



Marine Pollution By Plastic Debris: Imminent Dangers And Solutions

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Abstract

Marine environment plays a vital role in safeguarding the very existence of life in the blue planet since it absorbs 90 percent of excessive heat thus it has a crucial role in equilibrating the climate and climate change of the planet. The life saving machinery of the world is in an imminent danger due to marine pollution by plastic debris. A piece of plastic that enter into the marine environment exists in the ocean for more than millennium. As per statistics at least 14 million tones of plastic reach in the marine environment every year and it is 80 percent of all other debris. Marine plastic is injurious to marine mammals, equilibrium of climate, damaging to food web and the best solutions to regulate it is to make international laws are regulations, ban of single use plastic, availing alternatives at cheap rate, recycling, systematic waste manages technologies etc. It is doctrinal research using number of research works and surveys.

Keywords: Marine Pollution; Plastic pollution; Nairobi Convention - 2022; Marine plastic pollution, Recycling of plastic; Growth of plastic pollution; climate change; plastic threats in marine environment; sustainable development

Introduction

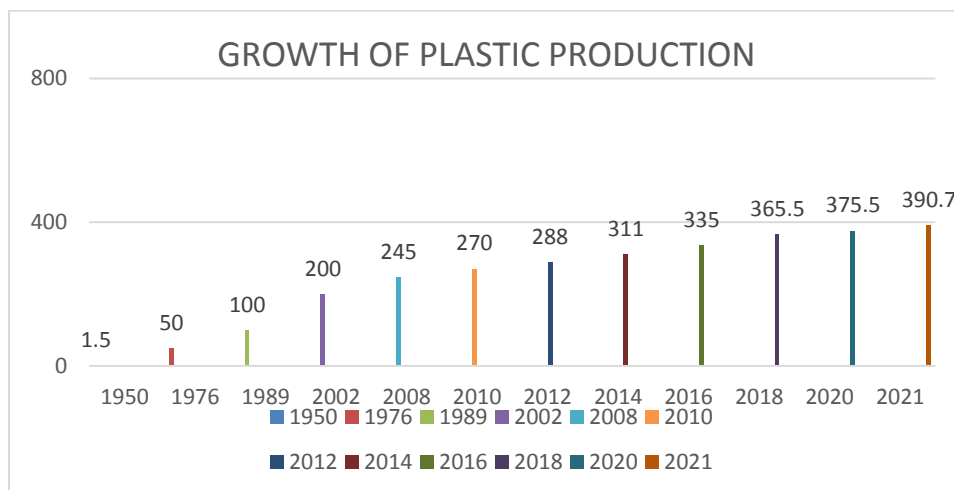
Pollution by plastic debris and specifically marine pollution by plastic debris is the most imminent danger before the human race hanging as the sword of Damocles(Hammer et al., 2012). It was considered to be the most advantageous and useful discovery of the 20th century for its light weight, chemical stability, thermal conductivity, quality of resistance from rust, adaptability to various designs, cheap in cost of production, transparency, durability etc. Plastic as basic building blocks was discovered in the year 1850 by English scientist named Alexander Parks. It was a rudimentary discovery and the first synthetic form of plastic was produced by a Belgium chemist named Leo Baekeland in the year 1907(de SÁ et al., 2020).

The word plastic means “flexible and easily designed”. The combination of materials used to produce synthetic plastic is known as polymer which means “of many parts”. Plastic can be produced by natural cellulose as well as from petroleum and other fossil fuels. The structure of the atoms of plastic decides its plasticity or the quality of plastic such as hardness, thickness,

transparency, flexibility, weight etc. The variety of chemical compounds added to the polymer gives variance to plastic products and make it outstandingly useful products in all spheres of our life(Eyerer & Gettwert, 2010). The discovery of plastic was praised as the greatest blessing of the blue planet however today the world realize that it is the most dangerous discovery ever has made in the history due to its millennium lasting pollution. It becomes a millennium lasting pollution because a plastic piece that is manufactured endure in this world for more than 1000 years to decompose. The whole blue planet is hazardously affected by plastic debris pollution and the most affected arena is marine which is the downstream of the earth(Eriksen, 2014).

Growth Of Plastic Production

The growth of plastic production was in the year 1950 only 1.5 million metric tons. The growth percentage of plastic and its production is 4 percent per annum from the year 1950 to 2021. The manufacturing of plastic products high rocketed from 1950 onwards without any control or legal measures(Mulder, 1998).



