

Boyan Slat “How the Oceans Can Clean Themselves” TRANSCRIPT



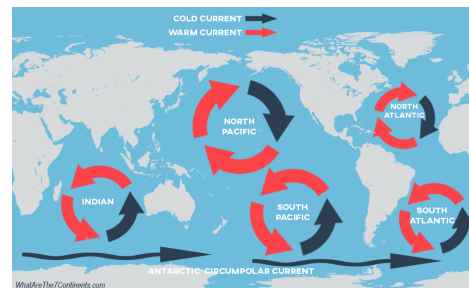
Once there was a Stone Age, a Bronze Age and now we are in the middle of the Plastic Age. Because every year we produce about 300 million tons of plastic and a fraction of that enters rivers, waterways and eventually the oceans.

If we want to eat a biscuit nowadays, we have to buy a biscuit within a plastic wrapper, within a plastic tray, within a cardboard box, within some plastic foil, within a plastic bag. It’s not hazardous nuclear waste — it’s a biscuit.

And this is me. I love diving, just taking you through my holiday slides here. This is at the pristine Azores Islands and this is how their beaches look. Covered with plastic fragments.

Due to sun and waves over the years the garbage breaks down into ever smaller pieces, but remains plastic. And, well interestingly, you don’t see a lot of red particles in here because those look like food to birds more than any other color. So this is the result.

And well, the debris primarily collects at these **5 rotating currents called the gyres**, where it doesn’t only directly kill sea life, but due to the absorption of PCBs and DDTs, also poisons the food chain. A food chain that includes us — humans.



And while diving in Greece, I came across more plastic bags than fish and astounded by the depressing sights my Scottish dive buddy turned to me and said, “A lot of jellyfish are here. Seen about a thousand.” There were no jellyfish.

And when talking about environmental issues in general, I think a common response is, “Well, that’s a long way off. That’s for our children to worry about.” So hello, here I am.

Why don’t we just clean it up? There are multiple reasons why current plastic pollution researchers believe we should focus on prevention, for example through

education, rather than attempting a cleanup operation. Because we would need to deal with 5 colossal areas — each moving around. Plastic sizes ranging from these massive **ghost nets** to molecules — **bycatches** and emissions.

Furthermore we would need to get all the plastic back to land. It would need to be financially realistic, and in fact the total amount of plastic within the gyres is unknown.

But about a year ago, when I was on my way to the hairdresser's and I must admit I don't go there often but I had this little **epiphany**. I saw even old people throwing rubbish in the water and I thought, "well some people will just never learn, will they?" We'll need the combination of both roads, and we'll need them soon.

So then I simply used this list of concerns as challenges, and in fact a week later as a school assignment, I had a chance to spend a lot of time on a subject of choice together with a friend of mine. And this gave me the perfect opportunity to do new and fundamental research regarding plastic pollution.

I then went on a holiday to Greece taking this manta **trawl** with me, which is the common device for sampling plastic, and so I had to leave home all my clothes due to low-cost airline weight limit policies.

Well, the trawl we built, however, is 15 times finer than a regular one. And what we discovered was that the count of those minute particles is in fact 40 times higher than the larger particles. So we have to take these small plastics out, but then we wouldn't want to take the important plankton out as well.

Luckily, these could simply be separated using **centrifugal forces**. However, nobody knew how much **G forces** common zoo-plankton could survive. So we took the trawl out again, and we didn't have a boat, so and we tested it, and in fact they can survive over **50 Gs**, which is more than enough for successful separation.

And then in order to know up to which depth the ocean surface should be cleaned, we designed and built something that I call a multilevel trawl. We basically stuck ten trawls on top of each other.

Here you can see us testing that on the North Sea, I thought it was a great day — I was the only one who didn't get sick, but then the so perfectly working trawl broke and of course we didn't quit there, because I believe you can't clean up something you don't know the size of.

I've heard estimations ranging from several hundred thousand tons all the way to a hundred million tons. I knew we really needed a better estimate — some scientific data.

So then I simply contacted some professors from the universities Delft, Utrecht and Hawaii — who then actually helped us in determining how much plastic there is in the top layers of the gyres.

The result — a whopping 7.25 million tons of extractable plastic in 2020. That's the weight of 1,000 Eiffel Towers floating in the gyres.

Now, researcher and in fact, discoverer of the **Great Pacific Garbage Patch**, Charles Moore estimates it would take 79,000 years to remediate that. However, I believe the Great Pacific Garbage Patch can completely clean itself in just 5 years. And that is a difference of 78,995 years.

Well, of course, this is the conventional idea of extracting litter, so you have a vessel and a net fishing for plastic. Of course, multiple vessels could be used to cover a larger area, but by spanning booms between those vessels, suddenly a much larger area would be covered, because the essence is not to catch the debris, but divert it.

