

The Health of the Mediterranean Involves Fighting Against Marine Litter

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Since time immemorial, the Mediterranean has been the link between many cultures and peoples. Around its waters great civilisations or small fishing settlements have been established. The historical journey of its populations has been very long and many of its natural areas have had a significant human presence. In this framework, in which different natural resources have been used since ancient times, there are examples of areas where human beings have been able to benefit from the natural resources and maintain a biodiversity, in many cases unique. At present we are facing a major challenge, such as marine litter, because the human presence in coastal areas is increasingly more intense and the management of the waste is not efficient enough. The presence of marine litter in our oceans must be approached globally because it concerns all countries, regardless of where the waste originates. Given its negative effects on the marine ecosystems, the damage it causes in the fishing sector or the possible effects of the presence in the sea of marine litter on human health, it must be an issue jointly addressed by the whole of society.

Marine Litter, a Global Problem

Since the late 20th century there has been a significant increase in the waste generated by human beings. Despite the efforts underway to manage it appropriately, some of it ends up in the environment. Jambeck et al. (2015) calculated that the annual input of plastic waste from land into the ocean was around 8 million tons at world level. The dumping of waste not only has negative effects on nature but also means an important loss of resources, which are increasingly scarcer.

This is why its presence in seas and oceans is a growing concern in society. In recent dec-

ades, many ecologists and nature preservation organisations have been reporting these problems and working to foster more responsible consumption models that are more respectful of nature. These efforts have resulted in several regulations and initiatives, both governmental and citizen. The Oceans Resolution and the Law of the Sea adopted in 2005 by the UN General Assembly and the Honolulu Strategy defined the world framework strategy to avoid, reduce and manage marine litter.

In 2014 the Communication from the Commission to the European Parliament “Towards a circular economy: A zero waste programme for Europe” was issued, establishing 30% as the

goal for reducing marine litter by 2020 for the most common types of waste on beaches and fishing gear found at sea.

Moreover, Spain is a contracting party of the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention, 1976) and through the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources the signatories agree to work to avoid pollution from land-based sources and activities. In Spain, the development of marine strategies by the Ministry of Livestock and Fisheries, Food and the Environment, one of the descriptors of the state of quality of marine ecosystems, was a major boost for initiatives to fight against marine litter. On World Oceans Day many organisations expressed their concern about this problem and highlighted the need to make more efforts to fight against it. In 2016 a specific Working Group on Marine Litter was created in the National Environment Congress (CONAMA 2016) comprising several administrations, third sector organisations, companies or fishermen. The result was a document describing the state of marine litter in Spain, a world reference for understanding this issue in depth.

Marine litter “is any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment from any source” (United Nations Environment Programme, UNEP, 2011). Thus, it includes all objects from human activities that are dumped or abandoned in the marine and coastal environment, that come from rivers, sewage and water depuration systems or are blown by the wind from land. Marine litter comprises a large number of materials such as plastic, wood, metal, glass, rubber, fabric and paper. Given its importance, the difficulty of removing it from the marine environment and the uncertainty of its consequences on human health, it is paramount to understand the issue of microlitter, particles of

waste measuring less than 5 mm resulting from the fragmentation of larger waste or specifically designed with a small size. Generally it is called “microplastics” because plastic is the main material.

Seas and oceans, as they are at the lowest drainage level on the planet, are the final destination of the waste abandoned in land areas; in fact, it is estimated that 80% of marine litter comes from land (this overall division is based on estimates unsupported by data, although it clearly illustrates the main source of marine litter).

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The need to know the origin of marine litter revealed the scarcity of data on its distribution, an aspect that has been solved in recent decades thanks to research and monitoring programmes such as OSPAR in the Atlantic or MEDPOL in the Mediterranean, among others, which provided more accurate knowledge about the sources of marine litter.

Main land-based sources of marine litter include:

- Urban, such as waste produced in cities and not appropriately managed, litter abandoned on beaches, riverbeds or the environment, waste produced in leisure events, such as concerts, parties and other waste disposed of in uncontrolled tips.
- Industrial, such as ship-breaking, plastic production processes or industrial activities in ports.
- Agricultural, mainly in some areas with a large number of greenhouses.
- Accidentally produced in extreme events such as floodwaters or storms.

- Dragged into rainwater depuration and evacuation systems.

Sea-based sources include those that originate in:

- Shipping: merchant, public transport or pleasure.
- Fishing activities.
- Aquaculture.

