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Fate and impacts of Microplastics: Knowledge and Responsibilities

A COMPARATIVE ASSESSMENT OF MICROPLASTIC ABUNDANCE INSIDE AND OUTSIDE A MARINE PROTECTED AREA: The case of the National Marine Park of Zakynthos isl., Ionian Sea, Greece

Nikoletta Digka, Aryiro Adamopoulou, Athina Kokkali, Danae Patsiou, Laura Bray, Helen Kaberi, Chrsitina Zeri, Catherine Tsangaris

Hellenic Centre for Marine Research – Street Address: 46,7 km Athens Sounio ave., P.O. Box 712, P.C. 19013, Anavyssos Attiki, Greece
ndigka@hcmr.gr

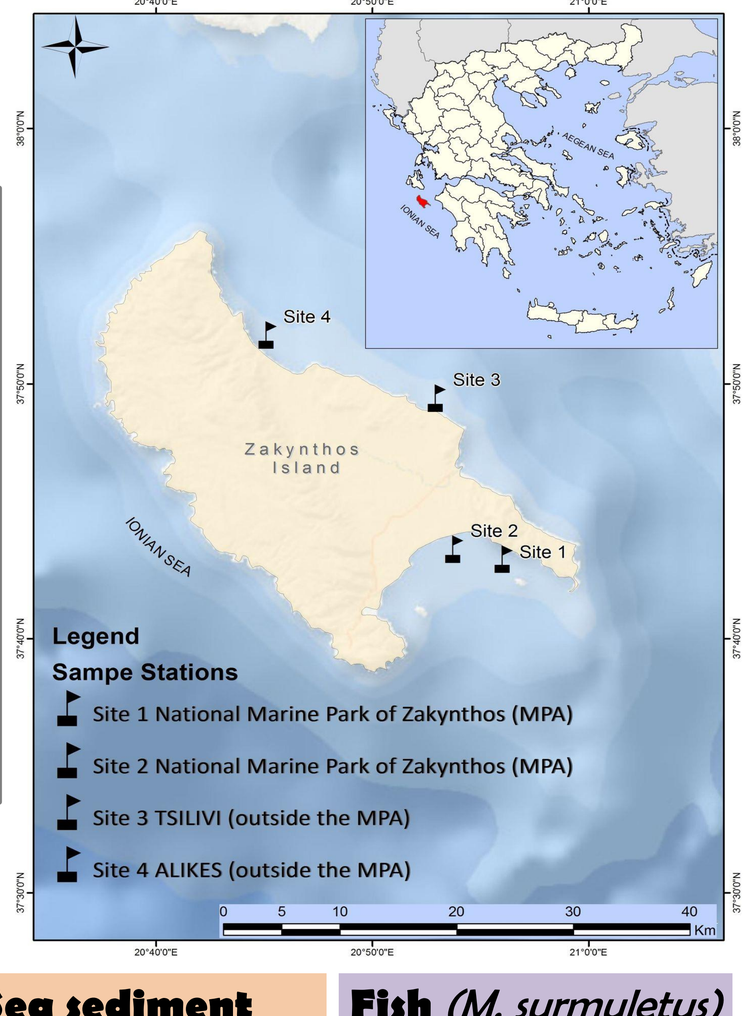
INTRODUCTION

Microplastics (MPs-plastic particles <5 mm) are a serious threat for marine ecosystems and a major concern is their ubiquity: they are found from the sea surface and water column to the beach and seabed sediments or even ingested by marine organisms.

MATERIALS & METHODS

STUDY AREA

- Zakynthos isl., Greece
- 4 Sampling sites
(2 inside the National Marine Park (MPA) & 2 outside)
- In **JUNE 2019**



LAB ANALYSIS

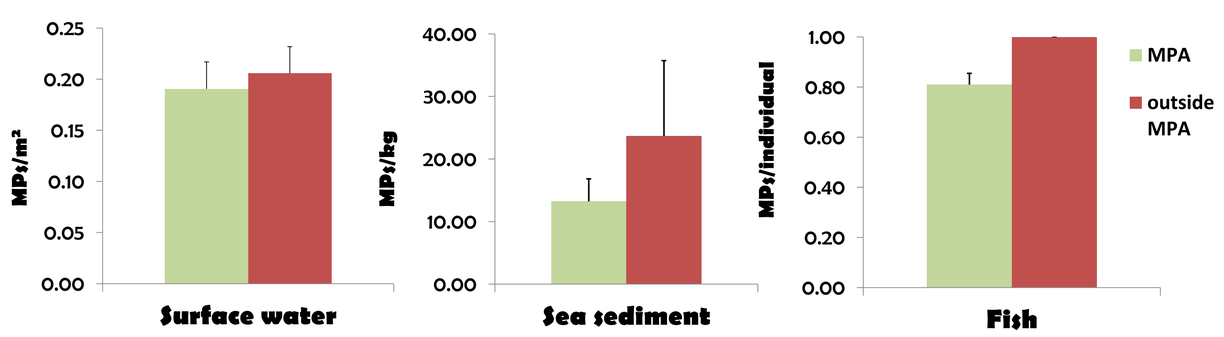
Surface water n= 6	**Sea sediment** n= 9	**Fish** *(M. surmuletus)* n= 93
1. Sieving	1. Sieving & density separation ($Na_2WO_4 \cdot 2H_2O$)	1. Dissection of gastrointestinal (GI)
2. Digestion of organic material (H_2O_2, 15%)- optional	2. Digestion of organic material (H_2O_2, 15%)- optional	2. GI digestion (H_2O_2, 15%)

