



CTA-136-Plastic Is Killing our Oceans

Join WFCRC

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For a **Diver**  Every day is **Ocean Day**

Plastic Is Killing our Oceans – The Issues, Facts, and Possible Solutions



Approximately 40% of the world's 7.6 billion people live within 62 miles (100km) of an ocean coast. For the other 60%, some of whom may never have even seen an ocean, the seas still play a vital role in their lives.

Oil and consumer goods are moved around the world on vast ships, keeping the wheels of commerce, and vehicles, turning. Most importantly, the ocean is vital to the food chain.

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Unfortunately, we collectively treat the oceans worse than most of us treat the inside of our cars. Every year, anywhere from about 8 to 12 million US tons of plastic end up in the world's oceans.

For perspective, that's close to three times as heavy as all the elephants on Earth combined.

The scale of the problem is enormous, but it's not a lost cause. Just like when your dentist says you can avoid further problems with your gums if you brush better and floss often, a change in how we live could be the catalyst for cleaner oceans in the future.

Read on to learn about the true scope of the issue, why plastics in our oceans are such a problem, why we at itsafishthing.com are so concerned, and why you should be too.

We'll finish by looking at some of the methods currently in use for ocean cleanup, what the future may hold, and what you and I can do to help put the brakes on plastic pollution.

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Coming to Terms With the Problem

Plastics ushered in an era of incredible convenience and are largely responsible for our modern era of mass consumerism.

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Things made with plastic are inexpensive to produce, and they're lighter (and hence more cost-effective) to ship. They're also incredibly versatile. Look around you and think about how much plastic there is within sight of you right now.

Two of plastic's other appealing qualities, durability and comparatively low purchase cost, are also its greatest downfalls.

Because plastic products are often inexpensive, we tend to throw them away without thinking, either because the item was a single- or low-use product, or because it was cheap to replace. They also last a long time. Plastic breaks down very slowly.

All this means there is a lot of plastic in the world. And far too much of it ends up escaping the proper waste disposal streams. Unfortunately, once it leaves the waste stream, it tends to stay out of it.

You don't have to live anywhere near water to know that plastic has a way of finding its way out of the confines of our garbage cans and recycling boxes. When was the last time any of you urban-dwellers went for a walk and *didn't* see a plastic water bottle or grocery bag at the side of the road, or pressed up against a fence?

But, let's skip over that issue for now and focus on the world's oceans. To say there's a lot of garbage in the oceans is an understatement!

