

IN THE GREAT PACIFIC GARBAGE PATCH, COASTAL LIFE PIGGYBACKS ON PLASTIC TRASH

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April 17, 2023 08:30 pm | Updated 08:30 pm IST

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Representative photo of plastic trash in the water off the coast of Indonesia, September 21, 2021. | Photo Credit: Naja Bertolt Jensen/Unsplash

“The Anthropocene epoch” – some scientists have proposed this name for a [new period in the history of the earth](#) characterised by the influence of one species on the planet’s geology, ecosystems, even its fate: *Homo sapiens*. They’re still figuring out when this epoch really began; some candidates include the first nuclear weapon test and rapid industrialisation after the Second World War.

Yet another contender is the creation of plastic trash – abundant in our urban refuse, rivers, and forests, from the slopes of the highest peaks to the depths of abyssal trenches. Ocean life has washed ashore at beaches with [stomachs of plastic debris](#). Plastic has provided ample evidence of its persistence in the natural universe, but of late, scientists have also been uncovering evidence that it’s becoming one with nature in troubling new ways.

In a study [published on April 17](#), researchers from Canada, the Netherlands, and the U.S. have reported that coastal lifeforms have colonised plastic items in the Great Pacific Garbage Patch, throwing up many dubious firsts.

There are some water currents in the oceans that, driven by winds and the Coriolis force, form loops. These are called gyres. The North Pacific Subtropical Gyre (NPSG) is one such, located just north of the equator in the Pacific Ocean. It consists of the Kuroshio, North Pacific, California, and North Equatorial currents and moves in a clockwise direction. These currents flow adjacent to 51 Pacific Rim countries. Any trash that enters one of these currents, from any of these countries, could become part of the gyre.

A diagram showing the NPSG. The eastern part of the convergence zone hosts the Great Pacific Garbage Patch. | Photo Credit: U.S. NOAA, public domain

Inside this gyre, just north of Hawai’i, lies a long east-west strip where some of the debris in these currents has collected over the years. The eastern part of this is the Great Pacific Garbage Patch. It is, [per one estimate](#), 1.6 million sq. km big and more than 50 years old.

The patch contains an estimated 45,000-1,29,000 metric tonnes of plastic, predominantly in the

form of microplastics. The numerical density of plastics here is around 4 particles per cubic metre. Mass-wise, however, heavier, more visible objects that haven't yet broken down into smaller particles accounted for 92% in 2018.

The tsunami off the Japanese coast in 2011 contributed to the debris in this garbage patch. Until at least 2017, researchers had found debris washing ashore on the West coast of North America containing live lifeforms originally found in Japan.

From November 2018 to January 2019, researchers collected 105 pieces of plastic debris from the eastern part of the NPSG, "the most heavily plastic-polluted ocean gyre on the globe," per their paper.

Based on studying them, they reported that 98% of the debris items had invertebrate organisms. They also found that pelagic species (i.e. of the open ocean) were present on 94.3% of them and coastal species, on 70.5%. That is, organisms found on coasts were getting by on small floating islands of garbage (to humans) out in the Pacific Ocean.

"The number of coastal species such as arthropods and molluscs identified rafting on plastic was over three-times greater than that of pelagic species that normally live in the open ocean," per a press release accompanying the paper.

In all, they found organisms belonging to 46 taxa, and 37 of them were coastal; the rest were pelagic. Among both coastal and pelagic organisms, crustaceans were the most common. The coastal species were most commonly found on fishing nets whereas the pelagic species, on crates.

According to the paper, "Nearly all taxa were of Northwest Pacific origin", including Japan.

Similarly: "Most debris items (85.7%) did not have identifiable markings linked to origin, such as manufacture locations or company/brand names." However, eight of the remainder were from East Asia and five specifically from Japan. Four items were from North America.

The researchers also found that 68% of the coastal taxa and 33% of the pelagic taxa reproduced asexually, and that there was evidence of sexual reproduction among the hydroids and the crustaceans, among others. They found a strong positive correlation between reproduction and mobility.

Speaking to another form of uniquely human influence on the planet, the researchers have written in their paper that "the introduction of a vast sea of relatively permanent anthropogenic rafts since the 1950s" has given rise to a new kind of "standing coastal community ... in the open ocean". They've named it the *neopelagic community*.

They write in their paper that while coastal species have been found on human-made objects in the open ocean before, they were always considered to have been "misplaced" from their intended habitats. The neopelagic community, on the other hand, is not misplaced but *lives* on plastic items in the garbage patch, including reproducing there.

The finding recalls a study published on April 3, in which researchers reported that polyethylene films had *chemically* bonded with [rocks in China](#) – which is reminiscent, in turn, of the ["anthropoquinas" of Brazil](#) (sedimentary rocks embedded with plastic earrings) and the ["plastiglomerates" of Hawai'i](#) (beach sediment + organic debris + basaltic lava + melted plastic). When did humans begin creating such delectable recipes?

As it happens, the Anthropocene Working Group, of the International Commission on Stratigraphy, will vote this summer on where in the geological record – i.e. the layers of rock that record everything from evidence of nuclear tests to the burning of fossil fuels – the Anthropocene epoch can be said to have commenced.

No surprises if they agree that it looks like a spike in the concentration of microplastics.

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