PLASMAR

Bases para la planificación sostenible de áreas marinas en la Macaronesia

SAMPLING AND PROCESSING MICRO AND MESOPLASTIC SAMPLES FROM SANDY BEACHES

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I. Largest size fraction (1-5 mm and 5-25 mm)

1.1 Sampling

1- Discover the location of the beach

2- Locating the microplastics on the beach, usually at the high tide line. Frame them in the center of a 50 x 50 cm quadrant (Figure 1).

3- Photograph the sampling area.

4- Collect 1L of the first 'cm' of sand with a metal spoon, weigh the sample and put it in a 1mm mesh bag (Figure 2).

5- Rinse the bag in sea water, to eliminate the sand, and to retain only microplastics and organic material (Figure 3).

Figure 1. 50 x 50cm quadrant placed at the high tide line

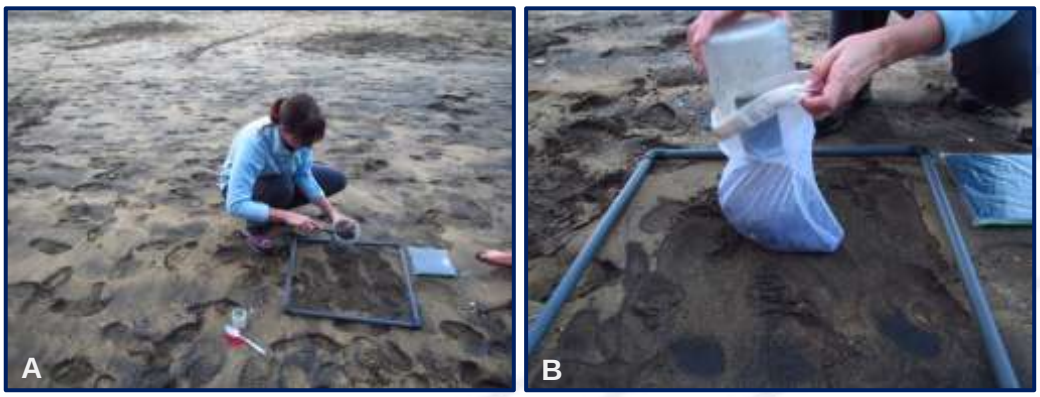

Figure 2. A) Collect 1L of the first 'cm' of sand; B) Placing the sand in a 1mm mesh bag

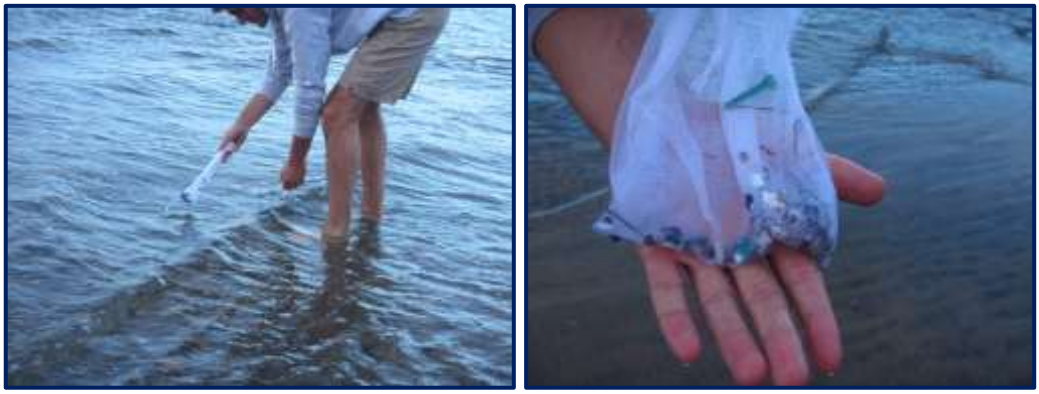

Figure 3. Sample washed in sea water

1.2 Plastic extraction

1- If the samples contain biological material (remaining vegetal fragments), it is necessary dry the sample well and perform density separation using ethanol (96%).

2- Placing a funnel in a 500mL beaker, pour in the contents of the sample bag. Then, wash the sample with ethanol, using a squirt bottle up to the 100mL mark (Figure 4).

Figure 4. Transfering the sample to a beaker containing ethanol (96%).

3- Decant the supernatant from above the organic sample (if EPS and XPS foam remains, remove with forceps and place them in a Petri dish separated from the other microplastics. This eases both inspection and measuring).

4- Filter the microplastics remaining on the bottom using a 50 µm mesh net (also one can use a 100 or 200 µm mesh net, if available).

5- If the sample contains sand, separate it from the microplastics by density with a saturated NaCl solution (358.9 g/L).

6- Remove mesh-filter with the microplastics, place it in a petri dish and dry it in an oven at 60ºC for 24 hours (if the sample contains tar or polystyrene, don't dry it in a heater).

7- Separate micro (1-5mm) and mesoplastic (5-25mm) fractions with a 5mm sieve.

