sea. Today, few pristine water bodies are left, most of them in forested areas. Human impact can be divided into physical impact, chemical impact and biological impact:

Physical impact	Chemical impact	Biological impact
Lake drainage	Point sources	Introduction of non-nature species
Drainage of agriculture and forest land	Sewage treatment plants	Fishing
Water regulation	Single households	Pests
Dam construction	Farms	
Channelisation	Urban storm water	
Land fill	Non-point sources	
	Leakage from agriculture and forest land	
	Atmospheric deposition	

For the Baltic Sea the physical and chemical impacts are most important.

Changes of the Landscape and Water Bodies

The physical changes of greatest importance for the Baltic Sea are:

- elimination of wetlands and lakes
- altered morphology of streams *(e.g.. creation of canals)*
- fragmentation of rivers and streams

The elimination of wetlands decreases the retention capacity of the hydrological system. In areas with intense agriculture, more than 90% of the wetlands have been drained. This has led to changes in patterns of transportation of nutrients and organic and inorganic matter. There is also an increasing risk of flooding. Recent Swedish studies have indicated that the loss of nutrients from agricultural land to the water in the past was as high as today but the discharge to the sea is now greater. The possible explanation is that the natural retention has decreased due to the elimination or alteration of freshwater and other landscapes.

Further, the changed morphology not only affects retention capacity but also leads to impaired biotopes for organisms like fish. Some alterations have been carried out to facilitate log-driving and shipping.

The fragmentation of rivers has led to decreased connectivity. Dams for hydropower stations, old mills and road culverts create obstacles that prevent migration to spawning parts of the streams. Salmon, brown trout and European eel (*Anguilla anguilla*) have suffered badly. The negative effects are reinforced by regulation of the water. At one time almost 100 rivers around the Baltic Sea held wild salmon populations but today only 38 wild populations exist. The hydropower sector has radically changed river ecosystems and affected the biology of the sea.

Pollution

The chemical pollution includes eutrophication and toxics, which affect the freshwater ecosystems and eventually the Baltic Sea itself. Point sources such as industries, farms, and single households contain toxic substances, nutrients and organic matter. The most important non-point source in large parts of the catchment is agriculture. The agricultural sector is also a great source of nutrients (fertilisers) and pesticides. However, in the northern part of the catchment area many nutrients also originate from forestland and forestry.

High nutrient levels cause eutrophication (see previous section 4.4), which results in high primary production. When organic matter is broken down, the oxygen in the water is consumed. This may lead to oxygen depletion and the death of fish and other organisms. An even more serious problem is the discharge of toxic substances (see section 4.7). Heavy metals, for example, cannot be broken down and are taken up by animals through their food.

Air pollution has caused acidification – another large-scale problem. In Sweden, for example approx. 20,000 lakes and thousands of kilometres of streams are affected by acidification to a degree where biological damage occurs.

The Way Forward

In order to decrease/minimise human impacts on freshwater ecosystems and the Baltic Sea, we need to act now. The measures required can be incorporated into a strategy with five components:

- Holistic planning, taking the whole landscape (catchment area) into consideration. The EU Water Framework Directive will be an important tool when it is implemented
- Protection of freshwater ecosystem. The Ramsar Convention and Natura 2000 network are examples of tools available for freshwater conservation
- Restoration of ecological processes, by restoring biotopes such as wetlands, natural water dynamics (hydrology), elimination of obstacles to migration
- Measures to protect freshwaters in agricultural practices as well as in forestry, for example buffer zones along streams
- Utilisation of environmentally friendly techniques in industrial processing and production and decreased use of pesticides in the agricultural sector
- Improved treatment of sewage water from communities, industries and single households

Toxics

Toxics reduction is one of the fundamental parameters of a healthy Baltic ecosystem. Due to the specifically high sensitivity of the Baltic Sea, with respect to the low age of the ecosystem with its limited number of species, the low water exchange (30 years) and temperatures as well as the low degradation rate compared to the high size of the human population in the catchment area, there are serious concerns about the level of contamination of key species (seals, white-tailed eagle) and evidence of toxic effects in biota.

Inadequate safety standards, poor data availability with regard to the actual toxics situation, lack of public awareness and of access to information as well as old fashioned management and decision-making traditions in the private sector (industry and agriculture) demand that the toxics issue in the Baltic is dealt with as a priority area.

