

## DAFTAR PUSTAKA

1. Padeniya U, Davis DA, Wells DE, Bruce TJ. Microbial Interactions, Growth, and Health of Aquatic Species in Biofloc Systems. *Water* 2022;14(24):1–15.
2. Puspitasari A, Isyanto AY, Aziz S. Penerapan Teknologi Bioflok Pada Budidaya Ikan Nila Di Desa Cibuniasih Kabupaten Tasikmalaya. *Abdimas Galuh* 2020;2(2):175.
3. Andik Sudirman, Sinung Rahadjo, Djumbuh Rukmono, Izzul Islam, Adi Suryadin. Analisis Kualitas Air Dan Kepekatan Bioflok Pada Budidaya Polikultur Ikan Lele (*Clarias* sp.) dan Ikan Nila (*Oreochromis niloticus*) Sistem Bioflok. *JIPBP* 2023;18(2):140–151.
4. Deswati D, Zein R, Dwisani R, Fitri WE, Putra A. Biofloc-based catfish cultivation and its effect on the dynamics of water quality. *AACL Bioflux* 2023;16(6):3123–3137.
5. Deswati D, Safni S, Khairiyah K, Yani E, Yusuf Y, Pardi H. Biofloc technology: water quality (pH, temperature, DO, COD, BOD) in a flood & drain aquaponic system. *Int J Environ Anal Chem* [homepage on the Internet] 2022;102(18):6835–6844. Available from: <https://doi.org/10.1080/03067319.2020.1817428>
6. Hossain S, Manan H, Shukri ZNA, et al. Microplastics biodegradation by biofloc-producing bacteria: An inventive biofloc technology approach. *Microbiol Res* [homepage on the Internet] 2023;266(April 2022):127239. Available from: <https://doi.org/10.1016/j.micres.2022.127239>
7. Hu X, Meng LJ, Liu HD, et al. Impacts of Nile Tilapia (*Oreochromis niloticus*) exposed to microplastics in bioflocs system. *Sci Total Environ* [homepage on the Internet] 2023;901(July):165921. Available from: <https://doi.org/10.1016/j.scitotenv.2023.165921>
8. Patidar K, Ambade B, Mohammad F, Soleiman AA. Microplastics as heavy metal vectors in the freshwater environment : Distribution , variations , sources and health risk. *Phys Chem Earth* [homepage on the Internet] 2023;131(July):103448. Available from: <https://doi.org/10.1016/j.pce.2023.103448>
9. Deswati D, Khairiyah K, Safni S, Yusuf Y, Refinel R, Pardi H. Environmental detoxification of heavy metals in flood & drain aquaponic system based on biofloc technology. *Int J Environ Anal Chem* [homepage on the Internet] 2020;102(18):7155–7164. Available from: <https://doi.org/10.1080/03067319.2020.1826463>
10. Safsafubun1 FR, Undap2 SL, Indra R.N. Salindeho2, Novie P.L. Pangemanan2, Juliaan Ch. Watung2 HP. Fluktuasi parameter kualitas air dan perkembangan flok pada budidaya ikan Nila (*Oreochromis niloticus*). *Budid Perair* 2023;11(2):213–226.
11. Deswati, Rahmiana Z, Joko S, Norita Tetra O. Flokponik, integrasi akuakultur berbasis bioflok dengan hidroponik. 2022;
12. Zunnur Y, Suyani H. Utilization of Planting Media of Coconut Fiber and Charcoal Rice Husk in Lettuce ( *Lactuca sativa L.* ) to Reduce Ammonia , Sulfides , Phosphate , Zinc and Iron in Hydroponics Systems. *Chem Pharm Res* 2018;10(3):15–22.
13. Choo HX, Caipang CMA. Biofloc technology (BFT) and its application towards improved production in freshwater tilapia culture. *AACL Bioflux* 2015;8(3):362–366.
14. Yu Y, Choi J, Lee J, Jo A, Lee KM, Kim J. Biofloc Technology in Fish Aquaculture : A Review. *antioxidants* 2023;12(398):1–35.
15. Kurniawan et al. Analisis Keterkaitan Kelimpahan Mikroplastik Dengan Keberadaan Sampah Plastik di Sungai Mahakam, Kecamatan Muara Kaman. *J Teknol Lingkung UNMUL* 2023;7(1):20–30.
16. Sarkar S, Diab H, Thompson J. Microplastic Pollution: Chemical Characterization and Impact on Wildlife. *Int J Environ Res Public Health* 2023;20(3).
