IMPACTS OF ANTHROPOGENIC POLLUTANTS ON BENTHIC BACTERIAL COMMUNITIES IN MEDITERRANEAN PORT SEDIMENTS

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Ports and marinas are part of the logistics chain and the transport networks with a decisive role in the development of coastal areas [1]. They are hot spots of polycyclic aromatic hydrocarbons and metals with pollutant levels usually higher than the adjacent coastal zones. Sediments act as a long-term source of pollutants, thereby altering the diversity and functionality of the aquatic ecosystem. Several port activities (e.g. dredging) imply sediment disturbance, thus determining changes in environmental conditions in benthos, resuspension of particle bound contaminants, and contaminant mobilization to the water column.

Within the EU legislation, the peculiar features of ports justify their designation as Heavily Modified Water Bodies and the development of monitoring programmes specific and adequate to their characteristics [2]. Existing sediment quality assessment tools include chemical analyses combined with ecotoxicological approach and macrobenthic community descriptors, as ecological indicators of sediment quality [3]. Currently, an ecological approach based on the analysis of bacterial communities has not been still established for regulatory purposes.

The general objective of this work was to evaluate the impacts of anthropogenic pollutants on the benthic bacterial communities in sediments of Mediterranean tourist ports with the final aim of developing an ecological approach based on Bacteria indicators for sediment quality monitoring and remediation. The specific aims of the present study were: i) analysis of community composition of benthonic Bacteria by NGS of 16S rRNA gene, ii) comparison of results obtained by fingerprinting with T-RFLP and NGS, iii) linking between pollution parameters and bacterial communities in port sediments, iv) application of the information derived by NGS of bacterial communities to the rational planning of bioremediation treatments in sediments.

The three investigated Mediterranean ports (Cagliari, Italy; El Kantaoui, Tunisia; Heraklion, Greece) are characterized by marked difference in their pollution status by polycyclic aromatic hydrocarbons and metals [3, 4].

The analysis of benthic bacterial communities by NGS demonstrated that the port site was the main factor structuring communities in superficial sediments. The bacterial community in sediments collected near the shipyard in the Heraklion port, displayed a peculiar composition, which could be ascribed to the low redox potential, the high percentual of silt and clay and the high levels of aliphatic hydrocarbons.

Copper, an anthropogenic metal used as anti-fouling and introduced into the marine ecosystems by shipping activities, seems to be an important driver structuring bacterial communities. It is notable that the analysis of samples collected during coordinated sampling campaigns has demonstrated that the macrozoobenthos community is also strongly affected by Cu [3].

Literature

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