Components of Marine De-pollution in the Mediterranean Region

Selim L. Sanin
Environmental Engineering Department
Hacettepe University, Ankara

The fate of de-pollution in the Mediterranean Sea is related to the success of international efforts. Over the years, the problems in the Mediterranean Sea have been well discussed, documented, and categorized into seven major groups; (i) sustainable development, (ii) combating land-based pollution, (iii) preventing maritime accidents and illegal discharges from ships, (iv) managing coastal areas, (v) preserving the Mediterranean marine and coastal biodiversity, (vi) safeguarding cultural heritage and (vii) promoting information and communication. Each of these topics has equal importance and presents very complicated interactions among the shareholders.

Mediterranean Region: General Perspective

According to the United Nations Environment Programme (UNEP), the borders of the Mediterranean region are determined by nature's borders of the "olive tree line," which include 22 countries neighbouring the sea.

Since the eastern part of the Mediterranean Sea is said to be among the primary regions of civilization, it is not difficult to understand why this oligotrophic ecosystem has been subject to human intervention for thousands of years, exploited and yet still a very important resource for the world.

The Mediterranean region is rich in terms of endemic species. There are over 25,000 floral varieties, more than half of them endemic to Mediterranean region, and several of them have the potential for industrial uses. 6% of the world's marine species live in the Mediterranean Sea.

The Mediterranean Sea has a coastal line of at least 46,000 kilometres, which covers a surface area of 2.5 million square kilometres. In other words, the Mediterranean Sea occupies only 1% of the world's total sea surface. The coastline is inhabited by over 150 million people living in societies with different civilizations. Its mild climate, historical background and unique ecosystem make the region an attraction point for several human activities. Therefore, human population is not limited to the residents of the Mediterranean region; annually around 170 million tourists, mostly in the summer season, visit the area. Annual tourist population is expected to reach 235 to 300 million visitors by the year 2030. It is also known that 80% of the pollution in the Mediterranean Sea is land-based. Over 200 petrochemical and energy installations, chemical industries and around 80 major rivers transport heavy loads of pollution to the Mediterranean Sea. Chemical contaminants (heavy metals, persistent xenobiotics and hazardous substances) discharged into the sea create the major problem for the Mediterranean. Finally, surface water resources are limited and groundwater is a major resource in the region.

That is why this "global treasure vault" must be protected, yet even some residents of the region are not aware of the environmental disaster potential threatening this fragile ecosystem.

Activities towards De-pollution of the Mediterranean Sea

In November 2005, at the summit to celebrate the 10th Anniversary of the Euro-Mediterranean Process, the partners decided to *de-pollute* the Mediterranean Sea by the year 2020 (Horizon 2020 initiative).

The strength of the commitment towards such an objective is highlighted by the inclusion of a statement towards "providing appropriate financial resources and technical support to implement the programmes" and to use "the Mediterranean Strategy for Sustainable Development" and "exploring possible areas for co-operation in this regard with the UNEP."

In a Mediterranean Hot Spot Investment Programme (MeHSIP) activity, coordinated by the European Investment Bank and the World Bank (finalized in 2008), projects that have the largest impact on Mediterranean pollution across the Mediterranean region were to be identified. This programme was initiated to support the non-EU member countries. According to the final report of the study, economically feasible projects in the selected countries are urban wastewater systems, municipal solid waste systems and industrial emission control systems. (http://ec.europa.eu/environment/enlarg/med/pdf/mehsip_report.pdf)

In a UNEP Mediterranean Action Plan report (www.unepmap.org/index.php), discharge of untreated sewage to the Mediterranean Sea is identified as a major source of microbial pollution. According to the report, microbial pollution is a major problem in the eastern and southern Mediterranean regions.

Even though very economical treatment technologies for sewage are available, cultural and political barriers and conceptual differences prevent the establishment of sustainable solutions.

Impact of Anthropogenic Activities on the Mediterranean Ecosystem

According to Galil (2002), the Suez Canal (1869) created the first salt-water passage between the Mediterranean and the Red Sea. Since the Red Sea is higher than the Eastern Mediterranean, the canal serves as a tidal strait that pours Red Sea water into the Mediterranean. The Bitter Lakes, which are natural hypersaline lakes that form part of the canal, blocked the migration of Red Sea species into the Mediterranean for many decades, but as the salinity of the lakes gradually equalized with that of the Red Sea, the barrier to migration was removed and plants and animals from the Red Sea began colonizing the Eastern Mediterranean. The Red Sea is generally saltier and more nutrient-poor than the Atlantic, so Red Sea species have advantages over Atlantic species in the salty and nutrient-poor Eastern Mediterranean. Accordingly, Red Sea species invade the Mediterranean biota, and not vice versa (Lessepsian migration or Erythrean invasion).

Another historical event, the construction of the Aswan High Dam across the Nile River in the sixties, reduced the inflow of freshwater and nutrient-rich silt from the Nile into the Eastern Mediterranean, making conditions there even more like the Red Sea and worsening the impact of the invasive species. Species from the Red Sea introduced into the Mediterranean through the canal have become a major component of the Mediterranean ecosystem and have had serious impact on the Mediterranean ecology, endangering many local and endemic Mediterranean species. Up to this day, about 300 species native to the Red Sea have already been identified in the Mediterranean Sea, and there are probably others as yet unidentified.

In recent years, plans by the Egyptian government to deepen and widen the canal have raised concerns from marine biologists fearing that such an act will only worsen the invasion of Red Sea species into the Mediterranean, facilitating the crossing of the canal for additional species.

