



Marine litter - a growing threat in our seas

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Filling the gaps in data and method availability

What is Marine Litter?

Marine litter is defined as any persistent, manufactured or processed solid material discard, disposed of or abandoned in the marine and coastal environment.

It is a complex, transboundary and multi-dimensional problem with significant implications on the marine and coastal environment and on human activities. It originates from many, different, unspecified sources and has a wide spectrum of negative ecological, economic (tourism, fisheries) and social (aesthetic, public health) impacts.

What are the impacts of Marine Litter on the marine environment?

- ⚙️ **Threats to marine biota** – Entanglement and ingestion of litter and microliter particles often have harmful effects on marine species, especially on turtles, fish, mammals and birds.
- ⚙️ **Ecological Threats** - A series of negative impacts have been recorded in relation to the biological and ecological behaviour of individual animals i.e. worsening physical condition, reproductive failure etc. Also, the transfer of non-indigenous species should be highlighted.
- ⚙️ **Pollutants in plastic** - A range of chemicals used as additives in plastic industry can be harmfully transferred to living organisms. In seawater, plastics are also known to sorb and concentrate contaminants, which have arisen in the environment from other sources.

FACTS and FIGURES: Marine Litter in the Mediterranean and Black Sea

The Mediterranean Sea has been described as one of the most affected areas by marine litter worldwide, in which there are no areas where litter permanently accumulates. PERSEUS main findings for the Mediterranean Sea include:

- ⚙️ The main marine litter component is plastic waste, comprising up to 95% of the accumulating litter on shorelines, ocean surface or sea floor.
- ⚙️ Cigarette butts are the main marine litter items found in great quantities on beaches, along the Mediterranean Sea.
- ⚙️ Plastic bags are found in excess on the seafloor, comprising almost 50% of all plastic litter.

The Black Sea is one of the basins where data and information on the abundance and distribution of marine litter are lacking. The Black Sea is particularly vulnerable to pollution, as it is a small semi-enclosed, surrounded by industrialised countries, home to shipping routes, fisheries and tourist activities, with relatively high river discharge. PERSEUS carried out dedicated marine litter studies on the seafloor of the basin where the MSFD protocol was used, with plastics (45%) and metals (22%) being predominant



PERSEUS contribution to Marine litter

Marine Litter is among the Marine Strategy Framework Directive (MSFD) descriptors with most gaps in data and method availability.

Research conducted within PERSEUS has been organized to provide the necessary scientific and technical basis for further implementation of monitoring within the MSFD and knowledge to support reduction measures. Dedicated studies covered most aspects of marine litter, based on the collection of harmonized data on beaches, surface waters, deep sea floor and on micro-plastics in both the Mediterranean and Black Sea in view of developing new approaches based on visual observation of floating marine macro litter for monitoring purposes.

PERSEUS recognised Marine litter as a top-priority issue. Methodologies are indeed becoming available, but monitoring is just beginning, while measures need to be selected and implemented.

How data gaps were filled by PERSEUS

Research conducted within PERSEUS was carried out, for the first time at basin scale level for the Mediterranean and Black Sea, based on common methodological approaches as well as on new approaches based on visual observation of floating marine macro litter. Marine litter studies in PERSEUS were organised to provide the necessary scientific and technical basis for further implementation of monitoring within MSFD and the adequate knowledge to support reduction measures.

Marine litter studies within PERSEUS can be classified into the following four main categories: beach litter, floating litter, seafloor litter and deep sea litter. PERSEUS was able to monitor each of these categories of litter through the use of different data-collection methodological approaches:

1. Beach litter - Marine LitterWatch Campaign

Through the PERSEUS Marine LitterWatch (MLW) Campaign a total of 41 beaches were adopted by PERSEUS partner institutes and were regularly surveyed for marine litter by using Marine LitterWatch (MLW) app developed by the European Environment Agency (EEA). The data collected through the Marine LitterWatch (MLW) app was submitted to a central database hosted by the EEA and is available (open-access), thus providing a central repository for this information across Europe.

2. Floating litter - Sealittercam

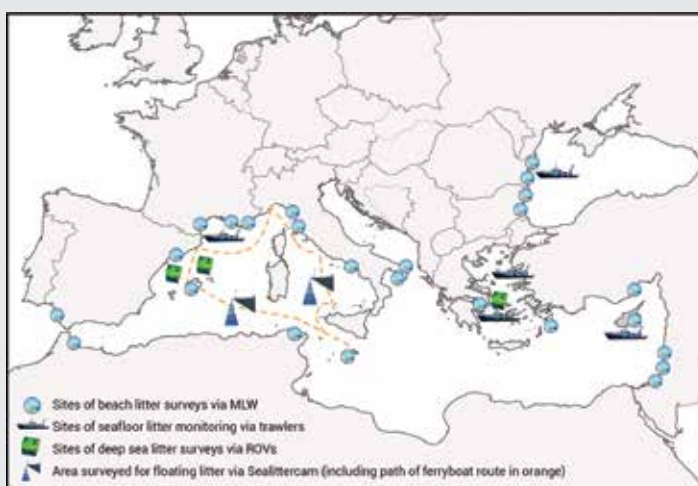
The Sealittercam is a tool to survey the sea surface for floating litter and other objects. The Sealittercam provides large-scale coverage aiming at the collection of images to support coherent monitoring. A long-term deployment of the system from the bow of ships-of-opportunity enabled the collection of 4.2 million images in 300 observation hours during daylight transects total of 10,000 km.

3. Seafloor litter - Trawlers

Surveys with experimental and commercial bottom trawlers, meant for demersal fish stock assessment, facilitated the collection of data in respect to seafloor marine litter, which were further analyzed for marine litter abundance, composition, identification of sources and proposal of management measures.

4. Deep sea litter - Remotely Operated Vehicles (ROV)

Studies were also conducted on the nature and distribution of litter in the large deeply incised submarine seabed areas i.e. canyons. The objective was to identify the most likely sources of the different marine litter types and investigating the interactions between litter and high-energy hydrodynamic processes occurring in the study areas. For this purpose, systematic surveys were carried out during oceanographic cruises by using Remotely Operated Vehicles (ROVs).



Locations where PERSEUS carried out Marine Litter monitoring activities using different methodologies

Recommendations

- ⚙️ **Prevent the production of waste** - This includes encouraging better consumer behaviours through recycling programmes, reducing most single-use, every-day plastic items and considering research on new, innovative and rapidly degrading materials.
- ⚙️ **Reduce Marine Litter at source** - This includes, inter alia, improvements in systems for the collection of municipal waste and in waste management schemes (especially for urban and coastal areas).
- ⚙️ **Establish large-scale, harmonised monitoring campaigns** - A harmonised methodology for data availability and data management across basins will allow a better understanding of the links between pressures and impacts on the marine ecosystems, the identification of marine litter accumulation zones (hot-spots) and ultimately support policymakers in establishing reduction targets and measures.
- ⚙️ **Carry out awareness raising campaigns** - Public awareness can be increased through the implementation of coordinated, transnational environmental education and campaigns across countries.

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