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REFERENCES

Adhikari, S., Kelkar, V., Kumar, R., & Halden, R. U. (2022). Methods and challenges in the detection of microplastics and nanoplastics: a mini-review. *Polymer International*, *71*(5), 543–551. https://doi.org/10.1002/pi.6348

Adji, B. K., Octodhiyanto, I., Rahmayanti, R., & Nugroho, A. P. (2022). Microplastic pollution in Rawa Jombor Reservoir, Klaten, Central Java, Indonesia: accumulation in aquatic fauna, heavy metal interactions, and health risk assessment. *Water, Air, and Soil Pollution*, *233*(4). https://doi.org/10.1007/s11270-022-05572-2

Ahrendt, C., Perez-Venegas, D. J., Urbina, M., Gonzalez, C., Echeveste, P., Aldana, M., Pulgar, J., & Galbán-Malagón, C. (2020). Microplastic ingestion cause intestinal lesions in the intertidal fish Girella laevifrons. *Marine Pollution Bulletin*, *151*(November 2019), 110795. https://doi.org/10.1016/j.marpolbul.2019.110795

Aiguo, Z., Di, S., Chong, W., Yuliang, C., Shaolin, X., Peiqin, L., Guohuan, X., Huijuan, T., & Jixing, Z. (2022). Characteristics and differences of microplastics ingestion for farmed fish with different water depths, feeding habits and diets. *Journal of Environmental Chemical Engineering*, *10*(2), 107189. https://doi.org/10.1016/j.jece.2022.107189

Akhbarizadeh, R., Moore, F., & Keshavarzi, B. (2019). Investigating microplastics bioaccumulation and biomagnification in seafood from the Persian Gulf: a threat to human health? *Food Additives and Contaminants - Part A Chemistry, Analysis, Control, Exposure and Risk Assessment*, *36*(11), 1696–1708. https://doi.org/10.1080/19440049.2019.1649473

Allen, S., Allen, D., Phoenix, V. R., Le Roux, G., Durántez Jiménez, P., Simonneau, A., Binet, S., & Galop, D. (2019). Atmospheric transport and deposition of microplastics in a remote mountain catchment. *Nature Geoscience*, *12*(5), 339–344. https://doi.org/10.1038/s41561-019-0335-5

Almroth, B. C., & Eggert, H. (2019). Marine plastic pollution: Sources, impacts, and policy issues. *Review of Environmental Economics and Policy*, *13*(2), 317–326. https://doi.org/10.1093/reep/rez012

Alsafy, M. A. M., Abd-Elhafeez, H. H., Rashwan, A. M., Erasha, A., Ali, S., & El-Gendy, S. A. A. (2025). Anatomy, histology, and morphology of fish gills in relation to feeding habits: a comparative review of marine and freshwater species. *BMC Zoology*, *10*(1). https://doi.org/10.1186/s40850-025-00223-5

Ammar, E., Mohamed, M. S., & Sayed, A. E. D. H. (2022). Polyethylene microplastics increases the tissue damage caused by 4-nonylphenol in the common carp (Cyprinus carpio) juvenile. *Frontiers in Marine Science*, *9*(November), 1–13. https://doi.org/10.3389/fmars.2022.1041003

Amponsah, A. K., Afrifa, E. A., Essandoh, P. K., & Enyoh, C. E. (2024). Heliyon Evidence of microplastics accumulation in the gills and gastrointestinal tract of fishes from an estuarine system in Ghana. *Heliyon*, *10*(3), e25608. https://doi.org/10.1016/j.heliyon.2024.e25608

Anderson, P. J., Warrack, S., Langen, V., Challis, J. K., Hanson, M. L., & Rennie,

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

M. D. (2017). Microplastic contamination in Lake Winnipeg , Canada *. *Environmental Pollution*, *225*, 223–231. https://doi.org/10.1016/j.envpol.2017.02.072

Andrady, A. L. (2017). The plastic in microplastics: A review. *Marine Pollution Bulletin*, *119*(1), 12–22. https://doi.org/10.1016/j.marpolbul.2017.01.082

Andrady, A. L., & Neal, M. A. (2009). Applications and societal benefits of plastics. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *364*(1526), 1977–1984. https://doi.org/10.1098/rstb.2008.0304

Arai, T., Abdul Kadir, S. R., & Chino, N. (2016). Year-round spawning by a tropical catadromous eel Anguilla bicolor bicolor. *Marine Biology*, *163*(2), 1–7. https://doi.org/10.1007/s00227-015-2792-8

Arai, T., & Chino, N. (2012). Diverse migration strategy between freshwater and seawater habitats in the freshwater eel genus Anguilla. *Journal of Fish Biology*, *81*(2), 442–455. https://doi.org/10.1111/j.1095-8649.2012.03353.x

Arai, T., Limbong, D., Otake, T., & Tsukamoto, K. (2001). Recruitment mechanisms of tropical eels Anguilla spp. and implications for the evolution of oceanic migration in the genus Anguilla. *Marine Ecology Progress Series*, *216*(February 2015), 253–264. https://doi.org/10.3354/meps216253

Arai, T., & Siti Raudah Abdul, K. (2017). Diversity , distribution and different habitat use among the tropical freshwater eels of genus Anguilla. *Scientific Reports*, *February*, 1–12. https://doi.org/10.1038/s41598-017-07837-x

Aryani, D., Khalifa, M. A., Herjayanto, M., Solahudin, E. A., Rizki, E. M., Halwatiyah, W., Istiqomah, H., Maharani, S. H., Wahyudin, H., & Pratama, G. (2021). Penetration of Microplastics (Polyethylene) to Several Organs of Nile Tilapia (Oreochromis niloticus). *IOP Conference Series: Earth and Environmental Science*, *715*(1). https://doi.org/10.1088/1755-1315/715/1/012061

Ashrafy, A., Liza, A. A., Islam, M. N., Billah, M. M., Arafat, S. T., Rahman, M. M., & Rahman, S. M. (2023). Microplastics Pollution: A Brief Review of Its Source and Abundance in Different Aquatic Ecosystems. *Journal of Hazardous Materials Advances*, *9*(October 2022). https://doi.org/10.1016/j.hazadv.2022.100215

Assas, M., Qiu, X., Chen, K., Ogawa, H., Xu, H., Shimasaki, Y., & Oshima, Y. (2020). Bioaccumulation and reproductive effects of fluorescent microplastics in medaka fish. *Marine Pollution Bulletin*, *158*(July), 4–9. https://doi.org/10.1016/j.marpolbul.2020.111446

Au, S. Y., Bruce, T. F., Bridges, W. C., & Klaine, S. J. (2015). Responses of Hyalella azteca to acute and chronic microplastic exposures. *Environmental Toxicology and Chemistry*, *34*(11), 2564–2572. https://doi.org/10.1002/etc.3093

Azizi, N., Khoshnamvand, N., & Nasseri, S. (2021). The quantity and quality assessment of microplastics in the freshwater fishes : A systematic review and meta-analysis. *Regional Studies in Marine Science*, *47*, 101955. https://doi.org/10.1016/j.rsma.2021.101955

Bank, M. S., & Hansson, S. V. (2022). *Chapter 1 - The Microplastic Cycle: An Introduction to a Complex Issue* (M. S. Bank (ed.); Microplast). Springer,

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Cham. https://doi.org/10.1007/978-3-030-78627-4_9

Barboza, L. G. A., Lopes, C., Oliveira, P., Bessa, F., Otero, V., Henriques, B., Raimundo, J., Caetano, M., Vale, C., & Guilhermino, L. (2020). Microplastics in wild fish from North East Atlantic Ocean and its potential for causing neurotoxic effects, lipid oxidative damage, and human health risks associated with ingestion exposure. *Science of the Total Environment*, *717*, 134625. https://doi.org/10.1016/j.scitotenv.2019.134625

Barbuzano, J. (2019). *Rivers are a highway for microplastics into the ocean*. Eos. https://doi.org/10.1029/2019EO130375

Batel, A., Borchert, F., Reinwald, H., Erdinger, L., & Braunbeck, T. (2018). Microplastic accumulation patterns and transfer of benzo[a]pyrene to adult zebrafish (Danio rerio) gills and zebrafish embryos. *Environmental Pollution*, *235*, 918–930. https://doi.org/10.1016/j.envpol.2018.01.028

Batista, C. (2024). *The morphology of the branchial skeleton of heterocongrines (Anguilliformes : Congridae) and its relation to their diet*. *165*(October 2023). https://doi.org/10.1016/j.zool.2024.126185

Bayo, J., López-Castellanos, J., & Olmos, S. (2020). Membrane bioreactor and rapid sand filtration for the removal of microplastics in an urban wastewater treatment plant. *Marine Pollution Bulletin*, *156*(March), 111211. https://doi.org/10.1016/j.marpolbul.2020.111211

Bellasi, A., Binda, G., Pozzi, A., Galafassi, S., Volta, P., & Bettinetti, R. (2020). Microplastic contamination in freshwater environments: A review, focusing on interactions with sediments and benthic organisms. *Environments - MDPI*, *7*(4). https://doi.org/10.3390/environments7040030

Bexeitova, K., Baimenov, A., Varol, E. A., Kudaibergenov, K., Zhantikeyev, U., Sailaukhanuly, Y., Toshtay, K., Tauanov, Z., Azat, S., & Berndtsson, R. (2024). Microplastics in freshwater systems: A review of classification, sources, and environmental impacts. *Chemical Engineering Journal Advances*, *20*(September), 100649. https://doi.org/10.1016/j.ceja.2024.100649

Bhagat, J., Zang, L., Nishimura, N., & Shimada, Y. (2020). Zebrafish: An emerging model to study microplastic and nanoplastic toxicity. *Science of the Total Environment*, *728*, 138707. https://doi.org/10.1016/j.scitotenv.2020.138707

Bhatt, V., Badola, N., & Singh, J. (2024). Microplastic in fishes : the first report from a Himalayan River — Alaknanda. *Environmental Science and Pollution Research*, *31*(1), 1637–1643. https://doi.org/10.1007/s11356-023-30889-8

Bhuyan, M. S. (2022). Effects of Microplastics on Fish and in Human Health. *Frontiers in Environmental Science*, *10*(March), 1–17. https://doi.org/10.3389/fenvs.2022.827289

Birch, Q. T., Potter, P. M., Pinto, P. X., Dionysiou, D. D., & Al-Abed, S. R. (2019). EPA Public Access. In *Advances in Ecological Research* (Vol. 60). https://doi.org/10.1007/s11157-020-09529-x.Sources

Bond, T., Ferrandiz-Mas, V., Felipe-Sotelo, M., & van Sebille, E. (2018). The occurrence and degradation of aquatic plastic litter based on polymer physicochemical properties: A review. *Critical Reviews in Environmental Science and Technology*, *48*(7–9), 685–722.

