SWIM and Horizon 2020 Support Mechanism

Working for a Sustainable Mediterranean, Caring for our Future

MONITORING MARINE LITTER ON BEACHES

Presented by:

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SWIM-H2020 SM / MIO-ECSDE Marine Litter Expert

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KEY STEPS & ELEMENTS OF ML MONITORING ON BEACHES

- Site selection
- Sampling units
- Frequency and timing of surveys
- Pre-survey characterization of sites
- Size limits and classes to be surveyed
- Collection and identification of litter
- Quantification of litter
- Equipment/Consumables
- Safety

Photo: Thomais Vlachogianni

SITE SELECTION



Photos: Thomais Vlachogianni

Site location	Site features
✓ In the vicinity of ports or harbors; ✓ In the vicinity of river mouths; ✓ In the vicinity of coastal urban areas; ✓ In the vicinity of tourists destinations; ✓ In relatively remote areas.	✓ Having a minimum length of 100 m; ✓ Low to moderate slope; ✓ Clear access to sea; ✓ Accessible to survey teams throughout the year; ✓ Ideally the site should not be subject to cleaning activities; ✓ Survey activities posing no threat to endangered or protected species.

Sampling locations

Photos: Thomais Vlachogianni

SAMPLING UNIT

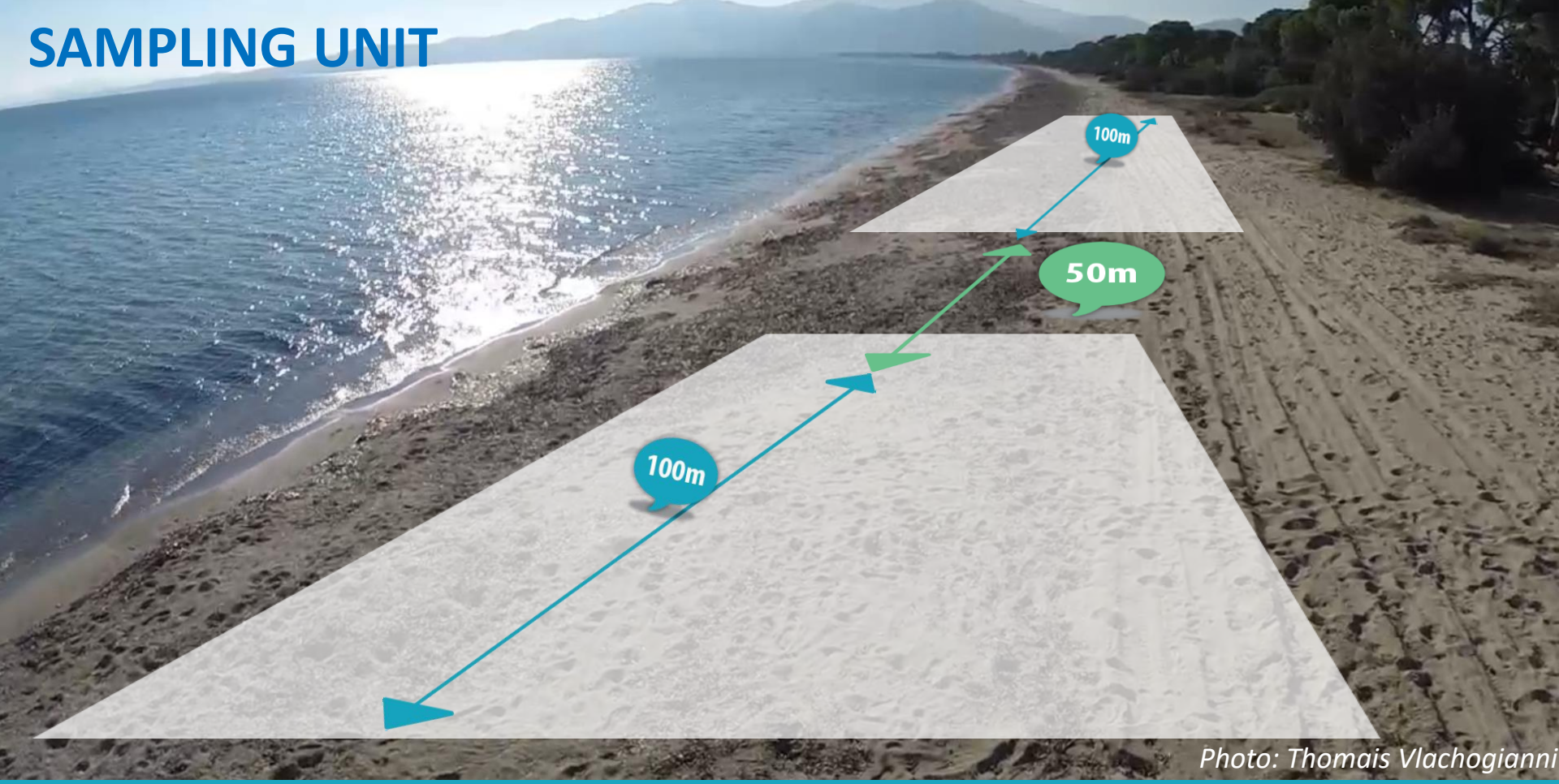


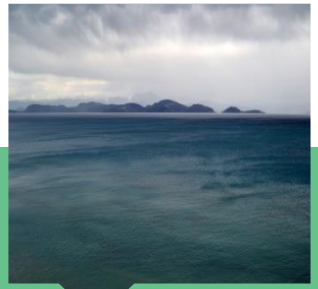
Photo: Thomais Vlachogianni

- The sampling unit should be a 100-metre stretch of beach along the strandline and reaching to the back of the beach

FREQUENCY AND TIMING OF SURVEYS

Frequency:
4 surveys/year
(minimum)

