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Eelco Rohling: A view from the ocean for Earth Day

April 16, 2018 by [PUP Author](#)



On April 22, we celebrate Earth Day. Mostly, we use this holiday to demonstrate support for [environmental protection](#).

The oceans cover some 72% of Earth's surface; this is why we sometimes call the Earth the "Blue Planet." Yet, in a time when people are talking about "the best deals," the oceans are getting an extremely shoddy one.

Humanity is stretching the global oceanic ecosystem to its limits. Major impacts come from [global overfishing](#), and from the physical destruction of critical pristine environments such as [coral reefs](#) and [mangrove](#) coasts. Combined, these reduce species diversity and richness, as well as breeding potential and resilience to disease. Our impacts on coastal systems are also strongly reducing the natural protection against wave- and storm-damage. We'd be wise to be more appreciative of, and careful with, our key food supplies and protection from the elements. After all, with 7 billion of us to feed, and with almost half of these people living within 100 miles from the sea, we have it all to lose.

Yet our deal with the oceans is even worse than that. That's because the oceans also get to be the end-station for everything transported by water, which includes plastics as well as toxic chemicals. To boot, we have for many decades unceremoniously dumped vast quantities of society's unwanted waste products directly into the oceans. Although [legal frameworks](#) have been introduced to limit dumping directly into the sea, illegal practices are still rife. In addition, indirect dumping via rivers—whether wittingly or unwittingly—remains a major headache.

As a result of our wasteful demeanour, we are leaving a legacy of oceans (and wildlife) that are visibly filling up with long-lived non-biodegradable [plastics](#), which leads to [graphic](#) news coverage. In consequence, plastic pollution is now being billed by some as our [oceans' biggest threat](#) today. It's certainly a very visible one, with [up to 240,000 tons of plastic](#) floating in the oceans. And that amount is equal to only 1% or less of the amount of plastic that is available for entering the ocean every year. This illustrates the massive potential for the plastic problem to explode out of control.

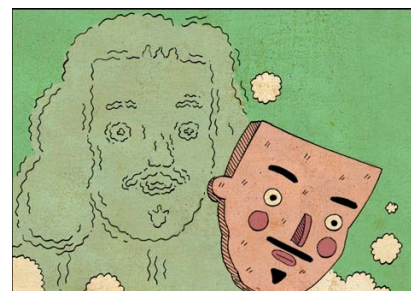
Much less visible, but just as devastating, is the pollution of our oceans with highly toxic and long-lived chemicals—especially human-made PCBs and other organic compounds, along with concentrated heavy metals. PCBs are among the very worst threats because they are so long-lived and so toxic.

Some 10% of all 1.3 million tons of PCBs produced [have made it into the oceans](#) already (that is, about 130,000 tons). While this is alarming enough by itself, there's up to 9 times as much waiting to be released and make its way into the oceans. All we can do to stop that from happening, is prevent any stored PCBs from making it into the open environment. So far, this has been done to 17% of the stores, while [83% have yet to be eliminated](#).

PCBs have become widespread in marine organisms, from coastal and estuarine waters to the



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greatest depths of the largest ocean: the Pacific. They cause an endless list of severe health problems, deformities, hormonal imbalance, immune-system weakening, **cancer**, and a decrease in fertility. Like most long-lived pollutants, PCBs accumulate into higher concentrations through the food web. Their accumulated impacts in whales already drive important infant mortality, as females **pass lethal amounts of PCBs to unborn or suckling calves**.

Nutrient-pollution is another big issue. This may sound like a strange type of pollution. After all, wouldn't more nutrients just lead to more happy life in the ocean? When nutrients come in reasonable amounts, then the answer is yes. But when the nutrient flux is excessive—we then talk about eutrophication—all **manner of problems develop**. And the flux of artificial and human and animal waste-derived nutrients is excessive in many estuaries and coastal regions. Together with ocean warming, this has caused a rapid global expansion of regions where decomposition of massive algal blooms strips all oxygen from the waters, resulting in vast "dead zones" with completely collapsed ecosystems.

Finally, there is the sinister, lurking threat of global warming and ocean acidification. The current rate of warming has been successfully documented through scientific study, and is **10 to 100 times** faster than ever before in the past 65 million years. Meanwhile, ocean acidification is caused by the oceans absorbing roughly a third of our carbon emissions. By now, the oceans have become about 0.1 pH unit more acidic than they were before the industrial revolution; that is an acidity increase of 25%. Projections for a business-as-usual emissions trajectory show a 0.3 to 0.4 pH unit change by 2100. In humans, a 0.2 pH unit change results in seizures, coma, and death. **Fish, and most other vertebrates, are equally sensitive**.

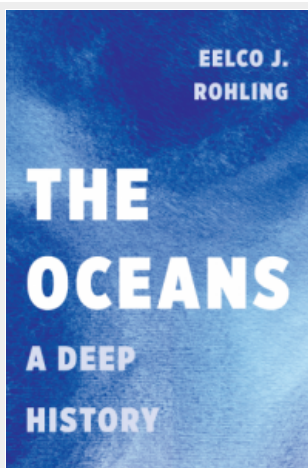
If the changes are slow enough, organisms can evolve to adapt. But researchers are very concerned about the extreme rate of acidification. For coral reefs, the combination of warming and acidification is certainly implicated in **massive bleaching and die-off** events that are going on around the world already. And let's not forget that coral reefs house one third of all oceanic biodiversity, while oceans cover more than two thirds of the Earth surface.

So here's my plea...

We really need an Earth Day, but we need an Ocean Day as well—to build awareness about this critical part of our planet.

At a passing glance, the oceans' problems remain hidden under a mesmerising veil of waves and reflections. We need to remind ourselves to keep looking beneath the surface, and to keep taking this critical system's pulse, lest it dies without us knowing about it. Maybe then we will realise how urgently we need to stop using it as a dumping ground and infinite food larder. That we instead should look for sustainable ways forward, not just for life on land, but also for life in the oceans.

Our attitude going forward will make or break society. Chances are very high that a marine mass extinction will drag us, the ultimate overpopulated top consumer, along with it.



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 (http://blog.press.princeton.edu/calendar/2018/05-07-2018/)
6:00 pm Issa Kohler-Hausmann @ NY County Lawyers Association
 (http://blog.press.princeton.edu/event/issa-kohler-hausmann-5/?instance_id=1369)

MAY 8 Tue
 (http://blog.press.princeton.edu/calendar/2018/05-08-2018/)
6:30 pm David Weintraub @ Houston Museum of Natural Science
 (http://blog.press.princeton.edu/event/david-weintraub/?instance_id=1383)
7:30 pm Mark Serreze @ Philadelphia Free Library
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