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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https://doi.org/10.1080/10643389.2018.1483155

Borvinskaya, E., Gurkov, A., Shchapova, E., Mutin, A., & Timofeyev, M. (2021). Histopathological analysis of zebrafish after introduction of non-biodegradable polyelectrolyte microcapsules into the circulatory system. *PeerJ*, *9*, 1–26. https://doi.org/10.7717/peerj.11337

Browne, M. A., Dissanayake, A., Lowe, D. M., & Thompson, R. C. (2008). Ingested Microscopic Plastic Translocates to the Circulatory System of the Mussel, Mytilus edulis (L.). *Environ. Sci. Technol*, *42*(13), 5026–5031. https://doi.org/10.1162/glep_r_00438

Burns, E. E., & Boxall, A. B. A. (2018). Microplastics in the aquatic environment: Evidence for or against adverse impacts and major knowledge gaps. *Environmental Toxicology and Chemistry*, *37*(11), 2776–2796. https://doi.org/10.1002/etc.4268

Cai, L., Wang, J., Peng, J., Tan, Z., Zhan, Z., Tan, X., & Chen, Q. (2017). *Characteristic of microplastics in the atmospheric fallout from Dongguan city , China : preliminary research and first evidence*. 24928–24935. https://doi.org/10.1007/s11356-017-0116-x

Chen, J., Rao, C., Yuan, R., Sun, D., Guo, S., Li, L., Yang, S., Qian, D., Lu, R., & Cao, X. (2022). Long-term exposure to polyethylene microplastics and glyphosate interferes with the behavior, intestinal microbial homeostasis, and metabolites of the common carp (Cyprinus carpio L.). *Science of the Total Environment*, *814*, 152681. https://doi.org/10.1016/j.scitotenv.2021.152681

Choi, J., & Kim, J. (2023). Toxic effects of sub-acute microplastic (polyamide) exposure on the accumulation , hematological , and antioxidant responses in crucian carp , Carassius carassius. *Environmental Toxicology and Pharmacology*, *102*(June), 104199. https://doi.org/10.1016/j.etap.2023.104199

Cocozza, P., Serranti, S., Setini, A., Cucuzza, P., & Bonifazi, G. (2025). Monitoring of contamination by microplastics on sandy beaches at Vulcano Island (Sicily , Italy) by hyperspectral imaging. *Environmental Science and Pollution Research*, *32*(28), 16898–16911. https://doi.org/10.1007/s11356-024-34972-6

Collard, F., Gilbert, B., Eppe, G., Roos, L., Compère, P., Das, K., & Parmentier, E. (2017). Morphology of the filtration apparatus of three planktivorous fishes and relation with ingested anthropogenic particles. *Marine Pollution Bulletin*, *116*(1–2), 182–191. https://doi.org/10.1016/j.marpolbul.2016.12.067

Collignon, A., Hecq, J. H., Galgani, F., Collard, F., & Goffart, A. (2014). Annual variation in neustonic micro- and meso-plastic particles and zooplankton in the Bay of Calvi (Mediterranean-Corsica). *Marine Pollution Bulletin*, *79*(1–2), 293–298. https://doi.org/10.1016/j.marpolbul.2013.11.023

Cong, Y., Lou, Y., Zhao, H., Li, Z., Zhang, M., Jin, F., Wang, Y., & Wang, J. (2022). Polystyrene microplastics alter bioaccumulation, and physiological and histopathological toxicities of cadmium in the polychaete Perinereis aibuhitensis. *Frontiers in Marine Science*, *9*(July), 1–11. https://doi.org/10.3389/fmars.2022.939530

Corami, F., Rosso, B., Bravo, B., Gambaro, A., & Barbante, C. (2020). A novel method for purification, quantitative analysis and characterization of

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

microplastic fibers using Micro-FTIR. *Chemosphere*, *238*, 124564. https://doi.org/10.1016/j.chemosphere.2019.124564

Cordova, M. R., Iskandar, M. R., Surinati, D., Kaisupy, M. T., Wibowo, S. P. A., Subandi, R., Ulumuddin, Y. I., Purbonegoro, T., Yogaswara, D., Sani, S. Y., Puspitasari, R., Rositasari, R., Riani, E., Zheng, S., Sun, X., & Wang, Z. (2024). Microplastic occurrence in sub-surface waters of the Indonesian archipelago. *Frontiers in Marine Science*, *11*(March), 1–16. https://doi.org/10.3389/fmars.2024.1362414

Crawford, C. B., & Quinn, B. (2017). Plastic production, waste and legislation. *Microplastic Pollutants*, *306*, 39–56. https://doi.org/10.1016/b978-0-12-809406-8.00003-7

Cresci, A. (2020). A comprehensive hypothesis on the migration of European glass eels (Anguilla anguilla). *Biological Reviews*, *95*(5), 1273–1286. https://doi.org/10.1111/brv.12609

Cresci, A., Durif, C. M., Paris, C. B., Shema, S. D., Skiftesvik, A. B., & Browman, H. I. (2019). Glass eels (Anguilla anguilla) imprint the magnetic direction of tidal currents from their juvenile estuaries. *Communications Biology*, *2*(1), 1–8. https://doi.org/10.1038/s42003-019-0619-8

Cverenkárová, K., Valachovičová, M., Mackul'ak, T., Žemlička, L., & Bírošová, L. (2021). Microplastics in the food chain. *Life*, *11*(12), 1–18. https://doi.org/10.3390/life11121349

da Silva Montes, C., Fernandes da Paixão, L., Nunes, B., Pimentel Nunes, Z. M., Pantoja Ferreira, M. A., & Martins da Rocha, R. (2023). Investigating spatial-temporal contamination for two environments of the Amazon estuary: A multivariate approach. *Marine Environmental Research*, *185*(July 2022). https://doi.org/10.1016/j.marenvres.2023.105883

Dalu, T., Themba, N. N., Dondofema, F., & Cuthbert, R. N. (2023). Nowhere to go! Microplastic abundances in freshwater fishes living near wastewater plants. *Environmental Toxicology and Pharmacology*, *101*(July), 104210. https://doi.org/10.1016/j.etap.2023.104210

Das, A. (2023). The emerging role of microplastics in systemic toxicity: Involvement of reactive oxygen species (ROS). *Science of the Total Environment*, *895*(April), 165076. https://doi.org/10.1016/j.scitotenv.2023.165076

David Johnson, G., Ida, H., Sakaue, J., Sado, T., Asahida, T., & Miya, M. (2012). A "living fossil" eel (Anguilliformes: Protanguillidae, fam. nov.) from an undersea cave in Palau. *Proceedings of the Royal Society B: Biological Sciences*, *279*(1730), 934–943. https://doi.org/10.1098/rspb.2011.1289

Dawood, M. A. O. (2020). *Nutritional immunity of fish intestines : important insights for sustainable aquaculture*. 1–22. https://doi.org/10.1111/raq.12492

Dawson, A. L., Bose, U., Ni, D., & Nelis, J. L. D. (2024). Unravelling protein corona formation on pristine and leached microplastics. *Microplastics and Nanoplastics*, *4*(1). https://doi.org/10.1186/s43591-024-00086-6

De-la-Torre, G. E. (2020). Microplastics: an emerging threat to food security and human health. *Journal of Food Science and Technology*, *57*(5), 1601–1608. https://doi.org/10.1007/s13197-019-04138-1

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

de Sá, L. C., Oliveira, M., Ribeiro, F., Rocha, T. L., & Futter, M. N. (2018). Studies of the effects of microplastics on aquatic organisms: What do we know and where should we focus our efforts in the future? *Science of the Total Environment*, *645*, 1029–1039. https://doi.org/10.1016/j.scitotenv.2018.07.207

De Sales-Ribeiro, C., Brito-Casillas, Y., Fernandez, A., & Caballero, M. J. (2020). An end to the controversy over the microscopic detection and effects of pristine microplastics in fish organs. *Scientific Reports*, *10*(1), 1–19. https://doi.org/10.1038/s41598-020-69062-3

Defontaine, S., & Jalón-Rojas, I. (2023). Physical processes matters! Recommendations for sampling microplastics in estuarine waters based on hydrodynamics. *Marine Pollution Bulletin*, *191*(April). https://doi.org/10.1016/j.marpolbul.2023.114932

Defontaine, S., Sous, D., Tesan, J., Monperrus, M., Lenoble, V., & Lanceleur, L. (2020). Microplastics in a salt-wedge estuary: Vertical structure and tidal dynamics. *Marine Pollution Bulletin*, *160*(September), 111688. https://doi.org/10.1016/j.marpolbul.2020.111688

Dinani, F. S. H., Baradaran, A., & Ebrahimpour, K. (2021). *Acute Toxic Effects of Polyurethane Microplastics on Adult Zebra fish (Danio rerio)*. https://doi.org/10.4103/ijehe.ijehe

Ding, J., Zhang, S., Razanajatovo, R. M., Zou, H., & Zhu, W. (2018). Accumulation, tissue distribution, and biochemical effects of polystyrene microplastics in the freshwater fish red tilapia (Oreochromis niloticus). *Environmental Pollution*, *238*, 1–9. https://doi.org/10.1016/j.envpol.2018.03.001

Drouineau, H., Durif, C., Castonguay, M., Mateo, M., Rochard, E., Verreault, G., Yokouchi, K., & Lambert, P. (2018). Freshwater eels: A symbol of the effects of global change. *Fish and Fisheries*, *19*(5), 903–930. https://doi.org/10.1111/faf.12300

Du, J., Hu, Y., Hou, M., Zhou, J., Xiang, F., Zheng, H., Zhang, X., He, X., & Xiao, H. (2023). Combined effects of high-fat diet and polystyrene microplastic exposure on microplastic bioaccumulation and lipid metabolism in zebrafish. *Fish and Shellfish Immunology*, *137*(May), 108803. https://doi.org/10.1016/j.fsi.2023.108803

Du, S., Zhu, R., Cai, Y., Xu, N., Yap, P., & Zhang, Y. (2021). RSC Advances Environmental fate and impacts of microplastics in aquatic ecosystems : a review. *RSC Advances*, *11*(April), 15762–15784. https://doi.org/10.1039/D1RA00880C

Durif, C. M. F., Diserud, O. H., Sandlund, O. T., Thorstad, E. B., Poole, R., Bergesen, K., Escobar-Lux, R. H., Shema, S., & Vøllestad, L. A. (2020). Age of European silver eels during a period of declining abundance in Norway. *Ecology and Evolution*, *10*(11), 4801–4815. https://doi.org/10.1002/ece3.6234

ECHA (European Chemicals Agency). (2019). *Echa Restriction Report-Microplastics* (Issue January).

Eltemsah, Y. S., & Bøhn, T. (2019). Acute and chronic effects of polystyrene microplastics on juvenile and adult Daphnia magna. *Environmental Pollution*,

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

254, 112919. https://doi.org/10.1016/j.envpol.2019.07.087

Espí, E., Salmerón, A., Fontecha, A., García, Y., & Real, A. I. (2006). Plastic films for agricultural applications. *Journal of Plastic Film and Sheeting*, *22*(2), 85–102. https://doi.org/10.1177/8756087906064220

Evode, N., Qamar, S. A., Bilal, M., Barceló, D., & Iqbal, H. M. N. (2021). Plastic waste and its management strategies for environmental sustainability. *Case Studies in Chemical and Environmental Engineering*, *4*. https://doi.org/10.1016/j.cscee.2021.100142

Fahmi, M. R. (2015). *Short communication : Conservation genetic of tropical eel in Indonesian waters based on population genetic study*. *1*, 38–43. https://doi.org/10.13057/psnmbi/m010106

Fan, J., Zou, L., & Zhao, G. (2021). Microplastic abundance, distribution, and composition in the surface water and sediments of the Yangtze River along Chongqing City, China. *Journal of Soils and Sediments*, *21*(4), 1840–1851. https://doi.org/10.1007/s11368-021-02902-5

Farrell, P., & Nelson, K. (2013). Trophic level transfer of microplastic: Mytilus edulis (L.) to Carcinus maenas (L.). *Environmental Pollution*, *177*, 1–3. https://doi.org/10.1016/j.envpol.2013.01.046

Fazey, F. M. C., & Ryan, P. G. (2016). Biofouling on buoyant marine plastics: An experimental study into the effect of size on surface longevity. *Environmental Pollution*, *210*, 354–360. https://doi.org/10.1016/j.envpol.2016.01.026

Feng, Z., Zhang, T., Li, Y., He, X., Wang, R., Xu, J., & Gao, G. (2019). Science of the Total Environment The accumulation of microplastics in fi sh from an important fi sh farm and. *Science of the Total Environment*, *696*, 133948. https://doi.org/10.1016/j.scitotenv.2019.133948

Ferreira, M., Sousa, V., Oliveira, B., Sousa, A. C., Abreu, H., Dias, J., Kiron, V., & Valente, L. M. P. (2023). An in - depth characterisation of European seabass intestinal segments for assessing the impact of an algae - based functional diet on intestinal health. *Scientific Reports*, 1–16. https://doi.org/10.1038/s41598-023-38826-y

Foekema, E. M., Gruijter, C. De, Mergia, M. T., Franeker, J. A. Van, Murk, A. J., & Koelmans, A. A. (2013). *Plastic in North Sea Fish*.

