Spain:
Diving among plastics

OCEANA

Contents

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#breakfreefromplastic

“Plastic traps” in the Spanish depths

Plastic pollution is a global threat that is jeopardising the health of the ocean and its resilience capacity, as well as affecting marine ecosystems and the species that inhabit it.[1]
It is estimated that Spain is the EU country that dumps the most plastic waste into the sea,[2] with the figure standing at around 126 tonnes a day.

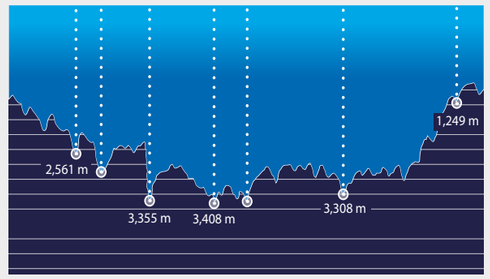
Spanish waters contain a wide variety of geomorphological features including canyons, escarpments, pockmarks, seamounts and reefs, among other things. As well as providing oases for marine life, this wide variety of geohabitats also act as plastic traps or sinks.

Deep waters are particularly vulnerable to the impact of marine debris, as the absence of sunlight and erosive agents, in addition to low temperatures, considerably slows down their degradation.[4] In shallow waters, plastics alter the environment and cause irreparable damage for decades or even centuries before becoming micro-plastics, but in deep-sea ecosystems the situation is more serious: the damage lasts considerably longer, as the plastics take much more time to degrade.

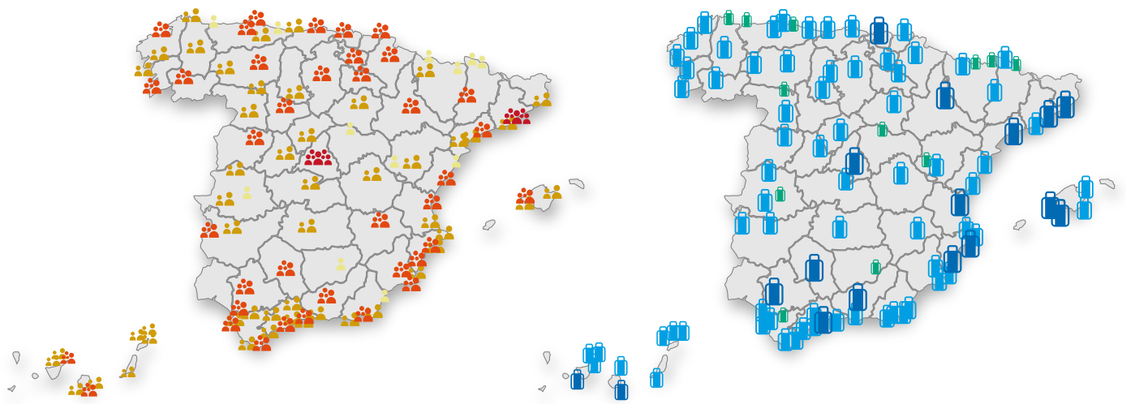
This data is even more alarming given Spain’s inescapable link with its surrounding waters. In fact, the country has twice as much sea area (1,008,400 km^2) as it has land,[5,6] and, according to a European Commission report, activities such as fishing, shipbuilding, and coastal tourism place it among the leading blue economies in the European Union[7]. In other words, it is impossible to understand Spain and its economic and social activity without considering its direct relationship with the sea and its resources.

This is why Oceana is emphasising the urgent need to create an ambitious legal framework to apply Directive 2019/904 on Single Use Plastics (SUP) in Spain and go beyond the minimums set by the European Union to drastically reduce the quantity of plastics that reach the sea.

92.4% of Spain is surrounded by deep waters, with an average depth of 3013 metres.[3] This is the equivalent of the Pyrenees inverted under the sea surface.



