

DAFTAR PUSTAKA

- A.Tickner, J., Schettler, T., Guidotti, T., McCally, M., & Rossi, M. (2001). Health risks posed by use of Di-2-ethylhexyl phthalate (DEHP) in PVC medical devices: A critical review. *Am. J. Ind. Med.*, 39: 100-111.
- Abidli, S., Lahbib, Y., & Trigui El Menif, N. (2019). Microplastics in commercial molluscs from the lagoon of Bizerte (Northern Tunisia). *Marine Pollution Bulletin*, 142, 243–252. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2019.03.048>
- Achmad, N., & Suryahman, A. (2023). Aspek Reproduksi Ikan Kurisi (*Nemipterus japonicus*) di Perairan Selat Sunda. *FISHIANA Journal of Marine and Fisheries*, 2, 1–10. <https://doi.org/10.61169/fishiana.v2i2.71>
- Ahmad, M., Li, J.-L., Wang, P.-D., Hozzein, W. N., & Li, W.-J. (2020). Environmental perspectives of microplastic pollution in the aquatic environment: a review. *Marine Life Science & Technology*, 2(4), 414–430. <https://doi.org/10.1007/s42995-020-00056-w>
- Ajith, N., Arumugam, S., Parthasarathy, S., Manupoori, S., & Janakiraman, S. (2020). Global distribution of microplastics and its impact on marine environment—a review. *Environmental Science and Pollution Research*, 27(21), 25970–25986. <https://doi.org/10.1007/s11356-020-09015-5>
- Akhbarizadeh, R., Moore, F., & Keshavarzi, B. (2018). Investigating a probable relationship between microplastics and potentially toxic elements in fish muscles from northeast of Persian Gulf. *Environmental Pollution*, 232, 154–163. <https://doi.org/https://doi.org/10.1016/j.envpol.2017.09.028>
- 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>
- Akkajit, P., Khongsang, A., & Thongnonghin, B. (2023). Microplastics accumulation and human health risk assessment of heavy metals in Marcia opima and Lingula anatina, Phuket. *Marine Pollution Bulletin*, 186, 114404. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2022.114404>
- Alberghini, L., Truant, A., Santonicola, S., Colavita, G., & Giaccone, V. (2023). Microplastics in Fish and Fishery Products and Risks for Human Health: A Review. *International Journal of Environmental Research and Public Health*, 20(1). <https://doi.org/10.3390/ijerph20010789>
- Alimi, O. S., Farner Budarz, J., Hernandez, L. M., & Tufenkji, N. (2018). Microplastics and Nanoplastics in Aquatic Environments: Aggregation, Deposition, and Enhanced Contaminant Transport. *Environmental Science & Technology*, 52(4), 1704–1724. <https://doi.org/10.1021/acs.est.7b05559>
- Amasuomo, E., & Baird, J. (2016). The Concept of Waste and Waste Management. *Management and Sustainability*, 6(4), 88. <https://doi.org/10.5539/jms.v6n4p88>
- F., dos Santos Galvão, L., de Weger, L. A., Hiemstra, P. S., Mauad, T. (2020). An emerging class of air pollutants: Potential of microplastics to respiratory human health? *Science of The Total Environment*, 749, 141676. <https://doi.org/10.1016/j.scitotenv.2020.141676>
- Optimization Software: www.balesio.com

- M. (2022). Microplastics Found In Rice Consumed By Humans. *Journal of Positive School Psychology*, 6(6), 7809–7818. Retrieved from <https://journalppw.com/index.php/jpsp/article/view/8974/5848>
- Amqam, H., Afifah, N., Iqrar, M., Muktadir, A., Devana, A. T., Pradana, U., & Fitri, Z. (2022). Kelimpahan dan Karakteristik Mikroplastik pada Produk Garam Tradisional di Kabupaten Jeneponto Abundance and Characteristic of Microplastics in Traditional Salts in Jeneponto. *PROMOTIF: Jurnal Kesehatan Masyarakat*, 12, 147–154.
- An, R., Wang, X., Yang, L., Zhang, J., Wang, N., Xu, F., ... Zhang, L. (2021). Polystyrene microplastics cause granulosa cells apoptosis and fibrosis in ovary through oxidative stress in rats. *Toxicology*, 449, 152665. <https://doi.org/https://doi.org/10.1016/j.tox.2020.152665>
- Andrade, A. L. (2011). Microplastics in the marine environment. *Marine Pollution Bulletin*, 62(8), 1596–1605. <https://doi.org/10.1016/j.marpolbul.2011.05.030>
- Andrade, A. L. (2017). The plastic in microplastics: A review. *Marine Pollution Bulletin*, 119(1), 12–22. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2017.01.082>
- Angnunavuri, P. N., Attiogbe, F., & Mensah, B. (2020). Consideration of emerging environmental contaminants in africa: Review of occurrence, formation, fate, and toxicity of plastic particles. *Scientific African*, 9, e00546. <https://doi.org/https://doi.org/10.1016/j.sciaf.2020.e00546>
- Aprillia, P., & Sudibyo, M. (2019). Analisis Asam Amino Non Esensial Pada Kerang Bulu (Anadara Antiquata) di Perairan Pantai Timur Sumatera UtaraA. *JURNAL BIOSAINS*, 5. <https://doi.org/10.24114/jbio.v5i1.12166>
- Arshad, N., Alam, M. M., Su'ud, M. B. M., Imran, S., Siddiqui, T., Saleem, K., ... Batool, A. (2023). Microplastic contamination from surface waters and commercially valuable fishes of Karachi Coast, Pakistan. *Regional Studies in Marine Science*, 62, 102955. <https://doi.org/https://doi.org/10.1016/j.rsma.2023.102955>
- Asadi, M. A., Iranawati, F., Nafidya, F., Supriyadi, S., & Talukder, A. (2022). Microplastics in Wild Clams Harvested from Coastal Waters of Lamongan, Indonesia. *Journal of Engineering and Technological Sciences*, 54(5). <https://doi.org/10.5614/j.eng.technol.sci.2022.54.5.6>
- Asamoah, B. O., Roussey, M., & Peiponen, K.-E. (2020). On optical sensing of surface roughness of flat and curved microplastics in water. *Chemosphere*, 254, 126789. <https://doi.org/https://doi.org/10.1016/j.chemosphere.2020.126789>
- Asriyanto, A. H., & Sardiyatmo. (2015). Analisis Hasil Tangkapan Purse Seine "Waring" untuk Pelestarian Sumberdaya Ikan Teri (Stolephorus Devisi) di Perairan Wonokerto, Kabupaten Pekalongan. *Journal of Fisheries Resources Utilization Management and Technology*, 4(4), 198–204.
- Astuto, M. C., Manieu, C., & Cattaneo, I. (2024). Vinylidene chloride (VDC). In P. W. M. (Ed.), *Encyclopedia of Toxicology (Fourth Edition)* (Fourth Edi, pp. 769–770). <https://doi.org/10.1016/B978-0-12-824315-2.00207-4>
- A. D., Jayasiri, H. B., Thushari, G. G. N., & Guruge, K. P. G. K. (2015). Identification and morphological characterization of plastic litter in surface waters off Colombo, west coast of Sri Lanka. *Monitoring and Assessment*, 192(8). <https://doi.org/10.1007/s10661-020-08472-2>
- S., & Regoli, F. (2015). Experimental development of a new Optimization Software: www.balesio.com

- protocol for extraction and characterization of microplastics in fish tissues: First observations in commercial species from Adriatic Sea. *Marine Environmental Research*, 111, 18–26. <https://doi.org/https://doi.org/10.1016/j.marenvres.2015.06.014>
- Ayuningtyas, W. C. (2019). Abundance of Microplastics in Water in Banyuurip, Gresik, East Java. *J. Fish. Mar. Res.*, 3(1), 41–45. <https://doi.org/10.21776/ub.jfmr.2019.003.01.5>
- Badan Pusat Statistik Kabupaten Jeneponto. (2021). *Jeneponto Dalam Angka 2021*. Kabupaten Jeneponto.
- Baedeker, B. R., Stienbarger, C. D., Horn, D. A., Joseph, J., Taylor, A. R., Granek, E. F., & Brander, S. M. (2020). Microplastic occurrence and effects in commercially harvested North American finfish and shellfish: Current knowledge and future directions. *Limnology And Oceanography Letters*, 5(1), 113–136. <https://doi.org/10.1002/lol2.10122>
- Baharuddin, A., Asran, A., Ikhtiar, M., & Suhermi. (2023). Spasial Analisis Mikroplastik dengan Metode FT-IR (Fourier Transform Infrared) Pada Feses Petani Kerang Hijau. *Window of Health: Jurnal Kesehatan*, 331–343. <https://doi.org/10.33096/woh.vi.1108>
- Barboza, Luís Gabriel A., Lopes, C., Oliveira, P., Bessa, F., Otero, V., Henriques, B., ... 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>
- Barboza, Luís Gabriel Antão, Dick Vethaak, A., Lavorante, B. R. B. O., Lundebye, A. K., & Guilhermino, L. (2018). Marine microplastic debris: An emerging issue for food security, food safety and human health. *Marine Pollution Bulletin*, 133(January), 336–348. <https://doi.org/10.1016/j.marpolbul.2018.05.047>
- Barboza, Luís Gabriel Antão, Vieira, L. R., Branco, V., Figueiredo, N., Carvalho, F., Carvalho, C., & Guilhermino, L. (2018). Microplastics cause neurotoxicity, oxidative damage and energy-related changes and interact with the bioaccumulation of mercury in the European seabass, *Dicentrarchus labrax* (Linnaeus, 1758). *Aquatic Toxicology*, 195(December 2017), 49–57. <https://doi.org/10.1016/j.aquatox.2017.12.008>
- Barel, A. O., Payne, M., & Maibach, H. I. (2009). *Handbook of Cosmetic Science and Technology*. CRC Press.
- Barili, S., Bernetti, A., Sannino, C., Montegiove, N., Calzoni, E., Cesaretti, A., ... Gigliotti, G. (2023). Impact of PVC microplastics on soil chemical and microbiological parameters. *Environmental Research*, 229, 115891. <https://doi.org/https://doi.org/10.1016/j.envres.2023.115891>
- Barrientos, M., Vásquez Lavín, F., Ponce Oliva, R. D., Nayga, R. M., & Gelcich, S. (2024). Microplastics in seafood: Consumer preferences and valuation for mitigation technologies. *Food Research International*, 187, 114342. <https://doi.org/10.1016/j.foodres.2024.114342>
- Basputra, E. M., & Handayani, S. (2021). Microplastic Pollution in Indonesia: Impact on Health and Environment in Indonesia : A Review. *Public Health for Tropical and Coastal Region*, 4(2), 63–77. <https://doi.org/10.3889/oamjms.2021.6494>
- Batesen, M., Austen, M. C., Börger, T., Clark, J. R., Cole, M., ... van der Velde, M. (2019). Global ecological, social and economic impacts of marine



- plastic. *Marine Pollution Bulletin*, 142(January), 189–195. <https://doi.org/10.1016/j.marpolbul.2019.03.022>
- Benson, B., Foureman, G., Hofmann, L., Kimmel, C., Kimmel, G., Makris, S., ... Vu, V. (2002). *A review of the reference dose and reference concentration processes*. <https://doi.org/EPA/630/P-02/002F>
- Bergmann, M., Mütsel, S., Primpke, S., Tekman, M. B., Trachsel, J., & Gerdts, G. (2019). White and wonderful? Microplastics prevail in snow from the Alps to the Arctic. *Science Advances*, 5(8), eaax1157. <https://doi.org/10.1126/sciadv.aax1157>
- Besseling, E., Foekema, E. M., Van Franeker, J. A., Leopold, M. F., Kühn, S., Bravo Rebolledo, E. L., ... Koelmans, A. A. (2015). Microplastic in a macro filter feeder: Humpback whale Megaptera novaeangliae. *Marine Pollution Bulletin*, 95(1), 248–252. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2015.04.007>
- Birawida, A. B. (2021). Community Behavior in Garbage Processing in Spermonde Islands of The City of Makassar. *Jurnal Nasional Ilmu Kesehatan*, 4, 2021.
- Biswas, T., & Pal, S. C. (2024). Emerging threats of microplastics on marine environment: A critical review of toxicity measurement, policy practice gap and future research direction. *Journal of Cleaner Production*, 434, 139941. <https://doi.org/https://doi.org/10.1016/j.jclepro.2023.139941>
- Botterell, Z. L. R., Beaumont, N., Dorrington, T., Steinke, M., Thompson, R. C., & Lindeque, P. K. (2019). Bioavailability and effects of microplastics on marine zooplankton: A review. *Environmental Pollution*, 245(2019), 98–110. <https://doi.org/10.1016/j.envpol.2018.10.065>
- Bourgeois, M., Johnson, G., & Harbison, R. (2017). Human Health Risk Assessment. In S. R. Quah (Ed.), *International Encyclopedia of Public Health (Second Edition)* (Second Edi, pp. 84–94). <https://doi.org/https://doi.org/10.1016/B978-0-12-803678-5.00388-X>
- BPS. (2022a). Population by Regency/City. Retrieved from South Sulawesi Central Statistics Agency website: <https://sulsel.bps.go.id/indicator/12/83/1/jumlah-penduduk.html>
- BPS. (2022b). Population Density. Retrieved from South Sulawesi Central Statistics Agency website: <https://sulsel.bps.go.id/indicator/12/55/1/kepadatan-penduduk.html>
- Bråte, I. L. N., Eidsvoll, D. P., Steindal, C. C., & Thomas, K. V. (2016). Plastic ingestion by Atlantic cod (*Gadus morhua*) from the Norwegian coast. *Marine Pollution Bulletin*, 112(1), 105–110. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2016.08.034>
- Browne, Mark A, Dissanayake, A., Galloway, T. S., Lowe, D. M., & Thompson, R. C. (2008). Ingested Microscopic Plastic Translocates to the Circulatory System of the Mussel, *Mytilus edulis* (L.). *Environmental Science & Technology*, 42(13), 5026–5031. <https://doi.org/10.1021/es800249a>
- Browne, Mark Anthony, Crump, P., Niven, S. J., Teuten, E., Tonkin, A., Galloway, T., ... (2011). Accumulation of Microplastic on Shorelines Worldwide: Trends. *Environmental Science & Technology*, 45(21), 9175–9179. <https://doi.org/10.1021/es201811s>
- Costa, A. K. S., Mota, G. C. P., Costa, G. A., Lucena-Frédu, F., ... (2022). Occurrence of microplastics in bivalve molluscs *Argopecten flexuosa* captured in Pernambuco, Northeast Brazil. *Marine Pollution Bulletin*, 179, 113659. <https://doi.org/10.1016/j.marpolbul.2022.113659>



- Brydson, J. A. (1999). *Plastics Materials*. Butterworth-Heinemann.
- Cáceres-Farias, L., Espinoza-Vera, M. M., Orós, J., García-Bereguain, M. A., & Alfaro-Núñez, A. (2023). Macro and microplastic intake in seafood variates by the marine organism's feeding behaviour: Is it a concern to human health? *Heliyon*, 9(5), e16452. <https://doi.org/https://doi.org/10.1016/j.heliyon.2023.e16452>
- Cadogan, D., & Howick, C. (2000). *Ullmann's Encyclopedia of Industrial Chemistry*. <https://doi.org/10.1002/0471238961.1612011903010415.a01>
- Campanale, C., Massarelli, C., Savino, I., Locaputo, V., & Uricchio, V. F. (2020). A detailed review study on potential effects of microplastics and additives of concern on human health. *International Journal of Environmental Research and Public Health*, 17(4). <https://doi.org/10.3390/ijerph17041212>
- Campanale, C., Savino, I., Pojar, I., Massarelli, C., & Uricchio, V. F. (2020). A practical overview of methodologies for sampling and analysis of microplastics in riverine environments. *Sustainability (Switzerland)*, 12(17). <https://doi.org/10.3390/SU12176755>
- Can Tunçelli, İ., & Erkan, N. (2024). Microplastic pollution in wild and aquacultured Mediterranean mussels from the Sea of Marmara: Abundance, characteristics, and health risk estimations. *Environmental Research*, 242, 117787. <https://doi.org/https://doi.org/10.1016/j.envres.2023.117787>
- Carbery, M., O'Connor, W., & Palanisami, T. (2018). Trophic transfer of microplastics and mixed contaminants in the marine food web and implications for human health. *Environment International*, 115(June), 400–409. <https://doi.org/10.1016/j.envint.2018.03.007>
- Catarino, A. I., Kramm, J., Völker, C., Henry, T. B., & Everaert, G. (2021). Risk posed by microplastics: Scientific evidence and public perception. *Current Opinion in Green and Sustainable Chemistry*, 29, 100467. <https://doi.org/https://doi.org/10.1016/j.cogsc.2021.100467>
- Chae, Y., & An, Y.-J. (2018). Current research trends on plastic pollution and ecological impacts on the soil ecosystem: A review. *Environmental Pollution*, 240, 387–395. <https://doi.org/https://doi.org/10.1016/j.envpol.2018.05.008>
- Chen, F., Lao, Q., Liu, M., Huang, P., Chen, B., Zhou, X., ... Cai, M. (2022). Impact of intensive mariculture activities on microplastic pollution in a typical semi-enclosed bay: Zhanjiang Bay. *Marine Pollution Bulletin*, 176, 113402. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2022.113402>
- Cho, Y., Shim, W. J., Jang, M., Han, G. M., & Hong, S. H. (2019). Abundance and characteristics of microplastics in market bivalves from South Korea. *Environmental Pollution*, 245, 1107–1116. <https://doi.org/https://doi.org/10.1016/j.envpol.2018.11.091>
- Chubarenko, I., Efimova, I., Bagaeva, M., Bagaev, A., & Isachenko, I. (2020). On mechanical fragmentation of single-use plastics in the sea swash zone with different types of bottom sediments: Insights from laboratory experiments. *Marine Pollution Bulletin*, 150, 110726. <https://doi.org/10.1016/j.marpolbul.2019.110726>
- P., Halsband, C., & Galloway, T. S. (2011). Microplastics as the marine environment: A review. *Marine Pollution Bulletin*, 62, 589–597. <https://doi.org/10.1016/j.marpolbul.2011.09.025>
- M. J. (2011). *Food and Beverage Packaging Technology*. Wiley-Blackwell.



- Incorporating Epigenetics Into a Risk Assessment Framework. In S. D. McCullough & D. C. Dolinoy (Eds.), *Toxicoepigenetics* (pp. 289–310). [https://doi.org/https://doi.org/10.1016/B978-0-12-812433-8.00013-7](https://doi.org/10.1016/B978-0-12-812433-8.00013-7)
- Cox, K. D., Covernton, G. A., Davies, H. L., Dower, J. F., Juanes, F., & Dudas, S. E. (2019). Human Consumption of Microplastics. *Environmental Science & Technology*, 53(12), 7068–7074. <https://doi.org/10.1021/acs.est.9b01517>
- Coyle, R., Hardiman, G., & Driscoll, K. O. (2020). Microplastics in the marine environment: A review of their sources, distribution processes, uptake and exchange in ecosystems. *Case Studies in Chemical and Environmental Engineering*, 2, 100010. <https://doi.org/10.1016/j.cscee.2020.100010>
- Cózar, A., Echevarría, F., González-Gordillo, J., Irigoien, X., Úbeda, B., Hernandez-Leon, S., ... Duarte, C. (2014). Plastic debris in the open ocean. *Proceedings of the National Academy of Sciences of the United States of America*, 111. <https://doi.org/10.1073/pnas.1314705111>
- Cozar, A., Echevarría, F., Gordillo, J. I. G., Irigoien, X., Ubeda, B., Leon, S. H., ... Duarte, C. M. (2014). Plastic debris in the open ocean. *Proceedings of the National Academy of Sciences of the United States of America*, 111(28), 10239–10244. <https://doi.org/10.1073/pnas.1314705111>
- Crawford, R. J. (1998). *Plastics engineering*. Butterworth-Heinemann.
- Dalberg Advisors, Wit, W. de, & Bigaud., N. (2019). *Assessing plastic ingestion from nature to people (an Analysis for WWF)*. 7.
- Daniel, D. B., Ashraf, P. M., Thomas, S. N., & Thomson, K. T. (2021). Microplastics in the edible tissues of shellfishes sold for human consumption. *Chemosphere*, 264, 128554. <https://doi.org/https://doi.org/10.1016/j.chemosphere.2020.128554>
- Danopoulos, E., Jenner, L. C., Twiddy, M., & Rotchell, J. M. (2020). Microplastic Contamination of Seafood Intended for Human Consumption: A Systematic Review and Meta-Analysis. *Environmental Health Perspectives*, 128(12), 126002. <https://doi.org/10.1289/EHP7171>
- Darmono. (2001). *Lingkungan hidup dan pencemaran : hubungannya dengan toksikologi senyawa logam*. Jakarta: UI-Press.
- Daud, A. (2020). *Dampak Lingkungan dan Kesehatan Mikroplastik dan Nanoplastik*. Yogyakarta.
- Daud, A., Birawida, A. B., & Amqam, H. (2021). Risk Analysis of Microplastic in Fish (*Nemiptus Japonicas* & *Rastrelliger Sp.*) in Communities in the Coast Area of Tamasuju, Galesong Takalar. *Medico Legal Update*, 21(2), 196–203. <https://doi.org/10.37506/mlu.v21i2.2673>
- Daud, A., & Dullah, A. (2013). *Perspektif Analisis Risiko Lingkungan dan Kesehatan*. Yogyakarta: Smart Writing.
- Davarpanah, E., & Guilhermino, L. (2019). Are gold nanoparticles and microplastics mixtures more toxic to the marine microalgae *Tetraselmis chuii* than the substances individually? *Ecotoxicology and Environmental Safety*, 181, 60–68. <https://doi.org/https://doi.org/10.1016/j.ecoenv.2019.05.078>
- Das, S. E. (2016). Microplastic Ingestion by Wild and Cultured (*Thalassophryne enerupsis philippinarum*) from Baynes Sound, British Columbia. *Environmental Contamination and Toxicology*, 71(2), 147–156. <https://doi.org/10.1007/s00244-016-0286-4>
- S. (2020). Sources and impact of microplastic pollution in Indian Ocean: A review. *Current World Environment*, 15(1), 1–9.
- (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>
- De Rosa, C. T., Fay, M., Keith, L. S., Mumtaz, M. M., Pohl, H. R., Hatcher, M. T., ... Johnson, B. L. (2008). Hazardous Wastes. In H. K. (Kris) Heggenhougen (Ed.), *International Encyclopedia of Public Health* (pp. 107–121). <https://doi.org/https://doi.org/10.1016/B978-012373960-5.00279-3>
- Deng, Y., Zhang, Y., Lemos, B., & Ren, H. (2017). Tissue accumulation of microplastics in mice and biomarker responses suggest widespread health risks of exposure. *Scientific Reports*, 7(1), 46687. <https://doi.org/10.1038/srep46687>
- Dewi, I. S., Aditya, A., & Ramadhan, I. (2015). Distribution of microplastic at sediment in the Muara Badak Subdistrict , Kutai Kartanegara Regency. *Depik*, 4(3), 121–131.
- Dewi, S. C., Aunurohim, & Saptarini, D. (2023). Characteristics of Microplastics in Anglu Parrotfish (*Chlororus Sordidus*) and Palefin Kurisi Fish (*Nemipterus Thosaporni*) at Jakarta Bay Waters. *Jurnal Kelautan*, 16(3), 268–280.
- Direktorat Jendral PP dan PL Kementerian Kesehatan. (2012). *Pedoman Analisis Risiko Kesehatan Lingkungan (ARKL)*". Bakti Husada.
- Direktur Jendral PP dan PL Kementerian Kesehatan. (2012). *Pedoman Analisis Risiko Kesehatan Lingkungan (ARKL)*.
- Dodson, G. Z., Shotorban, A. K., Hatcher, P. G., Waggoner, D. C., Ghosal, S., & Noffke, N. (2020). Microplastic fragment and fiber contamination of beach sediments from selected sites in Virginia and North Carolina, USA. *Marine Pollution Bulletin*, 151(January), 110869. <https://doi.org/10.1016/j.marpolbul.2019.110869>
- Domenech, J., & Marcos, R. (2021). Pathways of human exposure to microplastics, and estimation of the total burden. *Current Opinion in Food Science*, 39, 144–151. <https://doi.org/https://doi.org/10.1016/j.cofs.2021.01.004>
- Donoso, J. M., & Rios-Touma, B. (2020). Microplastics in tropical Andean rivers: A perspective from a highly populated Ecuadorian basin without wastewater treatment. *Heliyon*, 6(7). <https://doi.org/10.1016/j.heliyon.2020.e04302>
- Ebadi, Z., Khodanazar, A., Hosseini, S. M., & Zanguee, N. (2019). The shelf life extension of refrigerated *Nemipterus japonicus* fillets by chitosan coating incorporated with propolis extract. *International Journal of Biological Macromolecules*, 139, 94–102. <https://doi.org/https://doi.org/10.1016/j.ijbiomac.2019.07.204>
- Ebnesajjad, S. (2013). *Fluoroplastics*.
- Ebnesajjad, Sina. (2021). 14 - Processing and Fabrication of Polychlorotrifluoroethylene. In Sina Ebnesajjad (Ed.), *Introduction to Fluoropolymers (Second Edition)* (Second Edi, pp. 245–252). <https://doi.org/https://doi.org/10.1016/B978-0-12-819123-1.00014-8>
- Ekerke-Medrano, D., Thompson, R. C., & Aldridge, D. C. (2015). Microplastics in Freshwater Systems: A review of the emerging threats, identification of gaps and prioritisation of research needs. *Water Research*, 75, 63–73. <https://doi.org/https://doi.org/10.1016/j.watres.2015.02.012>
- Elshenawy, M., Bagaev, A., Kilesso, A., & Chubarenko, I. P. (2018). Microplastics Generation in the Sea Swash Zone With Coarse Particles: Laboratory Experiments. *Frontiers in Marine Science*, 5. <https://doi.org/10.3389/fmars.2018.00313>
- European Commission, European Council, European Parliament, & (NDA), A. (2014). Scientific Opinion on health effects of microplastics on human health. *EFSA Journal*, 12(11), 3993. <https://doi.org/10.2903/j.efsa.2014.3993>



- benefits of seafood (fish and shellfish) consumption in relation to health risks associated with exposure to methylmercury. *EFSA Journal*, 12(7), 3761.
- ElHawee, A. E. A. (2013). Biological studies of the invasive species *Nemipterus japonicus* (Bloch, 1791) as a Red Sea immigrant into the Mediterranean. *Egyptian Journal of Aquatic Research*, 39(4), 267–274. <https://doi.org/https://doi.org/10.1016/j.ejar.2013.12.008>
- enHealth. (2012). Environmental Health Risk Assessment: Guidelines for assessing human health risk from environmental hazard. In *Environmental Health*.
- EnHealth. (2002). *Environmental Risk Assessment: Guidelines for Assessing Human Health Risks from Environmental Hazards*.
- EPA. (2016). Vinylidene Chloride (1,1-Dichloroethylene). In *U.S. Environmental Protection Agency* (Vol. 24). Retrieved from <https://nj.gov/health/eoh/rtkweb/documents/fs/1451.pdf>
- Europe Plastics. (2022). *Plastics - the Facts 2022*.
- Expósito, N., Rovira, J., Sierra, J., Gimenez, G., Domingo, J. L., & Schuhmacher, M. (2022). Levels of microplastics and their characteristics in molluscs from North-West Mediterranean Sea: Human intake. *Marine Pollution Bulletin*, 181, 113843. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2022.113843>
- Fachruddin, L., Yaqin, K., & Iin, R. (2020). Perbandingan dua metode analisis konsentrasi mikroplastik pada kerang hijau, *Perna viridis* dan penerapannya dalam kajian ekotoksikologi. *Jurnal Pengelolaan Perairan*, 3(x), 1–12.
- Fadare, O. O., & Okoffo, E. D. (2020). Science of the Total Environment Covid-19 face masks: A potential source of microplastic fibers in the environment. *Science of the Total Environment*, 737, 140279. <https://doi.org/10.1016/j.scitotenv.2020.140279>
- Fan, A. M. (2005). Vinylidene chloride. *Encyclopedia of Toxicology*, i(1986), 440–445. <https://doi.org/10.1016/B0-12-369400-0/01009-7>
- FAO/WHO. (1995). Food Standards Programme. “Joint FAO/WHO Expert Consultation On The Application Of Risk Analysis To Food Standards Issues”. Recommendations to the Codex Alimentarius Commission.
- FAO. (2011). FAO yearbook: Fishery and aquaculture statistics. In FAO. Retrieved from <http://www.fao.org/3/a-i5716t.pdf>
- FAO. (2021). The State Of The World Series Of The Food And Agriculture Organization. In *Inform* (Vol. 32). <https://doi.org/10.4060/ca9229en>
- Fauziyah. (2020). *Microplastic Characteristic Found in Gastrointestinal Tract of Pelagic and Demersal Fishes In Tuban, East Java* (Institut Teknologi Sepuluh Nopember). Retrieved from https://repository.its.ac.id/76851/1/01311640000035-Undergraduate_Thesis.pdf
- Ferrante, M., Pietro, Z., Allegui, C., Maria, F., Antonio, C., Pulvirenti, E., ... Banni, M. (2022). Microplastics in fillets of Mediterranean seafood. A risk assessment study. *Environmental Research*, 204, 112247. <https://doi.org/https://doi.org/10.1016/j.envres.2021.112247>
- Apriadi, T. (2018). Potensi Ekologis dan Ekonomis Kerang Bulu (Perna Viridis) di Desa Sebong Pereh Kabupaten Bintan. *Jurnal Jeumpa*, 13–23. <https://doi.org/10.31629/v1i2.2289>
- Mie Saputri, Devi Syafrianti, Dewi Andayani, M. A. S. (2021). Mikroplastik Pada Kerang Hijau (*Perna Viridis*) Di Alue Nagah Kuala Kota Banda Aceh. *Jurnal Jeumpa*, 8(July), 1–7.
- Kuehr, R., Bel, G., Jinhui, L., Khetriwal, D. S., ... Yamamoto.



