

## **A STUDY ON MARINE POLLUTION PROBLEMS IN BLACKSEA AND MITIGATION OF THE DEFICIENCIES**

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### **Abstract**

Environmental Pollution in particular Marine Pollution is an international problem which seriously threatens human life and nature. As the pollution increase gradually and its negative impacts are understood by society, awareness and concerns on environmental protection increases. This study presents the main sources and/or reasons of maritime pollution, investigates the current situation in Turkey in the light of national and international acquis and level of implementations in order to define problem areas and gaps concerning governance. The Study involves mainly the Turkish maritime environment and neighbouring areas and focuses on the Black Sea region which is the most affected part of Turkey. It also investigates the level of the shipboard pollution and related issues. The purpose of this study is to investigate the legislation related to Maritime Environment Protection and problem areas on the application which directly affects Maritime Environment to define the measures to be taken for mitigation of the deficiencies.

**Keywords:** Environmental Pollution; Marine Pollution; Protection of the Environment; Pollution in the Mediterranean and Black Sea.

### **Introduction**

Oceans occupy 71% of the world's surface and contain 97% of the earth's water. Ocean water is 96% pure water. They present outstanding sources to sustain the life of the human, fauna and flora as well as worldwide lines of communication for sharing foods, goods and any other kind of products. That is the reason why it is sensitive to protect the maritime environment.

It is clear that all international and national measures or solutions to prevent pollution at sea are not sufficient. Whereas lands are under the sovereignty of a single nation, sea areas are shared by many nations and there is not an authority which has full control on the seas. Reluctance of a single neighbouring country may cause a serious damage to adjacent sea areas as the others are keen to protect the environment. The Black Sea is a good example which is seriously polluted by rivers which rise in different basins and pass through different countries.

The source of marine pollution is mostly generated by neighbouring land areas. Unfortunately many countries discharge their land origin pollution into seas. And as a result of the nature of the water, the pollution expands moving by winds or water currents. That is the reason why we need international regulations and intervention systems which have been fully supported by each individual nation to protect the marine environment.

Although we have many international organizations and national or international nongovernmental organizations which focus on environmental protection and there are many regulations, conventions, laws, codes etc. we are still not able to prevent the pollution. Current researches prove that the main problem is the insufficient implementation of the international regulations and national legislation accordingly, especially in the developing countries. If we have the perfect regulations concerning prevention of maritime pollution but we are not able to implement them, there is no possibility of success. Therefore, concrete measures to implement rules and regulations are strictly required in protection marine environment.

The shipping which transports 90 per cent of global trade is statistically the least environmentally damaging mode of transport when its productive value is taken into consideration. Moreover, set against land-based industry, shipping is a comparatively minor contributor, overall, to marine pollution from human activities” (IMO 2014).

### **Method**

The aim of this study is to look through the acquis related to marine environment protection and define problem areas and the missing points on application of the procedures which directly affects marine environment and measures to be taken for mitigation of the deficiencies in the Black Sea which is polluted actrousciosly.

The study starts with a comprehensive literature quest which is intended to gather detailed information on the sources of pollution which affect the maritime environment negatively, the current situation of maritime environment protection in the light of national and international acquis. The second step is based on an investigation which may help to solve the problem areas met and proposals to mitigate the deficiencies. The third and last part of the study covers the most reliable and applicable proposals to find remedies for existing and future problems.

### **Research**

The discussion is based on the evaluation of the pollution sources and effects. It covers a comprehensive study on the existing situation, legislation and applications in the world.

Major threats to marine environment are; Unplanned Coastal Development, Land Based Sources of Pollution, Marine-based Activities, Overfishing, Habitat Destruction, Climate

Change, Invasive Species and Nuclear Power Plants and Pollutant type of Ammunitions. Major environmental impacts of the pollution to oceans are ‘Loss of Biodiversity’ and ‘Damage to Sea Life’. Table-1 below provides an idea concerning to the sources of oceanic oil pollution. It is noticeable that the biggest source is natural seeps mainly derive from land.

