Seas of plastic: The Ocean Cleanup

As our oceans become more polluted by plastic waste a revolutionary project is underway to try to fix the problem. The Ocean Cleanup, founded by 20 year-old Boyan Slat, has initiated the largest clean-up in history.

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Introduction

Plastic pollution makes up the majority of marine litter. It is on a massive scale and is a growing threat. Initiatives to combat the problem face the challenges that it would take too long and cost too much money to collect up the trillions of plastic pieces. The Ocean Cleanup has a different approach. Instead of going after the plastic, it is developing technologies involving an *array* of long floating barriers to let the ocean currents capture the plastic itself. The beauty of this approach is that it is large scale, efficient and environmentally friendly.

The problem

Society is unable to store and recycle all of the plastics we use - this has led to millions of tons of plastic waste ending up in our oceans. The United Nations Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) has estimated that most of the waste orginates from land-based activities – whereas around 20 per cent comes from fishing boats, cargo ships and oil rigs.

As a result of the Coriolis effect (the Earth's spinning) some of this plastic has drifted to and accumulated in five rotating sub-tropical currents, known as gyres. Once in a gyre, the plastic objects are shredded to microplastics to form a kind of plastic soup. The biggest is the Great Pacific Gyre and the plastic problem was first observed there in 1997 by Oceanographer, Captain Charles Moore , who named it the Great Pacific Garbage Patch. He suggests these gyres amount to as much as 40 per of the planet's ocean surface — roughly 25 per cent of the entire earth, which gives an indication of the extent of the problem.

These huge plastic gyres endanger the ocean's ecosystem and can harm marine life and ultimately humans at the end of the food chain. In 1999 Captain Moore

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estimated there was as much as six times more plastic than zooplankton on average in our oceans. Following an expedition in 2014, he estimates the ratio to be more than 100 to one. Plastic pollution is also a carrier of invasive species.

In addition to environmental concerns come the costs consequences of plastic pollution e.g. cleaning of coastlines and impact on tourism. According to a report by the Asia-Pacific Economic Cooperation (APEC) from 2009, the costs of removing debris from beaches is on average USD 1,500, and up to USD 25,000 per ton.

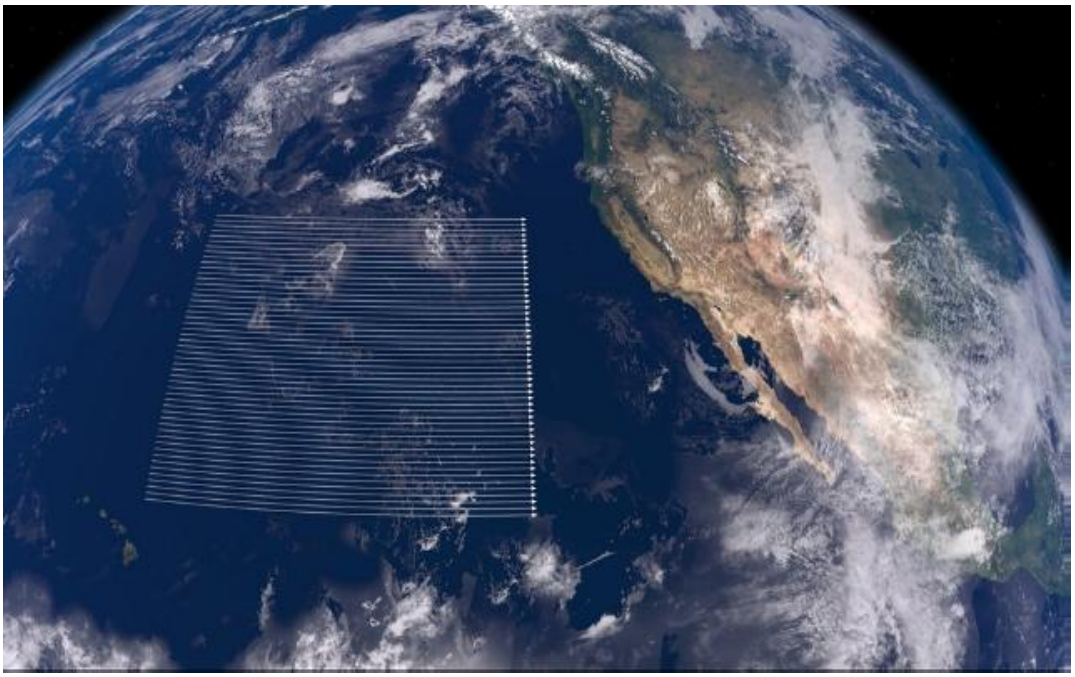
As the gyres are mostly located in international waters, responsibility for solving the problem must be inter-governmental or independent private initiatives.

The Ocean Cleanup project

The Ocean Cleanup and its founder Boyan Slat is one such initiative. Slat has invented a method with the mission of cleaning up the Great Pacific Garbage Patch.

While working on a school project, 16-year-old Slat started studying oceanic plastic pollution and the problems in cleaning it up. He came up with his passive clean-up concept and in 2013 started The Ocean Cleanup foundation.

A team involving 100 volunteer scientists and engineers spent a year carrying out a feasibility study , which was published in June 2014. It concluded that the passive system was likely to be a workable and cost-effective method to remove almost half the Great Pacific Garbage Patch within 10 years.