- (2020). The Global E-waste Monitor 2020: Quantities, Flows, and Resources. In *Ensure healthy Lives and Promote Well-being for All. Experiences of Community Health, Hygiene, Sanitation and Nutrition*.
- Fossi, M. C., Panti, C., Guerranti, C., Coppola, D., Giannetti, M., Marsili, L., & Minutoli, R. (2012). Are baleen whales exposed to the threat of microplastics? A case study of the Mediterranean fin whale (*Balaenoptera physalus*). *Marine Pollution Bulletin*, 64(11), 2374–2379. <https://doi.org/10.1016/j.marpolbul.2012.08.013>
- Galindo Montero, A. A., Costa-Redondo, L. C., Vasco-Echeverri, O., & Arana, V. A. (2023). Microplastic pollution in coastal areas of Colombia: Review. *Marine Environmental Research*, 190, 106027. <https://doi.org/https://doi.org/10.1016/j.marenvres.2023.106027>
- GESAMP. (2016). Sources, fate and effects of microplastics in the marine environment: part 2 of a global assessment. (IMO, FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP). In: Kershaw, P.J. (Ed.), Rep. Stud. GESAMP No. 90 (96 pp). *Reports and Studies GESAMP*, No. 93, 96 P., 93.
- 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. Retrieved from <https://advances.sciencemag.org/lookup/doi/10.1126/sciadv.1700782>
- Güçlü Üstündağ, Ö., & Mazza, G. (2007). Saponins: Properties, Applications and Processing. *Critical Reviews in Food Science and Nutrition*, 47, 231–258. <https://doi.org/10.1080/10408390600698197>
- H, A. P., & Maming. (2018). Heavy Metal Analysis Co and V On Sediment District Of Mamuju District Using Inductively Coupled Plasma Opticalemission Spectroscopy (Icp-Oes). *Marina Chimica Acta*, 19(1), 20–27.
- Hahladakis, J. N. (2020). Delineating the global plastic marine litter challenge: clarifying the misconceptions. *Environmental Monitoring and Assessment*, 192(5), 267. <https://doi.org/10.1007/s10661-020-8202-9>
- Hahladakis, J. N., Velis, C. A., Weber, R., Iacovidou, E., & Purnell, P. (2018). An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal and recycling. *Journal of Hazardous Materials*, 344, 179–199. <https://doi.org/https://doi.org/10.1016/j.jhazmat.2017.10.014>
- Hamed, M., Martyniuk, C. J., Lee, J.-S., Shi, H., & Sayed, A. E.-D. H. (2023). Distribution, abundance, and composition of microplastics in market fishes from the Red and Mediterranean seas in Egypt. *Journal of Sea Research*, 194, 102407. <https://doi.org/https://doi.org/10.1016/j.seares.2023.102407>
- Hamra, A. J. Al. (2020). *Mikroplastik pada kerang bulu anadara antiquata (linnaeus, 1758) dan siput gonggong strombus turturella (roding, 1798) di Pesisir Pulau Bintan, Kepulauan Riau* (Universitas Indonesia). Retrieved from <https://lontar.ui.ac.id/detail?id=20501707&lokasi=lokal>
- Mattila, M. (2006). Introduction to conductive materials. In H. R. Mattila (Ed.), *Conductive Textiles and Clothing* (pp. 217–238). <https://doi.org/10.1533/9781845691622.3.217>
- Thompson, R. C., & Pahl, S. (2015). Marine litter education boosts understanding and self-reported actions. *Marine Pollution Bulletin*, 17. <https://doi.org/10.1016/j.marpolbul.2014.10.049>
- Schäffer, T., Thompson, R. C., Hassellöv, M., Verschoor, A., ... Wagner, M. (2019). Are We Speaking the Same Language?



- Recommendations for a Definition and Categorization Framework for Plastic Debris. *Environmental Science & Technology*, 53(3), 1039–1047. <https://doi.org/10.1021/acs.est.8b05297>
- Hasibuan, J. S., Manurung, V. R., & Sinaga, J. (2023). *Biologi Reproduksi Ikan Gulamah (Johnius trachycephalus , Bleeker 1851) Yang Didaratkan di Tempat Pelelangan Ikan (TPI) Tanjung Beringin , Kabupaten Serdang Bedagai , Provinsi Sumatera Utara* Reproductive Biology of Gulamah Fish (Johnius trachycephalu. 2(1), 16–25.
- Hastuti, A. R., Lumbanbatu, D. T. F., & Wardiatno, Y. (2019). The presence of microplastics in the digestive tract of commercial fishes off pantai Indah Kapuk coast, Jakarta, Indonesia. *Biodiversitas*, 20(5), 1233–1242. <https://doi.org/10.13057/biodiv/d200513>
- Halfman, G. S., Collette, B. B., Facey, D. E., & Bowen, B. W. (2009). *The Diversity of Fishes: Biology, Evolution, and Ecology* (2nd ed.). Wiley-Blackwell.
- Henkel, C., Hüffer, T., & Hofmann, T. (2022). Polyvinyl Chloride Microplastics Leach Phthalates into the Aquatic Environment over Decades. *Environmental Science and Technology*, 56(20), 14507–14516. <https://doi.org/10.1021/acs.est.2c05108>
- Hermsen, E., Mintenig, S. M., Besseling, E., & Koelmans, A. A. (2018). Quality Criteria for the Analysis of Microplastic in Biota Samples: A Critical Review. *Environmental Science and Technology*, 52(18), 10230–10240. <https://doi.org/10.1021/acs.est.8b01611>
- Hernandez-Gonzalez, A., Saavedra, C., Gago, J., Covelo, P., Santos, M. B., & Pierce, G. J. (2018). Microplastics in the stomach contents of common dolphin (*Delphinus delphis*) stranded on the Galician coasts (NW Spain, 2005–2010). *Marine Pollution Bulletin*, 137(July), 526–532. <https://doi.org/10.1016/j.marpolbul.2018.10.026>
- Hernandez-Milian, G., Lusher, A., MacGabban, S., & Rogan, E. (2019). Microplastics in grey seal (*Halichoerus grypus*) intestines: Are they associated with parasite aggregations? *Marine Pollution Bulletin*, 146(August 2017), 349–354. <https://doi.org/10.1016/j.marpolbul.2019.06.014>
- 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>
- Hofmann, W. (1994). *Rubber Technology Handbook*. Hanser Publishers.
- Hongsawat, P., Thinjong, W., Chouychai, B., Punyapalakul, P., & Prarat, P. (2024). Microplastics in retail shellfish from a seafood market in eastern Thailand: Occurrence and risks to human food safety. *Marine Pollution Bulletin*, 201, 116228. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2024.116228>
- Hoornweg, D., Tata, P. B., & Kennedy, C. (2013). Environment: Waste production must peak this century. *Nature International Weekly Journal of Science*, 502, 315–317. Retrieved from <https://doi.org/10.1038/502615a>
- Olden, J. D. (2022). Global meta-analysis reveals diverse effects on freshwater and marine fishes. *Fish and Fisheries*, 23(6), 12701. <https://doi.org/https://doi.org/10.1111/faf.12701>
- Zhang, L., Hou, Y., Yang, L., An, R., ... Zhang, L. (2021). Polystyrene lead to pyroptosis and apoptosis of ovarian granulosa cells via caspase-1 signaling pathway in rats. *Ecotoxicology and Environmental Safety*, 212, 112012. <https://doi.org/10.1016/j.ecoenv.2021.112012>



- <https://doi.org/https://doi.org/10.1016/j.ecoenv.2021.112012>
- Id, M. E. M., Hamann, M., & Id, F. J. K. (2020). *Bioaccumulation and biomagnification of microplastics in marine organisms: A review and meta-analysis of current data*. 1–26. <https://doi.org/10.1371/journal.pone.0240792>
- Indonesian Republic's Finance ministry. (2019). Earth In A Plastic Bag. *Media Keuangan*, XIV(144), 1–30.
- Ineyathendral, T. R., Govindarajulu, B., & Priyanka, R. (2023). Characterization and distribution of microplastics in the commercial fishes along the coast of Chennai. *Environmental Nanotechnology, Monitoring & Management*, 20, 100898. <https://doi.org/https://doi.org/10.1016/j.enmm.2023.100898>
- Ismail, M. R., Lewaru, M. W., & Prihadi, D. J. (2019). Microplastics Ingestion by Fish in The Pangandaran Bay, Indonesia. *World News of Natural Sciences*, 23(February), 173–181. Retrieved from www.worldnewsnaturalsciences.com
- Ivar do Sul, J. A., & Costa, M. F. (2014). The present and future of microplastic pollution in the marine environment. *Environmental Pollution*, 185, 352–364. <https://doi.org/https://doi.org/10.1016/j.envpol.2013.10.036>
- Jambeck, J., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrade, A., ... Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Marine Pollution*, 347(6223), 768-. Retrieved from <https://science.sciencemag.org/CONTENT/347/6223/768.abstract>
- Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrade, A., ... Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science*, 347(6223), 768–771. <https://doi.org/10.1126/science.1260352>
- Jeneponto Regency Government. (2021). *Changes to the Jeneponto Regency Medium Term Regional Development Plan (P-RPJMD) 2018-2023*. Retrieved from https://esakipsmart.jenepontokab.go.id/dokumen/63fdcaa8f8bffa_1677568655.pdf
- Jiang, W., Fang, J., Du, M., Gao, Y., Fang, J., & Jiang, Z. (2022). Microplastics influence physiological processes, growth and reproduction in the Manila clam, *Ruditapes philippinarum*. *Environmental Pollution*, 293, 118502. <https://doi.org/https://doi.org/10.1016/j.envpol.2021.118502>
- Jin, H., Ma, T., Sha, X., Liu, Z., Zhou, Y., Meng, X., ... Ding, J. (2021). Polystyrene microplastics induced male reproductive toxicity in mice. *Journal of Hazardous Materials*, 401, 123430. <https://doi.org/https://doi.org/10.1016/j.jhazmat.2020.123430>
- Kain, E. C., Lavers, J. L., Berg, C. J., Raine, A. F., & Bond, A. L. (2016). Plastic ingestion by Newell's (*Puffinus newelli*) and wedge-tailed shearwaters (*Ardenna pacifica*) in Hawaii. *Environmental Science and Pollution Research*, 23(23), 23951–23958. <https://doi.org/10.1007/s11356-016-7613-1>
- Karami, A., Golieskardi, A., Choo, C. K., Larat, V., Karbalaei, S., & Salamatinia, B. (2018). Microplastic and mesoplastic contamination in canned sardines and anchovies. *Science of The Total Environment*, 612, 1380–1386. <https://doi.org/10.1016/j.scitotenv.2017.09.005>
- Kardi, A., Ho, Y. Bin, Larat, V., & Salamatinia, B. (2017). Microplastics in eviscerated flesh and excised organs of dried fish. *Scientific Reports*, 7, 4989. <https://doi.org/10.1038/s41598-017-05828-6>
- Kurniawati, S., & Sudarno. (2018). The existence of microplastic in Asian fish. *2018 IOP Conference Series: Earth and Environmental Science*, 131(1), 012050. <https://doi.org/10.1088/1755-1315/131/1/012050>



- KLHK. (2020). *KLHK: Indonesia Entering a New Era of Waste Management*. Retrieved from <https://ppid.menlhk.go.id/berita/siaran-pers/5294/klhk-indonesia-memasuki-era-baru-pengelolaan-sampah>
- Kooi, M., Nes, E. H. van, Scheffer, M., & Koelmans, A. A. (2017). Ups and Downs in the Ocean: Effects of Biofouling on Vertical Transport of Microplastics. *Environmental Science & Technology*, 51(14), 7963–7971. <https://doi.org/10.1021/acs.est.6b04702>
- Kor, K., Jannat, B., Ershadifar, H., & Ghazilou, A. (2023). Microplastic occurrence in finfish and shellfish from the mangroves of the northern Gulf of Oman. *Marine Pollution Bulletin*, 189, 114788. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2023.114788>
- Kusumawati, L. A., Haeruddin, H., & Suprapto, D. (2015). Filtration Rate Kerang Darah Dan Kerang Hijau Dalam Memfiltrasi Bahan Organik Tersuspensi Limbah Tambak Udang Intensif. *Jurnal Management of Aquatic Resources*, 4(1), 131–137.
- Langer, R. S., & Peppas, N. A. (1981). Present and future applications of biomaterials in controlled drug delivery systems. *Biomaterials*, 2(4), 201–214. [https://doi.org/https://doi.org/10.1016/0142-9612\(81\)90059-4](https://doi.org/https://doi.org/10.1016/0142-9612(81)90059-4)
- Laroche, M., Bergeron, J., & Barbaro-Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing*, 18(6), 503–520. <https://doi.org/10.1108/EUM0000000006155>
- Law, K. L., Morét-Ferguson, S., Maximenko, N. A., Proskurowski, G., Peacock, E. E., Hafner, J., & Reddy, C. M. (2010). Plastic accumulation in the North Atlantic subtropical gyre. *Science*, 329(5996), 1185–1188. <https://doi.org/10.1126/science.1192321>
- Lebreton, L. C. M., van der Zwart, J., Damsteeg, J.-W., Slat, B., Andradý, A., & Reisser, J. (2017). River plastic emissions to the world's oceans. *Nature Communications*, 8(1), 15611. <https://doi.org/10.1038/ncomms15611>
- Lebreton, L. C. M., Van Der Zwart, J., Damsteeg, J. W., Slat, B., Andradý, A., & Reisser, J. (2017). River plastic emissions to the world's oceans. *Nature Communications*, 8, 1–10. <https://doi.org/10.1038/ncomms15611>
- Lee, Y., Cho, J., Sohn, J., & Kim, C. (2023). *Health Effects of Microplastic Exposures : Current Issues and Perspectives in South Korea*. 64(5), 301–308.
- Lestari, P., Trihadiningrum, Y., Wijaya, B. A., Yunus, K. A., & Firdaus, M. (2020). Distribution of microplastics in Surabaya River, Indonesia. *Science of the Total Environment*, 726, 138560. <https://doi.org/10.1016/j.scitotenv.2020.138560>
- Li, J., Lusher, A. L., Rotchell, J. M., Deudero, S., Turra, A., Bráte, I. L. N., ... Shi, H. (2019). Using mussel as a global bioindicator of coastal microplastic pollution. *Environmental Pollution*, 244, 522–533. <https://doi.org/https://doi.org/10.1016/j.envpol.2018.10.032>
- Li, J., Zhang, L., Dang, X., Su, L., Jabeen, K., Wang, H., & Wang, Z. (2022). Effects of different methods on microplastics in dried shellfish. *Science of The Total Environment*, 837, 155787. <https://doi.org/10.1016/j.scitotenv.2022.155787>
- Murphy, M., Coppock, R. L., Lewis, C. N., Miller, R. Z., Watts, A. J. R., & S. (2020). Are we underestimating microplastic abundance in the environment? A comparison of microplastic capture with nets of different sizes. *Environmental Pollution*, 265, 114721. <https://doi.org/10.1016/j.envpol.2020.114721>



- Liu, Jianli, Hu, Z., Du, F., Tang, W., Zheng, S., Lu, S., ... Ding, J. (2023). Environment education: A first step in solving plastic pollution. *Frontiers in Environmental Science*, 11(March), 2021–2023. <https://doi.org/10.3389/fenvs.2023.1130463>
- Liu, Jun, Zhang, T., Piché-Choquette, S., Wang, G., & Li, J. (2020). Microplastic Pollution in China, an Invisible Threat Exacerbated by Food Delivery Services. *Bulletin of Environmental Contamination and Toxicology*, (eMarketer 2018). <https://doi.org/10.1007/s00128-020-03018-1>
- Liu, X.-W., Zhou, Y.-L., Wang, S.-Q., & Li, Y.-J. (2013). Synthesis and characterization of vinylidene chloride/methyl acrylate copolymers for water vapor barrier coating. *Wuhan Ligong Daxue Xuebao/Journal of Wuhan University of Technology*, 35, 22–26. <https://doi.org/10.3963/j.issn.1671-4431.2013.01.005>
- Long, M., Moriceau, B., Gallinari, M., Lambert, C., Huvet, A., Raffray, J., & Soudant, P. (2015). Interactions between microplastics and phytoplankton aggregates: Impact on their respective fates. *Marine Chemistry*, 175, 39–46. <https://doi.org/10.1016/j.marchem.2015.04.003>
- Lusher, A. (2015). Microplastics in the Marine Environment: Distribution, Interactions and Effects. In *Marine Anthropogenic Litter*. <https://doi.org/10.1007/978-3-319-16510-3>
- Lusher, A. L., McHugh, M., & Thompson, R. C. (2013). Occurrence of microplastics in the gastrointestinal tract of pelagic and demersal fish from the English Channel. *Marine Pollution Bulletin*, 67(1), 94–99. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2012.11.028>
- Lusher, A. L., Welden, N. A., Sobral, P., & Cole, M. (2017). Sampling{} isolating and identifying microplastics ingested by fish and invertebrates. *Anal. Methods*, 9(9), 1346–1360. <https://doi.org/10.1039/C6AY02415G>
- Makhdoomi, P., Hossini, H., & Pirsahab, M. (2023). A review of microplastic pollution in commercial fish for human consumption. *Reviews on Environmental Health*, 38(1), 97–109. <https://doi.org/10.1515/reveh-2021-0103>
- Mallik, A., Xavier, K. A. M., Naidu, B. C., & Nayak, B. B. (2021). Ecotoxicological and physiological risks of microplastics on fish and their possible mitigation measures. *Science of The Total Environment*, 779, 146433. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2021.146433>
- Mallongi, A., & Dullah, A. M. (2014). *Teknik Penyehatan Lingkungan*. Yogyakarta: CV Writing REvolution.
- Marsh, K., & Bugusu, B. (2007). Food Packaging—Roles, Materials, and Environmental Issues. *Journal of Food Science*, 72(3), R39–R55. <https://doi.org/https://doi.org/10.1111/j.1750-3841.2007.00301.x>
- Mathalon, A., & Hill, P. (2014). Microplastic fibers in the intertidal ecosystem surrounding Halifax Harbor, Nova Scotia. *Marine Pollution Bulletin*, 81(1), 69–79. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2014.02.018>
- Mauludy, M. S., Yunanto, A., & Yona, D. (2019). Microplastic Abundances in the Coastal Beaches in Badung, Bali. *Jurnal Perikanan Universitas*, 21(2), 73. <https://doi.org/10.22146/jfs.45871>
- Nansen, C., Shashoua, Y., & Khan, F. R. (2020). Microplastics in mussels and cockles (*Anadara antiquata*) along the Tanzanian coast. *Bulletin of Environmental Contamination and Toxicology*, 105(4), 1–6. <https://doi.org/10.1007/s00128-020-02991-x>
- Wood, P., Sullivan, B., Bergman, B., Jablonicky, C., Roan, A., & Vining, C. (2016). Ending hide and seek at sea. *Marine Governance*, 1(1), 1–10. <https://doi.org/10.1007/s40105-016-0001-1>



- 351(6278), 1148–1150.
- McKinley, E., & Fletcher, S. (2012). Improving marine environmental health through marine citizenship: A call for debate. *Marine Policy*, 36(3), 839–843. <https://doi.org/10.1016/j.marpol.2011.11.001>
- 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), 11639. <https://doi.org/10.1038/s41598-018-29980-9>
- Merga, L. B., Redondo-Hasselerharm, P. E., Van den Brink, P. J., & Koelmans, A. A. (2020). Distribution of microplastic and small macroplastic particles across four fish species and sediment in an African lake. *Science of the Total Environment*, 741, 140527. <https://doi.org/10.1016/j.scitotenv.2020.140527>
- Milne, M. H., De Frond, H., Rochman, C. M., Mallos, N. J., Leonard, G. H., & Baechler, B. R. (2024). Exposure of U.S. adults to microplastics from commonly-consumed proteins. *Environmental Pollution*, 343, 123233. <https://doi.org/https://doi.org/10.1016/j.envpol.2023.123233>
- Moerdyk, J. P., & Bielawski, C. W. (2012). Architectures of Polymers Synthesized using ROMP. In K. Matyjaszewski & M. Möller (Eds.), *Polymer Science: A Comprehensive Reference* (pp. 523–550). <https://doi.org/https://doi.org/10.1016/B978-0-444-53349-4.00094-7>
- Mohan, P., Shahul Hamid, F., Furumai, H., & Nishikawa, K. (2024). Beneath the surface: Exploring microplastic intricacies in *Anadara granosa*. *Marine Environmental Research*, 199, 106581. <https://doi.org/https://doi.org/10.1016/j.marenvres.2024.106581>
- Montoto-Martínez, T., Hernández-Brito, J. J., & Dolores Gelado-Caballero, M. A. (2020). Pump-underway ship intake: An unexploited opportunity for Marine Strategy Framework Directive (MSFD) microplastic monitoring needs on coastal and oceanic waters. *PLoS ONE*, 15(5), 1–18. <https://doi.org/10.1371/journal.pone.0232744>
- Morton, M. (1999). *Rubber Technology*. Springer.
- Moyle, P., & Jr, J. C. (2003). *Fishes: An Introduction to Ichthyology* (5th ed.). Prentice Hall.
- Mukhopadhyay, P., & Valsalan, S. A. (2024). Microplastics in fish and a bivalve species sampled from freshwater environment and retail outlets, and the assessment of human exposure. *Food Control*, 110664. <https://doi.org/https://doi.org/10.1016/j.foodcont.2024.110664>
- Naidoo, T., Glassom, D., & Smit, A. J. (2015). Plastic pollution in five urban estuaries of KwaZulu-Natal, South Africa. *Marine Pollution Bulletin*, 101(1), 473–480. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2015.09.044>
- Naidoo, T., Rajkaran, A., & Sershen. (2020). Impacts of plastic debris on biota and implications for human health: A South African perspective. *South African Journal of Science*, 116(5–6), 1–9. <https://doi.org/10.17159/sajs.2020/7693>
- Namira, N., Daud, A., Mallongi, A., Amqam, H., Wahyu, A., & Irwandy. (2023). Risk Assessment of Microplastic Exposure Through Consumption of *Anadara Granosa* Area. *Pharmacognosy Journal*, 15(4), 558–562. <https://doi.org/10.5530/pj.2023.15.119>
- Ott, A., & Manica, A. (2020). Microplastic ingestion rates are dependent in juvenile anemonefish. *Environmental Pollution*, 259, 1–8. <https://doi.org/https://doi.org/10.1016/j.envpol.2019.113855>
- Saju, P., Santhanam, P., & Perumal, P. (2022). Impacts of microplastics on marine organisms: Present perspectives and the way forward.



