

MARINE DEBRIS: TAKING BACK WHAT IS OURS

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Image credit: Dimitar Dilkoff

The majority of plastics float on top of the surface. Here a boat cuts a path through surface debris.

THE PRESENT PROBLEM OF PLASTIC

Since the mass production of plastics began in the 1950s, plastic debris has been steadily collecting in both terrestrial and marine environments. Marine organisms are at risk of being snared by debris or poisoned by their toxicity. Currently no viable methods for mid-ocean debris extraction exist, emphasizing the need for alternative methods. So why not let the debris come to us?

Tons of debris washes up on shores each day. This debris exposure presents a significant

opportunity to educate local communities on the effects of careless littering, while removing significant amounts of debris from circulation.

Plastic accumulation on the shores and in sediment has been consistently increasing over the last four decades¹. The release of plastics to the environment is the result of poor waste management and human error. Much of this debris collects on shorelines, with an abundance washing up near highly populated areas. Organized volunteer actions aimed to instruct the public and promote local

environmental maintenance remove large amounts of debris from the oceans each year. This coordinated movement addresses the negligence of the population and increases awareness of the rapidly increasing problem of ocean debris.

Photo credit: Mic Smith Photography

A diver helps remove a net from around a seal's neck. Large marine animals are more prone to entanglement.



THE SOLUTION IS NOT DILUTION

* Plastic production is projected to reach 850 million pounds annually by 2050.

* Plastic debris in the ocean is classified as either macro or micro plastics. Micro-plastics are any plastics less than 1mm. Macro-plastics are any fragments greater than or equal to 4mm.

* The haline environment and cool temperatures in the ocean reduces breakdown of the already durable plastics; letting them remain in circulation for up to hundreds of years.

Approximately 225 million tons of plastic is produced each year. It has been estimated that 10% of this ends up in the oceans through run-off, industrial waste, air-born plastics, illegal dumping and debris lost off of ships. Plastics are estimated to make up 60-80% of the total marine debris².

Plastic debris in the ocean poses a serious threat to marine life. Toxins leached from the material have deleterious effects on marine organisms. Plastics are commonly mistaken for food and consumption often results in death. Animals can become tangled in plastic debris and often die or suffer a severe reduction in mobility.

The longevity of plastics is estimated to vary from hundreds to

thousands of years. To make matters worse, the longer they remain exposed to the erosive motions of the ocean, the smaller the plastic fragments become. Macro-plastics, unlike micro-plastics, can become weighted down by marine life that causes them to sink, dipping below the currents that force them into gyres and escaping. Micro-plastics however, remain trapped away from shores. These micro-plastics are much harder to filter; as of yet no methods are able to filter ocean micro-plastics on a large scale³.

Currently, no feasible methods exist for extracting mid-ocean debris. Methods to sweep the ocean for debris require large fuel consumption for travel and as such are costly and unsustainable. Recent ideas have been

proposed for a stationary filter that runs on sustainable energy and has near zero by-catch, however these ideas are still undergoing testing to evaluate their feasibility.

Coastal cleanup projects take advantage of the limited time that debris remains stationary before the rising tide pulls it back out of reach. In 2011, the Great Canadian Shoreline Cleanup organized volunteers who collectively gathered roughly 144 metric tons of garbage. In 2012 the International Coastal Cleanup saw 561,633 volunteers who collectively gathered 5000 tons of garbage. These projects act to promote environmental awareness as well as get the community involved in actively cleaning up their local environment. Such cleanup programs display the

type as well as the abundance of all the gathered debris. The majority of products in both cleanup projects are products commonly, improperly discarded due to human carelessness. Displaying the relative findings, and community education associated with organized volunteer cleanup provides a way to educate the public about the importance of reducing careless waste disposal. These programs are not costly and remove large amounts of debris from the ocean, reducing the potential for micro-plastic formation, and require no special equipment or filtering methods.



Turtle eating plastic. Photo credit: Greenhouse carbon neutral foundation.

What needs to be done?

Policy Conclusions & Recommendations:

- The amount of plastic debris in the ocean has been steadily increasing without efficient methods of removal.
- Further support of volunteer cleanup projects is needed to maximize the scope and the success of such programs.
- Community volunteer programs should aim to increase awareness of each person's individual contribution to the problem and how they can reduce it.
- Volunteer coastal cleanups provide an effective way to remove ocean debris while simultaneously raising awareness of the problem and solutions.

References:

¹ Barnes, D. et al. (2009) Accumulation and fragmentation of plastic debris in global environments. *Philosophical Transaction of the Royal Society*. rstb.royalsocietypublishing.org (accessed 24 November 2013).

² Borrero, J. et al. (2012) Numerical modeling of floating debris in the world's oceans. *Marine pollution bulletin*. www.sciencedirect.com (Accessed 24 November 2013).

³ Ferguson, S. et al. (2010) The size, mass, and composition of plastic debris in the western North Atlantic Ocean. *Marine pollution bulletin*. www.sciencedirect.com (Accessed 24 November 2013).