

Busting Four Myths About
PLASTIC POLLUTION

≈ INTRODUCTION

Over the past four years, Simon Bernard, president of Plastic Odyssey, has been reviewing scientific studies on ocean plastic pollution. The results? Some of the most widely held beliefs about plastics in the ocean are totally false.

These misconceptions are often being propagated by groups that offer solutions to the plastics problem which, while generally are not harmful for the planet, will do little to stem the tide of plastic entering the ocean – 20 tons every minute.



1

“THE OCEAN CAN BE CLEANED UP BY COLLECTING FLOATING TRASH”

FALSE

Reality: less than 1% of ocean plastic floats on the surface.

Since the 1950s, 198 million tons¹ of plastic have been dumped into the ocean. More than 14 million tons are added every year.²

But a recent study³ estimated that the total amount of plastic on the surface of the ocean is 1.13 million tons. That figure sounds high, but it accounts for **less than 0.6%** of total plastic pollution...

A drop in the ocean!

1. Lebreton, L., Egger, M. & Slat, B. A global mass budget for positively buoyant macroplastic debris in the ocean. *Sci Rep* 9, 12922 (2019)

2. See details of sources

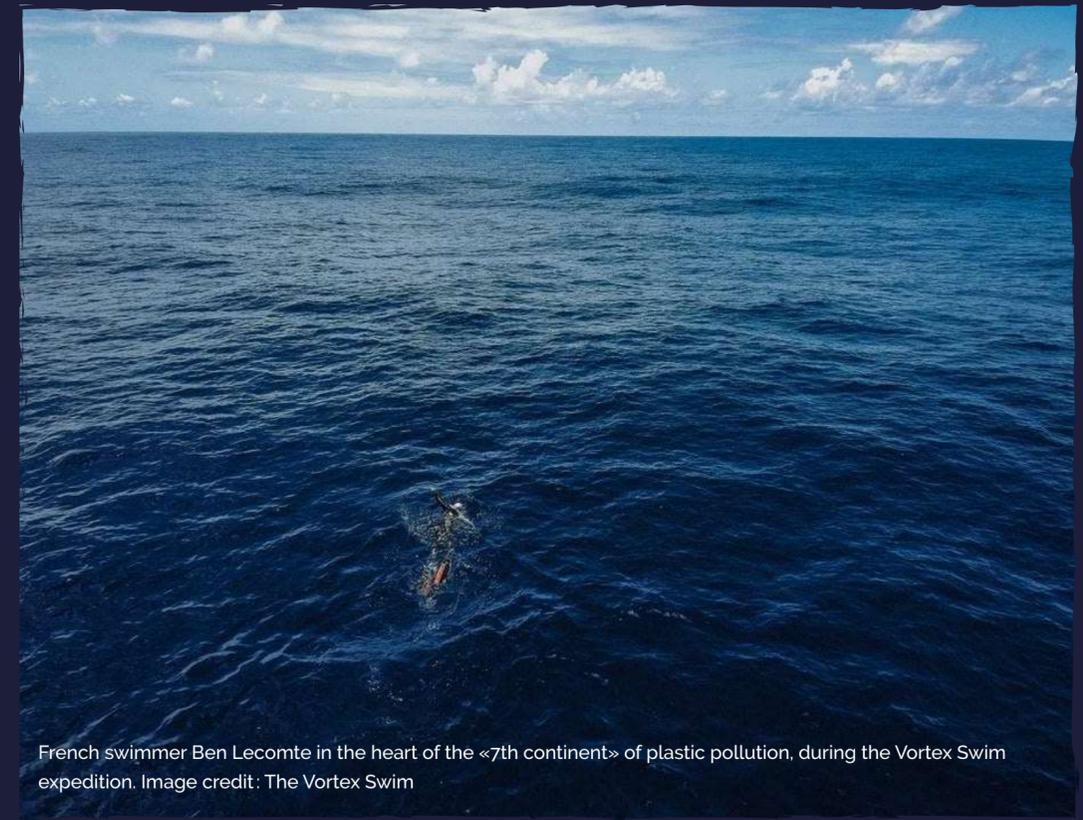
3. Lebreton, L., Egger, M. & Slat, B. A global mass budget for positively buoyant macroplastic debris in the ocean. *Sci Rep* 9, 12922 (2019)

Where's the plastic?

