IS THERE A NEED FOR DEVELOPING AN INTEGRATED BASIN-WIDE MONITORING NETWORK TO ENHANCE SUSTAINABLE DEVELOPMENT IN THE MEDITERRANEAN SEA?

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Abstract

This paper discusses how improving the expertise and capacity of a network at the Mediterranean basin scale would allow reliably surveying and monitoring key pollutants in the coastal Mediterranean environment. This would enhance regional capacity to (1) answer the pressing international demand for assessing the trends in land-based inputs of pollutants and (2) comply with seafood safety guidelines.

Keywords : Coastal Management, Pollution, Monitoring, Ecotoxicology.

Many natural and anthropogenic sources of chemical contamination occur within the Mediterranean basin (e.g., widely distributed petrol and mining industries, bauxite processing and geothermal activity in the NW basin, phosphate rock processing along African coasts, intense industrial trans-Mediterranean shipping activities, domestic waste waters from large coastal cities). In addition, the Mediterranean is undergoing striking demographic increases during the summer tourist season, with consequential striking increases in contaminants entering coastal systems through treated and untreated sewage [1].

Although the Mediterranean is surrounded by countries with important industrial, cultural, and regulatory differences, it is nevertheless characterized by a relative geographical homogeneity regarding the use of the coastal zone. Indeed, the tourism-related economy, welfare and fishery activities of human populations rely substantially on the quality of coastal waters. Hence, the aforementioned contamination sources represent threats to the quality of the marine environment and can therefore entail major socio-economic impacts (e.g. tourism, marine resource safety, public health issues). It is thus of prime concern to warrant the preservation of the Mediterranean coastal water quality. This is clearly demonstrated by the various international conventions and programmes (e.g. Barcelona Convention, UNEP-MAP, EU Horizon 2020) and scientific actions (e.g. UNEP-MEDPOL monitoring activities, CIESM Mediterranean Mussel Watch, IAEA Technical Cooperation Projects, EU/Ifremer Mytilos and Mytimed Projects) that are specifically dedicated to the Mediterranean region, some of which from as long as three decades.

These programmes substantially increase available information on the Mediterranean coastal environment available to the scientific community and decision makers. However, reliable field data remain sparse for wide coastal areas, especially along the southern and eastern shores. Nevertheless, the emergence of new threats (hundreds of new molecules are produced every year) and the evidence that those already well known may be more seriously and globally affecting the environment than formerly thought, stress the need to develop integrated strategies to protect both the environment and human health. To do so requires the involvement of the whole region. Indeed, hydrodynamics of the Mediterranean is such that what is happening in the Northern, Western, Southern or Eastern areas will be eventually transferred -even if "diluted" and delayed [2]- to any other part of this semi-enclosed sea. Hence, trying to solve any pollution-related problem requires considering the Mediterranean at the basin-wide scale. This in turn requires the involvement of many partners, working in close collaboration to reach common objectives.

As far as the Mediterranean is concerned, the common environmental objectives to be met should be those set up by the European Union that is undeniably the regulatory driving force in the region, with its long lasting existing legislative background on environment and seafood quality, recently re-enforced by the Water Framework Directive (WFD). In particular, the WFD [3] is implementing EU resolutions to reach the ambitious -but necessary- objective to drastically decrease pollution levels. This objective is also clearly articulated in the EU Horizon 2020 Action Plan [4] aiming at de-polluting Mediterranean coastal waters by 2020. Monitoring the long-term effects of EU environmental policy on the Mediterranean coastal water quality requires, obviously, a large-scale, active network using standardised methodologies and indicator end-points carefully selected. In addition, the unique characteristics of the Mediterranean allow for considering in parallel the bio-monitoring of one or several organisms out of a set of nearly ubiquist bioindicator species such as the mussel *Mytilus galloprovincialis*, the edible sea urchin *Paracentrotus lividus*, or the endemic phanerogam *Posidonia oceanica* [5, 6].

Meeting the ambitious environmental objectives of the EU would require an equally ambitious prospective networking issue. Such a network should have the capacity to reliably survey and monitor key toxic chemicals, biotoxins and pathogens in the environment and seafood. This structure could be achieved rapidly and with high probability of success by coupling, reinforcing and equipping existing networks, as those promoted and supported by the international organisations active in the Mediterranean, viz., UNEP (via its Programme for the Assessment and Control of Pollution in the Mediterranean, MEDPOL), IAEA (via the activities of its Technical Cooperation Department [7] and its Marine Environment Laboratories), CIESM (via its Mussel Watch), and EU (e.g. via the Short and Medium-Term Priority Environmental Action Programme, SMAP, and the National Environment Agencies). Indeed, these organisations are already engaged in bi-lateral collaborations (e.g. CIESM - IAEA-MEL; UNEP-MEDPOL - IAEA-MEL; EU - UNEP-MEDPOL). Thus, the main requirement to generate a multi-lateral, synergetic effort would be to intensify and cross-cut current cooperations. Bringing together their long lasting experience in collaborating with Mediterranean countries, sound expertise in transfer of knowledge, in technical training and capacity building, as well as in management of large inter-comparison exercises and databases would result in a synergetic partnership able to generate the necessary task force for building one basin-wide, integrated, multi-disciplinary and sustainable network of teams.

Beside providing Mediterranean countries with technical expertise and analytical capacity, the outcomes of such an operational network will (1) provide End-Users (Mediterranean countries, EU, UNEP-MEDPOL) with a unique, integrated and standardised tool (the network) equipped to assess long-term changes/improvements in the quality of the Mediterranean coastal environment (including seafood of commercial interest), (2) substantially improve the knowledge on the contamination of the coastal environment with reliable and inter-comparable data on key pollutants at the Basin-wide scale (key information for the assessment of temporal trends and for the decision on actions to be taken and legislation to be enforced), (3) consolidate a reliable and sustainable related database, (4) improve multi-lateral communications among Mediterranean countries, (5) improve national expertise to answer international demand on marine pollution regulation (with potential socio-economic impact on export of seafood complying with international guidelines) and (6) promote local, more fundamental, applied or prospective pollution-related research that can benefit from local enhanced expertise and/or equipment.

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