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Marine protection starts on land
Technical solutions to rid the oceans of plastic offer limited help

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Our oceans are under threat for a variety of reasons. One reason: they are being inundated with plastic waste which breaks down into tiny particles and ultimately ends up in the food chain. A plastic garbage patch the size of Europe is floating in the Pacific Ocean. If current practices don't change, it is estimated that there will be more plastic than fish in the oceans by the middle of the century. As a result, calls for technical solutions, like huge vacuums to clean up the oceans, are growing louder. But these technologies are not fully developed yet and also only address the symptoms. If we want to protect and preserve the oceans as ecosystems in the long term, we have to make sure that nothing ends up in the oceans that doesn't belong there: the most effective marine protection starts on land.

The first World Ocean Conference was held at the United Nations in New York in June. The mere fact that this conference was convened is an important indicator of how serious the situation is. After analysing the threats, the Member States adopted a "Call for Action" at the end of the conference which highlights the urgency of the issue and the importance of SDG 14 (Sustainable Development Goal): to conserve and sustainably use the oceans as they are essential to human survival.

Oceans form the largest habitat in the world and cover 70 % of the Earth's surface. They produce 50 % of the world's oxygen, capture far more carbon dioxide than forests, regulate the climate, are home to a vast abundance of species, provide raw materials, are used as trade routes and offer a place for recreation. They also make a key contribution to the world's food supply. Around half of the world's population lives near a coastline and relies on an intact marine ecosystem. Fish, for example, play a crucial role in developing countries as a source of protein and income.

More plastic than fish

For a long time, oceans were taken for granted as a resource that could be "emptied" and "filled" as needed. In the meantime, it is clear that this view is outdated and no longer acceptable because the oceans are under extreme pressure for various reasons. One reason is the growing volume of marine litter: pollutants end up in the oceans, mostly in an untreated state, they threaten fish, sea birds and turtles, make their way into the food chain and are also ultimately harmful to humans.

Ocean Cleanup, a non-governmental organisation, estimated that there are already more than five trillion plastic particles in the oceans today, mainly concentrated in five "marine garbage patches", the largest of which is found between Hawaii and California.

The overwhelming majority of plastic waste – it is said up to 80 % – comes from land and makes its way to the ocean in streams and rivers. Lost fishing nets and waste from shipping make up less than 20 % of the plastic rubbish. Estimates of how much plastic ends up in the oceans every year

The abundance of fish as it exists here is becoming increasingly rare.

in absolute figures vary considerably from two million to ten million tonnes. What is certain, however, is that more than half of the global waste discharged to the oceans can be attributed to six countries: China, Vietnam, Indonesia, Philippines, Sri Lanka and Thailand.

It is also certain that the consumption of plastic has increased drastically in the last 50 years: more than 600 % in the period between 1975 and 2012. And, according to forecasts, this quantity is expected to double again in the next 20 years because plastic has become a practical and widely used material in people's everyday lives in most countries in the world. But this doesn't just harm the oceans, it also endangers the climate because around 6 % of the oil and gas consumed today goes to the production of plastic.

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Quote

"The plastics sector will account for 20 % of total oil consumption and 15 % of the global annual carbon budget by 2050 (...)."

Global Economic Forum in Davos

The plastic economy

The main reason plastic is such a problem is its durability. Scientists hypothesise that it can take up to 500 years for plastic waste to completely biodegrade. Still, most countries are far from having a system that even slightly resembles a "circular economy". Conversely, this means that only a few countries have organised and, most importantly, extensive waste and wastewater systems to date. In terms of plastic, this means that only a small portion is reused for a new purpose. The great majority ends up in the ocean at some point. According to calculations by the Ellen MacArthur Foundation, national economies lose an estimated USD 80–120 billion in value every year as a result – to say nothing of the environmental costs which are not included in the calculations. As a result, the Foundation also holds the view that we live in a "plastic economy".

Plastic, plastic, plastic in the oceans.

Technical solutions

More and more technical solutions are being introduced for cleanup, for example, to filter plastic out of the ocean using currents. Gigantic vacuums have also been proposed. None of these solutions is fully developed as yet; the first trials will get underway at the end of 2017. Ocean Cleanup, for example, then wants to start by "vacuuming up" larger pieces of plastic such as bags along coastlines or at the mouths of rivers. Another idea is to collect plastic waste from smaller islands scattered in the Pacific with rubbish ships, to separate the waste on board and then process it further. But until now none of the solutions has proven truly practical. And whether or not the harmful microparticles that accumulate in the food chain can be removed from the ocean with a technical solution remains questionable.

