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Impacts of sea pollution on marine animals

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Abstract. In recent years, marine pollution has become a major issue for many scientists and affects the entire world. Global marine ecosystems are facing major challenges as litter or chemical emissions increase. This paper discovers about cause, effect on animals and plants, solutions of sea pollution. Results find that plastic pollution cause large amount of plastic float on sea surface and sink in the sea; oil spills is hazardous to birds, marine animals and plants, and the marine environment, and factory pollution cause decrease in water quality. Three types of animals most harmed by ocean pollution, which are sea turtle, marine mammals and sea birds, they always mistaken and harmed by the waste. On plants, algae blooms are killing other marine species life, and oxybenzone cause coral reef bleaching. This paper finds the solutions that people, government, and organizations can do in future in order to solve marine pollutions. Government should made policy to ban people use harmful chemical products, factory stop pollute pollutants, fishing should be reduced. For people, they can protect ocean by stop using plastic products, saving electricity. This paper popularizes the seriousness of plastic pollution and suggests future solutions.

Keywords: sea pollution, marine animals, plastic pollution, coral reef, marine protection.

1. Introduction

Nowadays, with the harm caused by marine pollution, this environmental issue has become the top concern of the government and related agencies. Marine pollution damages the environment, the health of all living things. This paper provide cause, effect, solution of ocean pollution. Result finds that oil spils, factory pollution, human made plastic cause animal eat plastic by mistake, or get trapped in it. Furthermore, coral reef bleaching and algae bloom also caused by pollution. In future, government needs to make more strict rules and enforce it, and people should join organizations and use other harmless product instead of plastic products. This paper prefers to see changes in human actions and people's mindset about ocean pollution. At last, hoping to reduce the harm to the oceans caused by human activities and factory development.

The ocean covers 70.8% of the earth's area, and it is the general term for the most expansive body of water on earth. The ocean contains many rich resources: such as biological resources, chemical resources, mineral resources and marine energy. Besides, the ocean is also a channel for traffic and a natural barrier to defend against foreign invasion. The area of ocean is large, and the sea water can absorb heat is strong and thus ability to store heat is also large. Ocean main source of heat is solar radiation. Ocean currents carry the heat to the land. Importantly, the ocean produces oxygen and maintains the carbon-oxygen balance. But at now, with the increase in trash or chemical substance release, the global marine

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ecosystem is facing major challenges. Most marine pollutants come from the production process on land. The wastes and plastic products discharged from the industrial production process are the main sources of marine pollutants. Marine pollution damages the environment, the health of all living things, and the structure of the global economy. National Geographic report that the Pacific Garbage Patch is one example, there are plastics and microplastics floating on and below the surface of swirling ocean currents between California and Hawaii in an area of about 1.6 million square kilometers (617,763 square miles) [1]. Research find that huge amount of human made plastic are follow to the ocean. Now there are polices made by government to reduce ocean pollution, they made some progress but still need large progress. According to a 2018 report from the United Nations, more than sixty countries have enacted regulations to limit or ban the use of disposable plastic items [1]. Also, people must make some actions, such as join ocean protections organizations. This paper gives people the opportunity to volunteer with ocean conservation groups and to find better alternatives to the harm caused by plastics.

2. Causes of Marine Pollution

2.1. Plastic Pollution

Plastic pollution caused unimaginable effect on both environment and animal's health. As people produce plastic waste, it flows from river, lake and finally sink in the ocean. There are estimated 583 billion plastic bottles were produced, the total number of plastic was 381 million tonnes in 2015 and this number continuing increase every year. In figure1, it shows the increasing number of plastic products from year 1950 to 2915. Country Philippines accounts for more than one-third (36%) of plastic inputs, because of there are seven rivers in there and people mainly live in the coastal regions [2, 3]. This evidence shows the coastal city contribute large amount of plastic ocean. As they flow to the ocean, those plastic will float at water first, since plastic is not biodegradable, so it need a hundred of years to fully decompose in the ocean. Evidence show that one plastic bag needs 20 to 500 years to fully decompose in the ocean [4]. At first, the uv light (ultraviolet light) will break the plastic in to small pieces which named micro plastics. Microplastics are plastic fragments and particles with diameter of less than 5 mm, which are more harmful to the environment than normal plastics.