Scientists call this discrepancy the «plastic mystery». Several hypotheses have been advanced as to where all that plastic goes.

One paper proposes that much of the pollution (44%) has washed back onto the coast, captured by vegetation, while the rest (35%) sank, or dissolved into microparticles (21%).⁴

But many scientists – like François Galgani, an oceanographer at France's National Centre for Scientific Research – have found through empirical study that much of the «missing» plastic has sunk to the bottom of the ocean.



French swimmer Ben Lecomte in the heart of the «7th continent» of plastic pollution, during the Vortex Swim expedition. Image credit: The Vortex Swim

4. [Lebreton, L., Egger, M. & Slat, B. A global mass budget for positively buoyant macroplastic debris in the ocean. Sci Rep 9, 12922 \(2019\)](#)

You might think that the blue masses are plastic, but they are really microorganisms that were picked up as part of taking the sample.



Counting plastic microparticles after sampling in the heart of the 7th continent.
Image credit: P. Lecompte, The Vortex Swim

Why does this make a difference?

A great deal of capital and energy are currently being spent on efforts to collect debris from the surface of the ocean, through special boats and other means. While these initiatives are commendable, their effect remains anecdotal, and many scientists are skeptical they can make a real difference in the plastic pollution problem.

Collecting plastics from the surface poses its own problem: the fine mesh nets that are generally used also inevitably pick up plankton and other microorganisms that are critical for ocean life.

This is a sample of plastic microparticles picked up in the heart of the «7th continent» of plastic pollution.

2

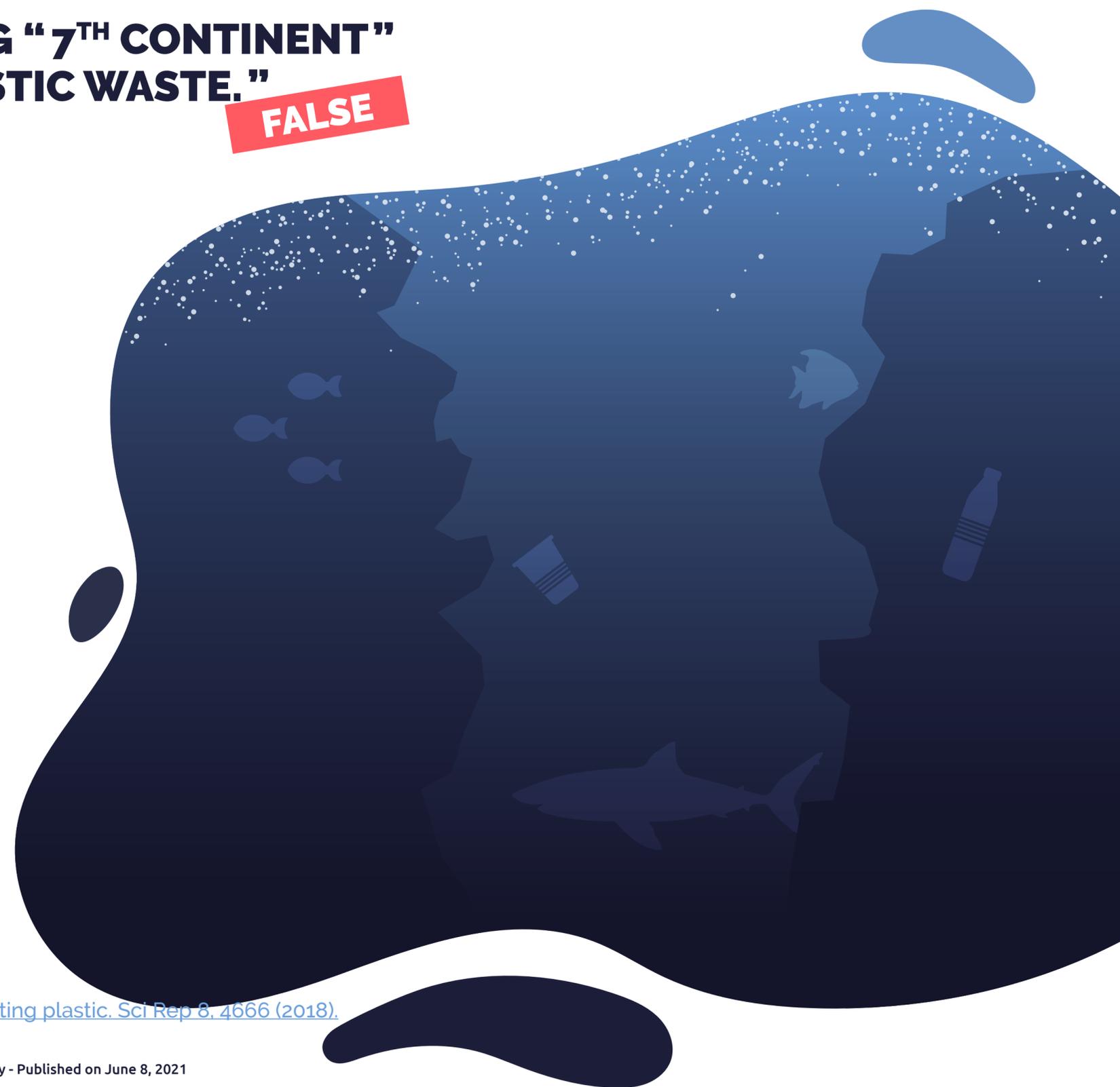
“THERE IS A FLOATING “7TH CONTINENT” ISLAND OF PLASTIC WASTE.”