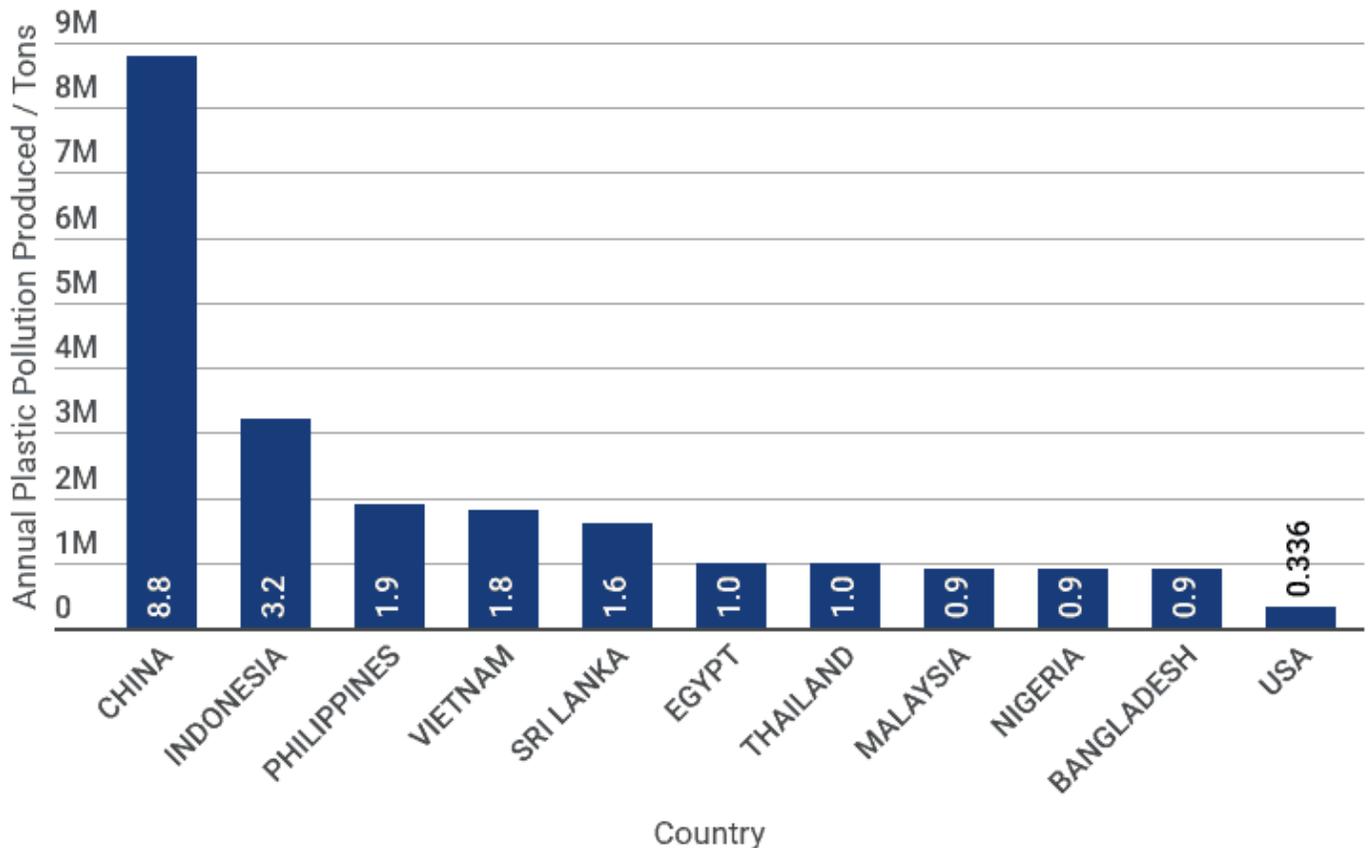
Here are some fast facts to put it in perspective:

- Every minute, an amount of plastic equal to a full garbage truckload is deposited in our oceans (Source: [World economic forum.](#))
- Of the plastic that ends up in the oceans each year, [236,000 tons are microplastics](#), minuscule particles of plastic smaller than the nail of your pinky finger
- The amount of plastic in the ocean is set to increase tenfold by 2020
- It is projected [that by 2050](#) the weight of all the plastic in the oceans will exceed the weight of all the fish
- This is not just a surface problem – [plastic has been found 7miles \(11km\) deep](#), in some of the most remote and least understood ecosystems on Earth

Where Does All the Plastic In the Ocean Come From?

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Scientists' best estimates are that 80% of the debris in the ocean comes from land-based activities. The remainder comes from oilrigs, private boats, commercial ships losing cargo, and fishing vessels dropping nets and other gear.

The debris itself is comprised of everything plastic you can conceive of: automobile parts, toys, cigarette lighters, beverage bottles, and countless tiny pieces beyond identification.

While just about every country on the planet contributes to the problem, certain countries lead the way.

Here's a graphic of the top 10 annual global plastic polluters, also showing where the USA stands in relation, contributing 336,000 metric tons of plastic waste to the oceans every year:

Top 10 Global Plastic Polluters – And How the USA Compares

Data courtesy of the [Wall Street Journal](#)

How Plastic Garbage Ends Up in the Ocean

Most of the world's major producers and consumers of plastic do not have waste management facilities in place to handle it all. They lack adequate collection, recycling, and disposal systems.

Some of the garbage is deliberately and illegally dumped straight into the ocean. Even where garbage dumps exist, poor containment can lead to wind-blown plastics ending up in rivers, lakes, and ultimately oceans.

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In the Philippines, one city has dumped its garbage on a beach for the past 50 years.

On an individual level, garbage left or lost at the beach or dropped in rivers contributes to the problem. Even plastics flushed down the toilet can sometimes find their way to the ocean.

Once it's in the ocean, however, where does it all end up?

The Lost Continent of Garbage

Kind of like how the great thinkers of the ancient world suggested the (former) existence of Atlantis, some modern scientists predicted there would be a large accumulation of garbage drifting somewhere in the ocean.

