

BAB V

KESIMPULAN DAN SARAN

5.1. KESIMPULAN

1. Kandungan logam merkuri (Hg) di kolom air sungai di Kawasan Konservasi Batang Kuantan Sijunjung melebihi baku mutu menurut PP No 22 Tahun 2021 Tentang Penyelenggaraan Perlindungan dan pengelolaan Lingkungan Hidup, namun demikian untuk kandungan timbal (Pb), tembaga (Cu), seng (Zn), dan kadmium (Cd) masih dibawah baku mutu.
2. Logam berat kadmium (Cd) yang terkandung dalam sedimen tertinggi terdapat pada stasiun 3. Kandungan logam berat kadmium (Cd) di seluruh stasiun melebihi baku mutu berdasarkan Australian dan New Zealand Environment and Conservation Council.
3. Nilai kandungan timbal (Pb) pada daging ikan Ngongai (*Bagarius bagarius*) melebihi nilai baku mutu yang ditetapkan oleh SNI Nomor 7387 tahun 2009 tentang batas maksimum cemaran logam berat dalam pangan (Ikan dan hasil olahannya) yakni 0,3 mg/kg.

5.2. SARAN

1. Perlunya perhatian dari pemerintah setempat untuk melakukan pengawasan terhadap kegiatan pencemaran lingkungan di Kawasan Konservasi Batang Kuantan Kabupaten Sijunjung.
2. Perlunya penyadaran kepada masyarakat agar tidak melakukan kegiatan Penambangan Emas Tanpa Izin agar lingkungan perairan Kawasan Konservasi Batang Kuantan Kabupaten Sijunjung tidak tercemar

DAFTAR PUSTAKA

- Ahmad, A.K., Mushrifah, I. & Othman MS. 2009. Water quality and heavy metal concentrations in sediment of Sungai Kelantan, Kelantan Malaysia: A baseline study. *Sains Malaysiana*:38 (4): 435-442.
- Ahyar, D. G. Bengen & Y. Wardiatno. 2017. Sebaran dan Bioakumulasi Logam Berat Pb dan Cd pada Bivalva Anadara nodifera, Meretrix lyrata, dan Solen lamarckii di Perairan Pesisir Selat Madura Bagian Barat. *Jurnal Ilmu dan Teknologi Kelautan Tropis*. 9 (2): 631 – 643.
- Akter, S., Ferdous, J., Uddin, S., Hossein, K., Rasul, G. & Barman, P.P. 2015. Biodiversity and present status of threatened catfishes, Sylhet Sadar, Bangladesh. *World Journal Zoology*, 10, 34–40.
- Alam, G.N. Siddiqui, K.U., Islam, M.A., Kabir, S.M.H., Ahmad, M., Ahmed, A.T.A., Rahman, A.K.A., Haque, E.U., Ahmed, Z.U., Begum, Z.N.T., Hasan, M.A. 2007. *Bagarius bagarius*. In *Encyclopedia of Flora and Fauna of Bangladesh: Freshwater Fishes*. Eds. Asiatic Society of Bangladesh: Dhaka, Bangladesh, 23, 300p.
- Ali, A.A., Elazein, E.M. & Alian, M.A. 2011. Investigation of heavy metals pollution in water, sediment and fish at Red Sea-Jeddah Coast-KSA at two different locations. *Journal Applied Environmental Biology Science 1*: 630-637.
- Alluri, H.K., Ronda, S.R., Settalluri, V.S., Bondili, J.S., Suryanarayana, V. & Venkateshwar, P. 2007. Biosorption: An eco-friendly alternative for heavy metal removal. *African journal of Biotechnology*, 6(25). pp.2924-2931.
- Anand, S.J.S., 1978, "Determination of Mercury, Arsenic, And Cadmium in Fish By Neutron Activation", *Journal of Radioanalytical Chemistry*, 44 -101
- Asmawi, S. 1986. Pemeliharaan Ikan Dalam Keramba. Gramedia Jakarta.
- Asril, A., Murwindra, R. & Ningsih, J.R. 2021. Identifikasi Logam Berat Hg, Pb dan Cd di Aliran Sungai Batang Kuantan, Kabupaten Kuantan Singingi. *JEDCHEM (Journal Education and Chemistry)*, 3(1), pp.1-3.
- Asuquo, F.E., Ewa-Oboho, I., Asuquo, E.F., & Udo, P.J. 2004. Fish species used as biomarker for heavy metal and hydrocarbon contamination for Cross River, Nigeria. *Environmentalist*; 24:29-37.
- Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ). 2000. Australian and New Zealand guidelines for fresh and marine water quality. Volume 1, Australian and New Zealand Environment and Conservation Council. Canberra. 29p.

