

Development of marine sediment quality guidelines for evaluation of heavy metals contamination in Croatia

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Introduction: Most important tool for the assessment of contamination in marine sediments is Sediment quality guidelines (SQGs). Such guidelines can have a high predictive ability and can be a vital tool for identifying areas with potentially adverse biological effects but are not definitive indicators of toxicity [1].

The use of SQGs has been the one of the most important regulatory tools for sediment management for decades. The hypothesis that a concentration threshold could be identified for chemicals in sediments below which aquatic life was not harmed was first proposed as part of defining criteria to assess dredged material for disposal at sea by the USEPA and US Army Corps of Engineers in the early 1970s and since then it was widely used in different SQGs around the globe [2].

Methods: The derivation of SQGs is largely based on either an empirical correlation of effects data for co-occurring sediment contaminants, mechanistic predictions using equilibrium partitioning combined with water quality guidelines, or a combination of both empirical and mechanistic approaches to arrive at a consensus-based guideline.

Unfortunately, there is no unique international SQGs that could be applied throughout the world. Different countries have proposed very specific SQGs, partially due to large variation of natural environmental concentrations, and partially due to specific pollution problems they face. In this paper we will propose Croatian SCGs for several chemical elements, some of which show increasing trend of concentrations in surface sediment evident from long term monitoring at several different locations.

Results: Concentrations of some elements like arsenic and chromium are naturally elevated in Croatian coastal sediments. It is essential to distinguish between natural and anthropogenic concentrations in order to define meaningful SQGs. The main aim of this research is to define sediment standards for selected heavy metals for protection of marine environment from excessive pollution. The standards will be evaluated based on more than 700 sediment samples collected along the Croatian coast [3]. Collected samples were designated by categories (bay, beach, settlement, port, marina pier, marina

service area, other) in order to obtain a quick overview of the range of concentrations in relation to different marine environments and human activities.

Discussion: This is first attempt to define Croatian SQGs for toxic elements in marine sediments together with a brief analysis of the environmental quality according to different types of the marine environment and human activities. This is done in purpose to set a baseline for future analysis of contamination level trends in sediments and for improving the knowledge of ways in which pollution occurs in sediments. This is necessary for proposing strategies and actions which will ensure that levels of contaminants will not significantly increase in long term period.

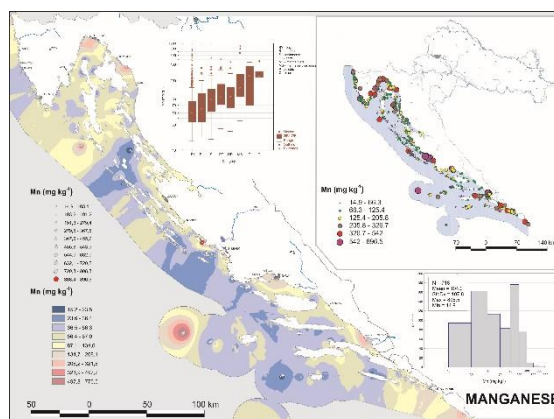


Fig. Distribution of Manganese in Croatian marine environment

References:

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