

The Dangers of Marine Pollution on Consumer Health, Economic Value, and Aesthetic Value in Human Life

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Abstract

Water pollution happening in the sea results in changes to the composition or structure of the water affected by human activities and natural processes. This leads to water having qualities and functions that do not align with their intended uses and can disrupt human life, marine biota, and marine ecosystems. Pollution in the marine ecosystem undoubtedly affects marine products in various aspects of life. This article used a literature review method to gather the necessary data for explaining the discussed topic. This article aims to explain the harmful impacts of marine pollution on consumer health, economic value, and the aesthetic value of the marine ecosystem. Based on the results of literature studies conducted through secondary data analysis from published journals in the last 10 years (2015-2024), it was found that marine pollution contaminated with bacteria or pathogens due to chemical substances can disrupt human health, causing symptoms such as vomiting, diarrhea, stomach pain, collapse, and even death. The economic aspect also experienced its impacts, such as the decrease in fishermen's catch and the disruption of the beauty of the marine ecosystem due to changes in water composition, leading to the sea appearing cloudy and odorous, and being filled with waste.

Keywords: Dangers of Marine Pollution, Consumer Health, Economy, Aesthetics

INTRODUCTION

The Almighty has given living creatures an environment to be utilized wisely and accompanied by preservation within the capabilities present; thus, this environment can remain a source of life for all living beings. This responsibility is carried by humans as Caliph (*Khalifah*) on Earth, provided with rational thinking (Dewi, 2021). The components present in the environment are closely tied to the needs of humans and other living beings, and one of these components is water. Indonesia is known as a maritime country because its water area is larger than its land area, with 70% being water and 30% being land. Water takes on a pivotal role as one of the essential needs for living beings, including humans, with high intensity in daily life. Therefore, the availability of water in terms of quality and quantity is absolutely necessary and must be continuously maintained. Efforts to preserve water

quality as a primary need for living beings must be carried out maximally (Farhan et al., 2023).

The water quality index in Indonesia, released by The Ministry of Environment and Forestry (Indonesian: *Kementerian Lingkungan Hidup dan Kehutanan*) in 2022, stood at 53.88. This figure shows a tendency of improvement compared to the previous year's value, which was around 52.83. However, this water quality index value still does not meet the minimum threshold for water quality, which is 55.03. The problem of poor water quality in Indonesia is due to the high intensity of water usage, which is not accompanied by awareness to preserve and maintain water quality. Instead, many people engage in activities that harm the water ecosystem, such as dumping waste, pollutants, and even genetically engineered products into waterways, leading to pollution in rivers, lakes, and seas, resulting in a decline in

water quality in Indonesia (Dinda Arba Fuzia, 2021).

The sea is a broad expanse of salty water that covers a significant area and can divide land masses into continents or islands. Water pollution occurring in the sea results in changes to the composition or structure of the water influenced by human activities and natural processes. This leads to water having qualities and functions that do not align with their intended uses and can disrupt human life, marine biota, and marine ecosystems. The impacts caused by water pollution are extensive as this condition can lead to contamination of drinking water, poisoning of animal food sources, disruption of the harmony of lake and river ecosystems, and can even damage forests due to acid rain. In bodies of water such as rivers and lakes, the presence of nitrogen and phosphorus from agricultural activities can increase the growth of aquatic plants beyond control, a process known as eutrophication (Mustaruddin et al., 2020).

The issue of marine pollution cannot be overlooked and solely focused on the problems of the sea alone. This issue is interconnected with the land because the ocean and landform one ecosystem that affects each other and cannot be separated. Activities conducted by living beings, especially humans on land, whether consciously or unconsciously, will affect the ecosystems in the sea, either directly or indirectly (Darza, 2020).

According to the National Oceanic and Atmospheric Administration (NOAA), around 80% of marine pollution is caused by issues on land. The source of these problems is non-point source pollution, which results in the runoff of pollutants from the land. Non-point source pollution is a collection of various small sources of pollution such as septic tanks, pollutants from boats or ships in the sea, as well as larger sources of pollution like runoff from agricultural activities, livestock, and forest areas. In general, water pollution can start from air pollution, causing some particulates or polluting materials to settle in water bodies and the sea (Pratiwi, 2020).

