

# LIVING WITH PLASTIC



Figure One: A Sesame Seed “**Microplastics are pieces of plastic debris that measure less than five millimeters long, roughly the size of a sesame seed**”

Stack, L., 2021. Ocean-Clogging Microplastics Also Pollute the Air, Study Finds (Published 2019). [online] Nytimes.com. Available at: <https://www.nytimes.com/2019/04/18/science/what-are-microplastics.html> [Accessed 10 February 2021].

# CATEGORIES

NATURAL ENVIRONMENT  
MARINE LIFE  
LIFE ON LAND  
ARTISTIC CONCIOUSNESS

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## Categori: Plant life

<http://www.aimspress.com/article/10.3934/environsci.2020011>

Main emissions sources of micro-plastics are different kinds of abrasions (road traffic, packaging, fibers of textiles during washing), waste disposal and drifts. From 2004 – 2008 production of plastic increased globally from 224 to 360 million tonnes. In Europe it increased from 60 to 64 million tonnes. The rise in plastic production is accompanied by a similarly increased amount of plastic waste.

26 million tonnes of plastic waste is produced in Europe each year (source: Lechner A, Kockeis H, Lurnberger-Lois F, et al. (2014) The Danube so colourful: A potpourri of plastic litter outnumbers fish larvae in Europe's second largest river. Environ Pollut 188: 177-181. doi: 10.1016/j.envpol.2014.02.006 )

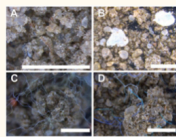
- 6% are collected for recycling

- 31% are landfilled

- 39% are incinerated (burned)

The remaining 24% end up in the environment where it accumulates and causes severe damage. If current trends continue, 12,000 megatons of plastic waste ends up on landfills and in the environment by 2050.

- Plastics in soil reduce water holding capacity and increases water evaporation = less water for plant growth.  
- Reduced plant growth = reduced microorganism growth = reduced feed for grazing animals.



<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6128618/>  
This study found that micro-plastic fibers form a skeleton for larger clumps of soil. They also found that certain types of micro-plastic beads could not be visually distinguished from soil. The researchers point out that particles blending with soil could lead to underestimation in studies using visual cues to estimate quantities of micro-plastics in soil.



(Above) Plastiglomerate sample collected by Patricia Corcoran (geographer) and Kelly Jazvac (artist/sculptor) at Kaimilo Beach, Hawaii, 2013

# NATURAL ENVIRONMENT

**26 million tonnes of plastic  
waste is produced in  
Europe each year**

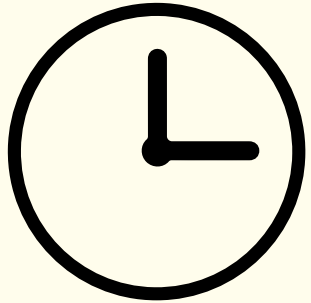
## Where do plastics go?

26 million tonnes of plastic waste is produced in Europe each year:

- 6% are collected for recycling
- 31% are landfilled
- 39% are incinerated (burned)

The remaining 24% end up in the environment where it accumulates and causes severe damage. If current trends continue, 12,000 megatons of plastic waste ends up on landfills and in the environment by 2050.

# Statistics



60 seconds = purchase of one million plastic bottles and two million plastic bags.

vs.

>1,000 years for most of these items to degrade, many will soon break apart into tiny shards known as microplastics



‘A single shower can flush as many as 100,000 microbeads, according to a 2016 report by the Environmental Audit Committee of the House of Commons in Britain. That adds up pretty quickly.’





# Microplastics rain down from the sky



# 'Microplastics blown by wind found in remote mountainous region'



'A study, by University of Strathclyde and the French National Research Centre at the University of Toulouse recorded the amount of microplastics in 'a remote mountain catchment' and 'took place in a remote spot four miles from the nearest village and roughly 75 miles from the nearest city, Toulouse. Researchers, taking samples from two separate monitoring devices, found that 365 pieces of microplastic per square meter rained down from the sky each day.'

# MARINE LIFE

# One more stressor in a stressed ocean

# Can micro-plastics cause fatal effects on marine life?

“One more stressor in a stressed ocean” (Martin Thiel)

A micro-plastic (characterised to be 5mm or smaller) can often be consumed by fish because of its resemblance to their prey organisms. This then poses a larger issue as we move up through the food chain, questioning whether the trophic transfer of micro-plastics is an issue. Some conclusions have been reached to say that there is no bioaccumulation through trophic levels.