17. Dewi MNBS. Studi Literatur Dampak Mikroplastik Terhadap Lingkungan. *J Sos Sains dan Teknol* 2022;2(2):239–250.
18. Rodrigues MO, Abrantes N, Gonçalves FJM, Nogueira H, Marques JC, Gonçalves AMM. Impacts of plastic products used in daily life on the environment and human health: What is known? *Environ Toxicol Pharmacol* [homepage on the Internet] 2019;72(July):103239. Available from: <https://doi.org/10.1016/j.etap.2019.103239>
19. Muhib MI, Rahman MM. Microplastics contamination in fish feeds: Characterization

- and potential exposure risk assessment for cultivated fish of Bangladesh. *Heliyon* [homepage on the Internet] 2023;9(9):e19789. Available from: <https://doi.org/10.1016/j.heliyon.2023.e19789>
- 20. Sturkell E, Wanner P, Konrad-schmolke M. Physical characteristics of microplastic particles and potential for global atmospheric transport: A meta-analysis. *Environ Pollut* 2024;342.
  - 21. Bermúdez JR, Swarzenski PW. A microplastic size classification scheme aligned with universal plankton survey methods. *MethodsX* 2021;8:10–15.
  - 22. Deswati D, Tetra ON, Febriani U, Suparno S, Pardi H, Putra A. Detection of microplastic in sediments at beach tourism area of Muaro Lasak, Padang City, West Sumatra, Indonesia. *AACL Bioflux* 2023;16(5):2765–2780.
  - 23. Yuan Z, Nag R, Cummins E. Human health concerns regarding microplastics in the aquatic environment - From marine to food systems. *Sci Total Environ* [homepage on the Internet] 2022;823:153730. Available from: <https://doi.org/10.1016/j.scitotenv.2022.153730>
  - 24. Turner A, Holmes L, Thompson RC, Fisher AS. Metals and marine microplastics: Adsorption from the environment versus addition during manufacture, exemplified with lead. *Water Res* [homepage on the Internet] 2020;173:115577. Available from: <https://doi.org/10.1016/j.watres.2020.115577>
  - 25. Acosta-Coley I, Mendez-Cuadro D, Rodriguez-Cavallo E, la Rosa J de, Olivero-Verbel J. Trace elements in microplastics in Cartagena: A hotspot for plastic pollution at the Caribbean. *Mar Pollut Bull* [homepage on the Internet] 2019;139(December 2018):402–411. Available from: <https://doi.org/10.1016/j.marpolbul.2018.12.016>
  - 26. Khalid N, Aqeel M, Noman A, Khan SM, Akhter N. Interactions and effects of microplastics with heavy metals in aquatic and terrestrial environments. *Environ Pollut* [homepage on the Internet] 2021;290(September):118104. Available from: <https://doi.org/10.1016/j.envpol.2021.118104>
  - 27. Arifin MY. Pertumbuhan dan Survival Rate Ikan Nila (*Oreochromis*. Sp) Strain Merah dan Strain Hitam yang Dipelihara pada Media Bersalinitas. *J Ilm Univ Batanghari Jambi* 2016;16(1):159–166.
  - 28. Sibagariang DIS, Pratiwi IE, Saidah, Hafriliza A. Pola Pertumbuhan Ikan Nila (*Oreochromis niloticus*) Hasil Budidaya Masyarakat Di Desa Bangun Sari Baru Kecamatan Tanjung Morawa. *J Jeumpa* 2020;7(2):443–449.
  - 29. Fadzry Nurul HH dan EE. Analysis of COD, BOD and DO Levels in Wastewater Treatment Instalation (IPAL) at Balai Pengelolaan Infrastruktur Air Limbah dan Air Minum Perkotaan Dinas PUP-ESDM Yogyakarta. *IJCER (International J Chem Educ Res* 2020;5(2):78–83.
  - 30. Carvalho A, Costa R, Neves S, Oliveira CM, Bettencourt da Silva RJN. Determination of dissolved oxygen in water by the Winkler method: Performance modelling and optimisation for environmental analysis. *Microchem J* 2021;165(March).
  - 31. Fachrerozi M, Utami LB, Suryani D. Pengaruh Variasi Biomassa *Pistia Stratiotes* L. Terhadap Penurunan Kadar Bod, Cod, Dan Tss Limbah Cair Tahu Di Dusun Klero Sleman Yogyakarta. *J Kesehat Masy (Journal Public Heal* 2010;4(1).