- Egyptian Journal of Aquatic Research*, 48(3), 205–209.
<https://doi.org/https://doi.org/10.1016/j.ejar.2022.03.001>
- Napper, I. E., Bakir, A., Rowland, S. J., & Thompson, R. C. (2015). Characterisation, quantity and sorptive properties of microplastics extracted from cosmetics. *Marine Pollution Bulletin*, 99(1), 178–185.
<https://doi.org/https://doi.org/10.1016/j.marpolbul.2015.07.029>
- Nelms, S. E., Barnett, J., Brownlow, A., Davison, N. J., Deaville, R., Galloway, T. S., ... Godley, B. J. (2019). Microplastics in marine mammals stranded around the British coast: ubiquitous but transitory? *Scientific Reports*, 9(1), 1–8.
<https://doi.org/10.1038/s41598-018-37428-3>
- NJS Health. (2010). Hazardous Substance Fact Sheet. In *New Jersey Department of Health*. <https://doi.org/10.1097/00152193-199711000-00013>
- Nosova, A. O., & Uspenskaya, M. V. (2023). Ecotoxicological effects and detection features of polyvinyl chloride microplastics in soils: A review. *Environmental Advances*, 13, 100437.
<https://doi.org/https://doi.org/10.1016/j.envadv.2023.100437>
- NTP. (2015). *NTP Technical Report on the Toxicology and Carcinogenesis Studies of Vinylidene Chloride (CASRN 75-35-4) in F344/N Rats and B6C3F1/N Mice (Inhalation Studies)* (Vol. 582). Retrieved from https://ntp.niehs.nih.gov/sites/default/files/ntp/htdocs/lt_rpts/tr582_508.pdf
- Nursalim, R. H., Suprijanto, J., & Widowati, I. (2012). Studi Bioekologi Kerang Simping (*Amusium pleuronectes*) di Perairan Semarang dan Kendal Abstrak PENDAHULUAN *Amusium pleuronectes* atau kerang simping adalah salah satu biota yang dijumpai di perairan laut terlindung seperti di pantai utara Jawa Tengah (B. 1, 110–117).
- Odum, E. P. (1971). *Fundamentals of Ecology 3rd Edition*. W.B. Saunders Company.
- OECD. (2022a). *Organisation de coopération et de développement économiques* (2022). Global Plastics Outlook: Economic Drivers, Environmental Impacts and Policy Options, OECD publishing.
- OECD. (2022b). Plastic pollution is growing relentlessly as waste management and recycling fall short, says OECD. Retrieved from Organisation for Economic Co-operation and Development website: <https://www.oecd.org/environment/plastic-pollution-is-growing-relentlessly-as-waste-management-and-recycling-fall-short.htm>
- Ory, N. C., Sobral, P., Ferreira, J. L., & Thiel, M. (2017). Amberstripe scad *Decapterus muroadsii* (Carangidae) fish ingest blue microplastics resembling their copepod prey along the coast of Rapa Nui (Easter Island) in the South Pacific subtropical gyre. *Science of The Total Environment*, 586, 430–437.
<https://doi.org/https://doi.org/10.1016/j.scitotenv.2017.01.175>
- Pahl, S., Wyles, K. J., & Thompson, R. C. (2017). Channelling passion for the ocean towards plastic pollution. *Nature Human Behaviour*, 1(10), 697–699.
<https://doi.org/10.1038/s41562-017-0204-4>
- PAIR (2023). *End-of-life of plastics used in seaweed aquaculture in Indonesia*. Retrieved from https://pair.australiaindonesiacentre.org/wp-content/uploads/2024/01/PAIR_End-of-life-of-plastics-used-in-seaweed-aquaculture-South-Sulawesi.pdf
- Parmentier, C., Le Bihan, F., Dubreil, L., Clérandoau, C., Chouvillon, F., ... Bégin, C. (2020). Environmental samples of microplastics induce significant behavioural changes in fish larvae. *Environment International*, 134(February 2019), 105047.
<https://doi.org/10.1016/j.envint.2019.105047>



- Parolini, M., Stucchi, M., Ambrosini, R., & Romano, A. (2023). A global perspective on microplastic bioaccumulation in marine organisms. *Ecological Indicators*, 149, 110179. [https://doi.org/https://doi.org/10.1016/j.ecolind.2023.110179](https://doi.org/10.1016/j.ecolind.2023.110179)
- Patterson, J., Jeyasanta, K. I., Laju, R. L., & Edward, J. K. P. (2021). Microplastic contamination in Indian edible mussels (*Perna perna* and *Perna viridis*) and their environs. *Marine Pollution Bulletin*, 171(July), 112678. <https://doi.org/10.1016/j.marpolbul.2021.112678>
- Paul, M. B., Stock, V., Cara-Carmona, J., Lisicki, E., Shopova, S., Fessard, V., ... Böhmer, L. (2020). Micro- And nanoplastics-current state of knowledge with the focus on oral uptake and toxicity. *Nanoscale Advances*, 2(10), 4350–4367. <https://doi.org/10.1039/d0na00539h>
- Peng, L., Fu, D., Qi, H., Lan, C. Q., Yu, H., & Ge, C. (2020). Micro- and nano-plastics in marine environment: Source, distribution and threats — A review. *Science of The Total Environment*, 698, 134254. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2019.134254>
- Petrie, E. M. (2007). *Handbook of Adhesives and Sealants*. McGraw-Hill.
- Pirsahab, M., Hossini, H., & Makhdoumi, P. (2020). Review of microplastic occurrence and toxicological effects in marine environment: Experimental evidence of inflammation. *Process Safety and Environmental Protection*, 142, 1–14. <https://doi.org/10.1016/j.psep.2020.05.050>
- Potje-Kamloth, K. (2001). Conducting Polymer-Based Schottky Barrier and Heterojunction Diodes and Their Sensor Application. In H. S. Nalwa (Ed.), *Handbook of Surfaces and Interfaces of Materials* (pp. 445–494). <https://doi.org/https://doi.org/10.1016/B978-012513910-6/50068-2>
- Prata, J. C., da Costa, J. P., Duarte, A. C., & Rocha-Santos, T. (2019). Methods for sampling and detection of microplastics in water and sediment: A critical review. *TrAC Trends in Analytical Chemistry*, 110, 150–159. <https://doi.org/https://doi.org/10.1016/j.trac.2018.10.029>
- Prata, J. C., da Costa, J. P., Lopes, I., Duarte, A. C., & Rocha-Santos, T. (2020). Environmental exposure to microplastics: An overview on possible human health effects. *Science of The Total Environment*, 702, 134455. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2019.134455>
- Pratama, A., Lestari, F., & Kurniawan, D. (2018). Pola Pemanfaatan Kerang Bulu (*Anadara antiquata*) di Perairan Kawal Kabupaten Bintan. *Sumberdaya Perairan*, (August 2018).
- Pratama, Angga, Lestari, F., & Kurniawan, D. (2018). *Pola Pemanfaatan Kerang Bulu (Anadara antiquata) di Perairan Kawal Kabupaten Bintan*.
- Pratiwi, A. I., Umroh, U., & Hudatwi, M. (2024). Analysis Of Microplastic Abundance in Fish Landed at Rebo Beach, Bangka Regency. *Jurnal Perikanan*, 13(3), 621–633. <https://doi.org/10.29303/jp.v13i3.601>
- Pratiwi, N. (2024). *Analisis kandungan mikroplastik pada air, sedimen dan kerang bulu (anadara antiquata) di pantai Ujung Gersik Kabupaten Belitung*. <https://doi.org/10.29303/jp.v13i3.601>
- Pratiwi, N., Islam, M. S., Haque, M. A., Rahman, M. M., & Mithu, M. (2024). Toxic effects of plastic on human health and environment: A review of health risk assessment in Bangladesh. *International Journal of Health Risk Assessment*, 1–5. <https://doi.org/10.14419/ijh.v6i1.8655>
- Liang, M., & Shi, H. (2018). Assessing the relationship between abundance and properties of microplastics in water and in mussels. *Science of The Total Environment*, 621, 679–686. <https://doi.org/10.1016/j.scitotenv.2017.11.200>



<https://doi.org/https://doi.org/10.1016/j.scitotenv.2017.11.284>

Rahman. (2007). *Analisis Risiko Kesehatan Lingkungan 9Kajian Aspek Kesehatan Masyarakat dalam studi AMDAL dan Kasus-Kasus Pencemaran Lingkungan*. Depok.

Rahman, A., Sarkar, A., Yadav, O. P., Achari, G., & Slobodnik, J. (2021). Potential human health risks due to environmental exposure to nano- and microplastics and knowledge gaps: A scoping review. *Science of The Total Environment*, 757, 143872. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2020.143872>

Rahmatin, N. M., Soegianto, A., Irawan, B., Payus, C. M., Indriyasaki, K. N., Marchellina, A., ... Irnidayanti, Y. (2024). The spatial distribution and physico-chemical characteristic of microplastics in the sediment and cockle (Anadara granosa) from the coastal waters of East Java, Indonesia, and the health hazards associated with cockle consumption. *Marine Pollution Bulletin*, 198, 115906. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2023.115906>

Ramli, R., Yaqin, K., & Rukminasari, N. (2021). Microplastics contamination in green mussels *Perna viridis* in Pangkajene Kepulauan Waters, South Sulawesi, Indonesia. *Akuatikisle: Jurnal Akuakultur, Pesisir Dan Pulau-Pulau Kecil*, 5(1), 1–5. <https://doi.org/10.29239/j.akuatikisle.5.1.1-5>

Rao, B. M. (2019). Review Microplastics in the aquatic environment : implications for post-harvest fish quality. *Indian J. Fish*, 66(1), 142–152. <https://doi.org/10.21077/ijf.2019.66.1.83125-20>

Ratner, B. D., Hoffman, A. S., Schoen, F. J., & Lemons, J. E. (2013). *Biomaterials Science: An Introduction to Materials in Medicine*. Academic Press.

Ren, X., Sun, Y., Wang, Z., Barceló, D., Wang, Q., Zhang, Z., & Zhang, Y. (2020). Abundance and characteristics of microplastic in sewage sludge: A case study of Yangling, Shaanxi province, China. *Case Studies in Chemical and Environmental Engineering*, 2(October). <https://doi.org/10.1016/j.cscee.2020.100050>

Renzi, M., Guerranti, C., & Blašković, A. (2018). Microplastic contents from maricultured and natural mussels. *Marine Pollution Bulletin*, 131, 248–251. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2018.04.035>

Rezania, S., Park, J., Md Din, M. F., Mat Taib, S., Talaiekhozani, A., Kumar Yadav, K., & Kamyab, H. (2018). Microplastics pollution in different aquatic environments and biota: A review of recent studies. *Marine Pollution Bulletin*, 133, 191–208. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2018.05.022>

Rios-Fuster, B., Alomar, C., Compa, M., Guijarro, B., & Deudero, S. (2019). Anthropogenic particles ingestion in fish species from two areas of the western Mediterranean Sea. *Marine Pollution Bulletin*, 144, 325–333. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2019.04.064>

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



Towne, M. A. (2013). Classify plastic waste as hazardous (types caused by consumption of plastic bags). *Nature*, 494(3), 169–

Li, E., Kurobe, T., & Teh, S. J. (2013). Ingested plastic transfers chemicals to fish and induces hepatic stress. *Scientific Reports*, 3. <https://doi.org/10.1038/srep03263>

Wang, A., Williams, S. L., Baxa, D. V., Lam, R., Miller, J. T., ... Teh, S. J. (2013). Anthropogenic debris in seafood: Plastic debris and fibers from

- textiles in fish and bivalves sold for human consumption. *Scientific Reports*, 5(1), 14340. <https://doi.org/10.1038/srep14340>
- Rota, E., Bergami, E., Corsi, I., & Bargagli, R. (2022). Macro- and Microplastics in the Antarctic Environment: Ongoing Assessment and Perspectives. *Environments*, 9(7). <https://doi.org/10.3390/environments9070093>
- Ryan, P. G., Moore, C. J., Van Franeker, J. A., & Moloney, C. L. (2009). Monitoring the abundance of plastic debris in the marine environment. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1526), 1999–2012. <https://doi.org/10.1098/rstb.2008.0207>
- Sacchi, A., Mouneyrac, C., Bolognesi, C., Sciuotto, A., Roggieri, P., Fusi, M., ... Capri, E. (2013). Biomonitoring study of an estuarine coastal ecosystem, the Sacca di Goro lagoon, using *Ruditapes philippinarum* (Mollusca: Bivalvia). *Environmental Pollution*, 177, 82–89. <https://doi.org/https://doi.org/10.1016/j.envpol.2013.01.042>
- Sacco, V. A., Zuanazzi, N. R., Selinger, A., Alliprandini da Costa, J. H., Spanhol Lemunie, É., Comelli, C. L., ... Delariva, R. L. (2024). What are the global patterns of microplastic ingestion by fish? A scientometric review. *Environmental Pollution*, 350, 123972. <https://doi.org/https://doi.org/10.1016/j.envpol.2024.123972>
- Safitri, N., & Hanizar, E. (2019). Efek Konsumsi Kerang Bulu (Anadara Antiquata) terhadap Kuantitas dan Kualitas Spermatozoa. *Al-Kauniyah: Jurnal Biologi*, 12, 207–219. <https://doi.org/10.15408/kauniyah.v12i2.11794>
- Saha, M., Naik, A., Desai, A., Nanajkar, M., Rathore, C., Kumar, M., & Gupta, P. (2021). Microplastics in seafood as an emerging threat to marine environment: A case study in Goa, west coast of India. *Chemosphere*, 270, 129359. <https://doi.org/10.1016/j.chemosphere.2020.129359>
- Sawalman, R., Putri, Z. iNeviaty, Shinta, W., & Samira, I. (2021). Akumulasi Mikroplastik pada Spesies Ikan Ekonomis Penting di Perairan Pulau Barranglombo, Makassar. *Jurnal Ilmu Dan Teknologi Kelautan Tropis*, 13(2), 241–259. <https://doi.org/10.29244/jitkt.v13i2.34587>
- Schmidt, C., Lautenschlaeger, C., Collnot, E. M., Schumann, M., Bojarski, C., Schulzke, J. D., ... Stallmach, A. (2013). Nano- and microscaled particles for drug targeting to inflamed intestinal mucosa - A first in vivo study in human patients. *Journal of Controlled Release*, 165(2), 139–145. <https://doi.org/10.1016/j.jconrel.2012.10.019>
- Schwabl, P., Köppel, S., Königshofer, P., Bucsics, T., Trauner, M., Reiberger, T., & Liebmann, B. (2019). Detection of Various Microplastics in Human Stool: A Prospective Case Series. *Annals of Internal Medicine*, 171. <https://doi.org/10.7326/M19-0618>
- Selden, K. R., & Baker, M. R. (2023). Influence of marine habitat on microplastic prevalence in forage fish and salmon in the Salish Sea. *Marine Pollution Bulletin*, 197, 115748. <https://doi.org/10.1016/j.marpolbul.2023.115748>
- Sood, S., Bhagwat, G., Carbery, M., Wilson, S., & Palanisami, S. (2020). Evaluation of the mass of microplastics ingested – A pivotal first step in health risk assessment. *Journal of Hazardous Materials*, 404, 124004. <https://doi.org/10.1016/j.jhazmat.2020.124004>
- Santi, E., Novoa, B., & Figueras, A. (2021). An overview of the sources and effects of microplastics and nanoplastics as pollutants of the marine environment in bivalves. *Science of the Total Environment*, 753, 142024. <https://doi.org/10.1016/j.scitotenv.2020.142024>



- <https://doi.org/10.1016/j.scitotenv.2020.142024>
- Setälä, O., Norkko, J., & Lehtiniemi, M. (2016). Feeding type affects microplastic ingestion in a coastal invertebrate community. *Marine Pollution Bulletin*, 102(1), 95–101. <https://doi.org/10.1016/j.marpolbul.2015.11.053>
- Severini, M. D. F., Villagran, D. M., Buzzi, N. S., & Sartor, G. C. (2019). Microplastics in oysters (*Crassostrea gigas*) and water at the Bahía Blanca Estuary (Southwestern Atlantic): An emerging issue of global concern. *Regional Studies in Marine Science*, 32, 100829. <https://doi.org/https://doi.org/10.1016/j.rsma.2019.100829>
- Seymour, R. B., & Carraher, C. E. (2013). *Polymer Chemistry*. CRC Press.
- Sharma, M. D., Elanjickal, A. I., Mankar, J. S., & Krupadam, R. J. (2020). Assessment of cancer risk of microplastics enriched with polycyclic aromatic hydrocarbons. *Journal of Hazardous Materials*, 398, 122994. <https://doi.org/10.1016/j.jhazmat.2020.122994>
- Sharma, S., & Chatterjee, S. (2017). Microplastic pollution, a threat to marine ecosystem and human health: a short review. *Environmental Science and Pollution Research*, 24(27), 21530–21547. <https://doi.org/10.1007/s11356-017-9910-8>
- Shean, R. (2012). *Venerupis philippinarum*, Japanese littleneck clam. Retrieved from <https://api.semanticscholar.org/CorpusID:139086397>
- Sherif, S. O., Salama, E. E., & Abdel-Wahhab, M. A. (2009). Mycotoxins and child health: The need for health risk assessment. *International Journal of Hygiene and Environmental Health*, 212(4), 347–368. <https://doi.org/https://doi.org/10.1016/j.ijheh.2008.08.002>
- Siagian, G., Wahyuningsih, H., & Barus, T. (2017). Struktur Populasi Ikan Gulamah Di Sungai Barumun Kabupaten Labuhan Batu Sumatera Utara. *Jurnal Biosains*, 3(2), 59–65.
- Silaban, R., Silubun, D., & Jamlean, A. (2021). Aspek Ekologi dan Pertumbuhan Kerang Bulu (*Anadara Antiquata*) di Perairan Letman, Kabupaten Maluku Tenggara. *Jurnal Kelautan: Indonesian Journal of Marine Science and Technology*, 14, 120–131. <https://doi.org/10.21107/jk.v14i2.10325>
- Silva, D. M., Almeida, C. M. R., Guardiola, F. A., Pereira, R., Rodrigues, S. M., & Ramos, S. (2024). Uncovering microplastics contamination in canned seafood. *Food Chemistry*, 448, 139049. <https://doi.org/https://doi.org/10.1016/j.foodchem.2024.139049>
- SIPSN. (2021a). Capaian Kinerja Pengelolaan Sampah. Retrieved from Sistem Informasi Pengelolaan Sampah Nasional website: <https://sipsn.menlhk.go.id/sipsn/>
- SIPSN. (2021b). Komposisi Sampah. Retrieved from Sistem Informasi Pengelolaan Sampah Nasional website: <https://sipsn.menlhk.go.id/sipsn/>
- SIPSN. (2021c). Timbunan Sampah. Retrieved from Sistem Informasi Pengelolaan Sampah Nasional website: https://sipsn.menlhk.go.id/sipsn/public/data/timbunan_sampah_nasional_processing_place. Retrieved from National Waste Information System website: <https://sipsn.menlhk.go.id/sipsn/public/home/fasilitas/tpa-tpst>
- SIPSN. (2021d). Sektor informal Sector. In *National Waste Management Information System*. Retrieved from <https://sipsn.menlhk.go.id/sipsn/public/home/fasilitas/sektor-informal>
- SIPSN. (2021e). Waste Bank. Retrieved from National Waste Management Information System: https://sipsn.menlhk.go.id/sipsn/public/home/waste_bank. Retrieved from National Waste Management Information System: https://sipsn.menlhk.go.id/sipsn/public/home/waste_bank



- Information System website:
<https://sipsn.menlhk.go.id/sipsn/public/home/fasilitas/bsi>
- SIPSN. (2022d). Reduce, Reuse, Recycle Waste Management Site. In *National Waste Management Information System*. Retrieved from <https://sipsn.menlhk.go.id/sipsn/public/home/fasilitas/tps3r>
- SIPSN. (2022e). Unit Waste Bank. In *National Waste Management Information System*. Retrieved from <https://sipsn.menlhk.go.id/sipsn/public/home/fasilitas/bsu>
- SIPSN. (2022f). Waste Composition. In *National Waste Management Information System*. Retrieved from <https://sipsn.menlhk.go.id/sipsn/public/data/komposisi>
- SIPSN. (2023). Waste Composition. Retrieved from Sistem Informasi Pengelolaan Sampah Nasional website:
<https://sipsn.menlhk.go.id/sipsn/public/data/komposisi>
- Sık dokur, E., Belivermiş, M., Sezer, N., Pekmez, M., Bulan, Ö. K., & Kılıç, Ö. (2020). Effects of microplastics and mercury on manila clam *Ruditapes philippinarum*: Feeding rate, immunomodulation, histopathology and oxidative stress. *Environmental Pollution*, 262. <https://doi.org/10.1016/j.envpol.2020.114247>
- Smith, M., Love, D., Rochman, C., & Neff, R. (2018). Microplastics in Seafood and the Implications for Human Health. *Current Environmental Health Reports*, 5. <https://doi.org/10.1007/s40572-018-0206-z>
- Soemirat, J. (2013). *Analisis Risiko Kesehatan Lingkungan*. Yogyakarta: Gadjah Mada University Press.
- Song, Y. K., Hong, S. H., Jang, M., Han, G. M., Jung, S. W., & Shim, W. J. (2017). Combined Effects of UV Exposure Duration and Mechanical Abrasion on Microplastic Fragmentation by Polymer Type. *Environmental Science & Technology*, 51(8), 4368–4376. <https://doi.org/10.1021/acs.est.6b06155>
- Steel, B. S., Smith, C., Opsommer, L., Curiel, S., & Warner-Steel, R. (2005). Public ocean literacy in the United States. *Ocean and Coastal Management*, 48(2), 97–114. <https://doi.org/10.1016/j.ocecoaman.2005.01.002>
- Stock, V., Böhmert, L., Lisicki, E., Block, R., Cara-Carmona, J., Pack, L. K., ... Lampen, A. (2019). Uptake and effects of orally ingested polystyrene microplastic particles in vitro and in vivo. *Archives of Toxicology*, 93(7), 1817–1833. <https://doi.org/10.1007/s00204-019-02478-7>
- 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, 716–724. <https://doi.org/https://doi.org/10.1016/j.jhazmat.2018.11.024>
- Suhrhoff, T. J., & Scholz-Böttcher, B. M. (2016). Qualitative impact of salinity, UV radiation and turbulence on leaching of organic plastic additives from four common plastics — A lab experiment. *Marine Pollution Bulletin*, 102(1), 84–94. <https://doi.org/https://doi.org/10.1016/j.marpolbul.2015.11.054>
- Sui, Q., Yang, X., Sun, X., Zhu, L., Zhao, X., Feng, Z., ... Qu, K. (2024). Distribution and accumulation of polycyclic aromatic hydrocarbons and their human health risk assessment in the characteristics of microplastics in marine organisms of China. *Journal of Hazardous Materials*, 473, 134622. <https://doi.org/10.1016/j.jhazmat.2024.134622>
- Swanson, J. C., & Shiels, H. A. (2023). Riverine microplastics and their uptake with freshwater fish. *Water Biology and Security*, 2(4), 100192. <https://doi.org/10.1016/j.watbs.2023.100192>
- Talukder, M. M., Khatun, M. A., Shahjalal, M., Akbor, M. A., Siddique, M. A., ...



- M. A. B., ... Malafaia, G. (2023). Microplastics in different fish and shellfish species in the mangrove estuary of Bangladesh and evaluation of human exposure. *Science of The Total Environment*, 858, 159754. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2022.159754>
- Suwartiningsih, N., Setyowati, I., & Astuti, R. (2020). Microplastics in Pelagic and Demersal Fishes of Pantai Baron, Yogyakarta, Indonesia. *Jurnal Biodjati*, 5(1), 33–49. <https://doi.org/10.15575/biodjati.v5i1.7768>
- Szycher, M. (2012). *Szycher's Handbook of Polyurethanes, Second Edition*. CRC Press.
- Tahir, A., Taba, P., Samawi, M. F., & Werorilangi, S. (2019). Microplastics in water, sediment and salts from traditional salt producing ponds. *Global Journal of Environmental Science and Management*, 5(4), 431–440. <https://doi.org/10.22034/gjesm.2019.04.03>
- Tang, K. H. D., Li, R., Li, Z., & Wang, D. (2024). Health risk of human exposure to microplastics: a review. *Environmental Chemistry Letters*, 22(3), 1155–1183. <https://doi.org/10.1007/s10311-024-01727-1>
- Tanguy, A., Bierne, N., Saavedra, C., Pina, B., Bachère, E., Kube, M., ... Canario, A. (2008). Increasing genomic information in bivalves through new EST collections in four species: Development of new genetic markers for environmental studies and genome evolution. *Gene*, 408(1–2), 27–36. <https://doi.org/10.1016/j.gene.2007.10.021>
- Teuten, E., Saquing, J., Knappe, D., Barlaz, M., Jonsson, S., Bjrn, A., ... Takada, H. (2009). Transport and release of chemicals from plastic to the environment and to wildlife. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, 364, 2027–2045. <https://doi.org/10.1098/rstb.2008.0284>
- Thilagam, H., Swetha, S., Rekha, S., Krishnamurthy, R., Thiagarajan, R., & Gopalakrishnan, S. (2024). Microplastics: Interactive Mechanisms in Human Systems. In V. Sivasankar & T. G. Sunitha (Eds.), *Microplastics and Pollutants: Interactions, Degradations and Mechanisms* (pp. 105–127). https://doi.org/10.1007/978-3-031-54565-8_5
- Thompson, R., Olsen, Y., Mitchell, R., Davis, A., Rowland, S., John, A., ... Russell, A. (2004). Lost at Sea: Where Is All the Plastic? *Science (New York, N.Y.)*, 304, 838. <https://doi.org/10.1126/science.1094559>
- Thushari, G. G. N., & Senevirathna, J. D. M. (2020). Plastic pollution in the marine environment. *Heliyon*, 6(8). <https://doi.org/10.1016/j.heliyon.2020.e04709>
- Toxics Link. (2020). Quantitative analysis of microplastics along River Ganga. Retrieved from [http://toxicslink.org/docs/Quantitative analysis of Microplastics along River Ganga.pdf](http://toxicslink.org/docs/Quantitative%20analysis%20of%20Microplastics%20along%20River%20Ganga.pdf)
- Trotman, E. R. (1985). *Dyeing and Chemical Technology of Textile Fibres*. Wiley.
- Tuhumury C, N., & Ritonga, A. (2020). Identifikasi Keberadaan dan Jenis Mikroplastik pada Kerang Darah (*Anadara granosa*) di Perairan Tanjung Tiram, Teluk Ambon. *TRITON: Jurnal Manajemen Sumberdaya Perairan*, 16(1), 1–7. <https://doi.org/10.30598/tritonvol16issue1page1-7>
- Environmental Protection Agency (U.S EPA). (2017). Conducting a Risk Assessment.
- Environmental Protection Agency (U.S EPA). (2024). Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Guidelines for Non-Carcinogenic Effects. Retrieved from <https://www.epa.gov/risk/risk-management-assessments-and-guidance>
- & Gupta, A. (2021). Microplastics as contaminants in Indian



