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Analysis of Water Quality from Several Rivers as Habitat of Mungkus Fish (*Sicyopterus* sp.) in Bengkulu Province

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ABSTRACT

Mungkus Fish (*Sicyopterus* sp.) is Gobiid fish inhabiting fast flowing and good quality river in Bengkulu Province. Today, it is rare to find Mungkus fish in the river. One of the extinction threats is the decline of water quality. This research was aimed to measure abiotic factor like chemical and physical factor in several rivers in Bengkulu Province where can be found Mungkus fish. Sampling was done in 8 rivers from 5 regencies. Chemical factors tested in this research were oil, Ammonia, Fe, BOD, nitrate, nitrite, phosphate, and detergent. Physical factors involved temperature, pH, DO, TSS, and TDS. The result of chemical factor test showed that chemical compounds of water from 8 rivers contained Ammonia (0.36-0.43 ppm), oil (0-40 ppm) nitrate (0.016-0.79 ppm), nitrite (0.0017-0.0038 ppm), Fe (0.051-7.24 ppm), phosphate (0-0.77 ppm), and detergent (0.26-0.479 ppm). Data of physical test showed that temperature range was 25^0C (at NPS) to 28^0C (at LKN). Conductivity range was 4.31 µs (at LKN) to 59.01 µs (at MRS), pH 7.99-8.7, TSS 13.89 ppm to 34.23 ppm, TDS 0.022 ppt to 0.039 ppt and DO concentration reached 6,32 (LKN) to 7,99 (ARM). The result can be concluded based on abiotic factor that 8 rivers are classified as good quality rivers.

***Keywords**: water quality, river, habitat, mungkus fish, abiotic factor*

1. INTRODUCTION

Bengkulu is a province with rich fishery product in Indonesia. There are many species of fish can be found in Bengkulu either common fish and endemic fish. Mungkus fish (*Sicyopterus* sp.) is one of freshwater fish species found in Bengkulu. Mungkus fish is cooked by local people as specific food from Bengkulu.

Mungkus fish has unique habitat. It lays eggs in rivers, and stick their eggs under large rocks and there are also eggs that drift downstream and hatch at the downstream, and the young fish will return to the upstream [1]. The presence of mungkus fish can also serve as an environmental bio-indicator of water pollution, because these fish are common in clean water habitats. The distribution pattern of mungkus fish in Bengkulu is currently unknown. But, based on former research, there were 7 species of mungkus fish found in Indonesia namely *Sicyopterus longifilis, S. microcephalus, S. cynocephalus, S. lagocephalus, S. micrurus, S. hageni* [2]. Bengkulu has many rivers as habitat of mungkus fish such as: Lokan river, the diversity of mungkus fish in Bengkulu must be preserved. Bengkulu has potential of mungkus diversity. Based on survey, there are 8 rivers found mungkus fish in Bengkulu province.

The quality of rivers will determine the existence and population of Mungkus fish. The quality of water is classified by Indonesian government into 4 classes. Class 1 and 2 is a best quality to support the life of mungkus fish. Class 1 & 2 can be used as drinking water, water recreation facilities and aquaculture. While class 3 & 4 can be used as agriculture, water for cropping, irrigation, and others.

The goals of this research are to analyse river water quality based on chemical and physical parameters so that this information can support the effort of conservation of biotic factors in river water especially mungkus fish as endemic species.

2. MATERIALS AND METHODS

This research was conducted from July-September 2020 in 8 rivers in Bengkulu Province that were Lubuk Muar river (Mukomuko Regency), Air Nokan river and Lubuk Banyau river (North Bengkulu Regency), Kedurang river (South Bengkulu Regency), Padang Guci river (Kaur Regency), and Maras's river (Seluma Regency)

Sampling of water was conducted in each river directly. Physical and Chemical parameter was conducted both in the field and in the laboratory of Chemistry and Biology, FMIPA UNIB. The physical parameters were pH, Temperature, DO, Conductivity, BOD, TSS, TDS. The chemical parameters were Oil, ammonium, nitrate, nitrite, Fe, Phosphate, and detergent. Testing methods for all parameters can be seen in Table.1.

