Introduction

Ocean transportation is steadily growing and shipping has the potential to become a sustainable way of transportation. However, commercial shipping has a variety of impacts on the marine environment, such as operational discharges, accidental and occasionally illegal releases of oil and hazardous substances, emissions of air pollutants such as sulphuric and nitrous oxides, introduction of non-indigenous species through the vector of ballast water, and loss of vessels and/or cargo. In addition, navigational requirements in coastal areas include dredging and disposal of sediments and large-scale development for port facilities.

The Baltic has some of the densest maritime traffic in the world. At any moment 2,000 ships are on route on the average. A combination of heavy shipping traffic, shipping lanes that cross each other, narrow straits, shallow waters and long periods with ice cover makes the Baltic a difficult area for navigation, with an apparent risk of shipping accidents.

Actions to mitigate environmental problems from ships have been part of the work by the Baltic Marine Environment Commission (HELCOM) since its start in 1974, and numerous recommendations related to shipping have been incorporated in the countries’ legislations. In addition, the Baltic has also been designated a
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Special Area under several MARPOL Annexes as well as a Particularly Sensitive Area. However, despite many years of international co-operation, several environmental problems remain.

Hazardous Substances
Operational losses of hazardous substances from shipping include losses by leaching biocides, tributyltin (TBT) used in antifouling coatings, and of zinc, copper and aluminium applied as anodes to ships hull, ballast tanks and cooling system as protection from corrosion. Data on losses by leaching of hazardous substances from antifouling coatings and anodes are hardly available. However, a first estimate suggests that the magnitude of most of the metals to the Greater North Sea equalled their direct discharges or atmospheric deposition; the magnitude of total losses of TBT in that sea region has been estimated to be around 130 tonnes in 2002 (OSPAR, 2006h).

The International Convention on the Control of Harmful Antifouling Systems, adopted by the IMO in 2001, provides a global framework for action to limit adverse effect on the marine environment and human health caused by antifouling systems. Adverse effects of TBT have been linked primarily to shell deformations and effects on reproduction of molluscs. A world wide ban on the use of TBT as antifouling agent has been agreed in the IMO framework from 2008.

Emissions of Air Pollutants
The combustion of marine fuels results in emissions of air pollutants, such as sulphur dioxide, nitrogen oxides (NO\textsubscript{x}), particulate matter, and volatile organic compounds. These air pollutants can damage human health and contribute to acidification and eutrophication, damaging sensitive ecosystems. Emissions of air pollution by ships in or near ports are generally quite large, particularly compared to the amounts emitted by vehicles on shore. In contrast to the expected progress in reducing emissions from land-based sources, air emissions from shipping are expected to increase, unless further actions are taken.

A large part of the atmospheric input of nitrogen to the Baltic Sea could be attributed to NO\textsubscript{x} emissions from shipping. However, technical solutions which cut NO\textsubscript{x} emissions more than 95% are at hand, and economic instruments such as differentiated shipping lane fees could be parts of the toolbox to reduce airborne emissions. Given the contribution of shipping to local and regional environmental and health problems and in order to meet mandatory air quality standards, the need for additional measures to reduce marine air emissions, such as onshore power supply where appropriate is highlighted.

Important steps have been taken to reduce air pollution from ships, such as the entry into force of Annex VI to MARPOL 73/78, and the designation of the Baltic Sea as a sulphur oxide emission control area. However, there are concerns that if no further measures are introduced, emissions of SO\textsubscript{x} and NO\textsubscript{x} from international shipping around Europe may have surpassed the total emissions from all land-based sources in the 25 EU Member States combined by 2020. This will have an impact on environmental and health problems. Furthermore, further work is needed on measures to reduce the climate change impact of international shipping.

Ship-generated Waste
Despite the wide range of measures taken in recent years, floating debris in the marine environment still remains a significant source of pollution causing environmental, safety and economic problems to marine and coastal environments, as well as to coastal communities. Accidental and intentionally discharges from ships pose a problem, which it is urgent to address through inter alia operational measures and by investigating the scope for the development of incentives for ships with a record of good environmental performance.
The provision of port waste reception facilities for mandatory use is one of the major tools for managing the disposal of garbage and other ship-generated wastes plus cargo residues, and for preventing illegal discharge into the Baltic Sea. The delivery of waste from ships and the provision of port waste reception facilities are both requirements of MARPOL 73/78 Annex I, IV and V and the EC Directive 2000/59/EC on Port Reception Facilities for Ship-generated Waste and Cargo Residues. Consistent with this Directive, a number of charging systems are in place in the North Sea States, and HELCOM Member States have a “No special fee” system for the Baltic Sea.

