



## Morpho-bathymetric acoustic surveys as a tool for mapping traces of anthropogenic activities on the seafloor: The case study of the Taranto area, southern Italy

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### ABSTRACT

In this study, an investigation procedure for mapping the traces of anthropogenic activities on the seafloor is proposed. Analyses are based on the interpretation of acoustic data (Multibeam Echosounder and Side Scan Sonar) acquired in the Taranto coastal area. Specific GIS tools supported the acoustic data analysis, interpretation, and mapping. These analyses highlighted that the seafloor of both coastal basins included in the investigated area is affected by a high distribution of traces related to different anthropogenic activities such as dredging, shipping, and mussel farming activities. Such kind of traces resulted efficiently detectable from morpho-bathymetric acoustic data. In particular, groove traces resulted highly distributed in both basins, while sunken mussel farm facilities are widely distributed in the Mar Grande basin. The results highlight as acoustic surveys represent a useful tool for orienting effective coastal management actions. This study points out how geophysical surveys support the geo-environmental characterization of highly urbanized coastal sectors.

Coastal areas characterized by the presence of industrial plants and harbours are strongly impacted by anthropogenic activities such as dredging, trawling, and dumping, as well as shipping-related activities, whose consequences led to seafloor morphometric modifications and landform alteration (Halpern et al., 2008; Crain et al., 2009; Ausili et al., 2020). In addition, seafloor and coastal sediments are also affected by the presence of litter items of variable size (from nano/micro to mega litter), whose origin can be attributed to different marine and terrestrial sources (Rech et al., 2014; Galgani et al., 2015; Scotti et al., 2021; Terzi et al., 2020). In this context, an integrated characterization of the seafloor of high-urbanized coastal sites represents a key factor for the identification of marine sectors requiring priority remediation actions and effective management strategies (Tursi et al., 2018). The Mediterranean basin hosts a high number of industrial plants and several areas considered hot-spot, i.e., areas where heavy industries (e.g., petrochemical plants and refineries) and large commercial harbours are concentrated, are mainly located in coastal sectors characterized by a high population density (EEA, 2009, 2014). In Italy, 17 of the 42 Sites of

National Interest (SINs), which identify areas requiring urgent remediation and reclamation actions and whose management is in charge of the Italian Ministry of Environment, Land and Sea (now Ministry for the Ecological Transition - MiTE), include in their perimeter coastal, marine, and lagoonal areas, occupying a total surface of 78,000 ha (MiTE, 2021). At the national level, the Italian Central Institute for the Scientific and Technological Research Applied at the Sea (ICRAM, now Institute for the Environmental Research and Protection - ISPRA) has been working since 2004 on the assessment of sediments quality and the spatial distribution of inorganic and organic pollutants in SINs areas by applying a tailored characterization protocol (Ausili et al., 2012, 2020). To evaluate the magnitude of the contamination of marine sediments from coastal SINs, the results of chemical analysis were compared with reference concentration values available at both the national level (defined by ICRAM in 2004) and at site-specific level (Italian Legislative Decree 152/2006). Nevertheless, the investigation protocol did not account for the assessment of the traces of anthropogenic activities on the seafloor morphology, considered as the indirect impact of maritime activities

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