Autumn:
mid Sep-mid Oct



Winter:
mid Dec-mid Jan

Spring:
Apr

Summer:
mid Jun-mid Jul

Photos: Thomais Vlachogianni

PRE-SURVEY CHARACTERIZATION OF SITES

Photo: Thomais Vlachogianni

PRE-SURVEY CHARACTERIZATION OF SITES

GPS COORDINATES

The GPS coordinates of all four corners of the sampling unit should be recorded

SITE ID NAME

A site ID name should be created and used for the duration of the study

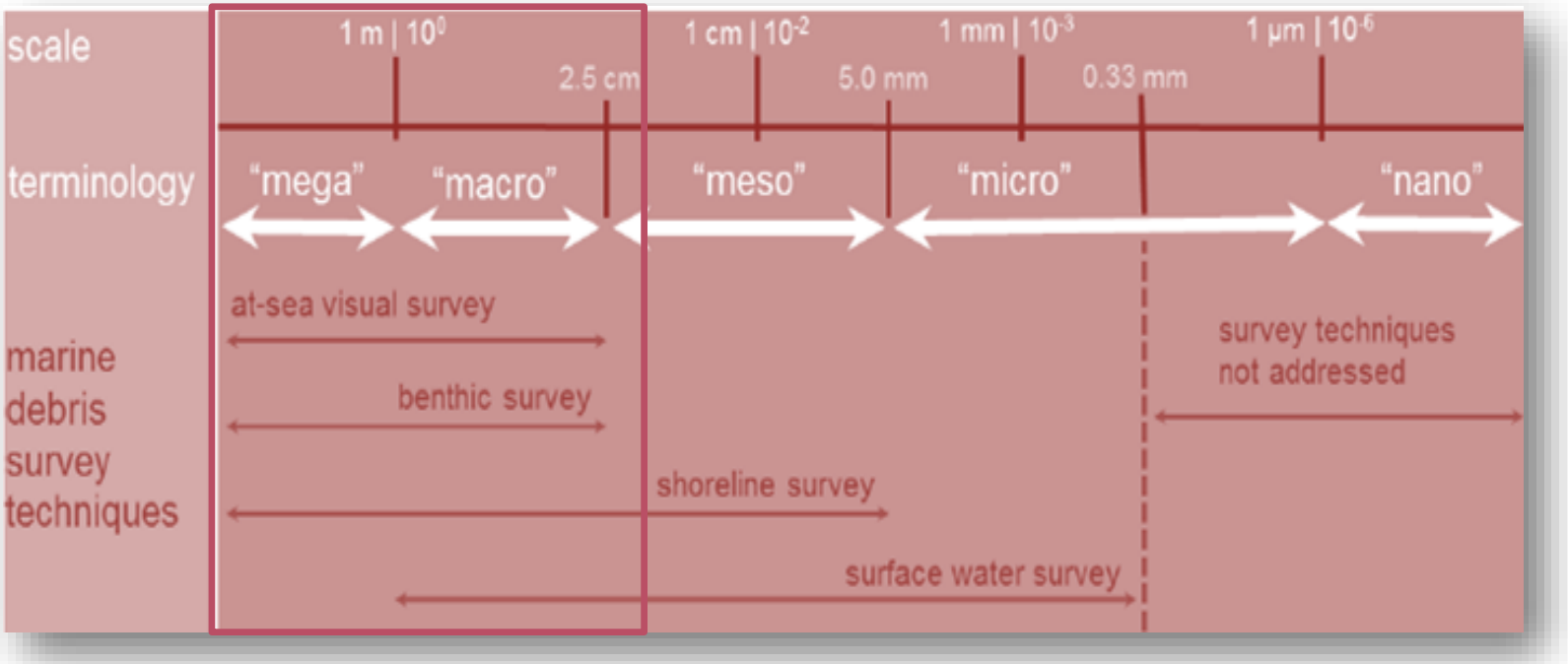
SPECIA FEATURES

Characterization of the type of substrate, beach topography, beach usage, distances from urban settlements, shipping lanes, river mouths, etc.

DIGITAL PHOTOS

Digital photographs should be taken to document the physical characteristics of the monitoring site

SIZE LIMITS SURVEYED



Source: S. Lippiatt, S. Opfer, C Arthur. Marine Debris Monitoring and Assessment. NOAA Technical Memorandum NOS-OR&R-46, (2013).

