DeFishGear

The project is co-funded by the European Union
Instrument for Pre-Accession Assistance

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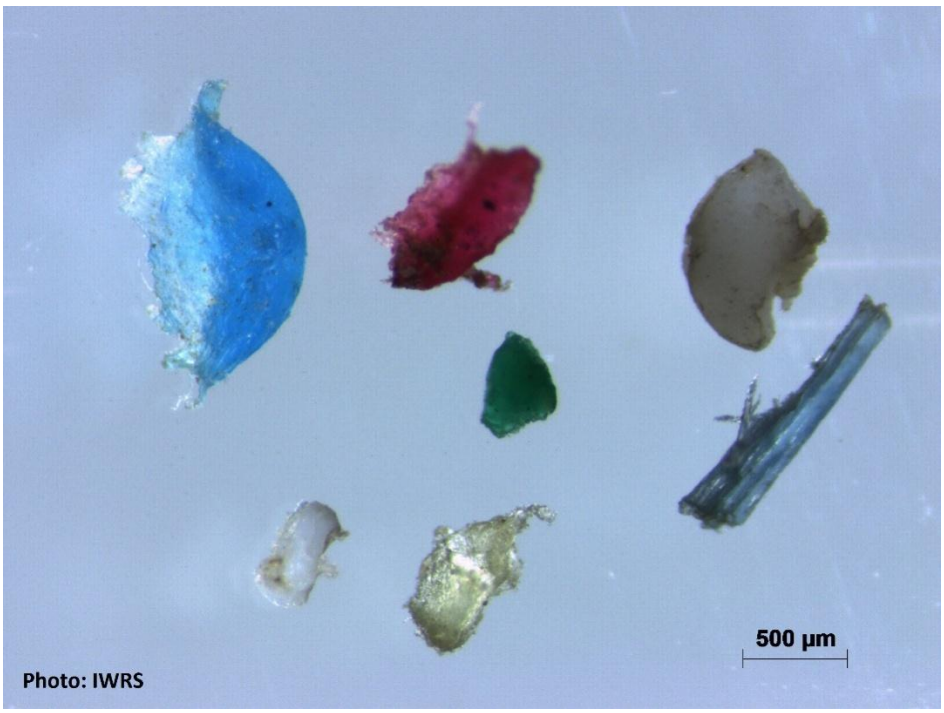
Adriatic IPA
Cross Border Cooperation 2007-2013

DeFishGear protocols for sea surface and beach sediment sampling and sample analysis



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February, 2015

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2 INTRODUCTION

Microplastic pollution is newly recognized and defined threat to environment. First was identified and documented from 1970s onwards, when three different researches published findings about polystyrene spherules less than 2 mm in diameter (Carpenter et al., 1972; Colton et al., 1974; Kartar et al., 1973). In September 2008 was "International Research Workshop on the Occurrence, Effects, and Fate of Microplastic Marine Debris" which bringing microplastics into broader attention of the scientific and political community (Allsopp et al., 2009).

There is very limited data related to micro-litter in the Adriatic Sea.In the Venice Lagoon the research on the microplastic presence in sea sediments was done and published in 2013. The total abundance of microplastic particles varied from 2175 to 672 microplastic particles per kg of dry weight. The most abundant type of plastic that had been identified are polyethylene and polypropylene.

In 2013, the Italian Ministry of Environment, Land and Sea initiated monitoring of micro-litter, as a start up activity within the scope of the MSFD monitoring programs. The first results of this activity are expected to be published by 2014.

Slovenia performed initial sampling for microplastics on the sea surface using epi-neuston net with mesh size of 300 µm. 22 samples in Slovenian sea were collected during the years of 2011 and 2014 using well established methodology (Colignon, 2012). In all the samples microplastic was found. Data has not been published yet. Chemical analysis of found microplastic is foreseen in the near future.

3 SEA SURFACE SAMPLING AND MICROPLASTIC SEPARATION - PROTOCOL

3.1 EQUIPMENT NEEDED

3.1.1 Sampling equipment

- Manta net with wings and cod end (mesh size: 308 µm, aperture: 16 x 60 cm, length: 3 m)
- Submersible water pump with a hose (for rinsing the net) or other equipment for net rinsing
- GPS
- Glass jars with caps or plastic bottles (500 ml) (one or more per each sample; when on the sea is a lot of sea grass, than you need 2 - 3 plastic bottles per sample)
- Sample container – cool box
- Screw driver
- Sieve (max 0.3 mm mesh size; preferable with smaller mesh size)
- Large bowl or washbasin (to prevent spillage of sample when emptying cod-end; 5 l <)
- Tap/fresh water source (tap/hose/squirt bottle)
- Squirt bottles 2 x (one for water; one for alcohol)
- Tweezers (longer)
- Metal spoon
- Funnel (Ø 20 cm)
- Latex gloves without powder
- 70 % ethanol
- Waterproof marker, vellum paper and pencil

3.1.2 Sample separation equipment

- Stereomicroscope (min. 80x zoom; recommended also: transmition light with dark field, polarisation contrast and ring light)
- Object glasses (marked – number of a sample, date of analysis)
- Micro tweezers and tweezers
- Glass petri dishes
- Glass vials
- Lab coat
- 70 % ethanol
- Sieve (max 0.3 mm mesh size; preferable with smaller mesh size)
- Squirt bottle 2x (one for distilled water; one for alcohol)
- Latex gloves without powder
- Filtered water or distilled water
- Analitical laboratory scale

