

REFERENCES

- Abdul, M. N., Ismail, M. S., Wakid, S. A., Syazwan, W. M., Abd Aziz, N. A., Mustafa, M., Okamura, H., Horie, Y., Ong, M. C., Dwi Setyawan, A., Kumar, K., Cheng, W. H., Chew, J. M., & Yap*, C. K. 2023. A Preliminary Checklist of Molluscs in the Kelanang Coast at Banting: An Observational Study. *Journal of Biomedical Research & Environmental Sciences*, 46, 1113–1119. <https://doi.org/10.37871/JBRES1775>
- Abdullah, M., Akhtar, A., Kamal, A. H. M., AftabUddin, S., Islam, M. S., & Sharifuzzaman, S. M. 2022. Assessment of benthic macroinvertebrates as potential bioindicators of anthropogenic disturbance in southeast Bangladesh coast. *Marine Pollution Bulletin*, 184September, 114217. <https://doi.org/10.1016/j.marpolbul.2022.114217>
- Adharyan, R., & Hasan, V. 2020. Checklist of mangrove snails Mollusca: Gastropoda in South Coast of Pamekasan, Madura Island, East Java, Indonesia. *Biodiversitas Journal of Biological Diversity*, 217, 3127–3134. <https://doi.org/10.13057/BIODIV/D210733>
- Akhrianti, I., Bengen, D. G., & Setyobudiandi, I. 2014. Spatial Distribution And Habitat Preference Of Bivalvia In The Coastal Waters Of Simpang Pesak Sub District, East Belitung District. *Jurnal Ilmu Dan Teknologi Kelautan Tropis*, 61. <https://doi.org/10.28930/JITKT.V6I1.8639>
- Aldin, F., Prasetyo, Y., & Helmi, M. 2019. Studi Pemetaan Habitat Dasar Perairan Laut Dangkal Berdasarkan Analisis Digital Menggunakan Citra Pleiades Multispektral Di Perairan Pulau Menjangan Besar, Kepulauan Karimunjawa, Jawa Tengah. *Jurnal Geodesi Undip*, 91, 77–86.
- Amran, A. A., & Mohamad, F. A. 2022. A review of types of feeds used in polychaete culture. *Songklanakarinn Journal of Science and Technology*, 441, 256–263. <https://doi.org/10.14456/sjst-psu.2022.37>
- Armonies, W. 2021. Who lives where? Macrobenthic species distribution over sediment types and depth classes in the eastern North Sea. *Helgoland Marine Research*, 751, 4–9. <https://doi.org/10.1186/s10152-021-00552-1>
- Bahri, S., Indah Dwi Kurnia, T., Ardiansyah Program Studi Biologi, F., & Matematika dan Ilmu Pengetahuan Alam, F. 2020. Keanekaragaman Kelas Bivalvia Di Hutan Mangrove Pantai Bama Taman Nasional Baluran. *Jurnal Biosense*, 31, 56–70. <https://doi.org/10.36526/BIONSENSE.V3I1.967>
- Banowati, E., Karsinah, Ulya, H., Salsabila, N. N., Mariyam, Ni'mah, M., Yuliasianty, D. G., Nisa, N., Doni, & Sari, Y. 2024. Development model for empowerment of Demak Coastal fishermen community through product re-branding. *IOP Conference Series: Earth and Environmental Science*, 13141.

<https://doi.org/10.1088/1755-1315/1314/1/012006>

- Baxa, M., Musil, M., Kummel, M., Hanzlík, P., Tesařová, B., & Pechar, L. 2021. Dissolved oxygen deficits in a shallow eutrophic aquatic ecosystem fishpond – Sediment oxygen demand and water column respiration alternately drive the oxygen regime. *Science of the Total Environment*, 766. <https://doi.org/10.1016/j.scitotenv.2020.142647>
- Bendary, R. E., Ibrahim, S. M., Goher, M. E., Elsaied, H. E., El Shabrawy, G. M., El Mordy, M. A., & Khalil, M. T. 2023. Taxonomic and functional structure of macrobenthic invertebrate communities and their response to environmental variables along the subbranches of the Nile River rayahs, Egypt. *Environmental Science and Pollution Research*, 3011, 28803–28817. <https://doi.org/10.1007/s11356-022-24140-z>
- Castro, P., & Huber, M. E. . 2016. *Marine biology*. 462.