- ✓ **There are no upper size limits** to litter recorded on beaches.
- ✓ Litter items with **a lower limit of 2.5 cm** in the longest dimension were monitored, ensuring the inclusion of caps & lids and cigarette butts.

Photo: Thomais Vlachogianni

COLLECTION & IDENTIFICATION OF LITTER ITEMS

According to the ‘Master List’, which consists of a set of some 160 litter items

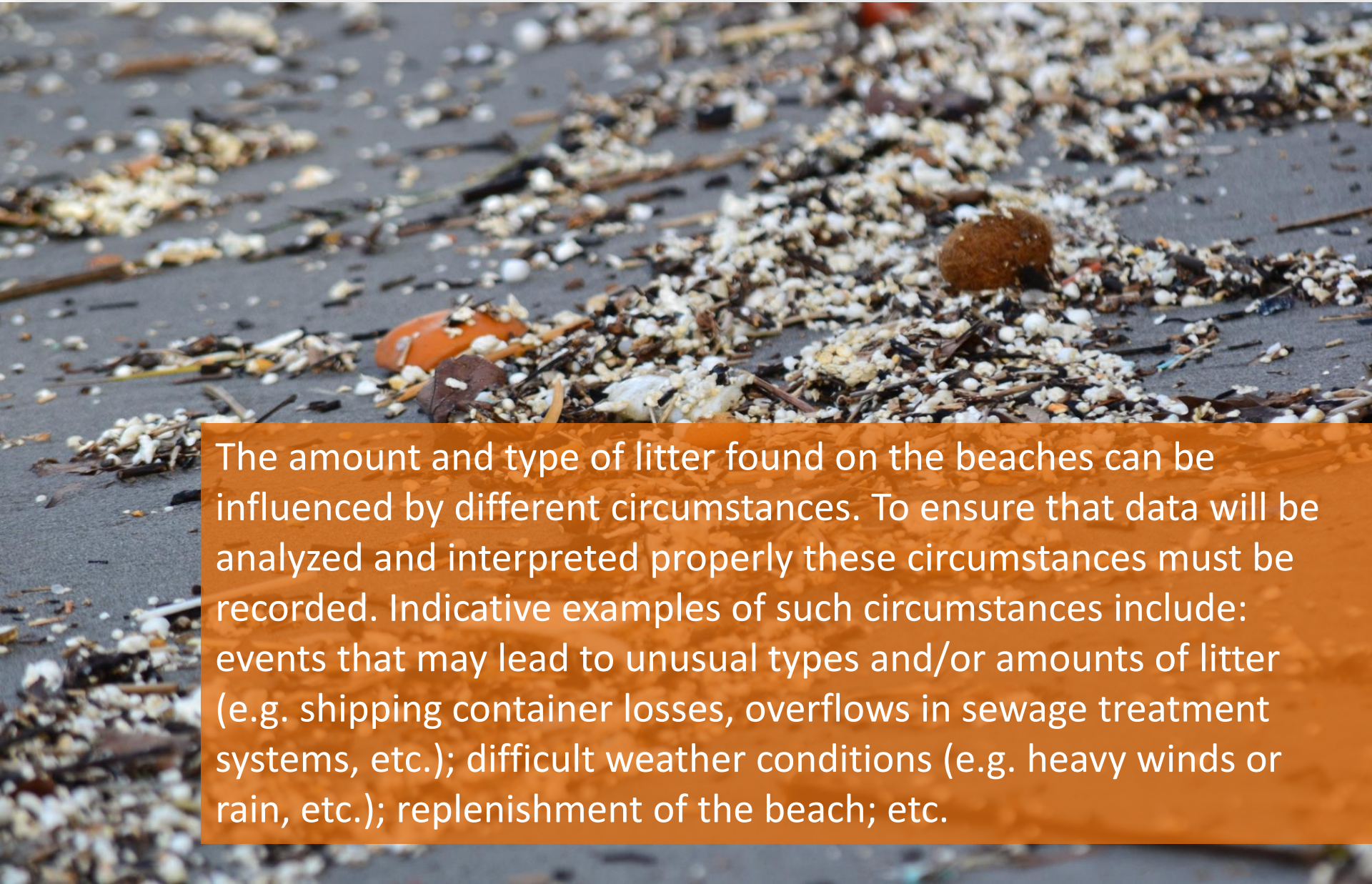
MLW Code	PLASTIC
G1	4/6-pack yokes, six-pack rings
G3	Shopping Bags incl. pieces
G4	Small plastic bags, e.g. freezer bags incl. Pieces
G5	Plastic bags collective role; what remains from rip-off plastic bags
G7	Drink bottles <=0.5l
G8	Drink bottles >0.5l
G9	Cleaner bottles & containers
G10	Food containers 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)

