



## Identification of Microplastics in Sediments in Limboto Lake

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### Abstract

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Lake Limboto is a lake that has several natural resources. Lake Limboto is currently experiencing pollution caused by the large amount of plastic waste. This study aims to determine the shape and color of microplastics in the sediment. Microplastics are a type of waste less than 5 mm in size. Based on the results of the study and discussion of the physical characteristics of microplastics contained in the sediment in Lake Limboto, it can be concluded that the identification of microplastics in the sediment consists of microplastics in the form of fibers with colors at location 1 purple, black and red, location 2 purple, location 3 black, and location 4 black.

**Keywords:** Microplastics, sediment

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## INTRODUCTION

Limboto Lake is located in Gorontalo Province, which stretches across five districts, namely Telaga, Tilango, Limboto, Batudaa, and Kota Barat, situated between two areas, namely 30% of the Gorontalo City area and 70% of the Gorontalo Regency area (Hogi et al., 2021). Limboto Lake is located between 122° 42' 0.24" and 123° 03' 1.17" E and 00° 30' 2.035" and 00° 47' 0.49" N (Sumarni., Junus, N., & M, J, 2023). Limboto Lake is one of the lakes with several natural resources. Limboto Lake is one of the several natural resources Gorontalo Province owns today. Lake Limboto functions as a home for plants and animals that live in the water, and it can be a source of livelihood for fishermen (Mahmud et al., 2020). The current condition of Lake Limboto is very concerning due to pollution and shallowing (Mahmud et al., 2020).

Lake Limboto, a shallow lake or floodplain type, is a unique ecosystem with a height of sedimentation processes in a low basin (Arsana et al., 2022). As highlighted by Olii et al. (2022), Lake Limboto is one of several natural resources currently owned by Gorontalo Province. It serves as a home for a diverse range of plants and animals, a regulator of hydrological functions, a stabilizer of natural processes, a source of energy, a mode of transportation, and a platform for research and teaching (Mahmud et al., 2020).

Sediment, a particle of material that usually includes rocks' chemical and physical properties, is a key component of Limboto Lake's ecosystem. However, the slower movement of microplastics in sediment can cause distributed microplastics to collect, as noted by Ambarsari & Anggiani (2022). According to Laksono et al. (2021), microplastics in sediments in waters contain microplastics in the form of fibers, fragments, films, and pellets with different colors, namely



brown, yellow, black, and red. This alarming presence of microplastics in the sediment underscores the urgent need for conservation efforts in Limboto Lake.

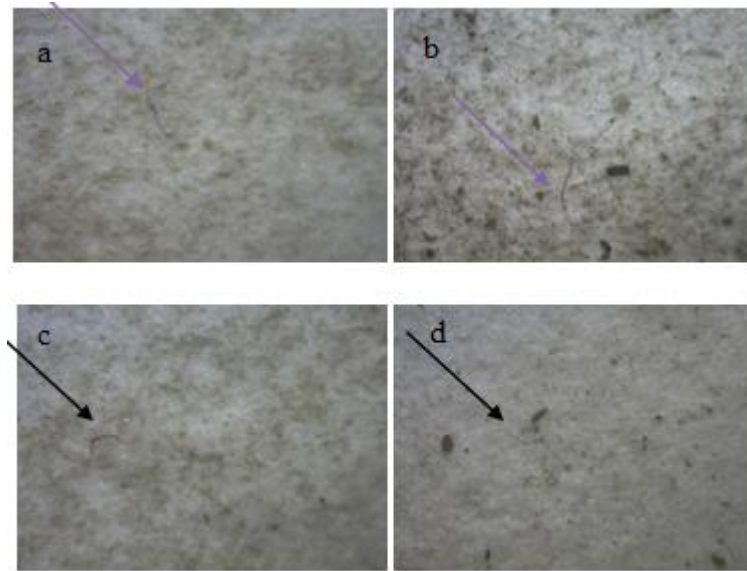
## **METHOD**

This research was conducted in Lake Limboto in June 2023. The tools and materials used in this study. Tools: Travel microscope used to see the shape and color of microplastics, the shovel used for sediment sampling, oven to dry sediment and fish meat samples, milling to smooth sediment samples, 250 mesh sieve to sieve sediment samples to separate large and small substrates analytical balance from measuring the mass of sediment samples. The materials used were sediment samples, 30% H<sub>2</sub>O<sub>2</sub> solution and Fe<sub>2</sub>SO<sub>4</sub> solution, aluminum foil, scissors, stirring rod, iron spatula, label paper, ruler, ziplock, sample bottles, labels, distilled water, and Whatman filter paper no. 42.

The area around Lake Limboto is the location for sediment sampling. Sediment samples were taken using a shovel with a shovel length of 75cm. Sediment samples were taken about 5 meters from the lake's edge and taken at a depth of 50cm. 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 the garbage dump). Sediment samples were taken with a shovel and then put into a ziplock bag for sampling. The sediment samples that had been taken were then dried using an oven (IRMECO) for 24 hours at a temperature of 110oC (Laksono et al., 2021); after the sample was dry, it was ground using milling (HERZOG) for 20 seconds, then the sample was sieved using a 250 mesh sieve to separate large and small substrates. After being sieved, the sediment sample was weighed with a weight of 15 grams. The sediment sample was dissolved in 50 ml of saturated NaCl solution and then left for 24 hours to settle (Wijayanti et al., 2021). After the sample was gone for 24 hours, the sample was filtered using fine Whatman filter paper no. 42 with vacuum filtration (Pamungkas et al., 2022), then observed using a microscope.