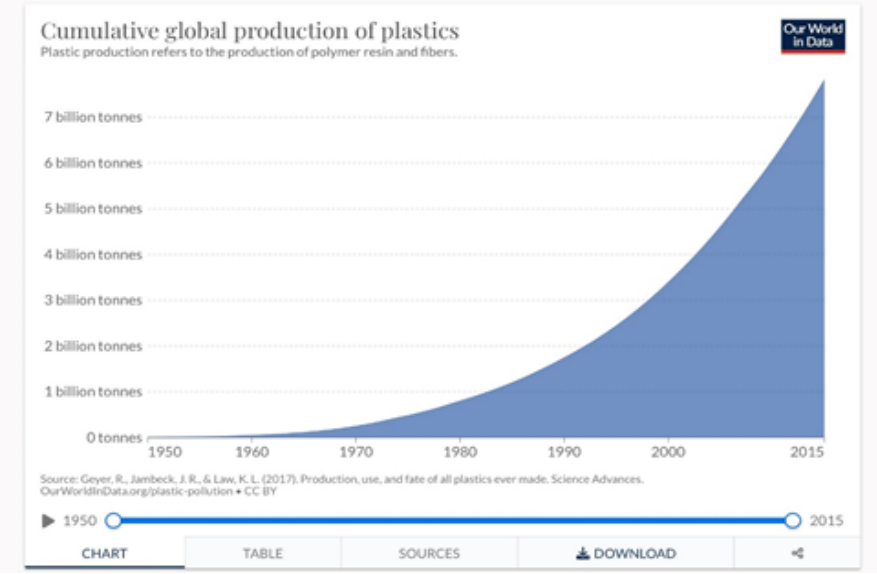


Figure 1. Work The increasing amount of plastics production from 1950 to 2015 [2].

2.2. Oil Spills

Crude oil is another big cause of ocean pollution, it will cause a large area of the sea surface to be covered with oil. Oil pollution can be divided into natural and man-made sources. There are various reasons for waste oil entering the ocean, mainly from shipwrecks, coastal oil refineries and pipeline

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leakage, which can cause marine oil pollution. The January 1991 Gulf War caused the worst oil pollution in history, and studies have found that weathered and underground oil still exists on some beaches some 10 years after the spill. When oil enters the ocean, it undergoes a complex series of changes, including diffusion, evaporation and other complex process.

2.3. Factory Pollution

As world development at a rapid speed, area used by coastal residents is expanding year by year. Industry pollutes waste and dumping to the lake and streams. National Geographic reports that 70 percent of all industrial pollution is dumped directly into the water [5]. This means the water will then flow to the ocean and pollute ocean. Besides, industry produce toxic chemicals such as SO2, CO2, CO, NO, hydrocarbons, fluorides, etc. that have biological hazards, it will decrease water quality.

