PERCEPTIONS ABOUT MARINE ANTHROPOGENIC LITTER & MICROPLASTIC POLLUTION IN IRELAND

Managing For Microplastics:

A baseline to inform policy stakeholders

IRISH RESEARCH COUNCIL
An Chomhairle um Thaighde in Éirinn

CAROLINE
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Managing for Microplastics: A Baseline to Inform Policy (IMP.act)

Perceptions about marine anthropogenic litter and microplastic pollution in Ireland

Synopsis of the online survey

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About the authors

Dr João Frias is the principal investigator of the IMP.act project. He is a postdoctoral researcher at the Marine and Freshwater Research Centre (MFRC) in the Galway-Mayo Institute of Technology (GMIT). He has a background in environmental and ecological engineering, ecotoxicology, marine pollution and microplastic pollution research. He recently concluded a Level 9 Certificate in Teaching and Learning, in GMIT. He has 10 years of experience in national and international research projects linked to marine litter and microplastic pollution, with several publications on the topic, including a recent publication to find a consensus on the definition of microplastics. He also has experience working with volunteers in citizen science related projects and with outreach and dissemination of results.

Dr Róisín Nash is a Lecturer and Researcher in GMIT with a Postgraduate Diploma in Teaching and Learning and a research background in environmental impact assessment, marine pollution and more recently microplastic research. She has more than 20 years of experience in national and international research, lecturing and postgraduate supervision. Róisín is currently working with a team of researchers in the MFRC researching microplastics in the Irish environment. Her current research is looking at estimating baseline concentrations of microplastics in water surface, benthic sediments and biota from environmental samples in both freshwater and marine ecosystems and exploring pathways and fate of microplastics within the Irish context. She was recently co-author on a scientific publication to find a consensus on the definition of microplastics.

Welcome!

Thank you for your interest in this booklet which provides an insight into the current perceptions about marine litter and plastic pollution in Ireland. The results presented here are based on an online survey conducted between March and May 2019 to 320 anonymous respondents living in Ireland.

The survey is part of the research project Managing for Microplastics: A Baseline to Inform Policy Stakeholders (IMP.act) and the respondents represent diverse sectors in the country such as waste managers, national and local authorities, academic researchers, coastal tourism and fisheries representatives, members of non governmental organisations (NGOs) and recreational users such as surfers, divers, beachgoers and sailors.

Broad trends presented here were done with the consent of participants and data gathered for this project follows the EU General Data Protection Regulation (EU) 2016/679 ("GDPR") guidelines.

The main aim of this booklet is to assess current knowledge about the topic from the stakeholder's perceptions, particularly in relation to plastic production, consumption and recycling. Understanding societal perceptions around environmental issues, such as plastic pollution is vital to develop a successful strategy and to develop mitigation measures for decisive solutions.

The dissemination of the findings is very important to us. To maximise the benefit of the research carried out, the results of the survey will be disseminated to the key actors tackling plastic pollution, will allow citizens to make more informed decisions, will help advocates who are working to find consensus on national policies and strategies on marine litter and microplastic pollution and many more. Providing this data to policy makers can potentially help to contribute to strategic plans that want to align public perception with societal behavioural change.

João Frias and Róisín Nash
2020

Contents

Important definitions

Marine litter (ML)

Marine litter is any persistent, manufactured or processed solid material that is deliberately or unintentionally discarded, disposed of, abandoned or transported by winds, rivers and animals into the marine and coastal environment

Marine Strategy Framework Directive, 2008/56/EC

Microplastics (MPs)

Microplastics are any synthetic, solid particle or polymeric matrix with regular or irregular shape, with size ranging between 1 μm and 5 mm, of either primary or secondary origin, which is insoluble in water

Frias and Nash, 2019, Marine Pollution Bulletin

Stakeholders

Stakeholders are actors, either individuals or organisations, with vested interest in a policy or other process which might influence or impact them. Another term for stakeholders is "interested parties" and they are divided into different groups depending of the individuals or organisations they represent

Schmeer, 1999, Stakeholder Analysis Guidelines

Sustainable development

Sustainable development is the development that meets the needs of the present without compromising the ability, integrity and stability of future generations to meet their needs

Brundtland, 1987, Our Common Future

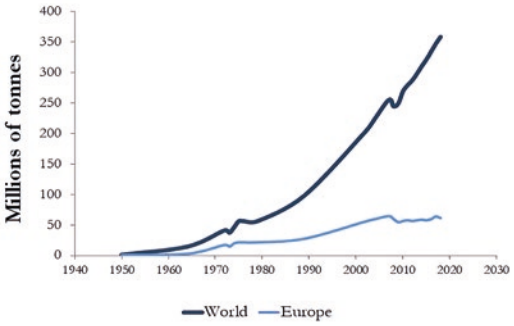
Recycling

Recycling is the recovery process of waste materials into reprocessed products, materials or substances whether for the original or other purpose

Waste Framework Directive, 2008/98/EC

Introduction

Shortly after the end of World War II, a new and promising material was introduced into households with the promise to reduce the time to complete our daily chores. That material was **plastic**. Plastic is durable, lightweight and very versatile, thus giving it an advantage over glass or metal. Subsequently, its global production is increasing exponentially. Global production rose from 1.7 Mtonnes in 1950 to 359 Mtonnes in 2018.



Global and European plastic production (PlasticsEurope, 2010 & 2019)

Plastics, often seen as single use items, just like other materials are disposed after use. However, when not properly recycled or disposed, plastic becomes an environmental pollutant. Their resilience as a material contributes to their widespread distribution and accumulation in the environment, with both negative effects and impacts on marine wildlife, ecosystems and local economies. It is estimated that the potential cost across the EU for coastal and beach cleaning, where plastic is a significant contributor, is almost €630 million annually, while the cost to the fishing industry is around €60 million, which is about 1% of the total revenue of the EU fishing fleet in 2010. Mammals, seabirds and other marine fauna have been known to become entangled in fishing gear and floating plastics while the former is often responsible for the entanglement of engines in boats. Plastics in water are also a risk through direct and indirect digestion for some marine species. These factors combined have led the United Nations recognising plastic marine litter (ML) as a global environmental problem. It is estimated that about 80% of marine litter found in the environment comes from land-based sources and remaining are related to marine and maritime activities. It is also estimated that about 70% of marine litter is made of plastic, and that more than 150 million tonnes of plastics have accumulated in the world's oceans, while an additional 4.6-12.7 million tonnes are added every year.

When exposed to solar radiation, salinity variations and abrasion processes, plastic items fragment into smaller pieces known as microplastics (MPs). Microplastics resulting from this fragmentation of larger pieces in the environment are called secondary microplastics while those plastics manufactured to have microscopic dimensions are known as primary microplastics. Scientific progress in recent decades has revealed the magnitude of the plastic problem, with microplastics being recorded in every ecosystem explored from the deep sea to mountain tops, and from the Arctic to the Antarctica.

Notably Ireland has been in the forefront of European changes, with the introduction of the plastic bag levy in 2002. The initial levy of 15 cents, further increased to 22 cents in 2007, contributed to a 90% decrease in plastic bag consumption after its implementation.

This was followed by initiatives on ocean and coastal literacy and clean beach campaigns (e.g. the Big Beach Clean programme) instigated by Coastwatch Ireland and An Taisce's Clean Coasts.

Ireland's Seafood Development Agency, Bord Iascaigh Mhara (BIM), has a Fishing for Litter scheme operating since 2015 which has already retrieved more than 400 tonnes of litter from Irish waters. These initiatives align with the concept of sustainable development, as highlighted in the Brundtland report, and with the Marine Strategy Framework Directive, the Water Directive, the Waste Directive, the United Nations Sustainable Development Goals, and the European Green Deal.

Think globally, act locally

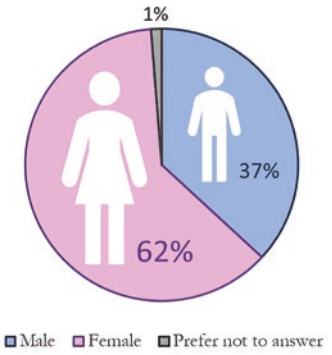
Current knowledge on marine litter and microplastic pollution

The information provided here is based on the answers from the 320 anonymous participants in the online survey *Perceptions about marine anthropogenic litter and microplastic pollution in Ireland* which was available from March to May 2019. This booklet will focus on the demographics, perception and accuracy of the replies of the participants. Unless stated otherwise, x-axis on graphs represent the number of replies.

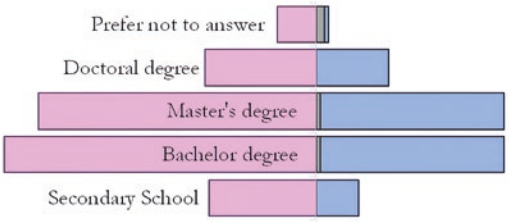
1. Demographics

Gender

Participants in this study identified mostly as female (62%), with only 1% of participants preferring not to share their gender. On average, individuals responding to the survey were likely to be female, have between 45-54 years of age and either holding a bachelor's or a master's college degree.