- Baensch, H.A. & Riehl, R. 1985. *Aquarien Atlas. Band 2*; Mergus, Verlag für Natur-und Heimtierkunde GmbH: Melle, Germany, 1216p.
- Baki, M.A., Hossain, M.M., Akter, J., Quraishi, S.B., Shojib, M.F.H., Ullah, A.K.M.A. & Khan, M.F. 2018. Concentration of heavy metals in seafood (fishes, shrimp, lobster and crabs) and human health assessment in Saint Martin Island, Bangladesh. *Ecotoxicology Environmental Safety* 159: 153-163.
- Bangun, J.M. 2005. Kandungan logam berat timbal (Pb) dan kadmium (Cd) dalam air, sedimen dan organ tubuh ikan sokang (*triacanthus nieuhofi*) di perairan Ancol, teluk Jakarta (Doctoral dissertation, Bogor Agricultural University).
- Borgmann, U. & Norwood, W.P. 1995. Kinetics of excess (above background) copper and zinc in *Hyalella azteca* and their relationship to chronic toxicity. *Canada Journal Fish. Aquatic Science.*; 52: 864-874.
- Chaturvedi, L.D. & Gupta, R.K. 1976. Studies on the morphology and histology of the digestive tract of *Bagarius bagarius* (Ham). *Gegenbaurs Morphology Jahrb.* 122, 636-645.
- Commission of the European Communities. Commission Regulation (EC) No. 221/2002 of 6 February 2002 amending regulation (EC) No. 466/2002 set maximum levels for certain foodstuff contaminants. Official Journal of the European Communities 2001, Brussels, 6 February 2002.
- Darmono. 2005. Lingkungan hidup dan pencemaran: hubungannya dengan toksikologi senyawa logam. UI Press. Jakarta.
- Darmono. 2008. Lingkungan Hidup dan Pencemaran. Penerbit Universitas Indonesia, Jakarta.
- Desliyan, P. & Herman. 2017. Analisis Kerusakan Lahan Pada Penambangan Emas di Kecamatan IV Nagari Kabupaten Sijunjung (Doctoral dissertation, STKIP PGRI SUMATERA BARAT).
- Effendi, H. 2000. Telaahan Kualitas Air bagi Pengelolaan Sumber daya dan Lingkungan Perairan. Bogor: Institut Pertanian Bogor Press.
- Federation, W. E. & APH Association. 2005. Standard methods for the examination of water and wastewater. *American Public Health Association (APHA): Washington, DC, USA.*
- Hasmalina NST., Pratama Yoga, G., & K. Darusman, L. 2012. Hubungan Karakteristik Sedimen Dasar Terhadap Kandungan Merkuri Akibat Pertambangan Emas Tanpa Ijin (Peti) Pongkor - Kab. Bogor. *Jurnal Photon*, 2(2): 19-23.

- Hutabarat, S.& S.M. Evans. 1986. Pengantar Oseanografi. Jakarta: UI Press.
- Ika., Tahril, Surya I. 2012. Analisis Logam Timbal (Pb) dan Besi (Fe) dalam Air Laut di Wilayah Pesisir Pelabuhan Ferry Taipa Kecamatan Palu Utara.*Jurnal Akademika Kimia*, 1 (4): 181-186
- IUCN Bangladesh.2015. *Red List of Bangladesh, Volume 5: Freshwater Fishes*. International Union for Conservation of Nature (IUCN), Bangladesh Country Office, Dhaka, Bangladesh, 360p.
- Jagfar, Agustono, Mizar A. 2014. Deteksi Logam Timbal (Pb) Pada Ikan Nila di Sepanjang Sungai Kali Mas.*Jurnal Ilmiah Perikanan dan Kelautan*, 6 (1): 42-48
- Jayaram, K.C. 1981.The Freshwater Fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka. Handbook; *Zoological Survey of India: Calcutta, India*. 237–238
- Karamah, E.F., Bismo, S. & Simbolon, H.M.2008. Pengaruh ozon dan konsentrasi zeolit terhadap kinerja proses pengolahan limbah cair yang mengandung logam dengan proses flotasi= The Effect of ozone and zeolite concentration to the performance of the treatment of wastewater containing heavy metal using flotation process.*Makara Teknologi* 12(1), 43-47.
- Kottelat, M. 1998. Fishes of the Nam Theun and Xe Bangfai basins, Laos, with diagnoses of twenty-two new species (Teleostei: Cyprinidae, Balitoridae, Cobitidae, Coiidae, and Odontobutidae). *Ichthyol.Explore. Freshwater.*, 9, 1–128.
- Kusuma, D.W. 2018.Strategi Pengendalian Pencemaran Sungai Batang Kuantan Dalam Upaya Mendukung Kawasan Geopark Di Kabupaten Sijunjung.Seminar Nasional Pelestarian Lingkungan (SENPLING).
- Low, K.H., Zain, S.M., Abas, M.R., Salleh, K.M., & Teo, Y.Y. (2015).Distribution and health risk assessment of trace metals in freshwater tilapia from three different aquaculture sites in Jelebu Region (Malaysia). *Food Chemistry*.;177: 390-396.
- Mazlin, M, Aris, A.Z., Munusamy. M. &Praveena, S.M. (2009).Assessment level of heavy metals in *Penaeus Monodon* and *Oreochromis Spp* in selected aquaculture ponds of high densities development area. *European Journal of Scientific Research*; 30 (3): 348-360.
- Miettinen, K.J. 1977. The Accumulation and Excretion of Heavy Metals in Organism. New York: Plenum Press.

