Trace element contamination severity of coastal waters: A first bioassessment at the scale of the whole Mediterranean

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Human activities generate large volumes of waste that supply marine coastal environments in pathogens, organic matter, nutrients and toxicants. Among the wide range of toxicants are trace elements. Since the latter are toxic for aquatic organisms from threshold levels and as they are therefore likely to cause multiple damage to the population, the community and the ecosystem levels, their environmental occurrence has to be accurately monitored in order to guarantee appropriate environmental management of coastal zones and to preserve marine coastal ecosystems and the goods and services they provide. In the framework of the STARECAPMED project, the present study aimed to monitor, for the first time, the coastal contamination of the entire Mediterranean by As, Ag, Cd, Cu, Hg, Ni and Pb, using *Posidonia oceanica* as bioindicator species. But sustainable coastal management also requires the development of appropriate contamination classification systems intended, among other purposes, for environmental managers and policy makers. The combined utilization of several complementary monitoring tools, *i.e.* water quality scale, pollution index (TEPI and TESVI) and spatial analysis (PCA, CA, correlation analysis and GIS mapping) successfully led to the development of an operational classification system of this kind. In particular, the mapping of the trace element contamination according to a new proposed 5-level water quality scale using the quantile method precisely outlined the contamination severity along Mediterranean coasts and facilitated interregional comparisons. The reliability of the use of *P. oceanica* as bioindicator species was further again demonstrated through several global, regional and local detailed case studies. In conclusion, holistic approaches such as developed in the present study should be privileged to accurately monitor the contamination rate of coastal waters and to transfer relevant information on this composite problem to environmental managers and policy makers.