By Dr Mae-Wan HoISIS Report 28/01/15

Read the rest of this report here

http://www.i-sis.org.uk/Plastic_Plague_in_Our_Oceans.php

############################

Plastics production has gone up 560-fold in just over 60 years to 280 million tonnes a year, less than half recycled or buried in landfills, the rest litter the oceans damaging marine life throughout the food chain; scientists call for the most toxic plastics to be classified hazardous waste, and ultimately for all plastics to be reused and recycled in closed-loop systems. Dr Mae-Wan Ho

Most comprehensive global estimate to-date

Over five trillion pieces of waste plastic are floating in our oceans weighing 268 940 tonnes and causing damage throughout the marine food chain, according to data collected by a team of scientists from the United States, France, Chile, Australia and New Zealand [1, 2]. The team went on 24 expeditions between 2007 and 2013 that surveyed all five sub-tropical gyres (large rotating ocean currents): North Pacific, North Atlantic, South Pacific, South Atlantic and Indian Ocean, and extensive coastal regions and enclosed seas (Bay of Bengal, Australian coasts and the Mediterranean Sea), and include surface net tows and visual transects for large plastic debris at 1 571 locations in all oceans.

This is the most comprehensive survey to-date, yet it is most likely a gross under-estimate of the scale of waste plastic pollution in the oceans.

Waste plastic an escalating environmental hazard

In 2012, 280 tonnes of plastic was produced globally; less than half consigned to landfill or recycled. Much of the remaining 150 million tonnes not still in use litters continents and oceans [3]. Global trends suggest that waste plastics are accumulating exponentially in parallel with trends in plastic production that has increased 56o fold in just over 60 years. These by-products of the oil industry are icons of the industrial economy built on the over-exploitation of

oil and other fossil fuels that's turning the planet literally into a terminal wasteland [4] (Redemption from the Plastics Wasteland, SiS 29).

The estimate from the global survey of plastic pollution on the sea surface for all fragment size classes combined is only 0.1 % of the world annual production. The estimates are “highly conservative”, the team acknowledged [2]. They do not account for the potentially massive amounts of plastic washed up on shorelines, submerged on the seabed, suspended in the water column, and inside organisms. Also, the survey only collected particles larger than 0.33 mm, due to the size of the netting used. Sequestration in the sediment is the likely fate of plastic pollutants after perpetrating numerous impacts on organisms along the way.

Waste plastic in the open ocean is degraded into smaller and smaller fragments through UV radiation, mechanical abrasion, biological degradation, and disintegration. The fragments disperse in the ocean, converging in the subtropical gyres. Generation and accumulation of plastic pollution also occur in closed bays, gulfs and seas surrounded by densely populated coastlines and watersheds. The impacts through ingestion and entanglement of marine organisms ranging from zooplankton to whales, seabirds and reptiles are well documented, and new studies are showing up harmful effects of nano-size plastic particles that have escaped inventories so far (see [5] Plastic Poisons in the Food Chain, SiS 65).

The data from the global survey showed that during fragmentation plastics are lost from the sea surface [2]. There is a 100-fold discrepancy between the expected microplastics (particles
amounts observed, indicating a tremendous loss of microplastics. This suggests removal processes are operating, including UV degradation, biodegradation (by microorganisms), ingestion/absorption by organisms, decreased buoyancy due to fouling organisms, entrapment in settled detritus, and beaching. Fragmentation rates of already brittle microplastics may be very high, breaking them down into ever smaller submicron or nanoparticles, and unrecoverable by the nets. Numerous studies demonstrate that many more organisms ingest small plastic particles than previously thought, either directly or indirectly via their prey organisms.
These are then packaged into faecal pellets which sink to the bottom. Further, there is evidence that some microbes can degrade microplastics.

Plastics should be classified hazardous waste

Read the rest of this report here
http://www.i-sis.org.uk/Plastic_Plague_in_Our_Oceans.php

Or read other recent reports from ISIS here
http://www.i-sis.org.uk/index.php

If you find this report useful, please support ISIS by subscribing to our

magazine Science in Society, and encourage your friends to do so.
http://www.i-sis.org.uk/subscribe
Or have a look at the ISIS bookstore for other publications
http://www.i-sis.org.uk/onlinestore/books.php
==========
This article can be found on the I-SIS website at
http://www.i-sis.org.uk/Plastic_Plague_in_Our_Oceans.php

All new articles are also announced on our RSS feed
http://www.i-sis.org.uk/feed.xml

ISIS website is now archived by the British Library as part of UK national documentary heritage

If you like this original article from the Institute of Science in Society, and would like to continue receiving articles of this calibre, please consider making a donation or purchase on our website

http://www.i-sis.org.uk/ISISappeal.php

ISIS is an independent, not-for-profit organisation dedicated to providing critical public information on cutting edge science, and to promoting social accountability and ecological sustainability in science.

If you would like to be removed from our mailing list unsubscribe at
http://www.i-sis.org.uk/unsubscribe

or email unsubscribe@i-sis.org.uk
==========
CONTACT DETAILS
Please see http://www.i-sis.org.uk/contact.php