- Mittal, A.K. 1970. Munshi, J.D. Structure of the integument of a fresh-water teleost, *Bagarius bagarius* (Ham.) (Sisoridae, y). *Journal Morphology.*, 130, 3–9.
- Naldi, A., Syandri, H. & Aswad, D. 2013. Kandungan Logam Berat Dalam Air Dan Ikan Baung (*Hemibagrus nemurus* CV) Di Kawasan Konservasi Sungai Batang Kuantan Kecamatan Sijunjung Kabupaten Sijunjung. *FPIK*, 3(1).
- Nautiyal, P. 2018. Diet components, dietary habits, resource and its use in the coexisting catfish species. *Journal Inland Fishery Social India*, 50, 9–20.
- Ng, H.H. 2020. *Bagarius bagarius* (Versi Errata diterbitkan pada 2020). *The IUCN Red List of Threatened Species 2010*.
- Odum, E.P., 1971, *Fundamental of Ecology*. W.B. Saunders Company, Philadelphia.
- Palar, H. 2004. *Pencemaran dan Toksikologi Logam Berat*. Penerbit Rineka Cipta, Jakarta.
- Palar, H. 2008, *Pencemaran dan Toksikologi Logam Berat*, Rineka Cipta, Jakarta
- Palar, H. 2012. *Pencemaran dan Toksikologi Logam Berat*. Jakarta: Rineka Cipta.
- Putri, W. A. E., D. G. Bengen., T. P. Pratono., & E. Riani. 2016. Konsentrasi Logam Berat (Cu dan Pb) di Sungai Musi Bagian Hilir. *Jurnal Ilmu dan Teknologi Kelautan tropis*. 7 (2): 453– 463.
- Rahman, A.K.A. 2005. *Freshwater Fishes of Bangladesh*, 2nd ed. Zoological Society of Bangladesh, Dhaka, Bangladesh, 263p.
- Rahman, M.M, Awang, M.B., Jalal, K.C.A., Aisha, S. & Kamaruzzaman, B.Y. 2013. Study on Toxic chemicals in Kuantan River during Pre and Post Monsoon season. *Australian Journal of Basic and Applied Sciences*; 7(4):24-30.
- Rajeshkumar, S. & Li, X. 2018. Bioaccumulation of heavy metals in fish species from the Meiliang Bay, Taihu Lake, China. *Toxicology Report* 5: 288-295. DOI: 10.1016/j.toxrep.2018.01.007.
- Reny Puspasari, 2006, *Logam Dalam Ekosistem Perairan*, *Jurnal Bawal*. 1(2): 43-47.
- Riede, K. 2004. *Global Register of Migratory Species—From Global to Regional Scales*. Federal Agency for Nature Conservation: Bonn, Germany, 329p.

