# Tackling the Arctic's microplastic problem at its root: Keeping European beaches clean to stop plastic pollution

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**Tackling the Arctic's microplastic problem at its root:**
**Keeping European Beaches clean to stop plastic pollution**

**Key points:**

- Plastic breaking down to microplastic in the Arctic Ocean is an environmental threat and a threat to local wildlife, including fish stocks.
- Preventing plastic from accessing the Arctic Ocean is a vital step to inhibit growing pollution.
- Plastic originates from maritime activities and from waste left at coastlines, e.g., in Western Europe, especially created by tourists.
- A sojourn tax directed at regular beach and coast clean-ups, as well as improved waste management, is proposed here as a way to prevent plastic being transported to the Arctic by the sea.

## Introduction

With the discovery of microplastics in the Arctic region in 2019, it appears that no place in the world is safe from plastic pollution anymore. With the oceans' currents transporting waste from coastlines into the Arctic, people living far from the region impact its pollution. This includes the EU: Although the majority of EU citizens live outside the Arctic circle, the EU nevertheless leaves a plastic footprint in the region.

Microplastic describes fragments of plastic that have a size of ≤5 mm and ≤1 µm. They can be transported air- and seaborne and are often made by larger fragments of plastic breaking down over time[1].

Filtering the plastic out of the water currently is still extremely laborious. Instead, it is more efficient to prevent plastic from entering into the ocean in the first place. Targeting the plastic waste left by tourists at beaches and coasts in Western Europe can be an important step here to protect the fragile ecosystem in the Arctic.

## Microplastic in the Arctic

When not properly recycled, plastic breaks down overtime, turning into smaller and smaller particles until hardly visible to the eye. Such microplastic poses a global environmental and health risk.

[1] Bergmann et al. (2022). *Plastic pollution in the Arctic,* 323.

Studies indicate that apart from a deficient waste management in Arctic communities causing land-based marine litter[2], most plastic waste is carried into the Arctic via the North Atlantic[3]. Research shows that the most common polymer types of microplastic found in the Arctic Ocean are acryl, polyethylene, and polyester[4]. The latter are commonly used in e.g., textiles, PET-bottles or packaging material. As the Arctic region is scarcely populated, the plastic mostly originates from users in different regions like Europe and Asia. The Arctic receives much plastic pollution from the North Atlantic and North Pacific, as well as via rivers leading into the Arctic Ocean[5]. Eventually, the journey ends, turning the Arctic into the "dead end of this plastic conveyor belt"[6]. At this dead end, the Arctic Sea ice is for now providing a temporal sink for microplastic: With the freezing of the ice, microplastic is bound in the ice until it melts. Then, however, the microplastic is further distributed along the Arctic coasts[7].

While this process transitorily helps to store microplastic, it is endangered by its freight: When further breaking down, microplastic emits greenhouse gasses which increases global warming, leading to the melting of glaciers and sea ice. Additionally, this lost plastic cannot be recycled, increasing emissions to reproduce it[8].

When breaking down, microplastics can also release trace metals like lead or persistent organic pollutants (POPs). When entering a body, these chemical additives can affect its tissues and organs. Additionally, the small particles can cause a decreased nutritional value of food and lead to internal or external physical damage, especially for fish and other seafood. It can lacerate guts or engorge the stomach, leading to a disrupted feeding behaviour[9].

This changed behaviour and conditions can lead to reduced populations, and consequently harm the food chain in the Arctic, as well as human consumption.

The transport of plastic to the Arctic via the ocean's currents creates several negative effects that harm the region but create a larger impact: The breaking down of the plastic waste emits greenhouse gas and lets it adsorb chemicals and trace metals. Next to the impact on the climate, the adsorption can endanger local maritime wildlife and, consequently, influence the fish stock. As many Arctic countries rely on fishing as part of their economy, they face the consequence of the Arctic's problem with microplastic.

[2] Broder (2019). *Plastic and Microplastic Litter: A Serious Problem in the Arctic Ocean,* 2.
[3] Bergmann et al. (2022). *Plastic pollution in the Arctic,* 326.
[4] Yakushev et al. (2021). *Microplastics distribution in the Eurasian Arctic is affected by Atlantic waters and Siberian rivers,* 5.
[5] Bergmann et al. (2022). *Plastic pollution in the Arctic,* 323f.
[6] Broder (2019). *Plastic and Microplastic Litter: A Serious Problem in the Arctic Ocean,* 1.
[7] Peeken et al. (2018). *Arctic sea ice is an important temporal sink and means of transport for microplastic,* 7.
[8] Bergmann et al. (2022). *Plastic pollution in the Arctic,* 332.
[9] United Nations Environment Programme (2021). *From Pollution to Solution,* 23f.

**Sources of microplastic in EU**

The small size of the plastic particles makes it extremely arduous to remove. Hence, tackling the problem at its core helps to prevent plastic from being transported to the Arctic and breaking down to microplastic. With most of the plastic being carried seaborne, it helps to look at the route of the "plastic conveyer belt". It becomes apparent that the "conveyer belt" passes Western Europe, e.g., France, Ireland, Norway, or Greenland. Plastic that enters the oceans in these countries gets transported to the Arctic and breaks down on the way, becoming smaller and smaller.


*Figure 1: The main pathways of pollution transport to the Arctic* [10]

Plastic debris from fisheries is the dominant type of plastic waste found in the Arctic. Next to fishing nets, bottles, containers, or other packing material are also items typically found[11]. When tracing back the routes of the "conveyer belt" and the found material, the coastline of Western European countries can be found as a source of such plastic materials.