Water sampling in the rivers was conducted directly in each river. Physical parameters (temperature, TSS, turbidity and TDS) were measured directly in sampling site by using multi tester equipment. The descriptive research was carried out based on observation and laboratory analysis methods.

The water sampling technique followed Indonesian National Standard number 6989.57/2008 concerning sampling methods for surface water. We take samples three times at one point in each river. Water samples were collected in sample bottle containers [3]. The data was analysed descriptively by comparing the result of sample test with Water Quality Status by the Environmental Ministerial Decree No. 115/2003 and a Government Regulation about Water Quality Management and Control of Pollution Class II [3].

3. RESULT AND DISCUSSION

Measurement of abiotic factors including chemical and physical parameters is very important to determine water quality. Chemical and physical factors have become significant factors to support life of fauna in water. In this research we used some rivers which found mungkus fish by direct survey in the site. Those rivers had clear color compared by other polluted rivers in Bengkulu Province. But, the chemical and physical factors of those rivers were not known. Mungkus fish is always found in clear, rocky and fast stream rivers.

Based on the research, those rivers have normal pH between 7.99- 8.7 (see Figure 1.). The temperature of the rivers is 25ºC-28ºC. It means that it is also normal condition for fish and others to live. Temperature has important role in the river. It determines the quality of water in biology, chemistry,

Table 1. Parameters dan method used in research

No.	Parameter	Unit	Methods	Class II
			Physical Parameters	
1.	Temperature	C	Termometri	deviation 3
2.	TSS	mg/L	Gravimetric	1000
3.	TDS	mg/L	Gravimetric	50
4.	Conductivity	µS	Conductivity cell elektroda	-
			Chemical parameters	
1.	DO	mg/L	DO meter	4
2.	BOD	mg/L	SNI 06-6989.72:2009	3
3.	Oil	mg/L	Gravimetric	1000Ugr/L
4.	Phosphate	mg/L	SNI 06-6989.31-2005	0.2
5.	Detergent	mg/L	Spectrophotometric	200 µgr/L
6.	pH		SNI 06-6989.11-2004	6-9
7.	Ammonium	mg/L	SNI 06-6989.30-2005	Negative
8.	Nitrate	mg/L	SNI 06-6989.9-2004	10
9.	Nitrite	mg/L	Spectrophotometric	0,06
10.	Fe	mg/L	Spectrophotometric	Negative

(Government Regulation about Water Quality Management and Control of Pollution)

Table 2. Physical Parameter from 8 water rivers

No.	Parameter	MRH	LBY	LKN	KDR	NPS	KNL	PGC	MRS	Class II**
1.	Temperature (0C)	27	27	28	27.2	25	25	25	25	deviation 3
2.	Conductivity (µS)	21.28	28.60	14.13	50.51	34.23	41.94	44.56	59.01	-
3.	TDS (mg/L)	13.89	14.58	14.19	25.75	34.23	21.35	22.75	29.96	50
4.	TSS (mg/L)	0.022	0.022	0.032	0.031	0.039	0.028	0.025	0.035	1000 µgr/L

and physics. Temperature will affect dissolved oxygen (DO). The sunny weather occurred at the time of sampling. Temperature also affects metabolism, growth and reproduction rate of aquatic biota [4].

Total Dissolved Solid (TDS) was between 0,00-40 mg/L. Total Suspended Solid (TSS) was 13.89-34.23 mg/L. It means that physical parameters of 8 rivers was good and can support the rivers as habitat of fish (see Table 2.). The value of suspended solid will determine the quality of water instantly. When the value of suspended solid is increased significantly, the rivers will look bad and dirty [5].

The research showed that number of Dissolved Oxygen (DO) from 8 rivers was between 6.32-7.99 mg/L. It means that the waters contained enough oxygen to support life of biota in the rivers. DO is very important for freshwater fish like cyprinid fish and gobiidae (*Sycioptеrus* sp.). These species need enough dissolved oxigen in water to breath. If, DO number is poor, the fish will face death in short time. This condition was occurred in several polluted rivers in Bengkulu like in Muara Bangkahulu river. Table 3. Showed that BOD was also good between 11.25-34.8 mg/L.

