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The Impact Of Environmental Pollution In The Thousand Islands

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ABSTRACT

The Thousand Islands, a key marine tourism destination in Indonesia, faces serious threats from environmental pollution. Plastic waste, oil spills, and unsustainable tourism activities damage the marine ecosystem, human health, and the socio-economic well-being of the local community. This study aims to examine the sources of pollution, its impacts, and mitigation efforts implemented in the Thousand Islands. The research method utilized a literature 1the primary pollution comes from microplastics, oil spills, and illegal tourism and fishing activities. This environmental damage reduces marine productivity, poses health risks, and fuels social inequality. Mitigation efforts need to be strengthened through plastic reduction policies, conservation education, and integrated waste management.

Keywords: Thousand Islands, environmental pollution, microplastics, oil spills, mitigation

INTRODUCTION

The Thousand Islands are a group of islands located north of Jakarta Bay and within the administrative area of the Special Capital Region of Jakarta. Comprising more than 100 small islands, this area boasts high marine biodiversity, including coral reef ecosystems, seagrass beds, and mangroves, which are crucial as habitats for marine life and natural protection against abrasion. In addition to their ecological value, the Thousand Islands also serve strategic social and economic functions, particularly in the fisheries and tourism sectors. Thousands of local and international tourists visit this area annually, making it one of Indonesia's leading marine destinations (Kompasiana, 2024).

However, as human activity increases, this area faces serious ecological pressures. Environmental pollution is a major threat, disrupting the balance of coastal ecosystems. Plastic waste from mainland Jakarta is carried by ocean currents and accumulates around small islands. Furthermore, increased tourism, property development, and environmentally unfriendly fishing practices are accelerating environmental degradation. Data from the Jakarta Environmental Agency (2023) noted that more than 60% of marine debris collected in the waters of the Seribu Islands is inorganic waste originating from human activities, both on land and in tourism (Antara, 2025).

One of the most worrying forms of pollution is the presence of microplastics in marine waters and sediments. Microplastics originating from the degradation of plastic waste can enter the food chain and accumulate in fish and other marine organisms. Research by the Indonesian Institute of Sciences (LIPI) shows that microplastics have been found in the bodies of reef fish and shellfish consumed by the public, potentially

posing a direct threat to human health (Antara, 2025). Furthermore, oil spills from fuel-carrying vessels and leaks from fishing boats also exacerbate marine pollution (Hukumonline, 2021).

Environmental pollution in the Seribu Islands not only has ecological impacts, but also social and economic ones. The decline in seawater quality has led to a drastic decline in fish catches, reducing fishermen's incomes. The tourism sector has also been impacted, as tourists have begun to complain about dirty beaches and polluted seawater. This has led to a decline in visits and impacted the livelihoods of local communities who depend on tourism for their livelihoods. (Kompasiana, 2024).

This situation demonstrates that environmental management in the Seribu Islands still faces numerous challenges, including regulatory challenges, public awareness, and inter-agency coordination. Mitigation efforts such as waste bank programs, ecosystem rehabilitation, and plastic reduction campaigns have been implemented, but have not yet shown significant results due to their partial and unsustainable nature (Sajogyo Institute, 2017).

Based on these issues, this study was conducted to examine in-depth the various sources of environmental pollution in the Seribu Islands, analyze their impacts on the environment and the community, and evaluate the effectiveness of existing mitigation efforts. Using a qualitative approach based on literature review and secondary data, this study is expected to provide a comprehensive overview of the actual pollution conditions in this region and offer strategic recommendations for more sustainable management.

This research is not only relevant for policy makers, but also important for the general public, tourism actors, and environmental communities in increasing awareness and participation in maintaining the sustainability of the Seribu Islands as one of Indonesia's national marine assets.

Research Objectives and Benefits

General purpose:

Comprehensively examine the sources of environmental pollution in the Seribu Islands and their impacts on the ecosystem and society.

Special purpose:

- Identify the types and origins of environmental pollution in the Seribu Islands.
- Analyze the impact of pollution on the environment and socio-economic aspects of society.
- Evaluate the effectiveness of mitigation efforts that have been carried out.

Benefit:

This research is expected to provide scientific contributions in the field of coastal environments and serve as a basis for policy makers in formulating effective management and mitigation measures.

RESEARCH METHOD

This research used a qualitative approach with a literature review method. Data were collected from various secondary sources, such as journal articles, government reports, NGO publications, and online media (Ekuatorial.com, 2025; Betahita.id, 2024).

The analysis was conducted thematically to identify pollution patterns and their impacts. Case studies were used to illustrate the real-world conditions on several islands, such as Pari Island and Pramuka Island, which have been significantly impacted by human activities (Kompasiana, 2024).

This research is grounded in coastal ecology theories that emphasize the importance of balance between human activities and environmental carrying capacity. The concept of sustainable development is also used as the primary framework for examining the long-term impacts of pollution. Furthermore, environmental political ecology theory is used to understand the inequalities in natural resource management between local communities and other stakeholders, such as businesses and the government.

RESULTS AND DISCUSSION

1. Quantitative Analysis of Marine Debris in the Seribu Islands

Data from the Jakarta Environmental Agency shows that throughout 2023, the average volume of waste collected from the Thousand Islands reached 4.3 tons per day, with a significant increase of up to 6 tons per day during the holiday season. The majority of waste found on beaches and in the waters consisted of single-use plastics such as beverage bottles, plastic bags, and straws. Based on a field survey by the marine care community, approximately 72% of the waste found in shallow waters came from tourists who did not manage their waste responsibly.

