

Starlyn Sosa

Prof Hunter

English 21003-D

15 April 2020

The Effect of Plastic pollution on Sea birds, Sea turtles and other Marine Organisms

Introduction:

The accumulation and persistence of plastic debris in the marine environment is of increasing concern. According to a UN report between 60 to 90 percent of the litter that accumulates on shorelines, the sea surface and the seafloor is made up of plastic debris. Sea turtles and birds are famously known for being affected by plastic pollution. The study “Impacts of Marine Plastic Pollution from Continental Coasts to Subtropical Gyres—Fish, Seabirds, and Other Vertebrates in the SE Pacific” stating that “Globally it is estimated that 52 percent of all sea turtles have ingested plastic debris”. (Schuyler, 2014). Although many organisms like whales and planktivorous fish are affected by plastic, sea birds and sea turtles are disproportionately affected by plastic debris. Seabirds, who according to Sara Kaiser from “islandconservation.org”, “Through migration, foraging, and nesting, seabirds bring sky, island, and sea into relationship. Their ways of life contribute to the health of island plants and wildlife”. Sea turtles “roles range from maintaining productive coral reef ecosystems to transporting essential nutrients from the oceans to beaches and coastal dunes.”. Furthermore,

oceans are an important source of food, “They host 80 percent of the planet’s biodiversity, and are the largest ecosystem on Earth. Fish provide 20 percent of animal protein to about 3 billion people.”. One of many reasons why we need to be proactive and maintain our oceans healthy from pollutants like plastic. Though this paper will focus on how sea birds and sea turtles are affected by plastic pollution, I will also inform about the other organisms affected by plastic.

The rise of Plastic in Oceans

Plastics are a ubiquitous and persistent form of marine pollution. Mass production of plastic increased from around 1.5 million tons in the year of 1950 to more than 322 million tons in 2015. (G, Patricia, C, Sarah). More astonishing is the fact that everyday approximately 8 million pieces of plastic pollution find their way into the oceans a lot of it which comes from the world’s rivers which serve as a direct conduit of trash from cities to marine environment. According to uneenvironment.org the 10 rivers alone carry more than 90% of the plastic waste that ends up in the oceans. These rivers include the Chang Jiang (Yangtze River) with 1,469,481 tons , Indus river with 164,332 tons , Huang He (Yellow River) 124,249 tons, Hai He 91,858 tons, Nile 84,792 tons, Meghna, Brahmaputra, and Ganges which carries 72,845 tons, Zhejiang(Pearl River) 52,958 tons, Amur 32,367 tons, Niger with 35,431 tons, and the Mekong river with 33,431 tons. Whether we mean to litter or not the plastic that we throw away can make its way to the oceans. Plastic litter dropped on the street gets carried away by rainwater and wind and passes through rivers, streams, and drains end up in our oceans.

Plastic consumption by Seabirds

Seabirds along with sea turtles are one of the most well-known animals affected by plastic pollution. This is due to the fact that interactions with vertebrates are best known, because vertebrates are larger and therefore more visible and recognizable than small marine invertebrates. According to the research article, “Impacts of Marine Plastic Pollution from Continental Coasts to Subtropical Gyres—Fish, Seabirds, and Other Vertebrates in the SE Pacific”, seabirds because they feed at the surface are “more susceptible to plastic ingestion than diving species.”. It’s important to note that not all seabird species are affected equally by plastic debris. Plastic consumption by seabird species depend on the place where they feed. The aforementioned article mentions that, “One species with relatively high frequency of plastic ingestion is the kelp gull *Larus dominicanus*, which is commonly observed feeding in fishing ports, at garbage containers, and on waste disposal facilities.”. Another research study, “PLASTIC INGESTION IN MARINE AND COASTAL BIRD SPECIES OF SOUTHEASTERN AUSTRALIA” which researched the levels of plastic in seabird and coastal bird species in Australian waters or the southwestern Pacific, found that 10 of the 30 birds they studied carried debris load, with nine carrying plastic debris. In total, 50 items were collected from 10 birds, 49 of which were plastic. They concluded that overall short-tailed Shearwaters tended to carry more plastic than Wedge tailed Shearwaters. In total “Shearwaters accounted for 67% of all birds that had ingested plastic, and they had ingested the highest number of pieces.”