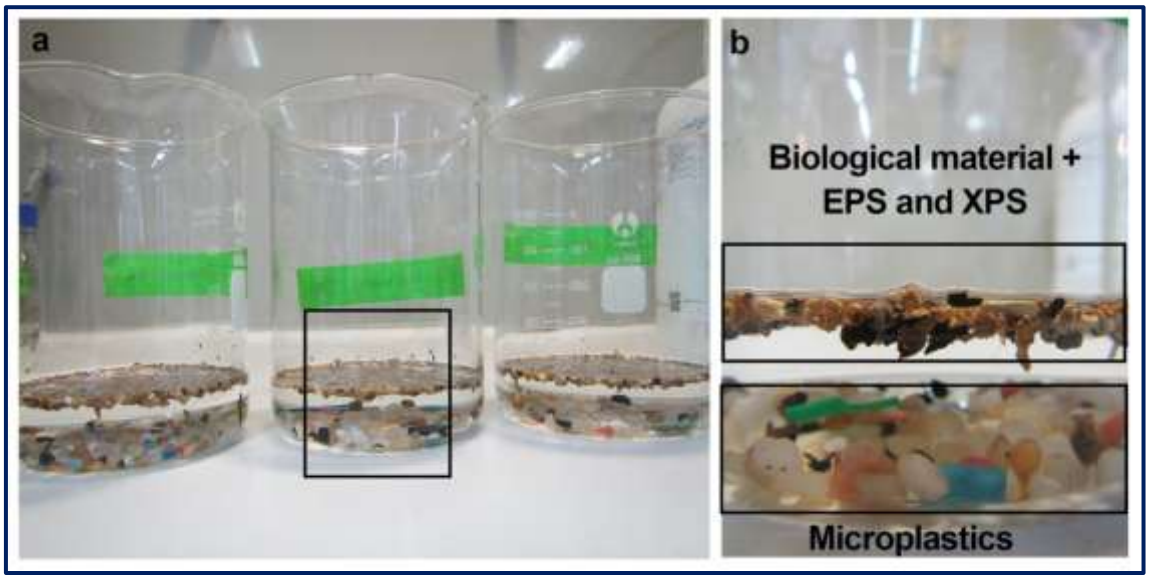

Figure 5. Separated sample. Biological material is in the supernatant and microplastics are at the bottom.

1.3 Quantifying

1- Weigh microplastics on a precision balance.

2- Count them with a stereomicroscope or with particle quantifying software.

3- Results are expressed in items/m2, g/m2, items/L, g/L and, if it is possible, in items/Kg and g/Kg.

II. Smallest size fraction (10µm-1 mm)

2.1 Sampling

Inside the same quadrant for the largest fraction, collect 100mL of surface sand with a metal spoon.

2.2 Plastic extraction

First, prepare a saturated NaCl solution with a density of 1.2 g/cm3 (358.9g NaCl in 1L of bi-distilled water).

1- Measure exactly 50mL of sand into a 50mL beaker. Rinse into a 250mL beaker with a saturated NaCl solution using a wash bottle and make up to 250mL.

2- Place the beaker on a magnetic hotplate stirrer at 600 rpm for 20 minutes (Figure 6). *Depending on its composition, some of the sand may be magnetic and become attached to the magnetic stirring bar*.

Figure 6. Sand sample shaking for 20 minutes

3- Decant the sample, preferably within 12 hours, but not more than 24. Depending on the type of sand, this time can be reduced to 1 to 5 hours as recommended by Besley et al. (2017) (Figure 7).

Figure 7. Decanted sample

4- Carefully remove the supernatant by siphoning (Figure 8) and filter it through a 200µm mesh net. Observe and quantify this fraction under a stereomicroscope (between 200 µm-1 mm).

5- Filter the remaining sample through a 10 µm polycarbonate filter (10-200 µm size fraction) (Figure 9).

We recommend repeating this procedure three times and using a new filter each time. This procedure will ensure the best extraction efficiency.

Figure 8. Siphoning off the supernatant

Figure 9. Filtration system with a 10µm polycarbonate filters.

2.3 Quantifying

1- Count using a stereomicroscope.

2- Express results as items/m2, items/L and, if possible, in items/Kg.

References

Besley A., Vijver M.G., Behrens P., Bosker T., 2017. A standardized method for sampling and extraction methods for quantifying microplastics in beach sand. Marine Pollution Bulletin, 14(1): 77-83

Annex I (material)

- 50x50 cm quadrant
- Camera
- Big metallic spoon
- Little metallic spoon
- 1L beaker
- 1mm mesh bag or, alternatively, a 1mm mesh net to filter sand collected with microplastics
- Ethanol (96%)
- 1L wash bottle
- 500mL beaker
- Funnel
- Forceps/tongs
- Sodium chloride (NaCl)
- Glass petri dishes
- Heater
- 5mm sieve
- Precision balance
- Stereomicroscope
- Container to collect and store 100mL of sand (10 μm-1 mm fraction)
- Bidistilled water
- Graduate cylinder
- Magnetic hotplate stirrer
- 200μm mesh net
- Beakers of different sizes
- Polycarbonate filter with a pore of 10μm