



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(6): 141-143
© 2022 TPI
www.thepharmajournal.com
Received: 01-03-2022
Accepted: 04-04-2022

Madhvee Dhairykar
School of Wildlife Forensic and
Health, Nanaji Deshmukh
Veterinary Science University,
Madhya Pradesh, India

Shobha Jawre
School of Wildlife Forensic and
Health, Nanaji Deshmukh
Veterinary Science University,
Madhya Pradesh, India

Nidhi Rajput
School of Wildlife Forensic and
Health, Nanaji Deshmukh
Veterinary Science University,
Madhya Pradesh, India

Impact of plastic pollution on wildlife and its natural habitat

Madhvee Dhairykar, Shobha Jawre and Nidhi Rajput

Abstract

The impact of plastic pollution on wildlife is stunning. Entangle many wild creatures, strangling and drowning them and sometimes severing their limbs. Entangled wild animals also have trouble feeding and suffer injuries that can become fatal. Many of aquatic and terrestrial wild species are suffering from plastic pollution as result their natural habitats are disturbing continuously. Due to plastic waste soil, water and animals affected and it cause life threatening for them. Creating a circular economy would take legislation, international agreements and industrial incentives. Management of plastic waste is inadequate in all most all developing countries because of low environmental standards, poor waste recovery and disposal systems, low economic status, poor hygienic and living standards, lack of awareness of public regarding harmful effect of plastics, no strict law enforcement regarding waste disposal, and many more factors.

Keywords: Plastic, pollution, wildlife, impact, birds

Introduction

Plastics are synthetic compounds made from carbon-based materials; most plastic is derived from oil and other fossil materials, though it can also be made from other sources like cellulose and corn starch. Plastic is widely used because of its durability, but this also makes it dangerous: most plastics are not biodegradable and remain in the environment for hundreds of years. The root cause of plastic pollution is found in the delays and gaps in plastic waste management in most of the countries. Key economic sectors in the fisheries and tourism, are negatively impacted by plastic other pollution (Alessi and Giuseppe 2018) ^[1].

Since all most plastics are not biodegradable, the plastics present in the environment will remain there for hundreds or thousands of years (Geyer *et al.*, 2017) ^[20]. Plastics are synthetic compounds made from carbon-based materials; most plastic is derived from oil and other fossil materials, though it can also be made from other sources like cellulose and corn starch. The accumulation of plastic and products made of plastic in the environment lead to plastic pollution which imposes a hazardous effect on wildlife and human food chain. The plastics have a chemical configuration by which they are resistant to environmental degradation rusting to high incidences of environmental pollution due to slow degradation.

Effect on environment

Soil

Plastics released harmful chemicals by seepage in the groundwater and in the ecosystem especially in the soil. Sewage is a key factor in the distribution of microplastics. 80 to 90% of the plastic particles contained in sewage persist in the sludge. This sewage sludge is massively used as fertilizer, thus causing the wide dispersion of microplastics in our the soils. This can be harmful to the environment because the surfaces of tiny fragments of plastic may carry different microorganisms like bacteria and viruses that act as vectors for diseases. Polymer and nylon degrading bacteria like *Pseudomonas*, nylon-eating bacteria and *Flavobacteria* contribute to the release of methane gas from the breakdown of nylon which responsible for greenhouse gas and global warming (Ganguly and Choudhary, 2018b) ^[5]. Microplastics interact with soil fauna and disturb their health. For example earthworms, make burrows differently when microplastics are present in the soil, which affect the earthworm's fitness and the soil condition. This can further damage the rest of the environment by reducing forest flora which dependents on earthworms.

Corresponding Author
Madhvee Dhairykar
School of Wildlife Forensic and
Health, Nanaji Deshmukh
Veterinary Science University,
Madhya Pradesh, India

Water

Plastic contaminates the water bodies and oceans by storm-water runoff, flowing into watercourses or directly discharged into coastal waters. This pollution enters the food chain thereby causing hazardous long term carcinogenic effect to fishes, animals and human beings due to the release of diethylhexyl phthalate, lead, mercury and cadmium. Oceans are generally contaminated from micro-plastic debris which floats on the sea surface (Walker and Xanthos, 2018) [14].