Many of the impacts of marine litter on marine ecosystems are well known, such as entanglement in and ingestion of this waste (it should be highlighted that at world level it is estimated that over 1,000,000 marine birds and 100,000 marine mammals and turtles die annually after having been entangled in or ingested marine litter, according to Clean Up Greece et al., 2007) but the effect of microplastics on marine fauna is unknown. This is one of the aspects that science is currently researching. At an economic level, losses in the fishing sector are clear, not only for the decrease of catches or breaking of fishing gear, but in the effort involved in its removal and later management.

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Moreover, it is worth noting the number of economic and human resources allocated to ports, both commercial and leisure, as well as to beaches frequented by tourists to remove the waste accumulated in these areas, for whatever reason, made possible by citizens with their taxes.

Another relevant impact of marine litter is the effect that it may have on human health. There is a growing concern about the consequences that the presence of marine litter, mainly microplastics, may have on the food

chain. The presence of additives in many of them adds another degree of uncertainty when determining the potential negative effects for human health. We need to research its possible connection, although the precautionary principle must prevail and all possible efforts must be made to stop it reaching the food chain.

Thus, marine litter is not only a problem for the environment but also our health and the profitability of certain activities may be compromised by its presence in seas and oceans.

Advances in the Fight against Marine Litter

The main efforts to fight against marine litter must focus on two aspects:

- Removing marine litter present in the environment to prevent the impacts already taking place.
- Preventing the input of new waste into the sea.

With respect to removal of marine litter, the involvement of fishermen is essential and there are increasingly more fishermen's associations dedicated to fighting against marine litter. Projects such as Ecoportos, Marviva and Upcycling the Oceans in the Mediterranean and Nada por la Borda or Pescal in the Atlantic Ocean show the hard work of fishermen who, in their daily lives, remove enormous amounts of marine litter, taking the waste to port and depositing it separately for later management. In many places, their involvement is immense, not only because of the harm it does to them when they fish and the deterioration of the environment that forms the basis of their livelihood, but because of the love that many have of the sea, in which they have spent much of their life and that is increasingly more filled with "pollutants". The authorities seek to promote

the development of these types of initiatives, which can be funded with economic resources from the Operational Programme of the European Maritime and Fisheries Fund in which the involvement of the fishermen is paramount.

On beaches and coasts, as well as on the shallow seabeds, the ecologist and nature conservation organisations, divers and citizens in general are performing actions to remove the marine litter that cannot be collected by the authorities. Not only do they fulfil awareness-raising objectives but contribute to the monitoring of marine litter, identifying each type of waste removed, such as in the case of MARNOPA or Ocean Initiative (Marine Litter Watch). These actions enable the sources of the waste to be identified in greater detail and focus efforts on the most frequent and dangerous waste.

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There are several preventative initiatives underway from different sectors to reduce generation of marine litter. In this respect, citizens are a fundamental part of prevention, whether as tourists or residents in towns and villages, especially those close to the coast. Certainly the tourism sector exerts strong pressure on the coastal zones, increasing the population of the most visited areas during the summer, generating imbalances in the management systems and producing a large amount of waste on beaches and surrounding areas that end up as marine litter. However, raising awareness of the whole population, whether tourists or not, is key to avoiding the input of new litter into the oceans. Several initiatives have been developed, such as those already cited for the voluntary removal of waste or the environmental education pro-

grammes, which many local authorities, with the support of the different Extended Producer Responsibility (EPR) systems, are promoting in education centres to inform students and demonstrate the need to appropriately manage waste: avoiding its generation, reusing whenever possible and appropriately separating to later recycle. These actions help raise awareness among the population, both residents and tourists, although we must advance to achieve greater involvement of the tourism sector, because habits are relaxed during holiday period.

Mass events, such as parties, festivals and concerts, are another of the fields to focus on, because they occasionally produce large amounts of waste. In recent years, sustainable events, such as Demandafolk, have been held and there is an increasing demand for them. The training of the managers of these types of events is fundamental through initiatives such as the one developed by the Oxygen Foundation and its Sustainable Events project. San Francisco (USA) has established restrictions on the consumption of bottled water in public events promoting tap water (Drink Tap Program) as an alternative.

