



BEACH SAMPLING PROTOCOL

1. SELECTION OF BEACHES

The criteria below are shown for reference and are to be taken into account in the identification and preliminary selection of beaches. However, if for particular reasons (time, tourists...) preselected sites prove unfavorable for sampling, the items below are to be taken into particular consideration.

Criteria to be taken into consideration:

- Do not choose beaches where one can disturb endangered or protected species (normally discuss prior with the authorities);
- The beaches must have the following characteristics:
 - o Sand or gravel;
 - o Clear and direct access at any time of the year (or seasonal depending on the physical configuration of the site);
 - o No dam or pier that can affect local circulation of water or the accumulation of debris;
 - o A minimum of 100 m in length parallel to the water (measure at the waterfront);
 - o No regular cleaning activities. The sites chosen should not be isolated because of annual or biannual cleaning, however, it must be made clear when this is the case;
 - o Moderate slope of between 15 and 45 °;
 - o **Work at low tide (ideally choose the first 3 hours of the rising tide).**

2. NECESSARY EQUIPMENT

For the identification of a location:

- Camera;
- GPS;
- SenseFly Drone with Camera "RGB/Red Edge" and computer (definition of Flight Plan);
- First-aid kit (in case of accidents, cuts, etc...).

For the sampling of macro-plastics with transect of 5 m wide:

- Characterization sheet of the study site (GPS coordinates, slope, type of substrate, proximity to a town, river ...) _ 1 characterisation sheet/beach;
- Data sheets of the transect (coordinates of the GPS of the transect + other + counting and measurement categories of the collected waste) _ 1 data sheet/transect;
- Laminated sheet with pictures of debris (using different identification categories);
- Waterproof pens;
- Scales (to weigh) and lightweight and foldable bags (for weighing waste) of 20L and/or 50L;
- 100m rope with marks every 5m (for measuring the beach);
- Brightly colored tape (for marking transects) and marking cones for the angles;
- 25m measuring tape.

For the sampling of meso and micro-plastics

- Square metal frame of 50cm x 50cm and 10 cm deep;
- 0.3 mm sieve (203x50mm);
- 5mm sieve (203x50mm);
- Stainless steel tongs (to recover plastics in the sieves);
- Brushes (to brush the stones);

- Sample jars of 180 mL (10 per beach, about 50 per stop);
- Labels (to mark the jars) to write the date, stop, name of the beach, no. of the transect, no. of the sample ...
- Scrapers;
- Spades;
- 12L containers (rigid or flexible bucket) of a diameter of 250 mm;
- Air Pump with a pierced pipe (to make bubbles in the bucket);
- Wash bottles (for rinsing sieves, removing macro-waste from the sieves);
- Possibly: Water pump (for rinsing macro-waste from the sieves);
- Gloves (to avoid contamination of samples and contact with possible pollutants);
- 1L and 5L Ziplocks bags.

3. STEPS TO FOLLOW:

A) Site Characterization and marking:

- Name of the beach for the labels and drone images: "Archipelego Name-Island Name-Beach N°-Flight N°";
- Mark a 100m section of the beach parallel to the water edge that will be sampled;
- Mark transects of 5 m wide at regular intervals using ropes and cones every 20m (0-5m, 25-30m, etc ..) from the water until the end of the beach (ie. where the morphology of the land or biotope changes);
- Take the GPS coordinates of the 4 corners of the 100m section of the beach;
- Take the GPS coordinates of the transects, 2 coordinates per transect from the middle of the sea side and land side (see diagram below).
- Describe the beach by specifying:
 - o Type of substrate (sand, pebbles, other ..);
 - o Distance covered by the tide on the beach;
 - o First barrier at the back of the beach (dunes, trees, cliffs, etc ..);
 - o Use of the land in the immediate vicinity of the beach (agriculture, industry, housing ..);
 - o The close presence of particular morphological elements (stream, river, harbour, city, houses, touristic areas, ..);
 - o Features that could affect the deposition of waste (touristic areas, cleaning, recent storms, morphology the beach ..)
- Take photos of the beach and particular morphological elements (note the number of photos).

