Citizen science: a useful tool for both microplastic research and environmental engagement

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Background

- **Plastic debris** are discarded or abandoned in the environment and end up reaching marine ecosystems directly or indirectly (e.g. Jambeck et al. 2015)
- **Microplastics** are currently one of the most **widely distributed** debris in the coastlines, seas and oceans around the world (e.g. Cózar et al., 2014)
- **Citizen science** has proven to be a suitable tool for large-scale anthropogenic waste **monitoring** in **coastal environments, making science inclusive for society and raising awareness.** (e.g. Hidalgo-Ruz et al., 2018; Wyles et al., 2016)

Objective

Monitor plastic debris (micro and meso sizes) concentration, distribution and composition in beaches **involving educational community** in scientific research through the ***'Plástico 0'*** project of the ***'Sea Watchers'*** citizen science platform.

Material and Methods

Study area (2016 - 2018)

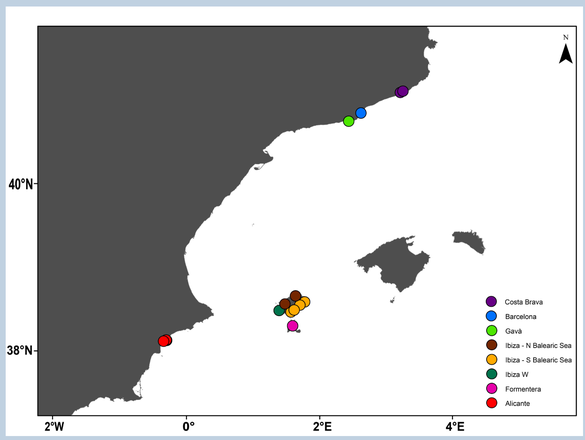

Figure 1. Distribution of the beaches analysed during 2016-2018

Procedure at the beach

- Minimum coverage: 100 m
- Minimum one sampling per month currently: 1252 samples in total

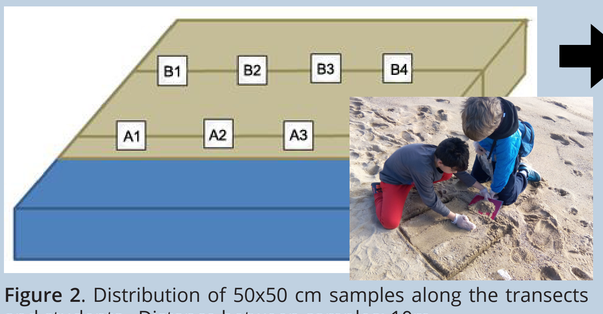

Figure 2. Distribution of 50x50 cm samples along the transects and students. Distance between samples: 10m

Pocedure in the Lab-Classroom

- Visual separation
- Categorization of plastic particles

Figure 3. Work on separation and categorization of plastic debris in the laboratory (Teacher training)

Upload the Observation

- Observations validated by experts

www. observadoresdelmar.es

Figure 4. "Sea Watchers" citizen science platform

Results: plastic particle concentration

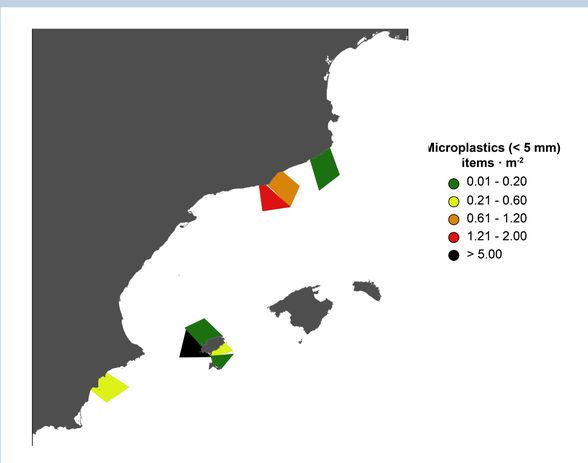

Figure 5. Preliminary results of microplastics concentration during 2016-2018

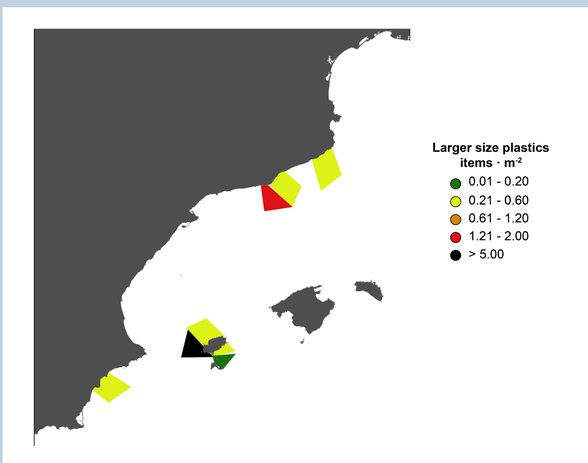

Figure 6. Preliminary results of larger size plastic concentration during 2016-2018