Because there is no mesh size, we can even get out the smallest particles, and since all organisms can simply move under the booms, we'll be able to eliminate bycatches by 99.98%.

But, if we want to do something different, shouldn't we also have to think differently?

For example then: the absorption of PCBs by plastic is not such a bad thing, it's a good thing.

Get all the plastic out and simultaneously remove tons and tons of persistent organic pollutants from the marine environment. But how would we minimize environmental, financial and transportation costs then? Let's use our enemy to our advantage, okay? The oceanic currents moving around is not an obstacle — it's a solution.

Why move through the oceans if the oceans can move through you? By fixing the "ships" to the seabed and letting the rotating currents do their work — vast amounts of funds, manpower and emissions will be saved. The platforms will, of course, be completely self-supportive, receiving their energy from sun, currents

and waves. And inspired by my diving at the Azores, it now actually seems that the best shape for these platforms is that of a Manta Ray, by letting its wings sway like a real manta, we can assure contact of the inlet with the surface even in the roughest weather.

Well, imagine a zigzag array of just 24 of these platforms cleaning an entire ocean.

Let's make a comparison. These are the beaches of Hong Kong, earlier this year. The largest plastic spill in history. And this is their source, just 6 containers. How much could we get out? Over 55 of these containers per day.

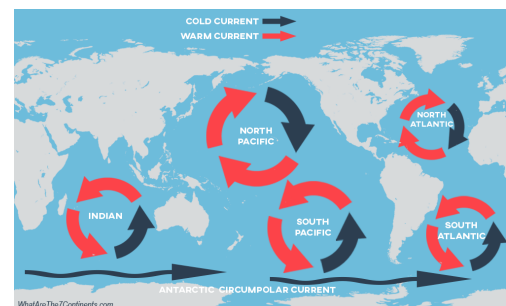
Not only is plastic directly responsible for over a \$1 billion in vessel damages a year, no, the awesome surprise for me was that if we sell the plastics retrieved from the 5 gyres we'd make over \$500 million and this is in fact more than the plan would cost to execute.

In other words — it's profitable. But I believe that the key thing is that only if we realize change is more important than money, money will come. And yes, it will be one of the largest environmental rescue operations yet, but we created this mess.

Heck, we even invented this new material first before we made this mess, so please don't tell me we can't clean this up together. Thank you very much.

Additional Information on Key Vocabulary

5 rotating currents called gyres: "Gyres are large systems of circulating ocean currents, kind of like slow-moving whirlpools. There are **five gyres** to be exact—the North Atlantic Gyre, the South Atlantic Gyre, the North Pacific Gyre, the South Pacific Gyre, and the Indian Ocean Gyre—that have a significant impact on the ocean."



<https://oceanservice.noaa.gov/podcast/mar18/nop14-ocean-garbage-patches.html>

ghost nets: “A ghost net is a **fishing net that's been lost or abandoned in the ocean**. They are one particularly egregious part of the global ghost fishing problem, which includes fishing gear abandoned in the water. Any net or line left in the ocean can pose a threat to marine life.”

<https://www.worldwildlife.org/stories/our-oceans-are-haunted-by-ghost-nets-why-that-s-scary-and-what-we-can-do--23>

bycatches: “Bycatch, in the fishing industry, is a fish or other marine species that is caught unintentionally while fishing for specific species or sizes of wildlife.”

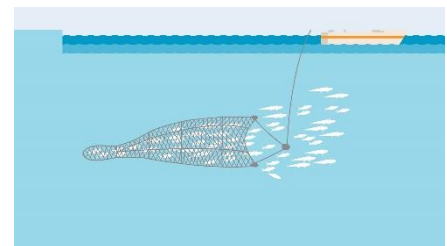
<https://en.wikipedia.org/wiki/Bycatch>



epiphany: “An epiphany is an experience of a sudden and striking realization. Generally the term is used to describe a scientific breakthrough or a religious or philosophical discovery, but it can apply in any situation in which an enlightening realization allows a problem or situation to be understood from a new and deeper perspective.”

[https://en.wikipedia.org/wiki/Epiphany_\(feeling\)](https://en.wikipedia.org/wiki/Epiphany_(feeling))

trawl: “A large conical net to gather fish or other marine life.”



centrifugal forces: “An apparent force that acts outward on a body moving around a center, arising from the body's inertia.”

G forces / 50 Gs: “A g-force is a measure of acceleration.”

<https://en.wikipedia.org/wiki/G-force>

Great Pacific Garbage Patch:

<https://www.nationalgeographic.org/encyclopedia/great-pacific-garbage-patch>