Table-1: Sources and Percentages of Oceanic Oil Pollution (Source: GESAMP 2007)

SOURCE	PERCENTAGE
<b>Natural seeps</b>	<b>49</b>
<b>Ship activity related</b>	<b>39</b>
<b>Coastal</b>	<b>10</b>
<b>Offshore production discharges</b>	<b>2</b>

Marine based activities include operations of huge merchant fleets especially in dense shipping areas also creates negative effects. In the last ten years, the dimension of world fleet increased 53 percent. International Seaborne Trade is developed 10 times (from 2.005 B tonnes to 9.842 B tonnes) between 1970 and 2014. The most important part of the sea sourced pollution is the oil spill and the major oil spill accidents occur in the Atlantic Ocean and the Mediterranean which have condensed sea traffic. These accidents create harmful and long duration pollution in the adjacent shore lanes.

2011 was a record-breaking year for extreme climate and weather events. Leading scientists are investigating the relationship between such events and climate change. According to the latest insights, climate change is leading to changes in the frequency, intensity, length, timing and spatial coverage of extreme weather events. New studies also suggest that the combined impacts of higher sea temperatures, ocean acidification, lack of oxygen and other factors could lead to the collapse of coral reefs and the spread of ocean dead zones (UNEP 2013).

The long term effects of nuclear disasters can often spread over thousands of years. It is estimated that Chernobyl won't be inhabited for at least another 20,000 years. But Nuclear Power Plants are prominent and provide approximately 5.7% of the world's energy and 13% of the world's electricity. With 437 Nuclear Power Plants worldwide, there are bound to be incidents every now and again (Process Industry Forum 2012). Nuclear decommissioning refers to safe handling, at the end of life, of nuclear power reactors and nuclear facilities. After the Fukushima accident, the number of reactors to be decommissioned in the next ten years is set to increase significantly (UNEP 2012).

***International Acquis on Marine Environmental Protection***

UNEP established in 1972, is the voice for the environment within the United Nations system. UNEP acts as a catalyst, advocate, educator and facilitator to promote the wise use and sustainable development of the global environment. UNEP has close relations with IMO's MEPC (Marine Environment Protection Committee) concerns with marine pollution from ships. UNEP's Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal) adopted in 1989. Basel obligations are mainly imposed on or directed to state parties.

IMO as the custodian of the 1954 OILPOL Convention assumed responsibility for pollution issues. As a consequence, it has, over many years, adopted a wide range of measures to prevent and control pollution caused by ships and to mitigate the effects of any damage to the environment that may occur as a result of maritime operations and accidents. IMO's area of interest concerning marine environment includes; Pollution Prevention, Pollution Preparedness/ Response, Ballast Water Management, Bio fouling, Anti-fouling systems, Recycling of ships.

In 1973, IMO adopted the International Convention for the Prevention of Pollution from Ships (MARPOL) which is an international convention for the prevention of pollution from ships. SOLAS, STCW 78 (2010), ISM and ISPS are also major instruments of IMO for safety. IMO also recognises that some areas need additional protection and the MARPOL Convention defines certain sea areas as "Special Areas" in which the adoption of enhanced special mandatory measures for the prevention of pollution is required. The Mediterranean Sea and Black Sea are declared as special areas against oil and waste dumping. But the special area requirements are not in effect in the Black Sea. MARPOL defined limits of Sulphur Dioxide and Nitrogen Oxide emissions from ship exhausts and prohibits deliberate emissions of ozone depleting substances in 2005. IMO adopted mandatory measures of energy efficiency to reduce Green House Gases (GHG) emitted by the ships in 2011. The Lower global sulphur cap in the Emission Control Areas (ECA) will be reduced to 0.50% max as of 1 January 2020.