The theory was based on the knowledge that tons of floating garbage was known to be in the ocean, and an understanding that ocean currents would cause it to collect in a few key locations.

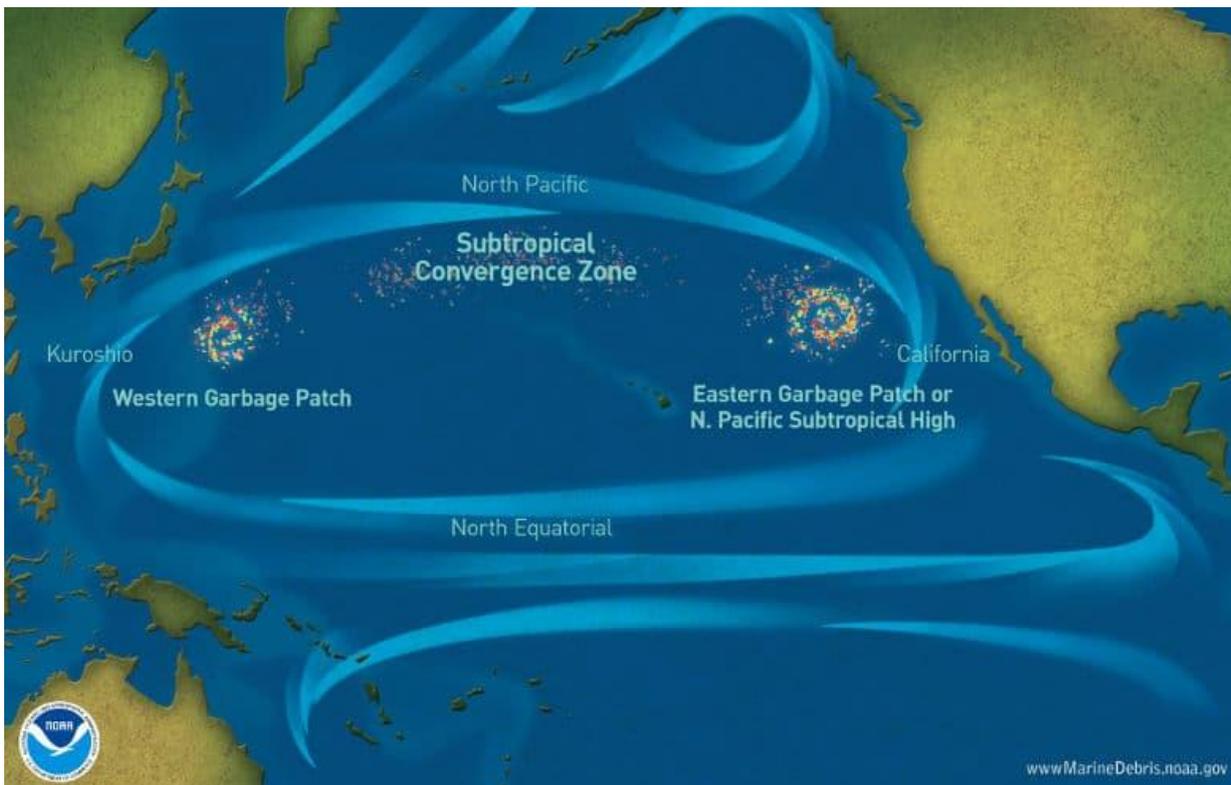
Despite a solid theory, no one could actually find the island of garbage. Even satellite imagery didn't reveal its location. Perhaps it was Atlantis all over again: a nice theory but entirely untrue.

It would take a chance finding in 1997 by racing boat captain Charles Moore, who was making a shortcut across the Pacific after a race, to prove it was there.

In a seldom-traveled area known as the North Pacific Subtropical Gyre, a convergence of currents has created what has since been dubbed the [Great Pacific Garbage Patch](#).

By NOAA [Public domain], [via Wikimedia Commons](#)

How Big Is the Great Pacific Garbage Patch?



The Patch is comprised of two distinct patches, one closer to Japan, and the other between Hawaii and California. The eastern patch alone covers a surface area about the size of Texas or about 268,000 square miles.

