

Exploring the Dangers of Marine Pollution to Marine Life

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Abstract. In a world where marine pollution is increasing, marine life is also under threat. Although the world has started to protect marine life, it should start by reducing marine pollution. In order to explore the harm of marine pollution to marine life, this paper summarizes the sources of marine pollution, the harm to marine life and the measures to be taken. The main sources of marine pollution are agriculture, which uses pesticides; industry, which spills oil; tourism, which produces waste; and everyday life, which discharges waste water. Different sources of marine pollution alter the marine environment to different degrees. Among the marine organisms affected by marine pollution, some animals are bound and injured by solid pollutants such as plastics, and some plants are covered by substances that enter the ocean with liquid pollutants and the effects of ocean eutrophication. After investigation and research, a series of measures will be proposed to government agencies and scientific research departments to reduce marine pollution, and young people will be urged to raise their environmental awareness and protect marine organisms. It is hoped that through the effective measures taken by various departments, human beings will be able to provide a near-"pollution-free" marine environment for marine organisms in the future, so that marine organisms will no longer be endangered.

Keywords: Marine pollution, marine life, plastics, oil spills, sea turtles.

1. Introduction

The Earth is known as the "blue planet" because of the critical importance of the oceans, which cover approximately 71 percent of the Earth's total surface area. Moreover, the marine environment has always been one of the most diverse ecosystems on Earth, hosting numerous ecological processes. Nowadays, with the continuous expansion of human activities and the acceleration of industrialization, the problem of marine pollution has become more and more serious and has even become a major problem for the global environment. As a result of marine pollution, the living environment of all kinds of organisms living in the oceans has been damaged, and even the marine organisms themselves are directly endangered. The number of many marine species has been drastically reduced, and some marine species have even become extinct. Therefore, in order to protect the marine ecosystem and marine organisms, it has become crucial to address the problem of marine pollution.

In recent years, people have gradually paid attention to the problem of marine pollution and studied the effects of some pollutants on the marine environment. A large number of articles have proved that marine pollution has caused great harm to some species. However, there is a lack of articles that summarise the various sources of marine pollution, the hazards it causes to marine organisms, and the measures to deal with them, and then fully illustrate the conclusion that marine pollution causes harm to marine organisms. Through an in-depth study of the hazards of marine pollution to marine organisms, people can better understand the seriousness of the problem of marine pollution and provide a scientific basis for the adoption of effective protection and management measures, thus contributing to the maintenance of the health and sustainability of the marine ecosystem.

This article further explores the harm of marine pollution to marine life with the aim of protecting the ocean. Firstly, starting from the source of marine pollution, the article examines the different types and degrees of harm that pollutants from different sources cause to the marine environment and marine organisms. Secondly, on the basis of the different sources of marine pollution summarised above, it explores the specific hazards caused by marine pollution to marine organisms, mainly involving marine animals and marine plants. Finally, effective measures for government departments and scientific research departments to deal with marine pollution, as well as educating young people

to protect the marine environment, are proposed as a way to reduce the harm of marine pollution to marine organisms.

2. Sources of Marine Pollution

If you want to study the damage of marine pollution to marine life, you have to start from the source of marine pollution. Various types of marine pollutants are the main reasons for endangering marine life, including domestic waste, pesticide emissions, industrial emissions, tourist waste and so on.