FALSE

Reality: the “7th continent” is mostly a cluster of plastic microparticles – many of which are invisible to the human eye.

Contrary to popular belief, the “7th continent” of plastic pollution is not a floating island of miscellaneous plastic waste.

Instead, plastic microparticles – impossible to collect – account for 94% of the debris in the area. The macro- and mega- plastic waste (over 5cm in size) you might be imagining are present in very small quantities: 62k tons⁵ or **0.03% of global pollution.**



5. Lebreton, L., Slat, B., Ferrari, F. et al. Evidence that the Great Pacific Garbage Patch is rapidly accumulating plastic. *Sci Rep* 8, 4666 (2018).

But what about the shocking images of plastic tides you see in media?

While these pictures do a great deal to help raise awareness of marine plastic pollution, they have very little to do with the real phenomenon.

These are generally taken near coastal areas, where larger plastic waste accumulates – or often, the Caribbean's Sargasso Sea, where common sargassum algae traps the plastic, giving the impression of a pile of surface waste.



Lecomte surrounded by plastic microparticles



Accumulated waste trapped in sargassae. - Image Credit : Caroline Power

Why does this make a difference?

The image of an island of plastic waste floating on top of the ocean makes it seem like the marine plastic problem has a simple solution; that the plastic is just waiting for us to come and collect it. But plastics are everywhere in the ocean, from the bottom through the entire water column, and most of it is too small to feasibly collect. In a word, it is **lost**.

At this point, collecting plastics from the ocean is just a Band-Aid. We have to act upstream, where the plastic comes from – on land – before it ends up in the ocean.

“90 % OF PLASTIC POLLUTION COMES FROM JUST 10 RIVERS.”

FALSE



Reality: about 1% of total plastic pollution comes from 10 rivers.

A 2017 study⁸ was misread by countless media outlets, who reported that just 10 rivers were responsible for 90% of marine plastic pollution.

The truth is that the total figure, including the remaining 10%, only concerns riverine contributions to ocean plastic pollution. Those 10 rivers really contribute about 1% of ocean plastic pollution.

Why does this make a difference?

Plastic pollution is commonly thought of as a localized problem that is solvable with a targeted approach. If the vast majority of ocean plastics came from just ten rivers, then it would seem that finding a way to filter out this waste would be enough to stop the pollution.

The truth is that there is no easy fix: ocean plastic pollution is a global problem that calls for global solutions, and for people across the world, in both rich and poor countries, to make a difference.



4

“MOST PLASTIC POLLUTION COMES FROM THE FISHING INDUSTRY”

FALSE

Reality: Fishing accounts for just 8% of plastic pollution.