Plastic ingestion by sea turtles

Like previously mentioned sea turtles are affected by plastic. According to a study published in 2018 which examined sea turtles obtained from across Queensland, Australia “A

Quantitative analysis linking sea turtle mortality and plastic debris ingestion” found that “Of the 246 turtles examined, 58 (23.6%) contained debris: 13 of 24 post hatchlings (54.2%), 41 of 175 juveniles (23.4%), 2 of 13 sub-adults (15.4%), and 2 of 12 adults (16.7%).” It’s worth noting that, “Of these, 160 were green sea turtles (*Chelonia mydas*), 52 were hawksbill turtles (*Eretmochelys imbricata*), 30 were loggerhead turtles (*Caretta caretta*), one was a flatback turtle (*Natator depressus*) and one was an olive ridley turtle (*Lepidochelys olivacea*).” Another study that focused on ingestion of marine debris by juvenile sea turtles in coastal Florida concluded “Debris was found in 24 of 43 green turtles (*Chelonia mydas*), 0 of 7 Kemp's ridleys (*Lepidochelys kempfi*), and 1 of 1 loggerhead (*Caretta caretta*).” (Bjorndal, Bolten, & Lagueux, 1994). Based on both these studies on sea turtles it can be inferred that the species *Chelonia mydas* (Green sea turtles) are affected more than any other species. According to “conserveturtles.org”, “Juvenile green turtles are heavily affected by marine debris”. Though all seven species of sea turtles are affected by marine debris, with juvenile’s green sea turtles affected more than their adult counterparts. It’s important to note the importance of green sea turtle, “Green turtles play a role in their ecosystem by facilitating nutrient turnover and sea grass regrowth. As the turtles’ graze on sea grass, they provide nitrogen-rich fertilizer in the form of fecal matter.” Not only are green sea turtles affected disparately by plastic they are also affected by us, humans. Humans use of nesting beaches negatively affect nesting sea turtles. “Turtle hunters” scavenge beaches to steal turtle eggs and kill sea turtles. Furthermore, green sea turtles like most sea turtles are threatened by hunting, overharvesting of eggs, being caught in fishing gear and loss of nesting beach sites, actions all done by us.

Marine Mammals

Marine mammals show more cases of entanglement by plastic than ingestion. “An important number of pinnipeds, large baleen whales, and Odontocetes in general (dolphins, porpoises, and toothed whales) have been reported entangled in fishing gear throughout neritic and oceanic waters off Peru and Chile.”([Aguayo-Lobo, 1999](#); [Alfaro-Shigueto et al., 2010](#)). Reports of whales entanglement have also been observed, [Campbell et al. \(2017\)](#) reported that “51% of stranded whales off Peru were humpback whales and all individuals showed evidence of entanglement.”. The study takes into consideration that, “Marine mammals are scarce in oceanic waters, so marine mammals are principally affected by entanglement with AMD floating in the productive waters of the HCS.”. Entanglement reports of fishes are very rare, while common for seabirds, marine mammals, and sea turtles. The lack of reports might be due to the fact that fish mortality caused by entanglement would cause sinking, whereas mammals and sea turtles and birds carcasses float at the sea surface and can therefore be studied. Unsurprisingly many reports of entanglement come from dead animals. The fact that plastic is affecting a large number of marine animals goes to show the widespread problem plastic pollution really is. The fact of the matter is that although we are not affected by plastic as much as these species we will be in the future. Plastic in our oceans is expanding at an exponential rate with already 150 million metric tons currently circulating.

Bias in studied populations

It's important to take into consideration the population bias that exist. The study "PLASTIC INGESTION IN MARINE AND COASTAL BIRD SPECIES OF SOUTHEASTERN AUSTRALIA" studied seabirds from southeastern Australia and included study of coastal and near-shore species which constituted over half of their sample. Though the study can confidently claim that "plastic ingestion is prevalent in Australia's pelagic migratory seabird species, and also that ingestion is apparent in resident coastal species." The study "A quantitative analysis linking sea turtle mortality and plastic debris ingestion" studied stranded sea turtles from the Eastern seabird of Australia. Though reports of plastic ingestions by sea turtles are found in other locations, obviously. The study "Ingestion of marine debris by juvenile sea turtles in coastal Florida habitats" studied the digestive tracts from 51 sea turtles' carcasses that washed ashore on the east and west coast of Florida. The fact that population biases exist in these studies does not take away from the fact that seabirds and sea turtles are affected in some way by plastic debris. As more plastic is produced and mismanaged, the plastic entering ocean ecosystems is negatively affecting animals through ingestion and entanglement.

Call to action

As more research is done on plastic effects on different animals' species, we have to be active and do everything we can to halt plastic pollution or at least learn to better manage it. Cities and countries all over the world are now considering or implementing bans on plastic bags. Canada, Australia, the U.S. and Europe, for example are all considering bans or other measures to reduce consumption. Education is important in solving plastic pollution. The public can get involved in decreasing plastic pollution by reducing, reusing, and recycling plastics. Limiting their use of plastic product. Using reusable shopping bags instead of plastic bags.

Participating in a beach or river clean up and help remove plastics from the ocean and prevent them from getting there in the first place. Marine animals like sea turtles, sea birds, play an important role in ocean ecosystems and maintain healthy seagrass beds and coral reefs. “If turtles were to ever go extinct, seagrasses would eventually die off and this would in turn affect the marine life and eventually human life as well” (<https://www.turtleconservationsociety.org.my/what-happens-to-the-environment-if-turtles-became-extinct/>). All animals play a role in our ecosystem and it’s important to maintain it. We as humans don’t know the catastrophic effects the extinction of a species has on our world.