LITTER ITEMS

Interpreting small pieces of litter in a harmonized way

- ✓ Pieces of litter that are recognizable e.g. as a shopping bag (G3) should be registered as such.
- ✓ Pieces of materials that are not recognizable as an item e.g. plastic and/or polystyrene pieces should be counted according to their size (G75-G83).

ADITIONAL CONSIDERATIONS



The amount and type of litter found on the beaches can be influenced by different circumstances. To ensure that data will be analyzed and interpreted properly these circumstances must be recorded. Indicative examples of such circumstances include: events that may lead to unusual types and/or amounts of litter (e.g. shipping container losses, overflows in sewage treatment systems, etc.); difficult weather conditions (e.g. heavy winds or rain, etc.); replenishment of the beach; etc.

- ✓ All litter items should be removed from the beach during the survey.
- ✓ Larger items that cannot be removed (safely) by the surveyors should be marked, with for example paint spray (which meets environmental friendly standards) so that they will not be counted again at the next survey.
- ✓ The litter collected should be disposed of properly.
- ✓ Regional or national regulations and arrangements should be followed. If these do not exist local municipalities should be informed.

DATA COLLECTION AND DATA PROCESSING

- ✓ Coordinated
- ✓ Harmonized
- ✓ Comparable
- ✓ Reliable

Beach litter recording sheet

Beach litter reporting template

Photo: Thomais Vlachogianni

QUANTIFICATION OF LITTER ITEMS

The unit in which litter will be assessed on the coastline will be number of items and it will be expressed **as counts of litter items per square meter** (m^2). In addition, the main category types of litter items should be weighed.

DATA PROCESSING

- Macro-debris density
  $C_M = n / (w \times l)$

- Clean Coast Index (CCI) = (Total litter on sampling unit/total area of sampling unit) x K

Photo: Thomais Vlachogianni

DATA PROCESSING

DeFishGear
www.defishgear.net

Attribution of marine litter items to sources according to their category type.

Sources of ML

- ✓ Shoreline, including poor waste management practices, tourism and recreational activities;
- ✓ fisheries and aquaculture;
- ✓ shipping;
- ✓ fly-tipping;
- ✓ sanitary and sewage related;
- ✓ medical related;
- ✓ agriculture;
- ✓ non-sourced.

SOURCES CLASSIFICATION LIST

- **Shoreline, including poor waste management practices, tourism and recreational activities.** Indicative items are shopping bags, drink bottles, food containers, straws and stirrers, etc.
- **Fisheries and aquaculture**. Indicative items are crab and lobster pots, octopus' pots, mussel nets and oyster nets, fishing nets, fish boxes, etc.
- **Shipping**. Indicative items are engine oil bottles and containers, jerry cans, gloves (industrial/professional rubber gloves), oil drums, etc.
- **Fly-tipping**. Indicative items are car parts, traffic cones, construction waste, appliances (refrigerators, washing machines, etc.), etc.
- **Sanitary and sewage related**. Indicative items are cotton bud sticks, diapers and nappies, condoms (incl. packaging), tampons and tampon applicators, etc.
- **Medical related.** Indicative items are syringes and needles, medical and pharmaceuticals containers, etc.
- **Agriculture**. Indicative items are: fertilizer and animal feed bags, olive harvesting nets, greenhouse sheeting, flower pots from retailer plant nurseries, etc.
- **Non-sourced**. Classified within this category are all items that cannot be attributed to any of the aforementioned sources, either because they could have been generated by several sources, or they are too small or damaged/weathered to be identified. Indicative items are foam sponge, buckets, gloves, small plastic or polystyrene pieces, etc.

