Macrozoobentos Composition In The Babura River Sumatra Utara

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Abstract.

To determine the composition of macrozoobenthos in the waters of the Babura river. The parameters measured are biological parameters, namely macrozoobenthos composition supported by physical and chemical parameters in the Babura river waters. The parameters measured in this research are biotic parameters, namely the type of macrozoobenthos and abiotic parameters, namely physical and chemical parameters. Physical parameters such as: temperature, turbidity, and chemical parameters such as: pH (degree of acidity), (DO), BOD, COD, and phosphate. Taking macrozoobenthos in shallow water using a quadrant and in deep water using an Eckman grab. Physical/chemical parameters are measured in situ and ex situ. Ex-situ is carried out in the BTKL laboratory. This type of research is ex-post de facto or only reveals existing data. Macrozoobenthos composition found in the Babura river: 1. There are six species of insects, namely Chironomus sp, Aeshna grandis, Dragonfiy nymph macronia, Agrion sp, Damsefly nymph, Dragonfly; 2. There are eight species of gastropods, namely: Thiara winteri, Thiara sp, Melanoides tuberculata, Melanoides rustica, Melanoides gramnifera, Brotia testudinaria, , Planorbis sp, Lymnaea rubiginosa; 3. There are two species of Hirudinea/Clitellata, namely Leeches and Glossiphoniidae; 4 There is one species of trematode, namely Pomatiopsis lapidaria Say; 5. There is one species of crustacean, namely Gammarus sp; 6. There is one species of nematode, namely the rolled worm; 7. There is one species of Oligochaeta, namely Tubifex sp; 8. There are three species of Turbilaria, namely Planaria sp, Dugesia sp, Mesostoma sp, so the macrozoobenthos composition consists of 8 classes with a total of 23 species. Physical/chemical parameters still support macrozoobenthos life in the waters of the Babura river.

Keywords: *Macrozoobenthos, parameters, index and quality.*

I. INTRODUCTION

Macrozoobenthos move is very low so that it can be used as a bioindicator of water quality, changes in water quality will have a significant impact on macrozoobenthos [1]; [2];[3].The composition of macrozoobenthos in fresh waters varies according to the aquatic habitat. From macrozoobenthos, 94 specimens were obtained consisting of 7 orders, 10 families and 10 genera of macrozoobenthos, namely Simulium, Agathon, Trichocera, Macrelmis, Callibaetis, Glossiphonia, Hirudo, Parlesta, Polycentropus and Tubifex. The Glossiphonia genus was most commonly found, with 43 specimens [4]. The research results show that there are significant differences in the diversity, uniformity and composition of macrozoobenthos between station one and station two in the Batang Kuantan River [5].The macrozoobenthos found consisted of two classes, three orders, eight families, 15 species with a total of 565 individuals. The species found were *Brotia subgloriosa*, *Brotia peninsularis*, *Brotia castulata*, *Pomacea diffusa*, *Pomacea paludosa*, *Filopaludina polygramma*, *Filopaludina sp.*, *Melanoides tuberculata*, *Lymnaea sp.*, *Emilia sp.*, *Corbicula sumatrana*, *Corbicula fluminea*, *Corbicula japonica*, *Pilsbryoconcha exilis*, and *Anodonta sp* [6]. According to [7], the results showed that 12 species of macrozoobenthos consist of 9 genus, 6 families, 4 classes and 2 phylum.

The macrozoobenthos found in the Tanjung Pinggir River consisted of the Ampullaridae family with 47 individuals, the Cyrenidae family with 26 individuals, the Unionidae family with 29 individuals, the Thiaridae family with 36 individuals, the Lumbricidae family with 30 individuals, so that the total found was 5 families with 168 individuals [8].The substrate in the Babura river consists of sand clay and silt clay [9]. The river has a long flow as the source of life by humans, like bathing, washing, and so on as a livelihood [10]; [11]. Macrozoobenthos are found 14 species in 7 classes. The classes macrozoobenthos were found classified are Diptera, Ephemeroptera, Plecoptera, Gastropods, Hirudinae, Oligochaeta, dan Chromadorea. Chemical and physical factors found in the Babura River support the river ecosystems for macrozoobenthos properly [12]. The headwaters of the Babura River are in Keci-Keci village, Sibolangit sub-district, Deli

Serdang district, which is still natural because it is in a forest area so it has not experienced pollution. Throughout the Sembahe sub-district area, it is still covered with trees and community gardens, this is the situation in the Durin Pitu area, Pancurbatu sub-district [13].