A country prone to plastic accumulation in the sea



Population (2019)

> 1,000,000
10,000 - 100,000
100,000 - 1,000,000
< 10,000

Population + incoming tourism (2019)

> 1,000,000
10,000 - 100,000
100,000 - 1,000,000

On the left, the main population centres in Spain in 2019. On the right, it can be seen how most of the tourists who visited the country in 2019 stayed mainly in the coastal areas.[3, 6, 9, 10]

Due to the ubiquitous nature of the material and the fact that it is easily transported by environmental agents (wind, waves, tides), pollution by plastics has no boundaries. However, certain factors do promote the accumulation of marine debris in particular areas of the oceans. For Spain, the main reasons for this are:

- The high population density in coastal areas: one third of Spaniards live on or near the coast, making these areas susceptible to the accumulation and dumping of waste at sea. In addition, prior to the COVID-19 pandemic, Spain was the second ranked tourist destination in the world. According to the National Institute of Statistics, in 2019 it received 83.7 million visitors, and it is estimated that four out of every five visitors spent their stay on the coast. This means that coastal areas, suffer the most, as the concentration of people generates an important volume of single-use plastics, which are very likely to end up in the sea. In fact, several studies point to tourism as one of the main sources of marine debris.[8]

Although the COVID-19 crisis has significantly reduced tourism in Spain, new threats to the oceans have emerged that are linked to the pandemic. These include an increase in the use of single-use personal protective equipment, such as masks and gloves, which, if incorrectly disposed of, can end up in the sea.

- The topography and diversity of the sea floor is the second factor explaining why Spain tends to accumulate plastics in its depths. Certain areas that act as breeding or feeding grounds due to their complex morphology are also prone to debris accumulation. In semi-enclosed seas such as the Mediterranean, the problem is greater, as these tend to favour the retention of plastics.[11]

The deepest areas of Spain's seas reach 5,400 metres on the abyssal plain to the west of the Galicia Bank seamount.

Bimbache seamount
Precious coral (*Corallium tricolor*) at a depth of more than 900 m

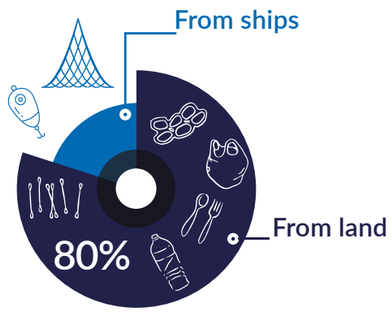
Guyot Bel seamount, Mallorca Channel
Tripod fish (*Bathypterois dubius*) at a depth of 920 m

How does plastic get to the bottom of the sea?

80% of the plastics that are dumped at sea come from the land,[12] while a smaller percentage comes from direct sources such as fishing or recreational boats - although this is a growing problem.

Most of the time they are transported from land to the coast or marine environment through the sewage system, carried by storms or the wind from landfills or urban environments. Agricultural plastic waste is another important element in Spain. This often ends up in estuaries and river mouths, as it washes down watercourses and bays, as these tend to retain the plastic waste.[13,14,15,16] This means that plastics generated in urban environments, even if these are far from the coast, can still end up on the ocean floor.

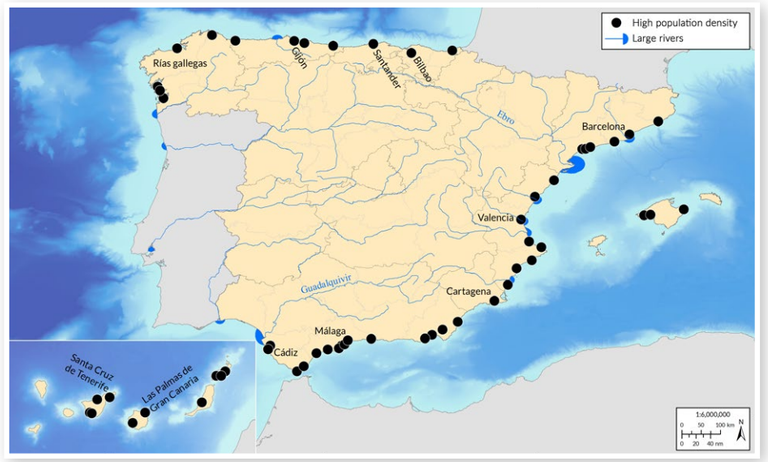
Sometimes the debris is generated by human activity at sea. The most common types include lost or abandoned fishing nets, as well as other plastics from fishing vessels. However, they may also originate from merchant vessels, passenger ships, or oil platforms.