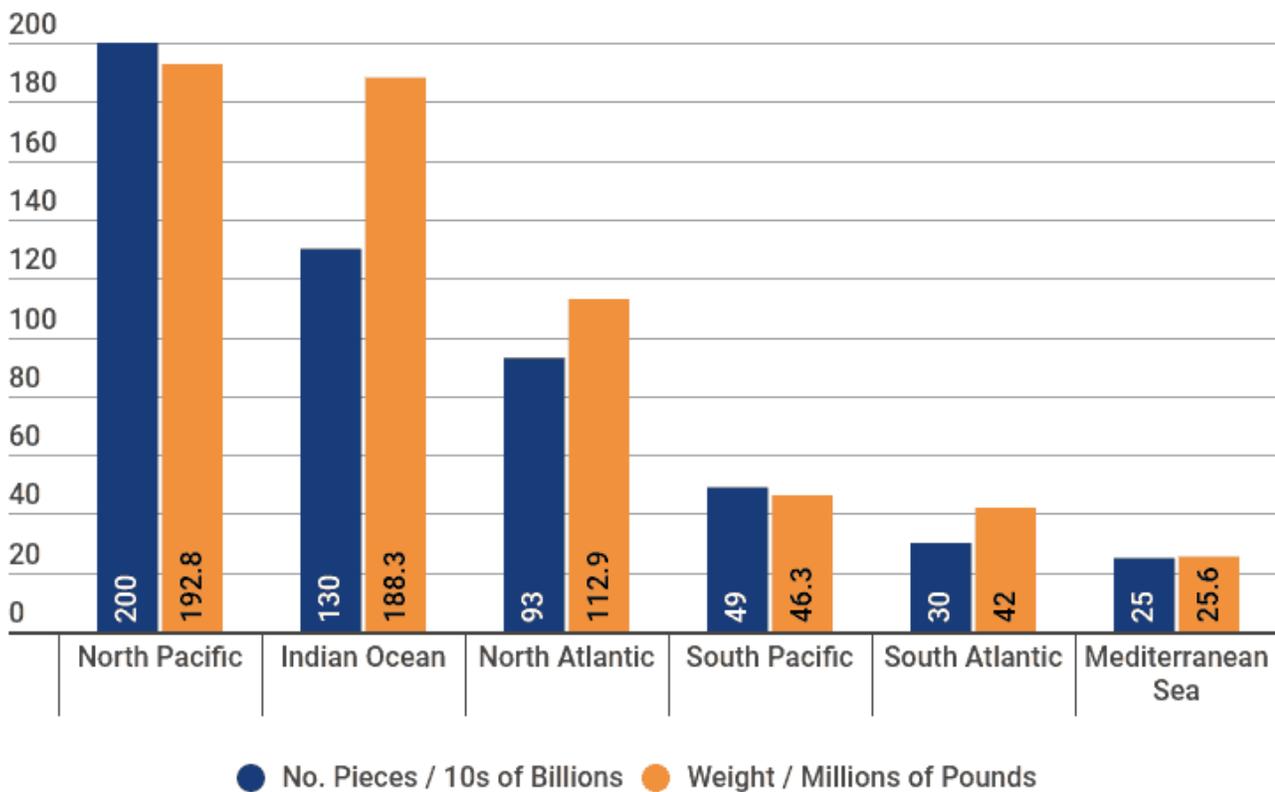
Though you may be picturing a floating mound of trash, the reality is subtler than that, but perhaps more disturbing.

The Patch is more like a vast soup of debris, mostly comprised of microparticles of broken down plastics. While some of the plastic is visible, much of the heavier debris floats suspended down to a depth of several meters beneath the surface.

As if one giant garbage patch wasn't enough, there are also similar patches in each of the five gyres found in the Pacific, Atlantic and Indian oceans.

Between the five gyres and as of early 2015, [there is an estimated 5.25 trillion pieces of plastic debris](#) with a total weight of nearly 270 million tons. The approximate distribution is as follows:

The Number of Pieces and Weight of Plastic Pollution in Each of the Oceans



Sources: VOX; Expert(s) (Eriksen, et al. 2014); PLOS

What Impact Does Plastic Have On the Oceans?

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It goes without saying that plastic debris floating in the water is unsightly.

