REDUCING ENVIRONMENTAL IMPACTS FROM MARITIME TRANSPORT AND PORT ACTIVITIES

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Summary: *The article reveals the different sources of Marine pollution and its impact on social economical life in the sea side regions. Also the authors describe the necessary measures undertaken in the countries members of EU for prevention of pollution of sea waters.*

What is the current state of the marine environment in relation to the various sources of pollution? According to the UNEP-GPA (2006), for various types of pollution, the situation has improved compared to previous years, while others have deteriorated. More specifically:

Drains

The dumping of untreated municipal and industrial wastewater is one of the main causes of marine pollution, particularly in coastal areas. The problem with raw sewage focused mainly in developing countries where sanitation networks are underdeveloped and wastewater treatment plants (see. Water) are often non-existent or not functioning properly. The proportion of wastewater discharged without treatment in the Baltic is 14% of all wastewater in the Mediterranean 53%, Caspian 60%, while in eastern and southern Asia, western and central Africa the rates of wastewater untreated disposed exceed 80%. Overall globally, the number of "dead zones" (lacking oxygen and life) have doubled since 1990 as a result of increasing urbanization and agricultural activities.

Organic substances with high life
They are highly toxic chemicals that do not decompose easily and can upset the ecological balance of ecosystems through the phenomenon of bioaccumulation and because of transport over very long distances. Especially the species found in high levels of the food pyramid (fish, predatory birds, mammals and man of course) are very susceptible to these substances. Such substances are mainly from agrochemicals and industrial waste. With the Stockholm Convention adopted by the international community in 2001, sought to stop production and use of certain such substances. Initially Treaty focuses 12 substances, of which 9 are microbicides. The problem of the organic substances focuses on seas that are in high latitudes.
radioactive substances
Radioactive substances into the marine environment from activities such as nuclear power plants, radioactive materials used in medicine, industry, research, military, etc. About 85PBq radioactive waste is stored in special tanks, more than 80 points of the oceans, mostly in the northeast Atlantic. Although this method of disposal following international safety standards, it still runs the risk of accidents, which would be disastrous for ecosystems and humans.

Trash

Waste found in the sea are mainly late or non-biodegradable materials. The calculation of waste found in the seas and oceans is difficult but it is estimated that 70% of the total are in the bottom 15% to the coasts and the remaining 15% is floating

on the surface. Indicative of the impact of waste is the annual death due to plastic more than 1 million. Birds and 100,000 marine mammals and turtles. The waste problem is growing steadily despite national and international efforts to control.

Biological invasions.

An important issue of marine ecosystems, which are increasingly attracting the interest of the scientific community, are the biological invasions. This question refers to natural or man-migration of alien species (which are called 'alien' or 'host' or 'biological invaders') in ecosystems which do not occur until that time. Some of these species can smoothly adapt to the new ecosystem, while others may be irreparably disrupt the trophic network, drastically reduce biodiversity of the region and have negative effects on economic activities such as fishing and tourism. Usually these items are transported through human (intentional or unintentional) interventions but can also migrate by themselves because of the change of the physicochemical and biological characteristics of ecosystems. Typical examples of biological invasions caused by humans are the types that are added to an area for economic reasons (eg fisheries production) and especially the species transported by ships (through the 'ballast') moving to distant areas. The last factor is considered as the main cause of the occurrence of biological invasions in marine ecosystems.

Figure 1 shows the most important "paths" and the origin of biological invaders. From this figure it appears that the Mediterranean is one of the most vulnerable to this phenomenon and has over 250 alien species. Principal itinerary of biological invaders Mediterranean is the Suez Canal, through which goods enter the Indian and Pacific Oceans, as well as Gibraltar, from which species entering the Atlantic Ocean. A particularly "aggressive" intruder in the Mediterranean is the type Caulerpa taxifolia escaped from the Oceanographic Museum of Monaco and is currently threatening the valuable seagrass meadows

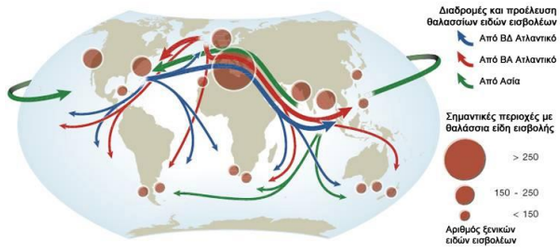

Figure 1

The areas where the biggest problems identified biological invasions in the marine environment and the paths these species

Heavy metals

Through the mechanism of bioaccumulation, heavy metals can become fatal in organisms found in higher levels of the food pyramid. Organic and inorganic metals and mineral substances released into the marine environment from industrial and mining activities, as well as combustion products, particularly coal and transport. Of the most dangerous heavy metals considered as mercury, lead and cadmium. The most characteristic and simultaneously devastating episode environmental pollution by heavy metals occurred in Minamata Bay in Japan in the 1950s today increasingly growing concern about the security of processing and disposal of electronic waste (basically the materials / computers and mobile phones) containing more than 1,000 materials, many of which have high toxicity. The Arctic, acting as a "reservoir" of lead suspended in the atmosphere is now quite high concentrations of this heavy metal. At the beginning of this century it found that seals and whales that live in the Arctic had in their body 2-4 times higher lead concentrations in relation to the previous quarter century.