3. The Impact of Pollution

3.1. Animal

Animals harmed a lot by ocean pollution, especially plastic pollution. They eat plastic by mistake or get trapped in it. Ocean pollution is also extremely harmful to the lung-breathing sea animals, those need go to sea surface in order to get oxygen for breathing. In 2015, Dutch researchers found that the number of marine species that swallow or get caught in plastic had doubled since 1997. This number is now above 2000. [5] This statistic shows the number of species affected by ocean pollution is still increasing, those number is only part of the ocean, so the actual effect is beyond expectations. Plastic is killing marine life at an unimaginable speed. This paper looks on some specific species that has extreme harmed by pollution. First, sea turtle perhaps be most harmed by plastic animals. The most primitive groups of living vertebrates, experts in maintaining ocean health- sea turtle. But the truth is that the plastic bags are eaten by them because their main food is jellyfish, and the bags look similar like jellyfish. Sea turtles chew plastic for food, they often die from the plastic itself or from starvation, they think they have eaten enough food, but they don't know the food is harmful for their body. Additionally, turtles can easily become trapped in plastic while eating it. Plastic trash can kill turtles by affecting their breeding grounds. A PADI diving center explorer find research has shown that there are many plastics in reproduction zone that temperatures can suffer, and hatchability can be reduced [6]. This cause serious consequence on the decrease amount of sea turtle in the world. Many turtles have died from ingesting plastic, and some have died from being pierced by hard plastic in their intestines or from intestinal obstruction. The second type of animal is marine mammals include whales' shark, whales and dolphins. Fact shown that plastic is often found in the stomachs of marine mammals. Those mammals can get caught in net or fishing line. Website blue ocean society have an article mainly discuss the effect of ocean pollution on whales. They show a Whale and Dolphin Conservation, in Plymouth, MA, published a recent article providing most entanglements are due to active fishing gear that is still in use [6]. In these circumstances, the fishing gear will hurt the whales surface skin and loss body energy due to carrying the waste. Meanwhile, many studies have shown that a large part of the cause of death of whales is due to ingesting too much plastic waste. Meanwhile, oil pollution can cause damage for mammals that need breathe, because these animals must breathe above the sea surface. Animals such as dolphins, walruses, whales etc. suffocate to death because their nostrils or blowholes are blocked by oil blocks. At last, seabirds which is a specie that near the sea will also be affected. Sea birds thought the plastic that floating on the sea or in the beach is look like food. By ingesting plastic, seabirds' stomach capacity is reduced, leading to starvation. To sum up, the effect of ocean pollution on animals mainly cause harm to animal surface skin and to animals's health.

3.2. Plants

To start with, ocean pollution may cause algae bloom. Marine pollution increases nutrients in the ocean that can increase algae numbers. The effects of algae blooms are killing other marine species life. It will kill marine plants and so needing a long time to grow. Algae has big role in the ocean system, as it can

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act as oxygen supplier, source of marine life, and stabilize the quality of water. But if algae bloom, it will release toxic to the ocean, and therefore kill plants. Also, oil can contaminate and kill algae, especially small algae. Due to oil pollution in many places, the production of seaweed has dropped sharply. The oil that floats ashore wilts any vegetation that encounters it. The second marine plants are coral reef, which also is the most important specie in the ocean. Coral reef is an important habitat on sea, and it can protect another marine animal as it can be home of small fish and plants. Ocean pollution also include harmful chemical substance from sunscreen that people use for protects their skins. Sunscreen has a harmful compound called Oxybenzone. According to marine safe, a research published in the journal Archives of Environmental Contamination and Toxicology last October, found that one such chemical, oxybenzone, has a toxic effect on young coral, causing ocrine disruption, DNA damage and death [7]. This study means new coral reef can't form, and ecosystem will be affected. As a result, coral reefs loss ability to adapt their environment. At now, the amount of CO2 is increasing at a rapidly speed, it causes ocean temperature will increase, and have another serious impact on coral reef- coral reef bleaching. The substance I talked before oxybenzone also causes coral bleaching. The causes of coral reef bleaching include high seawater temperature, solar radiation, and marine sewage, which affect the living conditions of corals, letting coral reef unbale to adapt, reducing coral reef abilities to reproduce and rebuild communities. If whole ocean loss big amounts of coral reefs, fish, algae will lose home and protection, the truth is the impact is unexpected.

4. Measures

4.1. Government

Government need make some policy to country in order to solve ocean pollution. A law in Hawaii lawmakers pass bill banning sunscreens with chemicals that can harm coral reefs. According to marinesafe, Senate Bill 2571, introduced by state Sen. Mike Gabbard (D, Kapolei-Makakilo). The sale of sunscreens containing oxybenzone and octoate is prohibited in Hawaii [8]. Hawaii is one of most famous coastal cities, so if people follow this policy, coral reef damage will be less. Banning the sale of sunscreen would have huge impact on the helping coral reefs. Palau Islands located in the southern chain of islands in the Philippine Sea in the western Pacific Ocean. It contains richest and various coral reefs. Palau is the first country introduce a broad ban on sunscreens to protect its fragile coral reefs. A law published by government restricting the sale and use of sunscreen and skin care products containing 10 different chemicals. As more island country enact the policy, the amount of oxybenzone will decrease, and so less harmful chemical substance release into the ocean. United Nations also made policy. Ensuring the sustainable use and development of oceans and marine reissues is one of goals that United Nations have set. signatures of 97 countries on to the "Agreement for Port State Measures" is the key progress toward achieving the goals. The goal is to make fish factories or humans stop fishing, to make humans realize that shooting with a lot of explosive harpoons and rifles is not correct and a cruel act, so people should stop any human activities that cause ocean pollution.

