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Identification of Microplastics in Manggaba'i Fish (Glossogobius Giuris) in Limboto

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Abstract

Manggaba'i fish (Glossogobius giuris) is one of the important commercial fish species in Lake Limboto. Manggaba'i fish (Glossogobius giuris) is a vertebrate animal and is included in the demersal fish class. Human activities and the environment can influence the distribution and abundance of microplastics. This study was conducted to identify microplastics in manggaba'i fish (Glossogobius giuris). The aim is to determine the physical properties of microplastics based on the shape, color, and amount of Manggaba'i fish in Lake Limboto. Based on the results of the study and discussion regarding the physical characteristics of microplastics contained in the digestive system of manggaba'i fish in Lake Limboto, it can be concluded that the identification of microplastics in the digestive system of manggaba'i fish was found to be all in the form of fibers with a size of (10-12cm) black, and a size of (12.5-14cm) blue, red, and black.

Keywords: *Microplastics, Manggaba'i fish (Glossogobius giuris)*

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INTRODUCTION

Lake Limboto is also increasingly damaged. Its condition is starting to dry up, and there is a lot of garbage, which pollutes and unkempts the surrounding environment (Olii Siti et al., 2022). Plastic is a valuable substance (Nurdhiana, 2021) and is a synthetic polymer that can be made almost entirely from hydrogen and carbon atoms (Al-Fatih, 2021). It takes hundreds of years for plastic to decompose. Thus, plastic waste in lake waters can be more polluted than other waste (Hasibuan et al., 2021).

Microplastics are waste that is less than 5 mm in size. There are two categories of microplastics: primary microplastics and secondary microplastics (Azizah et al., 2020). Microplastics can harm humans and impact the Limboto Lake ecosystem (Hogi et al., 2021). The problem of microplastic pollution has made many people more aware of the potential risks posed to humans and marine life due to the indiscriminate dumping of plastic waste into lakes (Widianarko & Hantoro, 2018).

Manggaba" I fish (Glossogobius giuris) is one of the important commercial fish species in Lake Limboto. Manggaba" I fish (Glossogobius giuris) is a vertebrate animal (Koniyo & Juliana, 2018) and is included in the demersal fish class. Human and environmental activities can influence the distribution and abundance of microplastics (Harpah et al., 2020). Microplastic pollution can have quite dangerous impacts, especially if it enters the body of animals or

humans. Microplastics will also increase with the increasing dependence on plastic-related human activities (Hermawan et al., 2022). If consumed by aquatic biota, microplastics can harm the digestive tract and other organ systems. In addition, heavy metals from the environment, including Hg, Pb, Cr, Cu, Cd, and Zn, can be absorbed by microplastics (Sugandi et al., 2021).

METHOD

This research was conducted in June-October 2023. This research was conducted in Lake Limboto, Gorontalo Province. Sampling was carried out at 4 locations, namely location 1 (far from settlements), location 2 (West Pentadio Village), location 3 (near settlements), and location 4 (near garbage dumps) which can be seen in Table 1. The Manggaba'I fish samples taken were fish measuring (10-12cm) and fish measuring (12.5-14cm).

Table 1. Sampling Coordinate Points

Sample Point	Coordinate Points		Area Description
	Latitude	Longitude	
Location 1	0º 36’ 24,37” N	123º 0’ 26,11” E	Samples were taken from lakes in areas far from residential areas.
Location 2	0º 36’ 43,,45” N	123º 0’ 27,06” E	Samples were taken at a lake in West Pentadio village.
Location 3	0º 36’ 24,,40” N	123º 0’ 26,05” E	Samples were taken from a lake in an area close to residents' homes.
Location 4	0º 36’ 52,,44” N	123º 0’ 25,01” E	Samples were taken from lakes in areas close to waste disposal sites.

The digestive system samples of Manggaba'i fish (Glossogobius giuris) taken were divided into two sizes, namely size (10–12 cm), and size (12.5–14 cm), each size of 10 fish, so that the total was 20 fish. The digestive system of the Manggaba'i fish was taken from 10 fish of each size. The combination of 10 digestive systems was carried out with utmost care and precision because the digestive system of the Manggaba'i fish was too small. If added with a solution and then tested, the fish digestive system sample could not be seen under a microscope. Sample preparation for fish was divided into two parts: the digestive system and the meat of the Manggaba'i fish. In the digestive system of fish, first, the length of the fish was measured, then it was dissected using scissors through the cloaca of the Manggaba'i fish to the stomach of the fish, then the digestive system was taken and then placed in a petri dish. Then, the sample was crushed using an iron spatula to accelerate the decay of organic matter. The crushed sample was then weighed and then added with 30% H2O2 solution until all parts of the sample were submerged or about 15 ml and 5 drops of 0.05 M FeSO4 were added (Al-Fatih, 2021), then incubated at room temperature for 24 hours. After incubation, the sample was heated using a water bath for 30 minutes at a temperature of 75oC at a speed of 120 rpm (Nurdhiana, 2021), then the sample was filtered using fine Whatman filter paper with vacuum filtration (ORION). The filtered sample was then observed using a microscope.

RESULTS & DISCUSSION

The manggaba'I fish used in the study were divided into two sizes, namely size (10-12cm) with a digestive system weight of 4.04 gr and size (12.5-14cm) with a digestive system weight of 4.99 gr. Figure 1 shows the test results obtained on two fish sizes based on microscope tests on fish digestive system samples. The identification results obtained were in the form of fiber microplastics. Fiber is the most common form found in the digestive system. Fiber-shaped microplastics in the digestive system of mangggaba'i fish have the characteristics of a long shape like thread or fishing line and striking colors.

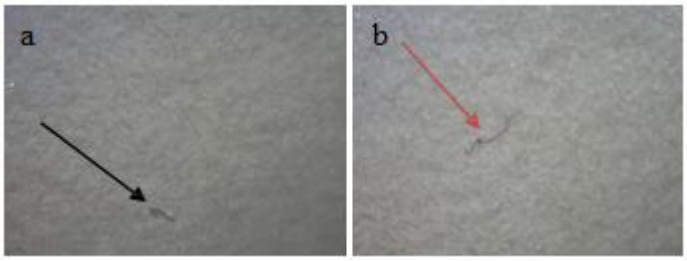

Figure 1. Microscope photo at 60x magnification of the Manggabai fish a) Size (10-12cm), and b) Size (12.5-14cm)

Figure 1 shows microplastics in the digestive system samples of manggaba'i fish with two fish sizes. Size (10-12cm) obtained in fiber microplastics with a black color and a particle count of 2 particles. The digestive system sample of manggaba'i fish size (12.5-14cm) was obtained as fiber microplastics with blue, red, and black colors and a particle count of 3 particles. The source of fiber-shaped microplastics found came from fishing activities involving using nets, fishing gear, ropes, and nets. In addition, fiber comes from household waste obtained by washing clothes. One type of plastic commonly found in lakes and can be swallowed by fish is fiber-shaped microplastics (Senduk et al., 2020)—the form of microplastics often found in fiber. The digestive system of manggaba'i fish generally has varying colors: blue, red, and black. The main route for microplastics to enter the human body is through the food chain. This is because the shape of microplastics is similar to food and can be swallowed and retained for a long time in the digestive tract (Kurisi et al., 2023).

CONCLUSION

Based on the results of research and discussion regarding the physical characteristics of microplastics contained in the digestive system of manggaba'i fish in Lake Limboto, it can be concluded that the identification of microplastics in the digestive system of manggaba'i fish was found to be all in the form of fibers with colors in sizes (10-12cm) namely black, and in sizes (12.5-14cm) blue, red, and black.

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