Potential zones of plastic discharge

Spain's most populated coastal areas and its most important river mouths are the main origins of plastic discharge. Rivers are instrumental in transporting plastic debris from the land to the sea. Indeed, according to a recent model, up to 2,41 million tonnes of plastics generated both on the coast and inland are transported globally by river currents each year.[17]

In this context, the Mediterranean coast is of particular interest, as it is home to some of the main Spanish cities as well as the mouths of rivers such as the Ebro, the Turia, the Júcar, and the Segura.



The main population hubs on the Spanish coast and the mouths of the main rivers.[3, 6, 11]

Areas vulnerable to plastic accumulation due to their ecological value

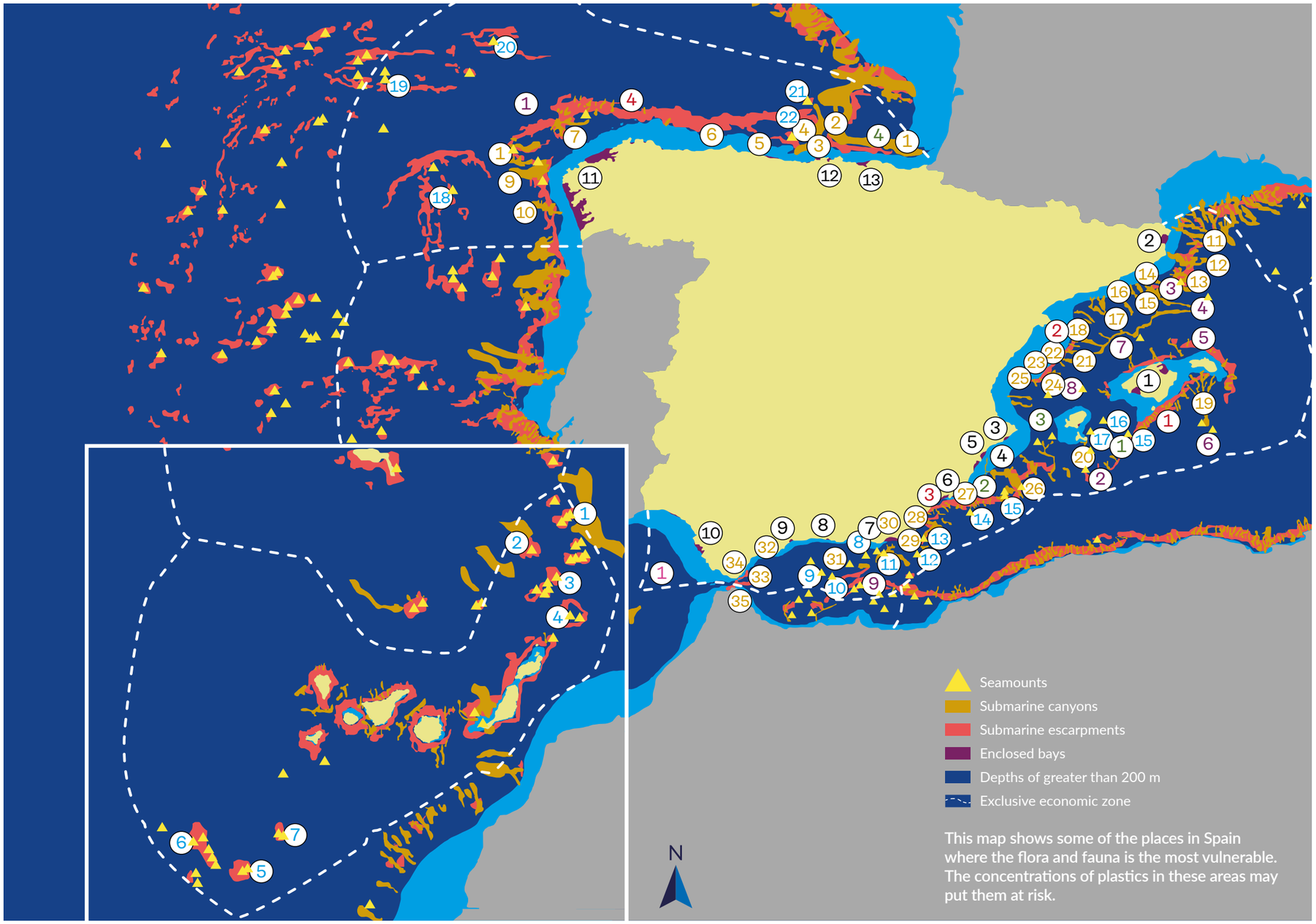
Both the Spanish coastline and the areas further from the littoral zone contain a wealth of geographical features that are home to much of the biological richness in Spain's seas. Submarine formations such as canyons, mountains, and escarpments possess characteristics that favour the aggregation of many species, such as the presence of a broad variety of rocky substrates, a wide range of depths, and currents that displace or accumulate nutrients in their surroundings.[20]