## **RESULTS & DISCUSSION**

The results obtained from the microscope test on sediment samples showed microplastic fiber forms. Fiber is the most common form found. Fibers are elongated like fibers, resembling thread or fishing line, and have striking colors. In sediment samples, fiber forms were found with purple, black, and red colors.



**Figure 1.** 60x Magnification Microscope Photo of Sediment at 4 Location Points Location 1, b) Location 2, c) Location 3 and d) Location 4.

Figure 4.1 shows the results obtained at four sampling locations. At the first location, far from settlements, microplastic fibers were found with three particles of different colors: purple, black, and red. The discovery of microplastics at this location was due to the long-term oxidation process in the environment. Due to the natural flow of the lake, plastic waste floats on the surface of the water, then oxidizes, decomposes, and is exposed to sunlight. This results in microplastic particles spreading throughout the lake, even to remote areas far from residential areas (Ningrum et al., 2022). The second location, West Pentadio Village, found microplastics in the form of fibers. However, the number of particles found at the second location was only one purple particle. Microplastic fibers at the second location are produced due to human activities around the lake. The third location near the settlement found microplastics in the form of fibers with four black particles. The source of microplastics in the form of fibers near settlements can come from household activities such as bathing, washing clothes, and activities of people who work as fishermen. The fourth location near the garbage dump was found to have microplastic fibers with more particles, namely five particles with a black color. The fiber form found at this location came from household waste and waste from fishermen who dumped their trash in that place.

## CONCLUSION

Based on the results of research and discussion regarding the physical characteristics of microplastics contained in sediments in Lake Limboto, it can be concluded that the identification of microplastics in sediments consists of microplastics in the form of fibers with colors at location 1 purple, black, and red, location 2 purple, location 3 black, and location 4 black.

## BIBLIOGRAPHY

- Ambarsari, D. A., & Anggiani, M. (2022). Kajian Kelimpahan Mikroplastik pada Sedimen di Wilayah Perairan Laut Indonesia. *Oseana*, 47(1), 20–28.
- Arsana, I. K. S., Gintulangi, S. O., Hasan, K. K., & Olilingo, F. Z. (2022).

- Analisis Pengembangan Ekonomi Pertanian Berkelanjutan Dan Konservasi Danau Limboto Sebagai Upaya Pelestarian Lingkungan Di Gorontalo. *Jurnal Sains Sosio Humaniora*, 6(1), 934–947. <https://doi.org/10.22437/jssh.v6i1.21219>
- Hogi, J., Katili, A. S., & Mamu, H. D. (2021). PERAIRAN DANAU LIMBOTO STUDY OF ABUNDANCE OF MANGGABA ' I FISH ( *Glossogobius giuris* ) IN. *Jambura Edu Bosfer Journal*, 3(2), 68–73.
- Laksono, O. B., Suprijanto, J., & Ridlo, A. (2021). Kandungan Mikroplastik pada Sedimen di Perairan Bandengan Kabupaten Kendal. *Journal of Marine Research*, 10(2), 158–164. <https://doi.org/10.14710/jmr.v10i2.29032>
- Mahmud, S. L., Achmad, N., & Panigoro, H. S. (2020). Revitalisasi Danau Limboto dengan Pengerukan Endapan di Danau: Pemodelan, Analisis, dan Simulasinya. *Jambura Journal of Biomathematics (JJBm)*, 1(1), 31–40. <https://doi.org/10.34312/jjbm.v1i1.6945>
- Ningrum, I. P., Sa'adah, N., & Mahmiah, M. (2022). Jenis dan Kelimpahan Mikroplastik Pada Sedimen di Gili Ketapang, Probolinggo. *Journal of Marine Research*, 11(4), 785–793. <https://doi.org/10.14710/jmr.v11i4.35467>
- Olii Siti Mulghimma Anastasya, Anggraini Ms Lagola, D. T. (2022). PARTISIPASI MASYARAKAT TERHADAP PENGEMBANGAN DAYA TARIK WISATA DANAU LIMBOTO DESA PENTADIO BARAT KABUPATEN GORONTALO. *Tulisan Ilmiah Pariwisata*, 5(1), 42–48.
- Pamungkas, N. A. G., Hartati, R., Redjeki, S., Riniatsih, I., Suprijanto, J., Supriyo, E., & Widianingsih, W. (2022). Karakteristik Mikroplastik pada Sedimen dan Air laut di Muara Sungai Wulan Demak. *Jurnal Kelautan Tropis*, 25(3),
- Sumarni., Junus, N., & M, J, T. (2023). Implementasi Peraturan Daerah Provinsi Gorontalo Tentang Rencana Tata Ruang Wilayah Strategis Provinsi Danau Limboto. *Journal of Comprehensive Science*, 2(1), 90–98.
- Wijayanti, D. A., Susanto, C. A. Z., Chandra, A. B., & Zainuri, M. (2021). Identifikasi Mikroplastik pada Sedimen dan Bivalvia Sungai Brantas. *Environmental Pollution Journal*, 1(2), 101–109.