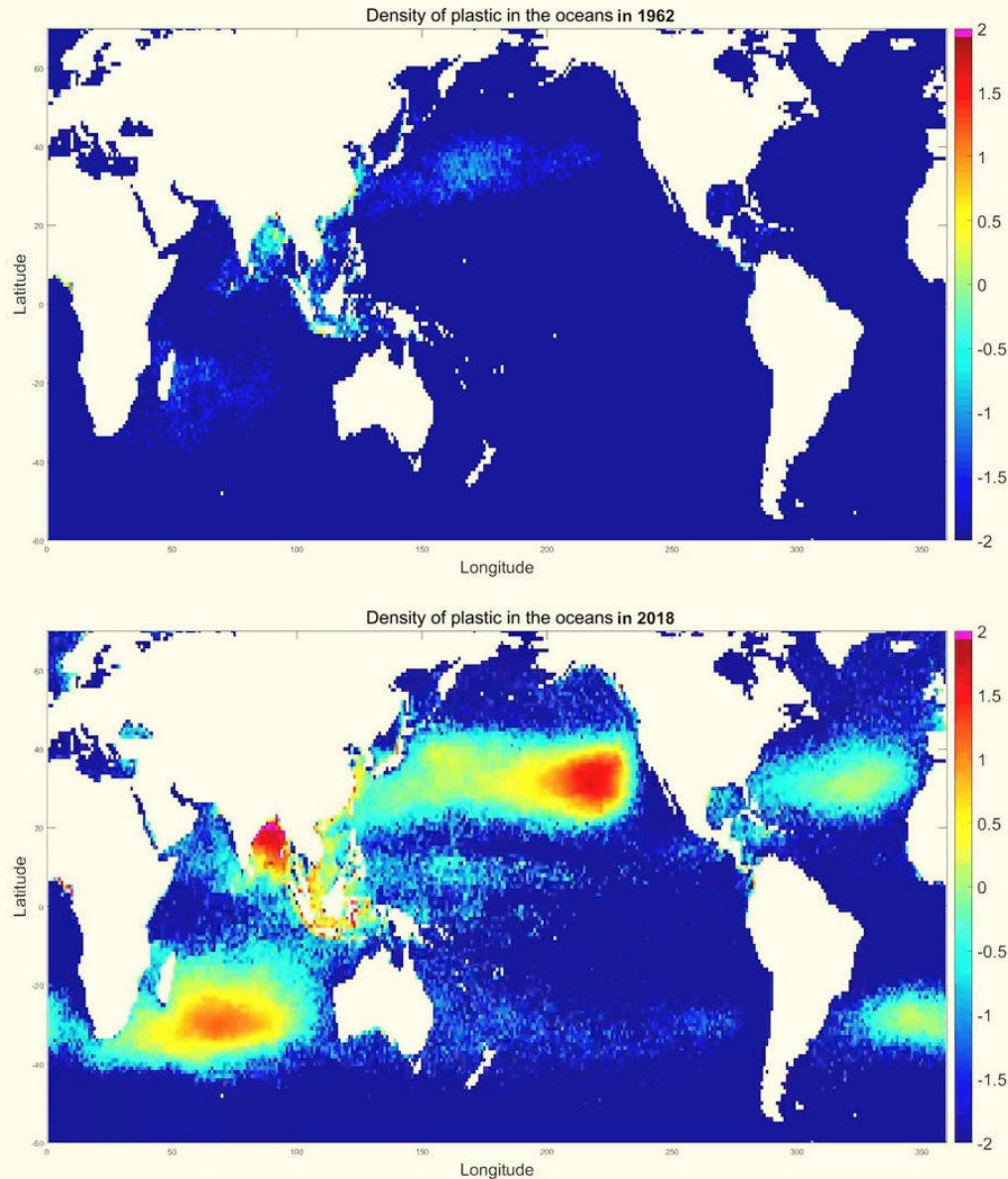
**Ingestion does not directly impose fatal effects on organisms.**

The exposure to plastic pellets induced toxic effects on the embryos of sea urchins, and the additives in plastic were found to be more toxic than the plastic itself.

# **A swirling oceanic graveyard**



# Great Pacific Garbage Patch: 'a swirling oceanic graveyard'



**'A region that looked like the rest of the ocean to the naked eye, but was polluted with tiny microplastics.'**

Microplastics account for just 8 percent of the mass of the patch, with larger pieces of debris floating in the sea, like bottles, buoys and fishing nets making up the majority.

