

“Identification and Quantification of Microplastics in Local Beach Sand”

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Introduction

The Mediterranean Sea is a semi-enclosed basin considered as a small scale of a global ocean and thus can serve to study plastic impact at a smaller scale. In the Mediterranean Sea, there is an estimated 250 micro tons of plastic, earning the title of the place with the highest densities of plastic on earth (François Galgani, Tara Ocean). The amount of plastic being dumped into this sea *every second* is equivalent to 563 plastic water bottles (Lauren Chadwick, Euronews). After this plastic degrades, it will become microscopic, and eventually, be washed onto our beaches. This results in a massive economic impact, costing the EU fishing fleet an estimated 61.7 million euros annually (WWF, 2018). This makes it relevant to understand and highlight plastic issues in the Mediterranean Sea.

The purpose of the experiment was to determine how much, and what types of plastic there is in the sand at Barceloneta Beach, as well as its distribution along the shoreline.

Hypothesis and Goals

I hypothesize that there will be tremendous amounts of plastics in the sand at the beach. I thought the closer to the water the sand was, the more plastic there would be as it was closer to the water: the source of plastic in the beach. I would like to have produced enough data to increase awareness of the population and provoke change in plastic use. Also, I would like to produce 2-3 ideas about how we can reduce plastic use. To perform my experiment, I will collect sand from the beach, and filter it to find microplastics.

Methodology

To perform my experiment, I first had to collect sand from Barceloneta Beach. I collected 1 liter from every meter on the beach starting under the water and ending 10 meters away from the water. After doing so, I poured each bag of sand through 3 different types of sieves (2, 3, and 6 mm screens). I then put the sand samples back in their original bags in order to minimize the amount of plastic lost. I filled each bag of sand with 2 liters of pre-filtered water, stirred and waited 24 hours. When 24 hours passed, I stirred again and waited another 24 hours. I then poured the water from the bags into coffee filters. Each sample of sand had 5 coffee filters (400 ml per filter). I then waited for the filters to dry and examined them with a microscope to count

microplastics as a whole, and the levels of the three different types of microplastic: pellets, fibers and fragments. I have repeated this experiment three times over the course of one year: December 2019, September 2020, January 2021.

Results

I found many microplastics in the samples, adding support for what I had hypothesized: the sand on the beach and the ocean itself is extremely contaminated with plastic. In my data however, I found almost no plastic in the samples under the water and in meters 10, and 9. This trend represents a Gaussian curve, with the most plastic in the middle samples. In the samples, I also found an increasing number of fibers and fragments as the samples got farther and farther from the water. Due to this, it can be inferred that fragments and fibers are most likely brought to the beach by visitors, where pellets are brought by the water.

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