EXAMPLE OF RESULTS | ABUNDANCE AND DISTRIBUTION OF ML IN THE ADRIATIC and IONIAN COASTS

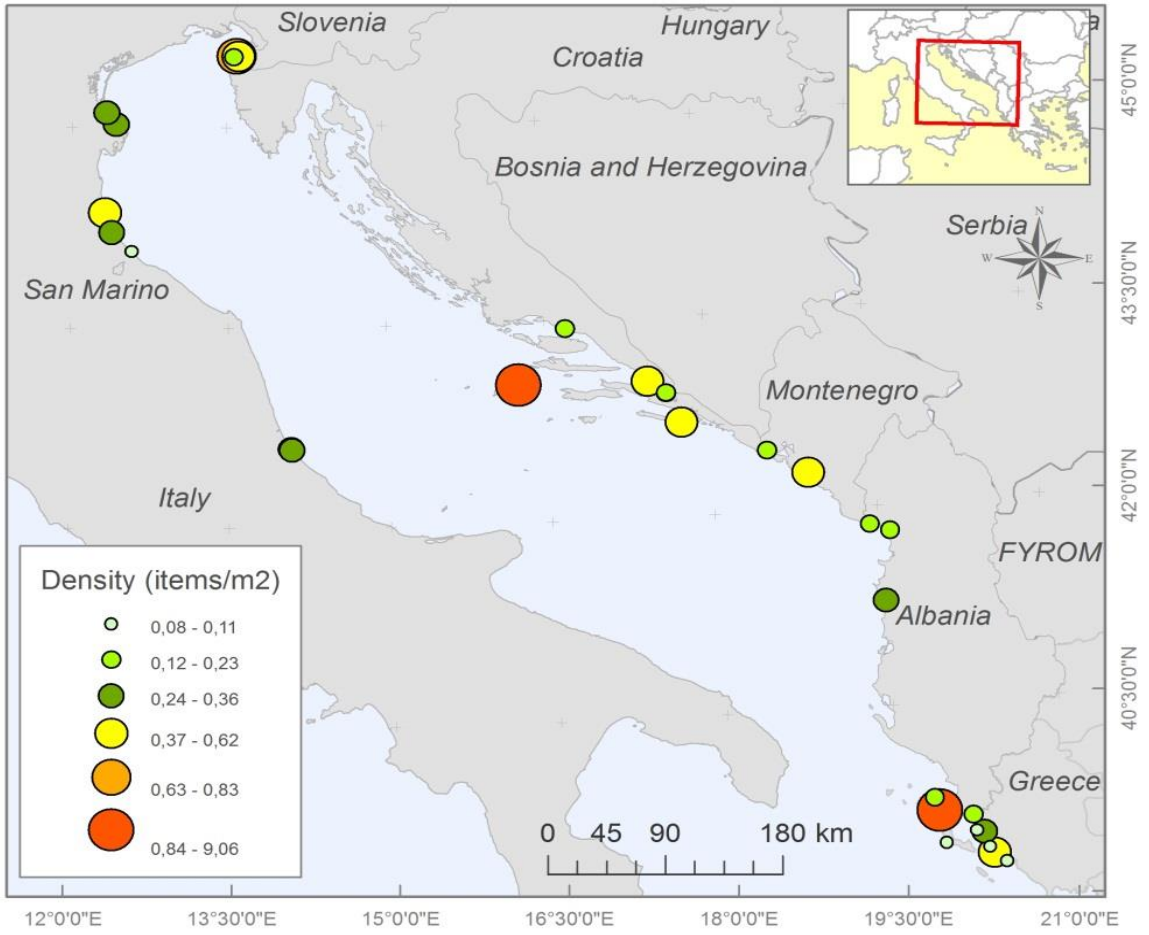
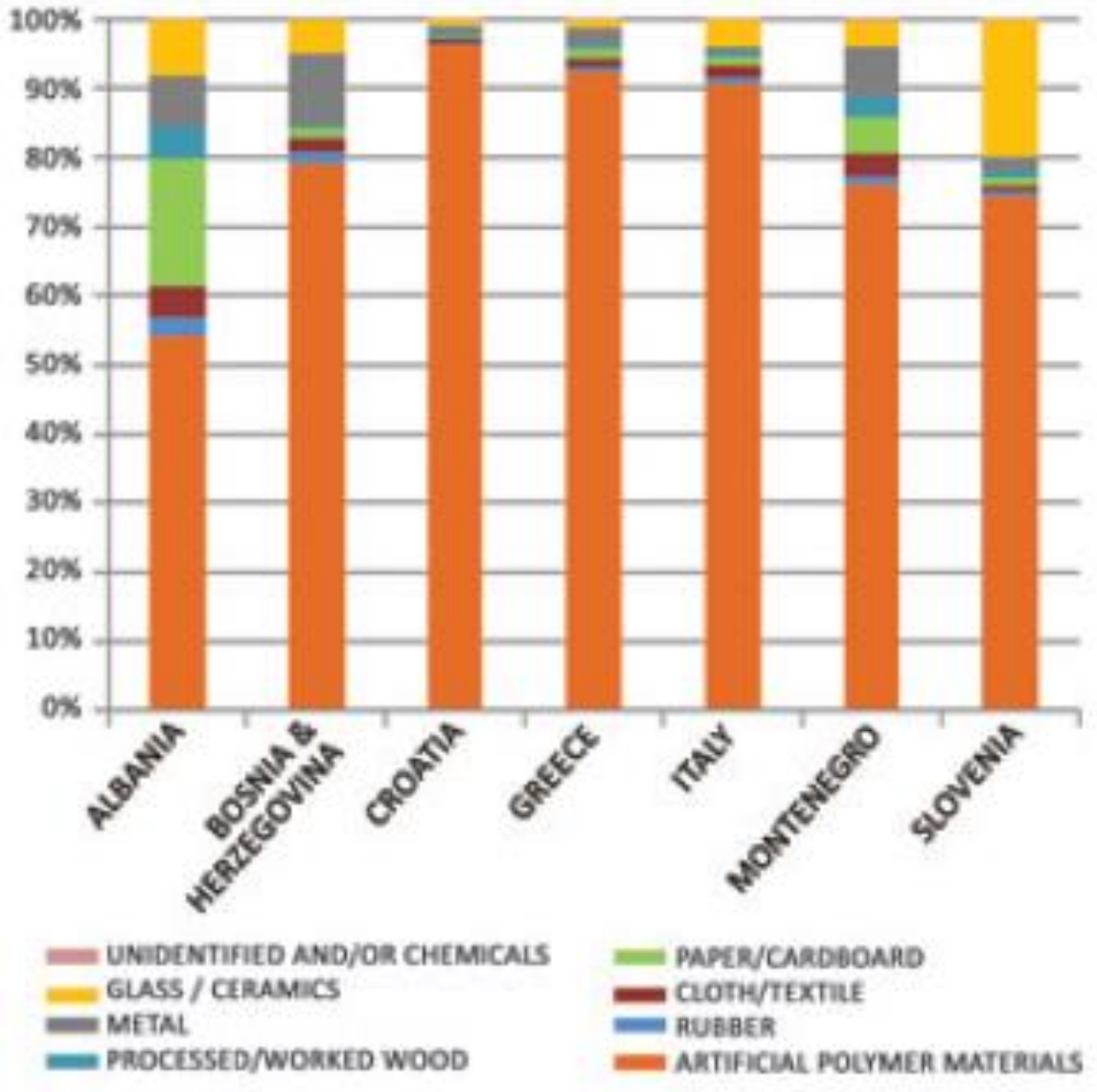