3.2 SEA SURFACE SAMPLING PROTOCOL

3.2.1 General conditions

1. Sampling area should be chosen on the basis of results provided by CMCC (accept for BIH and Slovenia).
2. On the river outflow, two samples should be sampled.
3. The start and stop point (GPS coordinates and time) of transect need to be written down.
4. Weather condition: the wind speed should not be more than 2 Beaufor (the weave high should not be more than 0.5 m).
5. The travel speed should be between 2 – 3 knots.
6. During trawls it is important to maintain a steady linear course at a constant speed.
7. Half part of manta net opening should be submersed during the sampling.
8. Duration of sampling should be for 30 min. (in case of huge amount of natural material, e. g. plankton bloom, the duration of sampling could be shorter).
9. Avoid the use of plastic tools and containers.
10. Avoid synthetic clothing (e.g. fleece).

3.2.2 Sampling of microplastic (>300 µm)

1. Deploy the manta net from the side of the vessel using spinnaker boom or »A frame« using lines and karabiners.
2. Deploy the manta net out of the wake zone (app. 4 m distance from the boat) in order to prevent collecting water effected by turbulence inside the wake zone (Figure 1).

Figure 1: The manta net position (photo: Andraž Lavtižar).

3. Write down the initial GPS coordinates and initial time in the data sheet provided.
4. Start to move in one straight direction with speed of app. 2 - 3 knots for 30 min and start with time measurement (Figure 2).

5. After 30 min stop the boat and write down final GPS coordinates, length of the route and average boat speed into data sheet provided.

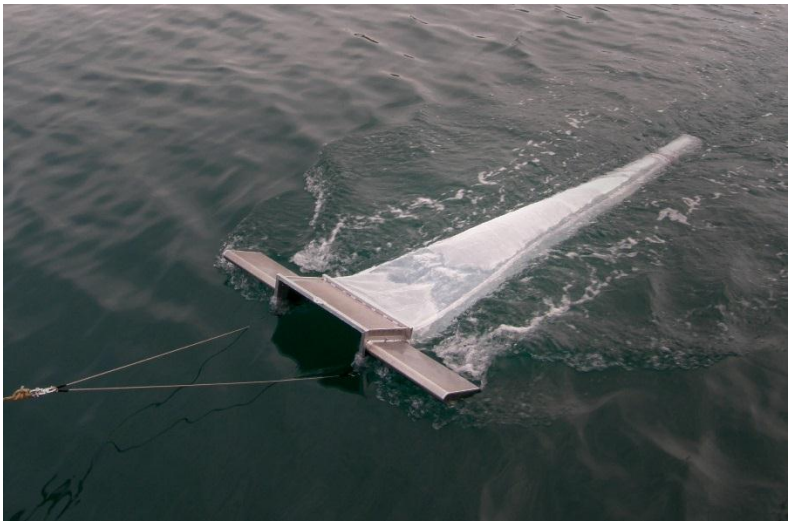

Figure 2: Microplastic sampling by the manta net (photo: IWRS).

6. Pick up the manta net from the water.
7. Rinse the manta net thoroughly (Figures 3) from the outside of the net with sea water using submersible pump (220 dc) or water from the boat water reservoir. Rinse in the direction from the manta mouth to the cod end in order to concentrate all particles adhered to the net into the cod end (Note: never rinse the sample through the opening of the net to prevent contamination).

Figure 3: The manta net rinsing (photo: IWRS).

8. Safely remove the cod end over a bucket, from the net using screw driver (Note: be careful not to reverse cod-end that contains sample as a precaution to catch any spillage).
9. Invert the cod end and sieve the sample in the cod end through 300 µm mesh size sieve (or less) (Figure 4).

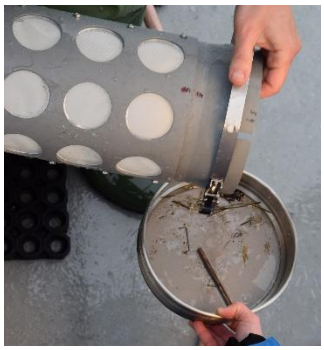

Figure 4: Sieving the sample from the cod end (photo: IWRS).

10. Rinse cod end thoroughly from the outside and pour the rest of the sample through the sieve (repeat this step so many times that no particles stayed inside the cod end).
11. Concentrate all material on the sieve in one part of the sieve (Figure 5).

Figure 5: Concentration of the material in one part of the sieve (photo: IWRS).

12. With the use of funnel, rinse the sieve into glass jar or plastic bottle by using 70 % ethanol (one sample max. 250 ml in the end).
13. Close the bottle, wipe it with paper towels and label the lid and outside of the jar with the sample name and date. Use waterproof marker for labels (Eding`s markers are the best, others could be erased). Write down the sample name, GPS coordinates and time of sampling with pencil on the vellum paper and put the paper into the sample. Transfer labeled plastic bottle into the cool box.