- Roberts, T.R. 1983. Revision of the South and Southeast Asian Sisorid Catfish Genus *Bagarius*, with description of a new species from the Mekong. *Copeia*, 2, 435–445.
- Rohasliney, H., Tan, H.S., Noor Zuhartini, Md.M. & Tan, P.Y. 2014. Determination of Heavy Metal Fishes from the lower reach of Kelantan River, Kelantan, Malaysia. *Tropical Life Sciences Research*; 25(2):21-39.
- Sandhu, A.A. 2003. Lone, K.P. Diel pattern of feeding of some catfishes from Chenab River, Punjab, Pakistan. *Proceedings Pakistan Congress. Zoology.*, 23, 157–166.
- Sany, B. T., A.H. Sulaiman., G.H. Mona-zami, & A. Salleh. 2011. Assessment of sediment quality according to heavy metal status in the West Port of Malaysia. *International Journal of Biological, Biomolecular, Agricultural, Food and Biotechnological Engineering*, 5(2):4-8.
- Shafer, M. M., Overdier, J. T., Hurley, J. P., Armstrong, D., & Webb, D. 1997. The influence of dissolved organic carbon, suspended particulates, and hydrology on the concentration, partitioning and variability of trace metals in two contrasting Wisconsin watersheds (USA). *Chemical Geology*, 136(1-2), 71-97.
- SNI 7387:2009. Batas Maksimum Pencemaran Logam Berat Dalam Pangan, Jakarta: Badan Standardisasi Nasional.
- Subekti, P., Hatika, R.G., Dewata, I. & Anwar, S. 2018. Determination Of Mercury (Hg) On Water Sample in Batang Kuantan River. *International Conference of Applied Science of Engineering, Business, Linguistic and Information Technology (ICo-ASCNITech)*, 13 – 15 Oktober 2017.
- Subowo, M.S., Widodo, & Nugraha, A. 1999. Status dan Penyebaran Pb, Cd, dan Pestisida pada Lahan Sawah Intensifikasi di Pinggir Jalan Raya. Bogor: Bidang Kimia dan Bioteknologi Tanah Puslittanak.
- Sudarmaji, Mukono. & I. P. Corrie. 2006. Toksikologi Logam Berat B3 dan Dampaknya terhadap Kesehatan. *Jurnal Kesehatan Lingkungan*. 2 (2): 20-38.
- Sukiyanti, E. 1987. Kadar Merkuri Kerang Darah dari Teluk Jakarta dan Hubungannya dengan Kadar Merkuri Kerang Darah dari Tempat Pelelangan Ikan Muara Angke. Tesis. Program Pasca Sarjana Universitas Indonesia. Jakarta
- Sung, W., Yue, P., & Chen, Y. 1998. *China Red Data Book of Endangered Animals: Pisces; Endangered Species Scientific Commission*: Beijing, China.

- Supriharyono, M.S. 2000. Pelestarian dan Pengelolaan Sumber Daya Alam di Wilayah Pesisir Tropis. PT. Gramedia Pustaka Utama. Jakarta.
- Supriyanto, C., Samin, & Kamal, Z., 2007, Analisis Cemaran Logam Berat Pb, Cu, dan Cd pada Ikan Air Tawar dengan Metode Spektrometri Nyala Serapan Atom (SSA), Seminar Nasional III SDM Teknologi Nuklir, Yogyakarta, 21-22 November.
- Sutamihardja, R.T.M., Adnan, K. & Sanusi. 1982. Perairan Teluk Jakarta Ditinjau dari Tingkat Pencemarannya. Bogor: IPB.
- Syandri, H., Azrita, Junaidi, & Elfiondri. 2015. Heavy Metals in Maninjau Lake, Indonesia: Water, Column, Sediment and Biota. *International Journal of Fisheries and Aquatic Studies*; 3(2): 273-278.
- Talwar, P.K. & Jhingran, A.G. 1991. Inland Fishes of India and Adjacent Countries. Oxford & IBH Publishing Company Pvt. Ltd. New Delhi, India, 1158p.
- Tangahu, B. V., Sheikh Abdullah, S. R., Basri, H., Idris, M., Anuar, N., & Mukhlisin, M. 2011. A Review on Heavy Metals (As, Pb, and Hg) Uptake by Plants through Phytoremediation. *International Journal of Chemical Engineering*.
- US Environmental Protection Agency. 1994. Short term methods for estimating the chronic toxicity of effluents and receiving waters to freshwater organisms. EPA/600/4-91/002, 370.
- Umar, M.T., Meagaung, W.M., & Fachruddin, L. 2001. Kandungan Logam Berat Tembaga (Cu) pada Air, Sedimen dan Kerang *Marcia Sp.* Di Teluk Parepare, Sulawesi Selatan, *Jurnal Natur Indonesia*, 2 (2)
- Vidthayanon, C., Karnasuta, J. & Nabhitabhata, J. 1997. *Diversity of Freshwater Fishes in Thailand*. Office of Environmental Policy and Planning, Bangkok, Thailand, 102p.
- Wulan, S.P., Thamrin, & Amin, B. 2013. Konsentrasi, distribusi dan korelasi logam berat Pb, Cr dan Zn pada air dan sedimen di perairan Sungai Siak sekitar Dermaga PT. Indah Kiat Pulp and Paper Perawang Propinsi Riau.
- Yalcin G, Narin I, & Soylak M. 2008. Multivariate Analysis of Heavy Metal Contents of Sediments from Gumusler Creek, Nigde, Turkey. *Environmental Geology* 54: 1155-1163.