If you've ever been down to any urban harbor, you've probably seen it floating by the piers, and it looks nasty. But, apart from being visually unappealing, is plastic in the oceans really a big deal? After all, there's plenty of other stuff floating around out there.

All garbage in the oceans is bad, but plastics are especially toxic to the environment. Plastic in the ocean breaks down into small pieces because of exposure to the sun through a process called [photodegradation](#).

In time, some plastics will degrade completely, but it can take decades, perhaps even centuries for even a simple plastic water bottle to fully disintegrate. Given the conditions in the ocean, it's possible that some plastics may *never* disappear entirely.

In the meantime, an estimated 1.9 million pieces of microplastics are fouling every square mile of the Garbage Patch.

While plastics deteriorate, they release hazardous chemicals into the water. Bisphenol-A (BPA), though less common in plastics today, was once found in most plastics. BPA is believed to be carcinogenic and is linked to a number of other health concerns in humans.

Other hazardous chemicals found in plastics include:

- Phthalates
- BPS (BPA Substitutes)
- Dioxins
- Lead
- Cadmium
- Mercury
- Antimony

On top of what is already a part of plastic's makeup, the material also adsorbs – meaning it attracts and holds on to other substances on a molecular and even atomic level – toxic chemicals like pesticides and PCBs. It's like a bonus level of toxicity for anything unlucky enough to eat it.

Studies have further shown that plastic increases the likelihood of coral becoming diseased [by as much as 89%](#). As coral reefs provide habitat for over 25% of all marine life, this is very concerning.

Hungry Animals Are Eating Plastic

Unlike humans, marine animals can't always distinguish between plastic garbage and their natural food sources.

Small pellets of plastic may resemble plankton, bugs, and other food sources to fish. In fact, there may not be much else to eat in the Patch – plastic outweighs zooplankton by about 6 to 1.

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Animals such as sea turtles and whales who dine on jellyfish frequently mistake plastic bags for their favorite meal. And seabirds like albatross bring home plastic for their chicks to eat.

By Chris Jordan (via U.S. Fish and Wildlife Service Headquarters) / CC BY 2.0 [[CC BY 2.0](#) or Public domain], [via Wikimedia Commons](#)

Unfortunately, plastic doesn't just taste bad. It's also indigestible. Animals who ingest large amounts of plastic end



up with stomachs full of the stuff. Since it won't digest, they can't pass it through, and they are unable to eat anything else. Eventually, the poor creatures starve to death.

In one of the best-known and most tragic examples of this phenomenon, a dead Cuvier's beaked whale washed ashore in Norway in 2017. An autopsy revealed 30 plastic bags stuck in its stomach.

The Problem of Plastics is Passed Through the Food Chain

While the unnecessary death of any animal is sad, there's a greater problem here than just the loss of a

single marine life.

As noted earlier, plastics contain hazardous chemicals. These chemicals can make their way into the bloodstream and flesh of animals that ingest them. If another animal later eats that animal, the problem is passed along.

Even worse, as each successively larger predator consumes a toxic meal, the toxins concentrate in even greater amounts. By the time the problem reaches the biggest predators, large amounts of toxins may be built up in their bodies.

Eventually, ocean-borne plastics can affect the entire food chain, even beyond the oceans themselves.

Because humans are at the top of the chain, we aren't immune to this issue. In fact, it all funnels toward us. Many species of fish commonly eaten by humans have been found to ingest microplastics at some point. So much for the health benefits of "wild-caught" seafood!

Ghost Fishing

Fishing nets are a major component of marine plastic debris, accounting for as much as 46% of the total weight of the Great Pacific Garbage Patch.

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Cut loose from trawlers and other fishing vessels, long nets drifting through the oceans continue to do their job of catching fish. This is what's known as "ghost fishing."

Not only are fish snagged in the nets, but also marine mammals, and even birds end up tangled.

[According to one study](#), of the 120 marine mammal species currently on the "threatened" list, 54% have been found either snarled in nets or with plastic in their systems.

Plastic Garbage Isn't Limited to the Surface

© Richard Carey / Adobe Stock

Scientists studying floating debris have discovered that approximately 70% of all marine garbage sinks to the bottom. This does not mean the end of the problem, however. It just means it's been passed on to a different ecosystem.