The above chart clearly shows global jumping of plastic production which was only 1.5 million metric tons of plastic in the year 1950 peaked into 50 million metric tons within 26 years; it peaked into 200 million metric tons in next 26 years that is in 2002. The graph above clearly indicate that the growth is relentless and steady and reached 390.7 million metric tons in the year 2021. It is interesting note that while the growth of plastic production is 4 percent per annum the growth of plastic waste is 3.1 percent and that debris will remain as landfill or move to marine environment and remain as debris for more than a millennium. It should be noted that among the mass production of plastic 40 percent manufacturing is concentrated on single use products which are used and thrown as waste within hours of its maximum use(Geyer et al., 2017).

Imminent Dangers Of Marine Pollution

Marine research indicates that plastic has become a pervasive disturbance to the entire oceanic environment and the presence of plastic cover has been found moving in underwater currents of sea in 7 miles below the oceanic water. Plastic debris is creating layers in the seabed which forbid growth of marine plants such as sea grass, algae and seaweeds which are food for many marine species.

Following are the imminent dangers of marine plastic:

Injury To Marine Animals

Plastic is amassing fast in the marine environment and it is estimated that among the vast majority of plastic produced all over the world 14 million tons of plastic moved to the marine environment every year. The whole marine environment is polluted and, in the pollution, most affected are the marine mammals. Marine plastic debris as part of its

decomposition and by the tearing of waves and water currents become plastic particles. The glittering pieces of plastic debris are eaten mistakenly by marine mammals. These marine mammals succumb to death due to ingestion and suffocation(Hammer et al., 2012). Marine mammals are also trapped and hooked up in 'ghost gear' that is lost or discarded fishing nets. There are number of reports of death of whales, dolphins, seals and sea lions in ghost gear which is a real and unescapable trap for marine mammals. The marine habitat of marine mammals is greatly disturbed by the excessive presence of plastic debris especially in the seabed. Certain marine mammals also have to leave their natural habitat due to lack of food for which they depend on marine grass which is shrinking due to the concreting of plastic debris in the surface of seabed(Andrady & Cole, 2018).

The Food Web Is Tampered

Another imminent danger of marine pollution by plastic debris is the toppling of the food web. Food web is the chain of food in a single network. Marine environment is becoming 'plastic soup'. Plastic in the form of macro and microplastic in cosmetic products together with plastic fragmentation as part of decomposition to nano plastic, microplastic and macro plastic is increasing the density of plastic steadily in the marine environment. Marine mammals eat small particles of plastic as if food their food and being micro in nature these particles become part of their body and when the larger mammal consumes the smaller ones and when man consumes marine fish it becomes part of our body(Proshad et al., 2017). Microplastic also become part of the body of marine mammals through their gills as they breath. The food web is also affected by plastic consumption of

marine mammals and death of marine beings' due ingestion and through derelict fishing by ghost gear. Plastic all through out its life span, extending more than a millennium, emit toxin as part of decomposition of various chemical compounds that are added to make variance in plastic products. These poisonous toxins produced by plastic debris is also hazardous to oceanic environment and to the food web since it poisons thousands of marine mammals(Ederer & Sluka, 2020).

Ocean Warming And Climate Change

Another dangerous effect of ocean pollution through plastic debris is the ocean warming. Marine environment has commendable role in equilibrizing the climate of the blue planet for 90 percent of the excess temperature is absorbed by the marine environment. It also rivets quarter of the carbon dioxide that is produced especially through massive consumption of fossil fuel(Proshad et al., 2017). The excessive presence of floating plastic in ocean environment hinders the light and heat beams to the depth of marine environment where marine grass and plants are grown. Seabed also is excessively flooded with plastic debris which would take more than a millennium to decompose also block the sunlight. The excessive presence at seabed and seawater topples down the capacity of marine environment to absorb the heat of the environment and naturally it would affect the entire world including the ice zone of Antarctica which also plays a vital role in equilibrating the climate system(Geyer et al., 2017).

Necessary Solution To Marine Pollution By Plastic Debris

The international community has become serious about the imminent danger of marine pollution by plastic debris and met together in Nairobi and decided to control marine pollution by plastic debris by 2024. The convention was an eye opening to the world. Following are the solution for the transboundary pollution created by plastic debris.