Foley, C. J., Feiner, Z. S., Malinich, T. D., & Höök, T. O. (2018). A meta-analysis of the effects of exposure to microplastics on fish and aquatic invertebrates. *Science of the Total Environment*, *631–632*, 550–559. https://doi.org/10.1016/j.scitotenv.2018.03.046

Fontana, C. M., Sumon, M. A. A., Wannavijit, S., Lubis, A. R., Khongdee, N., Linh, N. V., Phimolsiripol, Y., Hoseinifar, S. H., & Van Doan, H. (2024). Effects of Mango Seed (Mangifera indica) Powder on Growth Performance, Immune Response, Gut Morphology, and Gene Expression of Nile Tilapia (Oreochromis niloticus). *Fishes*, *9*(12), 1–17. https://doi.org/10.3390/fishes9120514

Fontana, G. D. (2021). *Influence of Sewing on Microplastic Release from Textiles During Washing*.

Franzellitti, S., Canesi, L., Auguste, M., Wathsala, R. H. G. R., & Fabbri, E. (2019). Microplastic exposure and effects in aquatic organisms: A physiological

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

perspective. *Environmental Toxicology and Pharmacology*, *68*(November 2018), 37–51. https://doi.org/10.1016/j.etap.2019.03.009

Frère, L., Paul-Pont, I., Rinnert, E., Petton, S., Jaffré, J., Bihannic, I., Soudant, P., Lambert, C., & Huvet, A. (2017). Influence of environmental and anthropogenic factors on the composition, concentration and spatial distribution of microplastics: A case study of the Bay of Brest (Brittany, France). *Environmental Pollution*, *225*, 211–222. https://doi.org/10.1016/j.envpol.2017.03.023

Frias, J. P. G. L., Otero, V., & Sobral, P. (2014). Evidence of microplastics in samples of zooplankton from Portuguese coastal waters. *Marine Environmental Research*, *95*, 89–95. https://doi.org/10.1016/j.marenvres.2014.01.001

Galloway, T. S., Cole, M., & Lewis, C. (2017). Interactions of microplastic debris throughout the marine ecosystem. *Nature Ecology and Evolution*, *1*(5), 1–8. https://doi.org/10.1038/s41559-017-0116

Gao, J., Shen, T., Wang, L., Yang, Q., Wang, J., & Zhang, D. (2025). Exposure pathway derived accumulation of microplastics in freshwater fish : A critical review. *Journal of Hazardous Materials*, *500*(September), 140270. https://doi.org/10.1016/j.jhazmat.2025.140270

Gatidou, G., Arvaniti, O. S., & Stasinakis, A. S. (2019). Review on the occurrence and fate of microplastics in Sewage Treatment Plants. *Journal of Hazardous Materials*, *367*(June 2018), 504–512. https://doi.org/10.1016/j.jhazmat.2018.12.081

Ge, J., Li, H., Liu, P., Zhang, Z., Ouyang, Z., & Guo, X. (2021). Review of the toxic effect of microplastics on terrestrial and aquatic plants. *Science of the Total Environment*, *791*, 148333. https://doi.org/10.1016/j.scitotenv.2021.148333

Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made [Producción, uso y destino de todos los plásticos jamás fabricados]. *Science Advances*, *3*(7), e1700782. https://advances.sciencemag.org/lookup/doi/10.1126/sciadv.1700782

Ghosh, T. (2025). Microplastics bioaccumulation in fish: Its potential toxic effects on hematology, immune response, neurotoxicity, oxidative stress, growth, and reproductive dysfunction. *Toxicology Reports*, *14*(December 2024), 101854. https://doi.org/10.1016/j.toxrep.2024.101854

Gigault, J., Halle, A. ter, Baudrimont, M., Pascal, P. Y., Gauffre, F., Phi, T. L., El Hadri, H., Grassl, B., & Reynaud, S. (2018). Current opinion: What is a nanoplastic? *Environmental Pollution*, *235*, 1030–1034. https://doi.org/10.1016/j.envpol.2018.01.024

Haave, M., Hæggernes, E., & Gomiero, A. (2024). Absence of microplastic bioaccumulation in cod fillets from plastic-polluted western Norwegian waters. *Water Emerging Contaminants and Nanoplastics*, *3*(3). https://doi.org/10.20517/wecn.2024.07

Habib, S. S., Sohail, M., & Fazio, F. (2026). *Nanoplastics in aquatic ecosystems : Disruptions to fish digestive physiology and gut microbiota*. *231*(June).

Hahn, A., Gerdts, G., Völker, C., & Niebühr, V. (2019). Using FTIRS as pre-screening method for detection of microplastic in bulk sediment samples.

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Science of the Total Environment, *689*, 341–346. https://doi.org/10.1016/j.scitotenv.2019.06.227

Hakim, L., Asmara, A. A., Priambodo, R. Y., & Wong, Y. J. (2023). Microplastic pollution profile in the Indian Ocean of the Southern Java Island, Indonesia. *Environmental Challenges*, *13*(October), 100786. https://doi.org/10.1016/j.envc.2023.100786

Hale, R. C., Seeley, M. E., King, A. E., & Yu, L. H. (2022). *Analytical Chemistry of Plastic Debris: Sampling, Methods, and Instrumentation*. https://doi.org/10.1007/978-3-030-78627-4_2

Handyman, D. I. W., Purba, N. P., Pranowo, W. S., Harahap, S. A., Dante, I. F., & Yuliadi, L. P. S. (2019). Microplastics patch based on hydrodynamic modeling in the north Indramayu, Java sea. *Polish Journal of Environmental Studies*, *28*(1), 135–142. https://doi.org/10.15244/pjoes/81704

Hantoro, I., Löhr, A. J., Van Belleghem, F. G. A. J., Widianarko, B., & Ragas, A. M. J. (2024). Characteristics of microplastics pollution in important commercial coastal seafood of Central Java, Indonesia. *Environmental Advances*, *17*(July). https://doi.org/10.1016/j.envadv.2024.100574

Hartono, D., Zamdial, Nabiu, M., Utami, M. A. F., Nabiu, N. L. M., Agustini, N. T., Azhara, B. A., Purdiana, D., Zulkarnain, R., & Setiawan, D. (2022). Pertumbuhan dan Kelangsungan Hidup Ikan Sidat Berbasis Sumberdaya Lokal di Kabupaten Bengkulu Selatan. *Seminar Nasional Hasil Penelitian Kelautan Dan Perikanan Tahun 2022*, *2015*, 231–236.

Hastuti, A. R., Yulianda, F., & Wardiatno, Y. (2014). *Distribusi spasial sampah laut di ekosistem mangrove Pantai Indah Kapuk , Jakarta Spatial distribution of marine debris in mangrove ecosystem of Pantai Indah Kapuk , Jakarta*. *4*(December), 94–107. https://doi.org/10.13057/bonorowo/w040203

Hayati, A., Adriansyah, W., Kusuma, M. R., Astri, A. R., Maulidah, S., Maullani, A., Wahyuni, A. D., Zubaidi, M. F., Soepriandono, H., Pramudya, M., Soehargo, L., Sugiharto, Dewi, F. R. P., & Nurbani, F. A. (2023). Effect of microplastic particles on the gills structure of freshwater fish supplemented with probiotics and vitamin C. *IOP Conference Series: Earth and Environmental Science*, *1273*(1). https://doi.org/10.1088/1755-1315/1273/1/012085

He, B., Wijesiri, B., Ayoko, G. A., Egodawatta, P., Rintoul, L., & Goonetilleke, A. (2020). Science of the Total Environment In fl uential factors on microplastics occurrence in river sediments. *Science of the Total Environment*, *738*, 139901. https://doi.org/10.1016/j.scitotenv.2020.139901

Hidalgo-Ruz, V., Gutow, L., Thompson, R. C., & Thiel, M. (2012). Microplastics in the marine environment: A review of the methods used for identification and quantification. *Environmental Science and Technology*, *46*(6), 3060–3075. https://doi.org/10.1021/es2031505

Hidayati, N. V., Hotijah, S., Hudawi, M. N., Andriyono, S., Sanjayasari, D., Hastuti, D. W. B. H., & Hendrayana. (2023). Kontaminasi Mikroplastik pada Ikan Kiper (Scatophagus argus) dari Laguna. *Rekayasa*, *16*(3), 283–294.

Horton, A. A., Jürgens, M. D., Lahive, E., Bodegom, P. M. Van, & Vijver, M. G. (2018). The in fl uence of exposure and physiology on microplastic ingestion

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

by the freshwater fi sh Rutilus rutilus (roach) in the River Thames , UK *. *Environmental Pollution*, *236*, 188–194. https://doi.org/10.1016/j.envpol.2018.01.044

Horton, A. A., Walton, A., Spurgeon, D. J., Lahive, E., & Svendsen, C. (2017). Science of the Total Environment Microplastics in freshwater and terrestrial environments : Evaluating the current understanding to identify the knowledge gaps and future research priorities. *Science of the Total Environment*, *586*, 127–141. https://doi.org/10.1016/j.scitotenv.2017.01.190

Hou, M., Xu, C., Zou, X., Xia, Z., Su, L., Qiu, N., Cai, L., Yu, F., Wang, Q., Zhao, X., He, Y., Wang, C., & Wang, J. (2022). Long-term exposure to microplastics induces intestinal function dysbiosis in rare minnow (Gobiocypris rarus). *Ecotoxicology and Environmental Safety*, *246*(June), 114157. https://doi.org/10.1016/j.ecoenv.2022.114157

Hu, L., Chernick, M., Lewis, A. M., Lee Ferguson, P., & Hinton, D. E. (2020). Chronic microfiber exposure in adult Japanese medaka (Oryzias latipes). *PLoS ONE*, *15*(3), 5–7. https://doi.org/10.1371/journal.pone.0229962

Imhof, H. K., Rusek, J., Thiel, M., Wolinska, J., & Laforsch, C. (2017). Do microplastic particles affect Daphnia magna at the morphological, life history and molecular level? *PLoS ONE*, *12*(11), 1–20. https://doi.org/10.1371/journal.pone.0187590

Indrayani, D., Yusfiati, & Elvyra, R. (2014). STRUKTUR INSANG IKAN Ompok hypophthalmus (Bleeker 1846) DARI PERAIRAN SUNGAI SIAK KOTA PEKANBARU. *Jom Fmipa*, *1*(2), 402.