Works Cited

Bjorndal, Karen A., et al. "Ingestion of Marine Debris by Juvenile Sea Turtles in Coastal Florida Habitats." *Marine Pollution Bulletin*, Pergamon, 3 Apr. 2003, www.sciencedirect.com/science/article/abs/pii/0025326X94903913.

Hersh, Kendalyn. "Chelonia Mydas (Green Turtle)." *Animal Diversity Web*, animaldiversity.org/accounts/Chelonia_mydas/.

"Information About Sea Turtles: Threats from Marine Debris." *Sea Turtle Conservancy*, conserveturtles.org/information-sea-turtles-threats-marine-debris/.

Kaiser Sara. "Seabirds: The Ecological Connectors in Need of Conservation." *Island Conservation*, 15 Aug. 2017, www.islandconservation.org/seabirds-conservation-anthropocene/.

Thiel, et al. "Impacts of Marine Plastic Pollution From Continental Coasts to Subtropical Gyres-Fish, Seabirds, and Other Vertebrates in the SE Pacific." *Frontiers*, Frontiers, 20 June 2018, www.frontiersin.org/articles/10.3389/fmars.2018.00238/full#B17.

Wilcox, Chris, et al. "A Quantitative Analysis Linking Sea Turtle Mortality and Plastic Debris Ingestion." *Nature News*, Nature Publishing Group, 13 Sept. 2018, www.nature.com/articles/s41598-018-30038-z.

"7 Reasons Why We Need to Act Now to #SaveOurOcean." *Food and Agriculture Organization of the United Nations*, www.fao.org/zhc/detail-events/en/c/846

Audience Receptions

Audience 1: Children story, 3-8 years of age

There lives a great ocean spirit named Umi. Umi is a very old and powerful spirit who looks over the oceans and seas. Umi is so old in fact that he lived when the dinosaurs roamed the Earth and drank plentifully from his waters. Many different creatures swam and made his waters home. In Umi waters swam many diverse animals. Ranging from different sizes, hues and shapes. Beautiful and colorful coral, starfishes and sea turtles made Umi's water their home. Umi was very fond of these animals. There was this one type of creature however, that intrigued the great spirit Umi the most. It looked different from all the other animals. It had two legs in which it walked on and came out of the Earth naked. It was a Human. Like all the other animals the humans also drank from Umi's water. Though humans were different from the other animals. They possessed great intelligence. Umi watched as the humans grew in number. There were so many so quick. With their great intelligence the humans built cities. More and more of Umi's water was used by humans to grow plants and food to feed themselves.

Over time Umi watched many great cities rise and crumble. Each one bigger and more impressive than the other. Umi's waters were used more and more by the humans. Thousands of years passed, and the humans transformed greatly the way the Earth looked. To Umi's surprise the humans invented new things. Though very old the ocean spirit Umi was very naïve. The humans were not like the other animals. Some of the humans were very egoistic and trashed Umi's water with the new inventions they created like plastic. The humans greatly depended on

Umi's oceans and seas, they used their ships to transport things back and forth. Sometimes the ships spilled petroleum oil that harmed many of the animals. Umi saw the way the animals were affected by these new human inventions. Sea turtles were eating plastic bags and dropped dead. Other animals like whales, dolphins and even sharks were poisoned by the plastic, they confused the plastic for food. Even seabirds were affected by the plastic and they too suffered. The amount of plastic and trash in the ocean was so much that it changed the ways animals lived. Umi saw and noticed the great devastation that these humans' inventions caused on the animals. As the oceans and seas became trashed by plastic more and more animals died. The once abundant coral reefs were diminished, and they lost their color. Humans were also affected by the trash. The fish that they ate intoxicated them. Many became sick and they too like the animals died as well. Years passed and many of Umi's animals died of extinction. These animals served a great purpose in the ecosystem and maintained marine life. As these animals died Umi's life source diminished. The oceans became dirty and turned a weird brown color. Never in his long life has Umi seen anything like this. Many of the creatures that made his water their home died. Umi's temperament changed. He became angry and hostile. He didn't know what to do to revive the animals he was so fond of. Many of the humans took notice of the plastic that accumulated. They too cared for the oceans and seas as they depended on it to live like the rest of the animals. Though it was too late.

Umi realized that it was the humans and their inventions that caused these problems. Plastics and oil spills and many other human inventions trashed Umi's water and caused the death of many of the animals and plants. Umi realized what he had to do. Filled with so much anger Umi the great ocean spirit pushed his waves against the human cities. He destroyed the cities and all the humans died. Without the human's inventions over time the animals and plants

recovered and so did Umi's life force. The problem all along were the humans and their inventions.

Audience 2: General Public Ad (Subway Ad)



Get informed at: <https://www.plasticpollutioncoalition.org>

