

To clean up ocean plastics focus on coasts, not the Great Pacific garbage patch

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Credit: Tiago Fioreze / Wikipedia

The most efficient way to clean up ocean plastics and avoid harming ecosystems is to place plastic collectors near coasts, according to a new study.

Plastic floating in the oceans is a widespread and increasing problem. Plastics including bags, bottle caps and plastic fibres from synthetic

clothes wash out into the oceans from urban rivers, sewers and waste deposits.

Larger plastics are broken down into smaller fragments that can persist for hundreds or even thousands of years, and fragments of all sizes are swallowed by animals and enter the food web, disrupting ecosystems.

One area of open [ocean](#) in the North Pacific has an unusually large collection of microscopic plastics, or microplastics, and is known as the Great Pacific garbage [patch](#). The patch is enclosed by ocean currents that concentrate the plastics into an area estimated to be larger than twice the size of the United Kingdom.

The patch has gained international attention, and there is now a project called The Ocean Cleanup that plans to deploy plastic collectors to clean up the region. However, a new analysis by Dr Erik van Sebille and undergraduate physics student Peter Sherman from Imperial College London suggests that targeting the patch is not the most efficient way to clean up the oceans.

Dr van Sebille, from Imperial's Grantham Institute, and Sherman used a model of ocean plastic movements to determine the best places to deploy plastic collectors to remove the most amount of microplastics, and to prevent the most harm to wildlife and ecosystems. The study is published today in *Environmental Research Letters*.

They found that placing plastic collectors like those proposed by The Ocean Cleanup project around coasts was more beneficial than placing them all inside the patch. The project proposes a system of floating barriers and platforms to concentrate and collect plastics and remove them.

For a ten-year project between 2015 and 2025, the team found that

placing collectors near coasts, particularly around China and the Indonesian islands, would remove 31 per cent of microplastics. With all the collectors in the patch, only 17 per cent would be removed.

"The Great Pacific garbage patch has a huge mass of microplastics, but the largest flow of plastics is actually off the coasts, where it enters the oceans," said Sherman.

"It makes sense to remove plastics where they first enter the ocean around dense coastal economic and population centres," added Dr van Sebille. "It also means you can remove the plastics before they have had a chance to do any harm. Plastics in the patch have travelled a long way and potentially already done a lot of harm."

The pair's model also looked at areas where microplastics overlapped with phytoplankton - microscopic floating plants that form the basic food of many ocean ecosystems. Many microplastics enter the [food web](#) in these areas as microscopic animals accidentally eat them.

Running the same model for areas rich in phytoplankton came up with a similar result: the overlap was reduced by 46 per cent by placing collectors near certain coasts, whereas the overlap was only reduced by 14 per cent by placing the collectors in the patch.

"There is a lot of plastic in the patch, but it's a relative dead zone for life compared with the richness around the coasts," said Sherman. A recent analysis by Dr van Sebille and colleagues in Australia showed that more than 90 per cent of seabirds have swallowed plastics, and these birds are also concentrated around coasts where their food is plentiful.

The pair will refine their analysis, but say the results are clear and hope that plastic collecting projects in the future will focus on the coastlines.

"We need to clean up ocean [plastics](#), and ultimately this should be achieved by stopping the source of pollution," said Sherman. "However, this will not happen overnight, so a temporary solution is needed, and clean-up projects could be it, if they are done well."

More information: "Modeling marine surface microplastic transport to assess optimal removal locations" by Erik van Sebille and Peter Sherman, will be published on Tuesday 19 January 2016 in *Environmental Research Letters* [DOI: 10.1088/1748-9326/11/1/014006](https://doi.org/10.1088/1748-9326/11/1/014006)

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