**Special Areas**

In Annexes I *Prevention of pollution by oil*, II *Control of pollution by noxious liquid substances* and V *Prevention of pollution by garbage from ships*, MARPOL 73/78 de-
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4.5.2 Total seaborne traffic in 2000

The total movements of ships in 2000 is shown in Figure 42. The figure consists of all the ports excluding the ferry traffic. Numbers in the projections are listed in Table 26.

Figure 42. The total transport figures of the Baltic Sea in 2000. Based on VTT, 2002.

<table>
<thead>
<tr>
<th>Point</th>
<th>Number of ships crossing in 2000</th>
<th>Number of ships expected to cross in 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23,388</td>
<td>31,600</td>
</tr>
<tr>
<td>2</td>
<td>34,692</td>
<td>70,100</td>
</tr>
<tr>
<td>3</td>
<td>46,476</td>
<td>83,700</td>
</tr>
<tr>
<td>4</td>
<td>58,500</td>
<td>105,300</td>
</tr>
<tr>
<td>5</td>
<td>75,696</td>
<td>121,100</td>
</tr>
<tr>
<td>6</td>
<td>85,296</td>
<td>136,500</td>
</tr>
</tbody>
</table>

The concept addresses the design, construction, operation and recycling of vessels and thus includes a cradle to grave perspective on shipping. Each phase contains several elements on which the Clean Ship Approach can be built and which may lead to actions towards cleaner shipping. The long term goal is to eliminate any negative environmental impacts of shipping. The Clean Ship Approach will provide an increased opportunity for transport managers to choose environmentally sound sea transport options.

Ensuring Environmentally Friendly Maritime Activities

Due to the international nature of shipping, the measures adopted at the national or regional level can only have limited impact on environmental impacts from shipping in a specific region. The IMO is the global regulator for fines certain sea areas as “special areas” in which, for technical reasons relating to their oceanographically and ecological condition and to their sea traffic, the adoption of special mandatory methods for the prevention of sea pollution is required. Under the Convention, these special areas are provided with a higher level of protection than other areas of the sea.

The International Maritime Organisation (IMO) meeting in London (2005) decided to designate the Baltic Sea as a “Particularly Sensitive Sea Area.” (PSSA).

An Integrated Approach

The environmental impacts from the shipping sector need to be considered in an integrated way and be addressed at the national, regional and international levels through the Clean Ship Approach for sustainable shipping.
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the shipping industry and the international measures constitute the foundation on which regions and nations can build on by introducing non-discriminatory economic incentives to further reduce pollution from ships within their jurisdiction. All riparian states must therefore take active part in global actions initiated within the IMO to reduce environmental impacts from ships.

The HELCOM Baltic Sea Action Plan is an ambitious strategy to restore the good ecological status of the Baltic marine environment. This new strategy will be a crucial stepping stone for wider and more efficient actions to combat the continued deterioration of the marine environment resulting from human activities. As one of the first schemes to implement the ecosystem approach to the management of human activities, the action plan may lead to new innovative changes in the ways the environment in the Baltic Sea region is managed.

The share of the total pollution loads in the Baltic Sea originating from maritime activities is growing, partly due to the stricter controls now applied to limit pollution from land-based sources.

In order to reach to goal to carry out maritime activities in the Baltic Sea in an environmentally friendly way, further actions are needed with regard to six issues of major importance for all the Baltic Sea coastal countries. Six corresponding management objectives have been defined:

- No illegal pollution
- Safe maritime traffic without accidental pollution
- Efficient response capability
- No introductions of alien species from ships
- Minimum air pollution from ships
- Oil production

No Illegal Pollution
The annual numbers of illegal discharges of oil in the Baltic Sea have decreased. However, the member countries’ ability to detect oil discharges must still be reinforced, also at night or during periods of poor visibility when discharges on purpose are more likely to occur.

The problem of intentional discharges does not only concern oil. Plastics and synthetic materials, which are durable and degrade slowly, have become the most abundant form of marine waste. The international shipping community should continue to develop quality management systems on board ships that address, and set down procedures for, the handling, storage and disposal of all wastes and encourage waste minimization and recycling, recognising the importance of adequate port waste reception facilities.

HELCOM states should act to speed up substitution of harmful antifouling systems with less harmful alternatives and to undertake to give full effect to the International Convention on the Control of Harmful Antifouling Systems on Ships (AFS Convention) in order to reduce
or eliminate adverse effects on the marine environment and human health caused by antifouling systems.

Safe Maritime Traffic without Accidental Pollution
The statistics on shipping accidents in the Baltic shows an increasing number of groundings and collisions. This is mainly due to the growing intensity of ship movements, which requires the Contracting Parties to put even more emphasis to ensure the safety of navigation. One way to do this is to make full use of the new tools available to control shipping traffic, notably the Automatic Identification System. Considering the increase in the transportation of oil products and the difficulties to respond to oil spills in icy conditions, further measures should especially be taken to increase safety during winter time.