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Quote

"KfW doesn't think that technical solutions for removing plastic waste from the oceans are very promising just now because many of the particles are so small. Our efforts should focus on preventing plastic from ending up in the oceans in the first place."

Stephan Opitz, Member of the Management Committee of KfW Development Bank, Head of the Policy and Latin America Department

Lowering consumption

It is more likely that the plastic already floating in the oceans can no longer be removed. This makes putting a rapid end to more plastic waste all the more important. If the business as usual scenario came true and the volume doubled again in the next 20 years, this would likely overwhelm the oceans and harm people sooner or later. Effective waste management on land therefore plays a central role. The triad "Reduce – Reuse – Recycle" should apply here as well:

- **Reduce:** It would be advisable to reduce plastic consumption with a combination of bans – e.g. on plastic bags – and incentives – e.g. to use alternative materials.
- **Reuse:** To enhance these efforts, as much plastic as possible should be reused, e.g. through the recycling of plastic bottles (product reuse).
- **Recycle:** And finally, plastic should be recycled (material reuse) or, where this is not possible, disposed of properly.

Encouraging examples exist: the small, densely populated, landlocked country of Rwanda in eastern Africa banned plastic packaging and the previously omnipresent plastic bag out of hand several years ago and strictly monitors this ban.

Or in Tunisia: A waste management system was set up there with the support of German development cooperation. Consumers of plastic packaging participate in the costs of its disposal through product fees similar to the German green dot system – and are

therefore incentivised to use less.

Not for free

Proper rubbish disposal, however, comes at a cost. Still, it is likely to be cheaper than the time-consuming process of removing plastic from the ocean in the long run. KfW estimates the costs of collecting, recycling, incinerating or storing (plastic) waste to be approx. EUR 60 to 80 per household per year. The countries listed above that are the primary producers of plastic waste in the oceans are almost all economically advanced. They could afford the costs for systematic waste management. Especially because it would create work for lower skilled people – a factor that is often overlooked in the discussion about costs. The best strategy, of course, would be to follow the example of Rwanda and reduce plastic consumption to a minimum from the start. International agreements and standards would also be helpful to reach this goal.

The construction of treatment plants

Microparticles, however, do not just emerge when large plastic pieces floating in the ocean are crushed. They occur much earlier, for example, as a result of the abrasion of car tyres or due to cleaning additives like the

Seemingly intact underwater world.

ones in toothpaste, or by synthetic fibres in clothing that erode over time. Substances of this kind can also make their way through the sewage system to rivers and later to the ocean. It would be technically feasible to remove them, even though this is an expensive process, but in most developing countries and emerging economies wastewater and rainwater is not treated before it flows into the ocean. With this in mind, it would be advisable, even though it might seem quite far-fetched at the current time, to construct technically advanced treatment plants in the river basins and coastal regions of developing countries and emerging economies. They would play a very important role in marine protection.

More plastic waste in the oceans can be prevented only to the extent that national governments set and implement – possibly also with international support – ambitious targets to keep rivers clean.

Conclusion

The good news: the general public is aware of the state of the oceans. Hardly a day goes by without a report on plastic waste in oceans. This is a big advantage compared with the view that the oceans are an almost freely available and infinite resource.

However, the public discussion so far has mainly concentrated on technical solutions designed to help fish plastic out of the oceans. This is understandable on the one hand because approaches of this kind draw attention with their innovative nature. On the other hand, they don't get to the core of the problem. Even if one or more of the propagated technologies is fully developed some day, they only solve one part of the problem. Most importantly, they start too late in the process, fighting the symptoms rather than the causes which continue to be the increase in plastic consumption itself.

This is why: marine protection always has to start on land and include waste and wastewater systems as well as treatment plants in the overall strategy. This is the most effective way to protect the oceans in the long run and to keep the marine habitat usable for humans over the long term – in order to achieve SDG 14 by the year 2030.

Literature and link selection

- Ellen McArthur Foundation: The New Plastics Economy. Rethinking the Future of Plastics, 2016.
- Marine Litter Solutions: 2016 Progress Report, 2016.
- Ocean Cleanup https://www.theoceancleanup.com/
- Ocean Conference https://oceanconference.un.org/

Photos

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