

Natural and anthropogenic contamination processes in the sediments of the Sacca di Goro lagoon (Po River delta, northern Italy)

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INTRODUCTION & AIM

The definition of heavy metal content in lagoon sediments plays a critical role in distinguishing between natural contamination (geohazard) and anthropogenic impact, and is essential for assessing the risk posed by these pollutants in the aquatic environment.

In particular, the Sacca di Goro lagoon, located in the Po River delta (northern Italy), represents a significant area of interest due to its natural and economic value.

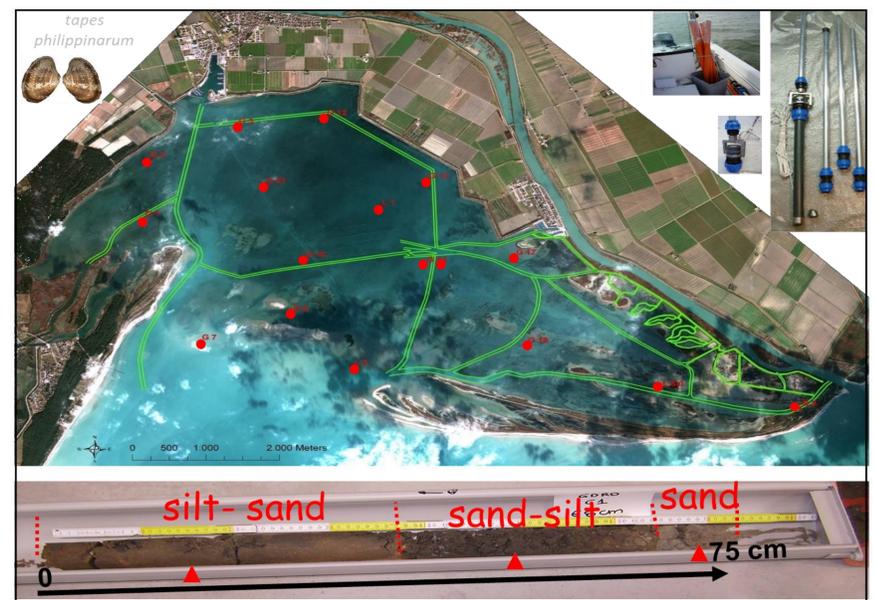
Spanning an area of approximately 20 km², with an average depth of 1.5 meters and salinity between 13 to 32‰, the lagoon is not only crucial for its biodiversity but also plays a pivotal role in regional aquaculture, particularly for mussels and clams. In this lagoon system, understanding the quality of the sea-bottom sediments is fundamental not only for the health and growth of cultivated

species but also in addressing potential bioaccumulation problems of heavy metals that may impact both wildlife and human health. By evaluating the qualitative status of the sediments, we can develop effective strategies for sustainable environmental management and safeguard productive aquaculture activities while minimizing risks to the ecosystem.