Wildlife

Wild animals living an area which are close to human habitat or contaminated with plastic and other foreign body materials are more susceptible to the development of plastic related health issues. The occurrences of polythene materials were well documented by various researchers' mostly in livestock but in wild animals information is still not well documented. Ruminant impaction due to indigestible foreign materials is rarely reported in wild ruminants as they tend to be selective feeders (Nagesh *et al.*, 2015). Entrance and migration of foreign objects through the body tissues lead to many complications that differ according to the nature of the foreign body and the way of its entrance into the tissues (Kumar and Dhar, 2013) [18]. Accumulation of plastic bag and other non degradable waste causes environmental pollution that can be manifested in number of ways. Foreign body ingestion such as plastic bags and other indigestible materials found in ruminants could pose serious health problem among free grazing animals and it is a common problem associated with these wastes which lead to death of domestic and wild animals. (Harne *et al.*, 2019) [6]. This pollution enters the food chain thereby causing hazardous long term carcinogenic effect to fishes, animals and human beings due to the release of diethylhexyl phthalate, lead, mercury and cadmium. Wildlife Wild animals living an area which are close to human habitat or contaminated with plastic and other foreign body materials are more susceptible to the development of plastic related health issues. The occurrences of polythene materials were well documented by various researchers' mostly in livestock but in wild animals information is still not well documented. With the expansion of agriculture and livestock near to natural areas, humans and their livestock have coming into greater contact with populations of wild animals in their habitats. Diseases have been documented as a major cause of local extirpation of various types of wild animal species (Sengar *et al.*, 2017) [12] and in such type of infected population, plastic impaction can increase the chance of population decline.

Marine Animals

In the aquatic animals, 134 species are victims of plastics ingestion, including 60 species of fish, all 3 species of sea turtle, 9 species of seabird and 5 species of marine mammal (sperm whales, fin whales, bottlenose dolphins, Risso's dolphins and striped dolphins) (Deudero and Alomar, 2015) [4]. Today, 90% of the world's aquatic birds suffering from plastic contamination in their stomach (in 1960 it was 5%), by 2050 this number may rise to 99% if action is not taken to reduce the contamination of plastics into the sea (Alessi *et al.*, 2018) [1]. Fibres and microplastics have been found in oysters and mussels, while crisp packets and cigarettes have been found in large pelagic fish (Jackson, 2000) [7]. The most extreme case was when 9m of fishing line, 4.5m of flexible hose, 2 flower pots and several plastic tarps were found in the

stomach of the whale (de Stephanis, 2013) [3]. Plastic cause various consequences in the body. It reduces the stomach capacity, which reduces the sense of hunger and subsequent fat deposition and cause various abnormality such as intestinal blockage, ulcers, necrosis, perforations and wounds as results the death of the animal. All the aquatic turtle species have been found to ingest plastics (UNEP, 2015) [13].

Over 90% of the damage caused to marine wildlife by human waste is due to plastics (Law, 2017) [10]. Globally, there are about 700 marine species threatened by plastics, of which 17% are listed by IUCN as "threatened" or "critically endangered". Large plastic pieces injure, suffocate and often kill marine animals, including protected and endangered species, such as sea turtles. Sea turtles are mostly affected by plastic pollution including some species of jelly fish which cause esophageal obstruction in them and also accumulate in the stomach of whales. Small fishes consume the tiny bits of plastic below the aquatic surface (Parker, 2014). Some specific fishes like Tuna, sword fish and Lantern fish also consume plastics by mistake which become a part of the aquatic food chain

Birds

Plastic waste and debris have caused substantial environmental pollution globally in the past decades, and they have been accumulated in hundreds of terrestrial and aquatic avian species. Birds have the largest number of species (more than 10,000 living species) among the tetrapod classes (Ducatez and Lefebvre 2014). They are endotherms organisms that are widely distributed in various habitats globally, from the equator to polar areas, and from oceans and freshwater to high plateaus, and they exhibit flight-related morphological and physiological traits that capable them to occupy diversified habitats and become important role of many ecosystems (Orme *et al.* 2006). Plastic pollution also affects birds which cause the obstruction of digestive tract as result tissue damage due to toxic chemicals called polychlorinated biphenyls (PCBs). The plastic particles are found intact within the birds' gizzards and proventriculi along with the plastic garbage, such as styrofoam mixed with their feed, it cause high mortality and morbidity of the aquatic birds (Parker, 2014) [11]. Terrestrial birds are an essential component of land ecosystems, with various ecological functions in the food web (Carlin *et al.* 2020) [2]. Zhao *et al.* (2016) [15] reported that macroplastics in the gastrointestinal tracts of most of the terrestrial bird species.