The soil can serve as one of the sources of pollutants due to the accumulation of pollutants on the soil surface, leading to deposition. When it rains, pollutants from the soil area will transfer to water bodies, rivers, and even to the sea area. Pollution caused by non-point sources can lead to insecurity for humans and other living beings such as animals. However, addressing pollution caused by non-point source pollutants in damaged or threatened areas requires significant financial resources for mitigation and remediation (Afrilla, 2021).

The marine and terrestrial ecosystems undoubtedly have interconnected qualities. Waste in the sea is greatly affected by waste on land, especially plastic waste. The amount of plastic waste in the marine area can be classified according to the size of the plastic, namely megaplastic, macroplastic, mesoplastic, and microplastic. The flow of microplastic waste in marine waters is significantly affected by microplastic density. For example, plastics like Polypropylene (PP) and Polyethylene (PE) have low densities, causing them to float, while plastics like Polystyrene (PS), Polyvinyl Chloride (PVC), Polyamide (PA), and Polyethylene Terephthalate (PET) have high densities. The type of microplastic waste will be dispersed in each sub-zone of marine waters. This issue can be addressed with good salinity because salinity is a key factor in affecting the chemical degradation of plastic materials (Wan et al., 2020).

Pollution in marine ecosystems undoubtedly significantly affects marine products in various aspects. The materials used in plastic production certainly contain carcinogenic chemicals, which can lead to disruptions in the endocrine system, hindering development, reproduction, neurological functions, and the immune system in both humans and animals if contamination occurs. Toxic contaminants present in plastic waste can accumulate on the surface of plastic, leading to disruptions due to long-term exposure to seawater as well (Budhiawan et al., 2022). The process that occurs when marine organisms

consume plastic waste that accumulates in the oceans can cause contaminants to enter the digestive system of marine organisms, resulting in accumulation over time in the food web. The consequence of this event is the transfer of contaminants from marine biota to humans through the consumption of seafood identified as posing health risks (Aini et al., 2021).

The impact of marine pollution also leads to the degradation of the natural beauty or aesthetics of ocean areas used as tourist destinations. This will also result in a decrease in the number of visitors and revenue for the tourism industry. The restoration of ecosystems affected by pollution, both in the sea and on land, will incur significant costs, which will also affect the economic condition related to the cleaning and maintenance of locations (Aini et al., n.d.)(Hellen Qurotu, 2023). Based on the explanation of the impacts of marine pollution, the author decided to conduct research with the title "The Dangers of Marine Pollution on Consumer Health, Economic Value, and Aesthetic Value in Human Life" to understand the

consequences of marine pollution on various aspects of life, thereby encouragement self-awareness to protect the environment.

METHODOLOGY

The method used in this article was a literature review using secondary data from journal publications over the past 10 years (2015-2024) that were relevant to the topic discussed. Google Scholar was used as the database for this article. The types of articles used were national and international articles that met the criteria for articles within the past 10 years. The articles relevant to the keywords are related to the discussion topic (Table 1).

RESULTS

The results of several relevant studies above indicate that pollution in the sea certainly affects the marine ecosystem, especially marine organisms. This condition can lead to various losses in terms of health, economy, and aesthetic value.

Table 1. the articles that were relevant to the keywords related to the discussion topic