3.3 MICROPLASTIC SEPARATION FROM THE SEA SURFACE SAMPLES

1. If sample does not contain any items larger than 25 mm and appears to be clean continue directly with step 3.
2. Pour sample through the sieve (≤ 300 µm mesh size) and remove all natural or artificial litter objects of size > 5 mm (macro and mezzo litter) from the sample, using visual identification and tweezers. Be careful to rinse each removed object carefully with distilled water in order to remove microplastic litter adhered to it. Store all natural and artificial litter objects in separate containers. Dry all natural and artificial litter objects in a desiccator (or on the air, but in closed dish) and weigh them. Identify all litter objects >25 mm (macrolitter) according to WP4 List of Marine Litter (see the Appendix 1).
3. After removing all larger objects concentrate all remaining pieces in one part of the sieve using squirt bottles or tap water. Pour sample into glass container using minimum amount of alcohol with the help of funnel.
4. Take small amount of sample (subsample) and pour it into glass Petri dish. Analyze the sample with the use of stereomicroscope (20 - 80x zoom). Search for the microlitter particles (Figure 6).

Figure 6: Sample analysis by the stereomicroscope and tweezers (photo: IWRS).

5. When finding each microplastic particle, categorize it into one of the categories according to categories in the Table 1and put it in the Petri dish (or other glass vials), marked with category name. The Petri dish needs to be closed at all times.
6. Each subsample should be reviewed by another person. Be careful to rinse the glass container with the sample so that all particles adhered to glass walls are washed into Petri dish.
7. When all of subsamples of one general sample are checked by two persons, weigh the microplastic particles of each category separately. Microplastic particles need to be previously dried (the open weighing dish can be put in desiccator or wait for 24 h to dry the samples on the air, but in closed dish).
8. Put Petri dish under the microscope with measuring equipment and measure the size of each particle (measure the longest diagonal), except filaments and note its colour (see Table 2) (If you do not have image analysis program, you do not need to do this, the National Institute of Chemistry Slovenia will do this).
9. Post well closed glass vials with microplastic particles (all categories) to the National Institute of Chemistry Slovenia. Please use following address:

National Institute of Chemistry Slovenia
Laboratory for Polymer Chemistry and Technology
dr. Andrej Kržan
Hajdrihova 28
1000 Ljubljana
Slovenia

Note: in case of uncertainty if item is microplastic or not, collect the item anyway, the final confirmation will be done by chemical analysis.

10. After chemical analysis store the samples till the end of the project or more.

How to identify micro litter?

When analyzing sample in search for microplastics, please consider that some particles will be easily visible (colour, shape, size) while others may be trickier to find. Here you can see few suggestions on how to identify microplastics in your sample:

- no cell structure

- uneven, sharp, crooked edges

- uniform thickness

- distinctive colours (blue, green, yellow, etc)

When separating microplastics from your sample be conservative and remove more than less. We can still later on determine real chemical structure of particles. Please consult also photo guide for categories for easier identification of microplastics in the Appendix 2.

*Table1: Categories of micro litter Items taken from EU TG ML Master List[1]. (*New category for uncategorized plastic pieces was added. In this category you can range the plastic items that are not typical for any other category).*

Micro litter categories
Fragments (G103, G104, G105, G106)
Pellets (G107, G108, G109, G110, G111)
Granules (G116)
Filaments (G113)
Films (G114)
Foam (G115, G117)
Other (nonplastic materials)(G217)
Uncategorized plastic pieces*

Tabel 2: Master List of Colours and Transparencency of Micro Litter Items (our list of colours exclude categories: crystalline, transparent and opaque. Categories transparent and opaque are included in separate categorisation. Each particles is described with colour name and transparencency. Example: Particles is opaque, red or is transparent, red.)

[1]For easier categorization we merged categories G103, G104, G105 and G106 in category of Fragments, categories G107, G108, G109, G110, G111 in category of Pellets, categories G115 and G117 in category Foam.

Colourof plastic items
White
Clear-white-cream
Red
Orange
Blue
Black
Grey
Brown
Green
Pink
Tan
Yellow

Transparencency of plastic items
Transparent
Opaque

3.4 META DATA

Meta data are listed in detail in the accompanying exceldata sheet.

3.5 PROPOSED PARTNERS' ACTIVITIES AND NUMBER OF SAMPLES

The first sampling for sea surface will be done till the end of September 2014.

In 2014 all of countries will sample on the areas where litter are accumulated, previously determined by CMCC (except Slovenia and BIH). Countries Slovenia, Albania and BIH should sample on one area, Croatia and Greece on two areas and Italy on three areas. Each of country should sample 5 samples on each area.

In 2014 each country should sample also 2 samples in the area on the river outflow (except BIH).

In 2015 each country should repeat sampling on locations from 2014 and instead of sampling in riverine outflows areas each country should perform sampling in fishery areas that will be determined in cooperation with WP6.

Sampling should be done outside of blooming season and season of fish spawning.

3.6 CONNECTIVITY WITH OTHER WPS AND ACTIVITIES

The sampling of micro-litter should be organized in parallel with the macro-litter surveys under WP4. Results on microplastic quantities will be shared with WP4 in order to test the modeling exercise efficiency and correctness.