Isfarin, N. N., Fara, M. E., Krisna, H. N., Machdani, S., & Munir, M. (2024). Microplastics in Indonesian land and aquatic environment: From research activities to regulation policies. *Marine Pollution Bulletin*, *206*(June), 116813. https://doi.org/10.1016/j.marpolbul.2024.116813

Iskandar, M. R., Cordova, M. R., & Park, Y. G. (2022). Pathways and destinations of floating marine plastic debris from 10 major rivers in Java and Bali, Indonesia: A Lagrangian particle tracking perspective. *Marine Pollution Bulletin*, *185*(PA), 114331. https://doi.org/10.1016/j.marpolbul.2022.114331

Ivleva, N. P., Wiesheu, A. C., & Niessner, R. (2017). Chemie. *Angewandte Chemie International Edition*, *56*(7), 1720–1739. https://doi.org/https://doi.org/10.1002/anie.201606957

Jaafar, N., Musa, S. M., Azfaralariff, A., Mohamed, M., Yusoff, A. H., & Lazim, A. M. (2020). Improving the efficiency of post-digestion method in extracting microplastics from gastrointestinal tract and gills of fish. *Chemosphere*, *260*. https://doi.org/10.1016/j.chemosphere.2020.127649

Jabeen, K., Li, B., Chen, Q., Su, L., Wu, C., & Hollert, H. (2018). Chemosphere Effects of virgin microplastics on gold fi sh (Carassius auratus). *Chemosphere*, *213*, 323–332. https://doi.org/10.1016/j.chemosphere.2018.09.031

Jambeck, J. R., Roland, G., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R., & Law, K. L. (2015). Marine pollution. Plastic waste inputs from land intothe ocean. *Science*, *347*(6223), 764–768.

Jin, Y., Xia, J., Pan, Z., Yang, J., Wang, W., & Fu, Z. (2018). Polystyrene

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

microplastics induce microbiota dysbiosis and inflammation in the gut of adult zebrafish. *Environmental Pollution*, *235*, 322–329. https://doi.org/10.1016/j.envpol.2017.12.088

Jo, A. H., Yu, Y. Bin, Choi, J. H., Lee, J. H., Choi, C. Y., Kang, J. C., & Kim, J. H. (2025). Microplastics induce toxic effects in fish: Bioaccumulation, hematological parameters and antioxidant responses. *Chemosphere*, *375*(February), 144253. https://doi.org/10.1016/j.chemosphere.2025.144253

Johansson, M. E. V., & Hansson, G. C. (2016). Immunological aspects of intestinal mucus and mucins. *Nature Reviews Immunology*, *16*(10), 639–649. https://doi.org/10.1038/nri.2016.88

Jovanović, B., Gökdağ, K., Güven, O., Emre, Y., Whitley, E. M., & Kideys, A. E. (2018). Virgin microplastics are not causing imminent harm to fish after dietary exposure. *Marine Pollution Bulletin*, *130*(March), 123–131. https://doi.org/10.1016/j.marpolbul.2018.03.016

Jung, M. R., Horgen, F. D., Orski, S. V., Rodriguez C., V., Beers, K. L., Balazs, G. H., Jones, T. T., Work, T. M., Brignac, K. C., Royer, S. J., Hyrenbach, K. D., Jensen, B. A., & Lynch, J. M. (2018). Validation of ATR FT-IR to identify polymers of plastic marine debris, including those ingested by marine organisms. *Marine Pollution Bulletin*, *127*(December 2017), 704–716. https://doi.org/10.1016/j.marpolbul.2017.12.061

Kamaruddin, H., Patittingi, F., Assidiq, H., & Bachril, S. N. (2022). *Legal Aspect of Plastic Waste Management in Indonesia and Malaysia : Addressing Marine Plastic Debris*. 1–17.

Kamau, M., Tole, M., & Timamy, M. K. (2023). Micro-plastics in Aquatic Environment: Source, Fate, Emerging Threats, and Regulatory Effort. *International Journal of Environment and Climate Change*, *13*(10), 3218–3225. https://doi.org/10.9734/ijecc/2023/v13i102989

Karami, A., Golieskardi, A., Keong, C., Romano, N., Bin, Y., & Salamatinia, B. (2017). Science of the Total Environment A high-performance protocol for extraction of microplastics in fi sh. *Science of the Total Environment, The*, *578*, 485–494. https://doi.org/10.1016/j.scitotenv.2016.10.213

Karami, A., Romano, N., Galloway, T., & Hamzah, H. (2016). Virgin microplastics cause toxicity and modulate the impacts of phenanthrene on biomarker responses in African catfish (Clarias gariepinus). *Environmental Research*, *151*, 58–70. https://doi.org/10.1016/j.envres.2016.07.024

Kasari, A. F., Effendi, H., & Sulistiono. (2017). Lingkungan perairan estuari Segara Anakan, Cilacap, Jawa Tengah sebagai dasar pengembangan perikanan. *Prosiding Seminar Nasional Ikan Ke-9 Lingkungan*, 421–432.

Kauts, S., Mishra, Y., Yousuf, S., Bhardwaj, R., Singh, S. K., Alshabrmi, F. M., Abdurahman, M., Vamanu, E., & Singh, M. P. (2023). Toxicological Profile of Polyethylene Terephthalate (PET) Microplastic in Ingested Drosophila melanogaster (Oregon R+) and Its Adverse Effect on Behavior and Development. *Toxics*, *11*(9). https://doi.org/10.3390/toxics11090782

Kazour, M., Terki, S., Rabhi, K., Jemaa, S., Khalaf, G., & Amara, R. (2019). Sources of microplastics pollution in the marine environment: Importance of wastewater treatment plant and coastal landfill. *Marine Pollution Bulletin*,

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
Sirayya Illiyin, Nur Indah Septriani, S.Si., M.Sc., Ph.D.; Kazuki Matsushige, Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

146(May), 608–618. https://doi.org/10.1016/j.marpolbul.2019.06.066

Kim, J., Yu, Y., & Choi, J. (2021). Toxic effects on bioaccumulation , hematological parameters , oxidative stress , immune responses and neurotoxicity in fish exposed to microplastics : A review. *Journal of Hazardous Materials*, *413*(December 2020), 125423. https://doi.org/10.1016/j.jhazmat.2021.125423

Klingelhöfer, D., Braun, M., Quarcoo, D., Brüggmann, D., & Groneberg, D. A. (2020). Research landscape of a global environmental challenge: Microplastics. *Water Research*, *170*. https://doi.org/10.1016/j.watres.2019.115358

König Kardgar, A., Doyle, D., Warwas, N., Hjelleset, T., Sundh, H., & Carney Almroth, B. (2024). Microplastics in aquaculture - Potential impacts on inflammatory processes in Nile tilapia. *Heliyon*, *10*(9). https://doi.org/10.1016/j.heliyon.2024.e30403

Kostić-Vuković, J., Kolarević, S., Kračun-Kolarević, M., Višnjić-Jeftić, Ž., Rašković, B., Poleksić, V., Gačić, Z., Lenhardt, M., & Vuković-Gačić, B. (2021). Temporal variation of biomarkers in common bream Abramis brama (L., 1758) exposed to untreated municipal wastewater in the Danube River in Belgrade, Serbia. *Environmental Monitoring and Assessment*, *193*(8). https://doi.org/10.1007/s10661-021-09232-6

Kuczenski, B., Vargas Poulsen, C., Gilman, E. L., Musyl, M., Geyer, R., & Wilson, J. (2022). Plastic gear loss estimates from remote observation of industrial fishing activity. *Fish and Fisheries*, *23*(1), 22–33. https://doi.org/10.1111/faf.12596

Kumar, R., Manna, C., Padha, S., Verma, A., Sharma, P., Dhar, A., Ghosh, A., & Bhattacharya, P. (2022). Micro(nano)plastics pollution and human health: How plastics can induce carcinogenesis to humans? *Chemosphere*, *298*(February), 134267. https://doi.org/10.1016/j.chemosphere.2022.134267

Kurniawan, S. B., Said, N. S. M., Imron, M. F., & Abdullah, S. R. S. (2021). Microplastic pollution in the environment: Insights into emerging sources and potential threats. *Environmental Technology and Innovation*, *23*, 101790. https://doi.org/10.1016/j.eti.2021.101790

Kuroki, M., Righton, D., & Walker, A. M. (2014). The importance of Anguillids: A cultural and historical perspective introducing papers from the World Fisheries Congress. *Ecology of Freshwater Fish*, *23*(1), 2–6. https://doi.org/10.1111/eff.12089

Kuroki, M., & Tsukamoto, K. (2012). *Eels on the move: Mysterious creatures over millions of years*. Tokai University Press.

Lahnsteiner, F. (2024). *Morphometric and Enzymatic Changes in Gills of Rainbow Trout after Exposure to Elevated Temperature — Indications for*. 1–13.

Lambert, S., & Wagner, M. (2016). Characterisation of nanoplastics during the degradation of polystyrene. *Chemosphere*, *145*, 265–268. https://doi.org/10.1016/j.chemosphere.2015.11.078

Law, K. L. (2017). Plastics in the Marine Environment. *Annual Review of Marine Science*, *9*(1), 205–229. https://doi.org/10.1146/annurev-marine-010816-060409

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Lebreton, L. C. M., Van Der Zwet, J., Damsteeg, J. W., Slat, B., Andrady, A., & Reisser, J. (2017). River plastic emissions to the world's oceans. *Nature Communications*, *8*, 1–10. https://doi.org/10.1038/ncomms15611

Lefebvre, C., Saraux, C., Heitz, O., Nowaczyk, A., & Bonnet, D. (2019). Microplastics FTIR characterisation and distribution in the water column and digestive tracts of small pelagic fish in the Gulf of Lions. *Marine Pollution Bulletin*, *142*(December 2018), 510–519. https://doi.org/10.1016/j.marpolbul.2019.03.025

Lestari, P., Trihadiningrum, Y., & Warmadewanthi, I. D. A. A. (2023). Investigation of microplastic ingestion in commercial fish from Surabaya river, Indonesia. *Environmental Pollution*, *331*(P2), 121807. https://doi.org/10.1016/j.envpol.2023.121807

Li, B., Su, L., Zhang, H., Deng, H., Chen, Q., & Shi, H. (2020). Science of the Total Environment Microplastics in fi shes and their living environments surrounding a plastic production area. *Science of the Total Environment*, *727*, 138662. https://doi.org/10.1016/j.scitotenv.2020.138662

Li, X., Bao, L., Wei, Y., Zhao, W., Wang, F., Liu, X., Su, H., & Zhang, R. (2023). Occurrence, Bioaccumulation, and Risk Assessment of Microplastics in the Aquatic Environment: A Review. *Water (Switzerland)*, *15*(9), 1–15. https://doi.org/10.3390/w15091768

Li, Z., Chao, M., He, X., Lan, X., Tian, C., Feng, C., & Shen, Z. (2022). Microplastic bioaccumulation in estuary-caught fishery resource. *Environmental Pollution*, *306*(April), 119392. https://doi.org/10.1016/j.envpol.2022.119392