  - 32. Sayow F, Polii BVJ, Tilaar W, Augustine KD. Analisis Kandungan Limbah Industri Tahu Dan Tempe Rahayu Di Kelurahan Uner Kecamatan Kawangkoan Kabupaten Minahasa. *Agri-Sosioekonomi* 2020;16(2):245.
  - 33. Hasanah U, Mulyati AH, . S, et al. Development of Cod (Chemical Oxygen Demand) Analysis Method in Waste Water Using Uv-Vis Spectrophotometer. *J Sci Innovare* 2020;3(2):35–38.
  - 34. Masruroh S, Purnomo T. Analisis Kandungan Logam Berat Tembaga (Cu) pada Tumbuhan Akuatik sebagai Indikator Pencemaran di Sungai Brantas Mojokerto. *LenteraBio Berk Ilm Biol* 2021;10(1):165–175.
  - 35. Setiawan H. Pencemaran Logam Berat di Perairan Pesisir Kota Makassar dan Upaya Penanggulangannya. *Info Tek EBONI* 2014;11(1):1–13.
  - 36. Supriyantini E, Endrawati H. Kandungan Logam Berat Besi (Fe) Pada Air, Sedimen, Dan Kerang Hijau (Perna viridis) Di Perairan Tanjung Emas Semarang. *Kelaut Trop*

- 2015;18(1):38–45.
37. Aziz Amin A, Kurnia Baihaqi V, Prawitma R, Kurniawan A. Analisis Daya Serap Mangrove Avicennia marina dan Rhizophora mucronata terhadap Logam Berat (Zn) di Kawasan Mangrove Wonorejo, Surabaya, Jawa Timur. Semin Nas Kelaut XIV 2019;7–15.
38. Bahri S, Pratiwi D, Zulnazri Z. Ekstraksi Kalium Dari Limbah Kulit Biji Kopi (*Coffea* Sp) Menggunakan Metode Reflux. J Teknol Kim Unimal 2020;9(1):24.
39. Peycheva K, Panayotova V, Merdzhanova A, Stancheva R. Estimation of THQ and potential health risk for metals by comsumption of some black sea marine fishes and mussels in Bulgaria. Bulg Chem Commun 2019;51(D):241–246.
40. Sugito, Soerya Dewi Marliyan HDA. Uji Kinerja Instrumen Spektrofotometer Serapan Atom (AAS) Shimadzu 6650 F Terhadap Logam Fe, Zn pada Kegiatan Praktikum Kimia Anorganik di UPT Laboratorium Terpadu UNS. 2022;5(2):83–89.
41. Iqbal N, Putri N, Evelyn J, et al. Tinjauan Kritis Kemampuan Fourier Transform Infrared Spectroscopy (FTIR) dalam Analisis dan Karakterisasi Senyawa Obat. Ilm Wahana Pendidikan, 2024;10(15):332–344.
42. Sutriyono. Rancang Bangun Mikroskop Riset Stereo Untuk Mendokumentasikan Video Pergerakan Hydra Sp Sebagai. Integr Lab J 2016;04(02):225–230.
43. Badan Standarisasi Nasional. SNI 6989.72:2009 tentang Cara Uji Kebutuhan Oksigen Biokimia (biochemical Oxygen Demand/BOD). Air dan air limbah-Bagian 72 Cara uji Kebutuhan Oksigen Biokimia (Biochemical Oxyg Demand/ BOD) 2009;1–20.
44. Nasional BS. Air dan air limbah – Bagian 15: Cara uji kebutuhan oksigen kimiawi (KOK) refluks terbuka dengan refluks terbuka secara titrimetri. 2004;
45. Metode uji untuk menentukan kadar logam dalam air dan ikan. (SNI 6989.84:2019).
46. Kumar V, Roy S, Behera BK, Swain HS, Das BK. Biofloc Microbiome With Bioremediation and Health Benefits. Front Microbiol 2021;12(November).
47. Wu M, Wu G, Lu F, Wang H, Lei A, Wang J. Microalgal photoautotrophic growth induces pH decrease in the aquatic environment by acidic metabolites secretion. Biotechnol Biofuels Bioprod [homepage on the Internet] 2022;15(1):1–13. Available from: <https://doi.org/10.1186/s13068-022-02212-z>
48. Cheng S, Meng F, Wang Y, Zhang J, Zhang L. The potential linkage between sediment oxygen demand and microbes and its contribution to the dissolved oxygen depletion in the Gan River. Front Microbiol 2024;15(July):1–16.