The rivers contain 0-40 mg/L oil, 0.36-0.42 mg/L ammonium, 0.0017-0.0038 mg/L nitrite, 0.16-0.77 mg/L nitrate, 0.28 -4.45 mg/L Fe, 0-0.77 mg/L phosphate and 0.26-0.479 mg/L detergent. Overall, the chemical content of water still fulfils National Standard of Water Class 2. Class 2 can be used for aquaculture. It can support the life of fish as Mungkus fish, Cyprinid fish and others [3].

Chemical compounds concentration in river could be caused by human activity, livestock, house waste disposal from human settlement [6]. Phosphate compound in the river can be derived from agricultural activity, industrial and residential activity [7,8,9] Water quality pollutants such as TDS & TSS are affected by the activity of land use in the upstream area.

The pollutant in the river can be from organic and chemical waste flows into the river. Pollutants from chemical waste and suspended material have a role to inhibit the penetration of sunlight if the concentrations are excessive. These will influence photosynthesis in the river [10-12].

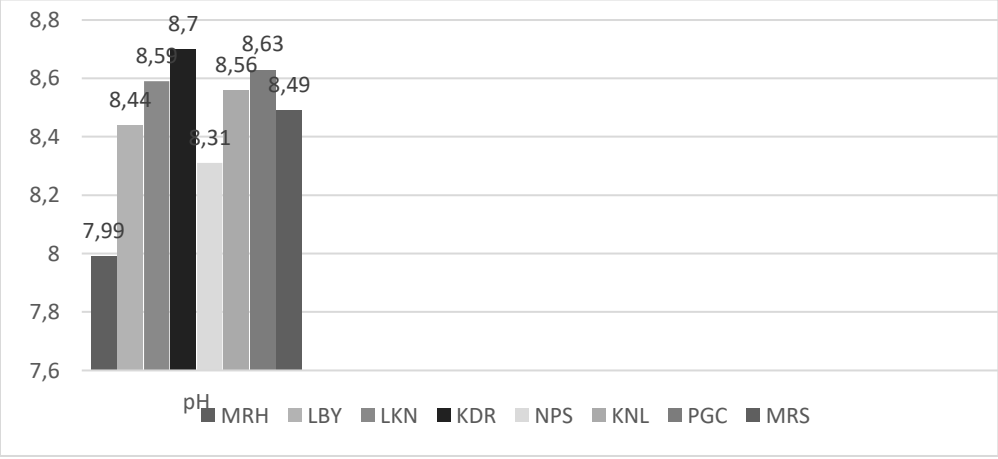

Figure 1. Degree of acidity

Table 3. Chemical parameters from 8 water rivers

No	Parameters	1	2	3	4	5	6	7	8	National Standard
		MRH	LBY	LKN	KDR	NPS	KNL	PGC	MRS	Class II**
1.	DO (mg/L)	7.99	6.73	6.32	6.41	7.39	6.88	6.85	7.41	4
2.	BOD (mg/L)	11.25	11.25	12.87	24.3	34.8	17.1	28.4	11.55	3
3.	Oil	19	13	7	0	40	30	40	30	1000 Ug/L
4.	Ammonium (mg/L)	0.42	0.39	0.38	0.41	0.41	0.36	0.42	0.43	Negative
5.	Nitrate (mg/L)	0.016	0.41	0.54	0.07	0.76	0.13	0.25	0.79	10
6.	Nitrite (mg/L)	0.0019	0.0017	0.0017	0.0018	0.0038	0.0029	0.002	0.0021	0.06
7.	Fe (mg/L)	0.28	0.051	0.28	0.16	4.45	7.24	0.92	4.36	Negative
8.	Phosphate (mg/L)	0.18	0.16	0.21	0.0	0.18	0.77	0.16	0.18	0.2
9.	Detergent (mg/L)	0.265	0.289	0.356	0.31	0.479	0.26	0.348	0.414	200 µgr/L

