

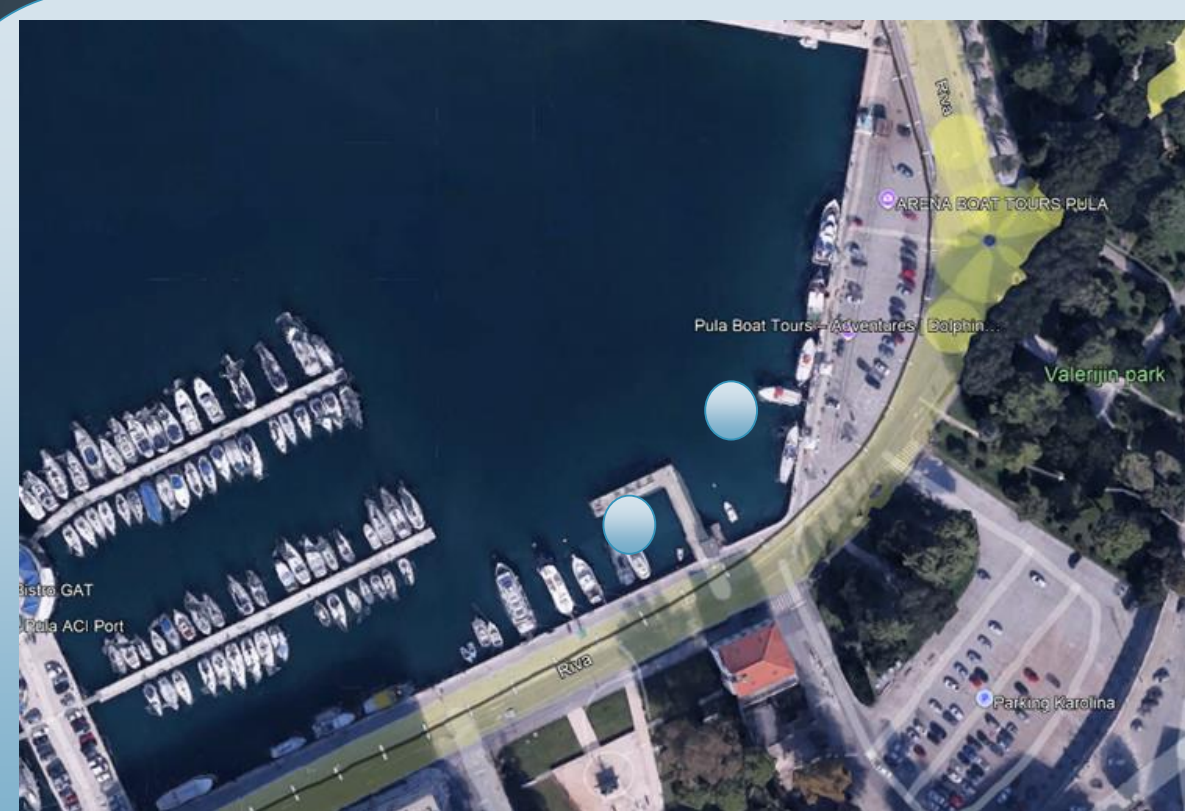
Contamination in the Invasive Pacific Oyster (*Magallana gigas*) in the Northern Adriatic