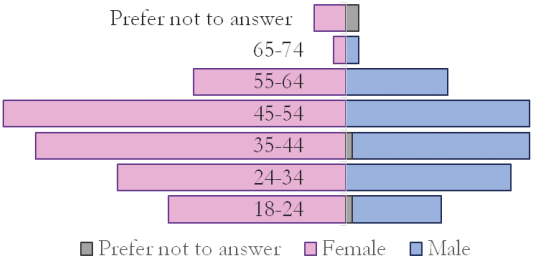
Education by gender



Most participants (37%) hold a minimum of bachelor's degree, with 34% having attained a master's degree, 13% a PhD and about 11% finished secondary school.

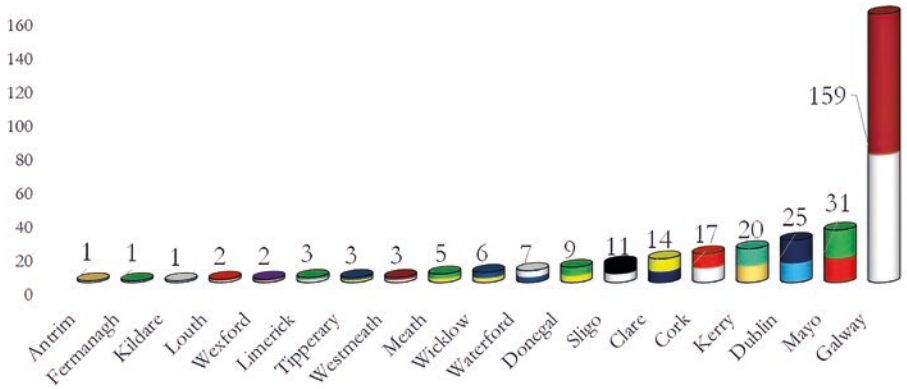
Age by gender

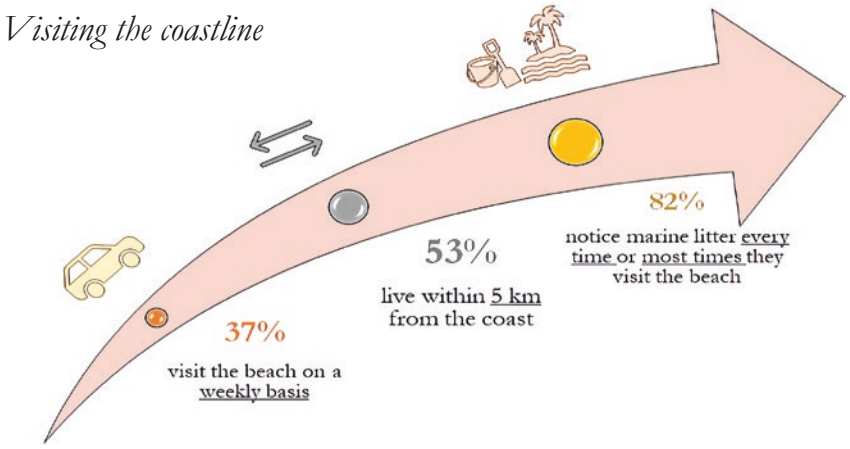
The participant's ages ranged between 18 and 74 years of age, with most common age groups recorded as 45-54 years (26%), followed by 35-44 (24%).



Participants by county

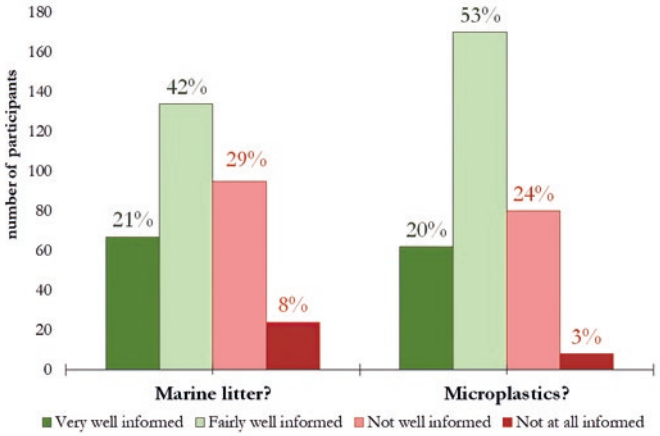
Most participants are based in Galway (50%), followed by Mayo (10%) and Dublin (8%), respectively. Most of the participants are based in the Republic of Ireland (318 people). However, there are two participants based in Northern Ireland (Antrim and Fermanagh). The figure below shows the participant distribution.





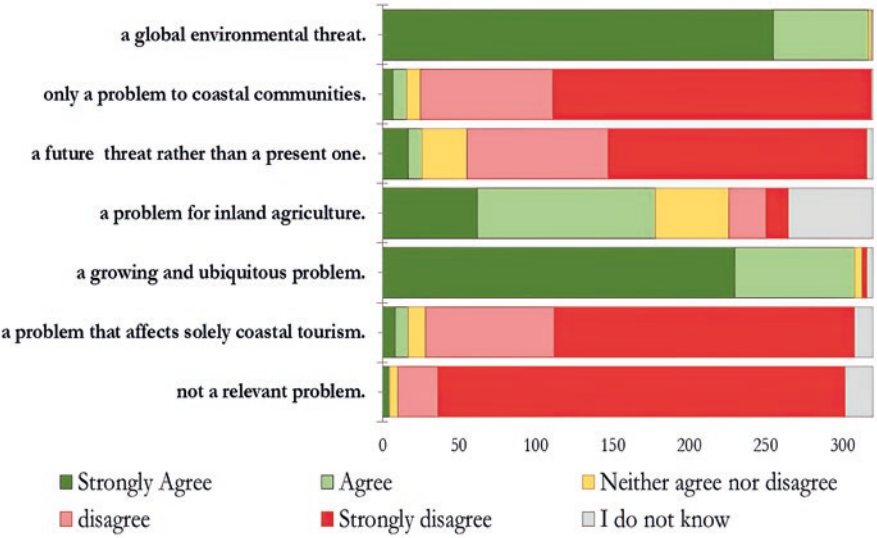
2. Perceptions on plastic as an issue

A series of questions about marine litter and microplastic pollution were posed to the participants to assess their general knowledge. When asked about how informed participants are about…



When asked about how informed participants are about...
Participants believe they are more informed about microplastics (**73%**) than marine litter (**63%**).

Participants have different perspectives on whether marine litter and microplastics are a problem depending what is the focus of the question. Generally, participants believe that marine litter and microplastics are…

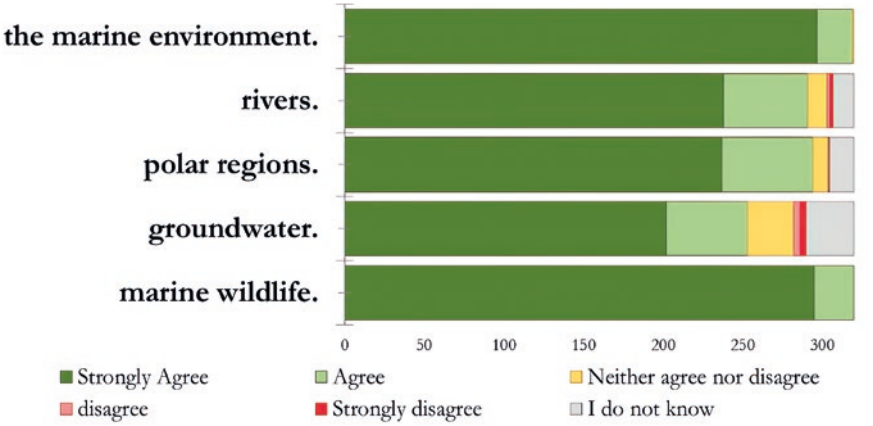


83% believe that plastic pollution is a relevant problem

5% believe that plastic pollution solely affects coastal tourism

8% believe that plastic pollution is a future environmental threat rather than a present one

Nonetheless, participants believe that marine litter and microplastic pollution pose a threat to ...



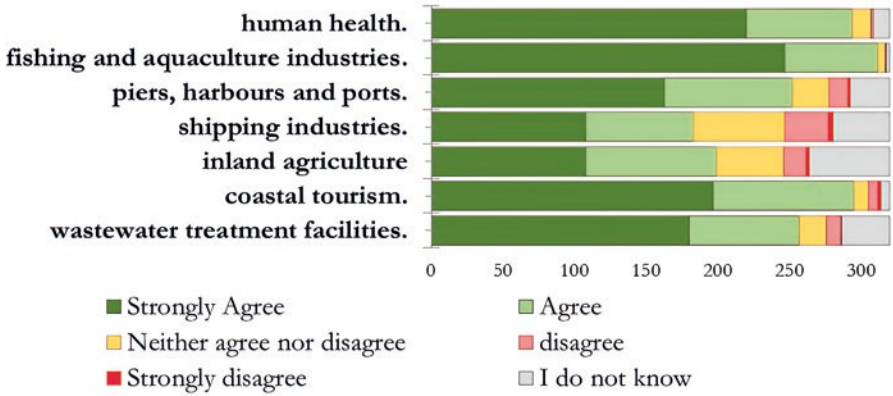
99.7% agree that plastic pollution is a threat to the marine environment

When it comes to polar regions most participants believe plastics pose a threat and only 5% refer not having enough knowledge

2.5% disagree or strongly disagree that plastic pollution affects groundwater. 9.3% do not have enough knowledge

100% of participants believe that marine litter is a threat to marine wildlife

Participants also believe that microplastics pose a threat to...