4 BEACH SEDIMENT SAMPLING AND MICROPLASTIC SEPARATION - PROTOCOL

4.1 EQUIPMENT NEEDED

4.1.1 Sampling equipment

- GPS
- Sample containers (metallic or glass jars or paper bags) - 2 for each replicate sample
- 2 Metal sieves with collecting pan (1 mm and 5 mm mesh size; preferably stacked together)
- 1 Glass beaker (2 l)
- 1 Measuring cylinder or glass beaker (250 ml)
- 1 Metal spoon or scoop
- 1 Metallic or wooden 100 x 100 cm quadrat

4.1.2 Sample separation equipment

- Ruler
- Büchner funnel (Figure 1) or a vacuum filtering device
- Filter papers 20-25 µm pore size (e.g. Whatman 41 Ashless Quantitative Filter Paper, 20-25µm, 12.5cm, EW-06647-04 – depending on the diameter of the filtering funnel (http://www.coleparmer.com/Category/Filter_Papers/1288?SortBy=6&Page=5) – 3 for each replicate sample, used only for SMP
- Sodium Chloride for analysis (for example: Merck – Cat. num.: 1.06404.1000)
- Magnetic stirrer and magnetic stirring bars
- Glass beakers (500 ml, 1000 ml)
- Stereomicroscope (min. 80x zoom; recommended also: transmition light with dark field, polarisation contrast and ring light)
- Object glasses (marked – number of a sample, date of analysis)
- Analitical laboratory scale
- Micro tweezer and tweezer
- Glass petri dishes
- Glass stick
- Lab coat
- Latex gloves without powder
- Glass vials
- Optional:
    a. desiccator
    b. laboratory oven

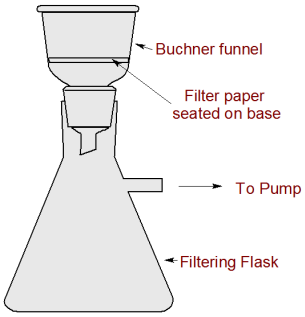

Figure 8: Schematic presentation of a Büchner funnel.

4.2 SEDIMENT SAMPLING PROTOCOL

4.2.1 General conditions

1. Sandy beaches (0.1 - 0.0125 mm grain diameter) should be chosen on the basis of their accessibility (accessible all year) and orientation to the predominant winds in order to maximize the probability of litter accumulation.
2. Microplastics should be monitored on the top of the shore (above the strand line = high water mark[2]).
3. Samples should be collected from the upper max. 5 cm of the sediment.
4. A minimum of five replicate samples should be collected on the beach. The replicates should be separated by at least 5 m. They can be distributed in a stratified random manner so as to be representative of the entire beach or a specific section of the beach. The samples should cover the area from the strand line (high water mark) until the back of the beach, depending on the width of the beach (Figure 2). If the beach is narrow then all the replicates should be sampled on the strand line.
5. Frequency: sampling should be done twice in a year (in the summer season, after the summer season); microplastic on beach can be sampled at the same time as macro litter on beaches, or in parallel with any other routine intertidal monitoring (e.g. for chemical contaminants, biota).
6. The person sampling should be down-wind of the sampling area.
7. Avoid the use of plastic tools and containers.
8. Avoid synthetic clothing (e.g. fleece).

[2]The area at the top of a beach where litter is deposited is an example of this phenomenon.

Figure 9: Blue square indicates appropriate location for beach sediment microplastic sampling (between high water mark and back of the beach)

4.2.2 Sampling of small microplastic (SMP) (20 µm – 1mm)

The SMP should be collected prior to the large microplastic samples (LMP) in order to minimize the risk of contamination made by persons undertaking the LMP sampling:

1. Collect the sediment sample from the top 3 cm of sand, using a metal scoop (or spoon), by kneeling on the strand line and collecting a series of scoops (approximately 15 ml each scoop) at arms-length at intervals within an arc shaped area to the front. It is better to make more scoops than deeper scoops.

Figure 10: Collecting a series of scoops at arm-length at intervals within an arc shaped area to the front.

2. Collect approximately 250 ml of sediment (use the 250 ml glass beaker or measuring cylinder).
3. Sieve each sample through a 1 mm metallic sieve in the metal or glass receiver (the most recommended is the original sieve receiver – collecting pan), and then store the material which passed through the sieve.
4. Store the sieved sediment samples in metal (e.g. foil) or glass containers (for SMP the paper bag is not recommended), and transfer them to the lab for the separation of the microplastics.

4.2.3 Sampling of large microplastic (LMP) (1 mm – 5 mm)

The sample for the LMP should be collected as an entirely independent sample at each location and should be obtained AFTER the sampling of the SMP. It should be done next to the SMP location. SMP and LMP sampling spots should not be mixed, unless the beach is not long enough.

1. Place a metallic or wooden quadrat, 100 cm x 100 cm, on the sand surface, on the top of the shore (see Chapter 1.3.1), next to the SMP location for this replicate sample.

Figure 11: Placing of the wooden quadrat on the sand surface.

2. Collect with a metal scoop (or spoon) the top 3 cm of sand from the area contained within the quadrat. Put the sand in the 2 l glass beaker, in order to calculate the volume of the

sediment sampled, and pass the sample through the 1 mm metal sieve. Repeat this step as many times as necessary until the sampling of the 100 x 100 cm surface is completed.

3. Write down the total volume of the sample.

Figure 12: Collecting the top 3 cm of sand with a metal scoop.