Petroleum (oil)

Although total oil flows into the sea at the beginning of the 21th century fell by 37% compared with 1985 levels, still showing significant episodes ship accidents (oil spills). However the biggest problem continues to exist and to grow is natural leaks. More specifically, the total annual inflows into oil sea in 1985 was 3.250 million. Tons while in 2003 limited to 1.269 million. Tons. Almost half of inputs (47%) due to natural leaks, 21% in discharge of large ships, 11% of land-based sources (urban and industrial waste and runoff) while 8% due to marine accidents. One of the biggest recent tanker wrecks caused huge ecological and economic disaster was the case of the 'Prestige', which sank in 2002 off the coast of Galicia. The oil spill caused by the approximately 10,000 tons of crude oil leaked (other calculations raise the final leak at 60,000 tons), had an enormous impact on sensitive ecosystems of the region and fisheries.

Excessive enrichment of sea water and the oceans with nutrients in addition to causing eutrophication may have a cascading effect on the degradation of habitats of species and the disruption of food chains. The nutrients usually come from land-based human activities, such as washing rural areas have received fertilizers, atmospheric deposition entraining substances from the combustion of fossil fuels and untreated municipal and industrial waste. The flow of nitrates in the seas and oceans between 1960 and 1980 significantly changed the coastal ecosystems of the developed regions of Europe, North America, Asia and Oceania. Estuaries, bays and semi-enclosed seas (such as the Baltic, the North Adriatic, the Black Sea and the Gulf of Mexico) were the greatest impact. Figure 2 shows the changes in nitrogen concentrations for larger catchment areas of the planet and by region for the periods 1979-1990 and 1991-2005. From the map it becomes apparent unevenness of changes in concentrations per basin.

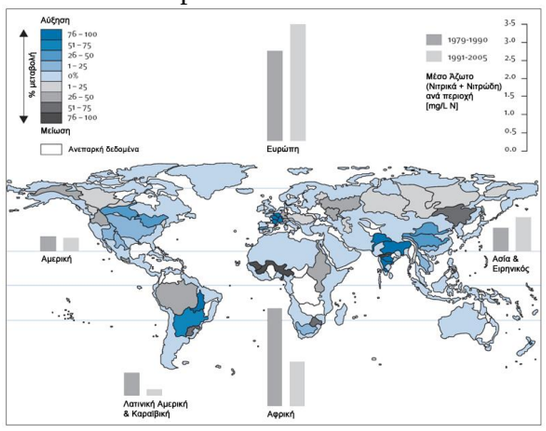

Figure 2

Changes in nitrogen concentrations in the major river basins of the world (%) and by region (concentration): 1979-1990 and 1991-2005
Source: UNEP 2006.

mobility sediment

The land use change and the change in the hydrology of coastal areas (through, for example, construction of dams and reservoirs, irrigation and dredging the river bed, etc.) has often resulted in a dramatic change of water flow and sediments from land areas to the sea. As a result, changes in coastal habitats, such as wetlands, estuaries, marine grasslands, coral reefs, etc. and significant impact on economic sectors such as tourism and fishing. Soil erosion by water and flooding in coastal areas are two of the most characteristic phenomena associated with the sediment mobility. The present global situation varies by region. For example, every year approximately 1.6 billion. Tons of sediment enrich the Indian Ocean from the rivers of the wider land area. At European level and in the year to less enrichment is the Baltic (12.5 tons per sq. Km.) And the greater the Mediterranean (300 tons per sq. Km.).

Policy overview

The international nature of maritime shipping and ports means that multiple levels of governance are used to regulate the sectors. Thus a mix of agreements, conventions, policies, and regulations exist across different levels which manage the sectors. The following section aims to identify policy gaps and therefore also highlights the most relevant governing mechanisms for the European waters, and focuses on international agreements, EU policies (including sector policies), and regional initiatives.

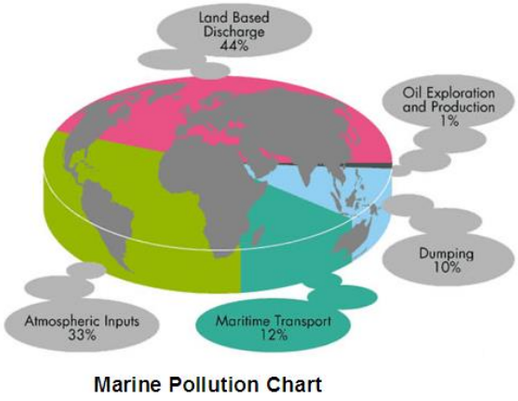

Figure 3
Marine Pollution Chart

International agreements

The International Maritime Organisation (IMO) is the United Nations' agency responsible for the safety and security of shipping and the prevention of marine pollution from ships. The IMO's MARPOL Convention is the main international convention on shipping and the environment. MARPOL's six annexes pertain to different forms of marine pollution; oil (Annex I), noxious liquid substance carried in bulk (Annex II), harmful substances carried in packaged form (Annex III), sewage (Annex IV), garbage (Annex V) and air pollution (Annex VI).