[10] Bergmann et al. (2022). *Plastic pollution in the Arctic,* 326.
[11] Bergmann et al. (2022). *Plastic pollution in the Arctic,* 326.

Samples of marine beach litter show that especially France, Spain and Portugal experience abundance of single-use plastic and fishing materials[12]. These countries all possess a coastline that connects to the Atlantic. Tourism could be an important source of this litter as they are more likely to use single-use plastic and packages like food wrappers out of their lack of other, more sustainable resources while on holiday.

Countries like France, Spain, or Portugal are typical touristic destinations on the EU: With an access to the sea and beaches, many people choose to visit the countries' seaside for a holiday. This favourable position in terms of tourism comes at a price: Recent research results show that beaches used for recreational purposes face a higher pollution with plastics[13]. In some tourist areas, waste production spikes during the summer season[14]. European beaches at the Iberian Sea face a higher pollution with e.g., bottle caps or other small items, things easily lost at a day at the beach.

When this waste is left at the coast, it can be transported into the water by the tides, wind, or in other ways. At the same time, plastic can be washed ashore and washed away again. Preventing this abandoned waste from (re)entering the ocean can stop them from being transported into the Arctic and instead returning them to recycling facilities.

While municipalities want to use their regional asset to benefit from tourism, they should not be the one to compensate for the plastic waste left by their guests. A tax to be used for waste can combat littering by financing better recycling stations and encourage people to litter less[15]. The additional income for the respective areas and municipalities helps to relieve cities facing high tourism and thus high litter to keep their beaches and coast clean.

**Solution**

The EU has already taken steps to tackle plastic waste created through fishing in the Arctic. However, little action has been seen so far to address plastic waste that is create in EU member states outside the Arctic circle but gets transported there.

The small size of these thrown away or lost items, like bottle caps, require much effort to remove them from the water[16]. Getting ahead of this pollution by collecting waste and storing it securely to keep it in the recycling cycle is paramount.

To enable such activities, municipalities with access to the respective seas could regularly clean up beaches and coastlines, as well as constructing land waste areas that are closed to avoid pollution by blown away plastic waste. These actions can be

[12] Hanke et al. (2019). *EU marine beach litter baselines,* 54–7.
[13] Kaviarasan et al. (2022). *Impact of multiple beach activities on litter and microplastic composition, distribution, and characterization along the southeast coast of India,* 8.
[14] Galgani et al. (2013). *Marine litter within the European Marine Strategy Framework Directive,* 1058.
[15] Kaviarasan et al. (2022). *Impact of multiple beach activities on litter and microplastic composition, distribution, and characterization along the southeast coast of India,* 10.
[16] Averett (2021). *The Fight Against Microplastics*.

financed by a sojourn tax that visitors and tourists have to pay when accessing a beach or staying near the coast.

The additional budget should be used to pay the additional staff, working hours etc. that result from the new tasks. With each municipality having to raise tax, the risk of unfair competition is not increased through the tax.

Compared to other models like an entrance fee at a beach or a local tax for hotels etc., a sojourn tax carries various benefits with respect to their target group and effect.

Entrance fees are already administered at different beaches in the EU. To be used effectively however, a visible barrier like a fence has to be constructed, creating the look of an exclusive area instead of a spot for relaxation and enjoyment open for everyone. Also, waste does not only occur directly next to the water, but also in proximity of a beach or coast. Waste can thus also be created outside of the restricted area.

By not limiting it to hotels and other places tourists live during their stay, the sojourn tax also addresses day-tourism who only come for a limited time and do not stay overnight.

Additionally, a sojourn tax would not discriminate residents: As tourists create more waste than residents, the latter should not have to pay additionally by being obliged to pay to enter a beach in their area of residency.

Most importantly, a sojourn tax would not be limited to a specific area. An entrance fee to a beach gives the impression that the funds would only be used to clean up the area the fee paid for. However, a clean-up must extend to all areas with contact to the water to ensure no plastic waste gets into the water. The tax would allow the municipality to use its own knowledge to the best outcome. As locals, the personnel would know best where the most plastic waste can be found and can direct clean-ups towards these areas, as well as improve landfill conditions.

Municipalities could also make use of their own expertise in finding a way to collect the sojourn tax and sole it in the most efficient way.

Cleaning the beaches and coastline by using the tax benefits the global environment by preventing the transport of plastic into the sea and the creation of even more microplastic. By addressing those who cause a larger share of plastic consumption and waste in touristic coastal areas, the tax can help to prevent further plastic and microplastic pollution in the Arctic and its wildlife.

## Conclusion

Microplastic is one of the many challenges we are facing at the moment. Especially the Artic sees increasing rates of pollution of microplastics, endangering local wildlife but also posing a risk to the environment when greenhouse gasses and pollutants escape during the breaking down of plastic into smaller particles.

Targeting this problem at its very root poses the most promising way to prevent a future increase of microplastic pollution. Hence, this proposal aims to solve a part of the plastic problem in the Arctic with an easy to apply and source-focused approach: One of the many sources for plastic waste are Western European beaches, with tourists causing more garbage, often left at the beach.

Introducing a sojourn tax directed at tourists to raise funds for beach and coast clean-ups can help tackle this waste problem: The funds enable the respective municipality to regularly remove plastic and other waste from the beaches and coasts to prevent it getting into the water, consequently helping to stop the pollution in the Arctic.

Such clean-ups would also carry further benefits: Cleaning the local environment also prevents plastic pollution within the own municipality, protecting own flora and fauna. Also, tourists directly benefit from their payment by having clean beaches, making for a more enjoyable stay.

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