Photo: Thomais Vlachogianni

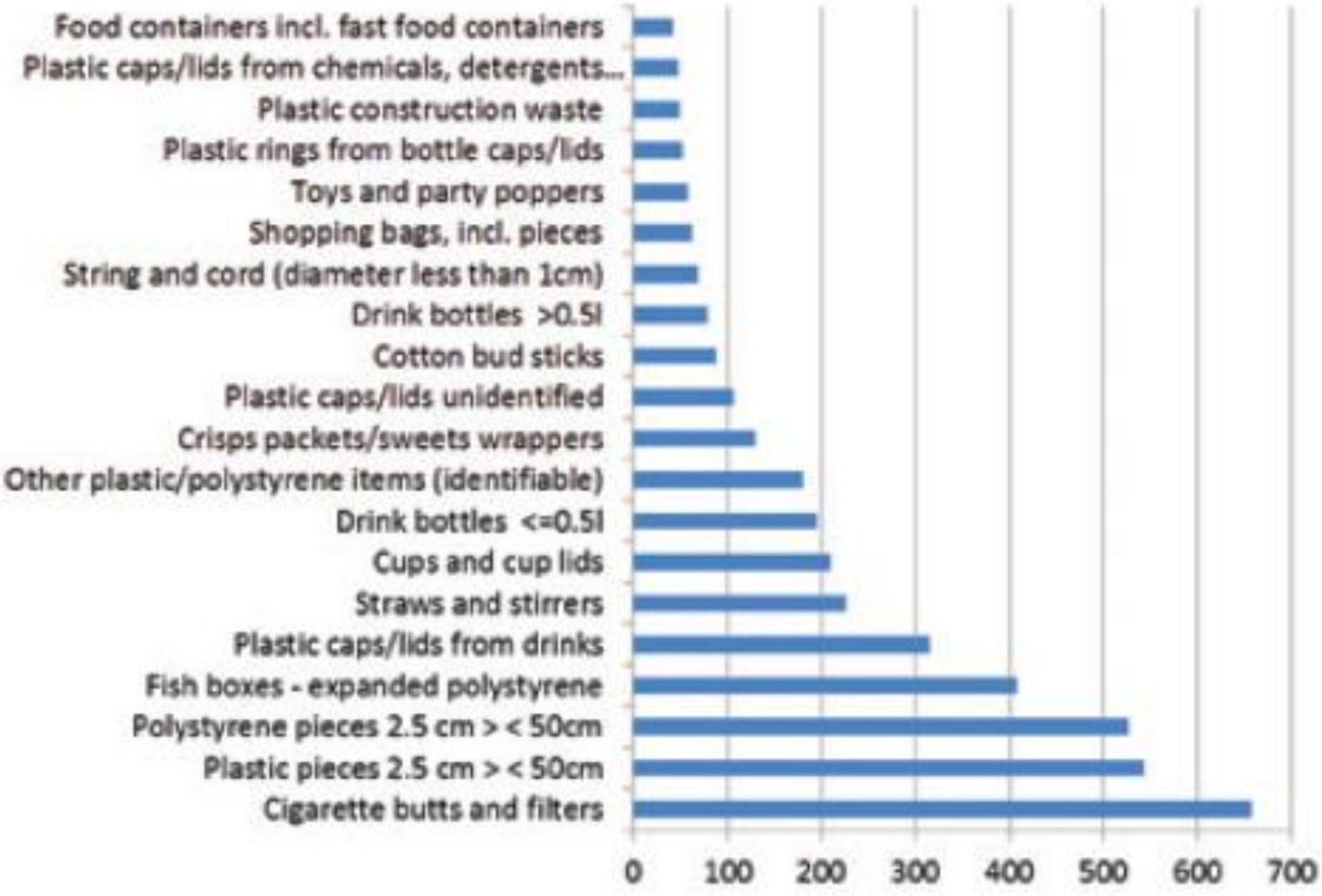
EXAMPLE OF RESULTS | ML COMPOSITION



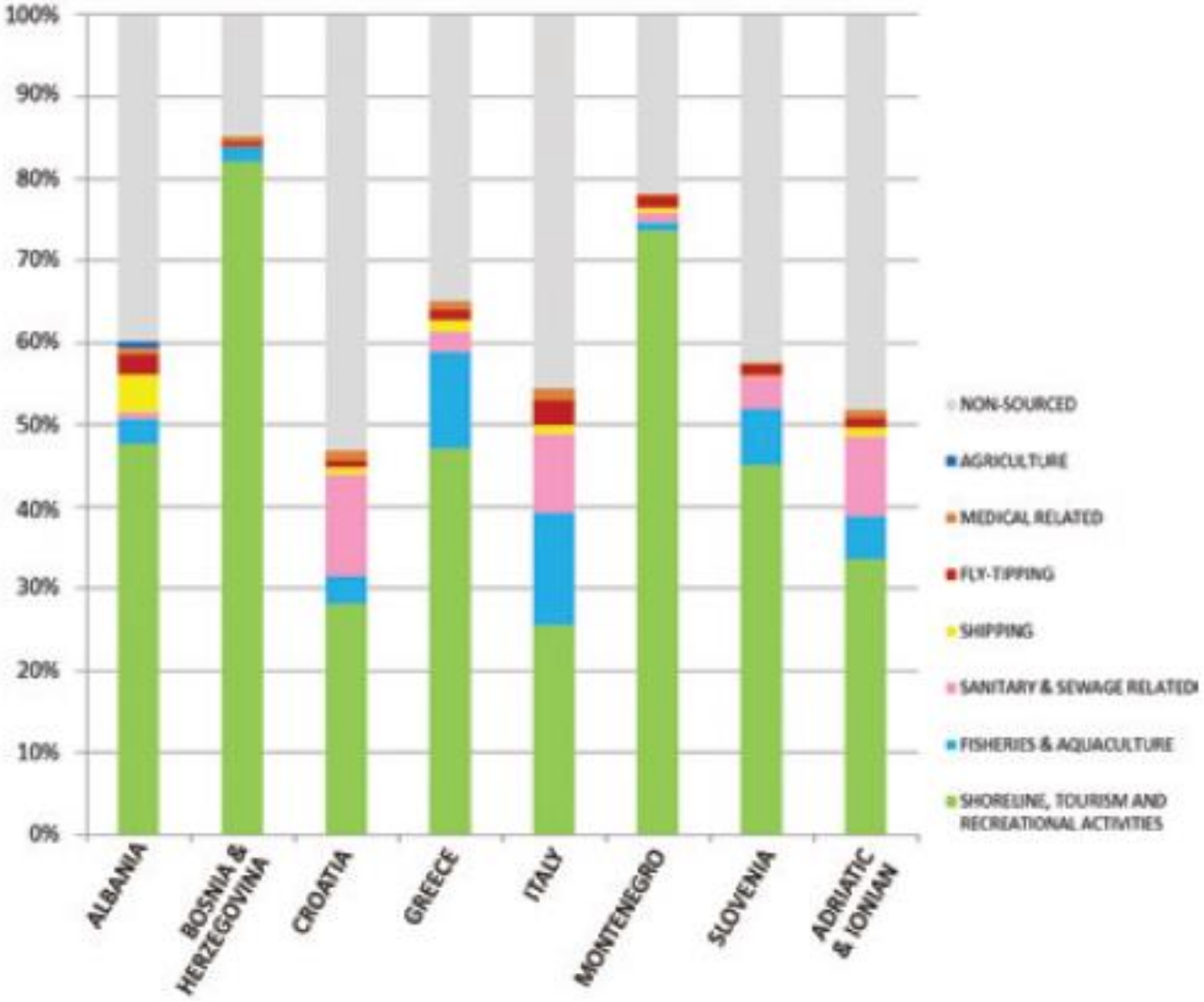
EXAMPLE OF RESULTS | TOP 20 ITEMS FOUND

TOP 20	Code	Items name	Total counts	%
1	G79	Plastic pieces 2.5 cm > < 50 cm	14,040	19.89
2	G82	Polystyrene pieces 2.5 cm > < 50 cm	8,422	11.93
3	G95	Cotton bud sticks	6,475	9.17
4	G21	Plastic caps/lids from drinks	4,705	6.67
5	G27	Cigarette butts and filters	4,660	6.60
6	G23	Plastic caps/lids unidentified	1,743	2.47
7	G45	Mussel nets, Oyster nets	1,716	2.43
8	G30	Crisps packets/sweets wrappers	1,492	2.11
9	G208	Glass or ceramic fragments >2.5 cm	1,368	1.94
10	G124	Other plastic/polystyrene items (identifiable)	1,350	1.91
11	G67	Sheets, industrial packaging, plastic sheeting	1,336	1.89
12	G10	Food containers incl. fast food containers	1,332	1.89
13	G35	Straws and stirrers	1,273	1.80
14	G33	Cups and cup lids	1,161	1.65
15	G22	Plastic caps/lids from chemicals, detergents	1,058	1.50
16	G3	Shopping bags, incl. pieces	974	1.38
17	G7	Drink bottles <=0.5 l	872	1.24
18	G8	Drink bottles >0.5 l	794	1.13
19	G24	Plastic rings from bottle caps/lids	770	1.09
20	G50	String and cord (diameter less than 1 cm)	748	1.06

EXAMPLE OF RESULTS | TOP 20 ITEMS FOUND IN GREECE



EXAMPLE OF RESULTS | SOURCES OF ML



USEFULL RESOURCES

- Marine Litter Assessment in the Adriatic and Ionian Seas
- Methodology for monitoring marine litter on beaches (macro debris >2.5 cm)
- E-learning module on monitoring marine litter on beaches
- Video-guidelines on monitoring marine litter on beaches

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Thank you for your attention!

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