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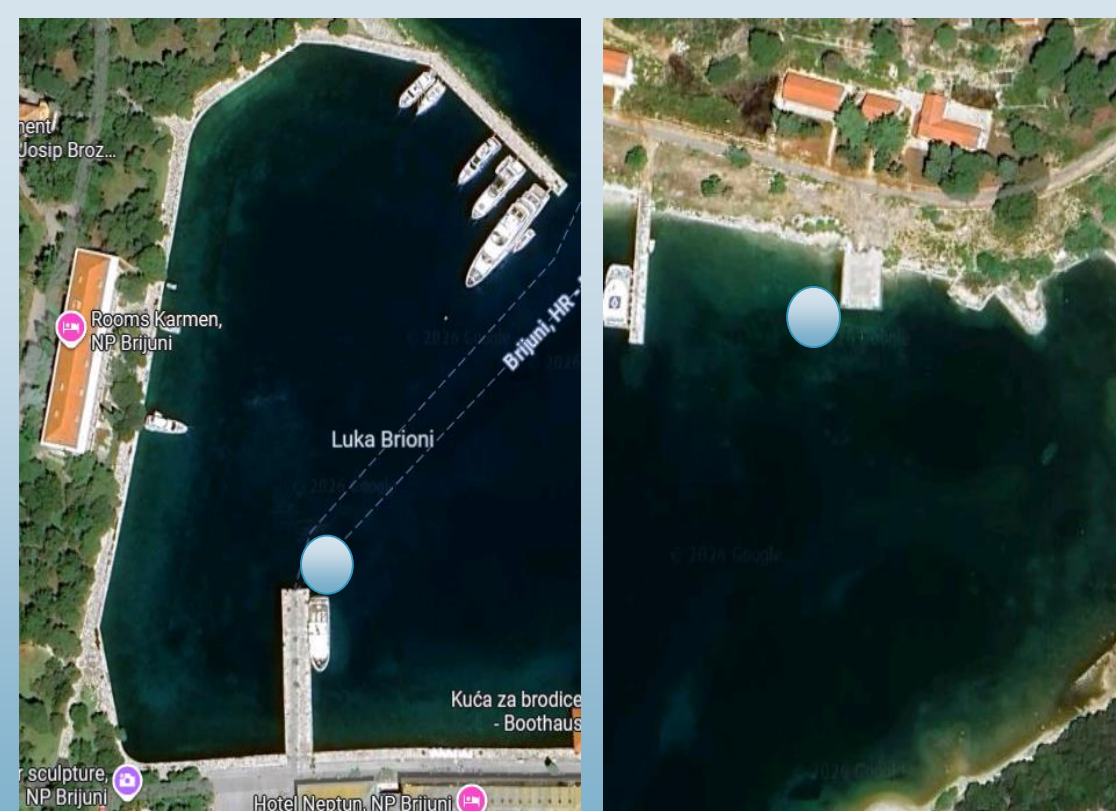
INTRODUCTION

Microplastic contamination of marine ecosystems represents a major global environmental challenge, posing threats to both biodiversity and associated economic activities. Bivalves are widely utilized as sentinel species for monitoring local pollution. Beyond native species, non-indigenous and invasive species such as the Pacific oyster (*Magallana gigas*) can also serve as valuable bioindicators for assessing microplastic pollution in the Adriatic Sea. In this study, *Magallana gigas* was used as a model organism to evaluate environmental microplastic contamination within Natura 2000 protected areas in the southern Istrian Peninsula (Northern Adriatic). The findings aim to highlight the dual role of invasive species as both ecological challenges and functional monitoring tools in marine management. Ultimately, this research supports the development of targeted conservation strategies and sustainable management framework for sensitive Adriatic ecosystems.

MATERIALS AND METHODS



Two sampling locations of Pacific oysters in Pula Harbour (blue spots) location 1 (left) and location 2 (right)

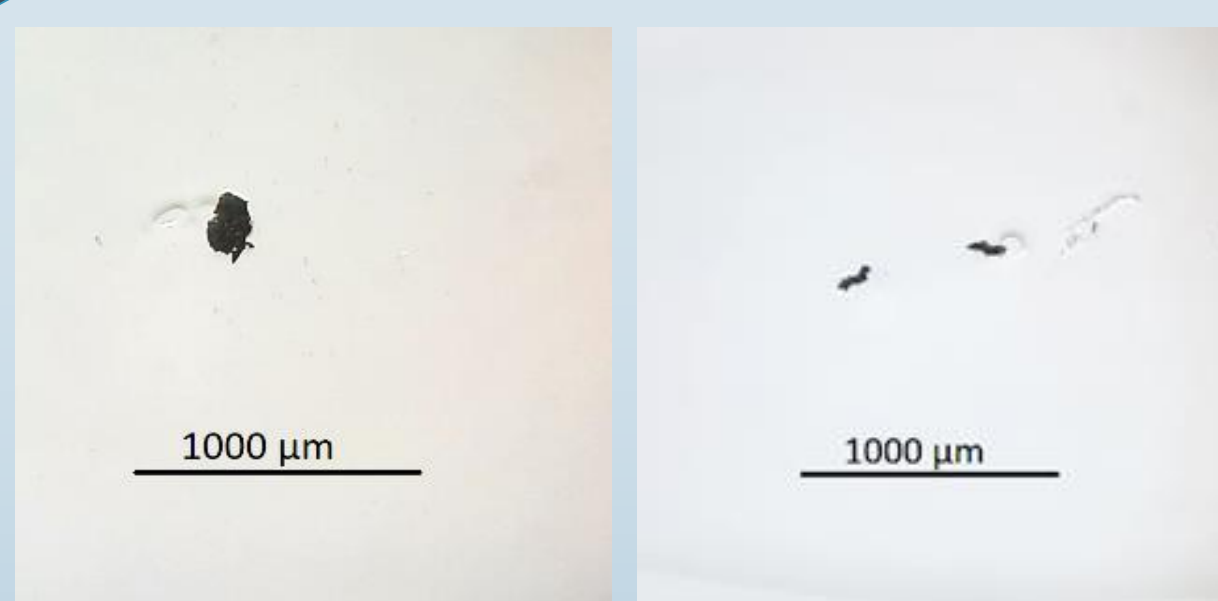


Two sampling locations of Pacific oysters in Brijuni National Park (blue spot), Veli Brijun (left) and Mali Brijun (right)