**"Most of the mass is actually large debris, ready to decompose into microplastic,"** Mr. Lebreton said.



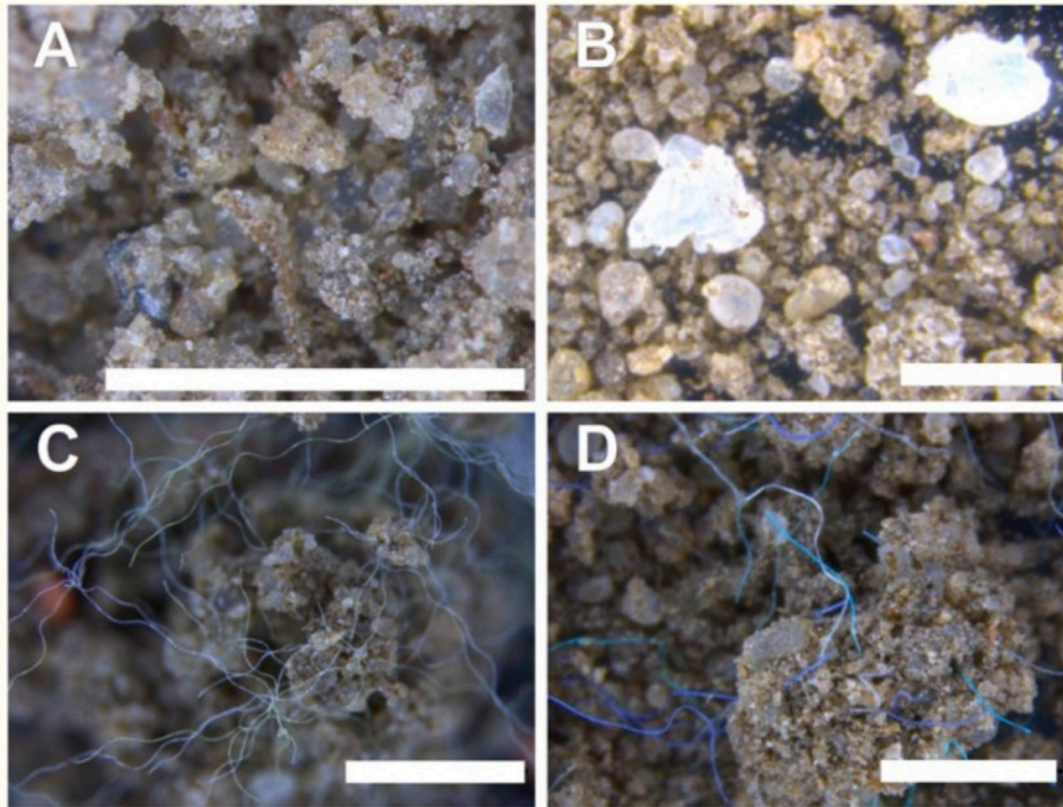




# LIFE ON LAND

# Microplastic skeleton

# Microplastic 'skeleton' in the soil



This study found that microplastic fibres form a **skeleton** for larger clumps of soil. They also found that certain types of micro-plastic beads could not be visually distinguished from soil.

The researchers point out that particles blending with soil could lead to underestimation in studies using visual cues to estimate quantities of microplastics in soil.

Figure 2

Integration of microplastic particles to the soil biophysical environment. Structure of control soil (A) was not visually distinct under the stereomicroscope from soil contaminated with polyamide beads ([SI S1D](#)). Polyethylene fragments (B), and polyester (C) or polyacrylic fibers (D) resulted in visually apparent soil features. The white bar in each panel represents 1 mm size.

# Can microplastics cause fatal effects on invertebrates?

What were the effects on soil invertebrates tested in this study?

- Overall the effects of polyester fibers on the soil invertebrates were slight.
  - Energy reserves isopods (lice) were slightly affected.
  - In one species (*E. crypticus* / a type of vasp) reproduction was negatively affected and survival was slightly decreased. Just from exposure to long fibres in the soil, the vasp didn't ingest it.
  - Isopods will engage in less eating when there is high concentration of short fibers in their food.
- This study shows that polyester fibers are not very harmful to soil invertebrates upon short-term exposure. However, longer lasting, multigeneration studies with functional endpoints are needed to reveal the possible long-term effects on soil invertebrates and their role in the decomposition process.