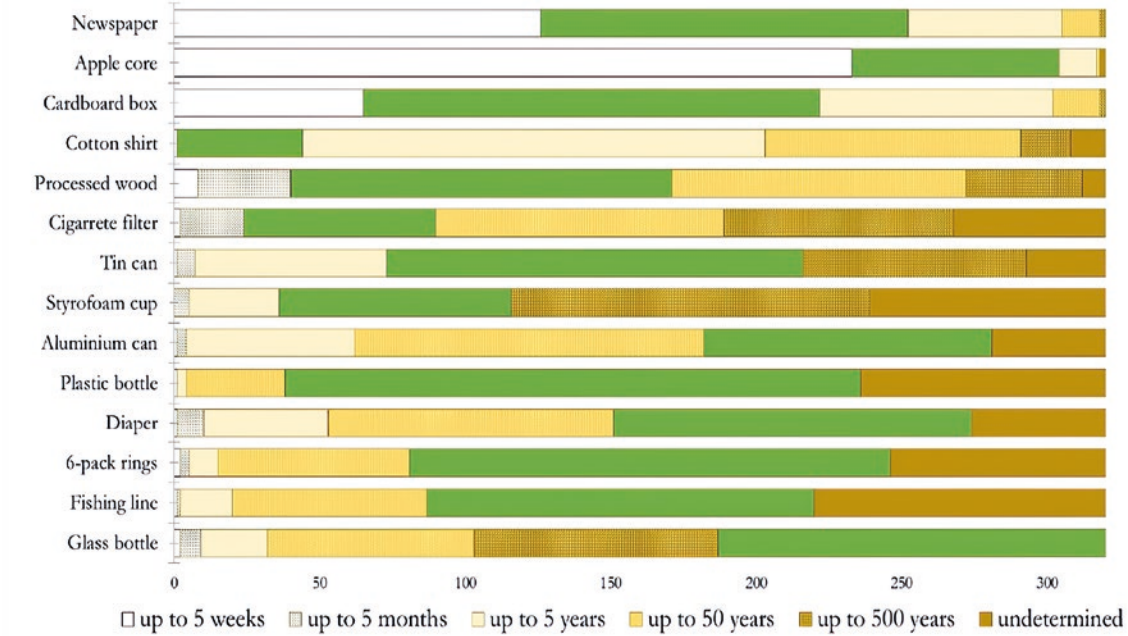
98% of participants believe that plastic pollution poses a threat to the fishing and aquaculture industries

Although **5.6%** of participants believe that inland agriculture is not affected, studies[1] show that microplastics from sewage sludge can reach crops

Even though **69%** believe that microplastics impact human health, there are is not enough scientific knowledge yet that validates this assumption or perception.

[1] See Corradini et al., 2019 https://doi.org/10.1016/j.scitotenv.2019.03.368

When asked about fragmentation or degradation times in the environment, generally participants have a good perception of the length of time for materials to fragment, with **71%** giving the correct answers[2], marked in green in the plot.

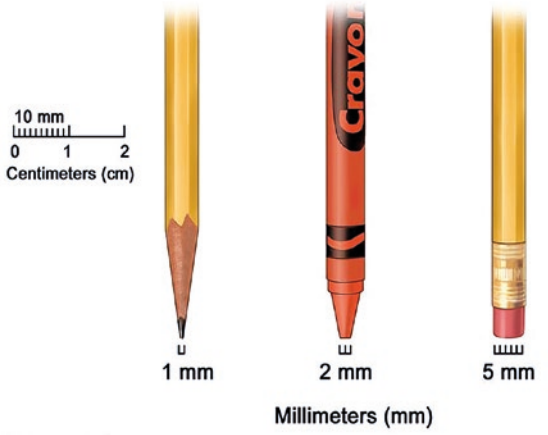


[2] See Answers: 1. Newspaper (6 weeks); 2.Apple core (2 months); 3. Carboard box (2 months); 4. Cotton shirt (2-5 months); 5. Processed wood (1-3 years); 6. Cigarette filter (1-5 years); 7. Tin can (50 years); 8. Styrofoam cup (50 years); 9. Aluminium can (200 years); 10. PET plastic bottle (450 years); 11. Diaper (450 years); 12. 6-pack rings (400 years), 13.Fishing line (600 years) and 14. Glass bottle (undetermined).

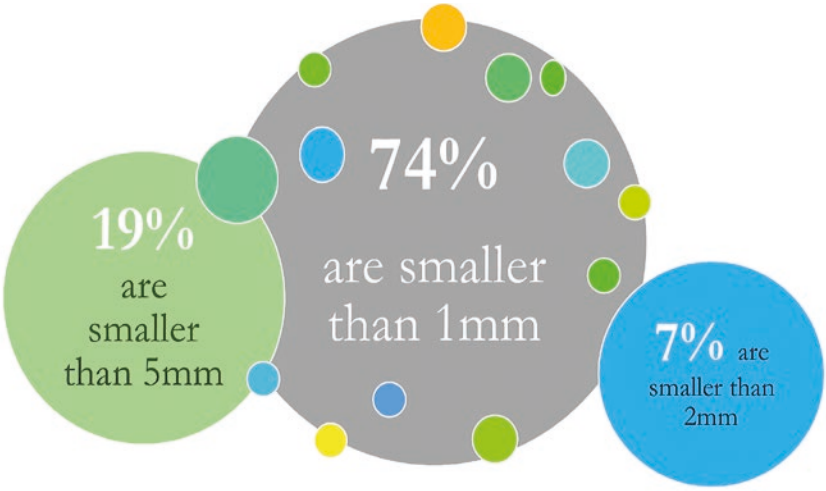
(Source: NOAA - National Oceanic and Atmospheric Administration, US | Woods Hole Sea Grant, US, 2015)

3. Size

Perceptions about the size ranges of marine litter and microplastics were also assessed, where participants were provided with images to match their answers. For microplastic sizes options, the following image was provided:

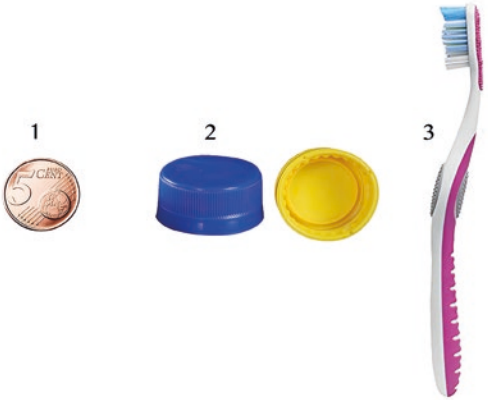


And when asked about how small are microplastics (MPs), participants stated:

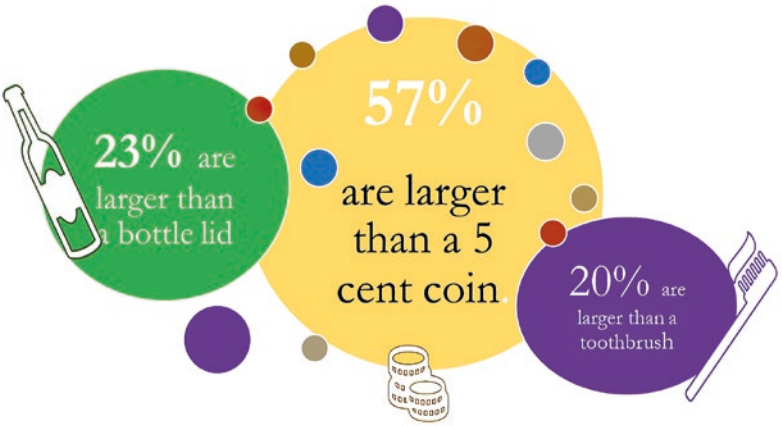


[3] The definition states "Below 5 mm". See Frias and Nash, 2019. https://doi.org/10.1016/j.marpolbul.2018.11.022

For larger plastic items the following image was provided:



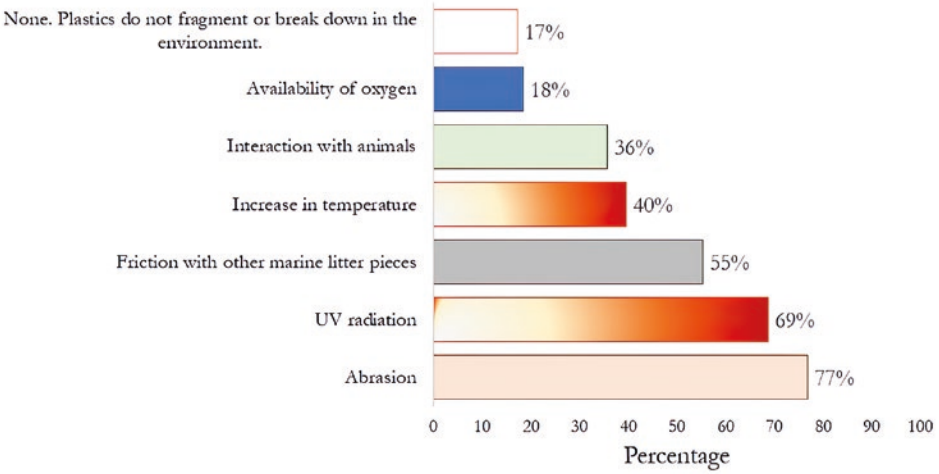
And when asked about how large are meso and MACROplastics[4], participants stated:



Circles in green mark the correct answers. So only approximately **20%** of participants got the right answer, which highlights the need for better science communication and knowledge transfer.