The vast majority of plastic pollution comes from land, not from seaborne sources like fishing, shipping, or aquaculture.

A common source for this misconception is the 2021 Netflix documentary *Seaspiracy*, which highlights real problems with the fishing industry but is somewhat misleading on this particular point. It states that «46% of the plastic found in the Pacific Gyre is fishing nets».

This figure comes from a scientific study by The Ocean Cleanup⁶, a nonprofit that launches cleanup boats, which estimates that 36,000 tons of nets were found in the gyre; but when compared to overall ocean plastic pollution, this accounts for less than 0.02% of waste. As explained above, waste floating on the surface accounts for very little of the total ocean plastic pollution.

6. [Lebreton, L., Slat, B., Ferrari, F. et al. Evidence that the Great Pacific Garbage Patch is rapidly accumulating plastic. Sci Rep 8, 4666 \(2018\).](#)

What is the share of the maritime sector in this plastic pollution?

Few studies on fishing's contribution to overall plastic pollution exist to date. The most exhaustive estimate is that 1.75 million tons of ocean plastic comes from marine sources, including 1.14 million tons from fishing; the sector is therefore responsible for less than **8% of annual plastic discharges** into the ocean.⁷

Why does this make a difference?

Industrial fishing is terrible for the environment and ocean life, but even if all fishing were to stop tomorrow, we'd hardly make a dent in the plastic pollution problem.

SO ...

7. [Study to support the development of measures to combat a range of marine litter sources. Eunomia \(2016\)](#)

HOW CAN WE REALLY STOP PLASTIC POLLUTION?

The answer is right at our feet: we have to act at the source, on land, to prevent plastics from entering the ocean in the first place.

There's no silver bullet to end plastic pollution. But we can start today by finding alternatives and changing behaviors and habits at a global scale, both for individuals and industries. For the waste that's already present in the environment, or that cannot be avoided, we must recycle more often and more completely: only 9% of the plastic produced since its invention has been recycled.

PLASTIC ODYSSEY is a floating laboratory and recycling center powered entirely by plastics. We're on a 3-year mission to 30 Global South countries, where we're helping local communities develop free solutions to prevent plastics from entering the ocean, while helping local economies and recyclers grow by treating the waste as a resource.

For more information, visit www.plasticodyssey.org 

METHODS AND SOURCES

Sources:

1. [Lebreton, L., Egger, M. & Slat, B. A global mass budget for positively buoyant macroplastic debris in the ocean. Sci Rep 9, 12922 \(2019\)](#)
3. [Lebreton, L., Egger, M. & Slat, B. A global mass budget for positively buoyant macroplastic debris in the ocean. Sci Rep 9, 12922 \(2019\)](#)
4. [Lebreton, L., Egger, M. & Slat, B. A global mass budget for positively buoyant macroplastic debris in the ocean. Sci Rep 9, 12922 \(2019\)](#)
5. [Lebreton, L., Slat, B., Ferrari, F. et al. Evidence that the Great Pacific Garbage Patch is rapidly accumulating plastic. Sci Rep 8, 4666 \(2018\).](#)
6. [Lebreton, L., Slat, B., Ferrari, F. et al. Evidence that the Great Pacific Garbage Patch is rapidly accumulating plastic. Sci Rep 8, 4666 \(2018\).](#)
7. [Study to support the development of measures to combat a range of marine litter sources. Eunomia \(2016\)](#)

≈ Total amount of plastic in the ocean

Given that the total predicted emissions of buoyant plastic since 1950 is 70 to 189.3 million tonnes and that the fraction of positively buoyant polymers is 65.5%, it can be concluded that the total emissions of plastics to the world ocean is 106.9 to 289 million tonnes. The total predicted average is 198 million tonnes. (Note: midpoint value may be more appropriate.)