This means that colonies of sessile filter feeders, which belong to the so-called 'ecosystem engineers' (including corals and sponges), can proliferate in these areas. These, in turn, increase the complexity of the habitat, attracting other fauna that reproduce or feed in the area. This generates what is known as a biodiversity hotspot, an ecosystem that is highly vulnerable to external impacts, including those produced by plastic debris.[21]

As can be seen on the map, the Spanish waters that hold the greatest concentration of these vulnerable spots are on the Mediterranean coast, owing to the significant presence of underwater canyons. The area around the Balearic archipelago is particularly noteworthy as this is home to the largest marine national park in the Western Mediterranean (Cabrera National Park). Other important sites are found off Murcia and in the Alboran Sea, which are very vulnerable due to their elevated biodiversity, the result of the confluence of Atlantic, Mediterranean, and North African species.[22]

Another outstanding area is the escarpment that delimits the Cantabrian continental platform (the Galicia escarpment), a place where there are numerous canyons and seamounts, with areas of special confluence like northern Cantabria and the Basque Country.

Geographical features that are the most vulnerable to the accumulation of plastics in Spanish waters. [3, 5, 6, 11, 18, 19]



Escarpments

1. Émile Baudot
2. Ebro
3. Mazarrón
4. Galicia

Pockmark fields

1. Balearic islands
2. Murcia
3. Between Alicante, Valencia and Ibiza
4. Kostarrenkala

Seamounts

1. Rybin
2. Dacia
3. Tritón
4. Concepción
5. Echo
6. Papps
7. Bimbache
8. Chella Bank
9. Djibuti
10. Idrisi
11. Avenzoar
12. Maimónides
13. Abubacer
14. Seco de Palos
15. Águilas
16. Emile Baudot
17. Ses Olives
18. Ausias March
19. Galicia Bank
20. Charcot
21. Vizcaya
22. Jovellanos
23. El Cachucho

Canyons

1. Capbreton
2. Santander
3. Torrelavega
4. Lastres
5. Llanes
6. Avilés
7. El Ferrol
8. Laxe
9. Muxía
10. Arosa
11. Cap de Creus
12. La Fonera
13. Palamós
14. Blanes
15. Mataró
16. Barcelona
17. Tarragona
18. Tortosa
19. Menorca
20. Pitiusas
21. Benicarló
22. Peñíscola
23. Alcalá de Chivert
24. Oropesa
25. Benicàssim
26. Alicante
27. Cartagena
28. Palomares
29. Gata
30. Almería
31. Motril
32. Guadalmina
33. Guadiaro
34. Algeciras
35. Ceuta

Deep zones

1. La Coruña
2. Formentera
3. San Feliú
4. Ramón Llull
5. Magonis
6. Jama
7. Ebro
8. Valencia
9. Alborán

Enclosed bays

1. Palma
2. Roses
3. Calpe
4. Benidorm
5. Alicante
6. Cartagena
7. Almería
8. Almuñécar
9. Málaga
10. Cádiz
11. Rías gallegas
12. Avilés
13. Santander

Three-dimensional structures

1. Gulf of Cádiz mud volcanoes

Mediterranean: two cases in the sea with the most plastic in Europe

Oceana, through its expeditions, has been studying plastic waste in European seas for fifteen years. During this time, they have documented more than a hundred locations in Spanish waters, all of which were found to contain waste. In this sense, it is especially worrying to find debris in areas that have been protected due to their high level of biodiversity, including:

Émile Baudot Escarpment (Balearic Islands)

Description

This escarpment, which is over 2000 metres deep and runs along almost 300 kilometres of seabed from the south of Formentera to Menorca, is the largest in the Mediterranean submarine panorama. This area is included within the Cabrera National Park because of the wide variability of its habitats and the associated species, including large pelagic fish, marine mammals, turtles, and birds that concentrate in this area, attracted by the nutrient-rich waters.

