

22/03/21



# Debris piles up in 'mid-ocean garbage patches'



*Plastics in water. A new study says that plastic debris released on coasts end up in mid-ocean garbage patches. Copyright: Image by tkremmel from Pixabay. This image has been cropped.*

## Speed read

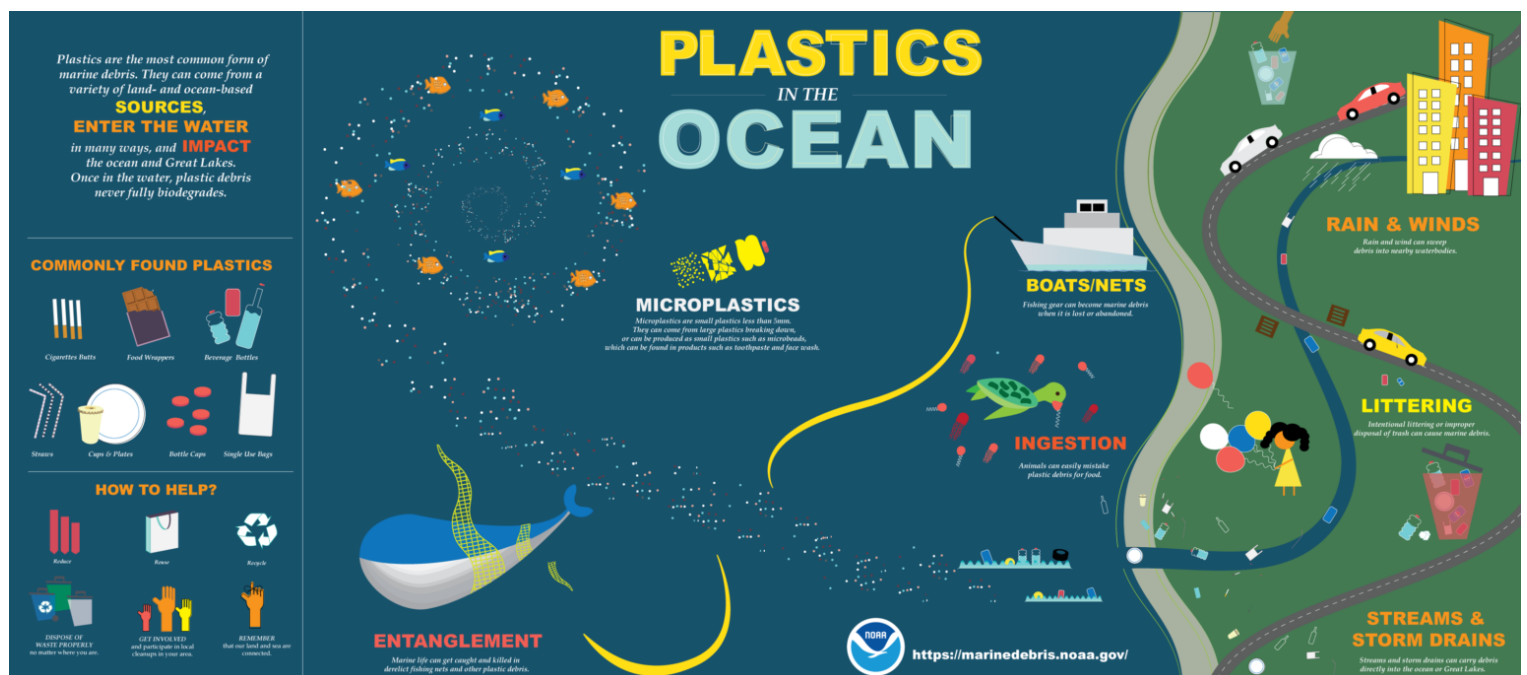
- Plastic debris released on the coasts reaches mid-ocean garbage patches
- Most garbage patches formed in the North and South Pacific Oceans
- 11 million tonnes of plastic waste enter the oceans annually

**By: Claudia Caruana**

[NEW YORK] Millions of tonnes of plastic and other debris released annually from coastal areas are transported by currents to mid-ocean garbage patches, especially in the North and South Pacific Ocean, and recirculated back to coastlines instead of to other gyres, a study has found.

Researchers in Germany and the US explored plastic waste pathways, moving from the coasts to the middle of the oceans, to determine the relative strengths of different subtropical gyres in the oceans and their role in the long-term accumulation of debris. They say their findings will help target ocean clean-up programmes.