The Toxics Issue

"There are approximately 100,000 chemical substances registered in the EU and on a daily basis citizens are exposed to hundreds or thousands of them. We inhale them, eat them and drink them all the time, like a cocktail. Except we do not know what is in it. Concerning effects on human health, a study from the OECD of the 1500 most common substances shows that only a minor part had been adequately examined and ten percent had not been examined at all. When it came to effects on the environment, virtually none of them had been thoroughly examined." – The International Chemical Secretariat.[3]

Because of the permanent and serious impact of toxics in the Baltic Sea, WWF's work on toxics targets chemical substances that are persistent in the environment, liable to bioaccumulate (stay in the fat in our bodies), and substances which are very toxic and/or can interfere with the endocrine system of organisms. Such substances are of very high concern since effects may occur with a long delay in time (including future generations).

Once such effects become visible they are practically irreversible and eliminating releases will not prevent further effects. Persistent chemicals can travel a long distance via the atmosphere or water currents and accumulate in biota, including humans, far away from the source of pollution. Substances that interfere with the endocrine system can cause effects at very low concentrations and a safe dose is often unpredictable.

Chemicals with endocrine properties have been shown to cause many adverse effects in animals, ranging from effects on reproduction and brain development, to structural deformities, immune system deficits and cancer. Numerous wildlife species, including mammals, birds, fish, reptiles, and mollusc have been already affected[4].

Due to slight differences in definition and criteria to determine the substances of concern, the number of

[3] http://www.chemsec.org/cocktail.htm
[4] CSTEE 1999

current (potential[5]) target substances varies between 12 (Stockholm Convention), 125 (EU PBT screening) and close to 400 (OSPAR and HELCOM)[6]

Overall Goal

The concentration of hazardous substance in the marine environment needs to be close to zero for synthetic substances and near-background concentration for naturally occurring substances. Meeting this goal in the long term is one of the prerequisites to prevent (further) losses in biodiversity, since an acceptable dose of these substances above natural background cannot be established with a sufficient level of certainty. WWF shares these objectives with the governments that are contracting parties under the Stockholm Convention (the POPs treaty), HELCOM and the EU.

The release of persistent and bioaccumulative substances (including POPs[7]) and endocrine-disrupting substances[8] into the natural environment of the Baltic Eco-region must come to an end within one generation (2020 by the latest). Informed decision-making on production and use of chemicals in all groups of stakeholders is a key requisite for this to take place

[5] The EU and the OSPAR lists are set up based on screening level information, hence the substances on these lists are candidate substances.

[6] In the terminology of the conventions for the protection of the marine environments (OSPAR, BARCOM, HELCOM) substances owing such properties as described above are called “hazardous”. In the terminology of the UN Environment Programme they are “Persistent Organic Pollutants” (Stockholm Convention 2001).See also the next note. Under the EU Water Framework Directive this type of substance is called a “priority hazardous substance”. In the context of the debate on a future chemicals policy in Europe and the EU risk assessment, persistent, bioaacumulative and toxic substances (PBTs) and very persistent and very bioaccumulative (vPvB) substancesare regarded as being of very high concern.

[7] Persistent Organic Pollutants (POPs) are toxic substances composed of organic (carbon-based) chemical compounds and mixtures. They include industrial chemicals such as PCBs and pesticides such as DDT. They are primarily products and by-products from industrial processes, chemical manufacturing and resulting wastes. The existence of POPs is relatively recent, dating to the boom in industrial production after World War II. POPs pose a particular hazard because of four characteristics: they are toxic; they are persistent, resisting normal processes that break down contaminants; they accumulate in the body fat of people, marine mammals, and other animals and are passed from mother to fetus; and they can travel great distances on wind and water currents.

[8] Endocrine Disrupting Chemicals (EDCs) are synthetic chemicals that interfere with naturally produced hormones, the body's chemical messengers, that control how an organism develops and functions. Many manufactured chemicals mimic natural hormones and send false messages. Other synthetic compounds block the messages and prevent true messages from getting through. Some cause disruption by preventing the synthesis of the body's own hormones or by accelerating their breakdown and excretion. Some EDCs are persistent in the environment and bioaccumulate; they accumulate in the fatty tissue of organisms and increase in concentration as they move up through the food web.