Many marine organisms that live at or near the bottom of the seas rely on food that sinks down from above. Unfortunately, plastics are mixed in with the food, and it seems it's being ingested.

Creatures living nearly 7 miles (about 11km) beneath the surface in the Mariana Trench, the deepest point in the oceans, have been found with plastic in their digestive tracts.

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Once plastic reaches the bottom, there's nowhere left for it to go. It will contaminate the local food chain, just as it does at the surface. With limited currents and no sunlight, the breakdown of any plastic at the bottom might halt altogether.

Given the incredible difficulties and costs for ocean-bottom salvaging, it's likely that any plastic down there will stay there forever.

Looking for the Solution to the Plastic Problem

The scale of the plastic waste problem in our oceans is incomprehensibly vast. Is it even possible to tackle an issue this big?

It has been suggested that any country that took on the challenge of cleaning up the Great Pacific Garbage Patch would bankrupt itself.

And since it's out in the middle of International Waters, no countries are lining up for the job.

As reliable a source as [the National Ocean and Atmospheric Administration](#) estimated it would take 67 ships an entire year to scoop up less than 1% of the garbage in the North Pacific.

Despite the scope of the situation, there are those trying to do something about it.

Let's take a look now at what's being done about the plastic already in the ocean, and what can be done to stop it getting there in the first place.

Youthful Enthusiasm Is Taking On the Garbage Patch

Incredibly, one of the most promising potential solutions for cleaning the oceans was dreamed up by a 17-year-old young man from the Netherlands. Today he's the head of The Ocean Cleanup, which staffs more than 70 people split between Delft, the Netherlands, and Alameda, California.

The Ocean Cleanup's plan is based on a free-floating, passive (non-powered) containment and collection system. It's designed to function autonomously, but with remote oversight. The system is to be deployed in the Garbage Patch and gradually scaled up in size with multiple units drifting with the currents.

If a picture is worth a thousand words, that means a video is worth... umm... 30 frames per second, times 1:36... Forget it. Have a look at this CG video to get an idea of how the technology works.

While the smallest microparticles may elude the system, the designers believe it will trap most waste from about 1/3 of an inch in size up to well over 100 feet.

Trapping larger pieces will prevent them from further breaking down. Some of the smaller pieces missed will hopefully degrade entirely on their own.

Debris caught by the system is funneled towards a central collection platform where it's extracted and stored. Once full, a ship sails out to collect the waste and bring it back to shore.

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The initial deployment hasn't happened yet, but a valuable test run in the North Sea in 2016 led to significant improvements to the design. The rollout of the first stage in the Pacific is planned for mid-2018.

Hopes are high for the project: The Ocean Cleanup team believes they can reduce the Great Pacific Garbage Patch by 50% in 5 years. Their ultimate goal is the complete eradication of plastic waste in the ocean by 2050.

You can learn more about this amazing and ambitious project [at their website](#). There is even merchandise you can purchase to help support the cause.

What Happens To All The Plastic Taken Out of the Ocean?

The Ocean Cleanup's projection is the removal of up to 353,000 cubic feet of plastic every month. What do you do with that much plastic?

Anyone with a municipal recycling program knows that some plastics can be recycled and some can't. Separating millions of tons of plastic, some of it very small, is just not practical, making it tough to recycle.

It turns out, however, that there are those who see value in this unnatural marine resource.

Intact PET bottles and fishing nets are more easily removed and can be made into a variety of products from shoes to furniture. It is hoped more buyers can be found for the harvest of plastic, with plastic sales helping to fund further clean up.

Stopping the Issue of Plastic Garbage at the Source

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For most of us, someone comes and picks up our garbage and recycling weekly. But are we garbage-free? No. We keep generating more garbage, and they keep coming to take it away in a never-ending cycle.

Even if it's successful, The Ocean Clean Up plan is essentially the same proposition. Cleaning up the plastic in the oceans is a noble pursuit, and of immense value to the environment. But, it doesn't stop more plastic from hitting the surf. And it will.

Something needs to be done to stop the plastic from getting there in the first place.