- Dan, S. F., Udoh, E. C., & Wang, Q. 2022. Contamination and ecological risk assessment of heavy metals, and relationship with organic matter sources in surface sediments of the Cross River Estuary and nearshore areas. *Journal of Hazardous Materials*, 438July, 129531. <https://doi.org/10.1016/j.jhazmat.2022.129531>
- Deng, Z., Huang, D., He, Q., & Chassagne, C. 2022. Review of the action of organic matter on mineral sediment flocculation. *Frontiers in Earth Science*, 10September, 1–20. <https://doi.org/10.3389/feart.2022.965919>
- Du, X., Huang, Y., Ye, Y., Zhou, Y., Huang, J., Zhu, B., Li, Y., & Zhao, Y. 2024. Effects of variations in hydrological connectivity on the macrobenthic community structure in reclaimed wetlands. *Science of the Total Environment*, 954August, 176111. <https://doi.org/10.1016/j.scitotenv.2024.176111>
- Dube, K. 2024. A Comprehensive Review of Climatic Threats and Adaptation of Marine Biodiversity. *Journal of Marine Science and Engineering*, 122. <https://doi.org/10.3390/jmse12020344>
- Elifal, S., Ria, M., & Sinaga, M. 2023. Studi Keanekaragaman Makrozoobentos Di Sungai Tanjung Pinggir Kecamatan Siantar Martoba Kota Pematang Siantar Provinsi Sumatera Utara. *Jurnal Wilayah, Kota Dan Lingkungan Berkelanjutan*, 22, 10–27. <https://doi.org/10.58169/jwikal.v2i2.223>
- Farantika, R., Putro, S. P., & Indarjo, A. 2020. Biomonitoring application using macrozoobenthic assemblages at coastal area of Menjangan Besar Island, Kepulauan Karimunjawa, Indonesia. *Malaysian Journal of Fundamental and Applied Sciences*, 163, 292–296. <https://doi.org/10.11113/MJFAS.V16N3.1669>
- Frontalini, F., Cordier, T., Balassi, E., Armynot du Chatelet, E., Cermakova, K., Apothéloz-Perret-Gentil, L., Martins, M. V. A., Bucci, C., Scantamburlo, E., Treglia, M., Bonamin, V., & Pawlowski, J. 2020. Benthic foraminiferal

- metabarcoding and morphology-based assessment around three offshore gas platforms: Congruence and complementarity. *Environment International*, 144 April, 106049. <https://doi.org/10.1016/j.envint.2020.106049>
- Garno, Y. S., Riyadi, A., Iskandar, Kendarto, D. R., Sachoemar, S. I., Susanto, J. P., Widodo, L., Suwedi, N., Prayogo, T., Dewa, R. P., Adibroto, T. A., Aliah, R. S., Haryanti, Syaefudin, & Adhi, R. P. 2024. The Impact of Aquaculture in Floating Net Cages Exceeding the Carrying Capacity on Water Quality and Organic Matter Distribution: the Case of Batur Lake, Indonesia. *Polish Journal of Environmental Studies*, 334, 3651–3663. <https://doi.org/10.15244/pjoes/178194>
- González-Gaya, B., García-Bueno, N., Buelow, E., Marin, A., & Rico, A. 2022. Effects of aquaculture waste feeds and antibiotics on marine benthic ecosystems in the Mediterranean Sea. *Science of the Total Environment*, 806, 151190. <https://doi.org/10.1016/j.scitotenv.2021.151190>