2.1. Domestic Waste

Domestic waste is an inevitable part of people's daily lives, and much of it ends up in the oceans. This is because one of the ways people used to deal with household waste was to dump it into the oceans, and although various measures have been taken in recent years to control this, some polluting household waste still ends up in the oceans. Plastic pollution in the oceans is a major marine pollution problem, and single-use plastic products, which are common in everyday life, are a significant source of this pollution. In 2010, an estimated 4.8-12.7 tonnes of plastic entered the oceans worldwide. In 2010, an estimated 4.8-12.7 tonnes of plastic entered the world's oceans, and in 2014 there were about 5.25 trillion plastic particles floating in the ocean. While plastics make up only about 10 per cent of everyday waste, plastic debris accounts for 60-80 per cent of marine litter, and as much as 95 per cent in some areas. Typically, large plastics enter the marine environment through dumping or poor waste management. Microbeads are also a type of plastic and are increasingly used in the manufacture of disposable cosmetics such as abrasive face scrubs and toothpastes [1]. Domestic laundry fluids are a major source of marine microfibre pollution, releasing nearly 700,000 particles per garment and approximately 1,900 particles per wash. Microfibres are commonly found in marine tap water and sediments and are as harmful as any other pollutant in the ocean; they can even absorb other pollutants such as heavy metals. Because of their small size, they can be easily ingested by aquatic species and pose a health risk [2].

2.2. Pesticide Emissions

There is no stopping the use of pesticides in agriculture. In recent years, many harmful pesticides have been explicitly banned from production and use. However, there are some pesticides that are very weak but very harmful to marine life. DDT is a well-known pesticide that was first suspected of being carcinogenic in 1962 and was banned as a pesticide worldwide in 2004 [3, 4]. However, it is still used in pesticides after 2004 because of its effectiveness in killing insects. DDT was produced in the former Soviet Union from 1946 to 1970. Subsequent use of DDT to control insect populations continued until the early 1990s, particularly in the Ob, Nadin, Pur and Tas river basins. The total amount of DDT used in the former Soviet Union (1946-1990) has been estimated at 250-520×10³ tonnes [5]. Other common pesticides include dichlorvos, chlorothalonil and 2,4-D, all of which are toxic to marine organisms. Once discharged into the sea, they not only pollute the ocean, but also cause great harm to marine organisms.

2.3. Industrial Emissions

Since the industrial revolution, there has been an increase in industrial growth and a corresponding increase in industrial discharges. Ocean dumping is one of the methods used by countries to dispose of industrial waste. Ocean dumping refers to the transport of waste into the sea for disposal. Of the industrial wastes with a history of ocean dumping in the US and abroad, organochlorine and other organ halogen compounds are probably the most harmful to the marine environment [6]. Heavy metals in industrial effluents can also be hazardous to marine life and are toxic to marine organisms if they exceed available limits. Another industrial activity that pollutes the oceans is oil spills. As the world's main source of energy, the production and consumption of petroleum products continues to

grow. Despite a high level of regulation and prevention, there is still a risk of major oil spills, ranging from different types of crude oil to large quantities of refined products [7]. Oil slicks floating on the surface of seawater after an oil spill block oxygen from entering the water, drastically reducing the oxygen content of seawater. Oil spills can also cause heavy metal contamination, particularly of several metals such as nickel and barium [8]. There are about 800 different industrial estates as well as oil refineries, oil company warehouses, ship-breaking companies, etc. on and near the banks of the Karnaphu River. A large amount of solid waste and sewage from these industrial activities is discharged into the sea through the Karnaphu River, which contains a large number of toxic pollutants that can threaten aquatic life, especially fish [9].

2.4. Tourist Waste

As the main tourist attraction of coastal cities, the sea is visited by tens of thousands of tourists during the tourist season. However, the waste generated by tourists has a direct impact on the marine environment. For example, tourists throw plastic and other debris directly into the ocean. There are also some island countries where tourism programmes are set up directly on the sea, where tourists eat and live directly on the sea surface and generate untreated waste that goes directly into the sea. In addition, the development of tourism has led to land reclamation, cutting down mangrove forests and destroying corals. These have caused direct damage to the marine environment and endangered marine life.

3. Hazards to Marine Life

The oceans are one of the Earth's biobanks, containing a non-trivial number of species, including animals and plants. From the text above, it is clear that the current marine environment is affected by various marine pollutants, resulting in threats to the survival of marine life.