Efficient Response Capability
The risk of shipping accidents cannot be totally eliminated, and there is a need to ensure that the sufficient emergency and response resources are in place in the Baltic Sea states. Much has been done to build up an adequate emergency capacity and response capability. Around 30 emergency tugs with bollard pull of 50 tonnes or more, and around 40 sea-going response vessels are located at different areas in the Baltic. To build up an sufficient capacity is a costly and timely process, so a step-wise approach may be applied, starting with assessments of the risk of accidents in the various sub-regions. Such assessments have been started in most areas of the Baltic, but none have yet reached a stage where conceivable missing capacities have been quantified to allow decisions to fill in such gaps in the most efficient way possible.

No Introductions of Alien Species from Ships
Increasing numbers of non-native species are being observed in seas all around the world, and the Baltic is no exception. Shipping is the most important vector of unintentional species introductions into aquatic environments, due to releases of ballast water and the fouling of hulls. The entry into force of the IMO International Convention for Control and Management of Ships’ Ballast Water and Sediments, 2004, would be the most important step forward to tackle this problem. The ratification of the Convention by the HELCOM countries is a challenging goal, but would provide an effective legislative tool to reduce the risk of introductions of non-native species into the Baltic. At the same time the need for measures along inland waterways connecting the Baltic Sea and the Ponto-Caspian regions should also be addressed.

A regional implementation strategy within OSPAR, HELCOM and other relevant regional organisations should be taken forward in order to implement a Ballast Water Management Strategy for the North Sea/North West Europe and the Baltic Sea to control the risks of non-indigenous species invasion through the control of ballast water exchange in line with the IMO Convention. This will establish adequate mitigation and control measures for the Baltic Sea based on ballast water exchange practices, prior to the IMO Convention’s water quality standards entering into force.
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Minimum Air Pollution from Ships
Air emissions from shipping are significant and are expected to grow in future. However, there are already feasible and cost-effective methods to substantially reduce air pollution from ships. The HELCOM Contracting Parties should continue to elaborate common positions and provide joint inputs to the ongoing global legislative processes to ensure that the best solutions are promoted and up-to-date technology is applied.

Improvements in ships’ environmental performance should also be promoted by introducing non-discriminatory economic incentives to further reduce pollution.

The possibility of integrating shipping into emission trading regime(s) to give incremental reductions in ships emissions should be considered. To strengthen the credibility of trading schemes, emission reductions should be monitored, calculated and verified in practice.

Installation of NOx catalysers in those ships flying the flag of Baltic States which are on fixed routes in the Baltic Sea should be economically supported, and the introduction of differentiated shipping lane fees should be promoted.

Oil Production
The volume of maritime oil transportation in the Baltic Sea has increased significantly during the last decades. Ships within the Baltic area annually transport around 160 million tonnes of oil and the volume is anticipated to increase to 250 million tonnes in 2015. The technological standard of shipping safety and regulations which cover various kinds of environmental hazards has been improved during the last decades, not the least as a more or less direct consequence of major oil accidents. Despite the fact that total quantities of oil lost to the seas have been decreasing during the last three decades globally, shipping safety improvements, especially the phasing out of single hull vessels, might not offset the steep increase in transports in the Baltic Sea. The major driving force behind the contemporary increase in oil transports in this area is the high oil price and Russian export ambitions as well as an increased economic activity in general in the former Soviet Union region.

The environmental hazards of oil spills are of two different kinds. Firstly, accidents may produce large and dramatic effects that require substantial and swift responses by several authorities in cooperation. Although most of the previous oil spill accidents in the Baltic Sea have been comparably small in size, the environmental effects may still be substantial, because of the environmental sensitivity of this brackish water area. Secondly, it is a fact that oily sludge or various forms of oil-contaminated residues is discharged in open seas on purpose. The Baltic Sea as well as the North Sea has received the status of Special Area under Annex I of the IMO MARPOL 73/78
The IMO decided in 2003 to accelerate the phasing-out of single hull tankers by 2010. The phase-out of single hull tankers will contribute to an increased level of maritime safety and environmental protection. However, this development has to be combined with a high level of control and maintenance of double hull tankers in order to avoid these vessels turning into high-risk ships.

In 2009, groundings and collisions accounted for 36% and 32% of shipping accidents, respectively (Figure 9). Pollution, fire, machinery damage and other types of accidents each made up less than 10% of the total number of reported accidents. Ten accidents resulted in pollution in 2009. This is one more than in 2008, and six more than in 2007. On the other hand, most of the pollution accidents reported in 2008 and 2009 were not related to grounding or collision, but rather occurred during e.g. fuel transfer.

References


Chapter 10