- Hafish, N. A., Kurniawan, R., Probosunu, N., Adharini, R. I., & Setyobudi, E. 2022. Keanekaragaman gastropoda di perairan Teluk Lembar, Nusa Tenggara Barat. *Jurnal Biologi Udayana*, 261, 45. <https://doi.org/10.24843/jbiounud.2022.v26.i01.p05>
- Herawati, T., & Januaristy, D. C. 2023. Total organic matter, carbon organic, nitrate, phosphate content in sediment at mangrove ecosystem of Angke Kapuk Protected Forest, DKI Jakarta. *BIO Web of Conferences*, 74, 1–9. <https://doi.org/10.1051/bioconf/20237405007>
- Hidayat, A., Maslukah, L., & Zainuri, M. 2022. Sebaran Ukuran Butir di Perairan Kemujan, Karimunjawa. *Indonesian Journal of Oceanography*, 42, 12–21. <https://doi.org/10.14710/IJOCE.V4I2.14123>
- Hogan, S., Murphy, E. A. K., Volaric, M. P., Castorani, M. C. N., Berg, P., & Reidenbach, M. A. 2022. Influence of oyster reefs on infauna and sediment spatial distributions within intertidal mudflats. *Marine Ecology Progress Series*, 686, 91–106. <https://doi.org/10.3354/MEPS13983>
- Hubarat, S. 2000. *Peran Kondisi Oseanografis Terhadap Perubahan Iklim, Produktivitas dan Distribusi Biota Laut*. Universitas Diponegoro Prosiding.
- Islam, M. S., Zamal, H., Alam, M. S., Bappy, M. M. M., Kamal, A. H. M., Hossain, M. B., & Arai, T. 2025. Biodiversity and Seasonal Succession of Macrobenthos in Saltmarsh Habitat Adjacent to a Ship-Breaking Area. *Diversity*, 174. <https://doi.org/10.3390/d17040231>
- Karimunjawa. 2017. *Profil. MDI-BTNKJ*. <https://tnkarimunjawa.id/profil/index>
- Kristensen, E. 2001. Impact of polychaetes *Nereis* spp. and *Arenicola marina* on carbon biogeochemistry in coastal marine sediments. *Geochemical Transactions*, 212, 92–103. <https://doi.org/10.1039/B108114D>
- Kruft, R. A., Hoppit, G., Schmidt, D. N., Witts, J. D., & Moon, B. C. 2024. Reviews

- and syntheses: The clam before the storm - a meta-analysis showing the effect of combined climate change stressors on bivalves. *Biogeosciences*, 211, 223–239. <https://doi.org/10.5194/bg-21-223-2024>
- Kurniawan Husain, T., Handoyo Mulyo, J., Program Studi Agribisnis, D., Pertanian, F., Muslim Indonesia, U., Departemen Sosial Ekonomi Pertanian, D., & Flora, J. 2016. *Comparative Analysis of Benefits And Risks of Fisheries Business With Monoculture and Policultural Systems in Pangkep Regency*. 272, 136.
- Magalhães Brito, R., Das Graças Pompolo, S., Fonseca, M., Magalhães, M., Gonçalves De Barros, E., & Sakamoto-Hojo, E. T. 2005. Cytogenetic Characterization of Two *Partamona* Species Hymenoptera, Apinae, Meliponini by Fluorochrome Stain-ing and Localization of 18S rDNA Clusters by FISH. *Cytologia*, 704, 373–380.