Negative effects of micro- or mesoplastics on invertebrates are not always caused by ingestion

Synthetic fibers can damage or otherwise hamper the fitness of the organism externally and result in responses at the population level due to reduced reproduction rate.

# ARTISTIC CONCIOUSNESS

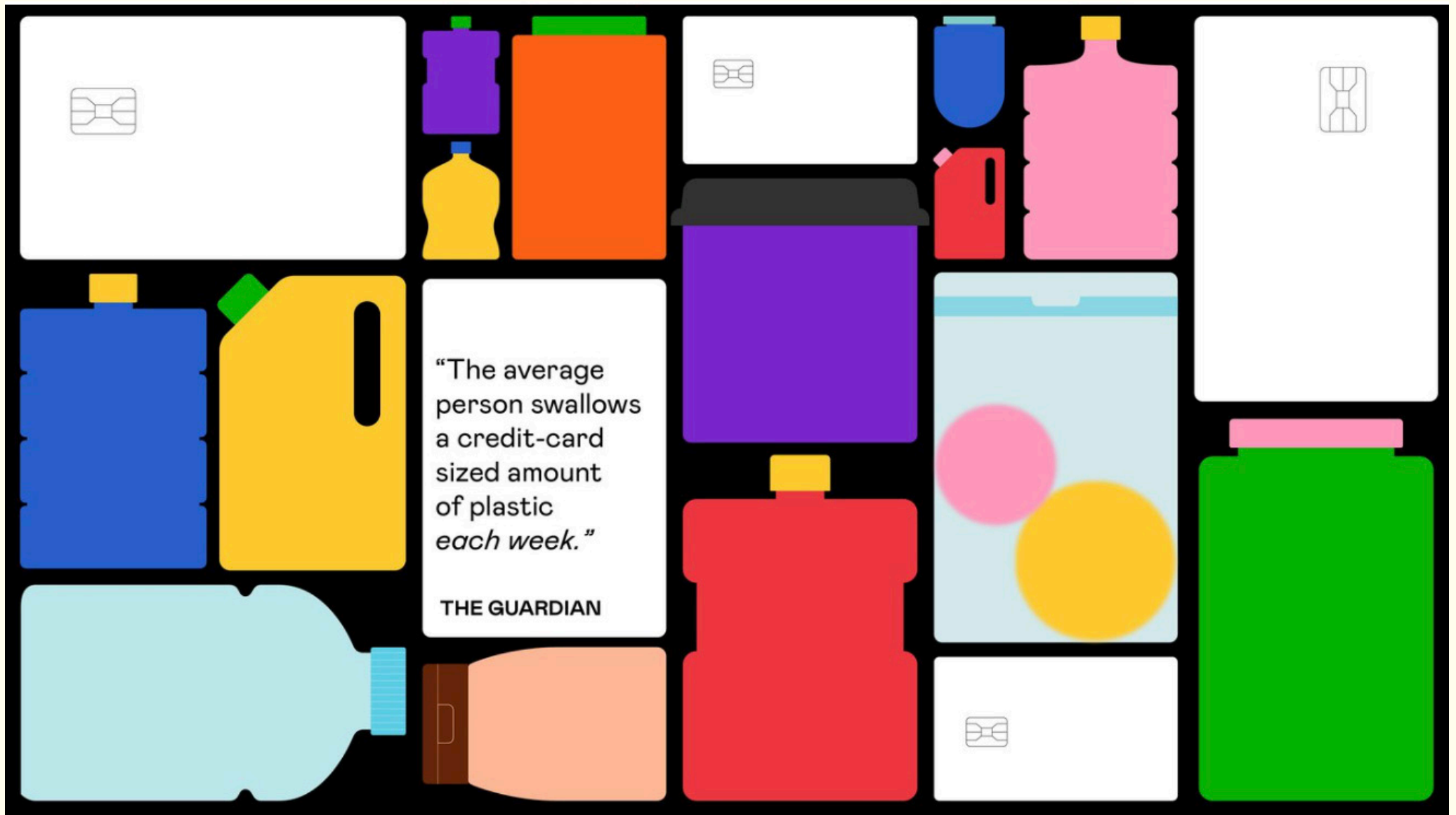




Left: Jelijn Verhoeven, A City Drowning in Objects 2017    Right: Gayle Chong Kwan, Wastescape, 2012.















