

## Monitoring Strategies of Marine Pollution

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## ABSTRACT

"Monitoring", in the context of the assessment and protection of the marine environment, has been defined as the repeated measurement of an activity or a contaminant or of its direct or indirect impact. In practical terms, monitoring can fall within the following three categories:

- monitoring for regulation purposes (control);
- monitoring of levels and trends;
- monitoring for scientific purposes.

The monitoring for scientific purposes is generally the main step for establishing monitoring of levels and trends which in turn provides useful information for defining the parameters of control (monitoring for regulation purposes).

In order to define the monitoring programmes of the marine environment, the following operational objectives, which have a high degree of universality, must be taken into consideration:

- Protection of human health;
- Protection of marine life and its environment;
- Assessment of levels and trends.

Monitoring activities concerning the quality of the marine environment were developed around the world as the scientific knowledge of the problems which had given rise to such activities was acquired. In fact sometimes monitoring activities preceded such knowledge. It is thus legitimate to review the strategies, underlying monitoring programmes. However, such a review and possible revision presupposes a critical look at the results obtained in pursuing the objectives set.

In this context, the author has carried out an in-depth assessment of the monitoring component of the "Long term monitoring and research programme on pollution in the Mediterranean Sea" (MED POL Phase II) of the United Nations Environment Programme (UNEP).

The main recommendations based on this assessment are the following:

- Monitoring objectives must be reformulated in a more coherent way in order to make planning more comprehensible and effective;
- It is necessary to reaffirm the crucial role of the monitoring of pollution sources;
- The first essential phase is to establish beyond the shadow of a doubt the baseline contamination levels, before establishing permanent programmes for certain areas of special concern;
- A biological effects monitoring programme must be devised and implemented within the MED POL framework;
- The quality assurance programme for results must not only be continued but reinforced as well;
- At the same time, all research efforts which might add to the general knowledge of the marine environment must be encouraged in order to promote the optimization of monitoring programmes.

## Pollution Problems in the Mediterranean and Relevant Research Priorities

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## ABSTRACT

Concern among the scientific community about the deterioration of local Mediterranean environments since the early 1960s induced FAO and ICSEM to convene a series of international conferences which stimulated pollution research in the Mediterranean. Attention appears to have been focussed at first on the impacts of urban effluents, radioactive, oil and thermal pollution and, later, on trace metals and synthetic organics.

Soon, numerous pollution research projects, either national, bilateral or sponsored by the EEC or UN Agencies were initiated in several parts of the Mediterranean. Some examples are:

- ASCOP, the Italian-Yugoslav Cooperative Project in the Adriatic Sea,
- EROCS, the Project on the European River Ocean System,
- MAST, the Marine Science and Technology Programme, (the latter two EEC sponsored)
- POEM, the Physical Oceanography of the East Mediterranean, and
- PRIMO, the International Research Programme in the Western Mediterranean sponsored by IOC and ICSEM.

Coordination between these numerous research efforts is still lacking. A recent World Bank initiative in the Mediterranean is directed at management and protective measures. The MED POL Programme launched by UNEP in 1975 remains the only co-ordinated research and monitoring programme encompassing all Mediterranean countries.

In spite of many limitations, the Pilot phase of this programme developed the infrastructure, induced baseline pollution research and laid the ground for Phase II.

Phase II encompassed twelve research activities and maintained an assistance component, but no order of priority was assigned to the research areas. Substantial scientific information has been generated on epidemiological hazards, toxicity and bioaccumulation of selected substances, eutrophication and abnormal plankton blooms, ecosystem modifications and on the biogeochemical cycle of specific pollutants. The quality and relevance of the data, however, are uneven and the geographical coverage inadequate. Some programme adjustments are needed for the coming MED POL Phase. They should aim at the selection of a smaller number of priority research areas, the quality assurance of the data and a better geographical coverage. The choice of priority areas should obey certain basic criteria:

- (a) the geographical-scale: Mediterranean-wide problems should be addressed in priority;
- (b) the time-scale: longer time-series are required to differentiate background trends from slow anthropogenic changes;
- (c) the scientific data-base: a multidisciplinary data-base on the coastal oceanographic processes should be developed;
- (d) the socio-economic pressure: the assessment of the inevitable consequences of the anticipated demographic stress on Mediterranean ecosystems is one of the first priorities;
- (e) the implementation of the Protocols and their Annexes: research should aim at the continuous improvement of the Annexes by updating them or proposing amendments as appropriate.

Taking in consideration the recommendations of Mediterranean scientists, the past experience of MED POL and the conclusions of GESAMP on the State of the Marine Environment, six priority research areas are proposed:

1. The comparative study of a specific Mediterranean and basin-wide ecosystem, the Posidonia community.
2. Eutrophication, long-term nutrient build-up and the dynamics of abnormal plankton blooms.
3. The impacts of anticipated global climate change and the development of Mediterranean models.
4. The coastal oceanographic processes, fluxes and biogeochemical cycles.
5. The air-borne fluxes of pollutants in the Mediterranean basin.
6. The consequences of present and anticipated coastal and inland developments and the resulting irreversible damages to the coastal zone.