- Magurran, A. E. 2021. Measuring biological diversity. *Current Biology*, 3119, R1174–R1177. <https://doi.org/10.1016/J.CUB.2021.07.049>
- Marques Mendes, A., Golden, N., Bermejo, R., & Morrison, L. 2021. Distribution and abundance of microplastics in coastal sediments depends on grain size and distance from sources. *Marine Pollution Bulletin*, 172July, 112802. <https://doi.org/10.1016/j.marpolbul.2021.112802>
- Martins, A. D., & Barros, F. 2022. Ecological Functions of Polychaetes Along Estuarine Gradients. *Frontiers in Marine Science*, 9March, 1–14. <https://doi.org/10.3389/fmars.2022.780318>
- Matoo, O. B., Lannig, G., Bock, C., & Sokolova, I. M. 2021. Temperature but not ocean acidification affects energy metabolism and enzyme activities in the blue mussel, *Mytilus edulis*. *Ecology and Evolution*, 117, 3366–3379. <https://doi.org/10.1002/ece3.7289>
- Meira, A., Byers, J. E., & Sousa, R. 2024. A global synthesis of predation on bivalves. *Biological Reviews*, 993, 1015–1057. <https://doi.org/10.1111/brv.13057>
- Mou, J., Liu, K., Huang, Y., Lin, J., He, X., Zhang, S., Li, D., Zu, Y., Chen, Z., Fu, S., Lin, H., & Liu, W. 2023. Species Diversity and Community Structure of Macrobenthos in the Cosmonaut Sea, East Antarctica. *Diversity 2023, Vol. 15, Page 1197, 1512, 1197*. <https://doi.org/10.3390/D15121197>
- Mugwanya, M., Dawood, M. A. O., Kimera, F., & Sewilam, H. 2022. Anthropogenic temperature fluctuations and their effect on aquaculture: A comprehensive review. *Aquaculture and Fisheries*, 73, 223–243. <https://doi.org/10.1016/j.aaf.2021.12.005>
- Muhammad Abdullah, H., Ahmed, S. M., Khan, B. M., Mohana, N. T., Ahamed, T., & Islam, I. 2021. Agriculture and fisheries production in a regional blending and dynamic fresh and saline water systems in the coastal area of

- Bangladesh. *Environmental Challenges*, 4December 2020, 100089. <https://doi.org/10.1016/j.envc.2021.100089>
- Mukherjee, J., & Ray, S. 2019. Biogeochemical Models. *Encyclopedia of Ecology: Volume 1-4, Second Edition*, 2, 21–36. <https://doi.org/10.1016/B978-0-12-409548-9.11180-7>
- Odum, E. P., & Barrett, G. W. 2004. *Fundamentals of Ecology. 5th Edition*.
- Pearson, T. H., & Rosenberg, R. 1978. Macrobenthic succession in relation to organic enrichment and pollution of the marine environment. *Oceanography and Marine Biology*, 16November 1977, 229–311.
- Prahmawaty, R. F., & Putro, S. P. 2018. Struktur Komunitas Makrobentos Pada Kawasan Budidaya dan Non Budidaya Di Pulau Tembelas, Kabupaten Karimun Kepulauan Riau. *Bioma: Berkala Ilmiah Biologi*, 201, 66. <https://doi.org/10.14710/BIOMA.20.1.66-74>
- Putro, S. P. 2014. *Metode Sampling Penelitian Makrobenthos dan Aplikasinya*.
- Putro, S. P., Anarizta, L. A., Muhammad, F., Adhy, S., & Helmi, M. 2023. the Roles of Macrobenthic Molluscs Structure in Assessing Ecological Status At Mangrove and Aquaculture Areas. *Jurnal Teknologi*, 856, 27–35. <https://doi.org/10.11113/jurnalteknologi.v85.20068>
- Putro, S. P., Hariyati, R., Suhartana, S., & Sudaryono, A. 2014. Response of Trophic Groups of Macrobenthos to Organically Enriched Sediments: A Comparative Study between Temperate and Tropical Regions. *Aquatic Science and Technology*, 21, 15. <https://doi.org/10.5296/AST.V2I1.4807>
- Putro, S. P., Hawarizqi, N., Widowati, & Adhy, S. 2022. Utilization of Dominant and Opportunistic Taxa of Macrobenthic Assemblages Inhabiting Sediments Under Fish Farms for the Environmental Status Assessment. *Jurnal Teknologi*, 846, 171–179. <https://doi.org/10.11113/jurnalteknologi.v84.18319>
- Putro, S. P., Sharani, J., Widowati, Adhy, S., & Suryono. 2020. Biomonitoring of the Application of Monoculture and Integrated Multi-Trophic Aquaculture IMTA Using Macrobenthic Structures at Tembelas Island, Kepulauan Riau Province, Indonesia. *J. Mar. Sci. Eng*, 8.