- environment: a review. *Environmental Science and Pollution Research*, 28(48), 68025–68052. <https://doi.org/10.1007/s11356-021-16827-6>
- Van Cauwenberghe, L., Claessens, M., Vandegehuchte, M. B., & Janssen, C. R. (2015). Microplastics are taken up by mussels (*Mytilus edulis*) and lugworms (*Arenicola marina*) living in natural habitats. *Environmental Pollution*, 199, 10–17. <https://doi.org/https://doi.org/10.1016/j.envpol.2015.01.008>
- Van Cauwenberghe, L., & Janssen, C. R. (2014). Microplastics in bivalves cultured for human consumption. *Environmental Pollution*, 193, 65–70. <https://doi.org/10.1016/j.envpol.2014.06.010>
- van Raamsdonk, L. W. D., van der Zande, M., Koelmans, A. A., Hoogenboom, R. L. A. P., Peters, R. J. B., Groot, M. J., ... Weesepoel, Y. J. A. (2020). Current Insights into Monitoring, Bioaccumulation, and Potential Health Effects of Microplastics Present in the Food Chain. *Foods*, 9(1). <https://doi.org/10.3390/foods9010072>
- Van Rensburg, M. L., Nkomo, S. L., & Dube, T. (2020). The ‘plastic waste era’: social perceptions towards single-use plastic consumption and impacts on the marine environment in Durban, South Africa. *Applied Geography*, 114, 102132. <https://doi.org/https://doi.org/10.1016/j.apgeog.2019.102132>
- Vikas Madhav, N., Gopinath, K. P., Krishnan, A., Rajendran, N., & Krishnan, A. (2020). A critical review on various trophic transfer routes of microplastics in the context of the Indian coastal ecosystem. *Watershed Ecology and the Environment*, 2, 25–41. <https://doi.org/10.1016/j.wsee.2020.08.001>
- Vivekanand, A. C., Mohapatra, S., & Tyagi, V. K. (2021). Microplastics in aquatic environment: Challenges and perspectives. *Chemosphere*, 282(April), 131151. <https://doi.org/10.1016/j.chemosphere.2021.131151>
- Wahdani, A., Yaqin, K., Rukminasari, N., Inaku, D. F., & Fachruddin, L. (2020). Konsentrasi Mikroplastik pada Kerang Manila Venerupis Philippinarum di Perairan Maccini Baji, Kecamatan Labakkang, Kabupaten Pangkajen Kepulauan, Sulawesi Selatan. *Maspuri Journal: Marine Science Research*, 12(2), 1–14.
- Wahdani, A., Yaqin, K., Rukminasari, N., Suwarni, Nadiarti, Inaku, D., & Fachruddin, L. (2020). Konsentrasi Mikroplasti Pada Kerang Manila (Venerupis philippinarum). *Maspuri Journal*, 12, 1–14. <https://doi.org/10.36706/maspuri.v12i2.12805>
- Walkinshaw, C., Lindeque, P. K., Thompson, R., Tolhurst, T., & Cole, M. (2020). Microplastics and seafood: lower trophic organisms at highest risk of contamination. *Ecotoxicology and Environmental Safety*, 190(December 2019), 110066. <https://doi.org/10.1016/j.ecoenv.2019.110066>
- Wang, W., Gao, H., Jin, S., Li, R., & Na, G. (2019). The ecotoxicological effects of microplastics on aquatic food web, from primary producer to human: A review. *Ecotoxicology and Environmental Safety*, 173, 110–117. <https://doi.org/https://doi.org/10.1016/j.ecoenv.2019.01.113>
- Wanyama, W. O., Oluwu, E., Ngila, J. C., & Ndungu, P. G. (2023). Effect of seawater physiochemical parameters on the physiological and energy metabolism responses of the common limpet (*Patella vulgata antiquata*) of Gazi Bay, Kenya. *Marine Pollution Bulletin*, 195, doi.org/https://doi.org/10.1016/j.marpolbul.2023.115500
- Ward, R. S. (2020). Investigation of Microplastics in Freshwater Mussels (*Ligona costata*) From the Grand River Watershed in Ontario, Canada. *Air, Water, Soil Pollution*, 231(8). <https://doi.org/10.1007/s11270-020-05070-0>



- WHO. (2004). *Environmental Health Criteria XXX: Principles for Modelling, Dose Response for The Risk Assessment of Chemicals*. JENEWA.
- Wootton, N., Reis-Santos, P., & Gillanders, B. M. (2021). Microplastic in fish – A global synthesis. *Reviews in Fish Biology and Fisheries*, 31(4), 753–771. <https://doi.org/10.1007/s11160-021-09684-6>
- World Bank Group. (2018). Indonesian Marine Debris Hotspot. *Public Disclosure Authorized*, (April), 1–49. Retrieved from <http://documents.worldbank.org/curated/en/642751527664372193/pdf/126686-INDONESIA-29-5-2018-14-34-5-SynthesisFullReportAPRILIND.pdf>
- World Economic Forum. (2020). Plastics, the Circular Economy and Global Trade. *World Economic Forum*, (July), 22. Retrieved from http://www3.weforum.org/docs/WEF_Plastics_the_Circular_Economy_and_Global_Trade_2020.pdf
- Worm, B., Lotze, H. K., Jubinville, I., Wilcox, C., & Jambeck, J. (2017). Plastic as a Persistent Marine Pollutant. *Annual Review of Environment and Resources*, 42(Volume 42, 2017), 1–26. <https://doi.org/https://doi.org/10.1146/annurev-environ-102016-060700>
- Wright, S. L., & Kelly, F. J. (2017). Plastic and Human Health: A Micro Issue? *Environmental Science & Technology*, 51(12), 6634–6647. <https://doi.org/10.1021/acs.est.7b00423>
- Wright, S. L., Rowe, D., Thompson, R. C., & Galloway, T. S. (2013). Microplastic ingestion decreases energy reserves in marine worms. *Current Biology*, 23(23), R1031–R1033. <https://doi.org/https://doi.org/10.1016/j.cub.2013.10.068>
- Wypych, G. (2018). *Handbook of Materials Weathering*. ChemTec Publishing.
- Xie, X., Deng, T., Duan, J., Xie, J., Yuan, J., & Chen, M. (2020). Exposure to polystyrene microplastics causes reproductive toxicity through oxidative stress and activation of the p38 MAPK signaling pathway. *Ecotoxicology and Environmental Safety*, 190(June 2019), 110133. <https://doi.org/10.1016/j.ecoenv.2019.110133>
- Xu, Q., Yin, X., Wang, M., Wang, H., Zhang, N., Shen, Y., ... Gu, Z. (2010). Analysis of Phthalate Migration from Plastic Containers to Packaged Cooking Oil and Mineral Water. *Journal of Agricultural and Food Chemistry*, 58(21), 11311–11317. <https://doi.org/10.1021/jf102821h>
- Yao, P., Zhou, B., Lu, Y. H., Yin, Y., Zong, Y. Q., Chen, M. Te, & O'Donnell, Z. (2019). A review of microplastics in sediments: Spatial and temporal occurrences, biological effects, and analytic methods. *Quaternary International*, 519(March), 274–281. <https://doi.org/10.1016/j.quaint.2019.03.028>
- Yar Johan, Manalu, F., Muqsit, A., Rent, P. P., & Purnama, D. (2021). Microplastic Analysis of Economic Fishes in Segarakota Bengkulu. *Jurnal Enggano*, 6(2), 369–384.
- Yuan, K.-K., Yu, Y.-Y., Mo, Y.-H., Liu, Y.-J., Zhang, W.-X., Lv, J.-J., ... Yang, W.-D. (2024). Exposure to microplastics renders immunity of the thick-shell mussel (*Mytilus galloprovincialis*) to diarrhetic shellfish toxin-producing harmful algae. *Science of the Total Environment*, 926, 172125. <https://doi.org/10.1016/j.scitotenv.2024.172125>
- Zaini, A., & Bahar, B. (2019). Analysis of Microplastic Content in Siganus Fish (Siganus sp) and Kakap Fish (Lutjanus sp) in the Coastal Area of Kuala Subdistrict, Jeneponto Regency. *Indian Journal of Public Health & Development*, 10, 1493. <https://doi.org/10.5958/0976-1818.18.1>



- Zhang, D., Li, J., Ju, P., Cao, W., Jiang, F., & Sun, C. (2024). Occurrence of microplastics in the Haima cold seep area of the South China Sea. *Science of The Total Environment*, 934, 173072. [https://doi.org/https://doi.org/10.1016/j.scitotenv.2024.173072](https://doi.org/10.1016/j.scitotenv.2024.173072)
- Zhang, K., Liang, J., Liu, T., Li, Q., Zhu, M., Zheng, S., & Sun, X. (2022). Abundance and characteristics of microplastics in shellfish from Jiaozhou Bay, China. *Journal of Oceanology and Limnology*, 40(1), 163–172. <https://doi.org/10.1007/s00343-021-0465-7>
- Zhang, X. F., Liu, Z. G., Shen, W., & Gurunathan, S. (2016). Silver nanoparticles: Synthesis, characterization, properties, applications, and therapeutic approaches. *International Journal of Molecular Sciences*, 17(9). <https://doi.org/10.3390/ijms17091534>
- Zhao, X., Wang, J., Yee Leung, K. M., & Wu, F. (2022). Color: An Important but Overlooked Factor for Plastic Photoaging and Microplastic Formation. *Environmental Science & Technology*, 56(13), 9161–9163. <https://doi.org/10.1021/acs.est.2c02402>
- Zhu, J., Zhang, Q., Li, Y., Tan, S., Kang, Z., Yu, X., ... Shi, H. (2019). Microplastic pollution in the Maowei Sea, a typical mariculture bay of China. *Science of The Total Environment*, 658, 62–68. <https://doi.org/https://doi.org/10.1016/j.scitotenv.2018.12.192>
- Zitouni, N., Bousserrhine, N., Belbekhouche, S., Missawi, O., Alphonse, V., Boughatass, I., & Banni, M. (2020). First report on the presence of small microplastics ($\leq 3 \mu\text{m}$) in tissue of the commercial fish *Serranus scriba* (Linnaeus. 1758) from Tunisian coasts and associated cellular alterations. *Environmental Pollution*, 263, 114576. <https://doi.org/https://doi.org/10.1016/j.envpol.2020.114576>
- Zou, J., Zhang, M., Huang, M., Zhao, D., & Dai, Y. (2022). Structure, Properties, and Modification of Polytrifluorochloroethylene: A Review. *Frontiers in Materials*, 9(March), 1–11. <https://doi.org/10.3389/fmats.2022.824155>



Optimization Software:
www.balesio.com

LEMBAR PENJELASAN KEPADA CALON SUBJEK

Salam sehat untuk kita semua, Perkenalkan nama saya Sarinah Basri K, saya adalah dosen S1 Kesehatan Masyarakat Universitas Negeri Gorontalo Sedang menjalani studi Doktoran (S3) pada Fakultas Kesehatan Masyarakat Universitas Hasanuddin (UNHAS). Saat ini saya melakukan penelitian tentang Analisis Risiko Mikroplastik Pada Kerang dan Ikan di Wilayah Pesisir Kabupaten Jeneponto". Penelitian ini disponsori oleh Beasiswa Pendidikan Pascasarjana Dalam Negeri (BPPDN) Kementerian Riset dan Teknologi. Penelitian ini bertujuan untuk menganalisis risiko mikroplastik pada kerang dan ikan terhadap kesehatan penduduk Wilayah Pesisir Kabupaten Jeneponto. Peneliti menawarkan partisipasi ibu/bapak untuk menjadi responden dan mengikuti penelitian.

A. Kesukarelaan untuk ikut penelitian

Anda bebas memilih keikutsertaan dalam penelitian ini tanpa ada paksaan. Bila Anda sudah memutuskan untuk ikut, Anda juga bebas untuk mengundurkan diri/ berubah pikiran setiap saat tanpa dikenai denda atau pun sanksi apapun.

B. Prosedur Penelitian

Apabila Anda bersedia berpartisipasi dalam penelitian ini, Anda diminta menandatangani lembar persetujuan ini rangkap dua, satu untuk Anda simpan, dan satu untuk untuk peneliti. Prosedur selanjutnya adalah:

1. Peneliti akan melakukan wawancara pada waktu dan tempat yang telah disepakati. Dalam penelitian ini, wawancara akan dilakukan selama 60-90 menit dan akan menggunakan kuesioner untuk mempermudah proses penelitian.
2. Peneliti akan menanyakan tentang pola konsumsi kerang dan ikan pada masyarakat dan data karakteristik responden mengenai antropometri melalui wawancara dan pengukuran langsung. Apabila selama proses wawancara Bapak/Ibu merasa tidak nyaman, maka Bapak/Ibu dapat mengundurkan diri dari penelitian ini.
3. Semua catatan yang ada dalam penelitian ini akan dijamin kerahasiaannya. Peneliti akan memberikan hasil penelitian ini jika Bapak/Ibu menginginkannya. Hasil penelitian ini akan diberikan juga kepada institusi tempat peneliti belajar dengan tetap menjaga penuh kerahasiaannya.

C. Kewajiban subyek penelitian

Sebagai subyek penelitian, bapak/ibu/saudara berkewajiban mengikuti aturan atau petunjuk penelitian seperti yang tertulis di atas. Bila ada yang belum jelas, bapak/ibu/saudara bisa bertanya lebih lanjut kepada peneliti.

D. Risiko dan efek samping dan penanganannya

Penelitian ini tidak memiliki dampak negatif terhadap Bapak/Ibu atau



dampak kesehatan jangka Panjang.

F. Kerahasiaan

Semua informasi yang berkaitan dengan identitas subyek penelitian akan dirahasiakan dan hanya akan diketahui oleh peneliti, staf penelitian, pihak kampus. Penelitian akan dipublikasikan tanpa identitas subyek penelitian

G. Kompensasi

Bapak/Ibu akan mendapatkan souvenir berupa barang

H. Pembiayaan

Semua biaya yang terkait penelitian akan ditanggung oleh peneliti dan sponsor

I. Informasi tambahan

Bapak/ ibu/ saudara diberi kesempatan untuk menanyakan semua hal yang belum jelas sehubungan dengan penelitian ini. Bila sewaktu-waktu terjadi efek samping atau membutuhkan penjelasan lebih lanjut, Bapak/ ibu/ saudara dapat menghubungi peneliti (Sarinah Basri K) di nomor HP 082127066768. Bapak/ ibu/ saudara juga dapat menanyakan tentang penelitian kepada Komite Etik Penelitian Kedokteran dan Kesehatan Fakultas Kedokteran UNHAS

Makassar,

2024

Peneliti,

Sarinah Basri K., SKM., M.Kes



LEMBAR PERSETUJUAN INFORMAN/RESPONDEN

Saya yang bertanda tangan di bawah ini :

Nama :

NIK (jika ada) :

Tempat, tanggal lahir :

Alamat tempat tinggal :

Nomor HP :

Setelah mendengarkan penjelasan dari peneliti, saya mengerti bahwa penelitian ini akan menghormati hak-hak saya selaku partisipan. Saya mempunyai hak untuk tidak melanjutkan keikutsertaan dalam penelitian ini jika suatu saat merugikan saya. Saya sangat memahami bahwa penelitian ini sangat bermanfaat untuk mengetahui kontaminasi mikroplastik pada kerang dan ikan serta bahayanya terhadap Kesehatan. Dengan menandai tangani lembar persetujuan ini, berarti saya menyatakan bersedia untuk berpartisipasi dalam penelitian ini dengan ikhlas tanpa ada paksaan dan tekanan dari siapapun.

Makassar, 2024

Peneliti

Partisipan

(.....)

(.....)

KUISIONER PENELITIAN

ANALISIS RISIKO MIKROPLASTIK PADA KERANG DAN IKAN DI WILAYAH PESISIR KABUPATEN JENEPOINTO

Hari/Tanggal :
Nama Pewancara :
Kecamatan :
Kelurahan/Desa :
Dusun :
RW/RT :

A. DATA KARAKTERISTIK

A.1	Nomor urut Responden	
A.2	Nama responden	
A.3	Status dalam keluarga 1. Kepala keluarga 2. Istri 3. Anak 4. Ibu/ayah 5. Mertua 6. Sepupu 7. Keluarga 8. Lainnya	
A.4	Jenis kelamin 1. Laki-laki 2. Perempuan	
A.5	Pendidikan responden : 1. Tidak sekolah 2. SD 3. SMP 4. SMA 5. Perguruan Tinggi	
A.6	Penghasilan Responden : 1. < Rp. 1.000.000 2. Rp 1.000.000 – Rp 2.000.000 3. Rp 2.000.000 – Rp 3.000.000 4. Rp 3.000.000 – Rp 4.000.000 5. Rp 4.000.000 – Rp 5.000.000 Rp 5.000.000	
	Telepon/HP	



B. ANTROPOMETRI

B.1	Berat Badan		Kg
B.2	Umur		Tahun

C. ANALISIS PAJANAN

C.1	Berapa lama tinggal di alamat ini (<i>Dt</i>)?		Tahun
-----	--	--	-------

D. KONSUMSI KERANG

D.1	Dimanakah Anda mendapatkan kerang?	
D.2	Cara Pengolahan Kerang	
D.3	Apakah Kerang sebagai menu wajib setiap kali makan 1.Ya 2.Tidak	
D.4	Pilihlah jenis kerang yang paling sering Anda konsumsi (Boleh memilih lebih dari satu opsi)!	



Kerang Darah



Kerang Hijau



Kerang Bulu



Kerang Manila



nnya

Sebutkan :

- 1.
- 2.
- 3.

Dstnya..

D.5	Food Frequensi Konsumsi Kerang Manila	
D.5.1	Kapan terakhir anda mengkonsumsi Kerang Manila	
D.5.2	Seberapa sering Anda mengkonsumsi kerang Manila (fE) <ol style="list-style-type: none"> 1. Setiap Hari 2. 6 hari/ minggu 3. 5 hari/minggu 4. 4 hari/minggu 5. 3 hari/minggu 6. 2 hari/minggu 7. 1 hari/minggu 8. 2 minggu sekali 9. Sebulan sekali 10. lainnya 	
D.5.3	Berapa kali dalam sehari Anda mengkonsumsi kerang (kali/hari)	
D.5.4	Berapa jumlah kerang yang anda konsumsi.....URT/gram Menggunakan sdm/centong/mangkok/lainnya	
D.6	Food Frequensi Konsumsi Kerang Bulu	
D.6.1	Kapan terakhir anda mengkonsumsi Kerang Manila	
D.6.2	Seberapa sering Anda mengkonsumsi kerang Bulu (fE) <ol style="list-style-type: none"> 1. Setiap Hari 2. 6 hari/ minggu 3. 5 hari/minggu 4. 4 hari/minggu 5. 3 hari/minggu 6. 2 hari/minggu 7. 1 hari/minggu 8. 2 minggu sekali 9. Sebulan sekali 10. lainnya 	
D.6.3	Berapa kali dalam sehari Anda mengkonsumsi kerang (kali/hari)	
D.6.4	Berapa jumlah kerang yang anda konsumsi.....URT/gram Menggunakan sdm/centong/mangkok/lainnya	



E. KONSUMSI IKAN

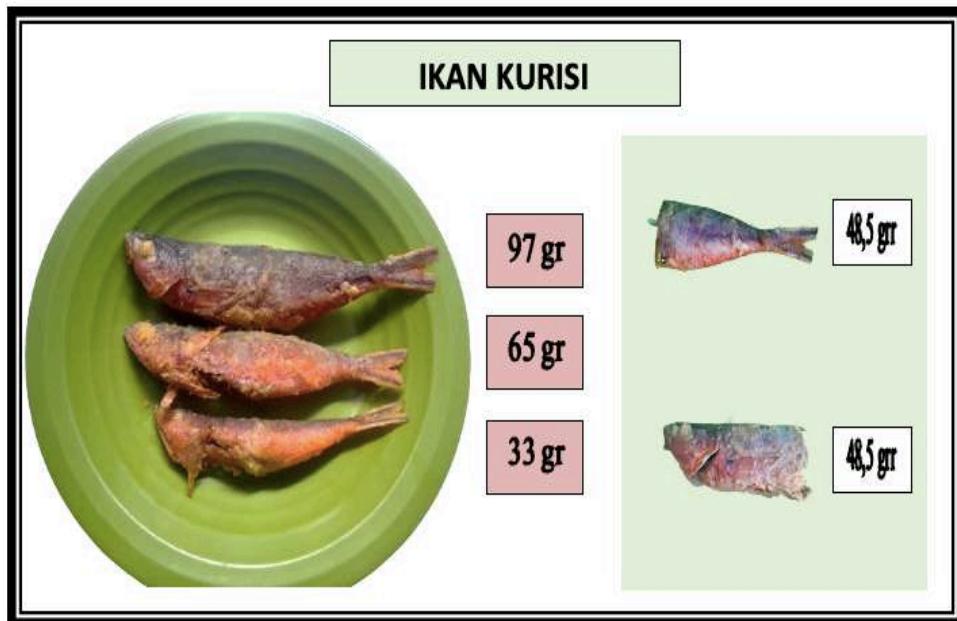
E.1	Dimanakah Anda mendapatkan ikan segar?	
E.2	Cara Pengolahan Ikan?	
E.3	Apakah ikan sebagai menu wajib setiap kali makan 1.Ya 2.Tidak	
E.4	Pilihlah jenis kerang yang paling sering Anda konsumsi (Boleh memilih lebih dari satu opsi)!	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <input type="checkbox"/> Ikan layang </div> <div style="text-align: center;">  <input type="checkbox"/> Ikan Kembung </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;">  <input type="checkbox"/> Ikan Kurisi/Koli </div> <div style="text-align: center;">  <input type="checkbox"/> Ikan Gulamah/Samge </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;"> <input type="checkbox"/> Lainnya </div> <div style="border: 1px solid black; padding: 10px; width: 200px;"> Sebutkan : <ul style="list-style-type: none"> 1. 2. 3. Dstnya.. </div> </div>



E.5.2	Seberapa sering Anda mengkonsumsi Ikan Kurisi (fE) 1. Setiap Hari 2. 6 hari/ minggu 3. 5 hari/minggu 4. 4 hari/minggu 5. 3 hari/minggu 6. 2 hari/minggu 7. 1 hari/minggu 8. 2 minggu sekali 9. Sebulan sekali 10. lainnya	
E.5.3	Berapa kali dalam sehari Anda mengkonsumsi ikan kurisi..(kali/hari)	
E.5.4	Berapa jumlah ikan yang anda konsumsi (R)....URT/gram	
E.6	Food Frequensi Konsumsi Ikan Gulamah	
E.6.1	Kapan terakhir anda mengkonsumsi Ikan Gulamah	
E.6.2	Seberapa sering Anda mengkonsumsi Ikan Gulamah (fE) 1. Setiap Hari 2. 6 hari/ minggu 3. 5 hari/minggu 4. 4 hari/minggu 5. 3 hari/minggu 6. 2 hari/minggu 7. 1 hari/minggu 8. 2 minggu sekali 9. Sebulan sekali 10. lainnya	
E.6.3	Berapa kali dalam sehari Anda mengkonsumsi Ikan Gulamah (kali/hari)	
E.6.4	Berapa jumlah ikan yang anda konsumsi.....URT/gram	



Food Model Konsumsi Ikan di Wilayah Pesisir Jeneponto



Optimization Software:
www.balesio.com

Food Model Konsumsi Kerang di Wilayah Pesisir Jeneponto

KERANG BULU

1 Ekor Kerang (7,2 gr)

1 SDM (14,4 gr)

1 Sendok Sayur (36 gr)

1 Centong Plastik (57,6 gr)

1 Mangkok Kaca (144 gr)



KERANG MANILA

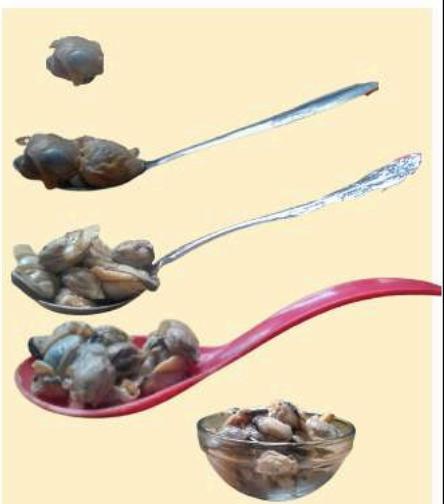
1 Ekor Kerang (7,2 gr)

1 SDM (14,4 gr)

1 Sendok Sayur (36 gr)

1 Centong Plastik (57,6 gr)

1 Mangkok Kaca (144 gr)





KEMENTERIAN PENDIDIKAN KEBUDAYAAN,
RISET DAN TEKNOLOGI
UNIVERSITAS HASANUDDIN
FAKULTAS KESEHATAN MASYARAKAT

Jl. Perintis Kemerdekaan Km.10 Makassar 90245, Telp.(0411) 585658,
e-mail : fkm.unhas@gmail.com, website: https://fkm.unhas.ac.id/

Nomor : 02972/UN4.14.1/PT.01.04/2024

3 April 2024

Lampiran :

Hal : Permohonan Izin Penelitian

Yth. Kepala Dinas Peranaman Modal dan Pelayanan Terpadu
Satu Pintu Provinsi Sulawesi Selatan
di Makassar

Dengan hormat, kami sampaikan bahwa mahasiswa Program Studi S3 Ilmu Kesehatan Masyarakat Fakultas Kesehatan Masyarakat Universitas Hasanuddin, yang tersebut di bawah ini:

Nama : Sarinah Basni K.
Nim : K013191029
Program Pendidikan : Doktor
Program Studi : Ilmu Kesehatan Masyarakat

Bermaksud melakukan penelitian dalam rangka persiapan penulisan Disertasi dengan Judul **Analisis Risiko Mikroplastik Pada Kerang dan Ikan di Wilayah Pesisir Kabupaten Jenepono**".

Promotor : Prof. Dr. Anwar Daud, SKM., M.Kes
Ko-Promotor : Dr. Agus Bintara Birawida,S.Kel,M.Kes
Ko-Promotor : Dr. Maming, MS
Waktu Penelitian : Bulan April s.d.Juni 2024
Tempat Penelitian :
1. Desa Bontosunggu, Kecamatan Tamalatea, Kabupaten Jenepono
2. Desa Bontojai, Kecamatan Tamalatea, Kabupaten Jenepono
3. Desa Garassikang, Kecamatan Bangkala Barat, Kabupaten Jenepono
4. Kelurahan Pantai Bahari, Kecamatan Bangkala, Kabupaten Jenepono

Sehubungan dengan hal tersebut kami mohon kebijaksanaan Bapak/Ibu kiranya berkenan memberi izin kepada yang bersangkutan.

Atas perkenan dan kerjasama Bapak/Ibu diucapkan terima kasih.

a.n. Dekan
Wakil Dekan Bidang Akademik dan Kemahasiswaan



Tembusan:



natan Masyarakat Dr. Wahiduddin, SKM.,M.Kes
an); NIP. 19760407 200501 1 004
saha Fakultas
st Unhas;
san
itas Kesehatan

Optimization Software:
www.balesio.com



Catatan
1. LGL-002 No. 11 Tahun 2008 Pasal 5 Ayat 1 "Informasi Elektronik Apresiasi Dokumen Elektronik diberikan hasil verifikasi dan pemeriksaan oleh lembaga yang setuju".
2. Dokumen ini belum ditandatangani secara elektronik menggunakan sertifikat elektronik yang diberikan oleh BNSP.