3.1. Animals

Some of the toxic or hazardous substances in marine debris cascade through the animal food chain, resulting in high levels of toxins in some marine mammals at the top of the food chain. The entanglement of marine animals in solid marine debris can lead to starvation, suffocation, lacerations, infections, reduced reproductive success and mortality. Other species, such as marine mammals, can become entangled in net debris or "ghost fishing gear". For example, Antarctic fur seals are frequently entangled in plastic marine debris [1]. Surface feeding fish and birds may mistake small plastic debris for plankton to feed on. Among the many marine animals that become entangled in marine debris is the sea turtle. Some sea turtles are scratched or accidentally eaten by plastic debris, while others become entangled in fishing nets or other plastic rope nets (Fig. 1). These injuries can affect their ability to feed or directly threaten their lives. And these turtles may not be able to get rid of these pieces of plastic or fishing nets for the rest of their lives without human help. In addition, marine invertebrates are also harmed by marine pollution from metal mining and other related activities [9]. Microfibres discharged into the ocean from household detergents can also be ingested by marine animals, causing blockages in their gills, internal organs and gastrointestinal walls, which in turn reduces feeding and hinders growth [2].



Figure 1. Sea turtles are wrapped all over their bodies in green plastic fishing nets.

https://i0.wp.com/oceanblueproject.org/wp-content/uploads/2020/05/sea_turtle_facts.jpg?fit=1024%2C576&ssl=1

3.2. Plants

Phytoplankton in marine plants are the first step in the uptake of exogenous substances and bioaccumulation in aquatic food webs. Once contaminated by marine debris, they directly affect the entire marine food chain. Eutrophication of seawater is a major threat to marine plants, and a variety of land-based pollutants, including sewage, detergents and agricultural runoff, can cause nutrient overload and eutrophication when they enter coastal waters [11]. Nutrient enrichment can lead to an imbalance in nutrient exchange between cnidarians and host corals. As nutrients stimulate phytoplankton growth, this in turn reduces light penetration from outside to the reef. It also leads to algal blooms, smothering and eventual replacement of slow-growing coral reefs [10]. Many corals are also covered by marine sediments from poorly managed land-based agriculture, dredging and mining, deforestation and inland development, accelerating mortality [11]. When corals are destroyed, not only is the marine ecosystem affected, but the many marine organisms that feed on and host corals are also threatened.

4. Measure

In order to prevent further damage to marine life, it is important to start implementing measures that can effectively reduce marine pollution from all sources.

4.1. Government

Marine pollution is prevalent in all countries and is harmful to marine life. Governments should therefore take the initiative and use their influence to make people aware of the dangers of marine pollution to marine life. Governments can enact policies or regulations related to marine pollution. For example, governments around the world have developed policies to ban the sale of plastic bags, charge customers for plastic bags, and tax shops that sell plastic bags (Fig. 2) [1]. There are also regulations to reduce the use of detergents containing marine pollutants in everyday life, to prohibit the use of government-banned pesticides in agriculture, to reduce the construction of industrial zones in coastal areas, and to strictly control the discharge of industrial waste into the sea. Government departments can also join hands with social environmental organisations to organise public participation in activities to "reduce marine pollution and protect marine life" to raise awareness of environmental protection. If everyone in the world sets an example, from personal ability to do things to start, I believe that the phenomenon of marine pollution will be able to get a significant improvement.

