

# Monitoring *the Mediterranean*

**Joan Albaiges and Eva Garnacho** assess what is known about the state of chemical pollution in the Mediterranean Sea and identify gaps in knowledge to be filled

The Mediterranean Sea is under considerable pressure from human activities taking place in its basin. Urbanisation of coastal zones, industrial activities, intensive agriculture, ports and shipping have been recognised to be the main driving forces behind marine pollution, risking the impairment of natural resources. Since the Barcelona Convention and the Mediterranean Action Plan (MAP) were adopted, action has been taken to improve knowledge of the sources and fate of pollutants in the sea.

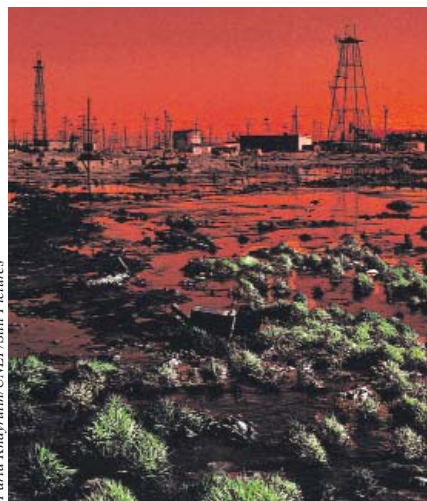
Monitoring of sources, environmental concentrations and effects of pollutants in the Mediterranean has been a cornerstone of the MEDPOL programme, the MAP's environmental assessment component. MEDPOL monitoring has covered heavy metals (mainly mercury and cadmium) and halogenated hydrocarbons (mainly PCBs and DDTs) in marine biota, and petroleum hydrocarbons in seawater. It has produced a database, populated with more than 50,000 data and over 100 technical reports, to assess the state of pollution from different compounds (such as trace metals, petroleum hydrocarbons, organo-halogen, organotin and organo-mercury compounds, etc. The technical reports both assessed environmental concentrations and biological effects and identified hot spots and sensitive areas – providing diagnostic tools and a valuable source of information.

On the basis of available data, chemical pollution seems localised at the Mediterranean coast and associated with urban, industrial and riverine discharges, being especially critical in harbours and coastal lagoons. However, chemical pollution also exists on a basin-wide scale and can be associated with atmospheric deposition of contaminants (such as mercury and zinc) and inputs from maritime transport (such as oil).

Decreasing trends of organochlorinated pesticides (such as DDT and lindane) have been generally observed in the biotic and abiotic marine compartments over the last

20 years, and this is consistent with regulatory restrictions on their production and use. Conversely, PCBs and PAHs levels remain more or less constant in many places, indicating that they have a steady source in the region, and that their inputs need to be better managed.

Mercury, copper, lead, and zinc are the principal inorganic pollutants reaching the Mediterranean Sea. Loads are generally higher than in other European seas, but in some cases arise from natural processes in the region and do not exhibit definite trends over time.



Farid Khanjari/UNEP/Sill Pictures

Monitoring of biota (invertebrates, vertebrates and seabirds) has been undertaken in all basins, with special emphasis on the northern ones. The results show bioaccumulation of the pollutants studied. Furthermore, biomarker responses studies in bivalves and benthic fish in certain coastal areas show an impact which could be related to a wide range of contaminants. Imposex in molluscs has also been widely observed, indicating impacts from tributyltin (TBT).

The monitoring activities have been in place for a long time, but we have not yet achieved comprehensive knowledge of the state of pollution in the Mediterranean. There are significant geographical data gaps, particularly in the South and South-

eastern basins, and lack of consistent temporal trends. Data on emerging pollutants and endocrine disruptors are also very limited.

Linking monitoring with policy decisions is still in its infancy. Any environmental monitoring and data gathering programme aims to provide reliable, relevant and updated information in a consistent way to support assessments and inform environmental managers and policy makers.

Implementing an ecosystem-based approach for managing the Mediterranean Sea requires assessing environmental quality and analysing the environmental pressures. Such analysis needs to consider human activities that lead to pressures on the environment. Indicators of these pressures are: direct and indirect inputs; disposal of industrial and domestic wastes; riverine discharges; operational and accidental discharges from shipping activities; atmospheric emissions and deposition; and diffuse inputs (such as leaching from cultivated land).

Many uncertainties remain regarding the loads received from rivers, the atmosphere, and diffuse sources – and how these have changed over recent years. As a result, changes in the state of the environment that may lead to impacts cannot be related back to the origin of the problem. Indicators for assessing environmental quality – such as environmental quality standards (EQS), background / reference concentrations (BRC), ecotoxicological assessment criteria (EAC), and ecological reference indices (ERI) – are necessary and still have to be developed for the Mediterranean.

The coastal regions of Mediterranean countries are one of their most precious present and future assets; so Contracting Parties should make every effort to ensure their sustainable and sound management. This implies enforcing an effective monitoring system in the region to maintain the health of the marine ecosystem, alongside appropriate human use, for the benefit of current and future generations ■

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