

From entanglement to invasions of alien species—the harm caused by marine litter

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The most visible effect of pollution on marine organisms is the entanglement of wildlife in marine litter. Credit: birdimagery.com H. Gladier

Marine litter is a threat to the marine ecosystem, human health and economic activities. A new report by the Commission Joint Research

Centre (JRC) sheds light on the many effects of litter in our oceans, and highlights the severity and scale of the issue. The report confirms that plastic items have the highest direct and indirect damaging impact.

Millions of animals that live in the oceans are debilitated, mutilated and killed by [marine litter](#) every year. Marine litter can be transported by ocean currents over long distances, and is found in all marine environments, even in remote areas in the open oceans and the deep sea.

Marine litter dominated by plastic

Records show that marine litter is dominated by plastic items, both in shallow and deeper waters. The top ten items recorded by the 2013 International Coastal Cleanup initiative were, in descending order: cigarette butts, plastic food wrappers, plastic beverage bottles, plastic bottle caps, straws and stirrers, plastic grocery bags, glass beverage bottles, other plastic bags, paper bags and beverage cans. Seven of these items are made of plastics. Past studies estimate that over 80% of recorded incidents involving marine species were associated with [plastic litter](#).

Entanglement and ingestion

The most visible effect of pollution on [marine organisms](#) is the entanglement of wildlife in marine litter. In 80% of reported cases, such entanglement leads to the death of the animal.

The second direct effect is ingestion by marine animals of litter items, including paper, processed wood and synthetic materials. It is clear that marine animals frequently encounter plastic debris, and that ingestion is a widespread phenomenon among all groups of marine organisms. Ingested plastic may affect the animal's health and capacity to move, or

lead to rapid death when the stomach or intestines of the animal are blocked or severely damaged.

Invasion of alien species

The invasion of our waters by non-indigenous species is one of the greatest drivers of biodiversity loss, posing a threat to the integrity and functioning of ecosystems. Marine litter can act as an enabler of this loss: non-indigenous invasive species often use litter in the ocean as a habitat in which to hide, as a platform on which to settle or as a transport medium for moving into new territories.

This is not a new phenomenon, as natural debris (dead wood, ash, etc.) have enabled species to move around for millions of years, but the movement of [alien species](#) on litter items is potentially a new problem, because of the proliferation of floating – mostly plastic – particles. The estimated 250 billion micro-plastic particles floating in the Mediterranean Sea are all potential carriers of non-indigenous invasive species. Plastic litter offers an excellent transport mechanism for alien species because of its longevity at sea and its surface, which is easy to attach to. Even if the introduction of large litter items into the [marine environment](#) ceased, the abundance of micro-plastics would continue to increase because of the fragmentation of the existing plastic items.

Socioeconomic impact

Marine litter affects ecosystem services, which has important implications for human welfare through losses to economic sectors such as tourism, fisheries, aquaculture, navigation and energy. As litter can be transported over long distances, it may generate significant costs in areas far from its point of origin and become a burden to sectors that are not responsible for its generation.

It is estimated that the annual damage of marine litter to the EU fishing sector is approximately €61.7 million in terms of reduced catch revenue and the costs of removing litter from fishing gear, fixing broken gear and propellers, and rescue services (source: Acoleyen et al., 2013).

A study carried out in the UK revealed that, in over 71% of the surveyed harbours and marinas, users had had problems with broken propellers, anchors, rudders and blocked intake pipes and valves caused by marine litter (Mouat et al., 2010). The annual cost of removing litter reported by 34 harbours in the UK was approximately €273 000, with an average cost of €8 000 per harbour per year.

Litter also has obvious impacts on the aesthetic value and use of beaches and other coastal tourist areas. Apart from the negative aesthetic effects on tourism services, it is also expensive to remove litter from coasts. Based on a study carried out in the Netherlands, the total cost of removing beach litter reported by the 32 municipalities located in the seven countries of the Adriatic-Ionian macro-region was estimated at €6 724 530 per year, with an average of €216 920 per year per municipality (Vlachogianni, 2016). On average, the municipalities spent some 5% of their budget on marine litter clean-up operations.

EU Marine Strategy protects the marine environment

Within the MSFD implementation strategy, the Marine Strategy Framework Directive (MSFD) recognises that marine litter poses a significant pressure on the marine environment that needs to be looked into. Marine litter is one of eleven descriptors defined by the MSFD to describe the 'good environmental status' of a marine environment, which specifically requires that properties and quantities of marine litter do not cause harm to the coastal and marine environment.

The MSFD Technical Group on Marine Litter (TG Marine Litter) was

set up to provide scientific and technical advice for the implementation of the MSFD requirements, and to support EU Member States. Made up of experts from EU Member States, Regional Sea Conventions, EU Institutions and other stakeholders, this group is led by the European Commission's Directorate-General for Environment, and is chaired by the Joint Research Centre (JRC), the French Research Institute for Exploitation of the Sea (IFREMER) and the German Environment Agency.

The evidence in the JRC report by the TG Marine Litter shows the harm caused by marine litter, and provides an evidence base for decisions on the actions to take to address the issue. This improved knowledge about the scale of the harmful effects of marine litter will further support EU Member States and Regional Seas Conventions in implementing their programmes of measures, regional action plans and assessments.

More information: JRC Report Harm caused by Marine Litter: [ec.europa.eu/jrc/en/publicatio ... caused-marine-litter](https://ec.europa.eu/jrc/en/publication/2017-03-entanglement-invasions-alien-species-the-marine)

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