No	Title and Year	Publication	Authors	Research
1.	Pengaruh Sampah Plastik Dalam Pencemaran Air (The Impact of Plastic Waste in Water Pollution) (2023).	Gudang Jurnal Multidisiplin Ilmu	Aulia Rizya Aqila, Abdul Razak and Eri Barlian	Research conducted by Aulia Rizya Aqila et al. explains that water pollution in the ocean caused by plastic waste can directly impact human health. This can reach humans through the consumption of contaminated fish or marine animals. Microplastics contaminated with fish can enter human organs such as the intestines and lungs, raising concerns about human health among researchers and environmentalists. (Aqilla et al., 2023)
2.	Analisis Risiko Kesehatan dan Kadar Timbal Dalam Darah: (Studi Pada Masyarakat yang Mengonsumsi Tiram Bakau (<i>Crassostrea gigas</i>) di Sungai Tapak Kecamatan Tugu Kota Semarang (Health Risk Analysis and Blood Lead Levels: (Study on Communities Consuming Pacific	Jurnal Kesehatan Lingkungan Indonesia	Puspita Raharjo, Masjid Raharjo and Onny Setiani	The research results show that the lead levels in Pacific Oysters are still within the safe category, with sample I at 0.61 mg/kg, sample II at 0.49 mg/kg, sample III at 0.48 mg/kg, and sample IV at 0.43 mg/kg. These figures are well below the maximum limit set by the Indonesian Food and Drug Authority (BPOM RI), which allows a maximum lead content of 1.5 mm/kg. However, continuous consumption by humans can lead to health problems such as vomiting, stomach pain, diarrhea, and even death. (Raharjo et al., 2018)

No	Title and Year	Publication	Authors	Research
	Oysters (<i>Crassostrea gigas</i>) in Tapak River, Tugu District, Semarang City) (2018)			
3.	Keberadaan Plastik di Lingkungan, Bahaya terhadap Kesehatan Manusia, dan Upaya Mitigasi: Studi Literatur (The Presence of Plastic in the Environment, Health Hazards to Humans, and Mitigation Efforts: A Literature Review) (2021)	Serambi Engineering	Yura Witsqa Firmansyah, Mirza Fathan Fuadi, Muhammad Fadli Ramadhan syah, Farida Sugiester.	Plastic waste found in the environment, whether in wastewater treatment facilities, clean water sources, or contaminated food with micro and nano-sized plastic particles, poses an increased health risk to humans. The discovery of plastic waste even in the smallest units can trigger cancer. Therefore, efforts for restoration and conservation are crucial, and the application of the 3Rs (reduce, reuse, recycle) and environmentally friendly plastic raw material substitutes are recommended. (Firmansyah et al., 2021)
4.	Analisis Dampak Pencemaran Lingkungan Terhadap Faktor Sosial dan Ekonomi pada Wilayah Pesisir di Desa Bagan Kuala Kecamatan Tanjung Beringin Kabupaten Serdang Bedagai (Analysis of Environmental Pollution Impact on Social and Economic Factors in Coastal Areas in Bagan Kuala Village, Tanjung Beringin District, Serdang Bedagai Regency) (2022)	Jurnal pendidikan Tambusai	Adlin Budhiawan, Adinda Susanti, Salsabillah Hazizah	The research conducted by Adlin et al. explains that water pollution in coastal environments has a significantly negative effect on the lives of surrounding communities. The livelihoods of coastal residents, mainly fishermen who rely on fish catches, are affected when the marine ecosystem is polluted, causing difficulties for fish to survive and disrupting fishermen's income to meet their daily needs. (Budhiawan et al., 2022)
5.	Pentingnya Pembangunan Kesadaran Masyarakat Akan Dampak Pembuangan Sampah Plastik Di Laut (The Importance of Raising Awareness Among Communities Regarding the Impact of Plastic Waste Disposal in the Sea) (2021)	JUSTITIA: Jurnal Ilmu Hukum dan Humaniora	Veronika Angelina Wau	Coastal areas are renowned for their breathtaking natural beauty, attracting numerous visitors and tourists. Many tourists choose to spend their leisure time on the beach, engaging in enjoyable activities or simply admiring the natural beauty. In coastal areas frequented by tourists, there are often vendors selling snacks wrapped in plastic packaging. While this can boost the economy of the vendors, the awareness among visitors to maintain cleanliness in the beach environment remains low. Visitors often litter, leading to an accumulation of waste in the sea, which damages the aesthetic value of the sea, causing changes in water color and unpleasant odors. (Wau, 2021)