4. CONCLUSION

The result of chemical factor test showed that chemical compounds of water from 8 rivers contained Ammonia (0.36-0.43 ppm), oil (0-40 ppm) nitrate (0.016-0.79 ppm), nitrite (0.0017-0.0038 ppm), Fe (0.051-7.24 ppm), phosphate (0-0.77 ppm), and detergent (0.26-0.479 ppm). Data of physical test showed that temperature range was 25 ^{0} C (at NPS) to 28 ^{0}C (at LKN). Conductivity range was 4.31 µs (at LKN) to 59.01 µs (at MRS). pH 7.99-8.7, TSS 13.89 ppm to 34.23 ppm, TDS 0.022 ppt to 0.039 ppt. DO concentration reached 6.32 (LKN) to 7.99 (ARM). The result can be concluded based on abiotic factor that 8 rivers are classified as good quality rivers.

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REFFERENCES

[1] N. Anggraini, B. Karyadi, R.Z. Ekaputri, A. Y. Zukmadini, R. Sastiawan, F. Anggriani, The population and habitat of mungkus fish (*Sicyopterus cynocephalus*) in Bengkenang Waters South of Bengkulu, IOP Publishing Ltd., Journal of Physics: Conference Series, 1116 (5) (2018).

[2] P. Keith, C. Lord, H. Darhuddin, G. Limmon T. Sukmono, R. Hadiaty, N. Hubert, *Schismatogobius* (Gobiidae) from Indonesia, with description of four new species, Cybium 41(2) (2017), 195–211.

[3] Government Regulation of Indonesia No 82 /2001 on Water Quality and Water Pollution Management

[4] M.N. Suparjo, Pollution level at Babon river Semarang, Jurnal Saintek Perikanan 4(2) (2009) 38–45.

[5] W. Atima, BOD and COD as Parameter of water and Waste Water Standard, Jurnal Biologi Science dan Education 4(1) (2015) 83–98

[6] B. Wang, C. Wu, G. Reniers, L. Huang, L.G. Ka ng, L.B. Zhang, The future of hazardous chemical safety in China: opportunities, problems, challenges and tasks Sci. Total Environ., 643 (2018) 1–11.

[7] H. Effendi. River water quality preliminary rapid assessment using pollution index. Procedia Environmental Sciences 33(2016) 562–567.

[8] D. Cao, J. Xiaoying, L. Gan, T. Wang, Z. Chen, Removal of phosphate using iron oxide nanoparticles synthesized by eucalyptus leaf extract in the presence of CTAB surfactant, Chemosphere 159 (2016) pp. 23–31. DOI:https://doi.org/10.1016/j.chemosphere.2016.05.080.

[9] S.F. Colborne, T.J. Maguire, B. Mayer, M. Nightingale, G.E. Enns, A.T. Fisk, S.O.C. Mundle, Water and sediment as sources of phosphate in aquatic ecosystems: The Detroit River and its role in the Laurentian Great Lakes. The Science of the total environment 647(2019) pp. 1594–1603. DOI: https://doi:10.1016/j.scitotenv.2018.08.029.

[10] W. Widiadmoko, Physical and chemical water quality monitoring in Hurun Bay waters. Balai Besar Pengembangan Budidaya Laut (BBPBL) Lampung, Bandar Lampung, 2013.

[11] H. Rugner, M. Schientek, R. Milačič, T. Zuliani, J. Vidmar, M. Paunović, S. Laschou,

Kalogianni, N.T. Skoulikidis, E. Diamantini, B. Majone, A. Bellin, G. Chiogna, E. Martinex, M.L. de Alda, M.S. Díaz-Cruz, P. Grathwohl, Particle bound pollutants in rivers: results from suspended sediment sampling in Globaqua River Basins, Science Total Environment 647(2019) 645–652.

[12] Y. Tian, X. Yao, L. Chen, Analysis of spatial and seasonal distributions of air pollutants by incorporating urban morphological characteristics, Computational Environment Urban System 75(2019) pp. 35–48. DOI:10.1016/j.compenvurbsys.2019.01.003