Liang, W., Li, B., Jong, M. C., Ma, C., Zuo, C., Chen, Q., & Shi, H. (2023). Process-oriented impacts of microplastic fibers on behavior and histology of fish. *Journal of Hazardous Materials*, *448*(October 2022), 130856. https://doi.org/10.1016/j.jhazmat.2023.130856

Limonta, G., Mancia, A., Benkhalqui, A., Bertolucci, C., Abelli, L., Fossi, M. C., & Panti, C. (2019). Microplastics induce transcriptional changes, immune response and behavioral alterations in adult zebrafish. *Scientific Reports*, *9*(1), 1–11. https://doi.org/10.1038/s41598-019-52292-5

Lin, L., Ma, L. S., Li, H. X., Pan, Y. F., Liu, S., Zhang, L., Peng, J. P., Fok, L., Xu, X. R., & He, W. H. (2020). Low level of microplastic contamination in wild fish from an urban estuary. *Marine Pollution Bulletin*, *160*(September), 111650. https://doi.org/10.1016/j.marpolbul.2020.111650

Liong, R. M. Y., Hadibarata, T., Yuniarto, A., Tang, K. H. D., & Khamidun, M. H. (2021). Microplastic Occurrence in the Water and Sediment of Miri River Estuary , Borneo Island. *Water, Air, & Soil Pollution*. https://doi.org/10.1007/s11270-021-05297-8

Liu, M., Liu, X., & Xu, J. (2024). Influence of microplastic pollution on the toxicity of potamodromous fish grass carp (Ctenopharyngodon idellus) and its swimming capacity. *Journal of Environmental Chemical Engineering*, *12*(5), 113520. https://doi.org/10.1016/j.jece.2024.113520

Liu, S., Jian, M., Zhou, L., & Li, W. (2019). Distribution and characteristics of microplastics in the sediments of Poyang Lake, China. *Water Science and*

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Technology, *79*(10), 1868–1877. https://doi.org/10.2166/wst.2019.185

Lozano, Y. M., Lehnert, T., Linck, L. T., Lehmann, A., & Rillig, M. C. (2021). Microplastic Shape, Polymer Type, and Concentration Affect Soil Properties and Plant Biomass. *Frontiers in Plant Science*, *12*(February), 1–14. https://doi.org/10.3389/fpls.2021.616645

Luo, H., Zhao, Y., Li, Y., Xiang, Y., He, D., & Pan, X. (2020). Aging of microplastics affects their surface properties, thermal decomposition, additives leaching and interactions in simulated fluids. *Science of the Total Environment*, *714*. https://doi.org/10.1016/j.scitotenv.2020.136862

Lusher, A., Consultant, F., Plymouth, U. K., Hollman, P., Consultant, F., Wageningen, T. N., And, Mendoza-Hill, J., Consultant, F., & Madrid, S. (2017). FAO book.pdf. In *Microplastics in fisheries and aquaculture Status of knowledge on their occurrence and implications for aquatic organisms and food safety*. https://oceanrep.geomar.de/id/eprint/49179/1/Microplastics in fisheries and aquaculture.pdf%0A(www.fao.org/publications

Macleod, M., Arp, H. P. H., Tekman, M. B., & Jahnke, A. (2021). *The global threat from plastic pollution*. *July*. https://doi.org/10.1126/science.abg5433

Magni, S., Binelli, A., Pittura, L., Avio, C. G., Della Torre, C., Parenti, C. C., Gorbi, S., & Regoli, F. (2019). The fate of microplastics in an Italian Wastewater Treatment Plant. *Science of the Total Environment*, *652*, 602–610. https://doi.org/10.1016/j.scitotenv.2018.10.269

Malli, A., Corella-Puertas, E., Hajjar, C., & Boulay, A. M. (2022). Transport mechanisms and fate of microplastics in estuarine compartments: A review. *Marine Pollution Bulletin*, *177*(February), 113553. https://doi.org/10.1016/j.marpolbul.2022.113553

Manabe, R., Higuchi, T., Watanabe, S., Tantu, F. Y., Sugeha, H. Y., Kaneko, H., Miller, M. J., Hagihara, S., Yoshinaga, T., Syahailatua, A., Wouthuyzen, S., Triyanto, Masengi, K. W. A., Sato, K., Aoyama, J., & Tsukamoto, K. (2023). Migration Behavior of Anguilla celebesensis Silver Eels within their Tomini Bay Spawning Area. *Zoological Studies*, *62*, 1–16. https://doi.org/10.6620/ZS.2023.62-46

Marchellina, A., Soegianto, A., Irawan, B., Indriyasari, K. N., Rahmatin, N. M., Mukholladun, W., Irnidayanti, Y., Payus, C. M., & Hartl, M. G. J. (2024). The presence and physico-chemical properties of microplastics in seawater, sediment, and several organs of the spotted scat fish (Scatophagus argus, Linnaeus, 1766) collected from different locations along the East Java coast in Indonesia. *Chemosphere*, *358*(March), 142214. https://doi.org/10.1016/j.chemosphere.2024.142214

Marco, G. De, & Cappello, T. (2023). *Histomorphological Changes in Fish Gut in Response to Prebiotics and Probiotics Treatment to Improve Their Health Status : A Review*.

Mariano, S., Tacconi, S., Fidaleo, M., Rossi, M., & Dini, L. (2021). Micro and Nanoplastics Identification: Classic Methods and Innovative Detection Techniques. *Frontiers in Toxicology*, *3*(February), 1–17. https://doi.org/10.3389/ftox.2021.636640

Marinović, Z., Miljanović, B., Urbányi, B., & Lujić, J. (2021). Gill histopathology

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

as a biomarker for discriminating seasonal variations in water quality. *Applied Sciences (Switzerland)*, *11*(20). https://doi.org/10.3390/app11209504

Marques, F., Vale, C., Rudnitskaya, A., Moreirinha, C., Costa, S. T., & Botelho, M. J. (2021). Major characteristics of microplastics in mussels from the Portuguese coast. *Environmental Research*, *197*(October 2020). https://doi.org/10.1016/j.envres.2021.110993

Martí, E., Martin, C., Galli, M., Echevarría, F., Duarte, C. M., & Cózar, A. (2020). The Colors of the Ocean Plastics. *Environmental Science and Technology*, *54*(11), 6594–6601. https://doi.org/10.1021/acs.est.9b06400

Mattsson, K., Johnson, E. V., Malmendal, A., Linse, S., Hansson, L. A., & Cedervall, T. (2017). Brain damage and behavioural disorders in fish induced by plastic nanoparticles delivered through the food chain. *Scientific Reports*, *7*(1), 1–7. https://doi.org/10.1038/s41598-017-10813-0

Mbugani, J. J., Machiwa, J. F., Shilla, D. A., Kimaro, W., Joseph, D., & Khan, F. R. (2022). Histomorphological Damage in the Small Intestine of Wami Tilapia (Oreochromis urolepis) (Norman, 1922) Exposed to Microplastics Remain Long after Depuration. *Microplastics*, *1*(2), 240–253. https://doi.org/10.3390/microplastics1020017

McKenzie, D. J., Farrell, A. P., & Brauer, C. J. (2007). *Fish physiology: Primitive Fishes*. Elsevier Academic Press.

McNeish, R. E., Kim, L. H., Barrett, H. A., Mason, S. A., Kelly, J. J., & Hoellein, T. J. (2018). Microplastic in riverine fish is connected to species traits. *Scientific Reports*, *8*(1), 1–12. https://doi.org/10.1038/s41598-018-29980-9

Mendes, D. S., Silva, D. N. N., Silva, M. G., Beasley, C. R., & Fernandes, M. E. B. (2024). Microplastic distribution and risk assessment in estuarine systems influenced by traditional villages and artisanal fishery activities. *Scientific Reports*, *14*(1), 1–12. https://doi.org/10.1038/s41598-024-80468-1

Mercy, F. T., Alam, A. K. M. R., & Akbor, A. (2023). Heliyon Abundance and characteristics of microplastics in major urban lakes of Dhaka , Bangladesh. *Heliyon*, *9*(4), e14587. https://doi.org/10.1016/j.heliyon.2023.e14587

Merga, L. B., Redondo-hasselerharm, P. E., Brink, P. J. Van Den, & Koelmans, A. A. (2020). Science of the Total Environment Distribution of microplastic and small macroplastic particles across four fi sh species and sediment in an African lake. *Science of the Total Environment*, *741*, 140527. https://doi.org/10.1016/j.scitotenv.2020.140527

Mizraji, R., Ahrendt, C., Perez-Venegas, D., Vargas, J., Pulgar, J., Aldana, M., Patricio Ojeda, F., Duarte, C., & Galbán-Malagón, C. (2017). Is the feeding type related with the content of microplastics in intertidal fish gut? *Marine Pollution Bulletin*, *116*(1–2), 498–500. https://doi.org/10.1016/j.marpolbul.2017.01.008

Morgado, V., Gomes, L., Bettencourt da Silva, R. J. N., & Palma, C. (2021). Validated spreadsheet for the identification of PE, PET, PP and PS microplastics by micro-ATR-FTIR spectra with known uncertainty. *Talanta*, *234*(June), 122624. https://doi.org/10.1016/j.talanta.2021.122624

Movahedinia, A., Abtahi, B., & Bahmani, M. (2012). Gill Histopathological Lesions of the Sturgeons. *Asian Journal of Animal and Veterinary Advances*,

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

7(8), 710–717. https://doi.org/10.3923/ajava.2012.710.717

Muraly, S., & Jomon, K. V. (2021). *Chemical and Microplastic Induced Histological Changes in Etroplus Suratensis*. *8*(7), 47–54.

Musing, L., Shiraishi, H., Crook, V., Gollock, M., Levy, E., & Kecse-Nagy, K. (2018). Implementation of the CITES Appendix II listing of European eel (Anguilla anguilla). *CITES Annex 1*, *1*(November), 82. https://cites.org/sites/default/files/eng/com/ac/30/E-AC30-18-01-A1.pdf

Na, S. H., Kim, M. J., Kim, J., Batool, R., Cho, K., Chung, J., Lee, S., & Kim, E. J. (2024). Fate and potential risks of microplastic fibers and fragments in water and wastewater treatment processes. *Journal of Hazardous Materials*, *463*(October 2023), 132938. https://doi.org/10.1016/j.jhazmat.2023.132938

Naderi Kalali, E., Lotfian, S., Entezar Shabestari, M., Khayatzadeh, S., Zhao, C., & Yazdani Nezhad, H. (2023). A critical review of the current progress of plastic waste recycling technology in structural materials. *Current Opinion in Green and Sustainable Chemistry*, *40*(February), 100763. https://doi.org/10.1016/j.cogsc.2023.100763

Nafsiyah, I., Nurilmala, M., & Abdullah, A. (2018). Nutrient Composition of Eel Anguilla bicolor bicolor and Anguilla marmorata. *Jurnal Pengolahan Hasil Perikanan Indonesia*, *21*(3), 504. https://doi.org/10.17844/jphpi.v21i3.24733

Naidoo, T., Sershen, Thompson, R. C., & Rajkaran, A. (2020). Quantification and characterisation of microplastics ingested by selected juvenile fish species associated with mangroves in KwaZulu-Natal, South Africa. *Environmental Pollution*, *257*, 113635. https://doi.org/10.1016/j.envpol.2019.113635