[4]The current definition states "Larger than a bottle lid (2.5 cm)". See Galgani, Hanke and Maes, 2015. https://doi.org/10.1007/978-3-319-16510-3_2

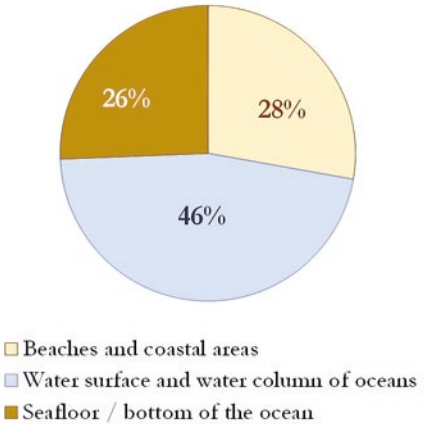
When asked about what affects fragmentation of larger items into microplastics?



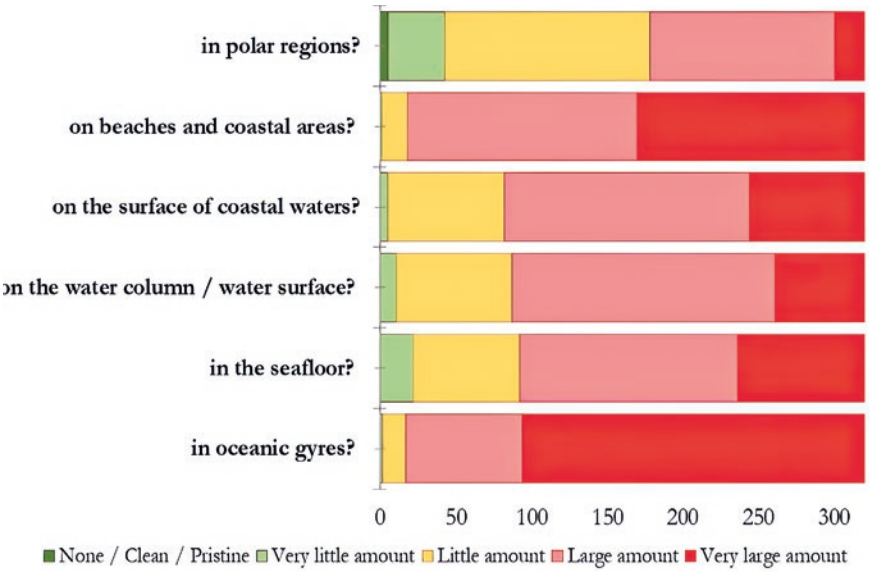
17% of participants believe that plastic does not fragment or degrade under environmental conditions

4. Sources and distribution

The third section of the survey relates to sources and distribution of plastic marine litter in the environment. Most participants believe that plastic is more commonly found at the water surface or water column, although research shows otherwise (see Kane et al., 2020).



When asked about how much marine litter there is...

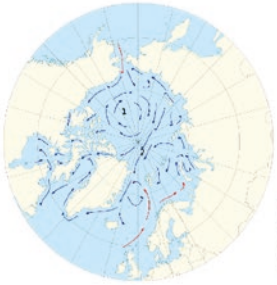


94% of participants believe that marine litter largely accumulates in oceanic gyres and only 0.02% believe polar regions are still pristine.

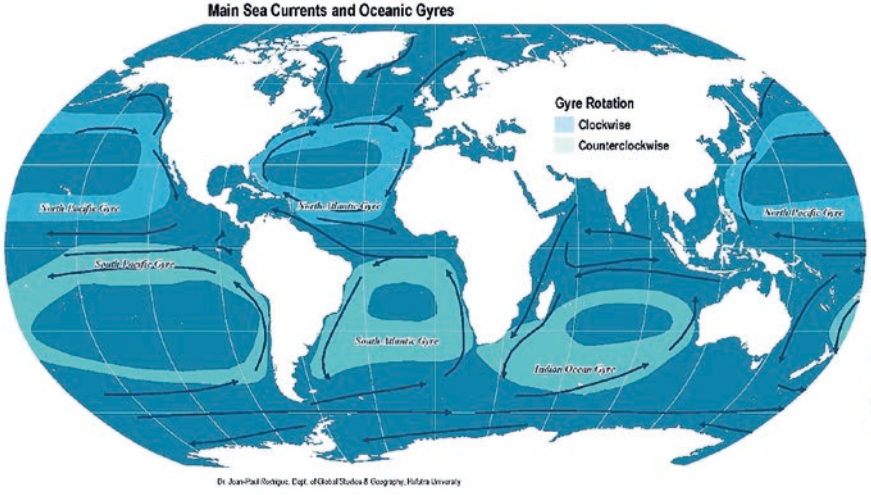
In fact, recent studies in the Arctic[5] and in the Antarctica[6,7], have shown that polar regions are not free from microplastic pollution. The widespread distribution of this lightweight material might have unseen consequences in once considered pristine environments.

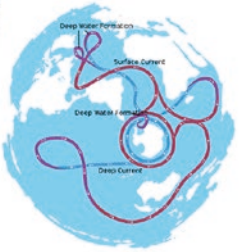
[5] National Geographic - Tiny pieces of plastic found in Arctic Snow
[6] Plastic Soup Foundation - Microplastic Pollution in Antartica
[7] Greenpeace Microplastics in the Antarctica

Oceanic gyres, also known as vortices, are large systems of circulating ocean currents influenced by wind. The Great Pacific Garbage Patch, close to the Hawaiian archipelago, was discovered by Cap. Charles Moore, and widely showed that these areas can accumulate plastic debris. Gyres are accumulation areas of floating plastics and microplastics in the ocean. There are seven known gyres: 1) North Pacific Gyre, 2) South Pacific Gyre, 3) North Atlantic Gyre, 4) South Atlantic Gyre, 5) Indian Ocean Gyre, 6) Arctic Gyre and 7) Antarctica Gyre.