Documented debris

The waste is mainly of terrestrial origin, although there is also debris from fishing activities and maritime traffic. Among the most abundant types of debris are bags, containers, bottles, cups, tapes, sheets, and sacks, which affect the marine biodiversity by being ingested or by asphyxiating animals such as mammals, turtles, and birds; and by abrading the tissues of corals and sponges, facilitating the appearance of infections due to their exposure to viruses and bacteria.

Sites where debris accumulates

The concentration of debris is particularly evident on the small terraces that make up the escarpment, which are found at various depths.

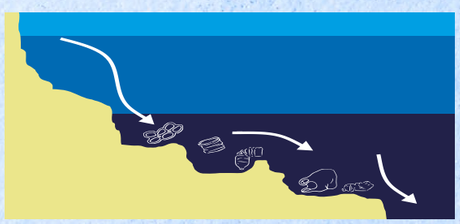
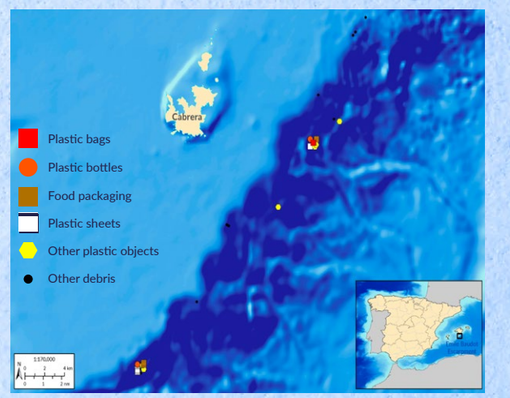


Diagram of waste accumulating on terraces of the Émile Baudot Escarpment.

Terrace accumulating waste and sediments on the Emile Baudot escarpment.



Remains of plastic waste on the Emile Baudot escarpment that runs along much of the seabed between Formentera and Menorca.[3, 6, 11]

Seco de los Olivos or Chella Bank (Almeria)

Description

This site is a small underwater elevation in the Alboran Sea (Western Mediterranean). It comprises a central seamount that rises approximately 600 m from the sea floor and it is surrounded to the northeast and west-southwest by other lower, but more abrupt, elevations. This area houses an enormous wealth of biodiversity, including cetaceans, sharks, many species of fish, deep-sea corals, and sponges, and is notable for the discovery of the first carnivorous sponge in Spain.[23]

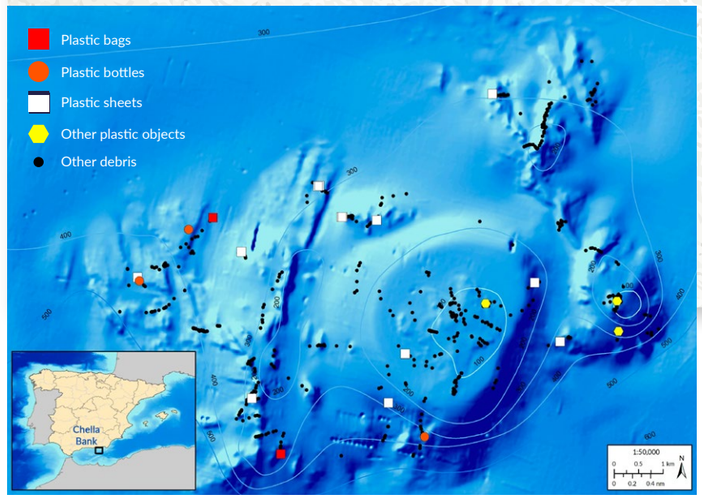
Documented debris

Most of the debris found here is related to fishing activities, both professional and sporting. Most plastic materials documented are from fishing lines, nets, pots, ropes and grappling hooks, and similar items. However, there is also a lot of waste from maritime traffic, which is very intense in this area, consisting of the remains of containers and packaging, plastic bags and boxes, and various other items of different or unknown origin, such as car batteries, hoses, and ferrous waste.[12]