Napper, I. E., Wright, L. S., Barrett, A. C., Parker-Jurd, F. N. F., & Thompson, R. C. (2022). Potential microplastic release from the maritime industry: Abrasion of rope. *Science of the Total Environment*, *804*, 150155. https://doi.org/10.1016/j.scitotenv.2021.150155

Narayanan, M. (2023). Origination, fate, accumulation, and impact, of microplastics in a marine ecosystem and bio/technological approach for remediation: A review. *Process Safety and Environmental Protection*, *177*(June), 472–485. https://doi.org/10.1016/j.psep.2023.07.013

Nasruddin, N. S., Azmai, M. N. A., Ismail, A., Saad, M. Z., Daud, H. M., & Zulkifli, S. Z. (2014). Histological features of the gastrointestinal tract of wild indonesian shortfin eel, anguilla bicolor bicolor (McClelland, 1844), Captured in peninsular malaysia. *Scientific World Journal*, *2014*. https://doi.org/10.1155/2014/312670

Nelms, S. E., Galloway, T. S., Godley, B. J., Jarvis, D. S., & Lindeque, P. K. (2018). Investigating microplastic trophic transfer in marine top predators. *Environmental Pollution*, *238*, 999–1007. https://doi.org/10.1016/j.envpol.2018.02.016

Neo, E. R. K., Soo, G. C. Y., Tan, D. Z. L., Cady, K., Tong, K. T., & Low, J. S. C. (2021). Life cycle assessment of plastic waste end-of-life for India and Indonesia. *Resources, Conservation and Recycling*, *174*(January 2021), 105774. https://doi.org/10.1016/j.resconrec.2021.105774

Noor, S. Y., Riani, E., Hariyadi, S., Butet, N. A., & Cordova, M. R. (2025). Microplastic accumulation in respiratory and digestive systems of selected fish

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

from Banten Bay, Indonesia. *Environmental Monitoring and Assessment*, *197*(4). https://doi.org/10.1007/s10661-025-13933-7

Nuamah, F., Kofi, S., Sefah, J., & Ed, R. O. (2023). *Microplastics in the Gulf of Guinea : An analysis of concentrations and distribution in sediments , gills , and guts of fish collected off the coast of Ghana*. *234*(July). https://doi.org/10.1016/j.envres.2023.116567

Nurfiarini, A., Kamal, M. M., Adrianto, L., & Susilo, S. B. (2015). Biodiversity of Fish Resources in Segara Anakan Estuarine , Cilacap , Central Java. *BAWAL Widya Riset Perikanan Tangkap*, *7*(1), 25–34.

Nurhasanah, Hasrianti, Hakim, L., Riani, E., Iswari, M. Y., & Cordova, M. R. (2025). *Microplastic contamination in the gut and gills of commercial marine fish*. *10*(4), 1897–1916. https://doi.org/10.22034/gjesm.2024.04.24

Nurito, N., Andriyono, S., Hendrayana, H., Husni, I. A., Hidayat, R., Andriyono, S., Ulinuha, M. R., & Hidayati, N. V. (2022). Karakteristik Sampah Plastik di Laguna Segara Anakan Cilacap. *Prosiding Seminar Nasional Lahan Suboptimal Ke-10 Tahun 2022, Palembang 27 Oktober 2022 "Revitalisasi Sumber Pangan Nabati Dan Hewani Pascapandemi DalamMendukung Pertanian Lahan Suboptimal Secara Berkelanjutan," 10*(1), 293–301.

Pankhurst, N. W. (1982). Relation of visual changes to the onset of sexual maturation in the European eel Anguilla anguilla (L.). *Journal of Fish Biology*, *21*(2), 127–140. https://doi.org/10.1111/j.1095-8649.1982.tb03994.x

Park, I.-S. (2021). The Current Status for Aquaculture of Anesthesia to Aquatic Animals for Aquaculture in Republic of Korea. *International Journal of Multidisciplinary and Current Educational Research*, *3*(4), 50–71. https://www.ijmcer.com/wp-content/uploads/2021/07/IJMCER_G034050071.pdf

Park, S. Y., & Kim, C. G. (2022). A comparative study on the distribution behavior of microplastics through FT-IR analysis on different land uses in agricultural soils. *Environmental Research*, *215*(P2), 114404. https://doi.org/10.1016/j.envres.2022.114404

Park, T. J., Lee, S. H., Lee, M. S., Lee, J. K., Lee, S. H., & Zoh, K. D. (2020). Occurrence of microplastics in the Han River and riverine fish in South Korea. *Science of the Total Environment*, *708*, 134535. https://doi.org/10.1016/j.scitotenv.2019.134535

Parker, B., Andreou, D., Green, I. D., & Britton, J. R. (2021). Microplastics in freshwater fishes: Occurrence, impacts and future perspectives. *Fish and Fisheries*, *22*(3), 467–488. https://doi.org/10.1111/faf.12528

Parvin, F., Jannat, S., & Tareq, S. M. (2021). Abundance, characteristics and variation of microplastics in different freshwater fish species from Bangladesh. *Science of the Total Environment*, *784*. https://doi.org/10.1016/j.scitotenv.2021.147137

Pedà, C., Caccamo, L., Fossi, M. C., Gai, F., Andaloro, F., Genovese, L., Perdichizzi, A., Romeo, T., & Maricchiolo, G. (2016). Intestinal alterations in European sea bass Dicentrarchus labrax (Linnaeus, 1758) exposed to microplastics: Preliminary results. *Environmental Pollution*, *212*, 251–256. https://doi.org/10.1016/j.envpol.2016.01.083

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Pegado, T. de S. e. S., Schmid, K., Winemiller, K. O., Chelazzi, D., Cincinelli, A., Dei, L., & Giarrizzo, T. (2018). First evidence of microplastic ingestion by fishes from the Amazon River estuary. *Marine Pollution Bulletin*, *133*(March), 814–821. https://doi.org/10.1016/j.marpolbul.2018.06.035

Perveen, S., Pablos, C., Reynolds, K., Stanley, S., & Marugán, J. (2022). Microplastics in fresh- and wastewater are potential contributors to antibiotic resistance - A minireview. *Journal of Hazardous Materials Advances*, *6*(February), 100071. https://doi.org/10.1016/j.hazadv.2022.100071

Pisku, P., & Astel, A. (2026). *Comparative study on microplastic abundance in fish organs from marine and freshwater ecosystems of the southern Baltic Sea region : influence of habitat zone and feeding preferences ☆*. *223*(September 2025). https://doi.org/10.1016/j.marpolbul.2025.118959

Putra, P. R., Munasik, M., & Taufiq-Spj, N. (2023). Dimorfisme Seksual dan Hubungan Panjang-Berat Ikan Sidat (Anguilla sp.) di Perairan Nusawungu, Kabupaten Cilacap. *Journal of Marine Research*, *12*(2), 283–292.

Putri, R. R. R. A. D., Retnoaji, B., & Nugroho, A. P. (2023). Accumulation of Microplastics and Histological Analysis on Marine Fish from Coastal Waters of Baru and Trisik Beaches, Special Region of Yogyakarta. *Environment and Natural Resources Journal*, *21*(2), 153–170. https://doi.org/10.32526/ennrj/21/202200207

Qaiser, Z., Aqeel, M., Sarfraz, W., Fatima, Z., Noman, A., Naeem, S., & Khalid, N. (2023). Case Studies in Chemical and Environmental Engineering Microplastics in wastewaters and their potential effects on aquatic and terrestrial biota. *Case Studies in Chemical and Environmental Engineering*, *8*(September), 100536. https://doi.org/10.1016/j.cscee.2023.100536

Rashid, E., Hussain, S. M., Ali, S., Kucharczyk, D., Nowosad, J., & Al-ghanim, K. A. (2025). *Polystyrene microplastics exposure in freshwater fish , Labeo rohita : evaluation of physiology and histopathology*. 1–10.

Ravindra, K., Kaur, M., & Mor, S. (2025). Impacts of microplastics on gut health: Current status and future directions. *Indian Journal of Gastroenterology*, *0123456789*. https://doi.org/10.1007/s12664-025-01744-0

Raza, M. H., Jabeen, F., Ikram, S., & Zafar, S. (2023). Characterization and implication of microplastics on riverine population of the River Ravi , Lahore , Pakistan. *Environmental Science and Pollution Research*, 6828–6848. https://doi.org/10.1007/s11356-022-22440-y

Ren, P. J., Dou, M., Wang, C., Li, G. Q., & Jia, R. (2020). Abundance and removal characteristics of microplastics at a wastewater treatment plant in Zhengzhou. *Environmental Science and Pollution Research*, *27*(29), 36295–36305. https://doi.org/10.1007/s11356-020-09611-5

Réveillac, É., Gagnaire, P. A., Lecomte-Finiger, R., Berrebi, P., Robinet, T., Valade, P., & Feunteun, É. (2009). Development of a key using morphological characters to distinguish south-western Indian Ocean anguillid glass eels. *Journal of Fish Biology*, *74*(9), 2171–2177. https://doi.org/10.1111/j.1095-8649.2009.02284.x

Rezania, S., Park, J., Md Din, M. F., Mat Taib, S., Talaiekhozani, A., Kumar Yadav, K., & Kamyab, H. (2018). Microplastics pollution in different aquatic

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

environments and biota: A review of recent studies. *Marine Pollution Bulletin*, *133*(May), 191–208. https://doi.org/10.1016/j.marpolbul.2018.05.022

Righton, D., Piper, A., Aarestrup, K., Amilhat, E., Belpaire, C., Casselman, J., Castonguay, M., Díaz, E., Dörner, H., Faliex, E., Feunteun, E., Fukuda, N., Hanel, R., Hanzen, C., Jellyman, D., Kaifu, K., McCarthy, K., Miller, M. J., Pratt, T., … Gollock, M. (2021). Important questions to progress science and sustainable management of anguillid eels. *Fish and Fisheries*, *22*(4), 762–788. https://doi.org/10.1111/faf.12549

Roch, S., Friedrich, C., & Brinker, A. (2020). Uptake routes of microplastics in fishes: practical and theoretical approaches to test existing theories. *Scientific Reports*, *10*(1), 1–12. https://doi.org/10.1038/s41598-020-60630-1

Rocha-Santos, T., & Duarte, A. C. (2015). A critical overview of the analytical approaches to the occurrence, the fate and the behavior of microplastics in the environment. *TrAC - Trends in Analytical Chemistry*, *65*, 47–53. https://doi.org/10.1016/j.trac.2014.10.011

Rochman, C. M., Tahir, A., Williams, S. L., Baxa, D. V., Lam, R., Miller, J. T., Teh, F. C., Werorilangi, S., & Teh, S. J. (2015). Anthropogenic debris in seafood: Plastic debris and fibers from textiles in fish and bivalves sold for human consumption. *Scientific Reports*, *5*(September), 1–10. https://doi.org/10.1038/srep14340

Rojoni, S. A., Ahmed, T., Rahman, M., Hossain, M. M., Ali, S., & Haq, M. (2024). Advances of microplastics ingestion on the morphological and behavioral conditions of model zebrafish : A review. *Aquatic Toxicology*, *272*(April), 106977. https://doi.org/10.1016/j.aquatox.2024.106977

Ronca, S. (2017). Polyethylene. In *Brydson's Plastics Materials: Eighth Edition* (Issue 1930). Elsevier Ltd. https://doi.org/10.1016/B978-0-323-35824-8.00010-4

Rouillon, M., & Taylor, M. P. (2016). Can field portable X-ray fluorescence (pXRF) produce high quality data for application in environmental contamination research? *Environmental Pollution*, *214*, 255–264. https://doi.org/10.1016/j.envpol.2016.03.055

Rybczyńska-Tkaczyk, K., Skóra, B., & Szychowski, K. A. (2023). Toxicity of bisphenol A (BPA) and its derivatives in divers biological models with the assessment of molecular mechanisms of toxicity. *Environmental Science and Pollution Research*, *30*(30), 75126–75140. https://doi.org/10.1007/s11356-023-27747-y

Sabilillah, A. M., Apriliawati, A., & Nugroho, A. P. (2026). *Microplastic contamination on urban river under different precipitation rate and land use gradient*.