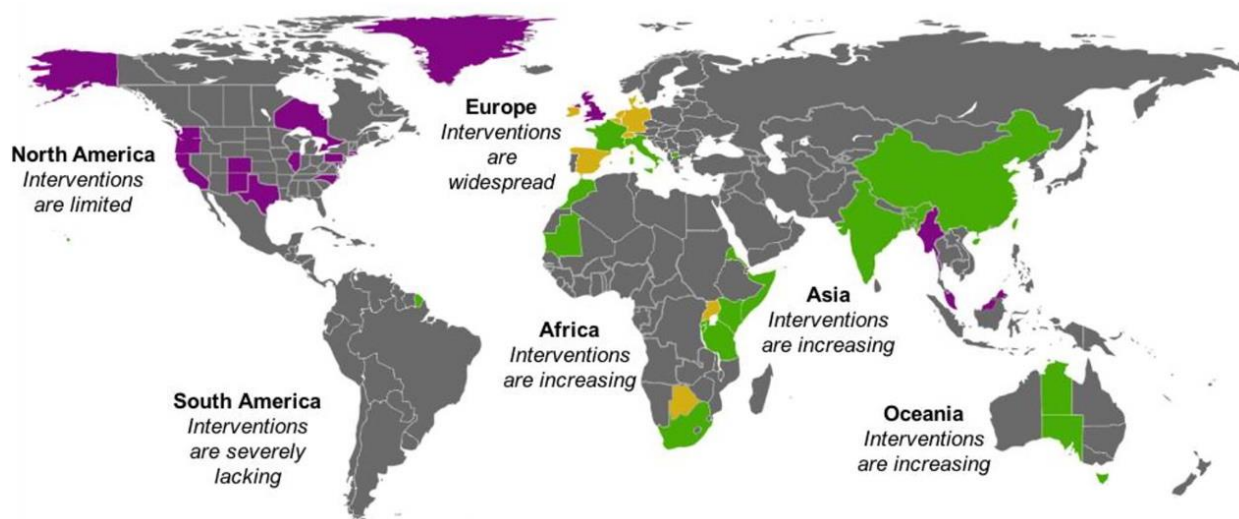


Figure 2. Phase out of lightweight plastic bags around the world. ■ Plastic bags banned; ■ Taxes on some plastic bags; ■ partial tax or ban (municipal or regional levels). https://ars.els-cdn.com/content/image/1-s2.0-S0025326X17301650-gr1_lrg.jpg

4.2. Science Sector

Through precise measurements and calculations, the scientific sector can provide the public with intuitive data that can illustrate the great damage caused by marine pollution to marine organisms, such as the extent to which the oceans have already been affected by various sources of pollution, the number of marine species that have been reduced or even extinguished as a result of marine pollution, the further impact of marine pollution on human health through marine organisms, and so on. Some measures taken by government agencies can only reduce future marine pollution, while the control of marine pollution that has already been caused by the scientific sector relies on research and development. For example, we can reduce the amount of plastic discharged into the sea through microbial degradation of plastic; we can optimise the discharge system of industrial waste liquid to reduce the amount of polluting substances in the waste liquid; and we can also research the replacement of detergents containing microfibres to protect marine organisms affected by microfibres. It is believed that with the development of science and technology, people can also rely on science and technology to reduce marine pollution.

4.3. Adolescents

For young people, the oceans of the future belong to them. Therefore, it is necessary to start raising awareness of marine conservation among young people so that they realise the harmful effects of marine pollution on marine life. By showing them extinct marine species, we can tell them that many of the marine creatures we see today will become extinct in the future if they continue to be affected by marine pollution. And let them get involved in marine conservation activities from their teenage years, so that they can realise which behaviours pollute the ocean and which behaviours can reduce marine pollution.

5. Conclusion

Marine pollution has always been an important issue in global environmental protection, and therefore marine organisms that are harmed by marine pollution have also been in the spotlight. This paper examines in detail the harmfulness of marine pollution to marine organisms, including different sources of marine pollution, the specific harm of marine pollution to marine organisms, and effective measures to reduce marine pollution. It finds that plastics and detergents used in everyday life pollute the ocean; pesticides used in agriculture release toxic substances into the ocean; industrial dumping and oil spills are major sources of marine pollution; and a range of marine wastes generated by

tourism also damage the marine environment. Marine animals can accumulate large amounts of toxins in their bodies as they move up the food chain, and they can also be harmed by large solid wastes. Marine plants, on the other hand, are threatened by eutrophication and sedimentation. In order to reduce these phenomena, it is hoped that government agencies and research and development departments will actively take effective measures, while at the same time raising young people's awareness of the need to protect the oceans. It is believed that in the future, after the sources of marine pollution have been controlled, marine life will no longer be threatened and the number of living species will no longer decrease.

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