

SWIM and Horizon 2020 Support Mechanism

Working for a Sustainable Mediterranean, Caring for our Future

METHODOLOGIES FOR MONITORING MARINE LITTER IN THE COASTAL AND MARINE ENVIRONMENT

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ASSESSMENT OF MARINE LITTER IN THE EGYPTIAN MEDITERRANEAN COASTLINE

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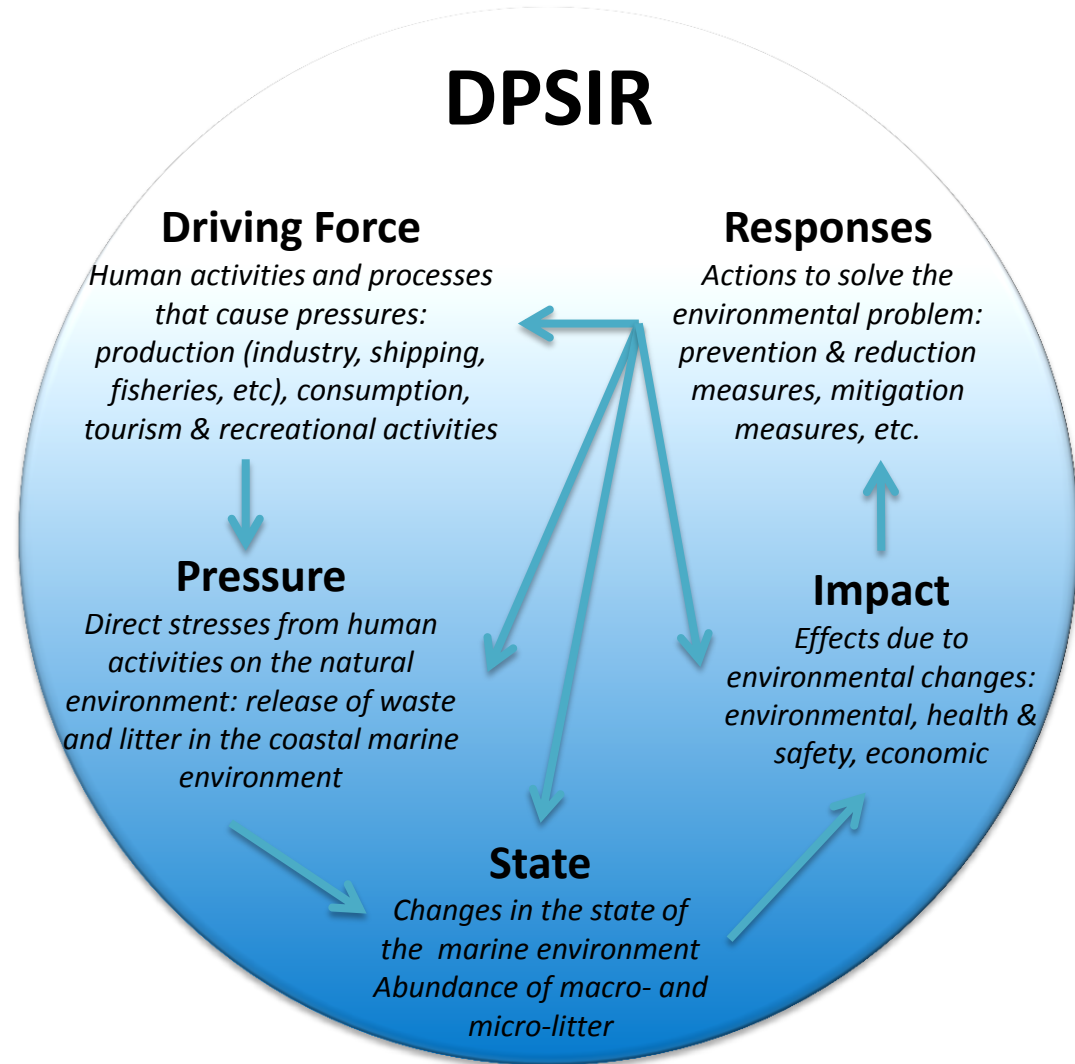
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INTRO TO MONITORING | WHAT & WHY

Monitoring is a **long term, standardized** measurement, observation, evaluation and reporting of the environment in order **to define status** and **trends**.

More specifically, ML monitoring aims to provide information on the **types, quantities, distribution** and **impacts** of marine debris; to **identify the sources** of marine debris; and to **assess the effectiveness of management measures** to address the issue.



HOW TO MONITOR |

KEY ELEMENTS OF A ML MONITORING STRATEGY

GENERAL ELEMENTS

- Aim & objectives of monitoring
- Selection of Indicators
- Quality assessment & control approach
- Site selection strategy
- Data handling & reporting

SPECIFIC ELEMENTS

- Survey design (selection of survey sites, number of sites, etc.)
- Sampling methodology/protocol
- Sample processing methodology
- Data analysis
- Key considerations

THE IMAP (BARCELONA CONVENTION) ML INDICATORS

COMMON INDICATOR 22

Trends in the amount of litter washed ashore and/or deposited on coastlines (EO10);

COMMON INDICATOR 23

Trends in the amount of litter in the water column including micro plastics and on the seafloor (EO10)

CANDIDATE INDICATOR 24

Trends in the amount of litter ingested by or entangling marine organisms focusing on selected mammals, marine birds, and marine turtles (EO10)