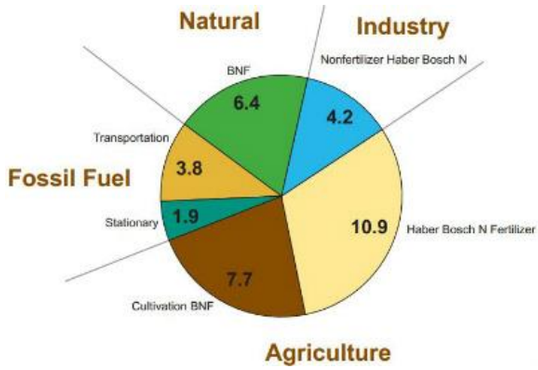

Figure 4
Sources Pollution Chart

In addition to the MARPOL convention, several other conventions relate to the prevention of marine pollution from ships. The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (LC) entered into force in 1975, and in 1996 the London Protocol was adopted. This latter convention prohibits the dumping of certain hazardous materials, and requires permits for the dumping of a number of other identified materials. Annex 4 of the convention provides a list of exempt materials. The Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS Convention) which came into force in 2008 bans the use of TBT paints on ships. It was transposed into EU legislation as EC No 782/2003 and, consequently, all ships that have TBT antifouling paints are banned from entering EU ports EU Directive

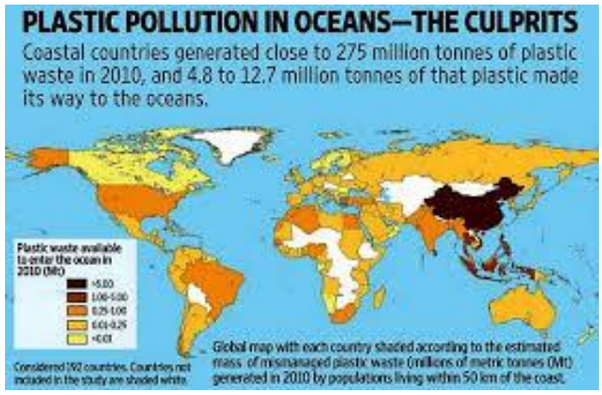

Figure 5 *Plastic pollution of the Sea waters*

95/21/EC establishes procedures for ports to enforce the ban within the jurisdiction of Member States. Furthermore, the IMO convention for the control and Management of Ships' Ballast Water and Sediments (BWM Convention) was completed in 2004, but as of this writing has not yet entered into force. The IMO has also adopted regulations regarding the energy efficiency of shipping vessels, namely the Energy Efficiency Design Index (EEDI), to reduce emissions from ships. However, this effort is arguably too little to combat the significant contribution of emissions by shipping, and the effects will only be seen after 2019. Even though the IMO sets out a number of standards, are not sufficient to protect the environment. Furthermore, they show severe gaps, especially in terms of GHG emissions, underwater noise and abrasion or shading.

Regional initiatives

Regional initiatives are also working to develop environmental protection measures targeted towards shipping and port activities. These include the Oslo Paris Convention (OSPAR) which is the mechanism to protect the marine environment of the North-East Atlantic and the Helsinki Convention (HELCOM) which works to protect the marine environment of the Baltic Sea. Further regional initiatives include the Barcelona Convention which aims to protect the environment and to foster sustainable development in the Mediterranean basin and the Bucharest Convention which works to protect the Black Sea Marine Environment. Regional conventions often facilitate the regional implementation of environmental policies as well as the monitoring of the environmental status. However, they rarely implement additional standards beyond those set at IMO or EU level.

European measures

The European Union not only implements IMO regulations and agreements, but also adopts further standards and policies relevant to the shipping and ports sector. The Integrated Maritime Policy (IMP) is the EU's overarching maritime policy which applies a holistic, integrated approach to resource management using the concept of ecosystem based management. The MSFD constitutes the vital environmental component of the EU's IMP. The MSFD aims to reduce the pressures of human activities on the marine environment to sustainable levels and provides a clear regulatory framework requiring that environmental targets are met in an effort to obtain GES, defined as the ' environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations. Key planning instruments are Integrated Coastal Zone Management (ICZM) and Maritime Spatial Planning (MSP),
which seek to provide a stable planning framework for coastal and maritime activities, and include considerations for environmental aspects such as marine protected areas.
Ecosystem based management is a key element of the EU marine policy. The ecosystems based management approach entails considering both ecological and anthropogenic dynamics within an ecosystem. The Driver Pressure State Impact and Response (DPSIR) framework, see Figure 3, is a structured way of considering the interaction of humans and the environment. A DPSIR framework is used to organise information about the state of the environment and requires that sectors, or data, are considered in terms of cause and effect relationships. By applying this concept, it is possible to track anthropogenic pressures, which develop into environmental impacts, and may ultimately impact socio-economic activities. Links between pieces of
information are provided, and with them the consequences of actions can be determined.

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