DISCUSSION

Mining and industrial activities in Indonesia involve extensive exploitation of gold mines. This condition is one source that exacerbates marine ecosystem pollution, including mercury pollution. The potential dangers posed by mercury pollution in marine and coastal areas significantly impact human health. Marine biota that accumulate mercury content can cause mercury poisoning in humans who consume seafood from waters contaminated with this hazardous substance. Seafood that is easily contaminated with mercury includes fish and shellfish, which can accumulate in the human body (Putri & Rismaya, 2023). When mercury remains in the human body for a long period, it can lead to various health problems, such as nervous system damage, kidney damage, immune system disorders, and even fetal damage in pregnant women. Mercury contamination in children is also highly dangerous, potentially causing nervous system damage, behavioral disorders, and cognitive impairments (Sugiana et al., 2022).

The chemical element lead can also cause marine water pollution, affecting the health of consumers who eat contaminated seafood. Fish and shellfish are types of marine biota that are easily contaminated by pollutants in their environment. Fish and shellfish contaminated with lead, whether in high or low concentrations, if consumed intensively over a long period, will increase the risk of lead poisoning, either chronic or acute. Symptoms that may arise include abdominal pain, vomiting, diarrhea, black stools, collapse, and even coma. In aquatic areas, metal elements that contaminate marine biota, even in low concentrations, will still be biologically absorbed by aquatic animals, leading to a process of absorption that enters the food chain system (Muhammad & Sarto, 2018).

The issue of water pollution in Indonesia, affecting rivers, seas, lakes, and groundwater, has become a serious problem over time. Currently, obtaining

clean water that is not contaminated by pollutants is not easy, especially in coastal areas or near industrial zones. One cause of water pollution from household waste is the use of detergents for washing. The chemicals in detergents harm marine and river biota, particularly fish. Detergent waste in water can cause respiratory problems for fish, leading to their death (Mariah et al., 2023).

The use of detergents that produce foam significantly impacts aquatic life. The effects can include the death of plants and fish in marine ecosystems due to their contaminated habitats. The chemicals in detergent waste can stimulate the growth of water hyacinths and weeds, leading to a drastic increase in their population. The growth of these plants, if in large quantities, can lead to siltation and blockage of water flow. These plants can also cover the water surface, hindering the entry of sunlight and oxygen for aquatic organisms. This will result in a decline in water quality, making it difficult for fish to survive and potentially causing mass fish deaths. Such conditions would undoubtedly disrupt the livelihoods of fishermen due to reduced fish production (Mariah et al., 2023).

A decrease in tourism sector income in tourist areas can also appear due to marine ecosystem pollution, resulting in aesthetic damage characterized by changes in color, taste, and even odor of the water. Furthermore, it can lead to ecosystem degradation affecting mangrove plants and coral reefs. Tourist destinations will experience a decline in their image, leading to a decrease in the number of both local and international tourists visiting the destination (Yatzin & Paskah, 2023). One destination that has experienced a decline in its aesthetic image is Tidung Island. The attraction of Tidung Island, which is its selling point, is the beauty of its beaches. However, due to marine pollution, particularly the accumulation of trash, there has been a decrease in the number of tourists visiting. One of the reasons is the inability to maintain the beach aesthetics properly (Gembong Satria, 2020).

CONCLUSION

Indonesia is known as a country with abundant water areas, a gift given by the Almighty as an environment for individuals around it. Our task as humans is to preserve this divine gift. Marine pollution, which results in changes in the composition or arrangement of water, is influenced by human activities and natural processes. This leads to water having quality and functions that are not under its purpose and can disrupt human life, marine biota, and marine ecosystems.

The impacts of marine pollution result in many marine products such as fish, clams, and shrimp being contaminated with harmful bacteria or pathogens that can be transferred to the human body through consumption activities. This condition can lead to health disorders in humans such as vomiting, stomach pain, diarrhea, collapse, and even death if consumption continues over the long term. Moreover, marine pollution also leads to many marine organisms struggling to survive and dying, which can affect the livelihood of fishermen who depend on the marine ecosystem for their living. The aesthetic aspect is also affected by marine pollution, as changes in the composition of seawater often result in murky, odorous water and accumulated trash. With these conditions, it is only right that we should preserve the environment that has been bestowed upon us.

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