IMO Assembly has adopted Guidelines for the designation of Particularly Sensitive Sea Areas (PSSAs), which are deemed to require a higher degree of protection because of their particular significance for ecological, socioeconomic or scientific reasons, and because they may be vulnerable to damage by international maritime activities. To this date, fourteen PSSAs have been designated by the IMO (MEPC 2012). The "London Convention" of 1975 which has been replaced by London Protocol in 2006, is one of the first global conventions to protect the marine environment. International Convention on Oil Pollution Preparedness, Response and

Co-operation 1990 (OPRC 90) and the Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances, 2000 (OPRC-HNS Protocol) are the major international instruments. Figure-1 below shows the relations between the ship source pollution and related instruments.

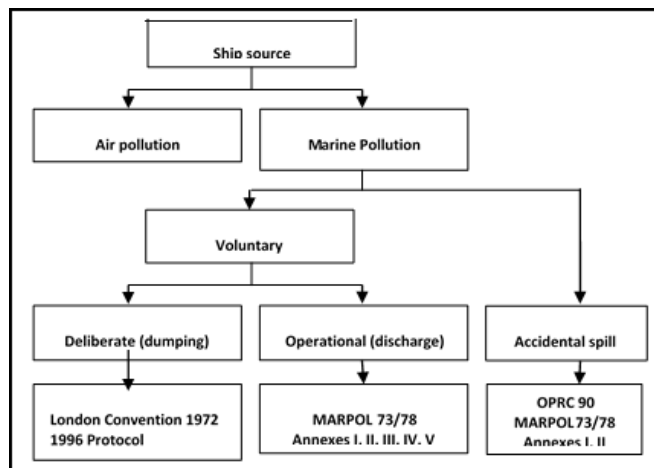


Figure-1: Ship Source Marine Pollution (Source: Mukherjee 2010)

### ***Discussion on the Situation in the Black Sea***

The Black Sea is one of the most remarkable regional seas in the world having over 2,200 m deep and receives the drainage from a 1.9 million km<sup>2</sup> basin covering about one third of the area of continental Europe. It carries about 300 km<sup>3</sup> of seawater to the Black Sea from the Mediterranean along the bottom layer and returning a mixture of seawater and freshwater with twice this volume in the upper layer through the Turkish Straits. Every year. About 350 km<sup>3</sup> of river water enters the Black Sea from an area covering almost a third of continental Europe and including significant areas of eighteen countries. Europe's second, third and fourth largest rivers (the Danube, Dniro and Don) all flow to the Black Sea (BSC 2008). The Black Sea is the most polluted area in the Mediterranean. Black Sea being a most isolated from the world oceans, has the most eutrophication, and is the most poisonous (hydrogen sulphide), the most anoxic and the most environmentally endangered sea and she requires more attention. Proliferation of pipelines and oil terminals, increased offshore activities for exploration and exploitation of hydrocarbon resources increased the risk of accidental spills; risk of operational/illegal discharge and risk of introduction of harmful alien species through ballast waters. Beginning point of the mitigation looks like the dirty inland rivers which pour to the Black Sea. All river coastal states must stop pumping/leaking of the pollutants into the rivers (Oral 2008).