The following principles need to be applied[9]

The precautionary principle:

In 1992, the United Nations adopted the following definition of the principle: “where there are threats of serious or irreversible damage to the environment, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation”.

The substitution principle:

A chemical substance must be substituted when a safer alternative is available.

The polluter pays principle:

An important part of a chemicals policy aiming at the elimination of hazardous substances is the polluter pays principle. The bottom line of this approach is that the company or persons that cause an environmental damage should pay for the consequences. This creates an incentive to substitute hazardous substances and to use the safest chemicals possible.

The right to know principle:

This principle intends to make government or corporate data and records available to the public or to those individuals with a particular interest in the information. The information needs to be readily accessible on products and through databases.

Compared to other marine areas the Baltic Sea is more sensitive to persistent and bio accumulative or toxic substances:

The Baltic ecosystems is a relatively young ecosystem and only a few species are truly adapted to the brackish water conditions, including the large changes of salinity triggered by freshwater or marine-water inflows. Several species may still live near the physiological tolerance range. This restricts the number of species living in the Baltic Sea. A few species have a key role for ecosystem functioning and when these populations decline there are no other species that can take over the functions of key-species[10].

The size of the human population in the Baltic catchments area (about 85 million) and the Sea’s relatively low volume (25,000 km^3) results in intensive burdens per unit of Baltic Sea water per person in the catchments area). The burden is about 5 time higher as for example in the North Sea.

Due to low water exchange (about 30 years for a complete exchange) as well as minimal tides and sediment circulation the Baltic Sea tends to trap and accumulate persistent chemicals. These are then either absorbed into the sediments or into marine organisms including fish, mammals and sea birds.

The lower water-temperature with large areas covered by ice during the winter retard the water’s degradation capacity for organic substances.

The shallowness of the water in the coastal regions cannot contribute to photo-degradation due to intensive algae blooming triggered by eutrophication.

Hence the carrying capacity of the Baltic Sea is more intensely used compared to other marine environments (about 30 times more as compared to North Sea)11. As a consequence, the criteria to determine PBT substances should be possibly

[9] Principles are adopted in different Multinational Environmental Agreements, but the exact wording from the The International Chemical Secretariat, http://www.chemsec.org

[10] See also http://www.helcom.fi/a/hazardous/Specific_conditions1.PDF

[11] Quantification based on TemaNord 2000:550

different from those used in the OSPAR area.

Sources of Toxics

In the Baltic region, hazardous substances are emitted from all stages of the industrial product chain – from the raw material handling, transport and the production processes, to the use of products and the handling of these as waste.

The major pathway into the marine environment is wastewater (industrial and urban), air, agricultural run-off and direct emissions from ship transport, harbour operations and offshore installations. A list of general sources is elaborated within the WWF-Toxics Target Driven Programme.

However, there are some regional particularities, which should be taken into account when setting priorities for action:

In the Nordic countries and Germany many large production sites – point sources mostly, covered by the EU Integrated Pollution Prevention and Control (IPPC) Directive – are operated under Best Available Technology (BAT) conditions. Hence releases of toxics are low. Due to the EU accession process, this will be also the case in Poland and the Baltic States within 10 years. In Russia and Byelorussia, however, there is no strong incentive as yet for state authorities and managers to implement BAT in production facilities. Thus point sources may remain a toxics issue for a longer time.

The density of ship transport and offshore installations in the Baltic Sea is steadily increasing. Oil and chemical spills, ship painting processes, use of off-shore chemicals and emissions from ship engines may therefore need particular attention, in particular because of the differing health-safety-environment (HSE) standards and supervision strategies in the harbours and coastal zones.

Pulp and paper production, oil shale chemistry in Estonia and chlorine industry in Poland are among the industrial processes of particular interest in the Baltic Sea Area. However, these sites mostly attract large investment programmes and hence BAT standards may have been implemented when the Baltic States and Poland join the EU.

There are a considerable number of textile, furniture and paint manufacturers in the area, many of them producing for the EU market, and many with shareholders in the Nordic countries and Germany. Nevertheless most of these companies not yet have made efforts to identify and substitute hazardous substances in their production processes.