Sabri, N. A. A., Razak, M. R., & Aris, A. Z. (2025). Fate of microplastics and emerging contaminants: Mechanisms of interactions, bioaccumulation and combined toxicity to aquatic organisms. *Marine Pollution Bulletin*, *214*(March). https://doi.org/10.1016/j.marpolbul.2025.117822

Sarafraz, J., Rajabizadeh, M., & Kamrani, E. (2016). The preliminary assessment of abundance and composition of marine beach debris in the northern Persian Gulf, Bandar Abbas City, Iran. *Journal of the Marine Biological Association*

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

of the United Kingdom, *96*(1), 131–135. https://doi.org/10.1017/S0025315415002076

Sarker, A., Deepo, D. M., Nandi, R., Rana, J., Islam, S., Rahman, S., Hossain, M. N., Islam, M. S., Baroi, A., & Kim, J. E. (2020). A review of microplastics pollution in the soil and terrestrial ecosystems: A global and Bangladesh perspective. *Science of the Total Environment*, *733*, 139296. https://doi.org/10.1016/j.scitotenv.2020.139296

Schabetsberger, R., Miller, M. J., Dall'Olmo, G., Kaiser, R., Økland, F., Watanabe, S., Aarestrup, K., & Tsukamoto, K. (2016). Hydrographic features of anguillid spawning areas: Potential signposts for migrating eels. *Marine Ecology Progress Series*, *554*, 141–155. https://doi.org/10.3354/meps11824

Schmidt, C., Krauth, T., & Wagner, S. (2017). Export of Plastic Debris by Rivers into the Sea. *Environmental Science and Technology*, *51*(21), 12246–12253. https://doi.org/10.1021/acs.est.7b02368

Seetapan, K., & Prommi, T. O. N. (2023). *Microplastics in commercial fish digestive tracts from freshwater habitats in Northern Thailand*. *65*, 48–65.

Sequeira, I. F., Prata, J. C., da Costa, J. P., Duarte, A. C., & Rocha-Santos, T. (2020). Worldwide contamination of fish with microplastics: A brief global overview. *Marine Pollution Bulletin*, *160*(July), 111681. https://doi.org/10.1016/j.marpolbul.2020.111681

Setyaningsih, W., Hadiyanto, H., & Triadi Putranto, T. (2023). Microplastic Pollution in Indonesia: The Contribution of Human Activity to the Abundance of Microplastics. *E3S Web of Conferences*, *448*, 1–10. https://doi.org/10.1051/e3sconf/202344803073

Shadwick, R. E., & Lauder, G. V. (2006). *Fish Physiology: Fish Biomechanics*. Elsevier Academic Press.

Shahul Hamid, F., Bhatti, M. S., Anuar, N., Anuar, N., Mohan, P., & Periathamby, A. (2018). Worldwide distribution and abundance of microplastic: How dire is the situation? *Waste Management and Research*, *36*(10), 873–897. https://doi.org/10.1177/0734242x18785730

SIPSN. (2021). *Sistem Informasi Pengelolaan Sampah Nasional: SIPSN, National Waste Management Information System, Ministry of Environment and Forestry. Republic of Indonesia. Grafik komposisi sampah*. https://sipsn.menlhk.go.id/sipsn/

SIPSN. (2022). *Sistem Informasi Pengelolaan Sampah Nasional: SIPSN, National Waste Management Information System, Ministry of Environment and Forestry. Republic of Indonesia. Grafik komposisi sampah*. https://sipsn.menlhk.go.id/sipsn/

Su, L., Deng, H., Li, B., Chen, Q., Pettigrove, V., Wu, C., & Shi, H. (2019). The occurrence of microplastic in specific organs in commercially caught fishes from coast and estuary area of east China. *Journal of Hazardous Materials*, *365*(October 2018), 716–724. https://doi.org/10.1016/j.jhazmat.2018.11.024

Sudo, R., & Yada, T. (2022). Anguillid Eels as a Model Species for Understanding Endocrinological Influences on the Onset of Spawning Migration of Fishes. *Biology*, *11*(6), 1–16. https://doi.org/10.3390/biology11060934

Sugeha, H. Y., & Suharti, S. R. (2008). *Discrimination and Distribution of Two*

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Tropical Short-Finned Eels (Anguilla bicolor bicolor and Anguilla bicolor pacifica) in the Indonesian Waters. *June*, 1–14. https://doi.org/10.5134/144634

Sugiantari, I. A. P., Sukmaningsih, A. A. S. A., & Wijana, I. M. S. (2022). Kajian Struktur Histologi Hati, Insang dan Lambung Ikan Nila (Oreochromis niloticus) di Danau Batur, Bangli. *Buletin Anatomi Dan Fisiologi*, *7*(1), 51–59. https://doi.org/10.14710/baf.7.1.2022.51-59

Sulaiman, B., Woodward, J. C., & Shiels, H. A. (2023). Riverine microplastics and their interaction with freshwater fish. *Water Biology and Security*, *2*(4), 100192. https://doi.org/10.1016/j.watbs.2023.100192

Sun, T., Wang, S., Ji, C., Li, F., & Wu, H. (2022). Microplastics aggravate the bioaccumulation and toxicity of coexisting contaminants in aquatic organisms: A synergistic health hazard. *Journal of Hazardous Materials*, *424*(PB), 127533. https://doi.org/10.1016/j.jhazmat.2021.127533

Sun, X., Li, Q., Shi, Y., Zhao, Y., Zheng, S., Liang, J., Liu, T., & Tian, Z. (2019). Characteristics and retention of microplastics in the digestive tracts of fish from the Yellow Sea. *Environmental Pollution*, *249*, 878–885. https://doi.org/10.1016/j.envpol.2019.01.110

Sutiani, Lia & Suseno, S. H. (2020). *Strategi Pemanfaatan dan Pelestarian Ikan Sidat secara Berkelanjutan Berbasis Masyarakat di Sungai Cimandiri , Kabupaten Sukabumi (Strategy of Sustainable Utilization and Conservation Tge Glass Eel Based Community in the Cimandiri River , Sukabumi Regenc*. *2*(3), 422–428.

Tanaka, K., & Takada, H. (2016). Microplastic fragments and microbeads in digestive tracts of planktivorous fish from urban coastal waters. *Scientific Reports*, *6*(September), 1–8. https://doi.org/10.1038/srep34351

Tang, N., Yu, Y., Cai, L., Tan, X., Zhang, L., Huang, Y., Li, B., & Peng, J. (2022). *Distribution Characteristics and Source Analysis of Microplastics in Urban Freshwater Lakes : A Case Study in*.

Tarya, A., Sunaringati, L. C., & Ningsih, N. S. (2019). Mangrove density impacts on tidal dynamic in Segara Anakan Lagoon, Indonesia. *Journal of Physics: Conference Series*, *1245*(1). https://doi.org/10.1088/1742-6596/1245/1/012060

ter Halle, A., Ladirat, L., Martignac, M., Mingotaud, A. F., Boyron, O., & Perez, E. (2017). To what extent are microplastics from the open ocean weathered? *Environmental Pollution*, *227*, 167–174. https://doi.org/10.1016/j.envpol.2017.04.051

Thacharodi, A., Meenatchi, R., Hassan, S., Hussain, N., Bhat, M. A., Arockiaraj, J., Ngo, H. H., Le, Q. H., & Pugazhendhi, A. (2024). Microplastics in the environment: A critical overview on its fate, toxicity, implications, management, and bioremediation strategies. *Journal of Environmental Management*, *349*(September 2023), 119433. https://doi.org/10.1016/j.jenvman.2023.119433

Tirkey, A., & Upadhyay, L. S. B. (2021). Microplastics: An overview on separation, identification and characterization of microplastics. *Marine Pollution Bulletin*, *170*(March), 112604. https://doi.org/10.1016/j.marpolbul.2021.112604

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Tramoy, R., Gasperi, J., Colasse, L., & Tassin, B. (2020). Transfer dynamic of macroplastics in estuaries — New insights from the Seine estuary: Part 1. Long term dynamic based on date-prints on stranded debris. *Marine Pollution Bulletin*, *152*(November 2019), 110894. https://doi.org/10.1016/j.marpolbul.2020.110894

Tsukamoto, K., & Aoyama, J. (1998). Evolution of freshwater eels of the genus Anguilla: a probable scenario. *Environmental Biology of Fishes*, *52*, 139–148. https://doi.org/https://doi.org/10.1023/A:1007427724175

Upadhyay, S., Sharma, P. K., Dogra, K., Bhattacharya, P., Kumar, M., Tripathi, V., & Karmakar, R. (2024). Microplastics in freshwater: Unveiling sources, fate, and removal strategies. *Groundwater for Sustainable Development*, *26*(April), 101185. https://doi.org/10.1016/j.gsd.2024.101185

Veerasingam, S., Mugilarasan, M., Venkatachalapathy, R., & Vethamony, P. (2016). Influence of 2015 flood on the distribution and occurrence of microplastic pellets along the Chennai coast, India. *Marine Pollution Bulletin*, *109*(1), 196–204. https://doi.org/10.1016/j.marpolbul.2016.05.082

Wang, J., Huang, M., Wang, Q., Sun, Y., Zhao, Y., & Huang, Y. (2020). LDPE microplastics significantly alter the temporal turnover of soil microbial communities. *Science of the Total Environment*, *726*, 138682. https://doi.org/10.1016/j.scitotenv.2020.138682

Wang, M., Rücklin, M., Poelmann, R. E., de Mooij, C. L., Fokkema, M., Lamers, G. E. M., de Bakker, M. A. G., Chin, E., Bakos, L. J., Marone, F., Wisse, B. J., de Ruiter, M. C., Cheng, S., Nurhidayat, L., Vijver, M. G., & Richardson, M. K. (2023). Nanoplastics causes extensive congenital malformations during embryonic development by passively targeting neural crest cells. *Environment International*, *173*(March 2023), 107865. https://doi.org/10.1016/j.envint.2023.107865

Wang, T., Hu, M., Xu, G., Shi, H., Leung, J. Y. S., & Wang, Y. (2021). Microplastic accumulation via trophic transfer: Can a predatory crab counter the adverse effects of microplastics by body defence? *Science of the Total Environment*, *754*, 142099. https://doi.org/10.1016/j.scitotenv.2020.142099

Wang, W., Ge, J., & Yu, X. (2020). Bioavailability and toxicity of microplastics to fish species: A review. *Ecotoxicology and Environmental Safety*, *189*(November 2019), 109913. https://doi.org/10.1016/j.ecoenv.2019.109913

Ward, J. E., Zhao, S., Holohan, B. A., Mladinich, K. M., Griffin, T. W., Wozniak, J., & Shumway, S. E. (2019). Selective Ingestion and Egestion of Plastic Particles by the Blue Mussel (Mytilus edulis) and Eastern Oyster (Crassostrea virginica): Implications for Using Bivalves as Bioindicators of Microplastic Pollution. *Environmental Science and Technology*, *53*(15), 8776–8784. https://doi.org/10.1021/acs.est.9b02073

Watanabe, S., Aoyama, J., & Tsukamoto, K. (2004). Reexamination of Ege's (1939) use of taxonomic characters of the genus Anguilla. *Bulletin of Marine Science*, *74*(2), 337–351.

