



A Mini-Review: Marine Debris in Indonesian Waters

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Indonesia is a country that has very wide sea waters and has abundant resources. The quality of the waters must be maintained, especially from marine debris (MD) contaminants. This article aims to explain the classification, movement, and impact of marine debris on the aquatic environment. From various studies, it was found that MD in Indonesian waters is grouped into macro and micro sizes. The movement of MD in waters is influenced by tides, currents, and wind speed. MD greatly impacts the ecosystem in aquatic habitats especially mangroves. The purpose of this article is to review of marine debris in Indonesian waters.

Keywords: *Impact; ecosystem; waste; mangrove; movement.*

1. INTRODUCTION

Marine Debris (MD) is a persistent solid material that is left in the surrounding marine and coastal environments [1] During the mid-20th century,

the proportion of plastic waste around the world increased by around 10% annually, which was spread across 61-105 countries based on the results of a survey in 2011 [2] The total proportion is dominated by the type of plastic

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waste that pollutes the marine ecosystem with a value range of 1.7 - 4.6% of the total [3] Especially in Indonesia, it can be found from various sources, including land, local waters, waste management, and aquaculture activities, and fishing activities [4]. When viewed from its mass, MD easily migrates from one location to another where hydrodynamic aspects of the oceans such as wind, tides, and currents have an important impact on their displacement [5].

2. CLASSIFICATION OF MARINE DEBRIS

Pollution has various sources of pollutants such as waste from households, industrial waste to MD contaminants that can pollute the sea [6]. Most of what is found in Indonesian waters is a type of plastic waste that is divided into *macro* and *micro* sizes [7]. Macro-sized MD contaminants have several types, consisting of glass bottles, foam, shoes, pipettes, bottle caps, *steamers*, cork, and rubber [8]. In each macro-sized garbage has a different weight and each piece of trash can move from one place to another because it is affected by oceanographic factors [9].

3. MOVEMENT OF MARINE DEBRIS

Waste in marine areas can move in all directions, this is due to its existence. the circulation of ocean currents in Indonesia through most of the East and Southeast Asia region of a country called the Indonesian Throughflow (ITF) [10] to identify a distribution pathway for MD in the oceans can use several methods, most of which research is limited to distribution of MD in an area [11] Some researchers have begun to compare observational data regarding the mass of MD types whose distribution is combined with a model [12]. Based on previous research, there is a hypothetical method used by some researchers to determine the prediction of sources from MD [13] The research can be carried out with different methods, namely in the form of a photometric method that can identify a movement of waste in real-time and cannot predict where the MD will move [14] There is another study using a simple model that utilizes tools in making prediction models from secondary data consisting of wind, current and tidal components, these parameters are factors that have an influence on MD displacement [15]. This observation method can understand the complexity of the movements that occur in waters and other benefits, the data used can be easily accessed and the results obtained are in

the form of observational data obtained with minimal costs [16]. The use of *instrumentation* in predicting MD displacement is also available. conducted in a research method with principles lagrangian to track releases into the sea and produce a prediction in which direction an MD will move [17]. Based on previous research, the use of an object with a principle as a *drifter* has a floating property which is analogous to a drifting waste object influenced by currents, waves, and wind, therefore the tool principle drifter can be used in analyzing the displacement of MD debris [18].

4. CONCLUSION

From various studies, it is found that MD in Indonesian waters is grouped into macro and micro sizes. The movement of MD in waters is influenced by tides, currents and wind speed. MD greatly impacts the ecosystem in aquatic habitats especially mangroves.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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