Legal Control Of Plastic

Plastic can be controlled only by international accord since it is a transboundary pollution. Plastic debris move from one part of the continent to another part through water currents of the sea and so nothing can control the pollution unless and until the international community as a whole

come together to regulate it. Nairobi international convention held in the year 2022 is said to be 'a track for a cure of marine pollution by plastic debris. The specific goal of the convention was to formulate an international accord for a legal control of plastic by the end of 2014(Antony, 2022). The participants from various states unanimously accorded that the world can't close the eye towards nonbiodegradable plastic or else the peril of the world is not away due to plastic pollution. The international agreement was an opening and a stepping stone for an internationally legally binding instrument only through which international cooperation is possible to the maximum extend to regulate production, supply and consumption of nondegradable plastic products(U N, 2018).

Reduction Of Single Use Plastics

The immediate remedy to curb plastic pollution is the international ban and cooperation to regulate the production, supply and usage of single use plastic products. The manufacturing and use of single use plastic exploded from the year 1950 as an easy, safety, and cheap means for packaging, throwaway utensils, bottles, medical equipment, straw and much more. The production of single use plastic was comparatively small from 1950 to 1970 however thereafter 1970 to 1990 the manufacturing of plastic products tripled and the wave continued to rise up even now(*Ban on Single Use Plastic in India: Step towards Clean India, Green India (Ministry of Environment, Forest and Climate Change)*, 2022). The production of single use plastic has high rocketed up to 40 percent and these products are dumped as waste as landfills or marine pollutant for more than a millennium without any decomposition emitting various kinds of toxin all throughout its life. Realizing the perils of single use plastics, many countries including India have volunteered to ban or regulate the production of single use plastics. It would be effective only if it is banned and regulated internationally since it is a transboundary pollutant(United Nations Environment Programme, n.d.).

Availability Of Alternatives And Awareness

The hazardous growth of plastic can be curtailed and regulated only through the availability of alternative products which are biodegradable and nature friendly. There was

a time in which man depended on nature than single use plastic products. It is high time to return to the nature for sustainable development and the awareness should be strongly added to the curriculum of school syllabus. Nature's blessings for sustainable development such as bamboo, glass, paper, coir, jute, coconut products, cotton, cork, wheat straw, natural fiber, stainless steel, clay pots etc. can be substituted for plastic products. To reach the goal of sustainable products instead of single use plastic products governments should promote sustainable products through various means such as tax to plastic products and tax relaxation to sustainable products. The governments should also give economical as well as technical assistance to cheapen the products in markets (Song et al., 2009).

Increasing Recycling Process

Increasing recycling process of plastic waste can reduce landfills of plastic trash as well as marine pollution. It is interesting to note that only 9 percent of plastic is recycled and the rest 91 percent of plastic trash is becoming landfills or getting into the marine environment sooner or later. Though recycling downgrades the quality of plastic owing to the presence and mixture of various chemical compounds added to plastic products for varying its features, it reduces plastic waste in considerable quantity and it would also cheapen the cost of production. Collecting plastic waste for recycling is considered as the best way of administering waste management of plastic debris. Through effective management plastic may be removed from sources of pollution and at the same time effective segregation of plastic can reduce degradation of plastic (Hopewell et al., 2009).

Systematic Waste Management

Systematic waste management is an imminent need of the time. The waste especially of plastic products if not retained from landfills or waterbodies would remain there for more than a millennium. Systematic plastic waste management includes promulgation of adequate laws, regulations, application of laws, collection, separation and recycling of plastic products (Nairobi Convention 2022-A Track for A Cure of Marine Plastic Pollution, 2022). The cost of production is reduced considerably since the cost of raw materials are saved through the collection of plastic debris which is part of systematic

management. Systematic waste management also includes reducing the possibility of downgrading the plastic at the time of recycling with the introduction of advanced technological knowhow (*Plastics without Waste-The Danish Government's Plastics Action Plan Ministry of Environment and Food*, 2018).

Conclusion

Plastic has become a most convenient friend of human race but now the world has realized that it is no more a friend but foe since its pollutive presence extends for generations. The harm that creates by plastic debris in the marine environment is irreversible and irreparable. It is hazardous to entire marine world and the perils is extended to human beings directly in the form of micro plastic through food web. It is high time to think of stopping the production and use of single use plastic and move to sustainable alternatives. Plastic debris is choking the world without any kind of solution. It is inevitable to have international cooperation and binding legal control to regulate and manage plastic production, distribution and usage. The step at Nairobi 2022 for an internationally legally binding accord to fight against marine pollution by plastic debris in 2024 be actualized for the survival of the world.

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