Wayman, C., & Niemann, H. (2021). The fate of plastic in the ocean environment-a minireview. *Environmental Science: Processes and Impacts*, *23*(2), 198–212. https://doi.org/10.1039/d0em00446d

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Wei, Y., Ma, W., Xu, Q., Sun, C., Wang, X., & Gao, F. (2022). Microplastic Distribution and Influence Factor Analysis of Seawater and Surface Sediments in a Typical Bay With Diverse Functional Areas: A Case Study in Xincun Lagoon, China. *Frontiers in Environmental Science*, *10*(February), 1–13. https://doi.org/10.3389/fenvs.2022.829942

White, G., & Reid, G. (2018). Recycled waste plastic for extending and modifying asphalt binders. *Proceedings of the 8th Symposium on Pavement Surface Characteristics*, *May*, 1–13.

Wijayanti, I., Endang Sri Susilo, & Setiyorini. (2018). *Nutritional Content of Wild and Cultured Eel (Anguilla bicolor) from Southern Coast of Central Java*. *23*(March), 37–44. https://doi.org/10.14710/ik.ijms.23.1.37-44

Williamson, M. J., Pike, C., Gollock, M., & Jacoby, D. M. P. (2023). ll Anguillid eels. *Current Biology*, *33*(17), R888–R893. https://doi.org/10.1016/j.cub.2023.07.044

Wootton, N., Reis-Santos, P., Dowsett, N., Turnbull, A., & Gillanders, B. M. (2021). Low abundance of microplastics in commercially caught fish across southern Australia. *Environmental Pollution*, *290*(May), 118030. https://doi.org/10.1016/j.envpol.2021.118030

Wouthuyzen, S., Achmad, M., & Syahailatua, A. (2024). *Ikan Sidat Tropis Indonesia*. BRIN.

Wu, F., Wang, Y., Leung, J. Y. S., Huang, W., Zeng, J., Tang, Y., Chen, J., Shi, A., Yu, X., Xu, X., Zhang, H., & Cao, L. (2020). Accumulation of microplastics in typical commercial aquatic species: A case study at a productive aquaculture site in China. *Science of the Total Environment*, *708*(36), 135432. https://doi.org/10.1016/j.scitotenv.2019.135432

Xie, M., Lin, L., Xu, P., Zhou, W., Zhao, C., Ding, D., & Suo, A. (2021). Effects of microplastic fibers on Lates calcarifer juveniles: Accumulation, oxidative stress, intestine microbiome dysbiosis and histological damage. *Ecological Indicators*, *133*, 108370. https://doi.org/10.1016/j.ecolind.2021.108370

Xu, Y., Chan, F. K. S., He, J., Johnson, M., Gibbins, C., Kay, P., Stanton, T., Xu, Y., Li, G., Feng, M., Paramor, O., Yu, X., & Zhu, Y. G. (2021). A critical review of microplastic pollution in urban freshwater environments and legislative progress in China: Recommendations and insights. *Critical Reviews in Environmental Science and Technology*, *51*(22), 2637–2680. https://doi.org/10.1080/10643389.2020.1801308

Yan, Z., Yang, Y., Xiang, J., Chen, Y., Zhu, P., Yuan, S., Huang, R., Hu, X., & Ma, Y. (2025). Exposure routes induce differential intestinal damage in zebrafish from polystyrene microplastics. *Process Safety and Environmental Protection*, *197*(December 2024), 107020. https://doi.org/10.1016/j.psep.2025.107020

Yang, H., Xiong, H., Mi, K., Xue, W., Wei, W., & Zhang, Y. (2020). Toxicity comparison of nano-sized and micron-sized microplastics to Gold fi sh Carassius auratus Larvae. *Journal of Hazardous Materials*, *388*(January), 122058. https://doi.org/10.1016/j.jhazmat.2020.122058

Yang, Y., Li, Z., Yan, C., Chadwick, D., Jones, D. L., Liu, E., Liu, Q., Bai, R., & He, W. (2022). Kinetics of microplastic generation from different types of mulch films in agricultural soil. *Science of the Total Environment*, *814*,

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

152572. https://doi.org/10.1016/j.scitotenv.2021.152572

Yao, F. C., Jin, C. X., Liang, H., Zhang, Y., Gu, Y., Song, F. B., & Zhou, Z. (2024). Chemosphere Microplastics weaken the digestion and absorption functions in the golden pompano (Trachinotus blochii) by affecting the intestinal structure , bacteria and metabolites. *Chemosphere*, *362*(February), 142415. https://doi.org/10.1016/j.chemosphere.2024.142415

Yap, K. S., Leow, Y. J., Chung, S. Y., Loke, C. P. H., Tan, D. Z. L., Yeo, Z., & Low, J. S. C. (2023). Life Cycle Assessment of Plastic Waste End-of-life Treatments in Singapore. *Procedia CIRP*, *116*, 522–527. https://doi.org/10.1016/j.procir.2023.02.088

Ye, Z., Li, H., & Zhang, Y. (2026). *Comparative Morphology of Digestive Tract Among 11 Different Marine Fish Species*. https://doi.org/10.1155/are/5731687

Yin, X., Wu, J., Liu, Y., Chen, X., Xie, C., Liang, Y., Li, J., & Jiang, Z. (2022). Accumulation of microplastics in fish guts and gills from a large natural lake: Selective or non-selective? *Environmental Pollution*, *309*(June), 119785. https://doi.org/10.1016/j.envpol.2022.119785

Yona, D., Maharani, M. D., Cordova, M. R., Elvania, Y., & Dharmawan, I. W. E. (2020). Microplastic analysis in gill and gastrointestinal track of reef fish in three small and outer islands of Papua, Indonesia: a preliminary study. *Journal of Tropical Marine Science and Technology*, *12*(2), 497–507.

Yona, D., Setyawan, F. O., Putri, S. E. N., Iranawati, F., Kautsar, M. A., & Isobe, A. (2023). *Microplastic Distribution in Beach Sediments : Comparison*. *15*(2), 303–315.

Yona, F., Agus, S., & Tofrizzal. (2022). Aplikasi Teknik Periodic Acid Schiff (PAS) Dalam Diagnosis Histopatologi Keganasan, Infeksi Jamur dan Kelainan Imunologi. *Collaborative Medical Journal (CMJ)*, *5*(1), 16–25.

Yonkos, L. T., Friedel, E. A., Perez-Reyes, A. C., Ghosal, S., & Arthur, C. D. (2014). Microplastics in four estuarine rivers in the chesapeake bay, U.S.A. *Environmental Science and Technology*, *48*(24), 14195–14202. https://doi.org/10.1021/es5036317

Yu, Y., Zhu, T., Liu, Z., Song, C., Chen, Z., & Yu, X. (2026). Comparative Biochemistry and Physiology , Part C Tracing microplastics in fish : Uptake , translocation , and multidimensional biological impacts. *Comparative Biochemistry and Physiology, Part C*, *308*(January), 110595. https://doi.org/10.1016/j.cbpc.2026.110595

Yunanto, A., Fitriah, N., & Widigati, N. (2021). *KARAKTERISTIK MIKROPLASTIK PADA EKOSISTEM PESISIR DI KAWASAN MANGROVE PERANCAK , BALI semakin meningkat pula potensi bahaya limbah plastik bagi lingkungan . Potensi sifat dari plastik yang sulit terurai secara dan sulit untuk diuraikan . Sampah plastik da*.

Zbyszewski, M., Corcoran, P. L., & Hockin, A. (2014). Comparison of the distribution and degradation of plastic debris along shorelines of the Great Lakes , North America. *Journal of Great Lakes Research*, *40*(2), 288–299. https://doi.org/10.1016/j.jglr.2014.02.012

Zhang, C., Wang, S., Pan, Z., Sun, D., Xie, S., Zhou, A., Wang, J., & Zou, J. (2020). Occurrence and distribution of microplastics in commercial fishes from

UNIVERSITAS
GADJAH MADA
Bioakumulasi Mikroplastik pada Jaringan Insang dan Usus Ikan Sidat (Anguilla bicolor McClelland, 1844) dari Perairan Segara Anakan, Cilacap, Jawa Tengah
Sirayya Illiyin, Nur Indah Septriani, S.Si., M.Sc., Ph.D.; Kazuki Matsushige, Ph.D.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

estuarine areas of Guangdong, South China. *Chemosphere*, *260*, 127656. https://doi.org/10.1016/j.chemosphere.2020.127656

Zhang, F., Xu, J., Wang, X., Jabeen, K., & Li, D. (2021). Microplastic contamination of fish gills and the assessment of both quality assurance and quality control during laboratory analyses. *Marine Pollution Bulletin*, *173*(PB), 113051. https://doi.org/10.1016/j.marpolbul.2021.113051

Zhang, H. (2017). Transport of microplastics in coastal seas. *Estuarine, Coastal and Shelf Science*, *199*, 74–86. https://doi.org/10.1016/j.ecss.2017.09.032

Zhang, J., Zhang, C., Deng, Y., Wang, R., Ma, E., Wang, J., Bai, J., Wu, J., & Zhou, Y. (2019). Microplastics in the surface water of small-scale estuaries in Shanghai. *Marine Pollution Bulletin*, *149*(2360). https://doi.org/10.1016/j.marpolbul.2019.110569

Zhang, K., Hamidian, A. H., Tubić, A., Zhang, Y., Fang, J. K. H., Wu, C., & Lam, P. K. S. (2021). Understanding plastic degradation and microplastic formation in the environment: A review. *Environmental Pollution*, *274*. https://doi.org/10.1016/j.envpol.2021.116554

Zhang, L., Liu, J., Xie, Y., Zhong, S., & Gao, P. (2021). Occurrence and removal of microplastics from wastewater treatment plants in a typical tourist city in China. *Journal of Cleaner Production*, *291*, 125968. https://doi.org/10.1016/j.jclepro.2021.125968

Zhao, M., Cao, Y., Chen, T., Li, H., Tong, Y., Fan, W., Xie, Y., Tao, Y., & Zhou, J. (2022). Characteristics and source-pathway of microplastics in freshwater system of China: A review. *Chemosphere*, *297*(February), 134192. https://doi.org/10.1016/j.chemosphere.2022.134192

Ziani, K., Ioniță-Mîndrican, C. B., Mititelu, M., Neacșu, S. M., Negrei, C., Moroșan, E., Drăgănescu, D., & Preda, O. T. (2023). Microplastics: A Real Global Threat for Environment and Food Safety: A State of the Art Review. *Nutrients*, *15*(3). https://doi.org/10.3390/nu15030617

Zink, L., & Wood, C. M. (2024). Comparative Biochemistry and Physiology , Part A The effects of microplastics on ionoregulatory processes in the gills of freshwater fish and invertebrates : A prospective review. *Comparative Biochemistry and Physiology, Part A*, *295*(April), 111669. https://doi.org/10.1016/j.cbpa.2024.111669