There is still an intensive trade in chemicals between Russia, Ukraine and Byelorussia on the one hand and the Baltic States and Poland on the other hand. Again, due to different standards in chemical control such imports may include substances of particular concern.

The amount of pesticides used in the Baltic Sea Area is comparably low due to successful pesticide reduction programmes in the Nordic countries and lower agricultural productivity[12] in Poland and the Baltic States. However, there are large obsolete stocks. These seem to be under control in Estonia, Latvia and Lithuania, but possibly not in Russia and Byelorussia. Information about Poland is lacking.

There are a considerable number of dumps near the coastline in some regions and in the river basins discharging into the Baltic Sea.

Only very few data on use and occurrence of hazardous organic

[12] in terms of tonnes per hectare or per working hour

substances are available in the EU accession countries. Until now monitoring has been focused on heavy metals and on point sources. Also, the monitoring programmes under HELCOM cover only a small range of well-known organic contaminants such as PCB, DDT, PAH and lindane. Information systems covering the type and amount of chemicals placed on the national markets exist only in the Nordic countries, not in Germany, Poland, the Baltic States and Russia.

Existing Trends Related to Environmental Impacts[13]

Due to international endeavours in environmental protection, the concentration of well-known contaminants such as mercury, lead, PCBs, dioxins, DDT, lindane and other organochlorine components in sea-water and biota has decreased during the last 20 to 30 years. The improvement of the breeding success of marine birds (white-tailed sea eagle and guillemot) and the recovery of populations of the three seal species are thought to be related to the diminishing levels of organic contaminants.

However, there are still serious concerns with regard to the level of contamination and evidence of toxic effects in biota:

Many female seals are still unable to produce pups due to uterine occlusion related to PCBs and dioxins in the environment. The concentration of these contaminants seems to have remained stable during the 1990s, indicating that some relevant, possibly regional, inputs still exist. As a consequence the Swedish Food Administration recommended in 1995 that women of childbearing age should limit their consumption of Baltic Herring and Salmon.

Another emerging problem is chronic intestinal ulcers, which are affecting an increasing number of young grey seals. These are probably caused by contaminants disrupting the seals immune system. The precise mechanisms, however, remain unknown.

Antifouling agents released continuously from the hulls of the ship end up in marine sediments and living organisms. One of the agents, tributyltin, causes hormonal disturbance in a number of invertebrates, e.g. some snail species. Tributyltin blocks the production of female hormone, causing females to grow male sex organs.

Though the level of measured contaminants in the Baltic Sea was lower in the 1990s compared to previous decades, the production of detoxifying enzymes in Baltic fish remained at two to three times higher than in earlier years. The Helsinki Commission interprets this as an indicator for exposure to not yet identified contaminants.

Monitoring of concentrations of hazardous substances in the environment, monitoring of effects, and establishing cause-effect relation are only affordable for a small number of potentially relevant chemicals and a small number of potential effects. In addition, using available methodology and data it will be mostly impossible to prove cause-effect links. Hence, the contribution of ecosystem-based trend analysis to targeting measures will be very limited.

Root Causes and Selection of Socio-Economic Factors

The "Toxics Issue" is a multi-cause problem. Hence root causes can be identified in various sectors of policy making, legislation, production,

[13] *data taken from the HELCOM Internet site* www.helcom.fi, *Environment of the Baltic Sea area 1994 to 1998*).

consumption and market forces. Beside the specific regional factors, listed below, that determine the direct or indirect release of hazardous substances into the marine Baltic Environment, the general European policy framework is also considered to be an obstacle to risk prevention related to chemicals.

Due to the inadequacies of chemical legislation in Europe[14], the majority of substances on the market are not sufficiently assessed and thus comparing alternatives mostly ends in identification of serious gaps in knowledge. This "incomparability" of options also slows down elimination of hazardous substances. Hence, currently it is not possible to make informed choices among chemical products.

Inadequate Standards Around the Baltic Sea

Usually wastewater standards, emissions standards and product standards cover only a small number of chemical substances. Only a few countries, e.g. Finland, have introduced obligations for companies to screen a list of potentially hazardous substances when applying for a wastewater permit. A general obligation for industry to consider possible alternatives before using a hazardous substance exists only in Sweden and Germany.