PEMERINTAH PROVINSI SULAWESI SELATAN
DINAS PENANAMAN MODAL DAN PELAYANAN TERPADU SATU PINTU

Jl. Bougainville No.5 Telp. (0411) 441077 Fax. (0411) 448936
Website : <http://simap-new.sulselprov.go.id> Email : ptsp@sulselprov.go.id
Makassar 90231

Nomor : 8417/S.01/PTSP/2024
Lampiran : -
Perihal : Izin penelitian

Kepada Yth.
Bupati Jeneponto

di-
Tempat

Berdasarkan surat Dekan Fak. Kesehatan Masyarakat UNHAS Makassar Nomor : 02972/UN4.14.1/PT.01.04/2024 tanggal 3 April 2024 perihal tersebut diatas, mahasiswa/peneliti dibawah ini:

Nama :
Nomor Pokok :
Program Studi :
Pekerjaan/Lembaga :
Alamat :

: SARINAH BASRI K.
: K013191029
: Ilmu Kesehatan Masyarakat
: Mahasiswa (S3)
: Jl. P. Kemerdekaan Km. 10 Makassar
PROVINSI SULAWESI SELATAN

Bermaksud untuk melakukan penelitian di daerah/kantor saudara dalam rangka menyusun Disertasi, dengan judul :

**" ANALISIS RISIKO MIKROPLASTIK PADA KERANG DAN IKAN DI WILAYAH PESISIR
KABUPATEN JENEPOINTO "**

Yang akan dilaksanakan dari : Tgl. **16 April s/d 16 Juni 2024**

Sehubungan dengan hal tersebut diatas, pada prinsipnya kami **menyetujui** kegiatan dimaksud dengan ketentuan yang tertera di belakang surat izin penelitian.

Demikian Surat Keterangan ini diberikan agar dipergunakan sebagaimana mestinya.

Diterbitkan di Makassar
Pada Tanggal 05 April 2024

**KEPALA DINAS PENANAMAN MODAL DAN PELAYANAN TERPADU
SATU PINTU PROVINSI SULAWESI SELATAN**



ASRUL SANI, S.H., M.Si.
Pangkat : PEMBINA TINGKAT I
Nip : 19750321 200312 1 008

Tembusan Yth

1. Dekan Fak. Kesehatan Masyarakat UNHAS Makassar;
2. Pertinggal;



Optimization Software:
www.balesio.com

LAMPIRAN

- A. Dokumentasi Penelitian
1. Survei Pendahuluan



Gambar 1. Ijin dengan pihak Desa



Gambar 2 . Diskusi bersama warga/nelayan setempat

2. Pengambilan titik lokasi



Gambar 3. Pengambilan titik lokasi kerang



Gambar 4. Pengambilan titik lokasi ikan

3. Pengambilan Sampel



Pengambilan Kerang



Gambar 6. Pengambilan Kerang





Gambar 7. Lokasi Pengambilan Titik Ikan



Gambar 8. Lokasi Pengambilan titik Ikan



Gambar 9. Lokasi Pengambilan Ikan



Gambar 10. Wawancara warga



Gambar 11. Wawancara warga



Gambar 12. Timbang berat badan

4. Alat



Timbangan Digital



Optimization Software:
www.balesio.com



Gambar 14. Timbangan Digital



Gambar 15. Mikroskop Stereo



Gambar 16. FTIR



Gambar 17. Gelas Beaker



Gambar 18. Labu Erlenmeyer



Gambar 19. Jangka Sorong



Gambar 20. Spatula Pengaduk



Cawan Petri



Optimization Software:
www.balesio.com



Gambar 22. Pinset



Gambar 23. Pisau Bedah



Gambar 24. Coolbox



Gambar 25. Masker



Gambar 26. Sarung tangan



Gambar 27. Botol Sampel



Gambar 28. Botol Semprot



Kemasan Sampel



Optimization Software:
www.balesio.com



Gambar 30. Kertas label

5. Bahan



Gambar 31. Kalium Hidroksida



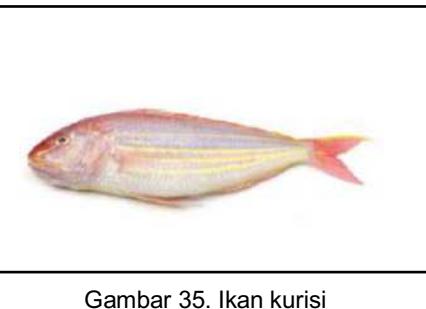
Gambar 32. Aquades



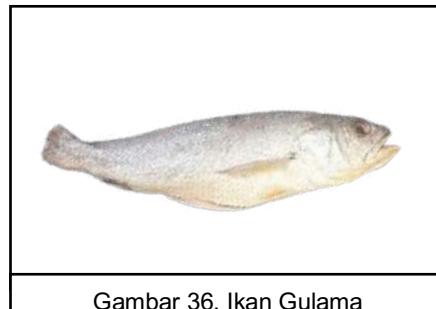
Gambar 33. Kerang Bulu



Gambar 34. Kerang Manila



Gambar 35. Ikan kurisi



Gambar 36. Ikan Gulama

6. Prosedur Pemeriksaan



ium hidroksida
gram ditimbang

Optimization Software:
www.balesio.com



Gambar 38. Kalium hidroksida
dilarutkan dalam aquades dengan
perbandingan 1:5



Gambar 39. Larutan KoH 20% diaduk hingga bening



Gambar 40. Sampel kerang dan ikan dikeluarkan dari coolbox untuk



Gambar 41. Kerang dan ikan terlebih dahulu ditimbang sebelum dibuka dan dipisahkan jaringan lunaknya



Gambar 42. Sampel kerang dan ikan diukur menggunakan jangka sorong



Gambar 43. Mengeluarkan isi perut ikan kemudian ditimbang



Gambar 44. Mengeluarkan isi kerang dari cangkangnya kemudian ditimbang



I yang ditimbang
dalam botol sampel



Gambar 46. Botol sampel ditandai sesuai dengan kode sampel





Gambar 47. Sampel ditambahkan larutan KOH



Gambar 48. Sampel diinkubasi hingga seluruh jaringan lunak larut



Gambar 49. Sampel kemudian dipindahkan ke kaca preparat



Gambar 50. Sampel diamati langsung dengan mikroskop stereo



Gambar 51. Sampel kemudian diamati dengan FTIR



Gambar 52. Menyimpan data setiap sampel polimer



Optimization Software:
www.balesio.com

HASIL PEMERIKSAAN MORFOLOGI KERANG DAN IKAN

Tempat : Laboratorium Kimia Biofisik FKM Unhas

Sampel 1. Kerang Manila (*Venerupis philippinarum*)
 2. Kerang Bulu (*Anadara Antiquata*)
 3. Ikan Kurisi (*Nemiptus japonicas*)
 4. Ikan Gulamah (*Johnius sp.*)

Jumlah Sampel : 30 ekor kerang dan 30 ekor ikan

1. Kerang Bulu (*Anadara Antiquata*)

Kode Sampel	TIC (cm)	PC (cm)	LEC (cm)	BT (gr)	BC (gr)	BB (gr)
Area I (A1)						
KG 1	3,0	5,5	3,3	53,0	45	8,0
KG 2	3,0	5,1	2,6	38,1	31,1	7,0
KG 3	3,2	5,0	2,9	34,5	29	5,5
KG 4	3,6	5,7	3,6	69,5	57,5	12,0
KG 5	3,3	5,5	3,4	55,0	46	9,0
Area II (A2)						
KG 6	3,5	5,5	3,1	49,0	41	8,0
KG 7	3,0	5,1	3,4	49,5	38,5	11,0
KG 8	3,2	5,4	2,9	40,5	33	7,5
KG 9	3,1	5,1	2,9	39,5	32,5	7,0
KG 10	3,3	4,9	2,7	36,0	29,5	6,5
Area III (A3)						
KG 11	3,0	5,1	3,0	40,5	34	6,5
KG 12	2,8	4,6	2,7	32,0	25	7,0
KG 13	3,4	5,2	2,6	45,0	36	9,0
KG 14	2,8	5,0	2,7	30,0	25	5,0
KG 15	3,1	4,0	2,8	41,0	31,5	9,5

2. Kerang Manila (*Venerupis philippinarum*)

Kode Sampel	TIC (cm)	PC (cm)	LEC (cm)	BK (gr)	BC (gr)	BB (gr)
Area I (B1)						
6	4,4	2,5	26,0	19	7,0	
7	4,6	2,8	30,5	23,5	7,0	
9	4,7	3,0	31,5	24	7,5	
3	5,0	3,2	44,0	33,5	10,5	
2	4,0	2,1	21,5	16,5	5,0	
Area II (B2)						

KB 6	3,8	4,6	2,9	32,0	24	8,0
KB 7	3,3	4,3	2,3	24,5	18,5	6,0
KB 8	4,2	5,2	3,0	42,0	31	11,0
KB 9	3,9	4,8	2,8	43,0	33	10,0
KB 10	3,9	4,9	2,7	41,0	34	7,0
Area III (B3)						
KB 11	3,9	4,9	2,7	32,5	24,5	8,0
KB 12	4,2	5,2	2,9	50,0	41	9,0
KB 13	4,2	5,1	3,0	39,5	30,5	9,0
KB 14	3,7	4,8	2,6	27,0	19,5	7,5
KB 15	4,1	4,8	3,0	41,0	33	8,0

Keterangan :

- Panjang Cangkang (PC) : Jarak dari bagian anterior sampai bagian posterior kerang.
- Tinggi Cangkang (TIC) : Jarak dari bagian dorsal yaitu pada bagian umbo sampai bagian ventral
- Tebal Cangkang (TEC) : Jarak titik tertinggi dari cangkang kanan dan cangkang kiri
- Berat Total (BT) : Berat keseluruhan kerang, termasuk cangkang dan daging
- Berat Cangkang (BC) : Berat dari cangkang atau kulit luar kerang
- Berat Basah (BB) : Berat dari daging atau isi kerang saat masih segar dan belum dimasak

3. Ikan Gulamah (*Johnius sp.*)

Kode Sampel	Panjang (cm)	Berat (gram)
Area I (C1)		
IG 1	16,7	72,0
IG 2	16,3	70,0
IG 3	16,2	72,5
IG 4	15,7	61,5
IG 5	17,9	92,0
Area II (C2)		
IG 6	14	42,5
IG 7	16,6	71,5
IG 8	13,9	40,5
IG 9	16	61,5
IG 10	16,9	67,5
Area III (C3)		
IG 11	15,5	59,5
IG 12	15,7	41,5
	13,8	61,0
	15,7	54,5
	15,4	60,5



4. Ikan Kurisi (*Nemiptus japonicas*)

Kode Sampel	Panjang (cm)	Berat (gram)
Area I (D1)		
IM 1	16,3	44,0
IM 2	22,1	119,5
IM 3	19,05	84,5
IM 4	17,9	66,5
IM 5	17,6	78,5
Area II (D2)		
IM 6	18,2	60,57
IM 7	16,8	60,50
IM 8	20,6	118,5
IM 9	21,3	123,5
IM 10	17,0	64,0
Area III (D3)		
IM 11	18,9	85,0
IM 12	20	130,5
IM 13	19,7	90,5
IM 14	17,01	77,5
IM 15	16,6	58,5

Keterangan :

- Panjang : Ukuran panjang total dari ujung kepala hingga ujung ekor ikan.
- Berat : Ukuran massa atau bobot total dari ikan.





**LABORATORIUM EKOTOXIKOLOGI LAUT
DEPARTEMEN ILMU KELAUTAN
FAKULTAS ILMU KELAUTAN DAN PERIKANAN
UNIVERSITAS HASANUDDIN**

Jl. Perintis Kemerdekaan, KM 10 Tamalanrea, Makassar, Indonesia 90245
Telp. (0411) 586025, Hp. 0815-250-4202

Hasil identifikasi dan Analisis Mikroplastik (MP) pada Kerang

1. Hasil Identifikasi Sampel Kerang Bulu (Anadara Antiquata)

Lokasi	:	Jenepono
Jumlah sampel	:	15 individu
Jumlah sampel terdeteksi MP	:	12 individu
Jumlah MP yang ditemukan pada	:	58 item
Persen kontaminasi	:	80%
Kelimpahan MP (item/individu)	:	3,867item/ind
MP yang ditemukan pada Kerang	:	

Kode sampel	Karakteristik Mikroplastik (MP)			Jumlah Item (MP)	Perbesaran
	Bentuk	Warna	Ukuran (mm)		
Area I (A1)					
KG 1	Line	Merah	3,660	12	4,5
	Line	Merah	2,211		
	Line	Biru	0,431		
	Line	Biru	0,314		
	Line	Biru	1,603		
	Line	Biru	0,761		
	Line	Biru	0,665		
	Line	Biru	0,381		
	Line	Biru	2,001		
	Line	Biru	0,938		
	Line	Biru	0,321		
	Line	Biru	6,800		
	Line	Transparan	2,382	15	4,5
	Line	Transparan	0,976		
	Line	Transparan	2,782		
	Line	Transparan	3,243		
		Biru	0,515		
		Biru	1,938		
		Biru	1,491		
		Biru	0,403		
		Biru	0,421		
		Biru	0,183		



	Line	Biru	1,151		
	Line	Biru	0,427		
	Line	Biru	0,798		
	Line	Biru	0,355		
	Line	Biru	1,726		
	Line	Biru	1,174		
	Line	Biru	0,692		
	Line	Biru	0,795		
	Line	Biru	1,435		
KG 3	Line	Merah	1,098	5	4,5
	Line	Merah	4,295		
	Line	Merah	6,308		
	Line	Biru	0,512		
	Line	Biru	1,077		
KG 4	Line	Biru	4,587	3	4,5
	Line	Biru	3,222		
	Line	Biru	0,898		
KG 5	Line	Merah	1,987	5	4,5
	Line	Biru	0,723		
	Line	Biru	0,856		
	Line	Biru	1,209		
	Line	Biru	4,033		
Area II (A2)					
KG 6	Line	Biru	0,633	5	4,5
	Line	Biru	2,153		
	Line	Biru	0,805		
	Line	Biru	0,891		
	Line	Biru	2,163		
KG 7	Line	Biru	0,406	2	4,5
	Line	Biru	0,490		
KG 8	Line	Biru	2,549	3	4,5
	Line	Biru	2,916		
	Line	Biru	2,284		
		Biru	1,431	5	4,5
		Biru	0,935		
		Biru	1,014		
		Biru	1,429		
		Biru	0,726		
		Biru	2,862		



Optimization Software:
www.balesio.com



**LABORATORIUM EKOTOXIKOLOGI LAUT
DEPARTEMEN ILMU KELAUTAN
FAKULTAS ILMU KELAUTAN DAN PERIKANAN
UNIVERSITAS HASANUDDIN**

Jl. Perintis Kemerdekaan, KM 10 Tamalanrea, Makassar, Indonesia 90245
Telp. (0411) 586025, Hp. 0815-250-4202

KG 11					
KG 12	Fragmen	Biru	0.027	1	4,5
KG 13	Line	Transparan	0.111	1	4,5
KG 14					
KG 15					
Total MP				58	

Kode Sampel	Berat Sampel (g)	Berat Sampel (Kg)	Jumlah MP (item)	Konsentrasi MP (mg/g)	Konsentrasi MP (mg/Kg)
Area I (A1)					
KG 1	8,0	0,008	12	1,50	1500,00
KG 2	7,0	0,007	15	2,14	2142,86
KG 3	5,5	0,006	5	0,91	909,09
KG 4	12,0	0,012	3	0,25	250,00
KG 5	9,0	0,009	5	0,56	555,56
Area II (A2)					
KG 6	8,0	0,008	5	0,63	625,00
KG 7	11,0	0,011	3	0,27	272,73
KG 8	7,5	0,008	2	0,27	266,67
KG 9	7,0	0,007	1	0,14	142,86
KG 10	6,5	0,007	5	0,77	769,23
Area III (A3)					
KG 11	6,5	0,007	0	0	0
KG 12	7,0	0,007	1	0,14	142,86
KG 13	9,0	0,009	1	0,11	111,11
KG 14	5,0	0,005	0	0	0
KG 15	9,5	0,010	0	0	0
Rata-rata				0,51	512,53



Optimization Software:
www.balesio.com



**LABORATORIUM EKOTOKSIKOLOGI LAUT
DEPARTEMEN ILMU KELAUTAN
FAKULTAS ILMU KELAUTAN DAN PERIKANAN
UNIVERSITAS HASANUDDIN**

Jl. Perintis Kemerdekaan, KM 10 Tamalanrea, Makassar, Indonesia 90245
Telp. (0411) 586025, Hp. 0815-250-4202

2. Hasil Identifikasi Sampel Kerang Manila (*Venerupis philippinarum*)

Lokasi	:	Jeneponto
Jumlah sampel KB	:	15 individu
Jumlah sampel terdeteksi MP yang ditemukan	:	9 individu
Jumlah MP	:	20 item
Persen kontaminasi	:	60%
Kelimpahan MP (item/individu)	:	1,333 item/individu
Karakteristik MP yang ditemukan pada Kerang	:	

Kode sampel	Karakteristik Mikroplastik (MP)			Jumlah Item(MP)	Perbesaran
	Bentuk	Warna	Ukuran (mm)		
Area I (B1)					
KB 1	Line	Transparan	0.355	2	4,5
	Line	Biru	0.176		
KB 2	Line	Biru	1.010	1	4,5
KB 3					
KB 4	Line	Transparan	1.968	2	4,5
	Line	Merah	0.235		
KB 5	Line	Transparan	0.299	4	4,5
	Line	Transparan	0.369		
	Line	Transparan	0.704		
	Line	Transparan	0.597		
Area II (B2)					
KB 6					
KB 7	Line	Biru	0.714	2	4,5
	Line	Biru	0.474		
KB 8					
KB 9					
KB 10	Line	Biru	0.215	3	4,5
	Line	Biru	0.158		
	Line	Biru	0.058		
Area III					
	Biru	0.915	1	4,5	
	Biru	0.203	2	4,5	
	Transparan	0.426			



Optimization Software:
www.balesio.com



**LABORATORIUM EKOTOXIKOLOGI LAUT
DEPARTEMEN ILMU KELAUTAN
FAKULTAS ILMU KELAUTAN DAN PERIKANAN
UNIVERSITAS HASANUDDIN**

Jl. Perintis Kemerdekaan, KM 10 Tamalanrea, Makassar, Indonesia 90245
Telp. (0411) 586025, Hp. 0815-250-4202

KB 14					
KB 15	Line	Transparan	0.476	3	4,5
	Line	Transparan	0.352		
	Line	Biru	0.647		
Total MP			20		

Kode Sampel	Berat Sampel (g)	Berat Sampel (Kg)	Jumlah MP (item)	Konsentrasi MP (mg/g)	Konsentrasi MP (mg/Kg)
Area I					
KB 1	7,0	0,007	2	0,29	285,71
KB 2	7,0	0,007	1	0,14	142,86
KB 3	7,5	0,008	0	0,00	0,0
KB 4	10,5	0,011	2	0,19	190,48
KB 5	5,0	0,005	4	0,80	800,00
Area II					
KB 6	8,0	0,008	0	0,00	0,0
KB 7	6,0	0,006	2	0,33	333,33
KB 8	11,0	0,011	0	0,00	0,0
KB 9	10,0	0,010	0	0,00	0,0
KB 10	7,0	0,007	3	0,43	428,57
Area III					
KB 11	8,0	0,008	1	0,13	125,00
KB 12	9,0	0,009	2	0,22	222,22
KB 13	9,0	0,009	0	0,00	0,0
KB 14	7,5	0,008	0	0,00	0,0
KB 15	8,0	0,008	3	0,38	375,00
Rata-rata				0,19	193,54



Optimization Software:
www.balesio.com



**LABORATORIUM EKOTOXIKOLOGI LAUT
DEPARTEMEN ILMU KELAUTAN
FAKULTAS ILMU KELAUTAN DAN PERIKANAN
UNIVERSITAS HASANUDDIN**

Jl. Perintis Kemerdekaan, KM 10 Tamalanrea, Makassar, Indonesia 90245
Telp. (0411) 586025, Hp. 0815-250-4202

3. Gambar Mikroplastik Pada Kerang



Fragmen Biru



Line Biru Line



Merah dan Transparan



Optimization Software:
www.balesio.com



**LABORATORIUM EKOTOKSIKOLOGI LAUT
DEPARTEMEN ILMU KELAUTAN
FAKULTAS ILMU KELAUTAN DAN PERIKANAN
UNIVERSITAS HASANUDDIN**

Jl. Perintis Kemerdekaan, KM 10 Tamalanrea, Makassar, Indonesia 90245
Telp. (0411) 586025, Hp. 0815-250-4202

1. Hasil Identifikasi Sampel Ikan Gulamah (*Johnius sp.*)

Lokasi	:	Jenepono
Jumlah sampel	:	15 individu
Jumlah sampel terdeteksi MP	:	7 individu
Jumlah MP yang ditemukan	:	12 item
Persen kontaminasi	:	46,7%
Kelimpahan MP IM (item/individu)	:	0,800 item/ind
Karakteristik MP	:	

Kode sampel	Karakteristik Mikroplastik (MP)			Jumlah Item(MP)	Perbesaran
	Bentuk	Warna	Ukuran (mm)		
Area I (C1)					
IG 1					
IG 2	Line	Hitam	0.437	1	4,5
IG 3	Line	Transparan	0.475	1	4,5
IG 4	Line	Biru	0.280	2	4,5
	Line	Biru	1.353		
IG 5					
Area II (C2)					
IG 6					
IG 7	Line	Transparan	1.322	1	4,5
IG 8	Line	Biru	0.524	3	4,5
	Line	Biru	0.185		
	Line	Merah	2.623		
IG 9	Line	Biru	0.090	2	4,5
	Line	Biru	0.542		
IG 10					
Area III (C3)					
IG 11					
IG 12					
IG 13	Line	Biru	0.639 1.788	2	4,5
	Line	Transparan			
TOTAL MP				12	





**LABORATORIUM EKOTOKSIKOLOGI LAUT
DEPARTEMEN ILMU KELAUTAN
FAKULTAS ILMU KELAUTAN DAN PERIKANAN
UNIVERSITAS HASANUDDIN**

Jl. Perintis Kemerdekaan, KM 10 Tamalanrea, Makassar, Indonesia 90245
Telp. (0411) 586025, Hp. 0815-250-4202

Kode Sampel	Berat Sampel (g)	Berat Sampel (Kg)	Jumlah MP (item)	Konsentrasi MP (mg/g)	Konsentrasi MP (mg/Kg)
Area I (C1)					
IG 1	72,0	0,072	0	0	0
IG 2	70,0	0,070	1	0,01	14,29
IG 3	72,5	0,073	1	0,01	13,79
IG 4	61,5	0,062	2	0,03	32,52
IG 5	92,0	0,092	0	0	0
Area II (C2)					
IG 6	42,5	0,043	0	0	0
IG 7	71,5	0,072	1	0,01	13,99
IG 8	40,5	0,041	3	0,07	74,07
IG 9	61,5	0,062	2	0,03	32,52
IG 10	67,5	0,068	0	0	0
Area III (C3)					
IG 11	59,5	0,060	0	0	0
IG 12	41,5	0,042	0	0	0
IG 13	61,0	0,061	2	0,03	32,79
IG 14	54,5	0,055	0	0	0
IG 15	60,5	0,061	0	0	0
Rata-rata				0,01	14,26



Optimization Software:
www.balesio.com



Hasil identifikasi dan Analisis Mikroplastik (MP) pada Ikan

2. Hasil Identifikasi Sampel Ikan Kurisi (*Nemiptus japonicas*)

Lokasi	:	Jeneponto
Jumlah sampel	:	15 individu
Jumlah sampel terdeteksi MP	:	9 individu
Jumlah MP yang ditemukan	:	22 item
Persen kontaminasi	:	60%
Kelimpahan MP (item/individu)	:	1,467 item/ind
Karakteristik MP	:	

Kode Sampel	Karakteristik Mikroplastik (MP)			Jumlah Item (MP)	Perbesaran
	Bentuk	Warna	Ukuran (mm)		
Area I (D1)					
IM 1					
IM 2					
IM 3	Line	Biru	0.085	2	4,5
	Line	Transparan	2.127		
IM 4	Line	Transparan	0.405	5	4,5
	Line	Transparan	0.797		
	Line	Transparan	1.069		
	Line	Biru	0.957		
	Line	Biru	0.247		
IM 5					
Area II (D2)					
IM 6	Line	Biru	0.148	2	4,5
	Line	Transparan	0.332		
IM 7	Line	Transparan	0.605	1	4,5
IM 8					
	Line	Biru	0.140	1	4,5
	Line	Biru	0.258	2	4,5
	Line	Biru	0.151		
Area III (D3)					
Line	Transparan	1.192	2	4,5	
Line	Biru	0.178			
Optimization Software: www.balesio.com					



**LABORATORIUM EKOTOKSIKOLOGI LAUT
DEPARTEMEN ILMU KELAUTAN
FAKULTAS ILMU KELAUTAN DAN PERIKANAN
UNIVERSITAS HASANUDDIN**

Jl. Perintis Kemerdekaan, KM 10 Tamalanrea, Makassar, Indonesia 90245
Telp. (0411) 586025, Hp. 0815-250-4202

IM 12	Line	Biru	0.319	5	4,5
	Line	Hijau	0.259		
	Line	Transparan	0.218		
	Line	Transparan	0.206		
	Line	Transparan	0.087		
IM 13	Line	Transparan	0.428	2	4,5
	Line	Biru	0.391		
IM 14					
IM 15					
TOTAL MP			22		

Kode Sampel	Berat Sampel (g)	Berat Sampel (Kg)	Jumlah MP (item)	Konsentrasi MP (mg/g)	Konsentrasi MP (mg/Kg)
Area I (D1)					
IM 1	44,0	0,044	0	0	0
IM 2	119,5	0,120	0	0	0
IM 3	84,5	0,085	2	0,02	23,67
IM 4	66,5	0,067	5	0,08	75,19
IM 5	78,5	0,079	0	0	0
Area II (D2)					
IM 6	60,6	0,061	2	0,03	33,02
IM 7	60,5	0,061	1	0,02	16,53
IM 8	118,5	0,119	0	0	0
IM 9	123,5	0,124	1	0,01	8,10
IM 10	64,0	0,064	2	0,03	31,25
Area III (D3)					
IM 11	85,0	0,085	2	0,02	23,53
IM 12	100	0,131	5	0,04	38,31
		0,091	2	0,02	22,10
		0,078	0	0	0
		0,059	0	0	0
Rata-Rata			0,02		18,11

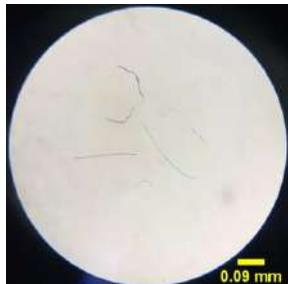




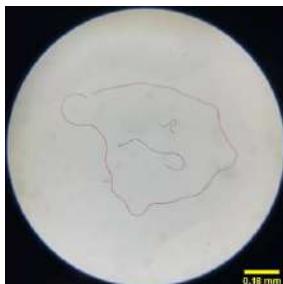
**LABORATORIUM EKOTOKSIKOLOGI LAUT
DEPARTEMEN ILMU KELAUTAN
FAKULTAS ILMU KELAUTAN DAN PERIKANAN
UNIVERSITAS HASANUDDIN**

Jl. Perintis Kemerdekaan, KM 10 Tamalanrea, Makassar, Indonesia 90245
Telp. (0411) 586025, Hp. 0815-250-4202

3. Gambar Mikroplastik Pada Ikan



Line Hijau,Biru dan Transparan



Line Merah dan Biru



Line Hitam

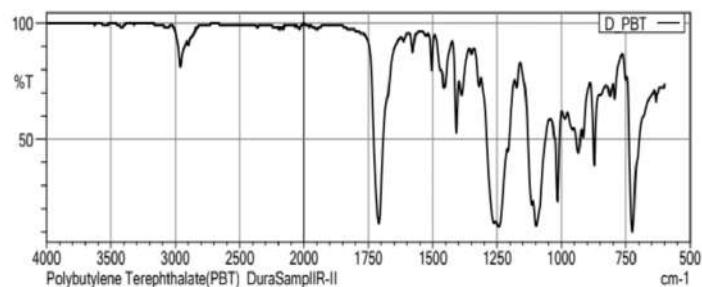


Optimization Software:
www.balesio.com

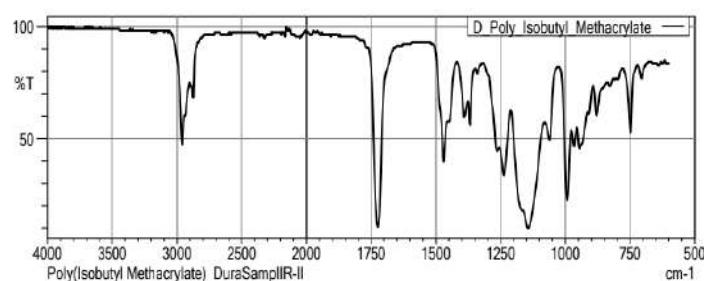
HASIL PEMERIKSAAN POLIMER KERANG DAN IKAN

Tempat : Laboratorium Kimia Analisa dan Pengawasan Mutu Pangan
Jenis : Spektroskopi FTIR (Fourier Transform Infra Red)
Sampell :
1. Kerang Manila (*Venerupis philippinarum*)
2. Kerang Bulu (*Anadara Antiquata*)
3. Ikan Kurisi (*Nemiptus japonicas*)
4. Ikan Gulamah (*Johnius* sp.)