B) Using the drone "Ebee"

- Define a flight plan according to the senseFly protocol in order to fly and photograph the sampled beach;
- Fly the drone with a S110 RGB camera (resolution: 2.5 cm/px);
- Retrieve the drone and process the images to store them with the GPS coordinates (store images in a folder called : "Archipelego Name-Island Name-Beach N°-Flight N°-RGB");
- Fly the drone with a Red Edge S110 camera (resolution: 2.5 cm/px);
- Retrieve the drone and process the images to store them with the GPS coordinates (store images in a folder called: "Archipelego Name-Island Name-Beach N°-Flight N°-RedEdge");

C) Sampling of macro-debris (>2.5 cm)

- Work within the 4 transects delineated in the 100m of beach from the water's edge;
- Take the GPS points at the beginning and the end of the transect (if not already done);
- Take the length of the transect (from the water's edge to the first line) for subsequently calculating the C° of debris = No. of macro-debris / (length * width of the analyzed section);
- For each transect within the areas marked with ropes, work up from the water until the end of the beach by recovering all waste of a size greater than 2.5 cm on at least one

dimension (a cigarette butt, a cotton swab, a bottle cap are objects that can be recovered). The size reference being 2.5 cm;

- Separate debris recovered according to different categories (plastic, metal, glass, rubber, fabric, paper ..) and place in a bag. Note:
 - o Macros debris of a size > 30cm are to be counted separately (a sample is to be taken - if possible - and placed in a ziplock bag with the GPS coordinates noted and a photograph taken noting its number on the tally sheet);
 - o a part of a plastic object can be counted as an object if it represents at least 50% of the initial object;
 - o separate fragments of the same object are to be counted separately;
 - o if multiple materials are on the same debris, the most dominate should be counted;
 - o for debris that are difficult to determine, take a photograph and provide a brief description.
- Once at the end of beach, if debris are still present in the trees or vegetation due to high tides for example, we must try as much as possible to also recover and count them separately in a new sheet!
- Next, separate the debris by type of material (metal, glass, plastic, composite materials, etc.);
- Weigh each type of type of material (metal, glass, plastic, composite materials, etc ..) with the help of a bag and scales (if <100gr or > 30kg, simply note it);
- Photograph the content of each type of material;
- Go to the next transect and repeat;
- Collect the waste collected and bring them to the nearest collection point (find out about the nearest collection point before arriving).

D) Sampling of meso and micro-debris (<2.5 cm)

- Four squares should be placed adjacent to each of the 4 transects (not in the transects): two close (above and below) the water line (preferred zone) and two at a distance (one square close to the end of the beach and one square near the water) _ See diagram below;
- Place the metal frame of 50cm x 50cm;
- Photograph the area and take the GPS coordinates;
- Put on plastic gloves
- Collect the large visible surface debris;
- Rinse with fresh water (if available, otherwise salt water) above the bucket using a 5mm sieve;
- Place the plastic debris <2.5 cm from sieve in a 180 mL jar and throw away debris > 2.5cm because we only collect meso (<2.5cm) and microdebris (<5mm);
- Shovel and scrape a 50cm² surface to a thickness of 10cm and place the sand and material in the 5 mm sieve over a bucket (do not use the sieve if it is a pebble beach!);
- Fill the bucket up to 15 cm from the top with salt water flushing the debris from the 5mm sieve (if it is stones, simply brush and rinse with salt water above the bucket);
- Place the plastic debris from the 5mm sieve into a jar using tongs (avoid touching the sieve with your hands or brushes);
- Place the tip of the air pump at the bottom of the bucket and stir the contents with air for a few minutes;
- Recover the supernatant with the 0.3mm sieve;
- Put the supernatant in a jar with the tongs (avoid touching the sieve with your hands);
- Rinse the sieve above the jar with sea water in a wash bottle to be sure not to lose any material and transfer the rest into a sample jar;
- Fill the jars of meso and micro-debris with salt water and close;
- Place a label on the jar with the name of the place "Archipelego Name-Island Name-Beach N°" as well as the date, time and GPS coordinates;

- Collect the jars and rinse the sieves (with sea water between sampling on the same beach - if fresh water is not available - and fresh tap water upon return).

Annexes:

Map of site characterization and the counting of debris per category according to the NOAA.

Fond de la page : back of shoreline

Corde :Rope

Laisse de mer : foreshore (wrackline)

Ruban de chantier :building cord

Quadrat : square

Bord de l'eau : water edge