4. Store the material retained on the sieve in metal (e.g. foil) or glass containers or paper bags. Transfer the samples to the lab for the separation of the microplastics.
   Recommendation: you can extend the protocol for mezzolitter (5 - 25 mm) using a 5 mm sieve to separate debris >5 mm from the beach sediment. Store the retained material on the sieve in metal or glass containers or in paper bags. Preferably the two sieves (1 mm and 5 mm) could be stacked together.

Figure 13: Material retained on the 5 mm sieve (left), plastic items larger than 5 mm (right).

4.3 MICROPLASTIC SEPARATION FROM THE BEACH SEDIMENTS

4.3.1 Laboratory separation of LMP(1 mm – 5 mm)

1. Put the material retained on the 5 mm and 1 mm sieves into two or more (depending on the quantity) plastic trays.
2. Separate all artificial items size 5.1 – 25 mm (mezzo litter) (collected on the sieve with 5 mm mesh size) with tweezersin one glass vial. Categorize each found particle according

to the WP4 List of Marine Litter (see the Appendix 1). Note the weight of all particles together.

3. Separate all artificial items (litter) size 1 – 5 mm (collected on the sieve with 1 mm mesh size), categorize each particle according to the Table 1, describe each particle with the colour according to the Table 2, measure the length of each particle(measure the longest diagonal) and store them in the glass vials for each category separately. For the smaller items you may use a stereomicroscope.
4. Weigh the particles in each category. If the weight of the particles of each category is too small for weighing, then weigh the particles from all categories together.
5. Post well closed glass vials with microplastic particles size 1 – 5 mm (all categories) to the National Institute of Chemistry Slovenia (same address as above). Note: in case of uncertainty if item is microplastic or not, collect the item anyway, the final confirmation will be done by chemical analysis.

4.3.2 Laboratory separation of SMP (20 µm – 1 mm)

1. Prepare a saturated NaCl solution with a density of 1.2 g/cm^3. Dissolve 360 g NaCl per 1 liter of distilled water in a glass beaker with the magnetic stirrer. The solubility depends on the temperature. The solution needs to be stirred between 20 - 25 min (for 1 l, for smaller volumes the time for dissolution of NaCl is shorter). A small amount of salt (one teaspoon) can stay in suspension.
2. Filter the NaCl solution through 20 µm filter paper, and check the filter under the stereomicroscope (x80) for any plastic contamination (if you used filtered distilled water, then you can skip this step).
3. Weigh 50 ml of sieved sediment sample.
4. Put 50 ml of the sieved sediment sample in a glass beaker using a metal spoon and add 200 ml of the saturated NaCl solution. Put into the glass beaker one magnetic stirring bar, cover it with the lid (for example: with aluminium foil) and put it on the magnetic stirrer for 2 min. Then allow to settle for 4 minutes (or the time that is neededfor sedimentation of all the sand particles; always use the same time). As an alternative you can use metal spoon or glass stick to mix the solution for 2 min.
5. Transfer the supernatant, which contains the plastic items, to the Büchner filtrating funnel and filter it through the 20 µm filter paper.
6. Rinse the filter with distilled water (filter 200 ml - 500 ml distilled water) to remove the salt and avoid the NaCl crystals on the dried filter. Store the filter in sealed petri dish.
7. Repeat the NaCl separation procedure three times with each SMP sample to ensure a high recovery of buoyant plastic items.

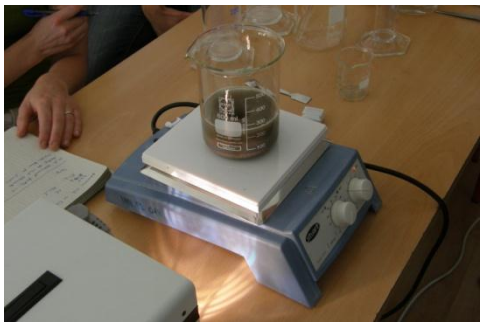

Figure 15: Mixing the sediment in NaCl solution for 2 min with magnetic stirrer.

8. Dry the filters in Petri dishes at the room temperature for 24 h in a desiccator or under a hood, so that no contamination occurs from the atmosphere. Alternatively, you can put the petri dishes in an oven at 40 °C overnight.
9. Put each filter paper in the Petri dish under the stereomicroscope (x80) and collect the plastic items using the micro tweezers.
10. When finding each microplastic particle, categorize it into one of the categories according to categories in the Table 1 and put it in the Petri dish (or other glass vials), marked with category name. The Petri dish needs to be closed at all times.
11. Each filter paper should be reviewed by another person (double check).
12. When each filter paper was checked by two persons, weigh the microplastic particles of each category separately.
13. Put Petri dish with microplastic particles under the microscope with measuring equipment and measure the size of each particle (measure the longest diagonal), except filaments and note their colour (see Table 2). (If you do not have image analysis program, you do not need to do this, the National Institute of Chemistry Slovenia will do this.)
14. Post well closed glass dishes with microplastic particles (all categories) to the National Institute of Chemistry Slovenia. Note: in case of uncertainty, collect the item anyway – the final confirmation will be done by chemical analysis.
15. Add together the data from the three filters (three repeated separations for each sample) and calculate the total number of microplastics in the 50 ml sediment sample.**Theentire sample (250 ml) must be analyzed**.
16. After chemical analysis store the samples till the end of the project or more.

4.4 META DATA

Meta data are listed in detail in the accompanying excel data sheet.

