

**Presence of Microplastics in Tilapia (*Oreochromis niloticus*) Along the Iloilo River**

A Special Paper

Presented to

The College of Agriculture, Resources, and Environmental Sciences

Central Philippine University

Jaro, Iloilo City

In Partial Fulfillment

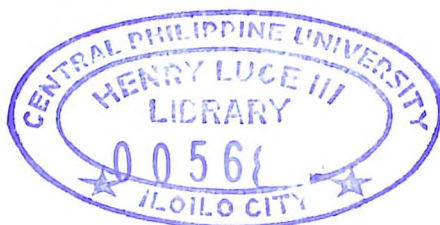
of the Requirements for the Degree

Bachelor of Science in Environmental Management

by

Trisha D. Laboriante

May 2024



## Presence of Microplastics in Tilapia (*Oreochromis niloticus*) Along the Iloilo River

Trisha D. Laboriante

### Abstract

Microplastic pollution poses a significant threat to aquatic ecosystems, with potential consequences for biodiversity and human health. This study investigates the presence and characteristics of microplastics in tilapia (*Oreochromis niloticus*) inhabiting the Iloilo River, a vital watercourse in the Philippines. Samples were collected from three distinct sites along the river: Barangay Tap-oc, Barangay San Rafael, and Barangay Progreso. A total of 45 tilapia specimens were examined, and microplastics were isolated from the gill and gut tissues using chemical digestion and filtration techniques. The results revealed a high detection rate of microplastics, with 95.6% of the fish specimens containing these contaminants. A total of 132 microplastic particles were identified, with fibrous morphologies being the most prevalent (70.5%), followed by particles (22.7%) and pellets (6.8%). Blue microplastics constituted the dominant color (50.0%), succeeded by red (21.2%) and black (15.9%). Statistical analysis demonstrated significant variations in microplastic abundance across sampling locations, with Barangay Tap-oc exhibiting the highest contamination levels. These findings underscore the pervasive nature of microplastic pollution in the Iloilo River ecosystem and the potential risks it poses to aquatic life and human health.

## References

- Albay, R. L. V. (2021, December 9). *Tributary Creeks Threaten the Iloilo River's Rehabilitation*. Esquiremag.ph. <https://www.esquiremag.ph/long-reads/features/iloilo-river-pollution-a2702-20211209-lfrm4>
- Andrady, A. L. (2011, August 1). *Microplastics in the marine environment*. Marine Pollution Bulletin. <https://doi.org/10.1016/j.marpolbul.2011.05.030>
- Ardestani, M. M. (2022, May 1). *Microplastics in the environment: their sources, distribution, and dangerous status*. Water, Air and Soil Pollution/Water, Air & Soil Pollution. <https://doi.org/10.1007/s11270-022-05630-9>
- Bhuyan, M. S. (2022, March 16). *Effects of Microplastics on Fish and in Human Health*. Frontiers in Environmental Science. <https://doi.org/10.3389/fenvs.2022.827289>
- Egbeocha, C., Malek, S., Emenike, C., & Milow, P. (2018, September 19). *Feasting on microplastics: ingestion by and effects on marine organisms*. Research Gate. Retrieved May 20, 2024, from [https://www.researchgate.net/publication/326574423\\_Feasting\\_on\\_microplastics\\_Ingestion\\_by\\_and\\_effects\\_on\\_marine\\_organisms#full-text](https://www.researchgate.net/publication/326574423_Feasting_on_microplastics_Ingestion_by_and_effects_on_marine_organisms#full-text)
- Espiritu, Dayrit, Coronel, Paz, Ronquillo, Castillo, & Enriquez. (n.d.). *Assessment of Quantity and Quality of Microplastics in the Sediments, Waters, Oysters, and Selected Fish Species in Key Sites Along the Bombong Estuary and the Coastal Waters of Ticalan in San Juan, Batangas*.
- Espiritu, E. Q., Rodolfo, R. S., Evangelista, S. M. J., Feliciano, J. J. G., Sumaway, A. M. N., Pauco, J. L. R., Alvarez, K. V. N., & Enriquez, E. P. (2023, February 1). *Microplastics contamination in the fishes of selected sites in Pasig River and Marikina River in the Philippines*. Marine Pollution Bulletin. <https://doi.org/10.1016/j.marpolbul.2023.114573>