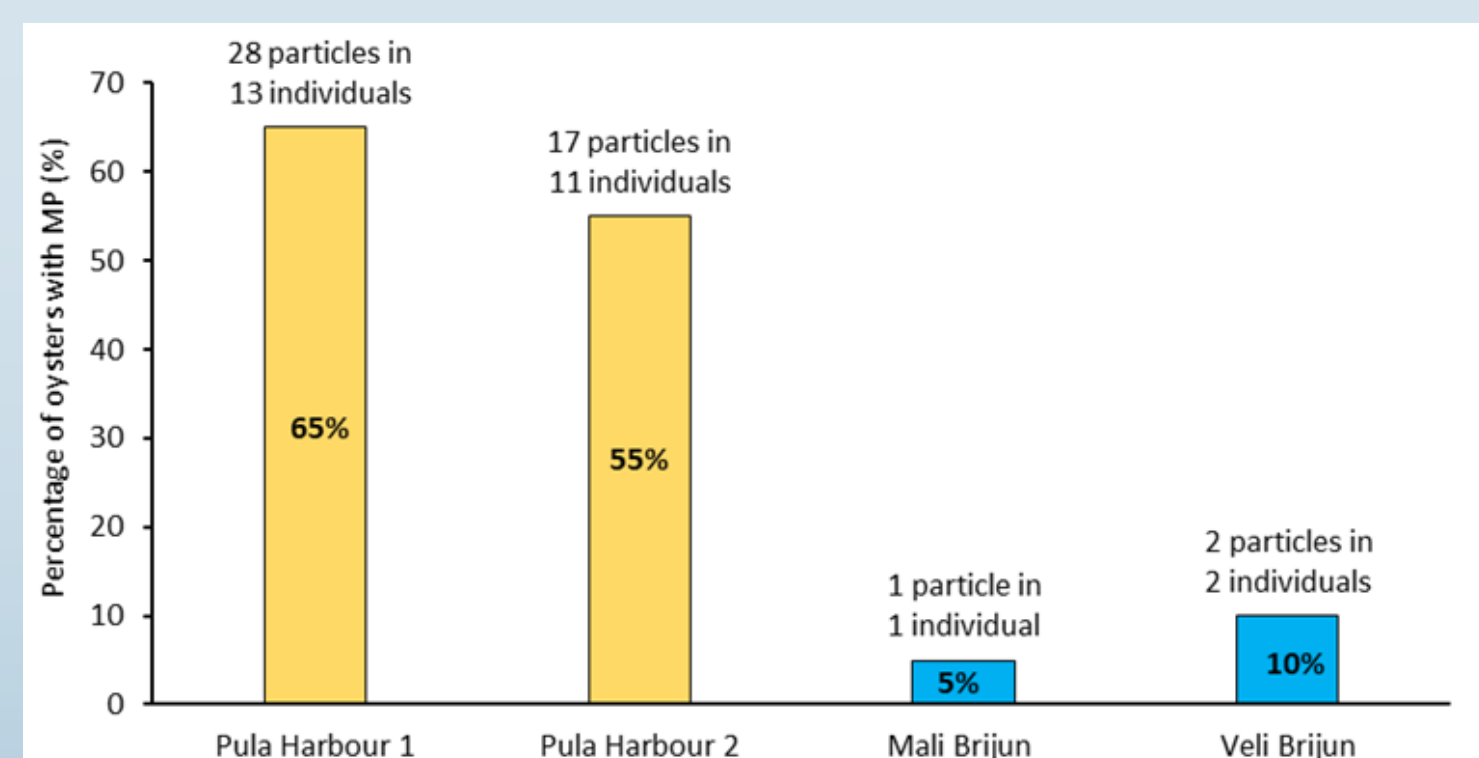


To evaluate local contamination levels, samples of the invasive Pacific oyster (*Magallana gigas* Thunberg, 1793, N = 80) were collected from Pula Port and the protected marine area of Brijuni National Park, followed by whole soft-tissue digestion using 10% KOH to isolate microplastic particles. The isolation was carried out according to the GESAMP (2019) protocol.