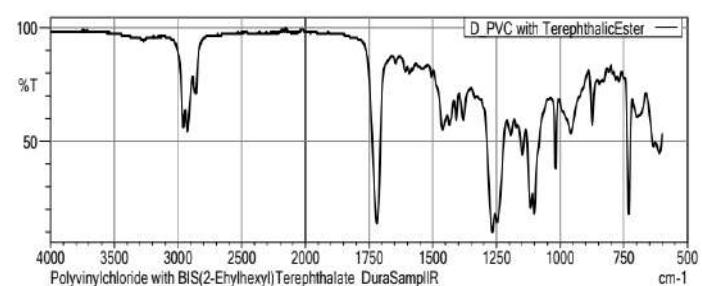
Polybutylene Terephthalate



Poly(Isobutyl Methacrylate)

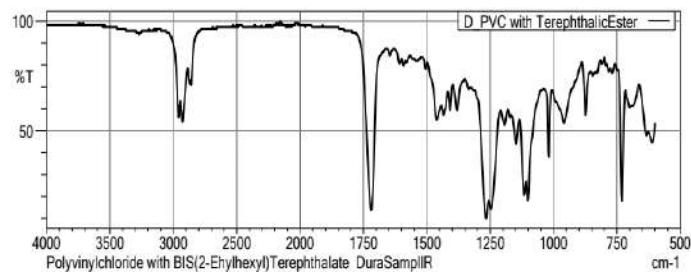


Polyvinylchloride

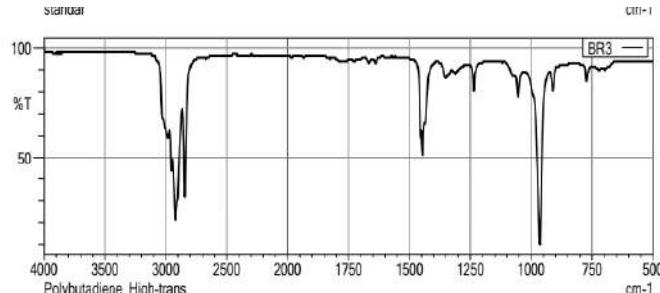


Optimization Software:
www.balesio.com

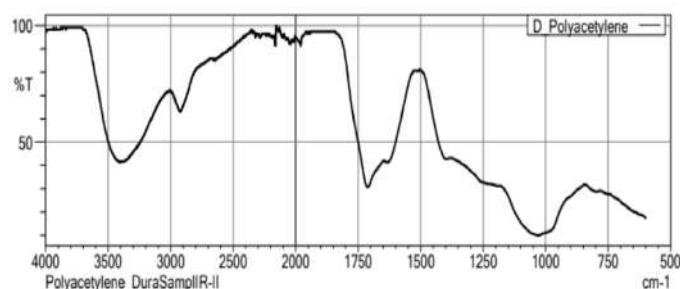
Polychloro-trifluoro-ethylene



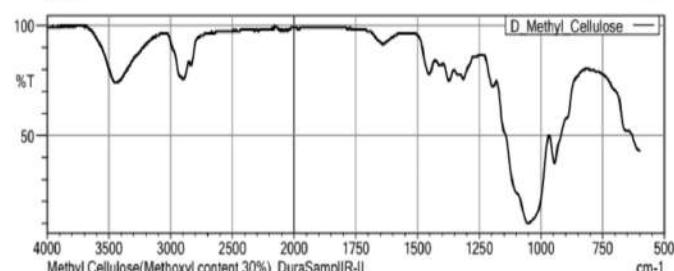
Polybutadiene



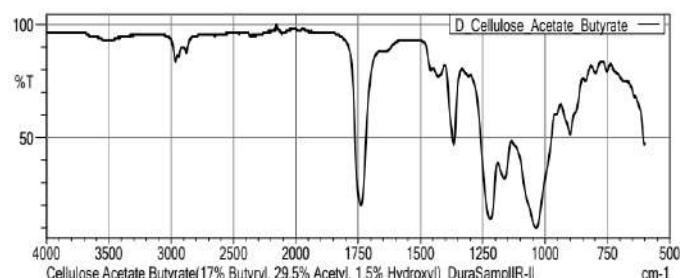
Polyacetylene



Methyl Cellulose



Cellulose Acetate Butyrate



Optimization Software:
www.balesio.com

Master Tabel Analisis Risiko Pada Kerang Bulu

Master Tabel Analisis Risiko Pada Kerang Bulu

Responden	Wb	Konsentrasi (mg/kg)	Kons (mg/g)	Fe (hari)	Jmlh (gr)	R (gr/hari)	f_e (hari/ minggu)	Lama konsumsi (minggu)	f_e pajanan (hari/tahun)	lama tinggal	Intake non- Karsinogenik (lifETIME)	Intake non- Karsinogenik (realtime)	RQ non- Karsinogenik (lifETIME)	RQ non- Karsinogenik (realtime)
Bontojai										Dt 30	Dt 30			
1	49	512,53	0,51	3	72	216	2	39	78	36	0,4804294	0,576515292	9,6085882	11,53030584
2	49	512,53	0,51	1	144	144	2	47	94	59	0,385986	0,759105843	7,71972044	15,18211686
3	74	512,53	0,51	2	144	288	3	39	117	42	0,6362444	0,890742096	12,7248871	17,81484191
4	55	512,53	0,51	2	144	288	3	26	78	15	0,5706919	0,285345953	11,4138381	5,706919054
5	70	512,53	0,51	1	115,2	115,2	1	39	39	62	0,0896802	0,18533899	1,79360313	3,706779804
6	42	512,53	0,51	2	144	288	3	43	129	26	1,2359765	1,071179648	24,7195303	21,42359295
7	50	512,53	0,51	2	72	144	3	39	117	35	0,4708208	0,549290959	9,41641644	10,98581918
8	56	512,53	0,51	2	144	288	3	39	117	28	0,8407515	0,78470137	16,8150294	15,6940274
9	73	512,53	0,51	2	144	288	2	47	94	47	0,518173	0,811804391	10,3634603	16,23608782
10	68	512,53	0,51	2	172,8	345,6	3	39	117	36	0,8308603	0,997032329	16,6172055	19,94064658
11	68	512,53	0,51	2	108	216	3	39	117	36	0,5192877	0,623145205	10,3857534	12,46290411
12	67	512,53	0,51	3	108	324	3	47	141	45	0,952723	1,429084441	19,0544592	28,58168882
13	55	512,53	0,51	2	144	288	2	47	94	37	0,6877569	0,848233524	13,7551382	16,96467049
14	56	512,53	0,51	2	144	288	2	39	78	29	0,560501	0,541817613	11,2100196	10,83635225
15	66	512,53	0,51	2	144	288	2	39	78	9	0,4755766	0,142672976	9,51153176	2,853459527
16	42	512,53	0,51	1	72	72	3	43	129	42	0,3089941	0,432591781	6,17988258	8,651835616
17	44	512,53	0,51	2	144	288	3	39	117	34	1,0700473	1,212720299	21,4009465	24,25440598
18	59	512,53	0,51	2	108	216	3	43	129	27	0,6598858	0,593897191	13,1977153	11,87794381
19	77	512,53	0,51	2	144	288	2	30	60	15	0,313567	0,15678349	6,27133962	3,13566981
Bon	 Optimization Software: www.balesio.com		0,51	2	115,2	230,4	3	26	78	29	0,3923507	0,379272329	7,8470137	7,585446575
	 Optimization Software: www.balesio.com		0,51	3	144	432	2	39	78	26	0,8883412	0,769895684	17,7668235	15,39791367
	 Optimization Software: www.balesio.com		0,51	2	108	216	2	47	94	34	0,4728329	0,53587726	9,45665753	10,71754521
	 Optimization Software: www.balesio.com		0,51	2	144	288	3	26	78	26	0,6975123	0,604510685	13,9502466	12,0902137
	 Optimization Software: www.balesio.com		0,51	3	115,2	345,6	3	39	117	7	1,2282282	0,286586587	24,5645646	5,731731745
	 Optimization Software: www.balesio.com		0,51	2	172,8	345,6	3	39	117	20	0,974112	0,64940803	19,4822409	12,9881606
	 Optimization Software: www.balesio.com		0,51	2	115,2	230,4	3	39	117	8	0,7847014	0,209253699	15,6940274	4,185073973
	 Optimization Software: www.balesio.com		0,51	3	144	432	3	43	129	5	1,5891127	0,264852111	31,7822533	5,297042214
	 Optimization Software: www.balesio.com		0,51	2	72	144	2	30	60	24	0,1857281	0,148582508	3,7145627	2,971650158

4	73	512,53	0,51	3	144	432	3	26	78	48	0,64496	1,031936048	12,8992006	20,63872096
5	62	512,53	0,51	2	144	288	2	39	78	41	0,5062589	0,691887229	10,125179	13,83774459
6	48	512,53	0,51	2	172,8	345,6	3	39	117	32	1,1770521	1,255522192	23,5410411	25,11044384
7	70	512,53	0,51	2	108	216	2	39	78	37	0,3363006	0,414770724	6,72601174	8,295414481
8	61	512,53	0,51	2	144	288	3	39	117	29	0,7718374	0,746109499	15,4367483	14,92218998
9	40	512,53	0,51	3	144	432	2	47	94	15	1,4184986	0,709249315	28,3699726	14,1849863
10	88	512,53	0,51	3	144	432	3	43	129	34	0,8848468	1,002826401	17,6969365	20,05652802
11	82	512,53	0,51	1	144	144	3	43	129	42	0,3165306	0,4431428	6,33061143	8,862855997
12	59	512,53	0,51	2	72	144	2	47	94	24	0,3205647	0,25645173	6,41129324	5,129034595
13	63	512,53	0,51	3	72	216	3	39	117	25	0,560501	0,467084149	11,2100196	9,341682975
14	69	512,53	0,51	3	144	432	3	26	78	22	0,682349	0,500389279	13,6469803	10,00778559
15	53	512,53	0,51	3	144	432	2	47	94	26	1,070565	0,927823003	21,4113001	18,55646007
16	45	512,53	0,51	2	115,2	230,4	3	43	129	54	0,9228625	1,661152438	18,4572493	33,22304877
17	66	512,53	0,51	3	144	432	2	47	94	40	0,8596961	1,146261519	17,1939228	22,92523039
18	48	512,53	0,51	2	144	288	1	30	30	48	0,2515068	0,402410959	5,03013699	8,048219178
19	48	512,53	0,51	2	144	288	2	30	60	38	0,5030137	0,637150685	10,060274	12,7430137
20	49	512,53	0,51	2	108	216	3	26	78	7	0,4804294	0,112100196	9,6085882	2,242003914
21	44	512,53	0,51	2	115,2	230,4	1	39	39	13	0,285346	0,123649913	5,70691905	2,472998257
22	62	512,53	0,51	1	144	144	3	43	129	65	0,4186372	0,907047282	8,37274414	18,14094565
23	60	512,53	0,51	2	43,2	86,4	2	30	60	41	0,1207233	0,164988493	2,41446575	3,299769863
24	55	512,53	0,51	2	172,8	345,6	3	26	78	15	0,6848303	0,342415143	13,6966057	6,848302864
25	65	512,53	0,51	1	144	144	2	47	94	10	0,2909741	0,096991359	5,81948156	1,939827187
26	60	512,53	0,51	2	144	288	3	43	129	37	0,8651836	1,067059726	17,3036712	21,34119452
27	65	512,53	0,51	3	43,2	129,6	7	43	301	41	0,8385625	1,146035456	16,7712506	22,92070913
28	50	512,53	0,51	1	144	144	2	47	94	20	0,3782663	0,252177534	7,56532603	5,043550685
29	51	512,53	0,51	2	108	216	3	43	129	24	0,7633973	0,610717808	15,2679452	12,21435616
30	55	512,53	0,51	2	14,4	28,8	3	47	141	43	0,1031635	0,147867736	2,06327073	2,95735472
31	60	512,53	0,51	3	144	432	3	43	129	50	1,2977753	2,162958904	25,9555068	43,25917808
32	65	512,53	0,51	2	28,8	57,6	7	47	329	44	0,4073637	0,597466773	8,14727418	11,94933547
33	45	512,53	0,51	3	144	432	2	47	94	26	1,2608877	1,092769315	25,2177534	21,8553863
34	42	512,53	0,51	1	108	108	2	39	78	70	0,273733	0,638710417	5,47466072	12,77420835
		0,51	2	144	288	4	39	156	10	1,1413838	0,38046127	22,8276762	7,609225405	
		0,51	3	144	432	2	47	94	20	0,7880548	0,525369863	15,7610959	10,50739726	
		0,51	2	180	360	3	47	141	26	0,9989427	0,865750338	19,9788539	17,31500675	
		0,51	2	108	216	3	39	117	25	0,5432548	0,452712329	10,8650959	9,054246575	
		0,51	3	144	432	2	39	78	51	0,7473346	1,270468885	14,9466928	25,40937769	
		0,51	2	144	288	3	43	129	49	0,798631	1,304430601	15,9726196	26,08861201	
		0,51	3	108	324	1	47	47	30	0,4527123	0,452712329	9,05424658	9,054246575	
		0,51	3	144	432	2	30	60	39	0,6833394	0,888341173	13,6667873	17,76682347	
		0,51	1	144	144	3	26	78	40	0,2961137	0,39481299	5,92227449	7,896365986	



44	50	512,53	0,51	2	168	336	2	47	94	33	0,8826214	0,970883507	17,6524274	19,41767014
45	62	512,53	0,51	3	108	324	2	47	94	35	0,6863703	0,800765356	13,7274061	16,01530711
46	57	512,53	0,51	2	108	216	2	39	78	41	0,4130007	0,564434319	8,26001442	11,28868637
47	52	512,53	0,51	2	168	336	2	47	94	40	0,8486744	1,131565859	16,9734879	22,63131718
48	50	512,53	0,51	2	168	336	3	39	117	27	1,0985819	0,988723726	21,9716384	19,77447452
49	73	512,53	0,51	3	144	432	2	26	52	33	0,4299734	0,472970689	8,59946707	9,459413774
50	52	512,53	0,51	1	144	144	2	47	94	55	0,3637176	0,666815595	7,27435195	13,33631191
51	53	512,53	0,51	3	144	432	3	39	117	31	1,3325118	1,376928819	26,6502352	27,53857638
52	67	512,53	0,51	2	115,2	230,4	4	26	104	38	0,4997103	0,632966412	9,9942065	12,65932824
53	49	512,53	0,51	2	144	288	2	39	78	5	0,6405725	0,106762091	12,8114509	2,135241823
54	60	512,53	0,51	1	168	168	3	43	129	36	0,5046904	0,605628493	10,0938082	12,11256986
55	88	512,53	0,51	3	144	432	2	43	86	50	0,5898797	0,983163138	11,7979577	19,66326276
56	76	512,53	0,51	2	144	288	3	39	117	44	0,6195011	0,908601586	12,3900216	18,17203172
57	49	512,53	0,51	1	216	216	2	47	94	49	0,578979	0,945665753	11,5795807	18,91331507
58	61	512,53	0,51	2	144	288	3	43	129	65	0,8510002	1,84383382	17,0200045	36,8766764
59	68	512,53	0,51	2	144	288	3	43	129	54	0,7633973	1,374115068	15,2679452	27,48230137
60	59	512,53	0,51	2	168	336	2	47	94	29	0,7479842	0,723051405	14,9596842	14,46102809
61	53	512,53	0,51	1	144	144	3	39	117	67	0,4441706	0,991980977	8,88341173	19,83961954
62	50	512,53	0,51	2	180	360	3	43	129	20	1,2977753	0,865183562	25,9555068	17,30367123
63	60	512,53	0,51	3	144	432	2	43	86	58	0,8651836	1,672688219	17,3036712	33,45376438
64	53	512,53	0,51	3	115,2	345,6	7	39	273	40	2,4873553	3,316473714	49,7471057	66,32947428
65	75	512,53	0,51	1	144	144	2	30	60	14	0,1609644	0,075116712	3,21928767	1,502334247
66	60	512,53	0,51	2	168	336	3	26	78	48	0,6103233	0,97651726	12,2064658	19,53034521
67	65	512,53	0,51	2	72	144	2	47	94	59	0,2909741	0,57224902	5,81948156	11,4449804
68	50	512,53	0,51	2	144	288	3	43	129	17	1,0382203	0,588324822	20,7644055	11,76649644
69	48	512,53	0,51	2	108	216	2	43	86	34	0,5407397	0,612838356	10,8147945	12,25676712
70	49	512,53	0,51	2	172,8	345,6	2	39	78	40	0,7686871	1,024916075	15,3737411	20,4983215
71	59	512,53	0,51	2	172,8	345,6	2	47	94	17	0,7693552	0,435967941	15,3871038	8,719358811
72	44	512,53	0,51	2	144	288	3	39	117	49	1,0700473	1,74774396	21,4009465	34,9548792
73	47	512,53	0,51	2	72	144	4	26	104	56	0,4452206	0,831078519	8,90441271	16,62157039

Pantalla de balesio



0,51	1	108	108	2	47	94	70	0,214924	0,501489415	4,2984807	10,02978829
0,51	2	115,2	230,4	3	43	129	37	0,5537175	0,682918225	11,0743496	13,65836449
0,51	2	172,8	345,6	3	43	129	42	0,7328614	1,026005918	14,6572274	20,52011836
0,51	1	108	108	3	39	117	13	0,3838213	0,166322573	7,67642644	3,326451459
0,51	2	144	288	2	47	94	13	0,6304438	0,273192329	12,6088767	5,463846575
0,51	2	72	144	3	43	129	30	0,4186372	0,418637207	8,37274414	8,372744145
0,51	2	108	216	2	47	94	16	0,4364611	0,232779262	8,72922234	4,655585248
0,51	1	108	108	2	39	78	70	0,1681503	0,392350685	3,36300587	7,847013699
0,51	3	144	432	3	43	129	22	1,5891127	1,165349287	31,7822533	23,30698574

10	63	512,53	0,51	2	108	216	2	47	94	30	0,450317	0,450317025	9,00634051	9,006340509
11	60	512,53	0,51	2	108	216	2	47	94	37	0,4728329	0,583160548	9,45665753	11,66321096
12	65	512,53	0,51	2	14,4	28,8	7	39	273	48	0,1690126	0,270420164	3,38025205	5,408403288
13	49	512,53	0,51	3	43,2	129,6	3	39	117	20	0,4323865	0,288257646	8,64772938	5,765152921
Garassikang														
1	61	512,53	0,51	2	216	432	2	47	94	30	0,930163	0,930163036	18,6032607	18,60326072
2	55	512,53	0,51	2	180	360	3	43	129	50	1,1797958	1,966326276	23,5959153	39,32652553
3	65	512,53	0,51	2	216	432	2	43	86	10	0,798631	0,266210327	15,9726196	5,324206533
4	75	512,53	0,51	1	144	144	7	39	273	20	0,7323879	0,48825863	14,6477589	9,765172603
5	45	512,53	0,51	3	43,2	129,6	4	26	104	28	0,4185074	0,390606904	8,37014795	7,812138082
6	53	512,53	0,51	2	108	216	2	39	78	31	0,4441706	0,458976273	8,88341173	9,179525459
7	58	512,53	0,51	2	144	288	3	43	129	20	0,8950175	0,596678318	17,9003496	11,93356637
8	72	512,53	0,51	2	108	216	4	26	104	30	0,4359452	0,435945205	8,71890411	8,71890411
9	61	512,53	0,51	1	172,8	172,8	2	39	78	63	0,308735	0,648343427	6,1746993	12,96686854
10	58	512,53	0,51	3	108	324	3	43	129	43	1,0068947	1,443215683	20,1378932	28,86431365
11	45	512,53	0,51	2	108	216	2	30	60	56	0,402411	0,751167123	8,04821918	15,02334247

Master Tabel Analisis Risiko Mikroplastik Pada Kerang Manila

Responden	Wb	Konsentrasi (mg/kg)	Kons (mg/g)	Fe (hari)	Jmlh (gr)	R (gr/hari)	f_e (hari/ minggu)	Lama konsumsi (minggu)	f_e pajanan (hari/tah un)	lama tinggal	Intake non- Karsinogenik (lifeltime)	Intake non- Karsinogenik (realtime)	RQ non- Karsinogenik (lifeltime)	RQ non- Karsinogenik (realtime)
		Dt 30		Dt 30										
Bontojai														
1	49	193,54	0,19	3	72	216	3	39	117	36	0,268475259	0,32217031	5,369505172	6,443406206
2	49	193,54	0,19	1	144	144	2	47	94	59	0,143798714	0,282804138	2,87597428	5,656082751
3	74	193,54	0,19	2	144	288	3	39	117	42	0,23703221	0,331845094	4,740644206	6,636901888
4	55	193,54	0,19	2	144	288	3	26	78	15	0,21261071	0,106305355	4,252214197	2,126107098
5	4	193,54	0,19	3	115,2	345,6	2	39	78	62	0,200461526	0,414287155	4,009230528	8,285743092
6	4	193,54	0,19	2	144	288	3	43	129	26	0,46046184	0,399066928	9,209236791	7,981338552
7	4	193,54	0,19	3	72	216	3	39	117	35	0,263105753	0,306956712	5,262115068	6,139134247
8	4	193,54	0,19	2	144	288	3	39	117	28	0,313221135	0,292339726	6,264422701	5,846794521
9	4	193,54	0,19	2	144	288	2	47	94	47	0,193044849	0,30243693	3,860896979	6,0487386
10	4	193,54	0,19	2	172,8	345,6	3	39	117	36	0,30953618	0,371443417	6,19072361	7,428868332
11	4	193,54	0,19	3	108	324	3	39	117	36	0,290190169	0,348228203	5,803803384	6,964564061
12	4	193,54	0,19	3	108	324	3	47	141	45	0,354936005	0,532404007	7,098720098	10,64808015
Optimization Software: www.balesio.com														



13	55	193,54	0,19	2	144	288	3	47	141	37	0,384334745	0,474012852	7,686694894	9,480257036
14	56	193,54	0,19	2	144	288	3	39	117	29	0,313221135	0,302780431	6,264422701	6,055608611
15	66	193,54	0,19	2	144	288	2	39	78	9	0,177175592	0,053152677	3,543511831	1,063053549
16	42	193,54	0,19	1	72	72	3	43	129	42	0,11511546	0,161161644	2,302309198	3,223232877
17	44	193,54	0,19	2	144	288	3	39	117	34	0,398645081	0,451797758	7,972901619	9,035955168
18	59	193,54	0,19	2	108	216	3	43	129	27	0,245839796	0,221255816	4,916795914	4,425116322
19	77	193,54	0,19	2	144	288	2	30	60	15	0,116819071	0,058409536	2,336381427	1,168190713
20	64	193,54	0,19	2	115,2	230,4	3	26	78	29	0,146169863	0,141297534	2,92339726	2,825950685
21	53	193,54	0,19	3	144	432	2	39	78	26	0,330950633	0,286823882	6,619012665	5,736477643
22	60	193,54	0,19	2	108	216	2	47	94	34	0,176153425	0,199640548	3,523068493	3,992810959
23	45	193,54	0,19	3	144	432	3	26	78	26	0,389786301	0,337814795	7,795726027	6,75629589
24	46	193,54	0,19	3	115,2	345,6	3	39	117	7	0,457575223	0,106767552	9,151504467	2,135351042
25	58	193,54	0,19	2	172,8	345,6	3	39	117	20	0,362904487	0,241936325	7,25808975	4,8387265

Bontosunggu

1	48	193,54	0,19	2	115,2	230,4	3	39	117	8	0,292339726	0,07795726	5,846794521	1,559145205
2	49	193,54	0,19	3	144	432	3	43	129	5	0,592022365	0,098670394	11,8404473	1,973407884
3	65	193,54	0,19	2	72	144	2	30	60	24	0,069192835	0,055354268	1,383856691	1,107085353
4	73	193,54	0,19	3	144	432	3	26	78	48	0,240279227	0,384446763	4,805584537	7,68893526
5	62	193,54	0,19	2	144	288	2	39	78	41	0,188606275	0,257761909	3,772125497	5,155238179
6	48	193,54	0,19	3	172,8	518,4	3	39	117	32	0,657764384	0,701615342	13,15528767	14,03230685
7	70	193,54	0,19	3	108	324	3	39	117	37	0,281899022	0,34767546	5,637980431	6,953509198
8	61	193,54	0,19	2	144	288	3	39	117	29	0,287547272	0,277962362	5,75094543	5,559247249
9	40	193,54	0,19	3	144	432	2	47	94	15	0,528460274	0,264230137	10,56920548	5,28460274
10	88	193,54	0,19	3	144	432	3	43	129	34	0,329648817	0,373601993	6,592976339	7,472039851
11	82	193,54	0,19	2	144	288	3	43	129	42	0,235846308	0,330184831	4,716926161	6,603696625
1		193,54	0,19	3	72	216	2	47	94	24	0,179139076	0,143311261	3,582781518	2,866225215
1	4	0,19	3	72	216	3	39	117	25	0,20881409	0,174011742	4,1762818	3,480234834	
1	4	0,19	3	144	432	3	26	78	22	0,254208457	0,186419535	5,084169148	3,728390709	
1	4	0,19	3	144	432	2	47	94	26	0,398837943	0,34565955	7,976758852	6,913191005	
1	4	0,19	1	115,2	115,2	3	43	129	54	0,171905753	0,309430356	3,438115068	6,188607123	
1	4	0,19	2	144	288	3	47	141	40	0,320278954	0,427038605	6,405579078	8,540772105	
1	4	0,19	2	144	288	1	30	30	48	0,09369863	0,149917808	1,873972603	2,998356164	
1	Optimization Software: www.balesio.com	4	0,19	3	144	432	2	30	60	38	0,28109589	0,356054795	5,621917808	7,12109589