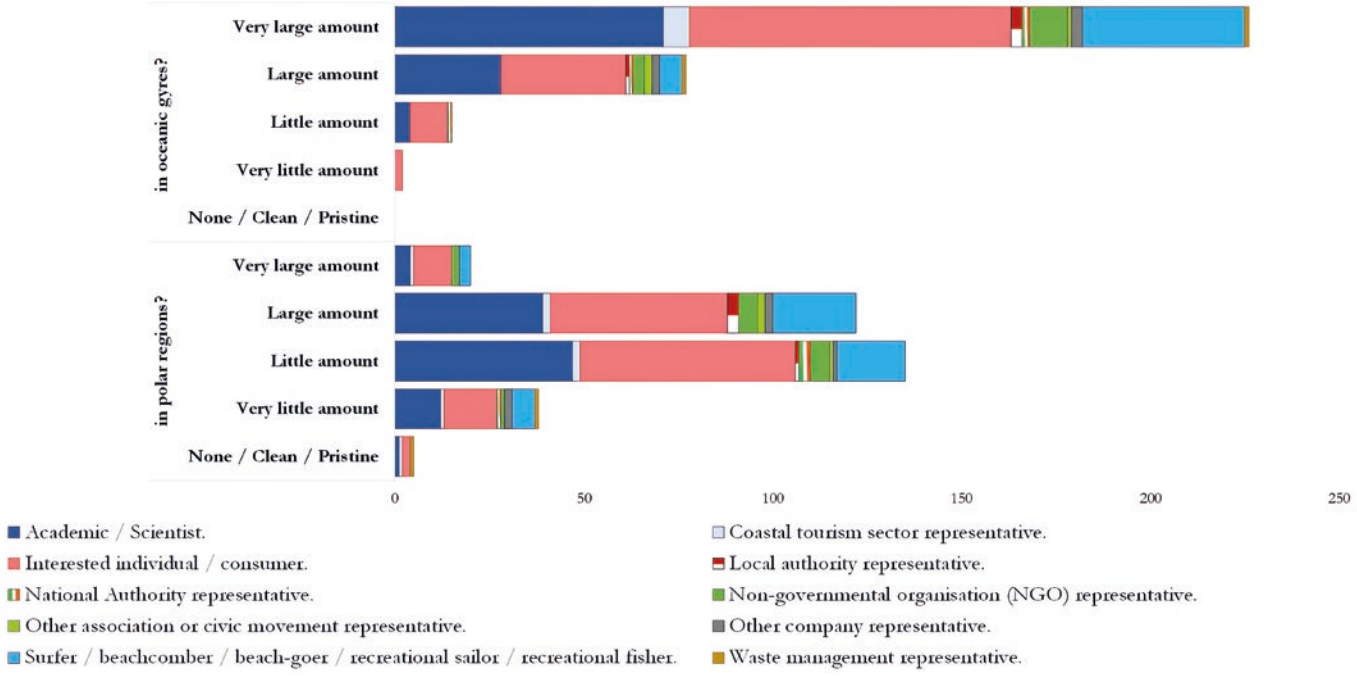
Arctic circulation



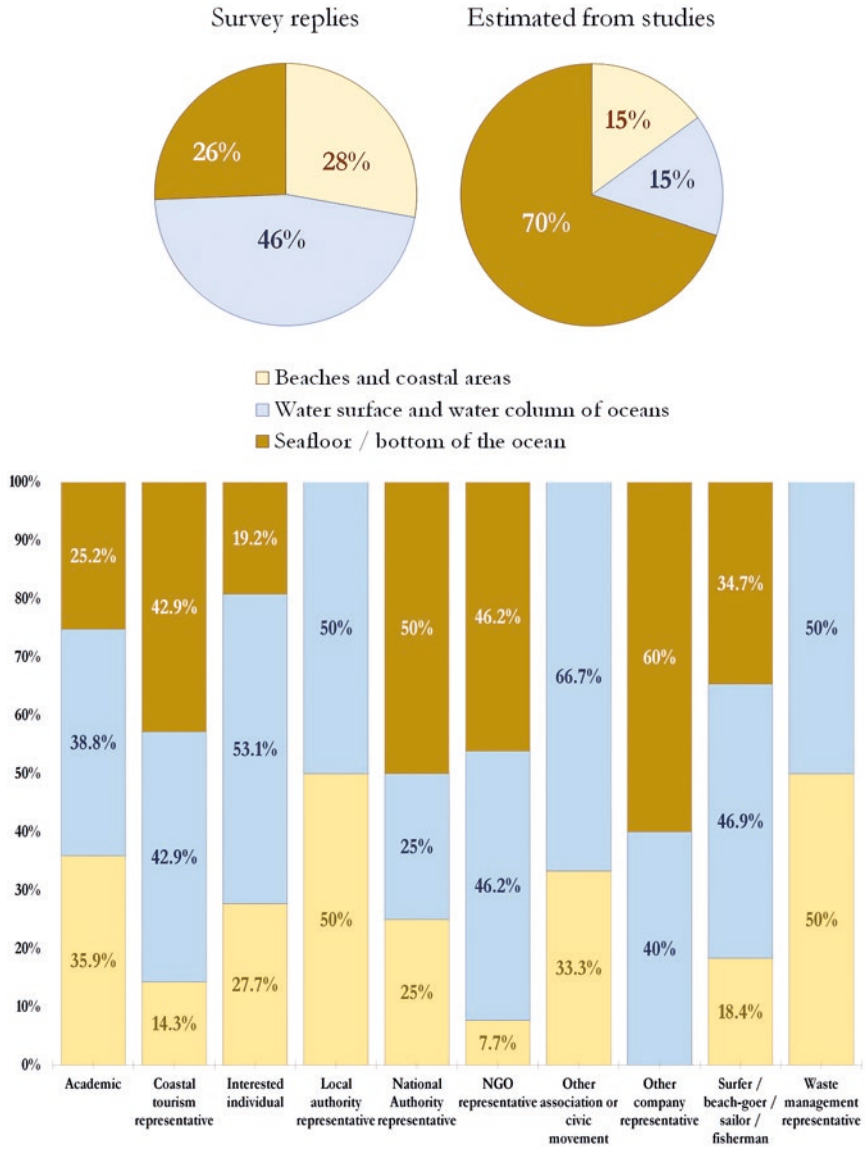


Antarctica circulation

A more careful analysis by stakeholders on the amounts of marine litter and microplastics in ocean gyres and in polar areas shows a wide range of replies. About **5%** of participants believe that ocean gyres **have little or very little plastic present**. While in relation to the **polar regions**, about **45%** believe they either have **very large or large amounts** of plastic litter present.



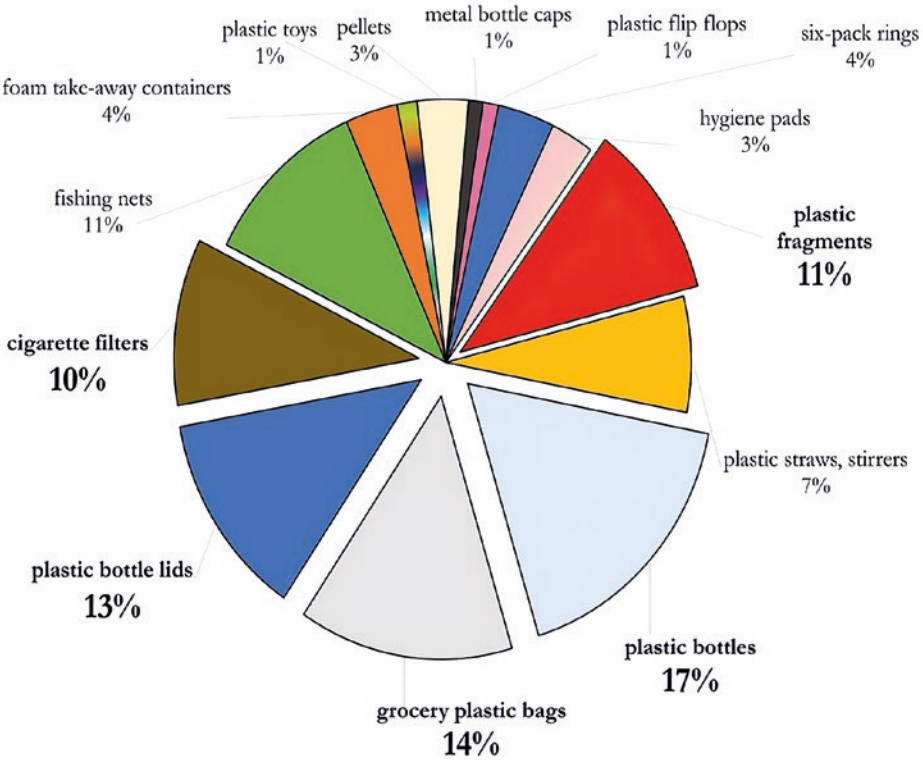
When asked where they believe marine litter accumulates[8], participants expressed different perspectives:



[8]Estimations from UNEP, 2005. Regional Seas Programme, Marine Litter and Abandoned Fishing Gear.

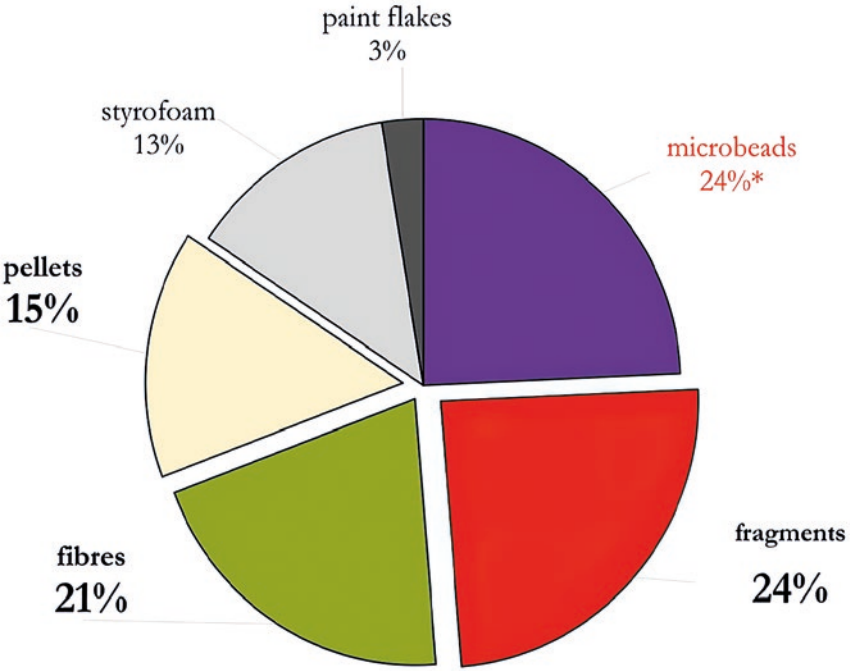
5. Top marine litter items

In the survey, participants were asked, from a wide range list of marine litter items, what would they believe are the TOP 5 items commonly found in beaches and coastal areas. Replies marked in bold correspond to the actual TOP 5[9] items found in global surveys:



[9] Based on the Ocean Conservancy's International Coastal Cleanup 2017 Report

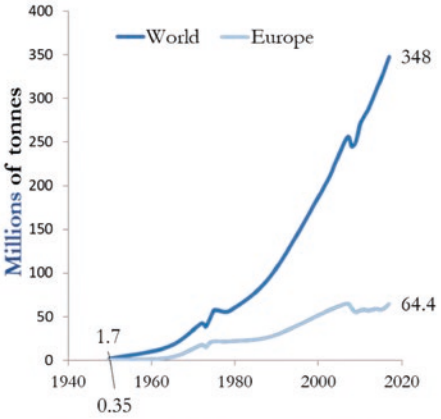
Participants were also asked what do they believe are the TOP 3 microplastic items commonly found in the environment. Although microbeads[10] were one of the most voted answers, they are not commonly found in the environment. Results marked in bold correspond to the most common microplastics in the environment. The correct order, from a review of research studies is 1) fibres, 2) fragments and 3) pellets.



[10] Primary microplastic items commonly found in toothpastes, exfoliants, and make-up products

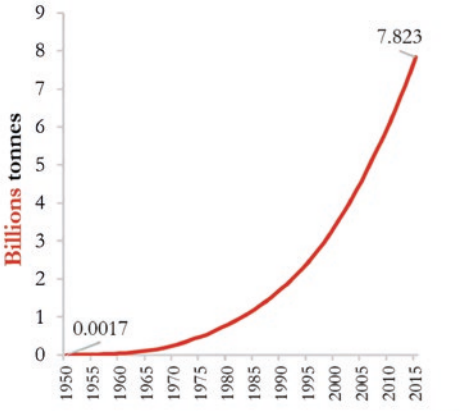
6. Production and recycling

An important aspect that the survey covered was the worldwide plastic production and recycling rates. For this section, the 2017 plastic production figures (blue) were used (i.e. 348 million tonnes worldwide). When asked how much plastic had been produced in 2017, **58%** of participants provided the correct answer, which shows that there is some awareness to global production. An additional figure recently published, is the fact that until 2015, the cumulative plastic production (red), had reached almost 8 billion tons worldwide.



Worldwide Plastic Production (1950-2017)

PlasticsEurope, 2018

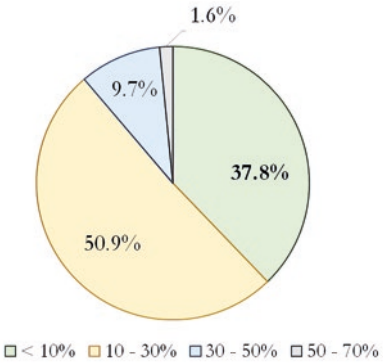


Cumulative worldwide plastic production (1950-2015)

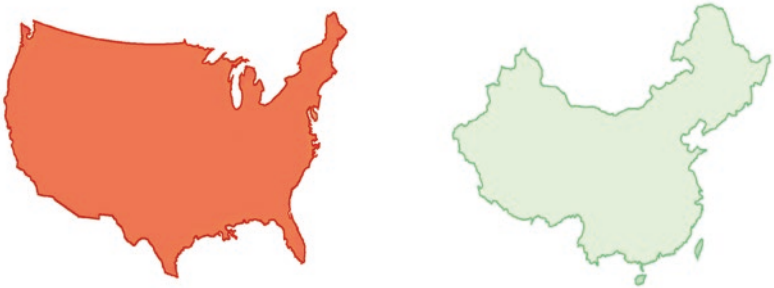
Our World in Data, 2019

Taking into consideration the fragmentation/degradation rates of plastic, highlighted in page 15 of this booklet, we can see how mismanagement of this material became a global pollution problem.

When asked about how much plastic is estimated to be recycled[11] globally per region, most participants (**50.9%**) believe that recycling is lower than 30%. In fact, less than 10% of plastics are recycled worldwide.



In Europe, that figure is between 10-30% (2014), so about **89%** of participants are properly informed about the recycling trends worldwide, as we accepted as correct answers that stated <30%.



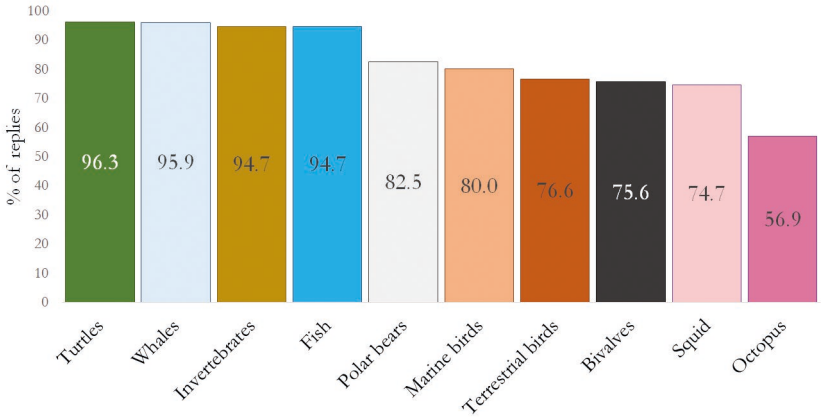
In 2014, the plastic recycling rate in the United States was 9% while in China it was 25%.

[11] Based on Geyer et al., (2017) Production, use, and fate of all plastics ever made. Science Advances, 7, e1700782. https://doi.org/10.1126/sciadv.1700782

54% of participants were aware that **Asia** is the biggest producer of plastic materials globally, but only **14%** knew that **Central and South America is** the continent which produces the least amont of material.

7. Impacts

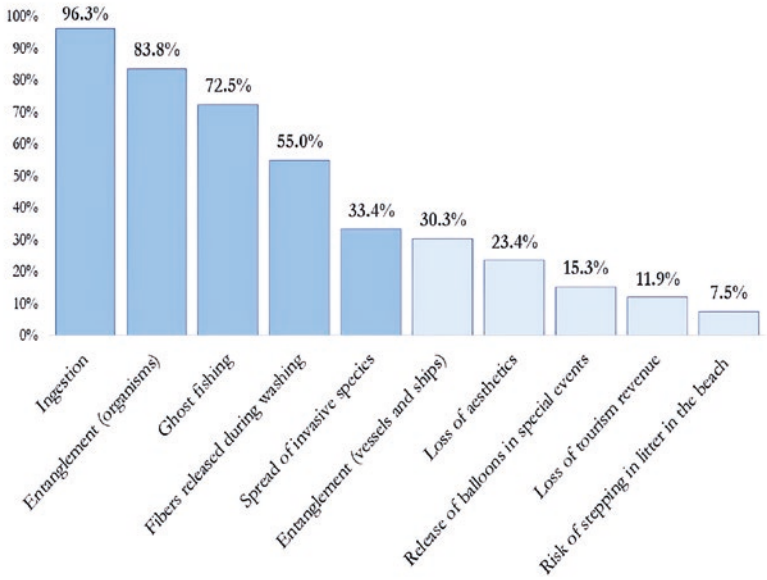
When exploring impacts on marine animals, **100%** of participants believe marine animals are **negatively affected**. Participants believe that charismatic animals such as whales, turtles, fish and invertebrates are the most affected in comparison to other species (see plot below).



All of the above have been recorded to have either ingested and/or have become entangeled in plastic litter.

Participants believe that the main consequences or impacts of plastic marine litter are related to:

1. Ingestion of microplastics;
2. Entanglement of marine organisms in nets and fishing gear;
3. Ghost fishing (nets tossed away that continue to fish);
4. Fibers released while washing clothes;
5. The spread of invasive species.