II. METHODS

This research measures three water quality indicators, namely biological (macrozoobenthos), physical (temperature, brightness) and chemical (pH, DO and BOD) [14]. Water samples are taken by inserting the sample bottle until it sinks and is open, tilted and parallel/facing the water flow. Once the sample bottle is full, then stand it up/cover it in water, so that there are no air bubbles. To be able to calculate macrozoobenthos diversity, samples were first taken using horizontal transects across the direction of the river flow, by determining sub stations, namely, on the left bank, in the middle and on the right bank. Sampling was carried out using the Surber/Eckman Grab tool three times at each research station. Surber/Eckman Grab lifts macrozoobenthos mixed with mud, then separated through multi-level filtration, with filter sizes of 0.5mmx0.5mm and 1.0mmx1.0mm. After the macrozoobenthos sample is clean from mud, it is then put into a collection bottle and treated with 70% alcohol. Next, the macrozoobenthos obtained were separated based on taxon, then the number of each taxon was calculated.

The simple research procedure is shown in the fishbone diagram (figure 1).

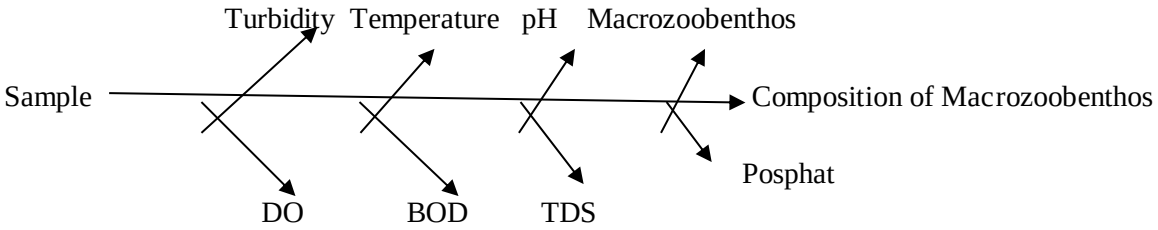

Fig 1. Fishbone Diagram

Research data collection is carried out through measurements in the field (in situ) and those that cannot be measured in the field, the samples are measured in the laboratory (ex situ), the measurements are detailed in (table 1)

Table 1. Parameters measured in units

Nu	Parameters	Measuring instrument	Unit	Measurement
1	Macrozoobenthos	Surber/Eckman grab	Ind/ltr	In situ
		Identification book was used Edmonsond's book (1959) and Hynes (1976)	Ind	Biologi Lab.
	Physical factors			
2	Current	Stop Watch	m/dtk	In situ
3	Temperature	Termometer	^{0}C	In situ
4	Light intensity	Lux meter	Lux	In situ
5	Turbidity	Turbidymeter	JTU	BTK3L
6	Substrate	Visual	-	In situ
	Chemical factors			
7	pH	pH meter	-	In situ
8	DO	DO meter	mg/ltr	In situ
9	BOD	Spektrofotometer	mg/ltr	BTK3L
10	Nitrate	Spektrofotometer	mg/ltr	BTK3L
11	Posphate	Spektrofotometer	mg/ltr	BTK3L
12	TDS	Spektrofotometer	mg/ltr	Biology Lab.

III. RESULTS AND DISCUSSION

Macrozoobenthos found in the waters of the Babura River, each species is put into one sample bottle, so the number of species is the same as the number of sample bottles. The sample bottle was filled with river water and dripped with 70% alcohol as a preservative so that the macrozoobenthos samples were not damaged before being identified in the FMIPA Unimed Biology laboratory. The existence of macrozoobenthos at each research station has differences in the number and species found, even in adjacent

areas. During the research, macrozoobenthos was found in the waters of the Babura river from upstream to downstream: *Chironomus sp, Aeshna grandis, Dragonfiy nymph macronia, Agrion sp, Damsefly nymph, Dragonfly, Hatelimnius sp, Thiara winteri, Thiara sp, Melanoides tuberculata, Melanoides rustica, Melanoides gramnifera, Brotia testudinaria, Pomatiopsis lapidaria Say, Planorbis sp, Lintah, Haemopsis, Gammarus sp, Chiochepalus deaphanus, Tubifex sp, Cacing gulung, Planatia, Dugesia sp, Glossiphonia,* and *Mesostoma sp*.