Sites where debris accumulates

Much of the debris gets caught on deep reefs and the slopes of marine rises, affecting the abundant biological communities. The most visible impact is caused by discarded fishing nets and lines, which become entangled and break up the fragile three-dimensional structures created by the corals and sponges. As in the case of domestic waste, this significantly worsens their health, due to lacerations, at times even causing the death of the colonies.[24]

In addition, corals and sponges, which tend to inhabit zones with currents, have been found to be highly susceptible to the ingestion of microplastics.[25] Likewise, the majority of the fauna inhabiting these ecosystems are also filter feeders, meaning the microplastics affect a large number of species in these areas of high ecological value.[14]



Debris accumulating on the Seco de los Olivos Seamount, in the Alboran Sea. [3, 6, 11, 24]

Net caught on sponges on the Seco de los Olivos.

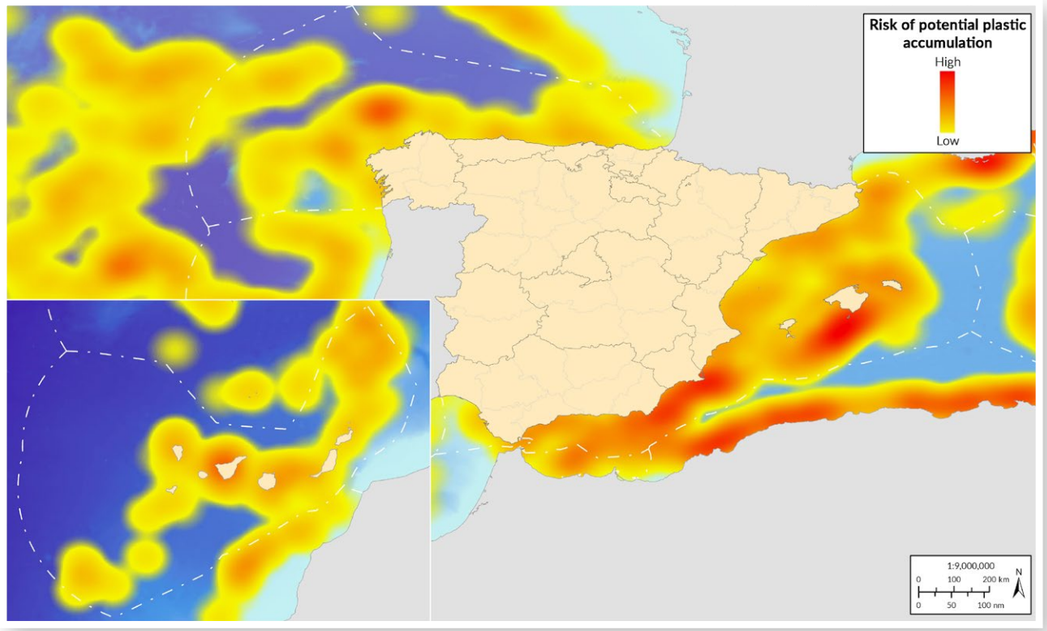
Where plastic hides in Spanish waters

Plastics have reached even the most remote areas of the planet and tend to accumulate in the deeps, for example, in the Marianas Trench.[26, 27] Spain, which is the second deepest country in Europe, is no different, and this is particularly worrying due to factors such as the large number of marine geological formations in its waters and the considerable depth of its seabed (more than 3,000 metres on average).

Consequently, the canyons, escarpments and seamounts — conducive to the build-up of plastics and other human debris — accumulate and channel the waste generated inland or on the coast down to the depths. These plains are veritable plastic sinks and represent approximately 79% of the Spanish Exclusive Economic Zone. Furthermore, due to the complex logistics and high costs, once the plastics have reached these sites, it is practically impossible to remove them by mechanical means and, indeed, trying to retrieve them could at times be even more damaging to wildlife. These characteristics, combined with the enormous biodiversity of these habitats, make Spain particularly vulnerable to the accumulation of plastics and the ecosystems may be threatened.