Agriculture is a major source of marine litter in some areas of the Mediterranean coast due to the increase in recent decades of the land allocated to intensive agriculture, in which a large number of materials, mainly of plastic origin, are used. This agriculture has been promoted thanks to the technological development of irrigation and groundwater extraction systems, which has enabled it to extend to areas where in the past intensive cultivation was impossible. This process has entailed an economic development of areas that in the past were depressed and had few options for growth, other than tourism. Intensification has caused undesired effects in the surrounding ecosystems along with those produced by the urban development in the same environment. The agricultural sector must face several chal-



Waste collected during one day by the fishing boat owned by Ignacio López Cabrera, President of the Motril Fishermen's Association (Ecopuertos project).

lenges, including once again the management of its waste, mainly plastics, which ends up in the seas and oceans and is a major part of the marine litter in the places where it collects. The economic importance of the agricultural sector in Spain is fundamental. The value of fruit and vegetable production (not including flowers and plants, wine grapes or olives), mostly grown in coastal areas, accounted for 10,000 million euros on average between 2008 and 2013. Moreover, Spain is the leading exporter of fruits and vegetables in the European Union, allocating 47% of its average production from 2008 to 2012 to export. The lack of systems to collect agricultural waste until several years ago has revealed the need to implement initiatives such as Cicloagro, which enables agricultural plastic waste in Andalusia to be managed more efficiently and its input into the sea to be reduced. Cicloagro is a system for collecting this waste to be recycled.

It is worth highlighting that the focus of marine litter has been on the presence of plastics in marine environments, mainly because of their persistence, floatability and impacts on the marine ecosystems. Coercive measures concerning this material have been implemented in Morocco and France, which prohibited products such as single-use plastic bags, whose presence in our seas has very serious consequences for marine fauna and which, after use, are still not adequately managed. Other countries have chosen to promote the use of biodegradable bags or impose a charge for non-reusable plastic bags.

The plastics sector is implementing initiatives to reduce the input into the sea of microplastics through the voluntary commitment made by the industry to avoid the loss of regrind (small pellets of raw material used to produce different plastic products) throughout the value chain (Operation Clean Sweep®).

Sectors such as cosmetics, after intense awareness-raising campaigns by organisations such as Surfrider Foundation Europe, supported by bloggers and consumers, have removed the plastic microspheres from several products, incorporating alternatives based on the use of other materials.

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The EPR systems bring together companies that generate products that become waste. By applying the principle of “the polluter pays” they are involved in the prevention and organisation of its management, and therefore must promote its proper separation. The EPRs currently in Spain are:

- Light and paper-cardboard containers
- Glass containers
- Phytosanitary product containers
- Medical packaging and expired medicines
- Batteries and accumulators
- Used tyres
- Used industrial oils
- Electrical and electronic equipment waste

Each of them is managed by one or several organisations. With this system, the responsibility for waste management falls on the producer rather than on the consumer. This is why all the EPRs develop awareness-raising campaigns to achieve correct waste separation and manage recycling as much as possible, avoiding its abandonment in nature and, by extension, in marine environments.

The initiatives framed in the circular economy processes, improvement of product design

or use of biodegradable materials that replace non-biodegradable materials can reduce the generation of marine litter. All citizens should get involved in this process, from designers to product manufacturers and packers to consumers, who have the last word when choosing a certain product or its most sustainable alternative. The information we have about these initiatives is increasingly greater and enables us to behave more sustainably.

Conclusions

At the Asociación de Ciencias Ambientales we are aware of the need to improve the management of our waste and avoid a situation where our seas and oceans have “more marine litter than fish”. This is why we firmly believe in:

- Becoming aware as individuals and consuming responsibly, avoiding the generation of waste, because we will save increasingly scarcer resources, such as materials, energy and water, promoting the use of products that can be easily reused or recycled or consuming products manufactured with recycled materials. In this respect, circular economy processes and eco-design have a lot to say because the possibilities of innovation are unimaginable and we must bear in mind not only the use of the product but its final destination when it becomes waste, as well as its possible uses as raw material for another production process.
- Fostering spaces of joint work that enable stakeholders to develop coordinated actions. Working groups such as that of Marine Litter at CONAMA contribute to sharing views and initiatives among the different sectors and organisations involved to fight more efficiently against marine litter.

- In the sea, avoiding dumping of any waste and promoting the work done by many fishermen to remove marine litter. Few people, when they go to work, remove as much waste everyday as they do, most of which was not produced during their activity.
- Contributing to citizen awareness and participating in voluntary and waste characterisation activities.
- Educating the new generations to respect nature and be an example.
- We firmly believe in supporting the Decalogue on the Fight against Marine Litter produced in the framework of the CONAMA working group and contribute, as far as we

can, to ensuring waste free oceans. Managing it is in our hands.

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