Several types of macrozoobenthos found in the waters of the Babura River can be seen in Figure 2.

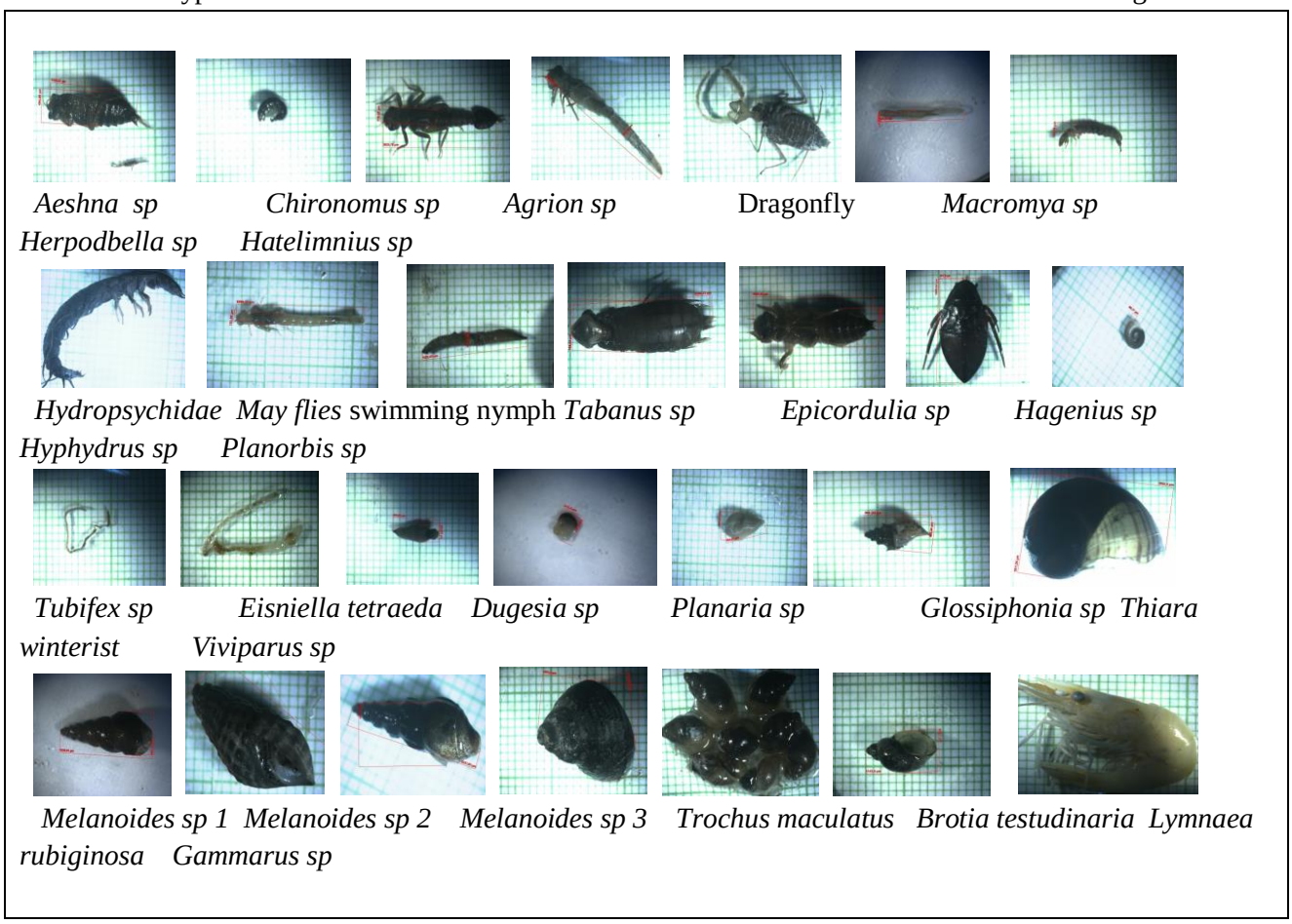

Fig 2. Several macrozoobenthos found in the Babura river

Table 2. Number of macrozoobenthos, composition and number of species.