Sailing To Glory On Garbage

In 2008, former US Marine, Dr. Marcus Eriksen, and his (then future) wife Anna Cummins built a raft out of 15,000 plastic water bottles, assorted bits of garbage, and the fuselage of a light airplane. Dubbed JUNK Raft, Eriksen sailed it from California to Hawaii to help raise awareness about plastic in the ocean.

The following year, the pair founded the 5 Gyres Institute. The Institute is dedicated to preventing the problem before it becomes one.

Their surveys and studies of the gyres and their garbage patches have provided a lot of useful data. Perhaps more importantly, they've been actively working to find solutions for the plastics problem.

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For example, part in thanks to their pressure, several large companies, including Proctor & Gamble and Johnson & Johnson, stopped using plastic microbeads in their products. They've also helped fund projects aimed at repurposing plastic waste, so it becomes useful instead of trash.

Want to know more? [Visit them online](#) to see what they're doing, and what you can do to help.

Top 5 Ways To End the Problem of Plastics in the Oceans For Good



It's not realistic to imagine plastic is going to go away entirely. It's too cheap and practical to ever get rid of unless someone invents something even better. Do you really think your next economy car is going to have a wooden dash?

What we can do, however, is minimize the impact of plastics. We can do that by rethinking how we make, use, and reuse plastic.

Here are some of the best

ways to keep plastic out of the waste stream and the water.

1. Society Must Become Less Reliant On Plastic

© Zoltan Galantai / Adobe Stock

The only permanent solution to the problem of plastic in our oceans is preventing it from ending up there. The easiest way to do that is to not use so much plastic.

Of course, that's only "easy" on paper. Plastics are so much a part of our lives it would be challenging to eliminate them entirely. But, they can certainly be reduced.

Single-use plastic products are one of the most significant problems but should be one of the easiest to eliminate. Take drinking straws, for example. They aren't necessary for the vast majority of people, and yet you can hardly order a cold drink at a restaurant without getting one.

It used to be the only place you didn't get a straw was at a zoo. Most zoos ban straws because they know they end up as litter, and they are a choking hazard for the animals. Today, however, many municipalities are implementing, or at least considering, [bans on the use of straws](#). Even without a ban in place, here's a simple thing each of us can do: when you order a drink, say, "no straw, please."

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The same goes for plastic water and soda bottles. You don't have to go far before you find a flattened water bottle lying in a park or on a beach. They're recyclable, yet many of them end up in the garbage or escaping into the wild.

Again, though, we as consumers have options. That plastic bottle of soda you're reaching for in the convenience store fridge – is there a can or a glass bottle you could choose instead?

Need water on the go? Take your home tap water with you in a reusable stainless steel container. (Don't even get me started on the foolishness of paying a for-profit company for bottled water taken from the same aquifers as your tap water!)

We can also decide to avoid plastics when there's an alternative. As an example, you can use your own shopping bags. Past that, try choosing consumer goods that don't come in plastic; look for products that come in cans, glass bottles, and cardboard boxes, all easily recyclable materials.

Even shopping for clothes needs to be reconsidered. Synthetic fibers add to the problem, too. Choose natural materials whenever possible, like cotton, linen, and hemp.

Whatever plastics people do use, they must take responsibility for their disposal.

Simply by putting your own garbage in a proper bin – hopefully one marked “Recycling” – you're doing what you can to ensure that particular piece of plastic ends up where it should. Every piece helps.

2. Make Plastic Producers Take Responsibility

While it's easy to say, “I'm going to use less plastic,” the end-user is only part of the problem. At the top of the plastic pyramid are the manufacturers who have decided plastic is the solution to almost all packaging and manufacturing problems.

To be fair, it certainly seemed like a great idea at the time when plastics first came on the market. Cheap, versatile – it was a wonder product.

Fast-forward to today and the use of plastics has become so ingrained in the manufacturing and consumer packaged goods industries, it would be difficult to change course now without a sudden and unexpected burst of corporate altruism.

Still, this really is the place to start. There needs to be a greater allocation of resources to developing plastic alternatives. Producers should also be held at least partially responsible for what happens to their products at the end of their lifecycles. This could include the collection, reuse, or where necessary, safe disposal of plastics.

Some companies do seem to be at least paying lip service to the issue. Increased consumer demand, however, can help convince even a major corporation to alter its course.