- Putro, S. P., Widowati, & Cheshire, A. 2018. Linking chemical and physical parameters of a coastal water ecosystem with macrobenthic assemblages to assess environmental disturbance. *Malaysian Journal of Fundamental and Applied Sciences*, 141, 78–82.
- Putro, S. P., Widowati, Suhartana, & Muhammad, F. 2015. The Application of Integrated Multi Trophic Aquaculture IMTA Using Stratified Double Net Rounded Cage SDFNC for Aquaculture Sustainability. *International Journal of Science and Engineering*, 92, 85–89.
- Rahman, I., Zainuri, M., Suprijanto, J., & Mujiyanto. 2013. Struktur komunitas

- juvenil ikan pada ekosistem padang lamun di kawasan Perairan Pulau Parang, Karimunjawa. *Kelautan Dan Perikanan*, 11, 1–8.
- Raiba, R., Ishak, E., & Permatahati, Y. I. 2022. Struktur Komunitas Gastropoda Epifauna Intertidal di Perairan Desa Lampanairi Kecamatan Batauga Kabupaten Buton Selatan. *Jsipi Jurnal Sains Dan Inovasi Perikanan Journal Of Fishery Science And Innovation*, 62, 87–102. <https://doi.org/10.33772/JSIPI.V6I2.17>
- Ramdhan, M., Priyambodo, D. G., & ... 2021. Studi Pemanfaatan Sumberdaya Air Permukaan Di Pulau Karimunjawa Dan Pulau Kemujan. *Seminar Nasional ...*, April. <https://doi.org/10.5281/zenodo.5507446.svg>
- Rebouças, V. T., Lima, F. R. dos S., Cavalcante, D. de H., & do Carmo E Sá, M. V. 2016. Reavaliação da faixa adequada de pH da água para o cultivo da tilápia do Nilo, *Oreochromis niloticus* L. Em águas eutróficas. *Acta Scientiarum - Animal Sciences*, 384, 361–368. <https://doi.org/10.4025/actascianimsci.v38i4.32051>
- Risal, Bahtiar, ., & Ketjulan, R. 2018. Struktur komunitas makrozoobenthos pada ekosistem mangrove di Perairan Teluk Staring Kabupaten Konawe Selatan. *Jurnal Manajemen Sumber Daya Perairan*, 13. <https://ojs.uho.ac.id/index.php/JMSP/article/view/2472>
- Rivera-Monroy, V. H., Kristensen, E., Lee, S. Y., & Twilley, R. R. 2017. Mangrove ecosystems: A global biogeographic perspective: Structure, function, and services. *Mangrove Ecosystems: A Global Biogeographic Perspective: Structure, Function, and Services*, 1–399. <https://doi.org/10.1007/978-3-319-62206-4>
- Rizal, A. C., Ihsan, Y. N., Afrianto, E., & Juliadi, L. P. S. 2017. Pendekatan status nutrien pada sedimen untuk mengukur struktur komunitas makrozoobentos di wilayah Muara Sungai dan Pesisir Pantai Rancabuaya, Kabupaten Garut. *Jurnal Perikanan Kelautan*, 82.
- Rosyadi, H. I., & Ali, M. 2020. Biomonitoring Makrozoobentos Sebagai Indikator Kualitas Air Sungai. *Jurnal Envirotek* , 121, 11–18.