Source: [Lebreton, L., Egger, M. & Slat, B. A global mass budget for positively buoyant macroplastic debris in the ocean. Sci Rep 9, 12922 \(2019\)](#)

Extracts:

“total predicted emissions of buoyant plastic since 1950 (70.0–189.3 million metric tons considered by our model)”

“fraction of positively buoyant polymers (65.5% of total) used by different market sectors associated with product lifetime distributions”

≈ Annual amount of plastic added to ocean pollution

Source of the pollution	Estimated quantity in 2015 (metric tons)	Percentage
Coastal populations (within 50 km of the sea) of which export of waste from the USA	10.7 million >1 million	74,3% >6,9%
Rivers	1 million	6,9%
Maritime activities of which Transport Fishing	1,75 million 0,61 million 1,14 million	12,2% 4,2% 7,9%
Microplastics (land-based sources)	0,95 million	6,6%
Total	14,4 millions	

1 Coastal population: 9.7 million metric tons (5.5 - 14.6 MMT)

Source: [J. R. Jambeck et al. Plastic waste inputs from land into the ocean. Science 347, 768–771 \(2015\) Supplement Material](#)

Retrieved from:

Table S1: Annual and cumulative quantities (millions of metric tons (MMT)) of mismanaged plastic waste and plastic marine debris (assuming three different conversion rates) for 2010-2025.

Year	Mismanaged plastic waste [MMT/year]	15% marine debris (MMT)	25% marine debris (MMT)	40% marine debris (MMT)
2010	31.9	4.8	8.0	12.7
2015	36.5	5.5	9.1	14.6
2020	41.3	6.2	10.3	16.5
2025	69.9	10.5	17.5	28.0
Cumulative	618.7	92.8	154.7	247.5

2 Waste export (USA): > 1 million metric tons (0.51 - 1.45 MMT)

A recent study estimated that a major source of pollution was linked to the export of waste from the United States (which has the highest consumption of plastic in the world) to countries with poor waste management. The annual US inputs to the coastal environment is 1 million metric tons, i.e. as much as rivers inputs.

Note: the US is not the only country to export part of its waste to countries with poor waste management. Europe is also concerned but the figures are not presented in this study.

Source: [K. Lavender Law et al. The United States' contribution of plastic waste to land and ocean Science Advances 30 Oct 2020](#)

Extract:



3 Rivers: 1 million metric tons (0.8 to 2.7 MMT)

Source: [L. J. J. Meijer et al. More than 1000 rivers account for 80% of global riverine plastic emissions into the ocean. Science Advances \(2021\)](#)

Extract:

Of the total 100,887 outlets of rivers and streams included in our model, we found that 31,904 locations emit plastic waste into the ocean, leaking in 1.0 (0.8 to 2.7) million MT into the marine environment in 2015.

4 Maritime activities: 1.75 metric tons (0.3 to 3.25 MMT)).

Extract:

“Of which 1.14 million tonnes from fisheries (65% from marine sources)”
“ Fishing’ 65% of at-sea sources and 5’ Shipping’ 35% of at sea-sources “

Source: [Study to support the development of measures to combat a range of marine litter sources. Eunomia \(2016\) See simplified report: \[Plastics in the Marine Environment. Eunomia \\(2016\\)\]\(#\)](#)

Note: to date there is no study, based on numerical modelling, that can accurately estimate pollution from fishing and aquaculture.

Many reports and press articles (see Greenpeace report) refer to another figure to quantify pollution from fishing nets (0.64 MMT). This figure is not based on any scientific publication and is in fact a misinformation according to a recent study

Source : [Kelsey Richardson, Chris Wilcox, Joanna Vince, Britta Denise Hardesty, Challenges and misperceptions around global fishing gear loss estimates, Marine Policy, Volume 129, 2021](#)

5 Microplastic from land-based sources: 0.95 million metric tons (0.5 to 1.4 MMT)

Source: [Study to support the development of measures to combat a range of marine litter sources. Eunomia \(2016\)](#) See simplified report: [Plastics in the Marine Environment. Eunomia \(2016\)](#)

Note: to date, there is no study, based on numerical modelling, that can accurately estimate primary microplastics inputs (which do not result from the degradation of macroplastics).

Total in 2015: 14.4 million metric tons/ year (7.61 - 23.4 MMT)

Note: based on Jenna Jambeck's estimates above, a 13% increase to 16.3 MMT in 2020 can be estimated

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