Conclusion

Management of plastic waste is inadequate in all most all developing countries because of low environmental standards, poor waste recovery and disposal systems, low economic status, poor hygienic and living standards, lack of awareness of public regarding harmful effect of plastics, no strict law enforcement regarding waste disposal, and many more factors. Plastic pollution is a global problem caused mainly by excessive consumption and with lack of effective waste management. It can be tackled with the commitment and collaboration of all agencies including governments, NGOs, businesses and individuals. For reducing impact of plastic pollution, research endeavors should be developed to convert petroleum-based plastics to bioplastics. Also, educating and spreading the awareness among common people to clean the land, water bodies like rivers, ponds and lakes can reduce the mortality of wild animals, livestock, fishes and sea animals

due to plastic pollution. The recent ban on poly bags by government and National Green Tribunal, India would go long way towards conservation of wildlife and natural habitat.

Acknowledgments

The author thanks her organization (School of Wildlife Forensic and health, Nanaji Deshmukh Veterinary Science University, Jabalpur, M.P.) for supporting her research activities.

References

- Alessi E, Giuseppe DC. Out of the plastic trap: Saving the Mediterranean from plastic pollution, World Wildlife Fund, Mediterranean Marine Initiative, Rome, Italy, 2018, 28.
- Carlin J, Craig C, Little S, Donnelly M, Fox D, Zhai L, *et al.* Microplastics accumulation in the gastrointestinal tracts in birds of prey in central Florida, USA. *Environ Pollut.* 2020;264:114633.
- De Stephanis R, *et al.* As main meal for sperm whales: plastics debris. *Mar. Pollut. Bull.* 2013;69:206-214.
- Deudero S, Alomar C. Mediterranean marine biodiversity under threat: Reviewing influence of marine litter on species. *Marine Pollution Bulletin.* 2015;98(1-2):58-68.
- Ganguly S, Choudhary S. Plastic pollution: an environmental concern. *International Journal of Emerging Technique in Advance Engineering.* 2018b;8(8):55.
- Harne R, Rokde A, Jadav K, Chitariya JM, Sengar A, *et al.* Studies on plastic bezoar ingestion in free range axis deer in summer. *Journal of Animal Research.* 2019;9(2):383-386.
- Jackson GD, *et al.* Diet of the southern opah *Lampris maculatus* on the Patagonian Shelf; the significance of the squid *Moroteuthis ingens* and anthropogenic plastic. *Mar. Ecol. Prog. Ser.* 2000;206:261-271.
- Jambeck B, Jenna R, Geyer RWC, *et al.* Plastic waste inputs from land into the ocean. *Science.* 2015;347(6223):769.
- Jambeck JR, Geyer R, Wilcox C, Siegler TR, Perryman M, Andrady A, Narayan R, Law KL *et al.* Plastic waste inputs from land into the ocean. *American Association for the Advancement of Science (AAAS).* 2015;347(6223):768-771.
- Law KL. Plastics in the Marine Environment. *Annu. Rev. Mar. Sci.* 2017;9:205-229.
- Parker L. New Map Reveals Extent of Ocean Plastic. *National Geographic*, 2014.
- Sengar A, Shrivastav AB, Singh KP, Rokde A, *et al.* Noninvasive assessment of gastrointestinal parasites infection in free-ranging wild herbivores and adjoining livestock of Panna Tiger Reserve, Madhya Pradesh, India, *Veterinary World.* 2017;10(7):748-751.
- UNEP/MAP. Marine Litter assessment in the Mediterranean, 2015.
- Walker TR, Xanthos D. A call for Canada to move toward zero plastic waste by reducing and recycling single-use plastics. *Resources, Conservation & Recycling.* 2018;133:99-100.
- Zhao S, Zhu L, Li D, *et al.* Microscopic anthropogenic litter in terrestrial birds from Shanghai, China: not only plastics but also natural fibers. *Sci Total Environ.* 2016;550:1110-5.
- Orme CDL, Davies RG, Olson VA, Thomas GH, Ding TS, Rasmussen PC, *et al.* Global patterns of geographic range size in birds. *PLoS Biol.* 2006;4:e208.
- Ducatez S, Lefebvre L. Patterns of research effort in birds. *PLoS ONE.* 2014;9:e89955.
- Kumar V, Dhar P. Foreign body impaction in a captive Sambar (Rusa unicolor) *Vet. World.* 2013;6:49-50.
- Negash S, Sibhat B, Sheferaw D. A postmortem study on indigestible foreign bodies in the rumen and reticulum of ruminants, eastern Ethiopia. *Onderstepoort J Vet. Res.* 2015;82:881-886.
- Geyer R, Jambeck JR, Law KL, *et al.* Production, use, and fate of all plastics ever made. *Sci. Adv.* 2017;3:e1700782.