No	Taxa	Station										
		I	II	III	IV	V	VI	VII	VIII	IX	X	Amount
1	*Chironomus sp*	-	-	4	5	3	4	3	4	-	-	23
2	*Aeshna grandis*	-	2	2	2	-	-	-	-	-	-	6
3	*Dragonfiy nymph macronia*	2	3	3	4	2	-	-	-	-	-	14
4	*Agrion sp*	-	3	2	-	-	-	-	-	-	-	5
5	*Damsefly nymph*	2	-	3	2	-	-	-	-	-	-	7
6	*Dragon fly*	2	-	2	3	4	-	-	-	-	-	11
7	*Thiara winteri*	-	-	10	5	-	-	-	-	-	-	15
8	*Thiara sp*	-	3	6	7	5	-	-	-	-	-	21
9	*Melanoides sp1*	-	-	-	-	7	-	-	-	-	-	7
10	*Melanoides sp2*	-	5	-	-	9	-	-	-	-	-	14
11	*Melanoides sp3*	-	5	-	-	4	11	-	-	-	-	20
12	*Brotia testudinaria*	-	-	-	-	-	-	-	2	4	10	16
13	*Pomatiopsis lapidaria Say*	-	-	-	-	-	-	-	5	7	6	18
14	*Planorbis sp*	1		1	-	-	-	-	-	-	-	2

15	*Lymnaea rubiginosa*	-	-	-	-	-	**2**	-	-	-	-	**2**
16	*Grammarus sp*	-	-	-	3	-	-	-	-	-	-	3
17	*Tubifex sp*	-	-	-	-	12	30	44	57	69	75	287
18	*Cacing gulung*	-	-	-	-	2	1	-	-	-	-	3
19	*Planaria*	**1**	**2**	2	2	-	-	-	-	-	-	7
20	*Dugesia sp*	-	**2**	4	-	-	-	-	-	-	-	6
21	*Lintah*	-	-	-	-	2	-	-	-	-	-	2
22	*Glossiphoniidae*	-	-	-	-	5	2	-	-	-	-	7
23	*Mesosstoma*	-	-	-	3	-	2	-	-	-	-	5
	Amount	8	25	38	45	57	48	47	64	80	91	

Based on table 1, there are two species most frequently found, namely: *Chironomus sp* dan *Tubifex sp* found at each of the six stations. There are two species that are only found at one different station, namely *Lymnaea rubuginosa* and *Grammarus sp*. The largest number of individuals found was Tubifex sp with 287 individuals. From stations 5 to 10 Tubifex sp was found, this shows that the station was contaminated with organic material because *Tubifex sp* is a bioindicator for organic pollutants. *Tubifex sp* can also live in conditions of polluted aquatic of organic matter and DO poor surface because they can absorb DO instantly through all parts of the body that dangle into water [6]. *Tubifex sp* also can live in conditions of polluted aquatic of organic matter and DO poor surface because they can absorb DO instantly through all parts of the body that dangle into water [15].

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The percentage of individuals found in the Babura River is shown in Figure 2.

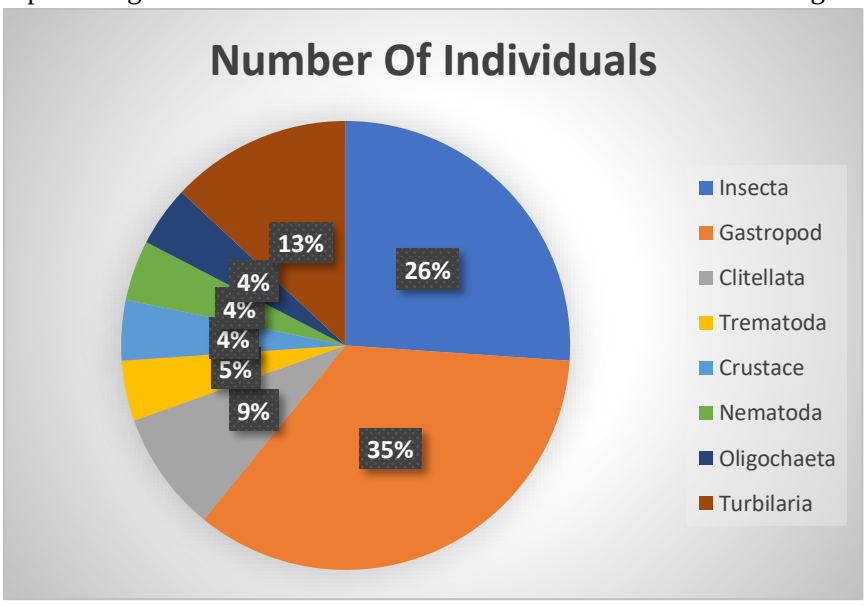

Fig 2. The percentage of individuals found in the Babura River

The results of measuring water samples from the upstream waters of the Babura river in Keci-keci Bingkawan village, Sibolangit Deli Serdang District to the downstream in the Petisah area of Medan City, obtained data on the physical and chemical parameters of the Babura river waters as in table 2.