Another prominent type of waste is Styrofoam waste from packaged food, which has a high potential to turn into microplastics. This waste is difficult to decompose and can break down into small particles that are ingested by marine life.

2. Marine Oil Pollution and Its ImpactsOil spills in the Seribu Islands generally come from two main sources, namely:

Fuel transport vessel activity in Jakarta Bay. Leaks from traditional fishing boats that do not have a good waste disposal system. In 2022, an oil spill near Lancang Island caused a sudden death in small fish populations and damaged approximately 1.5 hectares of coral reef. The impact was also felt by coastal communities, who experienced a decrease in income because the polluted water prevented them from fishing within a certain radius. This decrease in catches reached 25% compared to previous years.

3. Case Study: Tidung Island and Pari Island

Tidung Island:

The island is a popular tourist destination, attracting up to 2,000 visitors each weekend. However, the lack of waste management facilities has led to waste accumulation in several areas on land and in water. Local residents have complained about foul odors and declining groundwater quality. A 2023 study by the Indonesian Institute of Sciences (LIPI) showed that E. coli levels in several residents' wells exceeded safe limits.

Pari Island:

The island has come under scrutiny due to agrarian conflicts and environmental degradation. Pollution, coupled with sand exploitation and reclamation, has accelerated coastal erosion. In the past five years, Pari Island's coastline has receded by 7 meters. This erosion is exacerbated by the loss of coastal vegetation that previously served as natural protection from waves.

4. Socio-Economic Impact

The impacts of pollution not only damage the environment but are also deeply felt in the social and economic aspects of the community. Interviews with local fishermen revealed that their daily income has dropped drastically due to the declining fish population. Some fishermen have even switched to working as boat taxis or tour guides, which are also unstable due to their dependence on tourists.

Furthermore, pollution also reduces tourist appeal. Tourists disappointed by the dirty beaches leave negative reviews on social media, indirectly reducing tourist interest. Some accommodation operators have reported a 30% decrease in occupancy during the peak season compared to before the pandemic.

5. Evaluation of Mitigation Efforts

Existing programs such as eco-education, waste banks, and weekly beach cleanups have had a positive impact. However, the biggest challenge is the lack of continuity and coordination between institutions. Many activities only take place when external projects or funding are available.

The Environmental Agency needs to strengthen the Centralized Domestic Wastewater Management System (SPALDT), which remains unequally distributed across the islands. Furthermore, active community participation must be increased through economic incentives—for example, a waste-for-basic-food exchange program or subsidies for environmentally friendly businesses.

6. Sources of Pollution

- Microplastics: come from household and tourism plastic waste.
- Oil waste: comes from sea transportation and industrial activities in Jakarta Bay.
- Tourist waste: tourists littering, as well as coral damage from snorkeling and boat anchors.

Figure 1. Illustration of marine pollution in the Seribu Islands.

7. Environmental Impact

- Damage to coral reefs, seagrass beds, and fish habitats.
- Decreasing quality of sea water and ground water, disrupting community sanitation.
-Threatens populations of marine species, including turtles and reef fish.

Figure 2. Illustration of the impact on the environment

8. Social and Economic Impacts

- Fishermen's income has decreased due to a decrease in fish catches.
- Inequality in land access between local communities and the private sector.
- Community dependence on the tourism sector is increasingly vulnerable due to environmental degradation.

Figure 3. Illustration of social and economic impacts

9. Mitigation Efforts

- Marine conservation education and outreach to residents and tourists.
- Development of a centralized domestic waste processing system (SPALDT).
- Strengthening the zero waste policy for single-use plastics.
- Preservation of coral reef ecosystems through rehabilitation.

Figure 4. Illustration of mitigation efforts

TABLE 1 TYPES AND SOURCES OF POLLUTION

Types of Pollution	*Source*	*Main Impact*
Microplastics	Domestic and tourist waste	Marine food chain disruption
Waste Oil	Maritime transport and industry	Marine habitat destruction
Solid Waste	Residential tourism and activities	Coastal and marine pollution

COMPARISON GRAPH OF GARBAGE VOLUME ON SEVERAL ISLANDS

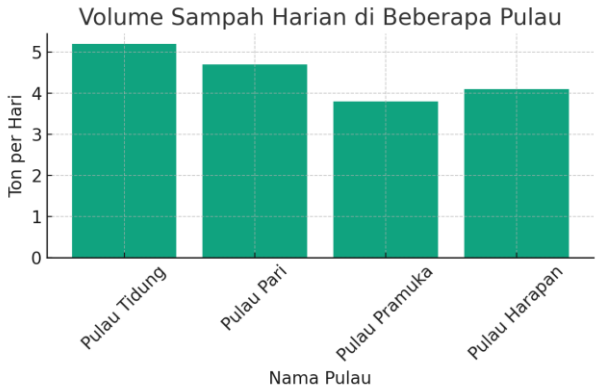

Figure 5. Daily waste volume on several islands in the Seribu Islands.

CONCLUSION

The Thousand Islands face serious threats from environmental pollution, particularly microplastics, oil waste, and tourism waste. The impact of environmental damage not only degrades ecosystem quality but also impacts human health and social well-being. It is recommended that the government increase monitoring and strengthen public education. Environmental pollution in the Thousand Islands is a complex problem involving many factors. Its impacts are not limited to ecological damage but also affect the social and economic aspects of local communities. The required solution must be holistic, encompassing government policies, public awareness, and active private sector participation. This study recommends strict monitoring of marine pollution, increased waste management capacity, and the development of conservation-based tourism.

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