### ***Pollution Protection Efforts in the Black Sea Area***

In April 1992 six Black Sea countries (Bulgaria, Georgia, Romania, Russian Federation, Turkey and Ukraine) signed and shortly thereafter ratified the Bucharest Convention on the Protection of the Black Sea against Pollution with its three integrated protocols. Convention obligates the contracting parties, in particular, to prevent pollution; by hazardous substances or matter; from hazardous wastes in trans-boundary movement and the illegal traffic, from land-based sources; from vessels; resulting from emergency situations; by dumping; caused by or connected with activities on the continental shelf, including exploration and exploitation of natural resources; from or through the atmosphere. The Black Sea Commission (BSC) is the intergovernmental body for promoting the implementation of the provisions of the Bucharest Convention, its protocols and Strategic Action Plan and the regional focal point for any aspects of the coastal and marine environment of the Black Sea. The Black Sea Environmental Programme (BSEP) launched in 1993, included a number of interventions by the GEF (Global Environment Facility), including the development of the first Black Sea Transboundary Diagnostic Analysis (TDA), finalised in 1996. The Black Sea Strategic Action Plan (BS-SAP), signed in the same year. Following the signature of the BS-SAP, GEF funding was sustained in order to enable countries to complete National Black Sea Strategic Action Plans and for the negotiations on the institutionalisation of the BSC Secretariat at Istanbul to be completed. Further GEF Full Project funding was secured in 2002 with the commencement of the Black Sea Ecosystem Recovery Project (BSERP) handled between 2002 and 2007. As a result of this project development of a revised Black Sea TDA and SAP is actualized which will embody specific actions (policy, legal, institutional reforms or investments) that can be adopted by nations. Black Sea Strategic Action Programme (BS SAP) addresses the major priority to transboundary problems in the TDA. Black Sea Integrated Monitoring and Assessment Programme (BSIMAP) established the monitoring /sampling stations along the Black Sea coast.

The system is good enough in theory and hopeful for a sign of a late awareness but current reports notifies deficiencies as; Gaps in countries' monitoring programs, the monitoring is mainly not integrated, mandatory parameters are often not covered, recommended frequency of observations is not always observed, difference in sampling and sample analysis techniques, different approach in assessment of environmental status, pure coordination between responsible authorities, insufficient financial support of monitoring (Myroshnychenko 2011).

After integration of Romania and Bulgaria in 2007, EU's borders extended to the Black Sea Coasts. Both Mediterranean Sea and Black Sea were covered in the EU Marine Strategy

Framework Directive (2008/56/EC) in 2008). And thanks to UN and EU many environmental protection projects were executed and completed in the Black Sea. In December, 2013 the BSC PS signed the Letter of Grant Agreement with the United Nations Development Program (UNDP) and became a partner of the joint EC/UNDP Project “Improving Environmental Monitoring in the Black Sea (EMBLAS)”. The Project aim is to strengthen capacities of the Georgia, Russian Federation and Ukraine for biological and chemical monitoring of water quality in the Black Sea, in line with EU acquis. The Project is completed between 2013 and 2014 contributes significant achievements on technical cooperation for data collections. ‘Clean Sea’ is a large continuing European research project for BSC aiming to provide instruments and tools to keep European seas clean, healthy and productive. Bucharest Declaration concerning Danube River Protection Convention and the Black Sea Protection Convention is a critical cornerstone to prevent the river load which is important sources of pollution in the Black Sea. Black Sea Littoral States Border/Coast Guard Agencies began with the initiative of Turkey in 2000. “The Black Sea Cooperation Forum (BCSF)” was established in 2006, aiming development of the cooperation between these authorities also prevent marine pollution.

### ***Situation in Turkey***

Turkey is a peninsular country surrounded with four seas with coastline over 8,400 KMs. The BSEC Headquarters - the Permanent International Secretariat of the Organization of the Black Sea Economic Cooperation (BSEC PERMIS) and the Black Sea MOU on Port State control are located in Istanbul. It facilitates to reach information in these organizations for authors.

Turkey has accepted 24 International Conventions, 32 IMO Conventions, 39 Regional Conventions, 5 Bilateral Maritime Agreements and European Union Directives related to the environment. Turkey has 36 Laws, 1 Decree Law, 19 Guidelines, and 1 Decree of the Cabinet of Minister, 38 Regulations, 1 Communiques in her national acquis on the same issue. The Main responsible institution concerning environment and pollution is the Ministry of Environment and Urbanization (MoEU). The Environment Law covers national environmental policies, pollution penalties, waste control, waste reception facilities, measures to prevent sea and inland water pollution caused by any kind of source. MoEU works in coordination with the Ministry of Transport, Maritime Affairs and Communications (MTMAC), Coast Guard, Metropolitan Municipalities. The responsibilities for reacting and taking necessary measures including intervention/response against environmental pollution in Turkey, the ‘Law

Pertaining to Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Harmful Substances’ is published in 2005.

