

Adverse effect of Non-biodegradable polymer on Marine life

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Abstract

From past few years there is serious problem of pollution due to non-biodegradable polymer (NBP). Every part of nature is adversely effected by these type pollutants (NBP). There is loss of biodiversity as a result of harmful effect of these NBP. It effect marine wildlife in two important ways, by entangling creatures and by eaten. The effect of NBP bags does not end with the death of animal. It will released into the environment to be ingested again by another animals. Marine debris are affecting at least 267 species worldwide, including 86% of all turtle species, 44% of all sea bird species and 43% of all marine mammal species. The purpose of this paper is to provide overview on harmful effect of NBP on marine life.

Key words

Non Biodegradable Polymer, Marine life, Environment Marine debris.

Introduction

Polymer word is self explanatory as poly means many and mer means repeating units that is molecule with large number of repeating units. Polymers are high molecular mass substances consisting of very large number of simple repeating structural units joined together by covalent bonds. Depending upon degradation polymers are of two types Biodegradable and non-biodegradable. A biodegradable polymer breaks down completely by nature to make a new form. Synthetic polymer which are used in our daily life are product of petrochemicals not product of nature and can not be broken down by natural process. IN case of polyolefin as in polyether repeating unit is --which is highly resistant to degradation due to high bond dissociation enthalpy of C-C and C-H covalent bonds, absence of reactive site, lack of chromophore make it inert toward photo and biodegradation, highly hydrophobic. Because of above characteristics PE has been considered almost inert to biodegradation. Some polymers may take 500 years to decompose. Biodegradation of LDPE film was reported as 0.2% weight loss in 10 years.

The non-biodegradation property of polymer will effect marine life if these enter into marine by any ways these will survive many years in water affecting aquatic animals in various ways.

Effect of Non-biodegradable polymer (plastic) on marine life

Human activities are responsible for a major decline of the world's biological diversity, and the problem is so critical that combined human impacts could have accelerated present extinction rates to 1000-10,000 times the natural

rate. One particular from of human impact constitutes a major threat to marine life: the pollution by plastic debris. Plastics are synthetic organic polymers, and though they have only existed for just over a century. These threats to marine life are primarily mechanical due to ingestion of plastic debris and entanglement in packaging bands viz. synthetic ropes and lines, or drift nets Broken or discarded fishing gear, pellets, scrubbers, micro plastics, films and flakes.

Plastic fragments on beaches are derived either (1) from inland sources and are transported to coasts by rivers, wind, man-made drainage systems or human activity, or (2) directly from the oceans where low density floating varieties accumulate and are transported across great distances. Floating plastic fragments in the world's oceans have been reported since the early 1970's with the amount of debris showing a documented exponential increase.

The majority of these items are non-biodegradable and can attract encrusting organism as drift plastics. Types and amounts of plastic debris on beaches are controlled mainly by topography, current and storm activity, proximity to litter sources and extent of beach use. Surveys carried out in South African beaches, showed that the densities of all plastic debris have increased substantially. In Panama, experimentally cleared beaches regained about 50% of their original debris load after just 3 months. Plastic pellets can be found across the Southwest Pacific in surprisingly high quantities for remote and non-industrialized places such as Tonga, Ratotonga and Fiji. In New Zealand beaches they are found in quite considerable amounts, in counts of over 100000 raw plastic granules per meter of coast, with greatest concentration near important industrial centers. Their durability in the marine environment is still uncertain but they seem to last from 3 to 10 years, and additives can probably extend this period to 30-50 years. Since they are also buoyant, an increasing load of plastic debris is being dispersed over long distance in marine environments and beaches across the globe are littered with plastic debris. Items of plastic have been reported from the poles to the equator. Even far and remote beaches (Sub Antarctic islands and South Pacific) are becoming increasingly affected by plastic debris, especially fishing lines.

In 1975 the world's fishing fleet alone dumped into the sea approximately 135400 tons of plastic fishing gear and 23600 tons of synthetic packaging material. It is estimated that merchant ships dump 639000 plastic containers each day around the world and ships are therefore, a major source of plastic debris. Recreational fishing and boats are also responsible for dumping a considerable amount of marine debris, and according to the US Coast Guard they dispose approximately 52% of all rubbish dumped in US waters.

The accumulation of NBP debris can inhibit the gas exchange resulting hypoxia or anoxia in the benthos that can interfere with the normal ecosystem functioning. In addition, chemicals including phthalates, PCB's and organ chlorine pesticides, reported in plastic fragments may present a toxicological hazard. Dispersal of aggressive alien and invasive species by these mechanisms leads one to reflect on the possibilities that ensuing invasions could endanger sensitive or at-risk coastal environments (both marine and terrestrial) far from their native habitats.

The following table shows number of species with records of ingestion.

Table 1. The number of species with records of ingestion.

Species Group	Total No. of Known Species	No. of Species with Ingestion Records		% Increase in the No. of Species with Ingestion Records (1997-2015)
		Laist (1997)	Gall & Thompson (2015)	
Fish	16754	33 (0.20%)	50 (0.30%)	52%
Seabirds	312	111 (36%)	122 (39%)	10%
Sea Turtles	7	6 (86%)	6 (86%)	0%
Marine Mammals	115	23 (23%)	30 (26%)	15%

This NBP can affect marine wildlife in two important ways : by entangling creatures, and by being eaten. However, the impact of NBP bags does not end with the death of one animal; when a bird or mammal dies in such a manner and subsequently decomposes, the plastic bag will be released into the environment to be ingested again by another animal. The problem may be highly underestimated as most victims are likely to go undiscovered over vast ocean areas, as they either sink or are eaten by predators. Marine debris are affecting at least 267 species worldwide, including 86% of all sea turtle species, 44% of all seabird species, and 43% of all marine mammal species (Least, 1997) Some representative examples typifying the global spread of NBP ingestion behavior are red phalaropes; 15 species of sea birds, Gough Island, South Atlantic Ocean; Wilsons storm-petrels, Antarctica; storm petrels short-tailed shearwaters, Bring Sea southern giant petrels, Southern Atlantic Ocean; northern fulmars, Nunavut, Davis Strait. Most distressing, over a billion seabirds and mammals die annually from ingestion of plastics. Brown mentioned that in Newfoundland 100000 marine mammals are killed each year by ingesting NBP.

Conclusion

Above mentioned impact of non-biodegradable polymer shows that there is danger of aquatic ecosystem. Which should be controlled timely other wise there can be serious consequences. As three fourth part of earth is covered by water bodies. If there biodiversity of marine effected more it will also be threaten to human race on terrestrial part of earth. Time has come that every person of this world think and act seriously to save marine life.

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