Dangers of Plastics in the Marine Environment

‘Plastics like Diamonds.........ARE FOREVER!’

They are ubiquitous, long lasting and extremely harmful to the marine environment and its wildlife. Every year around 250 billion pounds (lbs) (114 billion kgs) of plastic pellets are produced worldwide for use in the manufacture of plastic products. Of the billions of pounds of plastic manufactured each year, only about 3.5% is recycled. A small amount is incinerated but the remainder stays with us for hundreds of years, contaminating the oceans and seas and all the wildlife within them.

Plastics in our seas

On or near every square mile of the oceans surface there is an average of 46,000 pieces of plastic and this is growing. Of the plastic pollution in the sea, 80% comes from land-based sources. Over the past 16 years plastic waste has consistently accounted for over 50% of all litter found during MCS Beachwatch Surveys. In 2008, plastic accounted for almost 60% of all litter found. The density of plastic recorded for 2008 was 1307 items/km. This is the highest level ever recorded in a MCS Beachwatch Survey and has increased by 146% since 1994 (Fig. 1).

One particular area in the North Pacific Ocean, the ‘North Pacific Gyre’, where circulating currents are driven together, contains an area the size of 50 Northern Irelands put together full of plastic! The ratio of plastic to plankton by weight is a staggering 6:1 in this region.
Plastics are made up of petroleum-based products and synthetic materials that break down into smaller and smaller pieces, never completely going away. Common plastics may take 450 years or more to break down\(^2\). It actually takes longer for plastic to degrade in the oceans than on land, due to the cooling effect of the water preventing heat build up. This results in plastics remaining in our marine environment and the food chain for hundreds, if not thousands of years. Our beaches are littered with plastic bottles, six-pack rings and discarded fishing nets and lines. Floating and beach debris is not only aesthetically displeasing but it also clogs up our waterways and severely affects marine life.

**How do plastics affect marine wildlife?**

Seabirds, turtles, cetaceans (whales and dolphins) and fish can all mistake plastic debris for food and/or become entangled in it. As plastics cannot be digested they may block animals’ throats and stomachs, causing them to suffocate or starve to death. Leatherback turtles, found around the Northern Ireland coastline, can mistake plastic bags for jellyfish, their prime source of food, and swallow them causing suffocation or a blocked gut. They may also eat plastics which contain air bubbles, becoming permanently buoyant preventing them diving for food.

![Turtle mistaking plastic wrapping for food (Rebecca Hosking/BBC).](image)

Certain toxic pollutants, for example polybrominated diphenyl ethers (PDBEs), which cause hormone disruption and affect the nervous system, are attracted onto the surface of plastic pieces at many times the concentration of that in seawater. Toxic pollutants pose a serious threat to marine animals once ingested. Ultimately, these pollutants may then be passed up the food chain to fish and to human consumers.

Plastics are of particular environmental concern as they may never wholly break down, and can persist in the marine environment for hundreds of years. Larger items will eventually break down into small plastic pieces and microscopic dust, which can be consumed by filter feeding animals such as barnacles\(^5\).
All types of marine animals can also fall prey to ‘ghost fishing’ becoming entangled in discarded fishing nets; the nets continue to ‘fish’ without the presence of the fishermen.

A bird falling prey to ‘Ghost Fishing’ (David Peake/Marine Conservation Society).

**Plastics, Climate Change and Ocean Acidification**

In the production of plastics and the manufacture of plastic products, fossil fuels such as coal, oil and gas are burnt. This is contributing to the release of carbon dioxide (CO$_2$) into the earth’s atmosphere exacerbating the effects of climate change.

Approximately one third of the anthropogenic (human induced) CO$_2$ produced in the past 200 years has been taken up by the oceans. Each day the oceans absorb 22 million tonnes of CO$_2$ and this is having profound consequences in the marine environment, causing ocean acidification and the shifts in distribution of planktonic species that are fundamental to marine food webs. Ocean acidification occurs when CO$_2$ in the atmosphere reacts with seawater to produce a weak acid – carbonic acid. The resulting acidity of the seawater reduces the ability of shell-building sea life and coral reefs to build their calcium carbonate skeletal structures - as the increase in the acidity of the water reduces their ability to grow properly$^6$.

It is also thought that huge swirls of floating plastic, such as in the North Pacific Gyre, could contribute to global warming by creating a dense shade canopy which makes it difficult for plankton to grow.

If we continue to produce and use such large amounts of plastic, we are threatening our rich and biologically diverse marine ecosystems, which the health of our seas depends on. There is an urgent need for us, as a society, to reduce our dependence on plastic by using better alternatives; for example by cutting out plastic bags and using cloth bags instead. Litter problems can also be reduced by not dropping litter in the first place, by using bins provided, and by making use of local recycling facilities.
What’s happening in Northern Ireland?
Due to changes in our society and lifestyle over the past few years, plastic pollution is increasing each year in Northern Ireland, with more and more waste plastic being produced. Plastics occupy over 106,000 cubic metres of landfill in Northern Ireland; as they don’t degrade easily and so much is wasted they are taking up valuable space and wasting a resource that could be recycled or simply reused7.

We use around 230 million plastic bags in Northern Ireland every year, with the majority ending up in landfill. Over 12,000 tonnes of plastic bottles swamp into Northern Ireland’s waste stream each year and this number is gradually increasing8.

What can you do to help?
- Reduce, reuse, recycle – Be conscious shoppers and avoid excess plastic packaging. Reuse the plastic bags you already have and find out about recycling points for plastic products in your area. Take a bag with you!
- Get involved! Learn more about the impacts of plastic pollution and help look after your own beaches. Be a Beachwatch or Adopt-a-Beach volunteer! Visit www.mcsuk.org to find out more. Also see www.ulsterwildlifetrust.org and click on ‘Save Our Seas’ to take action.
- Encourage others and spread the word!

For more information
Visit the Marine Conservation Society website to find our more about Beachwatch and Adopt-a-beach at www.mcsuk.org
Say NO to plastic bags -see: ‘NEEDa bag’ campaign www.bagladyproductions.org

References

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