A gyre is a system of large, rotating ocean currents that also have become synonymous with concentrations of plastic waste and debris that are transported by ocean currents. The main gyres are the subtropical gyres of the North and South Pacific, the North and South Atlantic, and the Indian Ocean. According to a 2020 Pew Trusts report, an estimated 11 million metric tonnes of plastic waste enter the oceans annually.

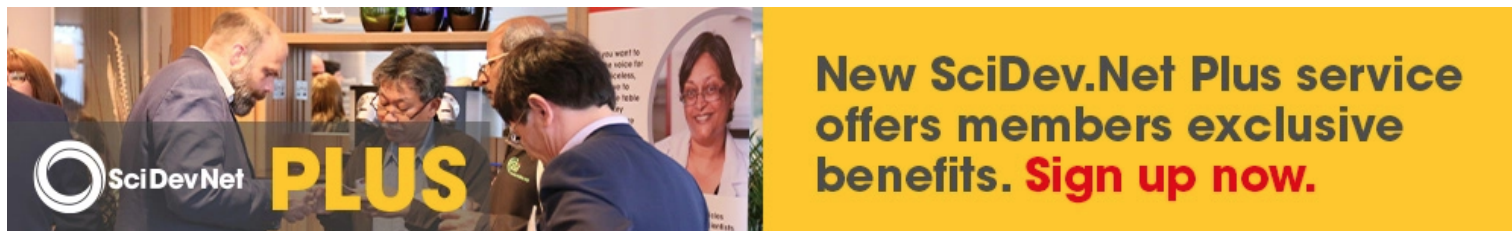


*Plastics in the ocean. Image credit: National Oceanic and Atmospheric*

Philippe Miron, scientist at the University of Miami and an author of the study published March in *Chaos*, says they explored debris pathways and patch stability by quantifying the connection between them and their ability to retain trash. They found that gyres, in general, are weakly connected or disconnected from each other.

“The weakness of the Indian Ocean gyre as a plastic debris trap is consistent with transition paths not converging within the gyre,” Miron says. “Indeed, in the event of anomalously intense winds, a subtropical gyre is more likely to export garbage toward the coastlines than into another gyre,” Miron says.

“We identified a high-probability transition channel connecting the Great Pacific Garbage Patch with the coasts of eastern Asia, which suggests an important source of plastic pollution there,” Miron tells *SciDev.Net*. “In this work, we focused on pathways from the coast to the subtropical gyres, from one gyre to another, and from the gyres to the coast.”



One of the biggest discoveries the group made is that while the North Pacific subtropical gyre attracts the most debris, consistent with earlier assessments, the South Pacific gyre stands out as the most enduring, because debris has fewer pathways out and into other gyres.

“Our results, including prospects for garbage patches yet to be directly or robustly observed, namely in the Gulf of Guinea and in the Bay of Bengal, have implications for ocean cleanup activities,” says Miron. “The reactive pollution routes we found provide targets — aside from the great garbage patches themselves — for those cleanup efforts.”

***“The reactive pollution routes we found provide targets – aside from the great garbage patches themselves – for those cleanup efforts”***

***Philippe Miron, University of Miami***

Many paths starting from coastal region of the Indian Ocean end up in the South Pacific gyre and the South Atlantic gyre in general, the garbage patches are disconnected from each other but the three garbage patches in the Southern Hemisphere are more linked together than with the patches in the Northern Hemisphere.”

“Because debris tend to fragment and sink when at sea for extended period, we believe that the reactive pollution routes provide targets (alternatives to the great garbage patches themselves) for activities such as ocean cleanup,” says Miron.

A green banner for the CABI BioProtection Portal. On the left, the text reads "CABI BioProtection Portal" in white, followed by "An independent go-to resource for information about registered biopesticide and biocontrol products" in a smaller white font. In the center, there are images of a desktop monitor, a tablet, and a smartphone, all displaying the portal's interface. On the right, there is a close-up photograph of a ladybug on a green leaf, and the CABI logo (a stylized 'C' in a circle) followed by the letters "CABI" in white on a dark green background.

Nancy Wallace, director of the NOAA Marine Debris Programme based in the US, says there are many unanswered questions about marine debris, including its fate and transport in the ocean and coastal environment. “We appreciate the efforts of the academic and research community to address knowledge gaps and increase our understanding of the sources, movement, and impacts of marine debris.”

The NOAA Marine Debris Programme emphasises prevention of marine debris, she says, adding: “We, as a global community, must reduce and prevent debris from entering the ocean, or we will forever be cleaning it up. Prevention efforts are the ultimate solution to marine debris, working to stop the problem at its source.”

*This piece was produced by SciDev.Net’s Asia & Pacific desk.*

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