Environmental Effects

Artistic Conciousness

Plastic Justice



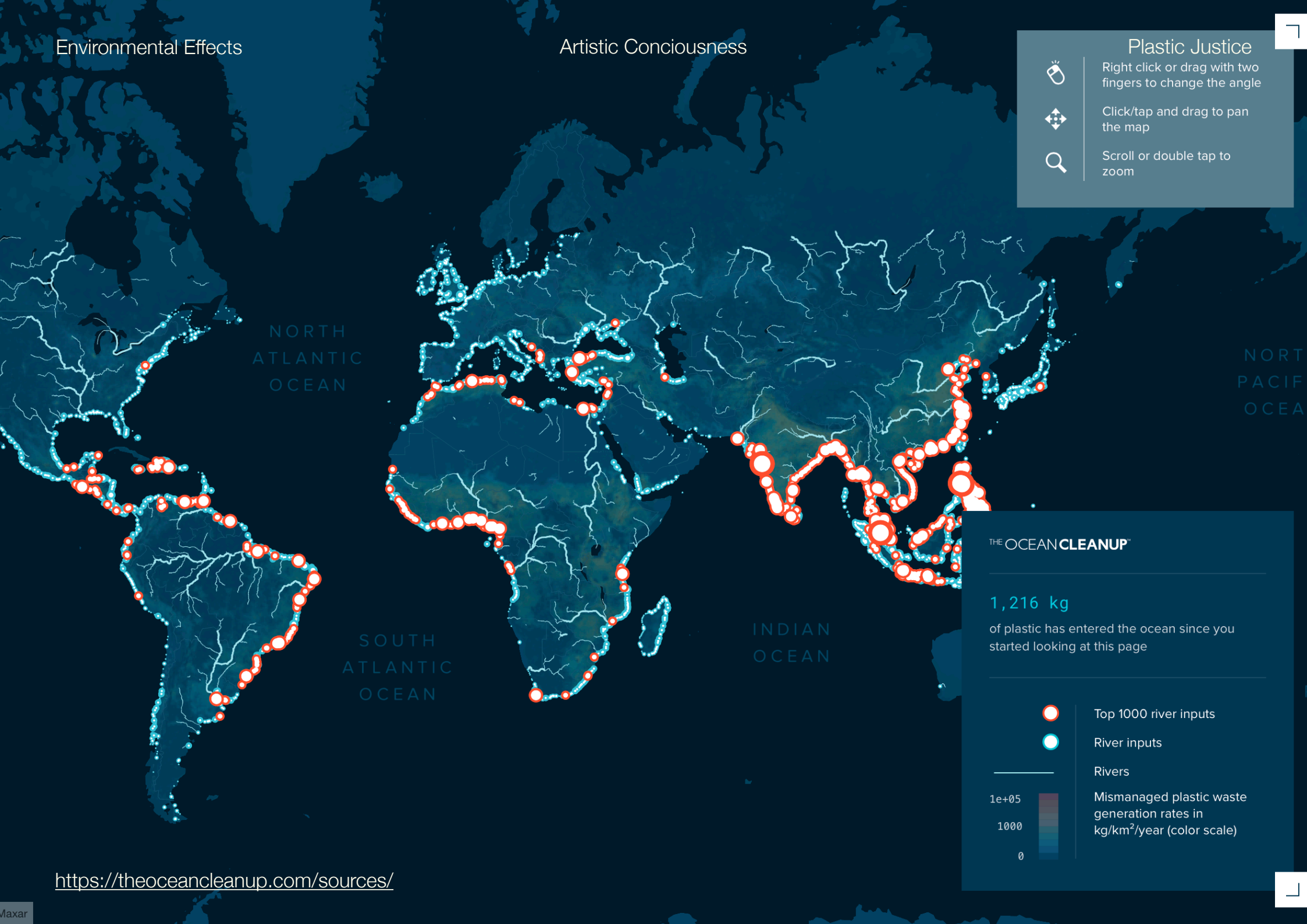
Right click or drag with two fingers to change the angle



Click/tap and drag to pan the map



Scroll or double tap to zoom



THE OCEAN CLEANUP™

1,216 kg

of plastic has entered the ocean since you started looking at this page



Top 1000 river inputs



River inputs

1e+05

1000

0

Rivers

Mismanaged plastic waste generation rates in kg/km²/year (color scale)

<https://theoceancleanup.com/sources/>



# FINAL THOUGHTS

**Can we utilise plastic waste?**

**Do we need conclusive research findings to take action?**

**How we increase awareness without conclusive research?**