49. Adi Suriyadin, Muhammad haikal Abdurachman, Muh. Fahruddin, Heri Murtawan, Muhammad Aidil Huda. Hematological Performance and Water Quality of Catfish Culture (*Pangasius* sp.) Treated with Photosynthetic Bacteria (*Rhodobacter* sp. and *Rhodococcus* sp.). J Ilmu-ilmu Perikan dan Budid Perair 2023;18(1):25–33.
50. Nugraha S, Balqis Huriyah S, Mulyani R. The Influence Of Bioflok System And Additional Chlorellla sp. on Water Quality In Catfish Larva Maintenance. J Ilmu-ilmu Perikan dan Budid Perair [homepage on the Internet] 2022;17(1):39–47. Available from: <https://jurnal.univpgri-palembang.ac.id/index.php/ikan>
51. Raza B, Zheng Z, Yang W. A Review on Biofloc System Technology, History, Types, and Future Economical Perceptions in Aquaculture. Animals 2024;14(10).
52. Boyd CE. Pond Bottom Soil Analyses. Bottom Soils, Sediment, Pond Aquac 2016;304–340.
53. Deswati, Safni, Latisha Putri Isara HP. Hydroton-biofloc-based aquaponics (hydroton-flocponics): towards good water quality and macro-micro nutrient. 2021;14(5):3127–3144.
54. Ombong F, Salindeho IR. Aplikasi teknologi bioflok (BFT) pada kultur ikan nila, *Orechromis niloticus*. e-Journal Budid Perair 2016;4(2):16–25.
55. Li C, Zhang X, Chen Y, et al. Optimized Utilization of Organic Carbon in Aquaculture Biofloc Systems: A Review. Fishes 2023;8(9).
56. Smriti, Ahmed A, Lodhi S, Shukla S. Copper toxicity in aquatic ecosystem: A Review. Int J Fish Aquat Stud 2023;11(4):134–138.
57. Saah SA, Adu-poku D, Boadi NO. Heavy metal contamination and water quality of selected fish ponds at Sunyani , Ghana : A comparison with WHO standards. Chem

- Int 2021;7(3):181–187.
58. Sheta B, El-Zahed M, Nawareg M, Elkhiary Z, Sadek S, Hyder A. Nanoremediation of tilapia fish culture using iron oxide nanoparticles biosynthesized by *Bacillus subtilis* and immobilized in a free-floating macroporous cryogel. BMC Vet Res 2024;20(1):455.
59. Ndayisenga JD, Dusabe S. Ponds' Water Quality Analysis and Impact of Heavy Metals on Fishes' Body. J Sustain Environ Manag 2022;1(2):62–72.
60. Deswati, Ulya N, Yusuf Y, Tetra ON, Edelwis TW, Pardi H. Improvement of water quality (Cu, Fe, Zn) in biofloc aquaponics systems by utilizing fish waste as a source of micronutrients. AACL Bioflux 2021;14(6):3440–3449.
61. Mustafa A, Belavilas M, Hossain R, Mishu I. Immunological effects of vitamin c and zinc on tilapia (*Orechromis niloticus*) exposed to cold water stress. PLoS One [homepage on the Internet] 2024;19(9):1–13. Available from: <http://dx.doi.org/10.1371/journal.pone.0311078>
62. Sharma K, Gulati R, Bamel K, Sushma. Effect of zinc concentration on the growth performance of White leg shrimp, *Litopenaeus vannamei* Boone. J Appl Nat Sci 2023;15(1):289–296.
63. Zhang S, Fu K, Gao S, Liang B, Lu J, Fu G. Bioaccumulation of Heavy Metals in the Water, Sediment, and Organisms from The Sea Ranching Areas of Haizhou Bay in China. Water (Switzerland) 2023;15(12).
64. Muendo PN, Verdegem MCJ, Stoorvogel JJ, et al. Sediment Accumulation in Fish Ponds ; Its Potential for Agricultural Use. Int J Fish Aquat Stud 2014;1(5):228–241.
65. Lall SP, Kaushik SJ. Nutrition and metabolism of minerals in fish. Animals 2021;11(9):1–41.
66. Fitran M, Putra AC. Aplikasi Teknologi Bioflok pada Pemeliharaan Benih Ikan Betok (*Anabas testudineus*) dengan Padat Tebar Berbeda. J Perikan dan Kelaut 2015;2(2):56–66.