In certain sectors, safety norms and technical product standards have triggered an increasing use of hazardous chemicals (e.g. brominated flame retardant, corrosion preservatives, antifouling). In other sectors, certain types of machinery require the use of hazardous substances (e.g. metal-cutting fluids, textile-finishing chemicals). In such cases, substitution of hazardous substances is only possible if the technical requirements are reconsidered and adapted as well. This usually takes time and leads to slow progress in eliminating hazardous substances.

Urban and industrial wastewater treatment in the EU accession countries, Russia and Byelorussia is far from having reached the EU Standard. However, in the accession countries large investment programs are being implemented at present. Even though hazardous substances cannot be sufficiently degraded by standard biological wastewater treatment, the load of bioaccumulating substances to the water environment is significantly reduced due to adsorption to sludge. A lack of urban or industrial wastewater treatment or the spraying of contaminated wastewater sludge onto agricultural soil could contribute considerably to the release of bioaccumulating substances into the environment.

Poor Data Availability

- Only scanty data on use and occurrence of hazardous organic substances is available in the EU accession countries, as noted above.
- For certain effects of concern, e.g. via the endocrine system, standard tests are not yet available. Hence systematic and widely accepted identification of substances for which action is needed remains difficult.
- Lack of public awareness and access to information

[14] More than 90% of the currently produced and imported chemical substances were placed on the EU market before 1981. For all these substances the pre-marketing testing requirements laid down in the EU chemicals legislation do not apply. Chemical substances that have been on the market for decades therefore have a competitive advantage.

- Due to the economic situation and administrative capacities in the EU accession countries the key factors for triggering public and business awareness on toxics are lacking in the Baltic Sea area. High unemployment, low household incomes and inefficient state inspectorates do not encourage a public debate on toxics.

Management/ Decision-Making Traditions

- Industrial companies in EU accession countries; Russia and Byelorussia still have a "Soviet-style" management that is often not capable to deal with "soft requirements" and decision-making in the absence of official norms.
- Many companies have not introduced management systems that are capable of systematically assessing the properties of the chemicals used in their processes and products with regard to risks to the environment and the consumers. Hence, pro-active substitution of hazardous substances by less hazardous alternatives usually does not take place, unless the consumers demand "clean products" via the market.
- Information flow with regard to hazardous components in chemical products has only started recently to develop in the EU accession countries. Thus the information base to set priorities for action is poor.

Development of the Agricultural Sector

The development of the agricultural sector in the accession countries still tends to follow the same route which has failed in the EU during recent decades:

Crop production and livestock farming aim at high volumes and uniform quality at low prices. This logically implies the use of pesticides in high amounts.

Access to EU subsidies is likely to lead to increased use of pesticides and fertilisers in the agricultural sector in the accession countries.

Activities within WWF Baltic Eco-region Programme

It is obvious that more awareness of the toxics issue is needed around the Baltic Sea, among consumers, trade, industry and policy makers. The overarching goal is the elimination of all releases of hazardous substances by the year 2020 at the latest. However certain priority substances of international concern should be phased out much earlier.

The major role for the WWF is to put pressure on chemical users by mobilising public opinion in order to shift markets and to lobby governments and parliaments to establish and implement the laws and legal framewoks necessary for a phase out of all hazardous substances.

WWF's Baltic Action Programme will specifically contribute to i) eliminating the production and use of hazardous substances in the Baltic Sea Area by targeting 15 substances15 of most concern (see Annex 2) and ii) developing

[15] 12 POPs plus TBT, plus two other substances of very high concern in the EU [including HELCOM and OSPAR] (to be selected from current priority lists) plus two substances of specific concern in the Baltic Region (to be determined by research)

frameworks to enable informed choices on chemicals in the relevant groups of stakeholders.

However, in the light of the different levels of awareness and the conditions of policy making, specific approaches may be needed in each of the three areas – the Nordic countries and Germany, the accession countries and Russia.

For example:

- Publication of independent and scientifically sound data on the occurrence of hazardous substances in food, human breast-milk and baby toys is a most successful strategy for rising public awareness.

  Networking with relevant scientists and possibly organising our own targeted research would be needed to push toxics onto the agenda.