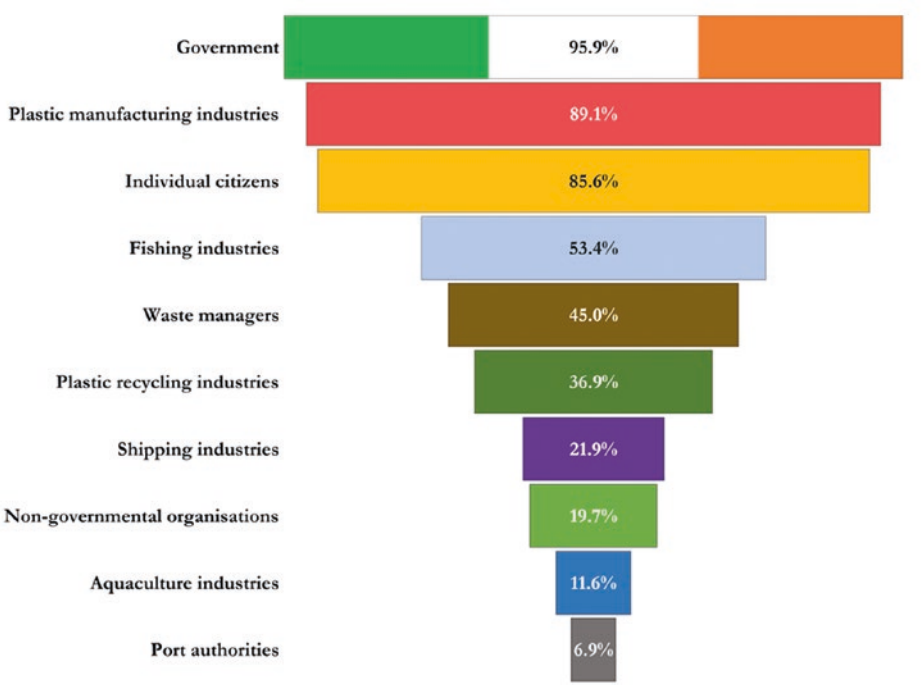


All the highlighted issues have been reported worldwide and have raised local, national and/or international concerns.

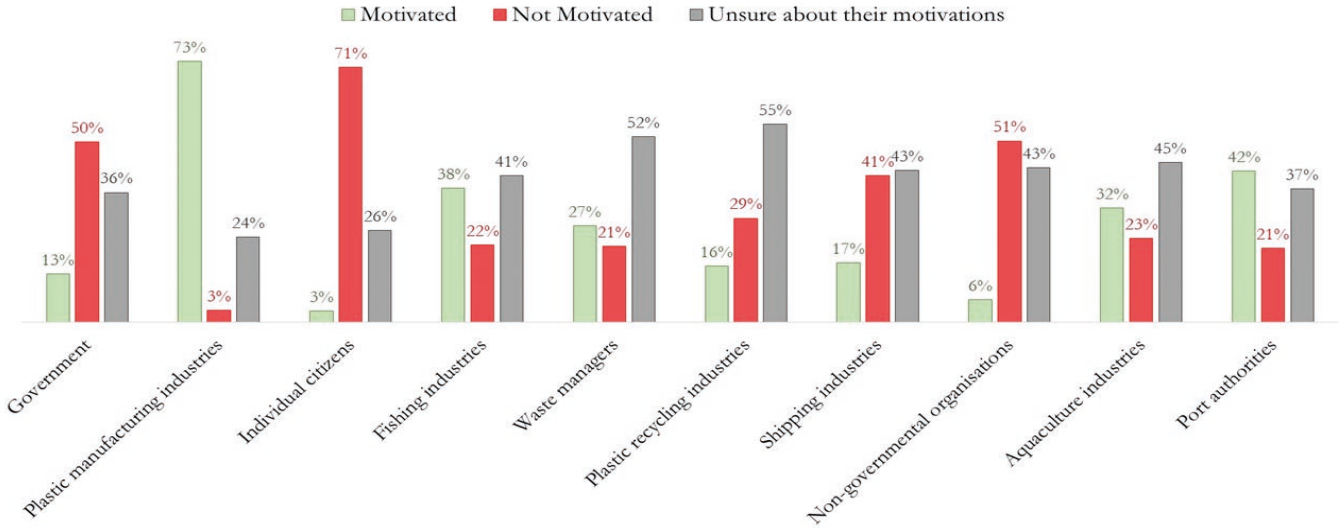
Entanglement of vessels and ships in marine litter (expressed in loss of days at sea) and losses in tourism revenue associated to loss of aesthetics (dirty beaches) in coastal areas (high municipal beach cleanup costs) are the main economic challenges related to plastic marine litter.

8. Responsibility

The final part of the survey is related to responsibilities. Participants were asked whose responsibility it is to deal with the marine litter pollution problem. The question allowed for multiple answers, and most participants stated that the three stakeholders whose responsibility is a key to solve this global issue are the Government, the plastic manufacturing industries and individual citizens. Each participant could choose a maximum of 5 stakeholders in this question. And the plot below summarises the answers:



What is the public's perception when asked about the motivation of the stakeholders to address the issue of marine litter?



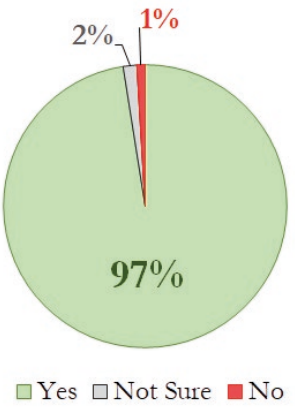
73% of participants believe plastic manufacturing industries are motivated to solve the marine litter problem. Yet, **50%** of participants believe that the Government is not motivated to solve this issue and **71%** believe individual citizens in Ireland are also not motivated. Participants uncertainty about the level of the motivation of stakeholders ranged between **24% - 55%.**

8.1 Market-based instruments in action in Ireland

Market-based instruments (MBI) are policy tools used to reduce or avoid negative environmental problems. According to the Organisations for Economic Cooperation and Development (OECD, 2007), MBIs seek to address market failure of 'environmental externalities' either by incorporating the external costs of production through taxes or charges on processes and products, or by creating property or other rights that create proxy markets for environmental services. Market-based instruments are none other than policy instruments that use markets, price, and other economic variables to provide incentives for polluters to reduce or eliminate negative environmental impacts. Examples of these instruments are bans, taxes, trade schemes, deposit-refund systems, taxes, charges and subsidies.

To address them, the following scenario was presented to participants:

"Ireland was the first European country to introduce a plastic bag levy in 2002, initially of €0.15 per plastic bag. After the first month of implementation, disposable single-use plastic bag consumption in supermarkets was reduced by almost 90%. The funds raised (~€9 million) were channelled into environmental initiatives within the country. Do you consider levy schemes such as the one mentioned to be beneficial to promote behaviour change in society?"



97% agree that such schemes promote behaviour change in society. In fact, according to research, in the first month the levy was implemented in Ireland, consumption of plastic bags was reduced by approximately **90%** creating a success story which was replicated all over Europe.

"In 2007, Ireland increased the value of the plastic bag levy from €0.15 to €0.22."

After providing this information, participants were then asked whether the price per bag should **increase, decrease** or be **kept the same** in the next couple of years.

78.4% of participants believe that price should increase
1.3% believe that price should decrease and
20.3% believe that price should be kept the same.

There is at least two potential reasons for almost 80% of participants choosing to increase the value:

1) Dissuading consumers to bring back more plastic into their households
2) Increasing the value of the environmental tax that will allow more funds for sustainable projects in Ireland

Consumers feel that they are contributing to achieving sustainability knowing that the revenue created from these taxes are being used to improve environmental systems

Still on the same topic, another example was provided:

"In 2000, the Dutch government started the initiative: Fishing for Litter. In 2015, a pilot project was introduced in Ireland by Ireland's Seafood Development Agency (Bord Iascaigh Mhara – BIM). This project now operates in 12 ports. This initiative aims to reduce marine litter by involving one of the key stakeholders, the fishing industry. Large bags are provided to fishing boats to collect marine litter while fishermen are at sea and port facilities are to allow the unloading of the bags filled with litter."

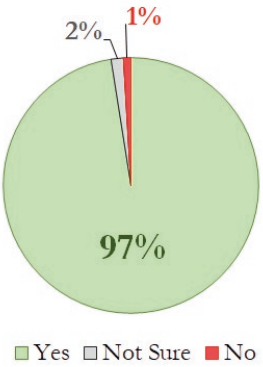
Participants were asked whether they were aware of this BIM initiative. The vast majority of participants (**63%**) were not aware that such a project already takes place in Irish waters. In January 2019, when this survey was prepared, participants were asked how many tonnes they believed had already been retrieved from the sea, since 2015[12]?

45% of participants replied 190 tonnes, which at that time was the correct answer.

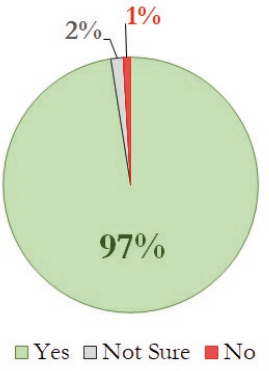
[12] BIM recently updated these statistics with more data, and the new figure is 409 tonnes. For more details please check: http://www.bim.ie/fishing-for-litter/

8.2 Bans

To assess participants' perceptions about certain single-use non-essential plastic items, participants were asked whether they agreed with banning **plastic cups, cutlery, plates, stirrers**. Not surprisingly, **97%** participants believe that such items should be banned.



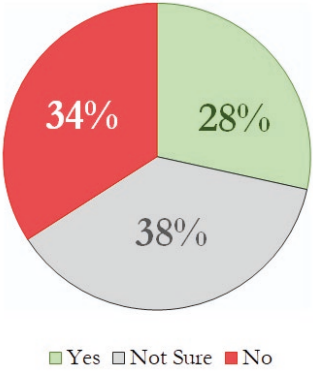
Interestingly, participants provided identical results when asked whether **plastic straws** should be banned, as **97%** believe straws should be banned.