- Guardian, D. (2021, June 13). *Iloilo, Jalaur Rivers among top plastic-emitting in the world – study*. Daily Guardian. <https://dailyguardian.com.ph/iloilo-jalaur-rivers-among-top-plastic-emitting-in-the-world-study/>
- Harikrishnan, T., Janardhanam, M., Sivakumar, P., Sivakumar, R., Rajamanickam, K., Raman, T., Thangavelu, M., Muthusamy, G., & Singaram, G. (2023, February 1). *Microplastic contamination in commercial fish species in southern coastal region of India*. Chemosphere. <https://doi.org/10.1016/j.chemosphere.2022.137486>
- Herrera, Štindlová, Martínez, Rapp, Romero-Kutzner, Samper, Montoto, Aguiar-González, Packard, & Gómez. (2018, December 10). *Microplastic ingestion by Atlantic chub mackerel (Scomber colias) in the Canary Islands coast*.
- Hidalgo-Ruz, Gutow, Thompson, & Thiel. (2012, March). *Microplastics in the Marine Environment: A Review of the Methods Used for Identification and Quantification*.
- Jenkins, T., Persaud, B. D., Cowger, W., Szigeti, K., Roche, D. G., Clary, E., Slowinski, S., Lei, B., Abeynayaka, A., Nyadjro, E. S., Maes, T., Hampton, L. T., Bergmann, M., Aherne, J., Mason, S. A., Honek, J. F., Rezanezhad, F., Lusher, A. L., Booth, A. M., . . . Van Cappellen, P. (2022, June 30). *Current State of Microplastic Pollution Research Data: Trends in Availability and Sources of Open Data*. Frontiers in Environmental Science. <https://doi.org/10.3389/fenvs.2022.912107>
- Kumar, A., & Krishan, G. (2023, December 27). *Microplastic Pollutants in Aquatic Ecosystems: Present and Future Challenges*. Water. <https://doi.org/10.3390/w16010102>
- Lando, Wolfart, Fermino, & Santos. (2016, March). *Structural effects on *Cattleya xanthina* leaves cultivated in vitro and acclimatized ex vitro*.

- Lopez, J. (2023, October 8). *Philippines Research Reveals Microplastics in Popular Fish Species*. Tech Times.  
[https://www.techtimes.com/articles/297293/20231008/philippines-research-reveals-microplastics-popular-fish-species.htm?fbclid=IwAR291Rsexl3\\_CVToEGp73cVvuXHLHRrq7HvjYORRllaGWPRI1tii9laXsw](https://www.techtimes.com/articles/297293/20231008/philippines-research-reveals-microplastics-popular-fish-species.htm?fbclid=IwAR291Rsexl3_CVToEGp73cVvuXHLHRrq7HvjYORRllaGWPRI1tii9laXsw)
- Osorio, E. D., Tanchuling, M. A. N., & Diola, M. B. L. D. (2021, September 3). *Microplastics Occurrence in Surface Waters and Sediments in Five River Mouths of Manila Bay*. *Frontiers in Environmental Science*.  
<https://doi.org/10.3389/fenvs.2021.719274>
- Phaksopa, J., Sukhsangchan, R., Keawsang, R., Tanapivattanakul, K., Thamrongnawasawat, T., Worachananant, S., & Sreesamran, P. (2021, November 26). *Presence and Characterization of Microplastics in Coastal Fish around the Eastern Coast of Thailand*. *Sustainability*.  
<https://doi.org/10.3390/su132313110>
- Piskula, P., & Astel, A. M. (2023, January 28). *Microplastics in Commercial Fishes and By-Catch from Selected FAO Major Fishing Areas of the Southern Baltic Sea*. *Animals*. <https://doi.org/10.3390/ani13030458>
- Quindao, & Sargado (2023, December 31). *Abundance of microplastics in a river-estuary along a rural-urban gradient pathway*.
- S. (2022, April 5). *Are Microplastics In Fish Harmful To Humans? - Fish Article*. *Fish Article*. <https://fisharticle.com/are-microplastics-in-fish-harmful-to-humans/>
- Similatan, K. M., Arcadio, C. G. L. A., Navarro, C. K. P., Capangpangan, R. Y., & Bacosa, H. P. (2023, January 1). *Microplastic Ingestion by Adult Milkfish *Chanos Chanos* (Forsskål, 1775) in Aquaculture System: The Case of Butuan Bay, Philippines*. <https://doi.org/10.2139/ssrn.4467288>

- Smith, M., Love, D. C., Rochman, C. M., & Neff, R. A. (2018, August 16). *Microplastics in Seafood and the Implications for Human Health*. Current Environmental Health Reports. <https://doi.org/10.1007/s40572-018-0206-z>
- TCAGP. (2015). *REGION 6 Iloilo River: DREAM Ground Surveys Report*.
- Thompson, A. (2024, February 20). *From Fish to Humans, A Microplastic Invasion May Be Taking a Toll*. Scientific American.  
<https://www.scientificamerican.com/article/from-fish-to-humans-a-microplastic-invasion-may-be-taking-a-toll/>
- Today, I. (2017, October 19). *10,000 tilapia, 4,000 crablets dispersed in Iloilo river*. Iloilo Today. <https://www.iloilotoday.com/10000-tilapia-4000-crablets-dispersed/>
- Wagner, J., Wang, Z. M., Ghosal, S., Rochman, C., Gassel, M., & Wall, S. (2017, January 1). *Novel method for the extraction and identification of microplastics in ocean trawl and fish gut matrices*. Analytical Methods.  
<https://doi.org/10.1039/c6ay02396g>
- Wootton, N., Reis-Santos, P., & Gillanders, B. M. (2021, September 20). *Microplastic in fish – A global synthesis*. Reviews in Fish Biology and Fisheries.  
<https://doi.org/10.1007/s11160-021-09684-6>
- Yin, X., Wu, J., Liu, Y., Chen, X., Xie, C., Liang, Y., Li, J., & Jiang, Z. (2022, September 1). *Accumulation of microplastics in fish guts and gills from a large natural lake: Selective or non-selective?* Environmental Pollution.  
<https://doi.org/10.1016/j.envpol.2022.119785>