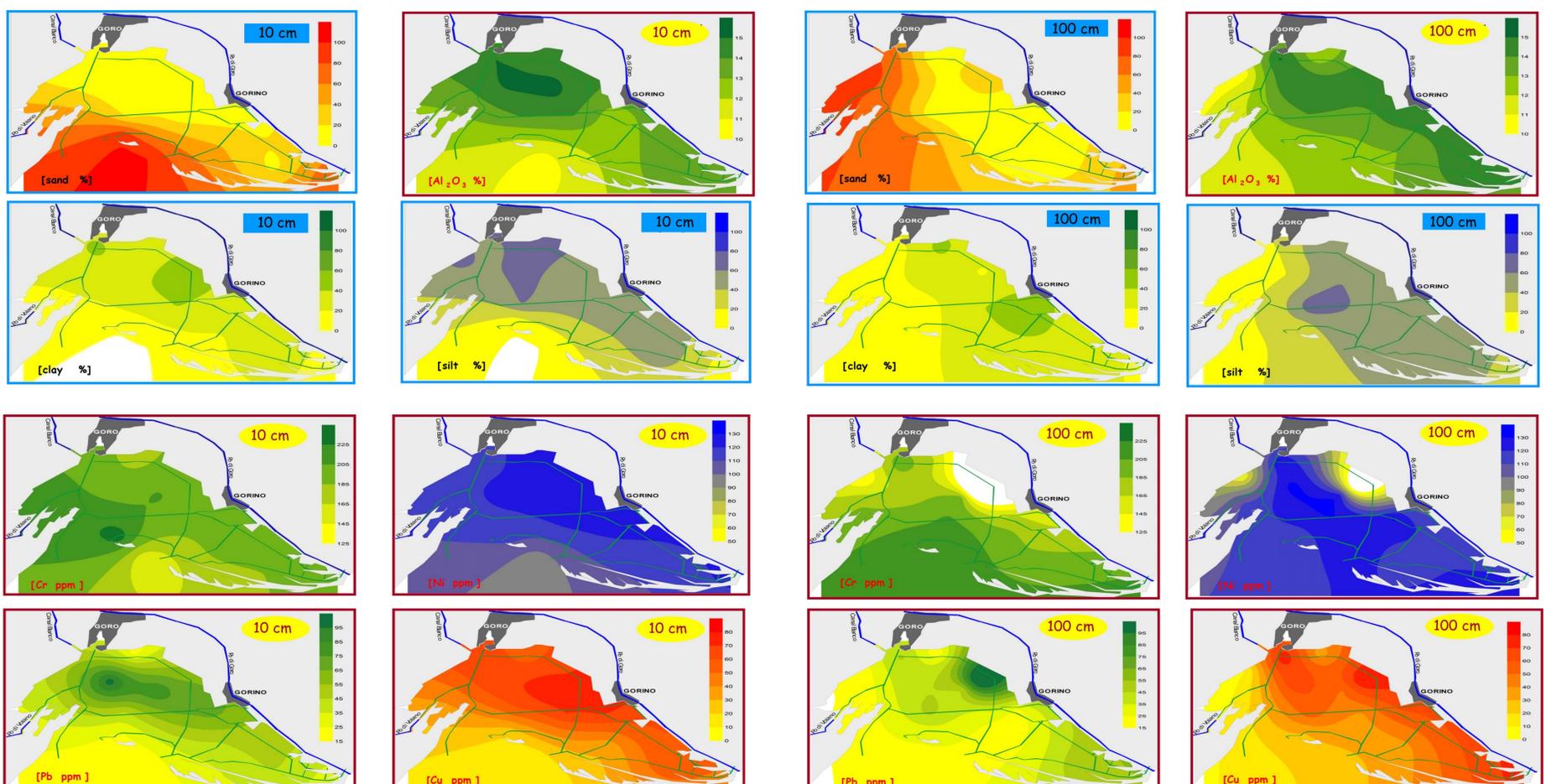
METHOD

Seventeen continuous core drilling surveys were conducted, with depths ranging from 100 to 200 cm, distributed evenly across the lagoon area. A total of 70 sediment samples were collected and analyzed for grain size composition, organic matter content, and concentrations of various elements such as SiO₂, TiO₂, Al₂O₃, Fe₂O₃, MgO, MnO, CaO, Na₂O, K₂O, Ba, Ce, Co, Cr, La, Nb, Ni, Pb, Rb, Sr, Th, V, Y, Zn, Cu, Ga, Nd, S and Sr.



RESULTS & CONCLUSION

The comprehensive dataset obtained from these analyses enabled us to achieve several important goals: i) defining the overall environmental quality of the sediments, ii) identifying areas with the highest contamination risks, iii) establishing a relationship between grain size distribution and chemical concentrations, and iv) emphasizing the local occurrence of natural pollution phenomena linked to metals such as chromium (> 50 ppm) and nickel (> 30 ppm), as well as human-induced contamination from lead (> 30 ppm) and copper (> 60 ppm).



This study provides valuable information for the formulation of effective management policies that can mitigate the risks posed by both natural and anthropogenic pollution, while ensuring the sustainable development of the aquaculture industry and the protection of the broader ecosystem in the Po River delta