4.2. Individuals

People can solve plastic pollution from personal actions. Overall needing limit use of plastic, in detail means people need reuse and recycle as much as possible. People can use metal straw to replace plastic straw and use recycle bag or paper bag instead of plastic bag. Specifically, people need use 4R principle: Reduce discarding emissions, reuse, recycle, and reject products that are not environmentally friendly. As above causes of ocean pollution, human activity contributes large amount of pollution to the ocean, so people can buy electricity car instead of cars, reduce air conditioning in order decrease CO2 amount in the air. At now habitat destruction and overfishing have led to dramatic declines in global marine fish amount. Therefore, when buying or eating seafood, people can consciously don't choosing rare sea species, or choosing healthy and sustainable seafood, or reducing the frequency of eating seafood. Besides, people should not buy marine biological products, because the production of some industrial products will directly destroy the fragile coral reef ecology and marine life in the ocean. Therefore, do

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not buy accessories made of coral. Shark-related products, such as squalene in cosmetics, are extracted from sharks. Also, people should stop buying sunscreen that contain oxybenzone, there are some healthy substances that better for the ocean. People need to protect the beach, when people do swimming, surfing or just relaxing in the beach, they need clean up the rubbish before leaving. The important things are that play on the beach without disturbing seaside animals or damaging marine organisms such as corals. Going a step further, everyone should get involved or mobilize others to help clean up the beach.

Table 1. Ocean protection organizations in the world.

Largest	Global organizations	On marine species
Oceana	Greenpeace	Marine megafauna foundation
The ocean conservancy	World wildlife fundx	Sea shepherd conservation society
The nature conservancy	Montery bay aquarium	Coral reef alliance

There are many ocean protection organizations in the world at now. As the table 1 mentioned above, there are 9 big organizations that need volunteer together to solve ocean pollution. Take Oceana, for example, this organization was established by a group of leading foundations, which is The Pew Charitable Trusts, Oak Foundation, Marisla Foundation (formerly Homeland Foundation), Sandler Foundation, and the Rockefeller Brothers Fund. This is an international organization focused on the oceans to accomplish our shared mission of protecting and restoring the world's oceans. Their official website shown oceana has won more than 225 victories and protected nearly 4 million square miles of ocean [9]. People can sign up as a membership or shop the Oceana store and adopt a marine animal. In another organization ocean conservancy, their aim is working with you to protect the ocean from today's greatest global challenges. Together, this paper creates evidence-based solutions for a healthy ocean and the wildlife and communities that depend on it [10]. They are a group of people who love ocean and love animals in the ocean, they want to see changes from our actions. Therefore, people can join those organizations and do only a tiny action that benefit for ocean, in order to protect our home and whole ecosystem.

5. Conclusion

Marine pollution, causing damage in whole marine ecosystem, affecting biological resources and endanger human health. In recent years, the pollution of ocean has become more and more serious, and there is a trend of continuous expansion. This paper find that it will cause sea turtles chew plastic for food, died from the plastic itself or from starvation; causing mammals get caught in fishing line or nets or influencing seabirds' stomach capacity, leading to starvation. For plants, algae bloom and oxgbenzone released from sunscreen cause coral reef bleaching. Alegae bloom will cause other plants died and oil pollution can contaminate and kill algae, especially small algae. The oil floats on the water cause withered on any vegetation that encounters it. In the future, the government should formulate more policies to stop industrial emissions, illegal fishing and other harmful behaviors to the ocean. At the same time, there will be more marine organizations such as oceans, ocean conservancy organizations to protect the ocean, and more volunteers will join them. People should do from their own actions and if have opportunities can be a leader that call on people help Ocean. This paper provides major effect of marine pollution and give people some suggestion to help marine.

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