4.5 PROPOSED PARTNERS' ACTIVITIES AND NUMBER OF SAMPLES

The sampling for beach sediment will be done two times, first in the touristic season in summer 2014 (**July or August 2014**) and second, after the touristic season in autumn (**October 2014 – December 2014**). The plan is to compare the results between touristic and non-touristic season.

Each country should sample on one beach, except in Greece three beaches will be sampled. If possible country can choose to do sampling on more than one beach.

In 2015 partners are not obliged to perform beach sediment sampling. If possible repeat sampling on the same location before and after touristic season.

4.6 CONNECTIVITY WITH OTHER WPS AND ACTIVITIES

The sampling of micro-litter should be organized in parallel with the macro-litter surveys under WP4. Results on microplastic quantities will be shared with WP4 in order to test the modelling exercise efficiency and correctness.

5 REFERENCES

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Appendix 1: Master List of Categories of Litter Items

Code	Items name	Item counts	Total
ARTIFICIAL POLYMER MATERIALS			
G1	4/6-pack yokes, six-pack rings		
G3	Shopping Bags		
G4	Small plastic bags, e.g. freezer bags, including pieces		
G5	Plastic bag collective role; what remainsfrom rip-off plastic bags		
G7	Drink bottles <=0.5l		
G8	Drink bottles >0.5l		
G9	Cleaner bottles & containers		
G10	Food containers incl. fast food containers		
G11	Beach use related cosmetic bottles and containers, eg. Sunblocks		
G12	Other cosmetics bottles & containers		
G13	Other bottles & containers (drums)		
G14	Engine oil bottles & containers <50 cm		
G15	Engine oil bottles & containers > 50 cm		
G16	Jerry cans (square plastic containers with handle)		
G17	Injection gun containers		
G18	Crates and containers / baskets		
G19	Car parts		
G21	Plastic caps/lids drinks		
G22	Plastic caps/lids chemicals, detergents (non-food)		
G23	Plastic caps/lids unidentified		
G24	Plastic rings from bottle caps/lids		
G25	Tobacco pouches / plastic cigarette box packaging		
G26	Cigarette lighters		
G27	Cigarette butts and filters		
G28	Pens and pen lids		
G29	Combs/hair brushes/sunglasses		
G30	Crisps packets/sweets wrappers		
G31	Lolly sticks		
G32	Toys and party poppers		
G33	Cups and cup lids		
G34	Cutlery and trays		
G35	Straws and stirrers		
G36	Fertiliser/animal feed bags		
G37	Mesh vegetable bags		
G40	Gloves (washing up)		
G41	Gloves (industrial/professional rubber gloves)		

G42	Crab/lobster pots and tops		
G43	Tags (fishing and industry)		
G44	Octopus pots		
G45	Mussels nets, Oyster nets		
G46	Oyster trays (round from oyster cultures)		
G47	Plastic sheeting from mussel culture (Tahitians)		
G49	Rope (diameter more than 1cm)		
G50	String and cord (diameter less than 1cm)		
G51	Fishing net		
G53	Nets and pieces of net < 50 cm		
G54	Nets and pieces of net > 50 cm		
G56	Tangled nets/cord		
G57	Fish boxes - plastic		
G58	Fish boxes - expanded polystyrene		
G59	Fishing line/monofilament (angling)		
G60	Light sticks (tubes with fluid) incl. packaging		
G62	Floats for fishing nets		
G63	Buoys		
G64	Fenders		
G65	Buckets		
G66	Strapping bands		
G67	Sheets, industrial packaging, plastic sheeting		
G68	Fibre glass/fragments		
G69	Hard hats/Helmets		
G70	Shotgun cartridges		
G71	Shoes/sandals		
G72	Traffic cones		
G73	Foam sponge		
G75	Plastic/polystyrene pieces 0 - 2.5 cm		
G76	Plastic/polystyrene pieces 2.5 cm >< 50cm		
G77	Plastic/polystyrene pieces > 50 cm		
G78	Plastic pieces 0 - 2.5 cm		
G79	Plastic pieces 2.5 cm >< 50cm		
G80	Plastic pieces> 50 cm		
G81	Polystyrene pieces 0 - 2.5 cm		
G82	Polystyrene pieces 2.5 cm >< 50cm		
G83	Polystyrene pieces > 50 cm		
G84	CD, CD-box		
G85	Salt packaging		
G86	Fin trees (from fins for scubadiving)		
G87	Masking tape		
G88	Telephone (incl. parts)		
G89	Plastic construction waste		