  Contaminants in Baltic Salmon (e.g. compared to Norwegian) or contaminants in human breast milk or other body tissue could illustrate the problem in a clear and understandable way.
- For all target substances alternatives are available. It should be possible to illustrate this by success stories from the Nordic countries or Germany. Such examples could include certain technical solutions, management tools or policy instruments.
- REACH: The proposed EU chemicals legislation, if further improved by the European Parliament, could make an important contribution to reducing the risk to wildlife and humans from chemicals by identifying and phasing out some of the most harmful ones.

  REACH also offers an opportunity to promote a sustainable, innovative and forward-looking chemical industry.

  We have a once-in-a-generation opportunity to have safer chemicals and a healthier future for wildlife and people. New markets for safer products, and increased trust, should make it good news for the chemical industry too.

While no one would deny that some chemicals bring significant benefits to society unfortunately certain chemicals pose a threat to wildlife and people, and the chemical industry is inadequately regulated.

The cost to the chemical industry is estimated by the European Commission to be 0.04 per cent of the chemical industry's annual turnover. The benefits for the chemical industry of new markets for safer products, increased trust in chemicals, and reduced threat of liability lawsuits should be considerable.

The main benefits that WWF is seeking through REACH are:

- All chemicals on the market at over 1 tonne per year will be checked for safety
- Safety information on chemicals will be publicly available
- Chemicals of high concern will be better controlled or phased out
- Rural development is a critical issue in all Baltic accession countries. Setting a specific target here to maintain a low level of pesticide use and preserve traditional agricultural practices could contribute to a decrease in toxic pressure on the marine environment.

- Nature conservation and water protection are high profile policy areas in the EU accession countries. By comparison, chemicals control has a much lower profile. Therefore, the toxics issue should be indirectly promoted by the setting up of river basin management plans under the Water Framework Directive and the protection of marine and coastal habitats. Close co-operation among the relevant WWF programmes at the EU level and at regional level is needed here.
- In order to improve knowledge on the use of hazardous chemicals and their occurrence in the environment, efficient data collection systems are needed. This is an issue for all countries bordering the Baltic Sea, since targeting the data collection in a more effective way needs considerable conceptual work. WWF could act here in a facilitating role and bring together experts from different countries and areas of expertiseThe specific Baltic targets, milestones and activities on toxics are laid down in the Baltic action plan. Activities being covered in overarching WWF activities such as the Toxics TDP, e.g. the activities around the revision of EU chemicals policy, are regarded as urgent and important for the Baltic as well though not being specifically named as Baltic activities.

The Way Forward

Making the toxic threat to the Eco-region visible to the public and communicating the benefits of a Baltic Sea free from hazardous substances ("A Non-Toxic Environment") will be one of WWF's main area activities.

There are three key benefits that can be communicated to the wider public:

- uncontaminated fish is the basis for income in the relevant industries
- safe food would contribute to health of consumers (especially children)in one or two generations the Baltic's children will be able to enjoy a richer biodiversity (in particular of national flagship species)
- Raising awareness should also include information on how consumers can take decisions on safer alternatives in daily life (choices among products and activities).

Priority Species

Introduction

When the major threats to the region have been identified and the root causes analysed the next step in the Eco-region conservation work is to identify our priorities in the Baltic Sea. This is important to be able to focus our activities and put our efforts where they are needed most. The Baltic Team has, together with expertise within the national offices, gathered substantial information on priority species and areas in the region. It was decided to use the following criteria for assessing species and habitats:

- threatened species and habitats
- endangered species and habitats
- flagship species
- regional importance
- economic importance
- ecosystem function

The list of priority sites is described in another report.

List of Priority Species

The list of priority species also contains flagship species, marked in bold. By flagship species we mean species that are seen as symbols for the biodiversity in our region, not necessarily endangered, but species of public interest that is easy to communicate.