The next milestone will be the Mega Expedition in August 2015. Up to 50 vessels will collect data during a three week period. They will cover in parallel a 3.5 million square kilometre area between Hawaii and California. This will result in the creation of the first high-resolution map of plastic in the Pacific Ocean.

The technology

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It has always been assumed that cleaning the oceans was impossible, due to the vastness of the areas in which plastic is concentrated and the significant harm that could be caused to sea life during the process.

Slat has other ideas. Instead of going after the plastic using boats and nets, The Ocean Cleanup Array, a series of long floating barriers, uses the natural movement of the ocean currents to passively collect plastic in front of the booms. The plastic can then be removed and collected by ship for recycling. By using booms rather than nets the possibility of catching and harming marine life (by-catch) is sigificantly reduced.

The technology is going though a series of up-scaling tests. During 2016 an operational 2,000 metres long pilot Array will be deployed in coastal waters off Tsushima, an island between Japan and Korea. It will be the longest floating structure ever deployed on the sea, just two per cent of the full scale structure which will be 100 kilometres in length.

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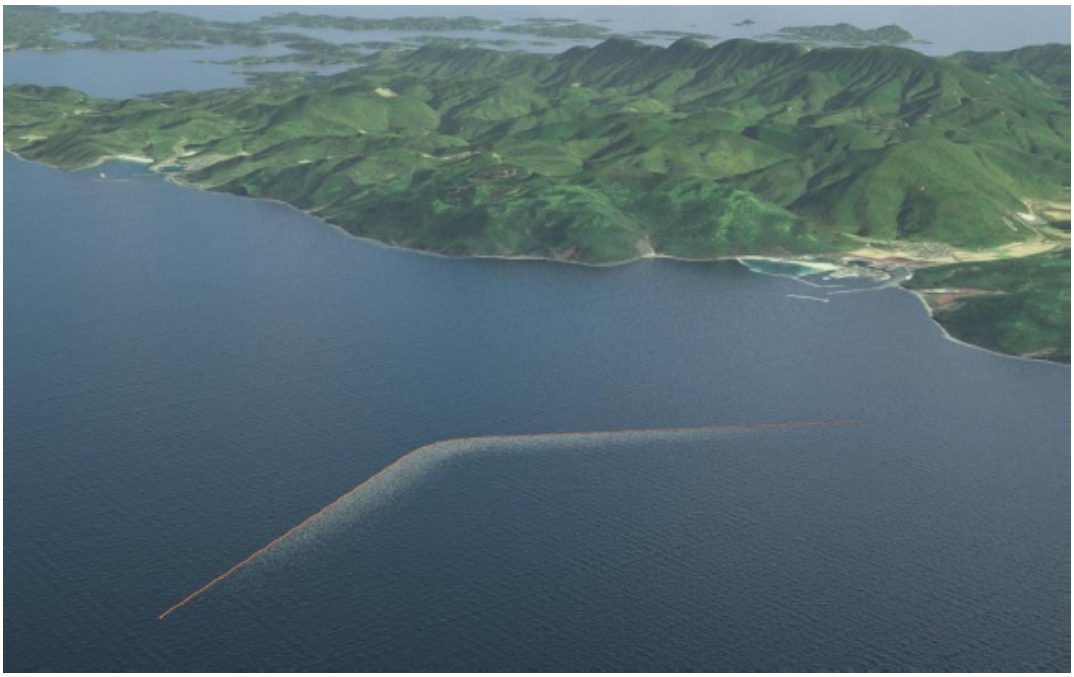

The goal is to deploy the Array in the Great Pacific Gyre in three to four years time.

Conclusion

Some working in this field believe marine plastic pollution recovery is a bad idea. Marcus Eriksen, Director of Research and co-founder of the 5 Gyres Institute takes the view that the problem needs to be tackled at its source, "upstream changes in product design and producer responsibility...are the long-term solutions we need" .

Captain Moore also believes the main focus should be on preventing the flow of plastic waste into the marine environment. However, he also supports marine clean-up initiatives, "Although cleaning the ocean today appears to be impractical, we embrace the creativity of those trying to solve this problem" .

Shipping can play its part in tackling the problem at source. In a previous article from 2009 we looked at the plastic pollution problem and increasing scrutiny of garbage disposal from ships following implementation by the US of MARPOL Annex V and its complete ban on disposal of plastics from ships. See also our Gard%20Alert%20MARPOL%20Annex%20V%20-%20Revised%20garbage%20disposal%20regulations.pdf on the revised MARPOL Annex V.

Boyan Slat is very clear that The Ocean Cleanup is not providing *the* solution to the plastic seas problem. Its main contribution is to significantly reduce the concentration of plastics in the gyres. He too advocates prevention of more plastic entering the oceans and is committed to raising awareness about the problem and its solutions. There are also plans to develop spin-offs of its collection technology for implementation in river deltas etc. to help reduce influx of new plastics into the sea.

Questions or comments concerning this Gard Insight article can be e-mailed to the Gard Editorial Team .

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Further information about The Ocean Cleanup project can be found on its website . Our thanks to them for allowing us to reproduce images from their website.

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