67. Deswati Zein, R., Dwisani, R., Putra, A., & Fitri, E. D. Biofloc-based catfish (*Clarias gariepinus*) cultivation in fishponds and its effect on heavy metal content (Cu, Fe, Zn, Cd, and Mn). Biofloc 2024;28(3):215–230.
68. El-Samee LDA, Hamouda YA, Hashish SM, Abdel-Wahhab MA. Mineral and heavy metals content in tilapia fish (*Oreochromis niloticus*) collected from the River Nile in Damietta governorate, Egypt and evaluation of health risk from tilapia consumption. Comun Sci 2019;10(2):244–253.
69. Authman MM. Use of Fish as Bio-indicator of the Effects of Heavy Metals Pollution. J Aquac Res Dev 2015;06(04).
70. Surbakti NAB, Febriani H, Syukriah S. Kandungan logam berat besi (Fe) pada air dan daging ikan lemeduk (*Barbomyrus schwanenfeldii*) di Sungai Belumai Deli Serdang. J Akuakultur Sungai dan Danau 2024;9(1):69.
71. EPA. Risk Assessment Guidance for Superfund. Volume I Human Health Evaluation Manual (Part A). 1989;I(December):289. Available from: <https://rais.ornl.gov/documents/HHEMA.pdf>
72. Samantara, M. K.; Panigrahi, S.; Mohanty, A. K.; Sahu, G.; Mishra, S. S.; Palaniswami, K.; Subramanian, V.; Venkatraman B. Heavy Metal Concentration in Marine Edible Fishes and Associated Health Risks: An Assessment from Tamil Nadu Coast, Bay of Bengal. Environ Chem Ecotoxicol [homepage on the Internet] 2023;193–204. Available from: <https://doi.org/10.1016/j.enceco.2023.09.002>.
73. Amirah MN, Afiza AS, Faizal WIW, Nurliyana MH, Laili S. Human Health Risk Assessment of Metal Contamination through Consumption of Fish. J Environ Pollut Hum Heal [homepage on the Internet] 2013;1(1):1–5. Available from: <http://pubs.sciepub.com/jephh/1/1/>
74. Yulianto B, Wijaya WA, Setyati WA, et al. Health risk analysis of Cd, Pb and Hg in blood mussel (*anadara granosa*) from Demak, Central Java, Indonesia. Asian J Water, Environ Pollut 2020;17(3):25–30.
75. Hu, Xin L-JM, Liu H-D, Guo Y-S, , Wen-Chang Liu H-XT, Luo G-Z. Impacts of Nile Tilapia (*Oreochromis niloticus*) exposed to microplastics in bioflocs system. Sci Total Environ 2023;901.

76. Basri SK, Aulia U, Septian Maksum T. Keberadaan Pencemaran Mikroplastik Secara Global di Lingkungan Akuatik. *Graha Med Public Heal J* [homepage on the Internet] 2022;1(2):2829–1956. Available from: <https://journal.iktgm.ac.id/index.php/publichealth>
77. Yuan W, Liu X, Wang W, Di M, Wang J. Microplastic abundance, distribution and composition in water, sediments, and wild fish from Poyang Lake, China. *Ecotoxicol Environ Saf* [homepage on the Internet] 2019;170(November 2018):180–187. Available from: <https://doi.org/10.1016/j.ecoenv.2018.11.126>
78. Deswati, Wisna ND, Zein R, et al. Preliminary study on microplastic pollution in water and sediment at the Beaches of Pariaman City, West Sumatra, Indonesia. *AACL Bioflux* 2023;16(1):381–397.
79. Kaiser D, Kowalski N, Wanek JJ. Effects of biofouling on the sinking behavior of microplastics. *Environ Res Lett* 2017;12(12).
80. Syamsu DA, Deswati D, Syafrizayanti S, Putra A, Suteja Y. Presence of microplastics contamination in table salt and estimated exposure in humans. *Glob J Environ Sci Manag* 2024;10(1):205–224.
81. Trivantira NS, Fitriyah F, Ahmad M. Identifikasi Jenis Polimer Mikroplastik Pada Ikan Tongkol Lisong (*Auxis rochei*) Di Pantai Damas Prigi Kabupaten Trenggalek Jawa Timur. *Biol Nat Resour J* 2023;2(1):19–23.
82. Pradiptaadi BPA, Fallahian F. Analisis Kelimpahan Mikroplastik Pada Air dan Sedimen di Kawasan Hilir DAS Brantas Brian. *Environ Pollut J* [homepage on the Internet] 2022;2(1):841–856. Available from: <https://ecotonjournal.id/index.php/epj>