Turkish government plans that half of ports will be certified as “Green Port” by 2023. Turkey has issued a Prime Ministerial Circular regarding IMO Strategy in 2010 to harmonize its laws with the IMO conventions and regulations and volunteered for IMO VIMSAS (The Voluntary IMO Member State Audit Scheme). Seven projects amounting to 10.2 m € have been successfully implemented by the MTMAC since 2004 in the fields of maritime safety, control of the ship-based emissions and training of seafarers (MTMAC 2013).

Currents statistics show that Turkey discharges almost 20 % of its total sewage water (812,167 thousands m<sup>3</sup>/year) into water land from land and other areas without being treated (TUIK 2014). Water land includes; seas, lakes, artificial lakes, rivers and dams and unfortunately some of them are used as the sources of potable water or agricultural watering. Figure-2 below shows successful trend of sewage treatment goes on.

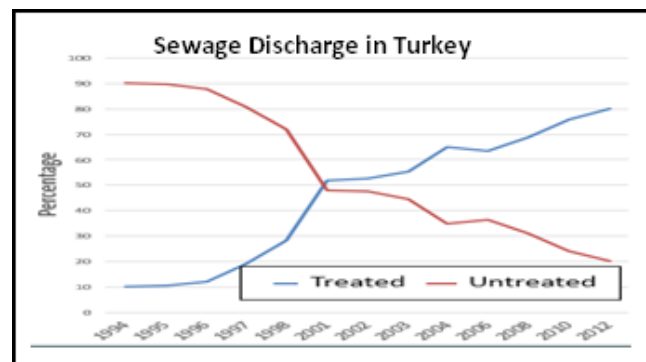


Figure-2: Annual Percentage of wastewater discharged from municipal sewerage

## Conclusion

The main sources of the marine pollution are land based; maritime activities are also contributors of marine pollution. Preventing land based pollution should be more focused. Sea has no physical borders and most marine problems are trans-boundary. Therefore measures applied by any coastal state may not be effective enough; regional approach including collective actions is required in order to mitigate marine environmental problems. It is pretty clear that the environment is the easiest area of cooperation. Marine pollution can be prevented only with international cooperation and collaboration. The close cooperation between the coastal states and countries associated with the inland seas such as the Black Sea is highly important.



Any gaps in implementation like “defining responsible authorities and areas of responsibility” must be filled. The establishment of a continuous and adequate pollution monitoring system is required for the application of deterrent measures.

The regulations have provided considerable benefits in reducing the amount of the pollution events and the areas affected. Thus we can say that legislation on pollution prevention is sufficient in many countries and in the framework of the IMO. But at the same time there is excess of regulations which all refers to same topic, creates complexity in application. We need less, simple but more operational regulations both national and international.

Almost all of the regulations are well designed and fit to purpose, serious problems are met at the implementation phase. Unfortunately the implementation of regulations is more effective in developed countries comparing with developing under- developed countries. Karim (2011) states that ‘The reason of the problem is the states’ reluctance in complying with and enforcing globally agreed standards contained in the international conventions defending lack of financial sources. Considering the financial constraints of under-developed and developing countries, expects to take serious measures on environmental pollution in these countries will be very unrealistic. Establishment an international financial assistance fund for these countries for this purpose would be a more realistic approach.

The Government of a State Party to a mandatory IMO instrument must be in a position to implement and enforce its provisions through appropriate national legislation and to provide necessary implementation and enforcement infrastructure (Curtis, 2010). The Black Sea countries have problems to fully comply with the IMO Regulations.

Some preventive measures for the ships may be; taking measures to prevent oil spills and dangerous goods leakages, pumping clean water, exhausting according gases, and applying waste management. Although regulations of MARPOL, London and Basel Conventions etc. are considered sufficient, there are many deficiencies in the implementation.