This may be compounded in areas where the geographical features are close together or situated at the mouths of large rivers or near coastal towns, as these are sources of plastic discharge into the sea. By making a simple analysis, for which value is attributed to each geographical feature present on the Spanish seabed, as well as to the sources of plastic debris, it is possible to approximate the areas that are potentially the most sensitive to the accumulation of plastic materials, colour coding them according to the risk.

By doing this, the Mediterranean area around the Balearic Islands, Murcia, and the Alboran Sea, as well as to the northwest of Galicia on the Atlantic side, once again stand out. There is a further hotspot in the area surrounding the island of Tenerife, due to the concentration of urban hubs and the steep slope caused by the rapid disappearance of the continental shelf, which is itself criss-crossed by several canyons.



The vulnerability gradient of the waters bordering Spain depends on the quantitative presence of geographical features, as these tend to concentrate plastics (seamounts, escarpments and submarine canyons), as well as proximity to areas that generate most of the waste that reaches the sea (large coastal towns and the mouths of the main rivers).[3, 5, 6, 11, 19, 20] Lhe areas in blue correspond to submarine plains, where debris ends up being deposited, but in these zones there are no irregularities in relief that would act as “plastic traps”.

Note: to draw up the map, other factors have not been considered, such as the relative size of each geomorphological structure, river, or urban hub, nor the distribution of currents, both of which affect the susceptibility of an area to the accumulation of plastic.

Andratx, Mallorca

Plastic bottle in the process of degrading.

Rota, Cádiz

Nets caught on the sea floor.

Oceana's recommendations

Oceana's findings in Spanish waters confirm that awareness campaigns on the negative effects of plastic on the oceans, waste collection, and beach cleaning have not been sufficient to ameliorate the situation. Although we cannot be certain of exactly how long the plastic we have documented has been in the sea, experts point out that, depending on the material, it may remain there for decades, even up to thousands of years.[28, 29] As a result, the solution must look beyond measures such as recycling and reuse, and it is essential to limit the use of plastics, particularly single-use plastics, as well as drastically reduce their production at a global scale. In the political sphere, the Single-Use Plastics Directive 2019/904 is a significant step forward towards reducing the quantity of plastic waste reaching the sea. In fact, this was one of the main drivers behind this text.

However, this directive is based on the articles mostly found on beaches, overlooking the reality of the deep sea. As we have explained, in deep-sea areas, studies indicate that plastic poses an even greater threat to ecosystems than in shallow waters. This is because the fauna in these areas has more exposure to the plastic, which tends to accumulate at the bottom of the sea.[14, 30]

Impacts on species include asphyxiation, ingestion, dissolution of toxic chemicals, and physical damage.[31] For this reason, Oceana therefore believes that it should be transposed to a national level in an ambitious manner, involving:

According to data from the European Commission, 70% of the plastic waste found on European beaches belongs to the 10 single-use items that will be banned from 2021, with the entry into force of the 2019/904 Single-Use Plastics Directive. These include cutlery, cups, food containers, and straws.[8]

1. **Eliminating the use of disposable cups and food containers** in bars, restaurants, and government buildings, to contribute to a 50% reduction in their consumption by 2025 and 80% by 2030. In parallel, these disposable products should be replaced by reusable ones.

2. **Reducing the consumption of wet wipes and eliminating the plastic rings** on drink packs. In addition, the release of balloons should be banned as these are the deadliest plastic waste for birds, turtles, and cetaceans.

3. **Setting targets for the marketing of refillable packaging** so that this accounts for at least 70% of the market by 2025, as well as implementing policies to promote deposits for returnable packaging.

4. **Introducing a finalist tax on non-healthcare single-use plastic products**, the collection of which will be used to tackle the problem of waste in the deep sea, promote return systems and carry out awareness campaigns.

5. **Developing a protocol for removing this waste**, including the cases where this is not appropriate due to the potential impact (for example, because of the vulnerability of the species affected).

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