Microplastics Dissemination from Fish *Mugil dussumieri* and Mangrove Water of Muara Teluknaga, Tangerang, Banten

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**Abstract.** Plastic trash accumulation under 5 mm (microplastics) has been playing as water contaminant for a long time period. Microplastics dissemination in the ocean can be threat and trigger for biological effects especially if ingested by the marine biota. The fish *Mugil dussumieri* is marine biota which is marine biota food resource used as bioindicator to investigate the presence of microplastics in Mangrove Muara Teluknaga, Tangerang, Banten. Microplastic are found both from fish *Mugil dussumieri* sample and the water sample during the investigation. The type of microplastics most commonly found on *M. dussumieri* sample and water sample is fiber. The average fiber can be found digestive organ is 164 particles/organs more than respiratory organ 132.5 particles/organ. The average amount of fiber found is 431.5 particles/L and film is 291.5 particles/L.

1. Introduction
Indonesia is a maritime country that is a country surrounded by sea and waters. People who lived within a radius in 50 km of the coastline of Indonesia produce a litter about 5.4 million metric tons of plastic waste [1]. Plastic waste also are found in the northern coast of Java. One of the regions in Indonesia which has the higher population in north coast of Java Island is Tangerang. One of the place is the mangrove ecosystem of Teluknaga, Tangerang. There are residential areas with high intensity waste disposal in ditches and areas of water around the mangrove ecosystem of Teluknaga. Therefore, cause the plastic waste flow the mangrove ecosystem and many plastic waste ubiquitous around that.

It is estimated that 60%-80% of marine debris source from plastic debris [2]. Plastic debris divided into microplastics, mesoplastics, and macroplastics [3]. Microplastics have size range less 5 mm [4]. Microplastics formed by accumulation of plastic debris in the oceans for the last four decades [5].

Microplastic can be found in the water column, marine sediments around the world till a depth of 5000 m [6]. The type of microplastics are fiber, fragment, film and pellet [7]. Microplastics can decompose and accumulate in the sea which has potentially being eaten by marine organism, such as turtle, fish, and marine mamals [8]. One of the marine organisms potentially affected by microplastics is fish *Mugil dussumieri*. This fish usually consumsed by people and sold for the other people.

2. Methodology

2.1. Sampling Study
The research was conducted in the mangrove ecosystem of the Muara Teluknaga, Tangerang regency. There are three sampling stations on the south, east, and west with each points 3 belanak fish (*M. dussumieri*).
*dussumieri* and 3 water samples. The water samples were taken as many as 20 liters by plankton net and filter results from plankton net approximately 150 ml. Pore size of plankton net used was 150 µm. Environment parameters test such as pH, waters temperature, and salinity were also taken with three repetitions.

![Map of sampling station](Source : d-maps.com)

**Figure 1.** The sampling station in the mangrove ecosystem of Muara Teluknaga in Teluknaga district

**Table 1.** Environmental parameters in the mangrove ecosystem of Muara Teluknaga

| Station | pH   | Water Temperature | Salinity (ppt) |
|---------|------|------------------|----------------|
| 1       | 8.5  | 30.5 °C          | 28             |
| 2       | 8.6  | 30.5 °C          | 29             |
| 3       | 8.0  | 31 °C            | 29             |

2.2. Sample collection

Sample of *Mugil dussumieri* was collected with the purposive random sampling method. Fifteen individuals were collected which were five individuals with each station. Individuals were put in glass jars containing 70% alcohol for preservation. The wet weight of each *Mugil dussumieri* was measured in weight and length. The wet weight *Mugil dussumieri* of the digestive and respiratory was measured and recorded.

2.3. Microplastics analysis

Fish were dissected and taken parts of the digestive organs and respiratory organ [9]. Each of the respiratory and digestive organs were put in glass jar 25 ml of HNO₃ and soaked for 24 hours. The samples were diluted 10 times dilution by the aquadest. The sample was filtered using the Whatman paper grade 1 with pore size 11µm then taken 1 ml by the pippete to be dropped on the sedgewick rafter counting. The sample is observed under a microscope with a magnification of 10 x 10. Calculate the number of microplastics and differentiated based on the type of microplastics.

2.4. Microplastics extraction from water
Water sample was taken at 150 mL and mixed with saturated NaCl 750 mL in a beaker glass with ratio of sample water and saturated NaCl were 1:3. The sample was taken 1 ml with dropped and melted on the counting chamber. Observed under a microscope with a magnification of 10 x 10. Calculate the number of microplastics and differentiated based on the type of microplastic [10].

2.5. Data processing and data analysis of microplastics
The results of this research are qualitative and quantitative data. Based on qualitative data, the results represent the presence or absence of microplastics in the water samples and fish Mugil dussumieri samples. While the quantitative results shows the number of microplastics found in water samples and Mugil dussumieri samples.

3. Result and Discussion
The results of this research are qualitative and quantitative data. The quantitative data showed the amount of microplastics found from the sample. Based on qualitative data, the results represent the presence of microplastics in the water samples and fish M. dussumieri samples.

The type of microplastics found in the water samples are film, fragment, and fiber. The most type of microplastics found is fiber. Fiber is derived of fragmentation, monofilament fishing net, rope and cloth. Fiber most commonly found in water samples taken from a fishing net and fishing rod [12]. The average fiber found in the water sample was 57.53 particles/mL while the average film found in the water sample was 38.87 particles/mL. Fragment is the least microplastics type found in the water sample, which is an average 0.067 particles/mL. Based on the figure 2, average amount of fiber found were 431,5 particles/L and film were 291,5 particles/L. Fragmen is type of microplastics rarely was discovered in the water sample.

![Figure 2. Type and Amount Microplastic/L water](image)

The digestive organ of M. dussumieri sample has the average weight 2.21g while weight respiratory organ has the average 1.43g. Microplastics can be found on both organs. Based on figure 3 shows that the digestive organ contains more microplastics particles than respiratory organ. The amount of microplastics particles found in the digestive organ are 511.33 particles/organ, while amount of microplastics particles found in the respiratory organ are 372.63 particles/organ. Mesopelagic fish had tendency to feed microplastic having the color of similar to plankton. Therefore digestive system and respiratory can be found types of microplastics. (Boeger et al 2010).
Figure 3. Types and number of microplastic in *M. dussumieri*

Based on figure 4, type of microplastic most commonly found on the digestive organ and respiratory organ are fiber. The average fiber can be found digestive organ is 164 particles/organ and respiratory is 132.5 particles/organ. The type of microplastic rare in samples of *M. dussumieri* sample are fragment. The average fragments found in digestive organs is 4.5 particles/organ and on the respiratory organs is 1.5 particles/organ. Fiber is a microplastic found in the mangrove ecosystem of the Muara Teluknaga because the activities of surrounding residents who work as fishermen to catch marine animals. Therefore the nets used to catch fish become microplastics which accumulate in the water and floats on the surface. The longer and the heavier body of fish *M. dussumieri* is observed, therefore the amount more microplastics is found. There is a correlation between the increment of body mass and the amount of microplastics.

Figure 4. The type microplastics of *M. dussumieri* sample

4. Conclusion
The type of microplastics has been found such as fragment, fiber and film. The type of microplastics most commonly found on *M. dussumieri* sample and water sample is fiber. The average fiber can be found digestive organ is 164 particles/organ more than respiratory organ 132.5 particles/organ. The longer and the heavier body of fish *M. dussumieri* is observed, therefore the amount more
Microplastics is found. There is a correlation between the increment of body mass and the amount of microplastics. The average amount of fiber found is 431.5 particles/L and film is 291.5 particles/L.

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