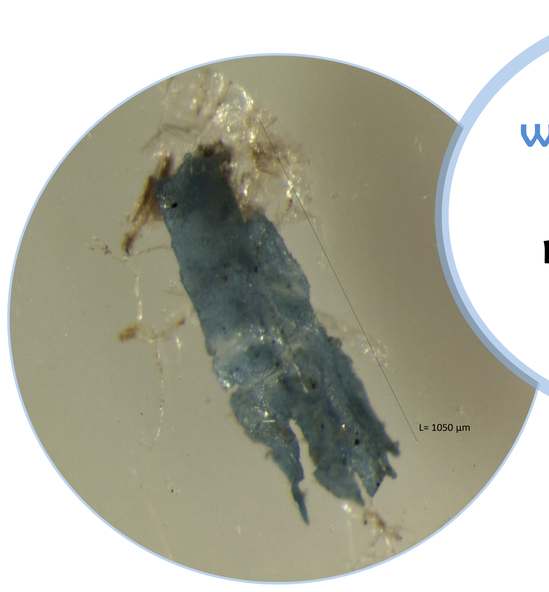
3. Filtration
4. Observation under stereomicroscope
5. FTIR for polymer identification
6. Statistical analysis (t-test, R statistics 3.4.0)

RESULTS

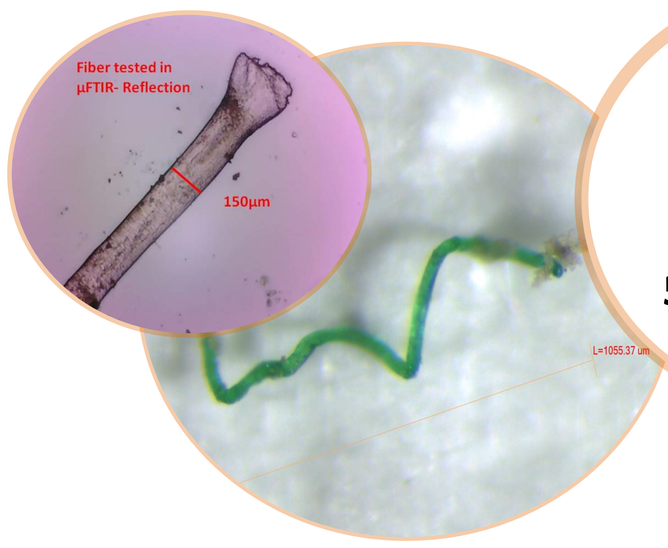
- MPs sized between 100-500 μm were the most abundant in sediment and fish samples.
- Fragments (> 50% of all items), fibers and films were detected in all environmental compartments. Foams were only found in surface water samples.
- Light colored MPs were the most common MPs in all environmental compartments.
-Polyethylene (PE) was the majority of the plastics tested.

Microplastic Abundances

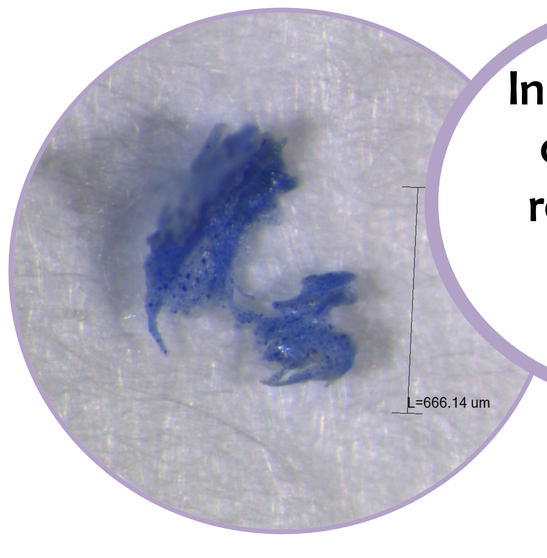




In surface water average abundance ranged from 0.13- 0.25 MPs/m²



In sea sediment average abundance ranged from 4-57.6 MPs/kg dry weight



In fish average abundance ranged from 0.5-1.75 MPs/fish

DISCUSSION & CONLUSIONS

✓ Preliminary analysis show lower MP abundances (mean ± SE) inside the National Marine Park of Zakynthos in water, sediment and fish samples, although differences are not significant ($p > 0.05$, t-test).

✓ Preliminary results (10% of all items) indicate PE as the most common polymer type in all environmental compartments tested.

✓ This is one of the first studies on microplastic abundance in MPAs in Greece that estimates the potential exposure of these ecosystems to this kind of pollution.

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