Non-essential single-use plastic items such as cups, cutlery, plates and stirrers have been banned in many European, countries, starting with France, and it is likely that such bans will soon reach other EU-member states. The plastic straw ban referred here is likely to be associated to a popular video of a turtle with a straw in its nose. Because humans tend to have compassion for charismatic animals, it is likely that this was also behind the intention to ban.

The last question about bans was provided **pre-coronavirus outbreak in Europe and in Ireland**. It was included to stimulate debate about the necessary use of single-use plastic items in medicine and research. The authors start by expressing that using single-use plastic items in medicine is essential and that the following question was solely introduced to provide societal debate.

Participants were asked whether single-use plastic items used in medicine and research should be banned, by providing the following image:



38% are **not sure** or do not have enough information
34% believe that such items should **not** be banned
28% believe such items **should** be banned

It would be interesting to conduct a post project assessment to understand whether Irish citizens still believe that such items should be banned and the reasons why.

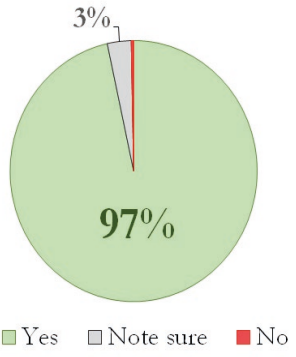
8.3 Other initiatives

Several industries and non-profit and/or non-governmental organisations (NGO) have started to recently develop awareness campaigns with their staff and with the general public to mitigate or reduce the impacts of plastic pollution. Theses campaigns are also developed to improve systems and processes, which will lead to brand or image improvements for them.

One of the most successful initiatives of the plastic industry is

Operation Clean Sweep®

Participants in the survey were provided with the following information: "The Operation Clean Sweep is a project which is part of the Global Plastics Associations Declaration for Solutions on Marine Litter. The main goal is to have zero plastic pellet, flake and powder loss, during handling by the various entities in the plastics industry and to prevent their release into the aquatic environment. Do you think that the polymer and plastics industries in Ireland (processors, suppliers, etc), should adopt similar prevention measures, in case they have not adopted it yet?"



97% of participants believe that such initiatives should be widely implemented

3% are not sure or do not have enough information

It would be interesting to conduct a post project assessment to understand whether Irish citizens still believe that such items should be banned and the reasons why.

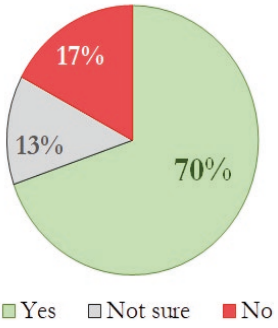
On the volunteering and non-governmental organisation side, there are some initiatives taking place in Ireland on a yearly basis that people all over the country can take part in. The two biggest projects in Ireland are Coastwatch Europe and *An Taisce* Clean Coasts. Both promote citizen science and contribute to protecting and managing coastal zones. Coastwatch started in the early 1980s and has been replicated all over Europe. The Clean Coasts programme is a national project which aims to create and improve Ireland's coastal environment. Both of these initiatives conduct regular beach and coastal zone cleanups and gather citizen science data that provide information for both national and European databases.

Coastwatch

Clean Coasts

An Taisce

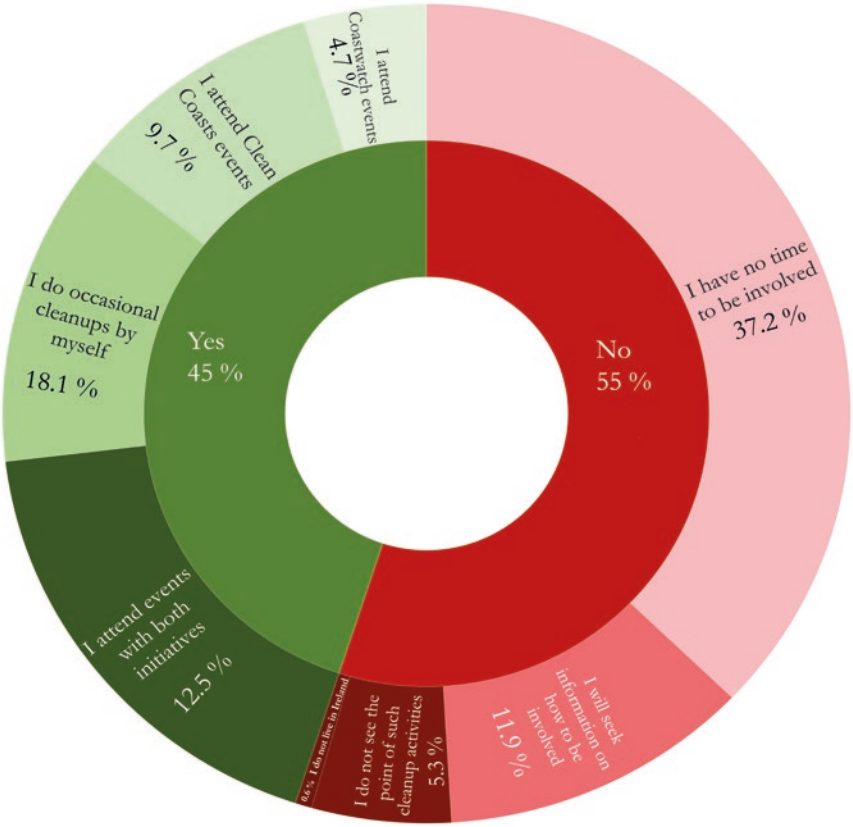
In the survey, participants were asked if they were aware of such programmes already existing in Ireland?



Most participants (**70%**) were aware of both initiatives taking place and only **17%** had not prior information.

As a follow up question, participants where asked whether they have attended any beach or coastal zone cleanup events with any of these two programmes or to provide a reason why in case they have not attended.

[13] If you live in Northern Ireland (U.K.), and want to be involved in such activities please contact Keep Northern Ireland Beautiful



Only **45%** have previously attended beach and coastal cleanup events before. Out of these 4.7% were involved with Coastwatch, 9.7% with Clean Coasts, and 12.5% with both programmes. In addition, about 18% of participants do regular cleanups by themselves. Less than 1% of participants live outside of Ireland and do so have not attended any of these events. On the negative side, about **37%** of participants mentioned that they do not have time to be involved in such activities and about **5%** do not see any point in doing such activities. Many people either do not have time to dedicate or believe that it is the responsibility of the city or county councils to deal with plastic litter in coastal areas, as they already pay their taxes. About 11% of participants mentioned that they will actively find out more information to attend future events.

Conclusions

This was the first online survey to assess the perceptions of the Irish public in relation to plastic marine litter and microplastic pollution. The survey found that most participants are aware of the global pollution issue and conscious of solutions to prevent and/or minimise it. Unfortunately, plastic pollution in the ocean is expected to double by 2026, and because plastic does not decompose in the natural environment, it is likely that smaller pieces resulting from fragmentation will also increase. It is expected that as much as 25 million metric tons of plastic could reach the ocean by 2025. It is also estimated that a plastic bottle can fragment into 10,000 microplastic pieces so about 96% of marine wildlife including seabirds are potentially at risk. Global environmental issues are complex in nature and solving them requires stakeholders to work together. At an individual level there are many things we can do once we are provided the correct information. Most people are aware of the 3R policy (reduce, reuse, recycle). More recently, it has been proposed that 3 new Rs should be included in the cycle to prevent and minimise pollution. They are Rethink, Refuse and Repair.

What can I do?

There are many things that can be done individually to reduce or minimise plastic pollution. Some of the things that individual citizens can do daily are:

Because we are all consumers, we all contribute to this issue. However, small individual steps will influence those around you, once they are consistent.

So, it is in our hands to make both the country and the planet liveable for future generations. Circulating accurate information on marine litter and microplastic pollution via booklets such as this or via outreach and awareness events, will engage stakeholders, improve their knowledge base and improve their local environment. Please share this booklet with friends and family to spread awareness on our perceptions of plastic pollution in Ireland.

For any more information about this topic, please contact the authors of this booklet. And just as mentioned before: *Think globally, act locally*.

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People and organisations

1. BIM Fishing for litter http://www.bim.ie/fishing-for-litter/
2. Captain Charles Moore http://www.captain-charles-moore.org/
3. Coastwatch Europe https://coastwatch.org/europe/
4. Clean Coasts https://cleancoasts.org/
5. Keep Northern Ireland Beautiful https://www.keepnorthernirelandbeautiful.org/
6. Operation Clean Sweep https://www.opcleansweep.org/

NOTES

Managing For Microplastics:

A baseline to inform policy stakeholders

This project contributes to the following United Nations Sustainable Development Goals

4 QUALITY EDUCATION

14 LIFE BELOW WATER

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