G90	Plastic flower pots		
G91	Biomass holder from sewage treatment plants		
G92	Bait containers/packaging		
G93	Cable ties		
G95	Cotton bud sticks		
G96	Sanitary towels/panty liners/backing strips		
G97	Toilet fresheners		
G98	Diapers/nappies		
G99	Syringes/needles		
G100	Medical/Pharmaceuticals containers/tubes		
G101	Dog faeces bag		
G102	Flip-flops		
G108	Industrial pellets		
G124	Other plastic/polystyrene items (identifiable)		
RUBBER			
G125	Balloons and balloon sticks		
G126	Balls		
G127	Rubber boots		
G128	Tyres and belts		
G129	Inner-tubes and rubber sheet		
G130	Wheels		
G131	Rubber bands (small, for kitchen/household/post use)		
G132	Bobbins (fishing)		
G133	Condoms (incl. packaging)		
G134	Other rubber pieces		
CLOTH/TEXTILE			
G137	Clothing / rags (clothing, hats, towels)		
G138	Shoes and sandals (e.g. Leather, cloth)		
G139	Backpacks & bags		
G140	Sacking (hessian)		
G141	Carpet & Furnishing		
G142	Rope, string and nets		
G143	Sails, canvas		
G144	Tampons and tampon applicators		
G145	Other textiles (incl. rags)		
PAPER/CARDBOARD			
G147	Paper bags		
G148	Cardboard (boxes & fragments)		
G150	Cartons/Tetrapack Milk		
G151	Cartons/Tetrapack (others)		
G152	Cigarette packets		
G153	Cups, food trays, food wrappers, drink containers		
G154	Newspapers & magazines		

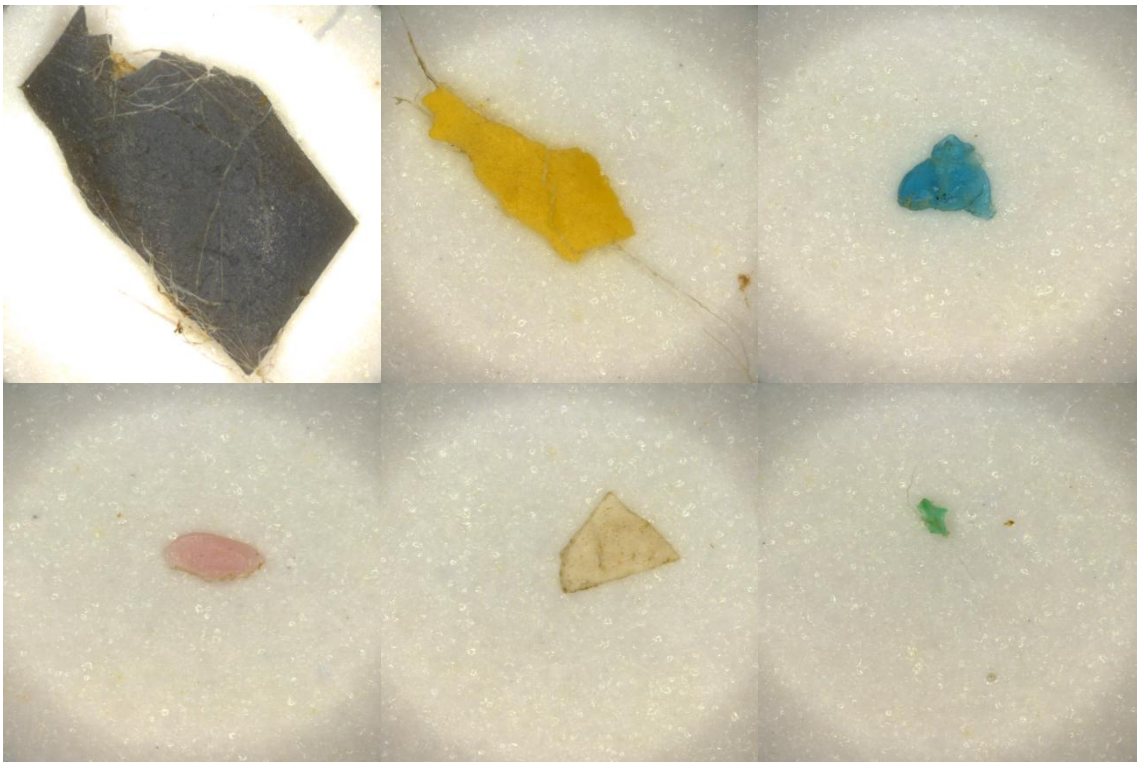
G155	Tubes for fireworks		
G156	Paper fragments		
G158	Other paper items		
PROCESSED/WORKED WOOD			
G159	Corks		
G160	Pallets		
G161	Processed timber		
G162	Crates		
G163	Crab/lobster pots		
G164	Fish boxes		
G165	Ice-cream sticks, chip forks, chopsticks, toothpicks		
G166	Paint brushes		
G167	Matches & fireworks		
G171	Other wood < 50 cm		
G172	Other wood > 50 cm		
METAL			
G174	Aerosol/Spray cans industry		
G175	Cans (beverage)		
G176	Cans (food)		
G177	Foil wrappers, aluminum foil		
G178	Bottle caps, lids & pull tabs		
G179	Disposable BBQ's		
G180	Appliances (refrigerators, washers, etc.)		
G181	Tableware (plates, cups & cutlery)		
G182	Fishing related (weights, sinkers, lures, hooks)		
G184	Lobster/crab pots		
G186	Industrial scrap		
G187	Drums, e.g. oil		
G188	Other cans (< 4 L)		
G189	Gas bottles, drums & buckets (> 4 L)		
G190	Paint tins		
G191	Wire, wire mesh, barbed wire		
G193	Car parts / batteries		
G194	Cables		
G195	Household Batteries		
G198	Other metal pieces < 50 cm		
G199	Other metal pieces > 50 cm		
GLASS/CERAMICS			
G200	Bottles, including pieces		
G201	Jars, including pieces		
G201	Light bulbs		
G203	Tableware (plates & cups)		
G204	Construction material (brick, cement, pipes)		