Recently different parts of the world suffered unordinary climate and weather events. There are some indications that signs to the relation among these events and climate change. Combined impacts of the pollution and climate change are higher sea temperatures, ocean acidification, lack of oxygen and other factors could badly affect the sea life. As the potential enemy of the environment, nuclear plants will continue to be used at least in the midterm to meet the need of energy. As a safer solution alternative energy production methods should be considered. There are many international arrangements to prevent environment but there is not a legal authority to enforce the countries to comply with these regulations. It is strongly recommended that an international enforcement authority supported with a jurisdiction system

based on 'Polluter Pays Principle'. Pollution does not recognize borders, so it is a problem for all, not just the coastal state- shared responsibility. Increasing awareness, continuous monitoring, immediate reaction, precautions relating to decreasing accidents, sanctions against conscious events without tolerance, are the key preventive measures.

Considering special status and situation of the Black Sea an effective cooperation and coordination between adjacent and related (the Danube trans-boundary) countries should be established.

## References

- IMO, 2014. IMO and Environment (<http://www.imo.org/OurWork/Environment/Retrieved/Pages/Default.aspx>) (Accessed 30 January.2017)
- UNCTAD, 2016. Review of Maritime Transport 2015
- GESAMP, 2007. Estimates of Oil Entering the Marine Environment from Sea-Based Activities, The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection Report 2007, London ISBN: 978-92-801-4236-5
- UNEP, (2013). Year Book 2012, Executive Summary <http://staging.unep.org/yearbook/>
- PROCESS INDUSTRY FORUM, 2012. Hot Topics, Top 10 Nuclear Disasters, <http://www.processindustryforum.com/hottopics/nucleardisaster> (Accessed 03 March 2017)
- MEPC, 2012. MEPC.1/Circ.778, List of special areas under MARPOL and particularly sensitive sea areas, 26 January 2012
- SOLAS, 1974. International Convention for the Safety of Life at Sea as amended in 1974 incorporated with SOLAS PROT 1978 & SOLAS PROT 1988), IMO, London
- MARPOL 73/78, 1978. International Convention for the Prevention of Pollution from Ships
- IMO, OPRC 1990, International Convention on Oil Pollution Preparedness, Response and Co-operation,
- MTMAC, 2013. Ministry of Transport, Maritime Affairs and Communications), Maritime Policy Developments in Turkey 30 October 2013, Brussels
- BSC, 2014. BSC Projects, [http://www.blacksea-commission.org/projects\\_observers\\_partners.asp](http://www.blacksea-commission.org/projects_observers_partners.asp)
- MYROSHNYCHENKO V., 2011. Environmental Indicators, The Black Sea Commission, 3<sup>rd</sup> Meeting of UNECA Joint Task Force on Environmental Indicators, Geneva, July 11-13, 2011
- TUIK, 2016. Statistics Institute of Turkey, Shore Based Sewage Discharges in Turkey (<http://www.resmiistatistik.gov.tr/?q=tr/content/62-at%C4%B1k-istatistikleri>) 03 March 2017
- KARIM S., (2010). Implementation of the MARPOL Convention in Developing Countries,

Nordic Journal of International Law 79 (2010) 303–337

ORAL N., (2008). The Black Sea Region: A Time for Change, World's Ocean in Globalization, Challenges for Regions.- International Conference on Marine Affairs and the Law of the Sea, Fridtjof Nansen Institute 21-23 August 2008, Oslo, Norway

CURTIS R. A., (2010). Update on IMO Activities and Initiatives Relevant to WHTI Themes, Regional Maritime Adviser (Caribbean) International Maritime Organization

BLACK SEA MOU (BSC), (2013) Port State Control in The Black Sea Region, Annual Report 2013, Black Sea Port State Control Secretariat Istanbul, Turkey