Remember the Styrofoam containers at McDonald's? Consumer pressure led to the major decision to do away with them in 1990. Prior to that, McDonald's used 2% of all the polystyrene made in the US.

3. Levy Taxes and Fees On Plastics That Pollute

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Very little plastic is made from renewable resources. That's because it's still cheaper to make it from oil. By taxing "fossil plastic" production to the point where renewable or recycled plastic becomes more economically appealing, governments can force plastic makers to rethink their process.

There are new plastic alternatives in use, including bioplastics and biodegradable plastics. The former is made from natural materials such as cornstarch. These are commonly used for food recycling and compost bags. Some are even edible, should they happen to escape the waste stream.

The latter are more like traditional plastics but are made to break down more quickly. While this is good news for animals that might otherwise eat the bag, they can still leech hazardous chemicals.

Speaking of eating the bag, why not take a short reading break and watch this tongue-in-cheek and bag-in-mouth video starring New Zealand-born actor Sam Neill.

4. Allocate More Money for Cleanup

Right now, most of the money for ocean cleanup programs and studies come from donations. For example, The Ocean Clean Up began with Kickstarter funding. Today, they still mostly rely on donations, volunteers, and profits from the sale of branded merchandise.

But what if governments played a more significant role? What if some of the plastic taxes proposed above went towards removing plastic from the water, and stemming the flow of ocean-bound garbage?

We tend to deride the "throw some money at it and it will go away" approach to society's problems. But, in this case, that could really help.

Mind you, the [National Oceanic and Atmospheric Administration estimated in 2012](#) it would cost as much as \$489 million each year just to run the boats needed to clean 1% of the North Pacific Ocean with a traditional approach (as in trawling for trash). You could view that as either pessimistic or realistic, depending on your point of view. Yes, that's a lot of money. Unless you compare it to the \$610 billion dollars the United States spent on its military in 2017. Suddenly it's a drop in the bucket. You could clean up the oceans for more than 1,200 years on that based on the NOAA's assessment.

Of course, the garbage isn't solely the responsibility of the US. I'm just using these numbers for illustrative purposes. The money is out there. Just imagine what could be done if it found its way to the right people?

5. Take On the Problem at the Largest Sources

As we identified in the chart earlier, there are certain countries whose contributions to the plastic garbage problem far exceed those of other nations. Unfortunately, all of the countries in the top ten are developing nations. Other than China, none of them have the economic resources available to tackle the problem single-handedly.

It has been suggested that rather than concentrate cleanup efforts in the middle of the ocean, it would be better to focus on where the garbage originates.

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For example, 93% of all river-borne plastic that ends up in the ocean [comes from 10 rivers](#) – eight in Asia and two in Africa. Simply halting the flow of plastic already in those rivers before it hits the ocean could cut the plastic problem by more than 2.8 million tons.

Raising public awareness is helping with the plastic waste problem in developed nations, but it is much harder to reach people who often lack Internet or cell phones.

It would take an enormous international effort to educate people on the ground, fund cleanups and establish effective waste management programs.

Economic pressure applied by foreign governments could also play a role, but sanctions sometimes backfire and end up hurting the people they're supposed to help.

We Are All At Fault. We Are All Responsible. We Can All Make A Difference.

Removing all the plastic from the world's oceans is probably impossible. What is possible is to stop more plastic from making its way there, and clean up as much as we can.

To do so will take a united and concerted effort, and not just from a few forward-thinking organizations. All individuals, companies, and governments need to play a role. After all, the oceans belong to all of us, and all life on Earth depends on them. When the oceans are sick, the planet is too.

Once you're truly aware of a problem, you can't ignore it any longer. Researching and writing this article was a genuine eye-opener for me. Hopefully, for you, reading it will have the same effect. Then you can take those open eyes, look around you, and see the difference you can make.

Together, we can be the current of change that turns this whole issue into a distant, shameful memory.

For additional reading see [The WFCRC Document Gallery](#) for articles about:

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- Coral Alert Network (CAN)
- Emergency Reporting Reports (ERR)
- Call to Action (CTA)
- Marine Protected Areas (MPA)
- Marine Life Alert (MLA)
- Seismic and Oil Production Threats
- Natural Science Reports (NSR)
- Oil Spill Alerts (OSA)
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