20	49	193,54	0,19	3	108	324	3	26	78	7	0,268475259	0,062644227	5,369505172	1,25288454
21	44	193,54	0,19	2	115,2	230,4	1	39	39	13	0,106305355	0,046065654	2,126107098	0,921313076
22	62	193,54	0,19	1	144	144	3	43	129	65	0,155962881	0,337919576	3,119257623	6,758391516
23	60	193,54	0,19	2	43,2	86,4	2	30	60	41	0,044975342	0,061466301	0,899506849	1,229326027
24	55	193,54	0,19	2	172,8	345,6	3	26	78	15	0,255132852	0,127566426	5,102657036	2,551328518
25	65	193,54	0,19	1	144	144	3	47	141	10	0,162603161	0,054201054	3,252063224	1,084021075
26	60	193,54	0,19	3	144	432	3	43	129	37	0,483484932	0,596298082	9,66969863	11,92596164
27	65	193,54	0,19	3	43,2	129,6	7	43	301	41	0,312405648	0,426954386	6,248112961	8,539087713
28	50	193,54	0,19	3	144	432	2	47	94	20	0,422768219	0,281845479	8,455364384	5,636909589
29	51	193,54	0,19	2	108	216	3	43	129	24	0,284402901	0,227522321	5,688058018	4,550446414
30	55	193,54	0,19	3	14,4	43,2	3	47	141	43	0,057650212	0,08263197	1,153004234	1,652639402
31	60	193,54	0,19	1	144	144	3	43	129	50	0,161161644	0,26860274	3,223232877	5,372054795
32	65	193,54	0,19	2	28,8	57,6	7	47	329	44	0,15176295	0,222585661	3,035259009	4,451713214
33	45	193,54	0,19	3	144	432	3	47	141	26	0,704613699	0,610665205	14,09227397	12,21330411
34	43	193,54	0,19	1	108	108	3	39	117	70	0,152968461	0,35692641	3,059369226	7,138528194
35	55	193,54	0,19	2	144	288	4	39	156	10	0,42522142	0,141740473	8,504428394	2,834809465
36	72	193,54	0,19	3	144	432	2	47	94	20	0,293589041	0,195726027	5,871780822	3,914520548
37	71	193,54	0,19	2	180	360	3	47	141	26	0,372155123	0,32253444	7,44310245	6,45068879
38	65	193,54	0,19	2	108	216	3	39	117	25	0,202389041	0,168657534	4,047780822	3,373150685
39	63	193,54	0,19	3	144	432	2	39	78	51	0,278418787	0,473311937	5,568375734	9,466238748
40	65	193,54	0,19	1	144	144	3	43	129	49	0,148764594	0,242982171	2,975291886	4,859643414
41	47	193,54	0,19	3	108	324	1	47	47	30	0,168657534	0,168657534	3,373150685	3,373150685
42	53	193,54	0,19	3	144	432	2	30	60	39	0,25457741	0,330950633	5,091548204	6,619012665
43	53	193,54	0,19	1	144	144	4	26	104	40	0,14708917	0,196118894	2,941783407	3,922377875
44	50	193,54	0,19	3	168	504	2	47	94	33	0,493229589	0,542552548	9,864591781	10,85105096
45	62	193,54	0,19	3	108	324	2	47	94	35	0,255706584	0,298324348	5,114131684	5,966486964
46	4	0,19	2	108	216	3	39	117	41	0,230794521	0,315419178	4,615890411	6,308383562	
47	4	0,19	2	168	336	2	47	94	40	0,316172813	0,421563751	6,32345627	8,431275026	
48	4	0,19	3	168	504	3	39	117	27	0,613913425	0,552522082	12,27826849	11,05044164	
49	4	0,19	3	144	432	2	26	52	33	0,160186151	0,176204766	3,203723025	3,524095327	
50	4	0,19	2	144	288	2	47	94	55	0,271005269	0,496842993	5,420105374	9,936859852	
51	4	0,19	3	144	432	3	39	117	31	0,49642595	0,512973482	9,928518997	10,25946963	
52	4	0,19	2	115,2	230,4	4	26	104	38	0,186166592	0,235811016	3,72331834	4,716220323	
53	4	0,19	2	144	288	2	39	78	5	0,238644674	0,039774112	4,772893486	0,795482248	



Optimization Software:
www.balesio.com

54	60	193,54	0,19	1	168	168	3	43	129	36	0,188021918	0,225626301	3,760438356	4,512526027
55	88	193,54	0,19	3	144	432	2	43	86	50	0,219765878	0,366276463	4,395317559	7,325529265
56	76	193,54	0,19	2	144	288	3	39	117	44	0,230794521	0,33849863	4,615890411	6,769972603
57	49	193,54	0,19	1	216	216	2	47	94	49	0,215698071	0,352306849	4,31396142	7,046136986
58	61	193,54	0,19	2	144	288	3	43	129	65	0,317039299	0,686918482	6,340785987	13,73836964
59	68	193,54	0,19	2	144	288	3	43	129	54	0,284402901	0,511925222	5,688058018	10,23850443
60	59	193,54	0,19	3	168	504	2	47	94	29	0,417991177	0,404058138	8,359823543	8,081162758
61	53	193,54	0,19	2	144	288	3	39	117	67	0,330950633	0,739123081	6,619012665	14,78246162
62	50	193,54	0,19	1	180	180	2	43	86	20	0,161161644	0,107441096	3,223232877	2,148821918
63	60	193,54	0,19	1	144	144	2	43	86	58	0,107441096	0,207719452	2,148821918	4,154389041
64	53	193,54	0,19	3	115,2	345,6	7	39	273	40	0,926661773	1,235549031	18,53323546	24,71098062
65	75	193,54	0,19	1	144	144	2	30	60	14	0,059967123	0,027984658	1,199342466	0,559693151
66	60	193,54	0,19	2	168	336	3	26	78	48	0,227375342	0,363800548	4,547506849	7,276010959
67	65	193,54	0,19	2	72	144	2	47	94	59	0,108402107	0,213190811	2,16804215	4,263816228
68	50	193,54	0,19	2	144	288	3	43	129	17	0,386787945	0,219179836	7,735758904	4,383596712
69	48	193,54	0,19	2	108	216	2	43	86	34	0,201452055	0,228312329	4,029041096	4,566246575
70	49	193,54	0,19	2	172,8	345,6	2	39	78	40	0,286373609	0,381831479	5,727472183	7,636629578
71	59	193,54	0,19	3	172,8	518,4	2	47	94	17	0,429933782	0,243629143	8,598675644	4,872582865
72	44	193,54	0,19	2	144	288	3	39	117	49	0,398645081	0,651120299	7,972901619	13,02240598
73	47	193,54	0,19	2	72	144	3	26	78	56	0,124399883	0,232213116	2,487997668	4,644262314

Pantai Bahari

1	66	193,54	0,19	1	108	108	2	47	94	70	0,080069738	0,18682939	1,60139477	3,736587796
2	75	193,54	0,19	2	115,2	230,4	3	43	129	37	0,206286904	0,254420515	4,125738082	5,088410301
3	85	193,54	0,19	2	172,8	345,6	3	43	129	42	0,273026785	0,382237499	5,460535697	7,644749976
4	46	193,54	0,19	2	108	216	3	39	117	13	0,285984515	0,123926623	5,719690292	2,47853246
5	4	193,54	0,19	3	144	432	2	47	94	13	0,352306849	0,152666301	7,046136986	3,053326027
6	4	193,54	0,19	2	72	144	3	43	129	30	0,155962881	0,155962881	3,119257623	3,119257623
7	4	193,54	0,19	3	108	324	2	47	94	16	0,243904742	0,130082529	4,878094837	2,60165058
8	4	193,54	0,19	1	108	108	3	39	117	70	0,093966341	0,219254795	1,87932681	4,38509589
9	4	193,54	0,19	3	144	432	3	43	129	22	0,592022365	0,434149734	11,8404473	8,682994688
10	4	193,54	0,19	3	108	324	2	47	94	30	0,25164775	0,25164775	5,03295499	5,03295499
11	4	193,54	0,19	2	108	216	2	47	94	37	0,176153425	0,21725589	3,523068493	4,345117808
12	4	193,54	0,19	3	144	432	7	39	273	48	0,094448219	0,151117151	1,888964384	3,022343014



Optimization Software:
www.balesio.com

13	49	193,54	0,19	3	43,2	129,6	4	39	156	20	0,214780207	0,143186805	4,295604138	2,863736092
Garassikang														
1	61	193,54	0,19	2	216	432	2	47	94	30	0,346531327	0,346531327	6,930626544	6,930626544
2	55	193,54	0,19	2	180	360	3	43	129	50	0,439531756	0,732552927	8,790635118	14,65105853
3	65	193,54	0,19	2	216	432	2	43	86	10	0,297529189	0,099176396	5,950583772	1,983527924
4	75	193,54	0,19	1	144	144	7	39	273	20	0,272850411	0,181900274	5,457008219	3,638005479
5	45	193,54	0,19	3	43,2	129,6	4	26	104	28	0,155914521	0,145520219	3,118290411	2,910404384
6	53	193,54	0,19	2	108	216	2	39	78	31	0,165475317	0,170991161	3,309506332	3,41982321
7	58	193,54	0,19	2	144	288	3	43	129	20	0,333437884	0,222291923	6,668757676	4,445838451
8	72	193,54	0,19	2	108	216	3	26	78	30	0,121808219	0,121808219	2,436164384	2,436164384
9	61	193,54	0,19	1	172,8	172,8	2	39	78	63	0,115018909	0,241539708	2,300378172	4,830794161
10	58	193,54	0,19	3	108	324	3	43	129	43	0,375117619	0,537668588	7,502352385	10,75337175
11	45	193,54	0,19	2	108	216	2	30	60	56	0,149917808	0,279846575	2,998356164	5,596931507

Master Tabel Analisis Risiko Pada Ikan Kurisi

Responden	Wb	Konsentrasi (mg/kg)	Kons (mg/g)	Fe (hari)	Jmlh (gr)	R (gr/hari)	f_e (hari/minggu)	Lama konsumsi (minggu)	f_e pajanan (hari/tahun)	lama tinggal	Intake non-Karsinogenik (lifetime)	Intake non-Karsinogenik (realtime)	RQ non-Karsinogenik (lifetime)	RQ non-Karsinogenik (realtime)
-----------	----	---------------------	-------------	-----------	-----------	-------------	---------------------	------------------------	----------------------------	--------------	------------------------------------	------------------------------------	--------------------------------	--------------------------------

Bontojai



											Dt 30		Dt 30	
		0,02	2	194	388	2	52	104	36	0,045124	0,054149	0,902477	1,082972	
		0,02	2	165	330	2	52	104	59	0,038379	0,075478	0,767571	1,509555	
		0,02	3	194	582	3	52	156	42	0,067228	0,09412	1,344569	1,882396	
		0,02	3	130	390	2	52	104	15	0,040408	0,020204	0,808169	0,404085	
		0,02	2	194	388	3	52	156	62	0,04738	0,097919	0,947601	1,958375	
		0,02	3	194	582	4	52	208	26	0,157933	0,136876	3,158669	2,737513	
		0,02	2	195	390	2	52	104	35	0,044449	0,051858	0,888986	1,037151	

8	56	18,18	0,02	3	194	582	3	52	156	28	0,088838	0,082915	1,776751	1,658301
9	73	18,18	0,02	2	231	462	2	52	104	47	0,036065	0,056502	0,721306	1,130046
10	68	18,18	0,02	3	194	582	2	52	104	36	0,048774	0,058528	0,975471	1,170566
11	68	18,18	0,02	3	97	291	1	52	52	36	0,012193	0,014632	0,243868	0,292641
12	67	18,18	0,02	2	194	388	2	52	104	45	0,033001	0,049502	0,66002	0,990031
13	55	18,18	0,02	3	195	585	3	39	117	37	0,068189	0,0841	1,363786	1,682002
14	56	18,18	0,02	4	97	388	2	52	104	29	0,039483	0,038167	0,789667	0,763345
15	66	18,18	0,02	3	194	582	4	52	208	9	0,100503	0,030151	2,010062	0,603019
16	42	18,18	0,02	2	195	390	2	52	104	42	0,052916	0,074082	1,058317	1,481644
17	44	18,18	0,02	3	195	585	2	52	104	34	0,075766	0,085868	1,515318	1,71736
18	59	18,18	0,02	3	165	495	3	52	156	27	0,071716	0,064544	1,434316	1,290885
19	77	18,18	0,02	2	195	390	5	52	260	15	0,072158	0,036079	1,44316	0,72158
20	64	18,18	0,02	3	132	396	2	52	104	29	0,03526	0,034085	0,705205	0,681699
21	53	18,18	0,02	3	97	291	2	52	104	26	0,031289	0,027117	0,625774	0,542338
22	60	18,18	0,02	3	130	390	3	52	156	34	0,055562	0,06297	1,111233	1,259397
23	45	18,18	0,02	2	194	388	3	52	156	26	0,073702	0,063875	1,474046	1,277506
24	46	18,18	0,02	3	165	495	3	52	156	7	0,091983	0,021463	1,839666	0,429256
25	58	18,18	0,02	3	195	585	3	52	156	20	0,086216	0,057478	1,724327	1,149551

Bontosunggu



0,02	4	194	776	2	52	104	8	0,092128	0,024567	1,842557	0,491349
0,02	4	130	520	3	52	156	5	0,090713	0,015119	1,814258	0,302376
0,02	3	130	390	3	52	156	24	0,051288	0,04103	1,025753	0,820603
0,02	2	195	390	3	52	156	48	0,045667	0,073067	0,913342	1,461347
0,02	2	194	388	4	52	208	41	0,071325	0,097477	1,426496	1,949544
0,02	3	195	585	3	52	156	32	0,104178	0,111123	2,083562	2,222466
0,02	3	194	582	4	52	208	37	0,09476	0,116871	1,895202	2,337415

8	61	18,18	0,02	3	260	780	4	52	208	29	0,145735	0,140878	2,914709	2,817552
9	40	18,18	0,02	2	194	388	3	52	156	15	0,082915	0,041458	1,658301	0,829151
10	88	18,18	0,02	3	194	582	3	52	156	34	0,056533	0,064071	1,13066	1,281415
11	82	18,18	0,02	3	97	291	3	52	156	42	0,030335	0,042469	0,606696	0,849374
12	59	18,18	0,02	2	194	388	3	52	156	24	0,056214	0,044971	1,124272	0,899418
13	63	18,18	0,02	2	194	388	2	52	104	25	0,035096	0,029247	0,701927	0,584939
14	69	18,18	0,02	2	194	388	2	52	104	22	0,032044	0,023499	0,640889	0,469986
15	53	18,18	0,02	3	194	582	3	52	156	26	0,093866	0,081351	1,877322	1,627013
16	45	18,18	0,02	2	195	390	2	52	104	54	0,049388	0,088899	0,987763	1,777973
17	66	18,18	0,02	2	194	388	2	52	104	40	0,033501	0,044668	0,670021	0,893361
18	48	18,18	0,02	1	195	195	2	52	104	48	0,023151	0,037041	0,463014	0,740822
19	48	18,18	0,02	3	194	582	2	52	104	38	0,069096	0,087521	1,381918	1,750429
20	49	18,18	0,02	3	194	582	1	52	52	7	0,033843	0,007897	0,676858	0,157933
21	44	18,18	0,02	3	97	291	4	26	104	13	0,037689	0,016332	0,753773	0,326635
22	62	18,18	0,02	2	194	388	3	52	156	65	0,053494	0,115903	1,069872	2,318056
23	60	18,18	0,02	3	231	693	2	52	104	41	0,065819	0,089953	1,316384	1,799058
24	55	18,18	0,02	2	194	388	2	52	104	15	0,040201	0,020101	0,804025	0,402012
25	65	18,18	0,02	3	194	582	2	39	78	10	0,038268	0,012756	0,76537	0,255123
26	60	18,18	0,02	3	165	495	3	52	156	37	0,070521	0,086975	1,410411	1,739507
27	65	18,18	0,02	3	165	495	3	52	156	41	0,065096	0,088964	1,301918	1,779288
			0,02	3	194	582	4	39	156	20	0,099498	0,066332	1,989962	1,326641
			0,02	2	194	388	2	52	104	24	0,043354	0,034683	0,867086	0,693669
			0,02	3	194	582	3	52	156	43	0,090453	0,129649	1,809056	2,59298
			0,02	3	165	495	3	52	156	50	0,070521	0,117534	1,410411	2,350685
			0,02	3	194	582	5	52	260	44	0,127562	0,18709	2,551233	3,741808
			0,02	2	291	582	2	52	104	26	0,073702	0,063875	1,474046	1,277506
			0,02	3	97	291	3	52	156	70	0,057848	0,134978	1,156954	2,69956



Optimization Software:
www.balesio.com

35	55	18,18	0,02	2	195	390	5	52	260	10	0,101021	0,033674	2,020423	0,673474
36	72	18,18	0,02	2	194	388	2	52	104	20	0,030709	0,020473	0,614186	0,409457
37	71	18,18	0,02	3	97	291	3	39	117	26	0,026276	0,022772	0,525518	0,455449
38	65	18,18	0,02	3	195	585	1	52	52	25	0,025644	0,02137	0,512877	0,427397
39	63	18,18	0,02	2	194	388	3	52	156	51	0,052644	0,089496	1,05289	1,789913
40	65	18,18	0,02	1	195	195	4	52	208	49	0,034192	0,055847	0,683836	1,116932
41	47	18,18	0,02	3	194	582	3	52	156	30	0,105849	0,105849	2,11698	2,11698
42	53	18,18	0,02	3	198	594	2	52	104	39	0,063868	0,083028	1,277353	1,660559
43	53	18,18	0,02	2	195	390	3	52	156	40	0,0629	0,083867	1,257999	1,677333
44	50	18,18	0,02	3	97	291	3	52	156	33	0,049749	0,054724	0,994981	1,094479
45	62	18,18	0,02	2	260	520	2	52	104	35	0,047795	0,055761	0,955899	1,115216
46	57	18,18	0,02	2	195	390	3	39	117	41	0,043864	0,059948	0,877289	1,198962
47	52	18,18	0,02	3	97	291	4	52	208	40	0,063781	0,085041	1,275616	1,700822
48	50	18,18	0,02	2	194	388	4	39	156	27	0,066332	0,059699	1,326641	1,193977
49	73	18,18	0,02	3	194	582	2	52	104	33	0,045433	0,049976	0,908658	0,999524
50	52	18,18	0,02	2	194	388	1	52	52	55	0,02126	0,038977	0,425205	0,779543
51	53	18,18	0,02	3	194	582	2	52	104	31	0,062577	0,064663	1,251548	1,293266
52	67	18,18	0,02	3	165	495	1	52	52	38	0,021051	0,026664	0,421018	0,53329
53	49	18,18	0,02	3	97	291	3	52	156	5	0,050764	0,008461	1,015287	0,169214
54	60	18,18	0,02	2	194	388	3	52	156	36	0,055277	0,066332	1,105534	1,326641
			0,02	2	97	194	2	52	104	50	0,012563	0,020938	0,251258	0,418763
			0,02	3	194	582	5	52	260	44	0,109099	0,160012	2,181975	3,200231
			0,02	2	97	194	7	52	364	49	0,078967	0,128979	1,579335	2,57958
			0,02	3	194	582	4	52	208	65	0,108741	0,235606	2,174821	4,712113
			0,02	2	198	396	1	52	52	54	0,016593	0,029868	0,331861	0,597351
			0,02	2	194	388	2	52	104	29	0,037476	0,036227	0,749515	0,724531
			0,02	2	194	388	4	52	208	67	0,083437	0,186342	1,668731	3,726832



Optimization Software:
www.balesio.com

62	50	18,18	0,02	1	194	194	4	52	208	20	0,044221	0,029481	0,884427	0,589618
63	60	18,18	0,02	2	195	390	2	52	104	58	0,037041	0,071613	0,740822	1,432256
64	53	18,18	0,02	3	194	582	2	52	104	40	0,062577	0,083437	1,251548	1,668731
65	75	18,18	0,02	2	194	388	1	52	52	14	0,01474	0,006879	0,294809	0,137578
66	60	18,18	0,02	2	198	396	4	52	208	48	0,075222	0,120355	1,504438	2,407101
67	65	18,18	0,02	2	194	388	4	52	208	59	0,068033	0,133798	1,360658	2,67596
68	50	18,18	0,02	2	260	520	2	52	104	17	0,059266	0,033584	1,185315	0,671679
69	48	18,18	0,02	3	194	582	1	26	26	34	0,017274	0,019577	0,345479	0,391543
70	49	18,18	0,02	2	165	330	3	39	117	40	0,043176	0,057568	0,863517	1,151356
71	59	18,18	0,02	3	194	582	2	39	78	17	0,04216	0,023891	0,843204	0,477816
72	44	18,18	0,02	2	195	390	2	26	52	49	0,025255	0,04125	0,505106	0,825006
73	47	18,18	0,02	3	195	585	3	39	117	56	0,079796	0,148952	1,59592	2,97905

Pantai Bahari

1	66	18,18	0,02	3	260	780	4	39	156	70	0,101021	0,235716	2,020423	4,714321
2	75	18,18	0,02	2	195	390	3	52	156	37	0,044449	0,054821	0,888986	1,096416
3	85	18,18	0,02	1	97	97	4	52	208	42	0,013006	0,018209	0,260126	0,364176
4	46	18,18	0,02	2	194	388	3	52	156	13	0,0721	0,031243	1,442001	0,624867
5	60	18,18	0,02	3	198	594	4	39	156	13	0,084625	0,036671	1,692493	0,733414
6	62	18,18	0,02	3	194	582	2	39	78	30	0,04012	0,04012	0,802404	0,802404
			0,02	2	194	388	2	52	104	16	0,034016	0,018142	0,680329	0,362842
			0,02	3	291	873	2	52	104	70	0,07107	0,16583	1,421401	3,316603
			0,02	3	194	582	5	52	260	22	0,169214	0,124091	3,384289	2,481812
			0,02	3	260	780	2	52	104	30	0,070554	0,070554	1,411089	1,411089
			0,02	2	195	390	3	52	156	37	0,055562	0,068526	1,111233	1,370521
			0,02	3	194	582	3	52	156	48	0,076537	0,122459	1,53074	2,449184
			0,02	2	97	194	5	52	260	20	0,056405	0,037603	1,128096	0,752064



Optimization Software:
www.balesio.com

Garassikang

1	61	18,18	0,02	3	194	582	7	52	104	30	0,054371	0,054371	1,087411	1,087411
2	55	18,18	0,02	3	260	780	1	26	114	50	0,088588	0,147646	1,771756	2,952927
3	65	18,18	0,02	3	97	291	1	52	114	10	0,027965	0,009322	0,559309	0,186436
4	75	18,18	0,02	3	194	582	2	52	88	20	0,037418	0,024945	0,748362	0,498908
5	45	18,18	0,02	2	231	462	3	52	104	28	0,058506	0,054606	1,170119	1,092111
6	53	18,18	0,02	3	194	582	2	52	104	31	0,062577	0,064663	1,251548	1,293266
7	58	18,18	0,02	2	194	388	4	52	147	20	0,053884	0,035923	1,077676	0,718451
8	72	18,18	0,02	3	260	780	2	39	100	30	0,059361	0,059361	1,187215	1,187215
9	61	18,18	0,02	2	291	582	2	39	104	63	0,054371	0,114178	1,087411	2,283563
10	58	18,18	0,02	2	194	388	4	52	156	43	0,057183	0,081962	1,143656	1,63924
11	45	18,18	0,02	3	260	780	4	39	135	56	0,128219	0,239342	2,564384	4,786849

Master Tabel Analisis Risiko Pada Ikan Gulamah

Responden	Wb	Konsentrasi (mg/kg)	Kons (mg/g)	Fe (hari)	Jmlh (gr)	R (gr/hari)	f_e (hari/ minggu)	Lama konsumsi (minggu)	f_e pajanan (hari/tahun)	lama tinggal	Intake non- Karsinogenik (lifetime)	Intake non- Karsinogenik (realtime)	RQ non- Karsinogenik (lifetime)	RQ non- Karsinogenik (realtime)
-----------	----	------------------------	----------------	--------------	--------------	----------------	----------------------------	------------------------------	-------------------------------	-----------------	---	---	---------------------------------------	---------------------------------------

Bontoiai



											Dt 30		Dt 30	
1		0,01	2	69	138	2	39	78	36	0,0060185	0,0072221	0,120369	0,144443	
2		0,01	2	148,5	297	2	52	104	59	0,0172703	0,033965	0,345407	0,6793	
3		0,01	2	138	276	3	52	156	42	0,0159408	0,0223171	0,318815	0,446341	
4		0,01	3	69	207	2	52	104	15	0,0107238	0,0053619	0,214476	0,107238	
5		0,01	2	138	276	3	52	156	62	0,0168517	0,0348268	0,337033	0,696535	
6		0,01	3	69	207	4	52	208	26	0,0280861	0,0243413	0,561722	0,486826	

7	50	14,26	0,01	1	148,5	148,5	2	52	104	35	0,0084625	0,0098729	0,169249	0,197458
8	56	14,26	0,01	2	138	276	3	39	117	28	0,0157984	0,0147452	0,315969	0,294904
9	73	14,26	0,01	2	138	276	2	52	104	47	0,0107728	0,0168773	0,215455	0,337546
10	68	14,26	0,01	3	69	207	2	52	104	36	0,0086737	0,0104084	0,173473	0,208168
11	68	14,26	0,01	2	69	138	1	52	52	36	0,0028912	0,0034695	0,057824	0,069389
12	67	14,26	0,01	2	138	276	2	52	104	45	0,0117375	0,0176062	0,23475	0,352124
13	55	14,26	0,01	3	148,5	445,5	3	39	117	37	0,0259644	0,0320227	0,519288	0,640455
14	56	14,26	0,01	3	69	207	2	52	104	29	0,0105323	0,0101812	0,210646	0,203624
15	66	14,26	0,01	1	138	138	4	52	208	9	0,0119153	0,0035746	0,238306	0,071492
16	42	14,26	0,01	2	69	138	2	52	104	42	0,009362	0,0131068	0,187241	0,262137
17	44	14,26	0,01	2	207	414	2	52	104	34	0,0268095	0,0303841	0,536189	0,607681
18	59	14,26	0,01	3	33	99	3	52	156	27	0,0071716	0,0064544	0,143432	0,129088
19	77	14,26	0,01	2	207	414	5	52	260	15	0,0382992	0,0191496	0,765985	0,382992
20	64	14,26	0,01	2	66	132	2	52	104	29	0,0058767	0,0056808	0,117534	0,113616
21	53	14,26	0,01	3	69	207	2	52	104	26	0,0111285	0,0096447	0,222569	0,192893
22	60	14,26	0,01	3	138	414	3	52	156	34	0,0294904	0,0334225	0,589808	0,668449
23	45	14,26	0,01	2	138	276	3	52	156	26	0,0262137	0,0227185	0,524274	0,454371
24	46	14,26	0,01	3	66	198	3	52	156	7	0,0183967	0,0042926	0,367933	0,085851
25	58	14,26	0,01	2	138	276	3	52	156	20	0,0203382	0,0135588	0,406764	0,271176