Coastal Plants

- Baltic marsh orchid – *Dactylorhiza baltica*
- Purple milk vetch – *Astragalus danicus*
- Salt marsh rush – *Juncus gerardii*
- *Cotoneaster scandinavicus*
- Field wormwood – *Artemisia campestris ssp. bottnica*
- Slender.naiad – *Naja flexali*
- Seaside centaury – *Centarium littorale and C. pulchellum*
- Flower spike- *Herminium monorchis*

Lichens

- *Ramalina baltica*

Mammals

- Otter – *Lutra lutra*
- Ringed seal – *Phoca hispidabotnica*
- Harbour porpoise – *Phocoena phocoena*
- Grey seal – *Haliceoerus grypus*
- Common seal – *Phoca vitulina*
- Flying squirrel – *Pteromys volans*
- Pond bat – *Myotis dasycneme*
- Nathusius' pipistrelle – *Pipistrellus nathusii*

Fish

- Wild salmon – *Salmo salar*
- Cod- *Gadus morhua*
- Herring – *Clupea harengus and Clupea harengus membras*
- Hornfish – *Belone belone*
- Sprat – *Sprattus sprattus*
- Asp – *Aspius aspius*

Birds

- White-tailed eagle – *Haliaeetus albicilla*

- Common eider – *Somateria mollissima*
- Bean Goose – *Anser fabalis fabalis*
- White stork – *Ciconia ciconia*
- Black stork – *Ciconia nigra*
- Caspian tern – *Sterna caspia*
- Baltic Dunlin – *Calidris alpina schinzii*
- Long-tailed duck – *Clangula hyemalis*
- Kingfisher – *Alcedo atthis*
- Crane – *Grus grus*
- White-backed woodpecker – *Dendrocopos leucotos*
- Osprey – *Pandion haliaetus*
- Great snipe – *Gallinago media*
- Ruff – *Philomachus pugnax*
- Corncrake – *Crex crex*
- Aquatic warbler – *Acrocephalus paludicola*
- Little tern – *Sterna albifrons*
- Black-tailed godwit – *Limosa limosa*
- Lesser black-backed gull – *Larus fuscus*
- Stellers eider – *Polysticta stelleri*

Invertebrates

- Apollo butterfly – *Parnasius apollo*
- Freshwater pearl-mussel – *Margaritifera margaritifera*
- Blue mussel – *Mytilus edulis*

Amphibians

- Green toad – *Bufu viridis*
- Crested newt – *Triturus cristatus*
- Marsh frog – *Rana ridibunda*
- Natterjack toad – *Bufo calamita*
- Fire bellied toad – *Bombina bombina*
- European tree frog – *Hyla arborea*
- Spadefoot toad – *Pelobates fuscus*
- Agile frog – *Rana dalmatina*
- Edible frog – *Rana esculenta*
- Pool frog – *Rana lessonae*
- Common toad – *Bufo bufo*
- Moor frog – *Rana arvalis*
- Common frog -*Rana temporaria*

Reptiles

- Smooth snake -*Coronella austrica*
- Gotland's grass snake – *Natrix natrix gotlandica*

Marine plants

- Eelgrass – *Zostera marina*
- Bladder wrack- *Fucus vesiculosus*
- Charophytes – *Charophyta*
- Thin leaved pondweed – *Potamogeton sp*

Abbrevations and Acronymes

ASCOBANS

The Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas

BSPA

Baltic Sea Protected Area

CMS

Convention on the Conservation of Migratory Species of Wild Animals (also known as the Bonn Convention)

EBM

Ecosystem-Based Management

EEZ

Exclusive Economic Zone

EU

European Union

GIS

Geographical Information System

HELCOM

Helsinki Commission – Baltic Marine Environment Protection Commission

Helsinki Convention

Convention on the Protection of the Marine Environment of the Baltic Sea (1974 and 1992)

IBSF

International Baltic Sea Fisheries Commission

ICES

International Council for the Exploration of the Sea

ICZM

Integrated Coastal Zone Management

IMO

International Maritime Organization

IUU

Illegal, Unreported and Unregulated (fishing)

NGO

Non-Governmental Organisation

NO

National WWF Office

OECD

Organisation for Economic Co-operation and Development

OSPAR

Commission for the Protection of the Marine Environment of the North East Atlantic

PO

WWF Programme Office

PSSA

Particularly Sensitive Sea Area

RAC

Regional Advisory Council

TAC

Total Allowable Catch

TDP

Target Driven Programme (the delivery mechanism for focused work on one of the global WWF priority issues, aimed at policy change)