COMPREHENSIVE OVERVIEWS FOR ML MONITORING



the EU MSFD TG10 **“Guidance on Monitoring of Marine Litter in European Seas”**

the OSPAR **“Guideline for Monitoring Marine Litter on the Beaches in the OSPAR Maritime Area”**

the NOAA **“Marine Debris Monitoring and Assessment: Recommendations for Monitoring Debris Trends in the Marine Environment”**

The UNEP/MAP MEDPOL **“Monitoring Guidance Document on Ecological Objective 10: Marine Litter”**

The EU IPA-Adriatic DeFishGear project related **“Monitoring Methodologies for Marine Litter”**

SELECTED METHODS MACRO ML MONITORING



Beach – visual observation



Floating – visual observation



Seafloor – scuba/snorkelling



Seafloor - trawling



Biota - ingestion

SELECTED METHODS FOR MICRO ML MONITORING

Sea surface – manta trawl

Fish - ingestion



Photo © Thomais Vlachogianni

A photograph of two women participating in a beach cleanup. They are crouching on a sandy beach, each holding a green plastic bag to collect litter. The woman on the left is wearing a purple jacket, and the woman on the right is wearing a red hoodie. In the background, there is a calm sea, some sparse trees, and distant mountains under a blue sky with scattered clouds. A yellow line is visible on the sand, possibly marking a survey area.

Methodology for Monitoring Marine Litter on Beaches

[Distance learning module](#) developed within the EU funded IPA-Adriatic DeFishGear project
You can enrol for free and receive an activation e-mail to access the lesson



Methodology for Monitoring Marine Litter on the Sea Surface: Visual observation

[Distance learning module](#) developed
within the EU funded IPA-Adriatic DeFishGear project
You can enrol for free and receive an activation e-mail to access the lesson

An underwater photograph showing a dense, healthy seagrass bed on a sandy continental shelf. The seagrass is green and leafy, growing in rows. The water is clear and blue, with sunlight filtering down from the surface. In the background, the seagrass bed transitions into a darker, more rocky area.

Methodology for Monitoring Marine Litter on the Seafloor (continental shelf): Bottom trawl surveys

[Distance learning module](#) developed
within the EU funded IPA-Adriatic DeFishGear project
You can enrol for free and receive an activation e-mail to access the lesson



Methodology for Monitoring ML on the Seafloor: Visual surveys with SCUBA/snorkeling

[Distance learning module](#) developed
within the EU funded IPA-Adriatic DeFishGear project
You can enrol for free and receive an activation e-mail to access the lesson



Methodology for Monitoring ML ingested by fish

OVERVIEW OF THE KEY STEPS FOR MONITORING MACRO ML IN FISH SPECIES

- ✓ Collection of specimens
- ✓ For each specimen, the main biological parameters (e.g. length, weight, sex) are recorded.
- ✓ Then, fish are dissected and stomachs and intestines are removed and placed in sealed bags and frozen again or stomach and intestine contents are quickly removed and transferred to plastic vials until the next processing steps.
- ✓ Stomach and intestine contents are weighed and then examined under a binocular stereomicroscope.
- ✓ ML items are measured, weighed and classified by type.



OVERVIEW OF THE KEY STEPS FOR MONITORING MACRO ML IN FISH SPECIES

The following indices are calculated:

- ✓ The percentage frequency of occurrence (%F) = the ratio of the number of guts containing a given litter item to the total number of non-empty guts examined ($\times 100$).
- ✓ The percentage numerical abundance (%N) = the ratio of the number of litter items of a given litter category in all non-empty guts to the total number of litter items of all categories in all guts ($\times 100$).
- ✓ The percentage weight (%W) = the ratio of the weight of litter items of a given litter category in all non-empty guts to the total weight of litter items of all categories in all guts ($\times 100$).



OTHER METHODOLOGIES FOR MACRO ML

ML ON THE SEA SURFACE

- ✓ Open sea surveys
- ✓ Aerial surveys
- ✓ Net tow surveys
- ✓ Riverine litter monitoring
- ✓ Monitoring through image acquisition

ML ON THE SEAFLOOR

- ✓ Shallow seafloor monitoring with towed video
- ✓ Deep seafloor monitoring using ROVs

ML IN BIOTA

- ✓ ML ingested by seabirds
- ✓ ML ingested by sea turtles
- ✓ ML ingestion by marine mammals
- ✓ Entanglement rates for beached animals

ASSESSING MICROLITTER IN THE SEA SURFACE

Sampling of
microlitter on the
sea surface with a
manta net

Separation of
microplastics from
the sea surface
samples

Chemical
identification of
microplastics with
ATR-FTIR
spectroscopy



USEFUL RESOURCES

- ❑ [E-learning module on monitoring marine litter on beaches](#)
- ❑ [Video-guidelines on monitoring marine litter on beaches](#)
- ❑ [Methodology for monitoring marine litter on beaches \(macro debris >2.5 cm\)](#)
- ❑ [Methodology for monitoring marine litter on the sea surface](#)
- ❑ [Methodology for monitoring marine litter on the seafloor – bottom trawl surveys](#)
- ❑ [Methodology for monitoring marine litter on the seafloor – scuba/snorkelling](#)
- ❑ [Methodology for monitoring macro- and micro-litter in biota](#)
- ❑ [Methodology for sampling plastic pellets for POPs determination](#)
- ❑ [Protocol for Microplastics Sampling on the Sea Surface and Sample Analysis](#)
- ❑ [Methodology for monitoring microplastics on the sea surface and in beach sediments](#)

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Thank you for your attention!

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