According to the 16th International Commission for the Conservation of Atlantic Tunas (ICCAT) Special Meeting of Oceana held in Marrakesh in November 2008 (www.oceana.org), because of their market value and lack of management (insufficient monitoring, overfishing, illegal fishing and pollution), tuna, sharks and swordfish are identified as overfished species in the Mediterranean Sea. Among them, the most serious warning is issued for bluefin tuna; according to the expert reports, this species is on the verge of extinction.

To give an example, in 2007, the declared catch was 32,398 tons for the East Atlantic and Mediterranean, according to the industry. However, according to the ICCAT Committee, these numbers are well below the actual catch values. It is argued that the catches are four times above the 2006 and 2008 scientific advice of 15,000 tons.

Another example of the strict management requirement between the use of regional resources and the protection of the Mediterranean ecosystem is seen in mining activities. Mercury is an important economic resource for the Mediterranean region; on the other hand, mercury-related activities must be

regulated strictly to prevent its negative impact on the environment. According to the conclusions of the 25th UNEP Council meeting, an international treaty to control mercury emissions will be negotiated starting from 2009 and is expected to be concluded by the year 2013.

Water scarcity may be the most significant environmental stress that the Mediterranean region will face in the near future. Availability of water will be limited physically and economically. The size of the water availability problem and the solutions to the problem may be beyond the national capacities. Therefore collaboration of all shareholders is expected.

Water scarcity may be the most significant environmental stress that the Mediterranean region will face in the near future. The size of the water availability problem and the solutions to the problem may be beyond the national capacities. Therefore collaboration of all shareholders is expected

Impact of Maritime Activities on the Mediterranean

The NATO Parliamentary Assembly Mediterranean and Middle East Special Group has published annual reports since 2001. In 2008, reported energy alternatives for the Mediterranean region were evaluated with predictions of an increase in maritime traffic and renewable energy usage in the region; obviously these activities will create environmental stresses in the Mediterranean Sea.

Compared to previous years, the Mediterranean Sea is monitored better for the accidental spills or illegal discharges from maritime transport activities. The EU's satellite oil pollution monitoring service (CleanSeaNet), coordinated by The European Maritime Safety Agency (EMSA), has been a major contributor to these activities. There are still more things to be done in terms of verification and confirmation of the spills. In all European seas, 3,296 individual hydrocarbon pollution indications were reported in 2008. Among them, 875 of the cases were verified as a spill and 232 cases were confirmed. Unfortunately, most of the spill confirmations were done in other European seas. Most of the indications observed by the satellite in the Eastern Mediterranean were not verified. Actually this statement by itself may help to explain how hydrocarbon spills occur in the region. (www.emsa.europa.eu/Docs/adminboard/emsa_evaluation_final_report.pdf)

According to a Regional Marine Pollution Emergency Response Centre (REMPEC) report published in 2008, the Mediterranean is a major marine transit route. Vessel activity within the Mediterranean is projected to increase by 18% over the next 10 years. Overall, the number of transits, as well as vessel capacity, is expected to rise by 23%. Chemical tanker and container vessels will show the highest rates of growth in respect to port callings within the Mediterranean over the next 10 years, whilst increases in transits will be most pronounced in the product and crude tanker sector.

Marine litter, most of which degrades slowly, poses an additional threat to the Mediterranean Sea. The growing threat for the Mediterranean marine environment is mentioned in UNEP Regional Seas Programme reports (2008), among other regional seas.

All of these predictions about the maritime activities in the Mediterranean Sea highlight the need for monitoring and international collaboration to prevent marine pollution.

Closing the Communication and Collaboration Gap

Although all of the countries in the region have close economical, historical and cultural links with each other, there is a communication gap among the partners for pollution prevention. The communication and collaboration gap (very significant between southern and northern shore countries of the Mediterranean Sea) started to narrow with the initiation of de-pollution activities. The UNEP Programme for the Assessment and Control of Pollution in the Mediterranean Region (MED POL) and the Regional Activity Centre for Information and Communication of the Barcelona Convention (INFO/RAC) are collaborating for an information system that will be available to interested nation-

al and international parties. The system will include data from previous activities of Mediterranean pollution prevention programmes and will gather research results from future studies.
At this point it is not wrong to say that the message – *to address any problem related to environmental protection in the Mediterranean region, regional priorities, instead of national ones, must be favoured* – is received.

Conclusion

The Mediterranean Sea is on the verge of collapse, not because the region is listed among one of the oldest human settlements, which meant constant exploitation that extended into centuries, but because of conceptual differences among the nations occupying the region for the environment. The responsibility of effective and improved communication among Mediterranean neighbours must be fulfilled by all the nations of the region to eliminate biases.
Land-based pollutants of the Mediterranean region have mostly anthropogenic content. Since it is known that 70% of the wastewater produced in the region is not treated, the increase in human population and mobility can only complicate the problem if priority is not given.
Therefore, any sustainable solution to the pollution problem of the Mediterranean Sea must include the management of human population and their needs (including tourism), prevention of pollution from land-based sources and management of Mediterranean natural resources. The Horizon 2020 initiative presents integrated economical, social and technical tools to achieve de-pollution in the Mediterranean Sea.

The responsibility of effective and improved communication among Mediterranean neighbours must be fulfilled by all the nations of the region to eliminate biases

References

GALIL, B.S. & ZENETOS, A. "A Sea Change: Exotics in the Eastern Mediterranean Sea" in LEPPÄKOSKI, E. (ed.), *Invasive Aquatic Species of Europe: Distribution, Impacts and Management*. 2002.