Bontosu



1	0,01	3	69	207	2	52	104	8	0,0122877	0,0032767	0,245753	0,065534
2	0,01	4	69	276	3	52	156	5	0,0240738	0,0040123	0,481476	0,080246
3	0,01	3	138	414	3	52	156	24	0,0272219	0,0217775	0,544438	0,435551
4	0,01	2	99	198	3	52	156	48	0,0115924	0,0185479	0,231848	0,370957
5	0,01	2	138	276	4	52	208	41	0,0253681	0,0346697	0,507362	0,693395
6	0,01	2	99	198	3	52	156	32	0,0176301	0,0188055	0,352603	0,37611

7	70	14,26	0,01	2	138	276	4	52	208	37	0,0224689	0,0277116	0,449378	0,554232
8	61	14,26	0,01	2	148,5	297	4	52	208	29	0,0277458	0,0268209	0,554916	0,536419
9	40	14,26	0,01	2	138	276	3	52	156	15	0,0294904	0,0147452	0,589808	0,294904
10	88	14,26	0,01	2	138	276	3	52	156	34	0,0134047	0,015192	0,268095	0,303841
11	82	14,26	0,01	3	69	207	3	52	156	42	0,0107892	0,0151048	0,215783	0,302097
12	59	14,26	0,01	2	138	276	3	52	156	24	0,0199935	0,0159948	0,39987	0,319896
13	63	14,26	0,01	2	138	276	2	52	104	25	0,0124827	0,0104023	0,249654	0,208045
14	69	14,26	0,01	2	69	138	2	52	104	22	0,0056986	0,004179	0,113973	0,08358
15	53	14,26	0,01	2	138	276	3	52	156	26	0,0222569	0,0192893	0,445138	0,385787
16	45	14,26	0,01	2	69	138	2	52	104	54	0,0087379	0,0157282	0,174758	0,314564
17	66	14,26	0,01	2	138	276	2	52	104	40	0,0119153	0,0158871	0,238306	0,317742
18	48	14,26	0,01	1	99	99	2	52	104	48	0,0058767	0,0094027	0,117534	0,188055
19	48	14,26	0,01	2	138	276	2	52	104	38	0,0163836	0,0207525	0,327671	0,41505
20	49	14,26	0,01	2	138	276	1	52	52	7	0,0080246	0,0018724	0,160492	0,037448
21	44	14,26	0,01	3	69	207	4	26	104	13	0,0134047	0,0058087	0,268095	0,116174
22	62	14,26	0,01	2	99	198	3	52	156	65	0,0136491	0,0295731	0,272983	0,591463
23	60	14,26	0,01	3	99	297	2	52	104	41	0,0141041	0,0192756	0,282082	0,385512
24	55	14,26	0,01	2	138	276	2	52	104	15	0,0142984	0,0071492	0,285968	0,142984
25	65	14,26	0,01	3	69	207	2	39	78	10	0,0068055	0,0022685	0,13611	0,04537
26	60	14,26	0,01	3	99	297	3	52	156	37	0,0211562	0,0260926	0,423123	0,521852
27		0,01	3	99	297	3	52	156	41	0,0195288	0,0266893	0,390575	0,533786	
28		0,01	3	138	414	4	39	156	20	0,0353885	0,0235923	0,70777	0,471847	
29		0,01	2	138	276	2	52	104	24	0,0154198	0,0123359	0,308396	0,246717	
30		0,01	3	69	207	3	52	156	43	0,0160857	0,0230561	0,321714	0,461123	
31		0,01	3	66	198	3	52	156	50	0,0141041	0,0235068	0,282082	0,470137	
32		0,01	2	138	276	5	52	260	44	0,0302466	0,0443616	0,604932	0,887233	

33	45	14,26	0,01	1	69	69	2	52	104	26	0,0043689	0,0037864	0,087379	0,075728
34	43	14,26	0,01	3	69	207	3	52	156	70	0,0205747	0,0480076	0,411494	0,960153
35	55	14,26	0,01	2	69	138	5	52	260	10	0,017873	0,0059577	0,35746	0,119153
36	72	14,26	0,01	2	138	276	2	52	104	20	0,0109224	0,0072816	0,218447	0,145632
37	71	14,26	0,01	3	69	207	3	39	117	26	0,0093456	0,0080995	0,186911	0,16199
38	65	14,26	0,01	2	69	138	1	52	52	25	0,0030247	0,0025205	0,060493	0,050411
39	63	14,26	0,01	2	138	276	3	52	156	51	0,0187241	0,0318309	0,374481	0,636618
40	65	14,26	0,01	1	69	69	4	52	208	49	0,0060493	0,0098805	0,120986	0,197611
41	47	14,26	0,01	3	138	414	3	52	156	30	0,0376473	0,0376473	0,752947	0,752947
42	53	14,26	0,01	3	66	198	2	52	104	39	0,0106446	0,013838	0,212892	0,27676
43	53	14,26	0,01	1	207	207	3	52	156	40	0,0166927	0,0222569	0,333854	0,445138
44	50	14,26	0,01	3	69	207	3	52	156	33	0,0176942	0,0194637	0,353885	0,389273
45	62	14,26	0,01	2	148,5	297	2	52	104	35	0,0136491	0,015924	0,272983	0,31848
46	57	14,26	0,01	2	69	138	3	39	117	41	0,0077606	0,0106062	0,155213	0,212124
47	52	14,26	0,01	3	69	207	4	52	208	40	0,0226849	0,0302466	0,453699	0,604932
48	50	14,26	0,01	2	138	276	4	39	156	27	0,0235923	0,0212331	0,471847	0,424662
49	73	14,26	0,01	3	138	414	2	52	104	33	0,0161591	0,017775	0,323183	0,355501
50	52	14,26	0,01	1	138	138	1	52	52	55	0,0037808	0,0069315	0,075616	0,13863
51	53	14,26	0,01	2	138	276	2	52	104	31	0,0148379	0,0153325	0,296759	0,306651
52	67	14,26	0,01	2	99	198	1	52	52	38	0,0042102	0,0053329	0,084204	0,106658
53			0,01	3	69	207	3	52	156	5	0,0180554	0,0030092	0,361107	0,060185
54			0,01	2	99	198	3	52	156	36	0,0141041	0,0169249	0,282082	0,338499
55			0,01	2	69	138	2	52	104	50	0,0044682	0,0074471	0,089365	0,148941
56			0,01	2	138	276	5	52	260	44	0,0258688	0,0379409	0,517376	0,758818
57			0,01	2	69	138	7	52	364	49	0,0280861	0,045874	0,561722	0,917479
58			0,01	3	69	207	4	52	208	65	0,019338	0,0418989	0,386759	0,837979
59	Optimization Software: www.balesio.com		0,01	2	66	132	1	52	52	54	0,0027655	0,0049779	0,05531	0,099558

60	59	14,26	0,01	1	138	138	2	52	104	29	0,0066645	0,0064423	0,13329	0,128847
61	53	14,26	0,01	2	138	276	4	52	208	67	0,0296759	0,0662761	0,593518	1,325523
62	50	14,26	0,01	1	138	138	4	52	208	20	0,0157282	0,0104855	0,314564	0,20971
63	60	14,26	0,01	2	148,5	297	2	52	104	58	0,0141041	0,0272679	0,282082	0,545359
64	53	14,26	0,01	1	138	138	2	52	104	40	0,007419	0,009892	0,148379	0,197839
65	75	14,26	0,01	2	138	276	1	52	52	14	0,0052427	0,0024466	0,104855	0,048932
66	60	14,26	0,01	1	99	99	4	52	208	48	0,0094027	0,0150444	0,188055	0,300888
67	65	14,26	0,01	2	138	276	4	52	208	59	0,0241973	0,0475879	0,483945	0,951759
68	50	14,26	0,01	2	99	198	2	52	104	17	0,0112833	0,0063939	0,225666	0,127877
69	48	14,26	0,01	3	138	414	1	39	39	34	0,0092158	0,0104445	0,184315	0,20889
70	49	14,26	0,01	2	138	276	3	39	117	40	0,0180554	0,0240738	0,361107	0,481476
71	59	14,26	0,01	2	138	276	2	39	78	17	0,0099967	0,0056648	0,199935	0,113296
72	44	14,26	0,01	2	148,5	297	2	26	52	49	0,0096164	0,0157068	0,192329	0,314137
73	47	14,26	0,01	2	148,5	297	3	39	117	56	0,0202559	0,037811	0,405118	0,75622

Pantai Bahari

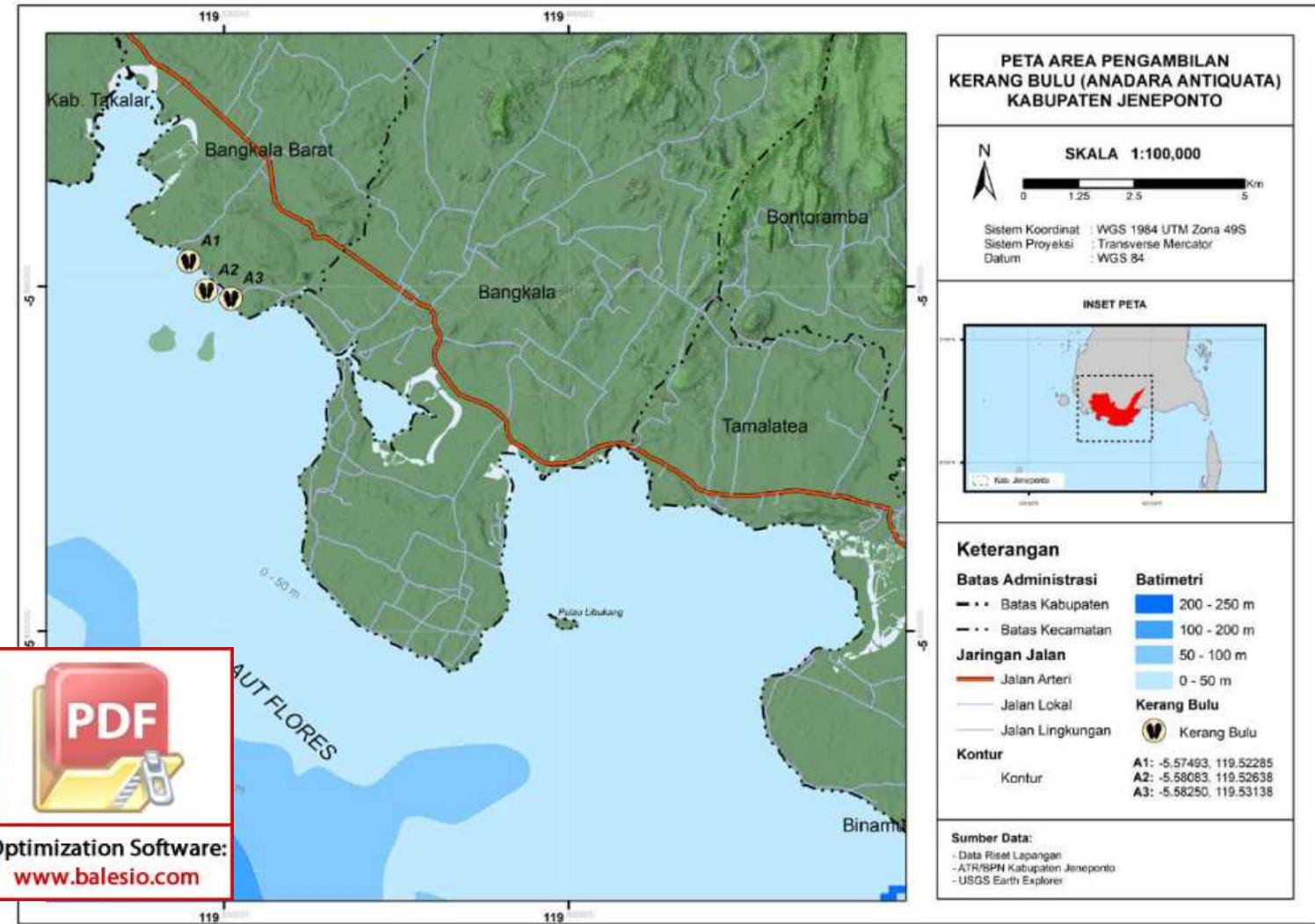
1	66	14,26	0,01	3	69	207	4	39	156	70	0,0134047	0,0312777	0,268095	0,625554
2	75	14,26	0,01	2	138	276	3	52	156	37	0,0157282	0,0193981	0,314564	0,387963
3	85	14,26	0,01	1	69	69	4	52	208	42	0,0046259	0,0064763	0,092519	0,129527
4	46	14,26	0,01	2	138	276	3	52	156	13	0,0256438	0,0111123	0,512877	0,222247
5		0,01	2	66	132	4	39	156	13	0,0094027	0,0040745	0,188055	0,08149	
6		0,01	3	138	414	2	39	78	30	0,0142696	0,0142696	0,285391	0,285391	
7		0,01	2	69	138	2	52	104	16	0,0060493	0,0032263	0,120986	0,064526	
8		0,01	3	138	414	2	52	104	70	0,0168517	0,0393205	0,337033	0,786411	
9		0,01	2	49,5	99	5	52	260	22	0,0143919	0,0105541	0,287839	0,211082	
10		0,01	3	138	414	2	52	104	30	0,0187241	0,0187241	0,374481	0,374481	
11		0,01	2	49,5	99	3	52	156	37	0,0070521	0,0086975	0,141041	0,173951	

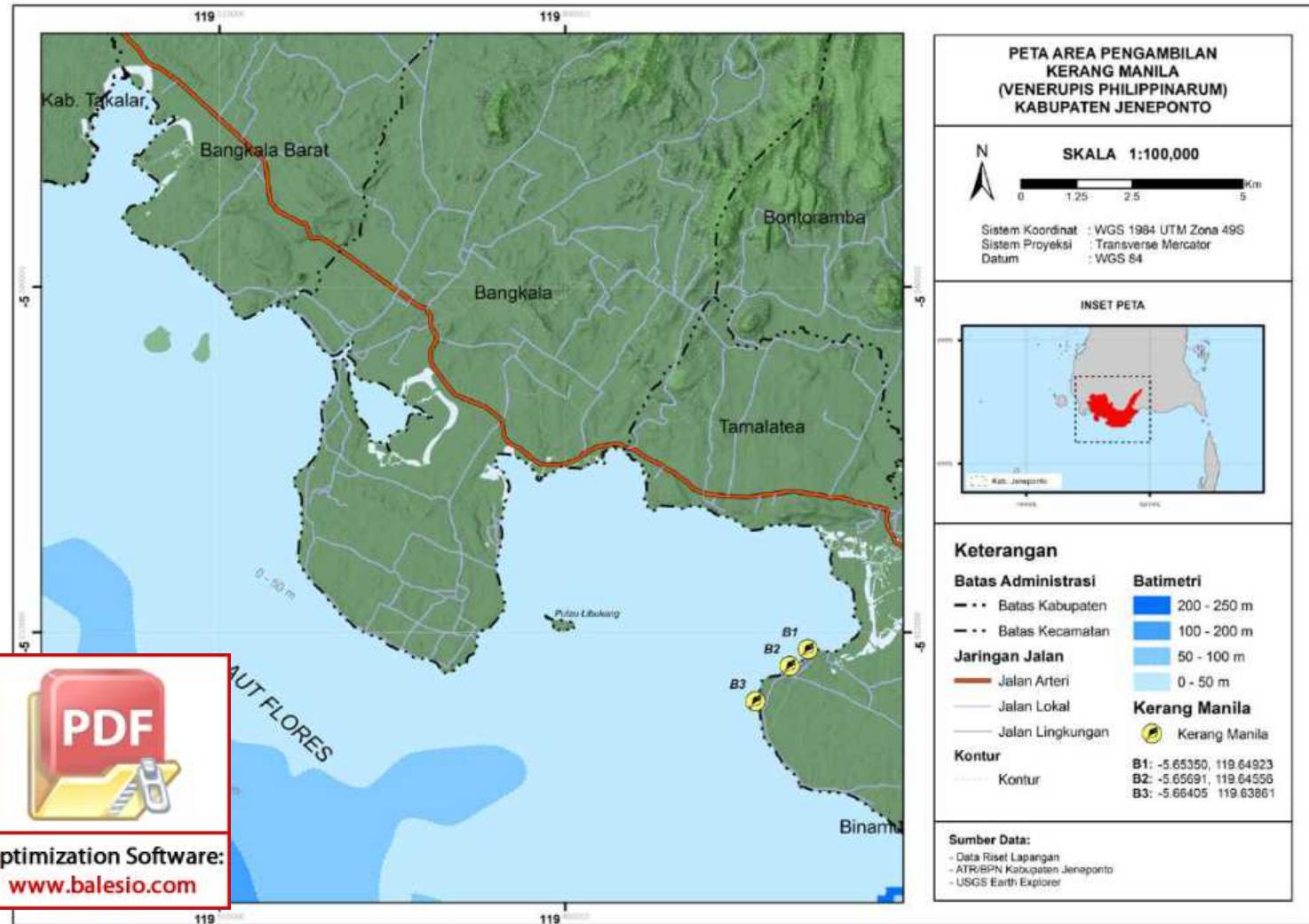
12	65	14,26	0,01	3	138	414	3	52	156	48	0,0272219	0,0435551	0,544438	0,871101
13	49	14,26	0,01	2	69	138	5	52	260	20	0,0200615	0,0133743	0,40123	0,267487

Garassikang

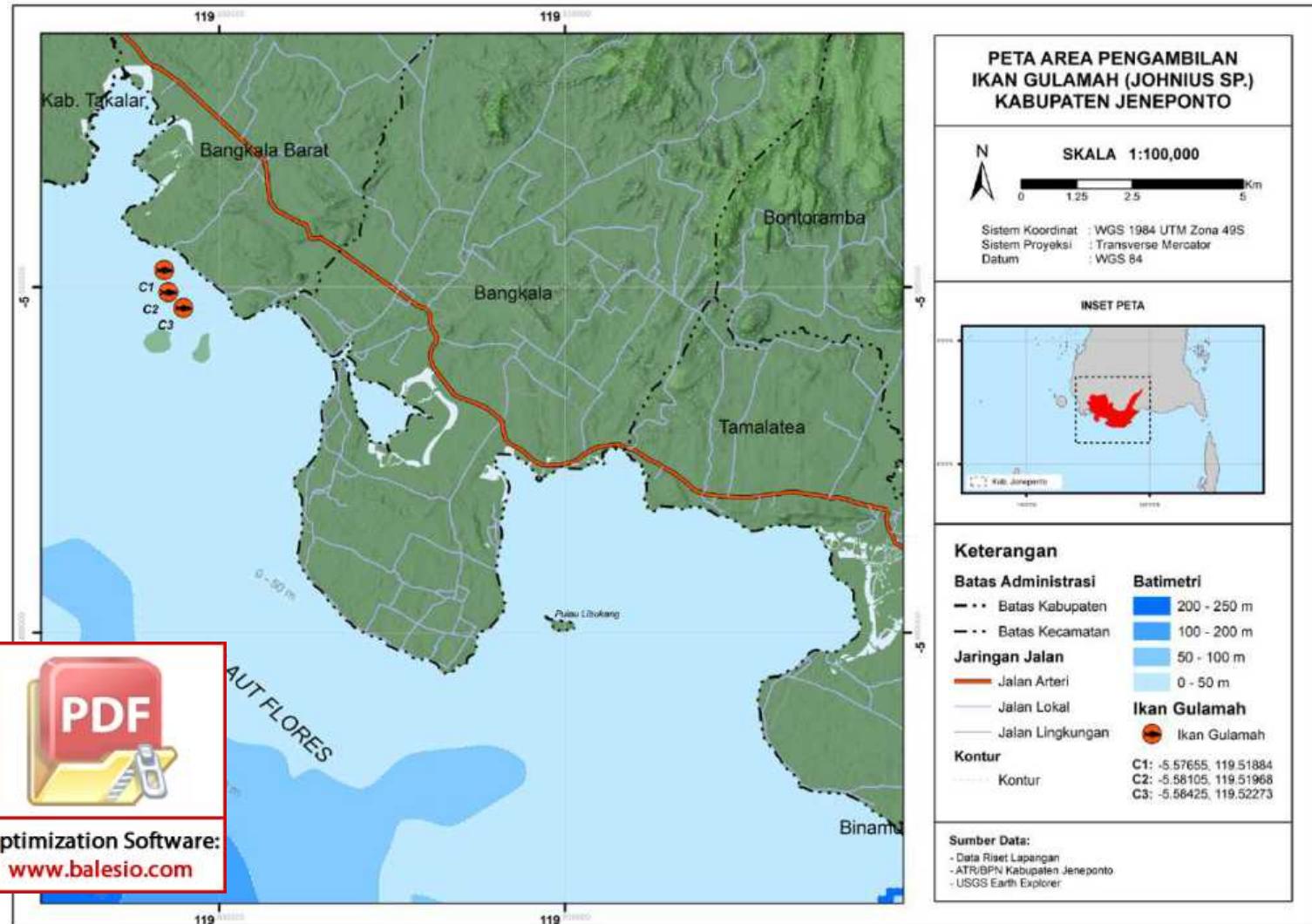
1	61	14,26	0,01	2	138	276	7	52	104	30	0,012892	0,012892	0,25784	0,25784
2	55	14,26	0,01	2	138	276	1	39	114	50	0,0156732	0,026122	0,313465	0,522441
3	65	14,26	0,01	3	69	207	1	52	114	10	0,0099465	0,0033155	0,198929	0,06631
4	75	14,26	0,01	2	138	276	2	52	88	20	0,0088723	0,0059149	0,177447	0,118298
5	45	14,26	0,01	2	207	414	3	52	104	28	0,0262137	0,0244661	0,524274	0,489322
6	53	14,26	0,01	3	69	207	2	52	104	31	0,0111285	0,0114994	0,222569	0,229988
7	58	14,26	0,01	2	138	276	4	52	147	20	0,0191649	0,0127766	0,383297	0,255531
8	72	14,26	0,01	2	207	414	2	39	100	30	0,0157534	0,0157534	0,315068	0,315068
9	61	14,26	0,01	2	99	198	2	39	104	63	0,0092486	0,0194221	0,184972	0,388441
10	58	14,26	0,01	2	138	276	4	52	156	43	0,0203382	0,0291514	0,406764	0,583029
11	45	14,26	0,01	3	99	297	4	39	135	56	0,024411	0,0455671	0,488219	0,911342

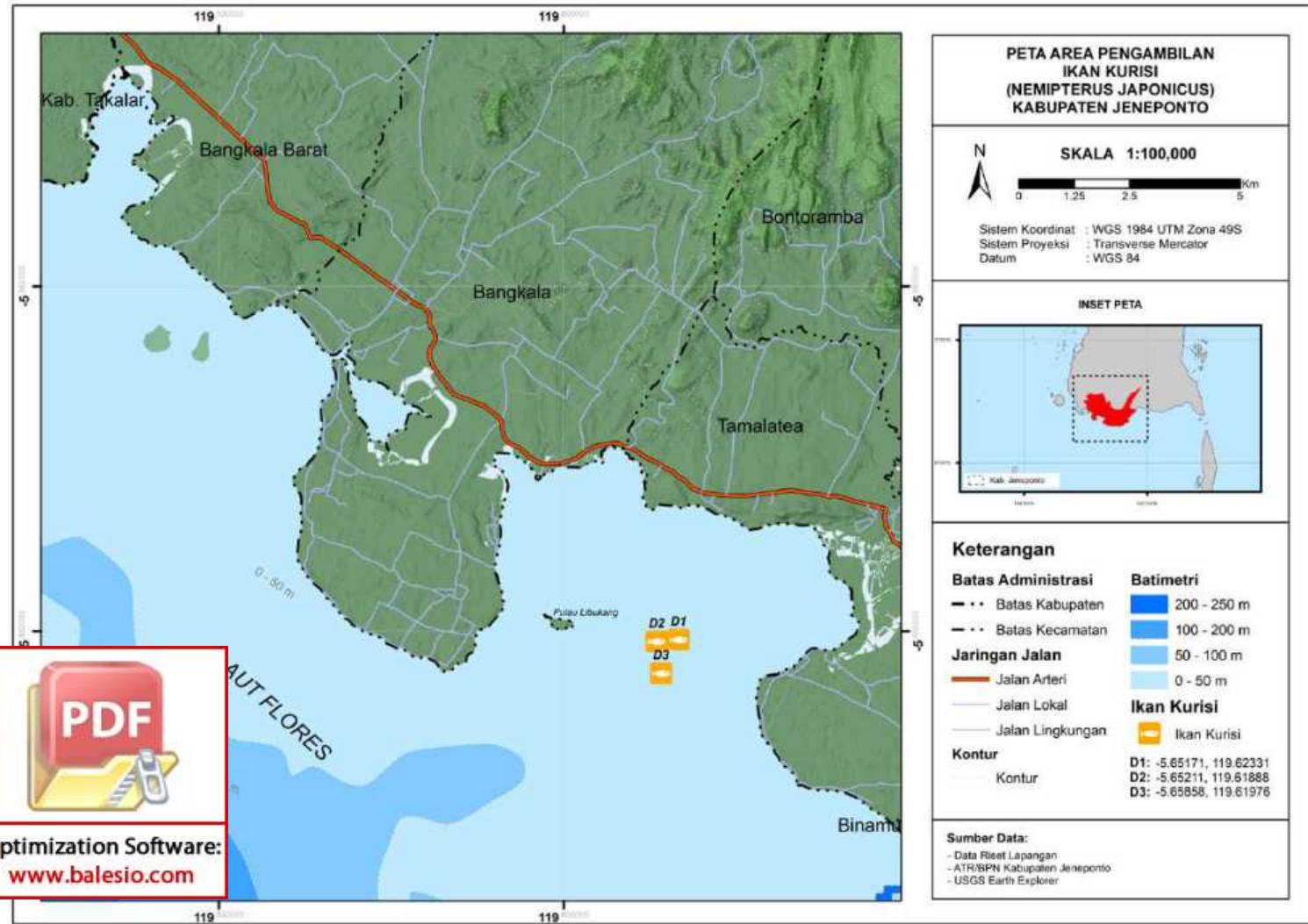






Optimization Software:
www.balesio.com





Optimization Software:
www.balesio.com