- Rudi, R., Sahami, F. M., & Kasim, F. 2017. Keanekaragaman Bivalvia di Kawasan Pantai Desa Katialada | Diversity of bivalvia in the coastal area of Katialada Village. *The NIKé Journal*, 51. <https://doi.org/10.37905/.V5I1.5265>
- Sabar, M. 2016. Biodiversitas Dan Adaptasi Makrozoobentos Di Perairan Mangrove. *Jurnal Bioedukasi*, 42. <https://doi.org/10.33387/BIOEDU.V4I2.166>
- Sholihah, H., Arthana, I. W., & Ekawaty, R. 2020. Hubungan keanekaragaman makrozoobentos dengan kerapatan lamun di Pantai Semawang Sanur Bali. *Current Trends in Aquatic Science*, 31, 1–7. <https://ojs.unud.ac.id/index.php/CTAS/article/download/51245/36014>

- Stier, A. C., Lee, S. C., & O'connor, M. I. 2019. Temporal variation in dispersal modifies dispersal-diversity relationships in an experimental seagrass metacommunity. *Marine Ecology Progress Series*, 613, 67–76. <https://doi.org/10.3354/MEPS12908>
- Syuja, M. P. 2018. Biomonitoring on Integrated Multi-Thropic Aquaculture IMTA activities using macrobenthic mollusks on Tembela Island, Kepulauan Riau Province. *Journal of Physics: Conference Series*.
- Tampo, L., Kaboré, I., Alhassan, E. H., Ouéda, A., Bawa, L. M., & Djaneye-Boundjou, G. 2021. Benthic Macroinvertebrates as Ecological Indicators: Their Sensitivity to the Water Quality and Human Disturbances in a Tropical River. *Frontiers in Water*, 3September, 1–17. <https://doi.org/10.3389/frwa.2021.662765>
- Tom, A. P., Jayakumar, J. S., Biju, M., Somarajan, J., & Ibrahim, M. A. 2021. Aquaculture wastewater treatment technologies and their sustainability: A review. *Energy Nexus*, 4July, 100022. <https://doi.org/10.1016/j.nexus.2021.100022>
- Trihatmoko, E., Nurlinda, N., Darussalam, A., Purwitaningsih, S., Sartohadi, J., Banowati, E., Naibaho, B. B., Husna, V. N., Juhadi, J., & Aji, A. 2024. Preserving coastal ecosystem through micro-zonation analysis of Karimunjawa, Indonesia. In *Environmental Monitoring and Assessment* Vol. 196, Issue 1. Springer International Publishing. <https://doi.org/10.1007/s10661-023-12257-8>
- Trombetta, T., Vidussi, F., Roques, C., Mas, S., Scotti, M., & Mostajir, B. 2021. Co-occurrence networks reveal the central role of temperature in structuring the plankton community of the Thau Lagoon. *Scientific Reports*, 111, 1–14. <https://doi.org/10.1038/S41598>
- Wang, Z., Niu, S., Cui, C., Gu, T., Hu, F., Feng, D., & Qu, X. 2025. Evaluation of a novel design of floating net cage with hybrid side and bottom nets in current. *Applied Ocean Research*, 1581, 104563. <https://doi.org/10.1016/j.apor.2025.104563>
- Wei, W., Algeo, T. J., Meyer, D., Liu, J., Snihur, K. N., Lazowski, C., Li, Z., Alessi, D. S., Konhauser, K. O., Du, Y., & Yu, W. 2025. Utility of the B/Ga salinity proxy in carbonate and marly sediments. *Chemical Geology*, 682January, 122751. <https://doi.org/10.1016/j.chemgeo.2025.122751>
- Wentworth, C. K. 1922. A scale of grade and class terms for clastic sediments. *The Journal of Geology*, 305, 377–392.
- Yeshitela, K. 2008. Effects of Anthropogenic Disturbance on the Diversity of Follicolous Lichens in Tropical Rainforests of East Africa: Godere Ethiopia, Bundongo Uganda, and Kakamega Kenya. Gottingen: Cuvillier Verlag.