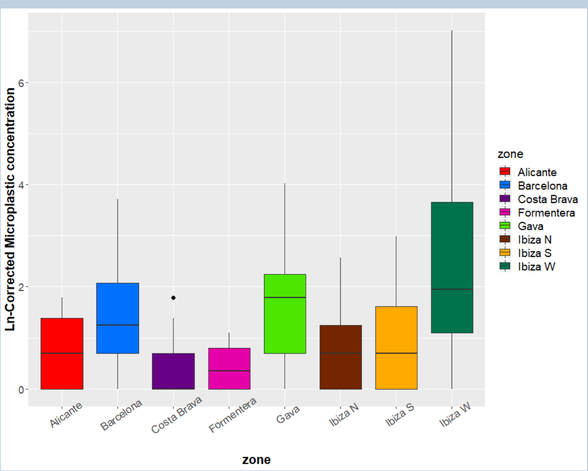

Figure 7. Regional differences in corrected microplastic debris concentrations

Kruskal-Wallis, H (χ^2) = 188.85 $p < 0.001$

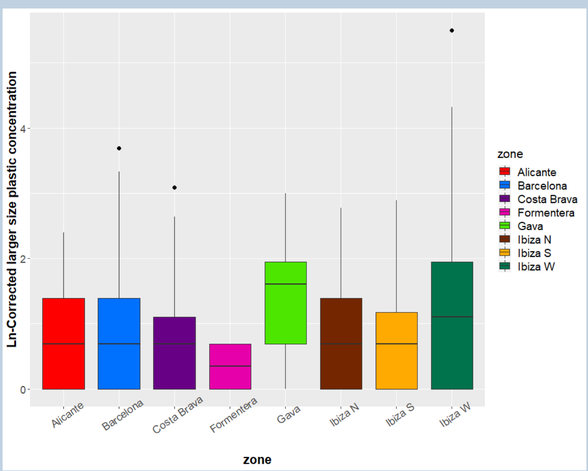

Figure 8. Regional differences in corrected larger size plastic debris concentrations

Kruskal-Wallis, H (χ^2) = 69.79 $p < 0.001$

Results: plastic debris composition

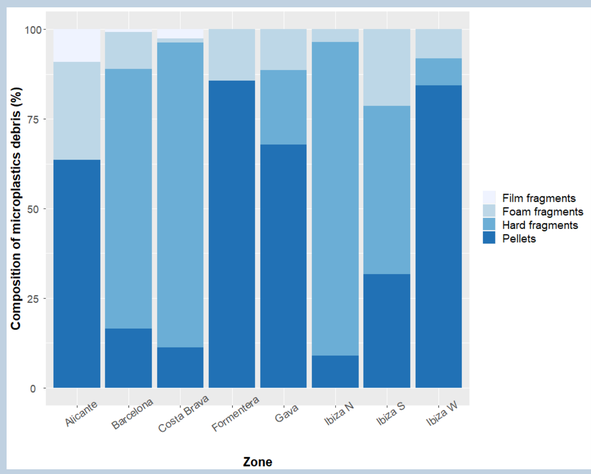

Figure 9. Composition of microplastic debris across all analyzed zones

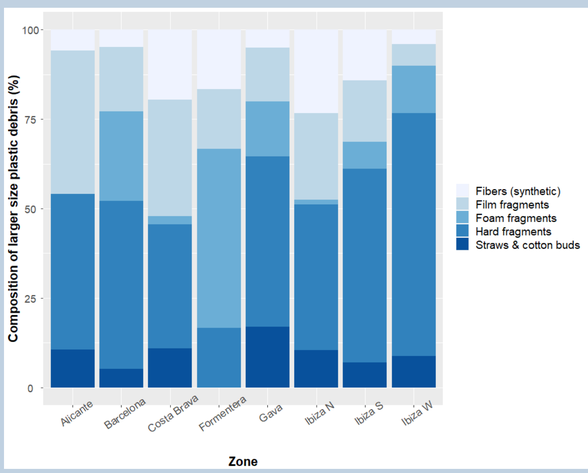

Figure 10. Composition of larger size plastic debris across all analyzed zones

Conclusions

- The use of **Citizen science** in **schools** demonstrates its **effectiveness** for **monitoring plastic** debris on beaches.
- The area of **Ibiza W** (Cala d'Hort) was the point with the **highest mean concentration**, exceeding more densely populated zones in the study area.
- Hard plastics and pellets are the proportionally most abundant fragments, although they have a great variability in their distribution even in adjacent zones.

Future work

- Increase the participation and zones (currently more than 1500 students)
- Include social analyses based on perceptions and environmental engage

Sea Watchers

Plastic 0

References

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