G205	Fluorescent light tubes		
G206	Glass buoys		
G207	Octopus pots		
G208	Glass or ceramic fragments >2.5cm		
G210	Other glass items		
UNIDENTIFIED AND/OR CHEMICALS			
G211	Other medical items (swabs, bandaging, adhesive plaster, etc.)		
G213	Paraffin/Wax		

Appendix 2: Photo guide of microlitter categories

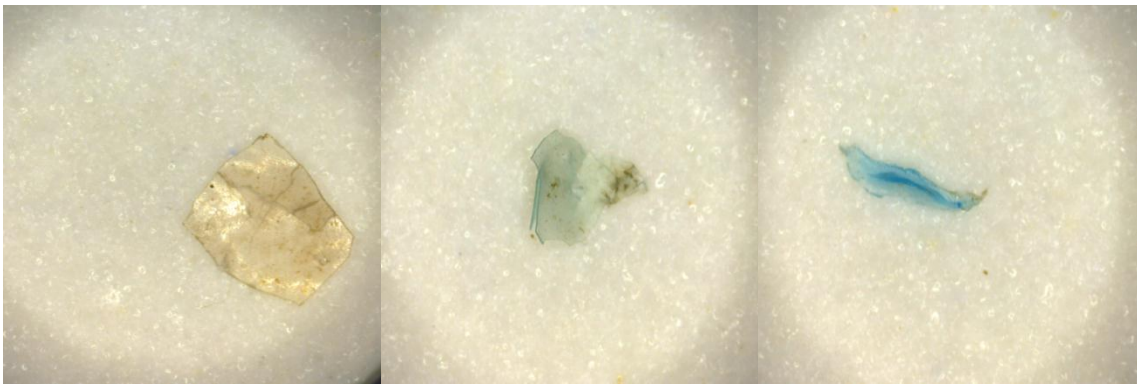
Fragments< 5 mm(G103, G104, G105, G106)

Irregular form, solid state, thick, sharp crooked edges



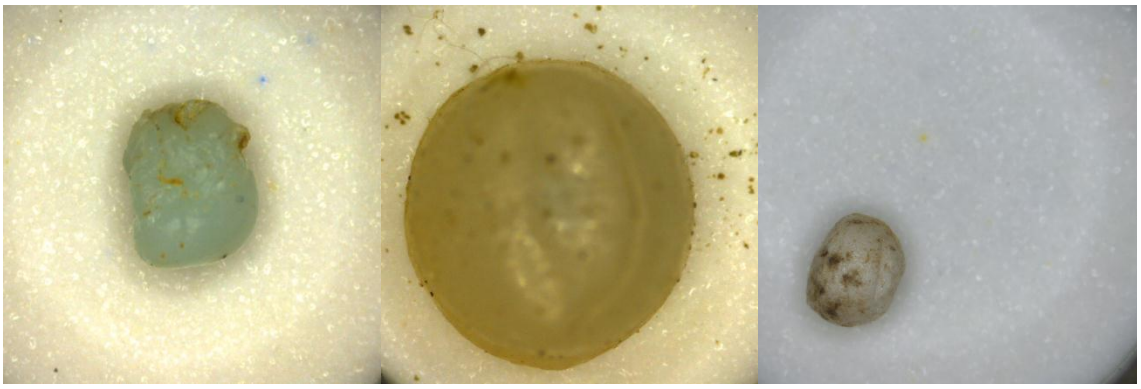
Films< 5 mm (G114)

Irregular form, flexible (not solid), thin



Pellets< 5 mm (G107, G108, G109, G110, G111)

Irregular round form, normally flat from one side

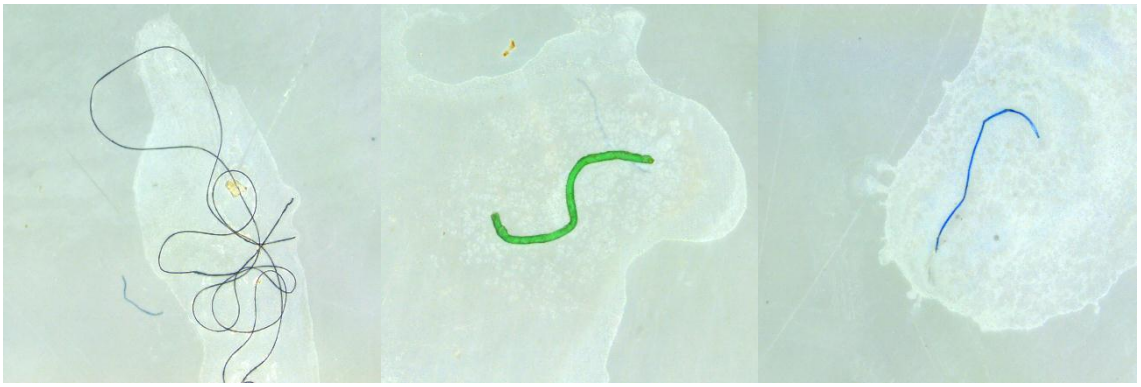


Granules< 5 mm (G116)

Regular round form

Filaments< 5 mm (G113)

Thin, short and long fibers



Foams< 5 mm (G115, G117)

Soft state, usually styrofoam and polyurethane foams, yellow to white colours