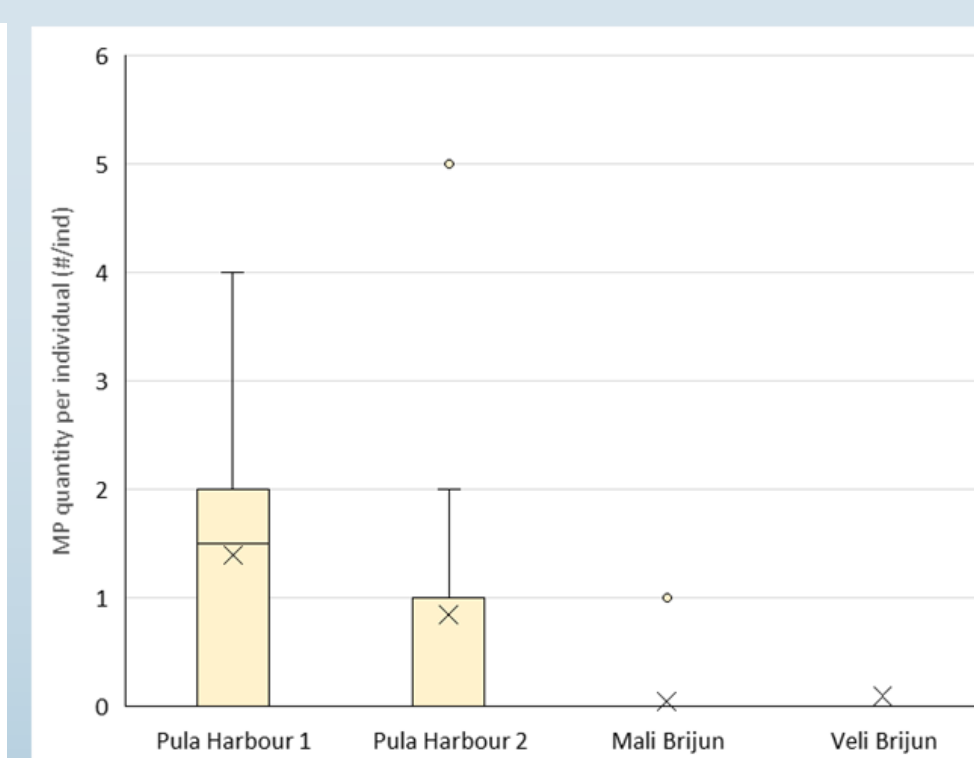
RESULTS



MPs isolated from oysters from Pula Harbour



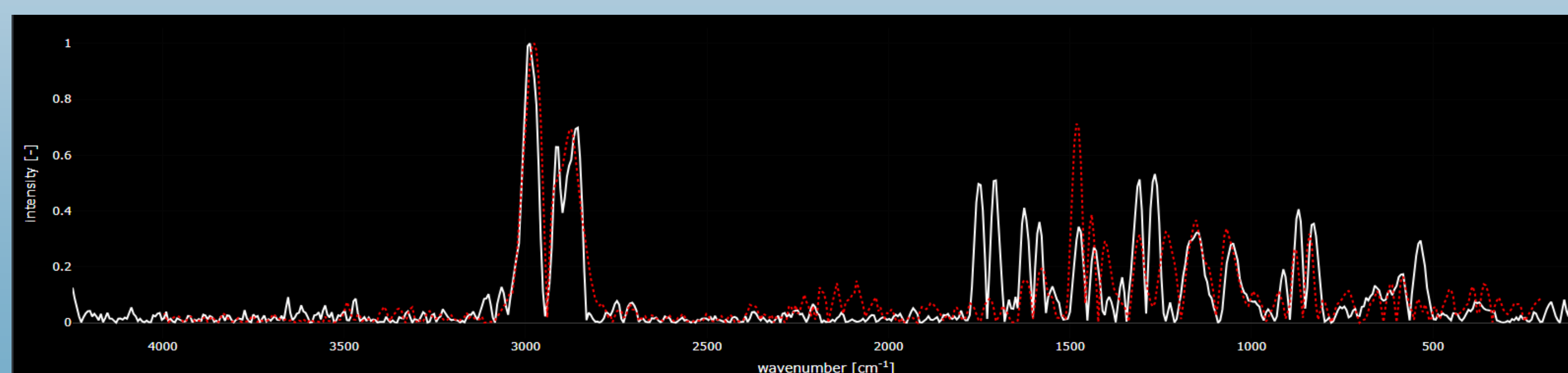
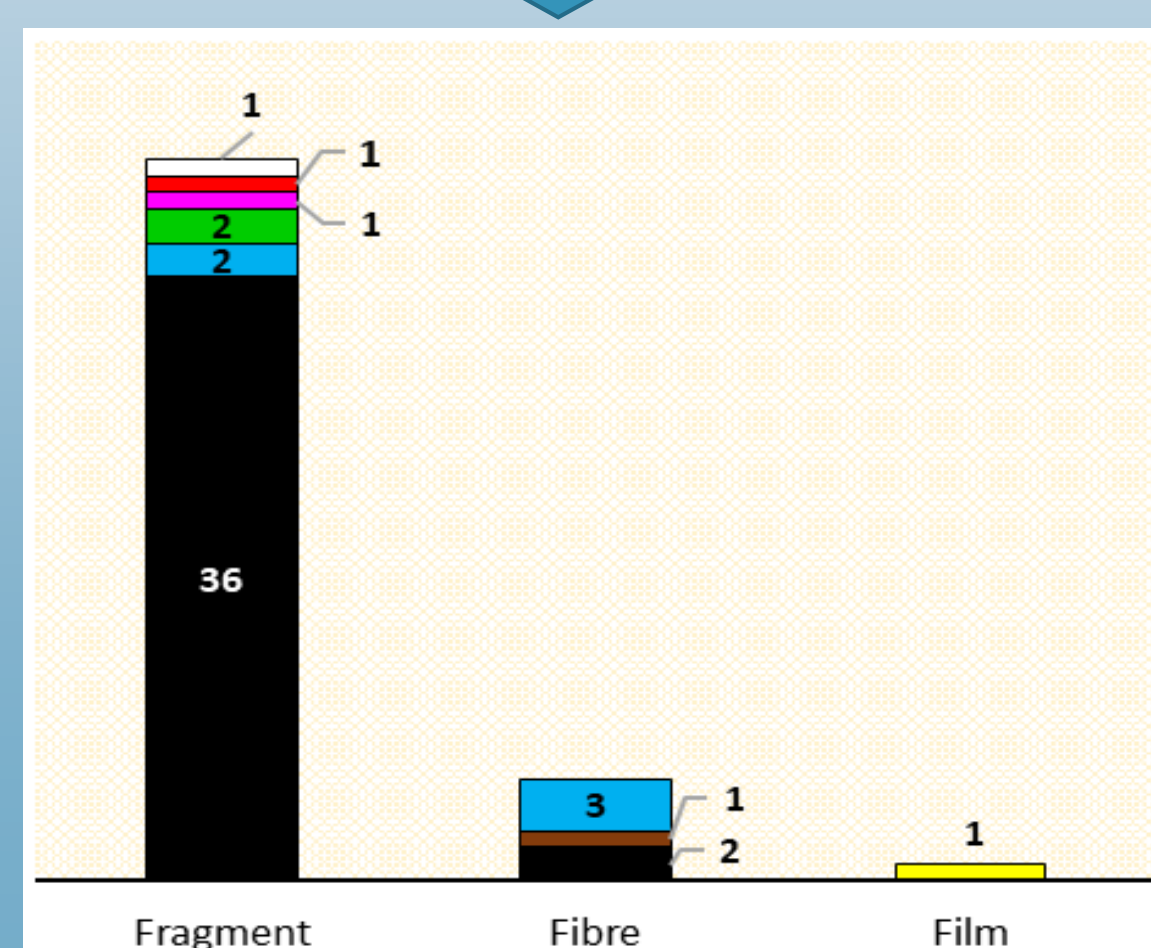
Presence of MPs in analysed oysters.



MP abundance per oyster.

MP Type	Av. length (µm)
Fragments	208
Fibres	792
Film	300

MP size found in oysters.



Spectrum of a black particle from an oyster at Pula Harbour 2 - Tragacanth rubber MPs in analysed oysters.

CONCLUSIONS

- A marked spatial disparity was observed between the study sites: microplastics were present in 60.0% of oysters from Pula Port (45 particles total; average 1.9 particles/individual), whereas only 7.5% of oysters from Brijuni National Park contained microplastics (3 particles total; average 1.0 particle/individual).
- Morphological analysis revealed that fragments were the predominant particle shape (85%), followed by fibers (14%) and films (1%).
- Black was the dominant color—primarily in the form of fragments—followed by blue. All identified particles exhibited an average size below 1 mm, with fragments averaging ~200 µm, fibers ~800 µm, and films ~300 µm.
- These findings highlight a strong anthropogenic influence on microplastic prevalence, with significantly higher contamination levels observed in the urbanized port environment than in the protected marine area, despite their close geographical proximity.
- This suggests that local anthropogenic activities can outweigh regional-scale environmental similarities in determining microplastic contamination.

ACKNOWLEDGEMENTS

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