Table 2. Values of physical and chemical water parameters at two research stations for the Babura River, Deli Serdang.

No	Parameter	Unit	Station									
			I	II	III	IV	V	VI	VII	VIII	IX	X
Physic												
	Temperature	ºC	27	28	30,6	29,3	29,6	28,3	29	29,6	29,15	30
	Turbidity	mg/l	5,56	21,84	25,35	17.18	52,3	53,88	33,79	49,98	33,71	80,32
	Current	m/dtk	1,90	3,28	3,00	2,80	2,60	3,84	2,33	2,39	3,45	2,40
Chemist												
	pH	-	7,84	6,33	5,42	6,67	6,71	7,19	6,70	5,29	5,98	6,10
	DO	mg/L	7,66	7,46	4,43			4,91	3,39	0,57	3,61	3,39
	BOD	mg/l	2,8	6	5	5,6	38,5					16,2
	COD	Mg/l	6,1	20	16	11,4	82,0					8,6
	Nitrat	Mg/l	< 1,0	< 1,0	< 1,0	3,1	< 1,0					< 1,0
	Fosfat	mg/l	0,058	0,071	0,45			0,24	0,19	0,28	0,25	0,44

Environmental variables measured showed significant statistical differences across the observation months and seasons, with the most influential factors on the three gastropod populations being dissolved oxygen (DO) and total dissolved solids (TDS) [15]. Aquatic organisms can live ideally in the pH range between weak acid to weak base. Water conditions that are strongly acidic or alkaline will endanger the survival of biota, because they will disrupt metabolic and respiration processes. From the pH values obtained, stations one, two and six have a pH range that is still good for the life of organisms, while at stations three, four, five, seven, eight, nine and ten the pH values are not good for the life of aquatic organisms. The tolerance limits of organisms to pH vary greatly and in general most biota are sensitive to changes in pH and prefer a pH of around 7 – 8.5. According to [16]. life in water can still survive if the waters have a pH range of 5-9.

Based on this, only stations four and five have a pH <5 and the macrozoobenthos found at these stations are those that are tolerant of polluted waters. The lime content affects the pH value in a body of water, where generally the pH value for fresh water is in the neutral range of 6.5 – 7.5. The pH value influences biochemical processes in waters, thus affecting aquatic communities [6]. The main source of DO in waters is the photosynthesis process of plants and the direct absorption/binding of oxygen from the free air through contact between the water surface and the air. Meanwhile, the reduction in DO in waters is the respiration activity of aquatic organisms or through direct release from the surface of waters into the atmosphere. The influence of DO on aquatic biota is limited to the need for respiration. Some aquatic organisms even have mechanisms that allow them to live in very low dissolved oxygen conditions. The phosphate content in waters is generally no more than 0.1 mg/l.Correlation of diversity index with physico-chemical factors from the strongest to the weakest starting from depth and phosphate each was 0.971, turbidity was 0.806, temperature was 0.971, pH was 0.658, BOD was 0.030, and DO was 0.366 [15].

IV. CONCLUSIONS

Macrozoobenthos composition found in the Babura river: 1. There are six species of insects, namely *Chironomus sp*, *Aeshna grandis*, *Dragonfiy nymph macronia*, *Agrion sp*, *Damsefly nymph*, *Dragonfly*; 2. There are eight species of gastropods, namely: *Thiara winteri*, *Thiara sp*, *Melanoides tuberculata*, *Melanoides rustica*, *Melanoides gramnifera*, *Brotia testudinaria*, *Planorbis sp*, *Lymnaea rubiginosa*; 3. There are two species of Hirudinea/Clitellata, namely *Leeches* and *Glossiphoniidae*; 4 There is one species of trematode, namely *Pomatiopsis lapidaria Say*; 5. There is one species of crustacean, namely *Gammarus sp*; 6. There is one species of nematode, namely the rolled worm; 7. There is one species of Oligochaeta, namely *Tubifex sp*; 8. There are three species of Turbilaria, namely *Planaria sp*, *Dugesia sp*, *Mesostoma sp*. So the macrozoobenthos found in the Babura River consists of 8 classes with a total of 23 species.
Physical/chemical parameters still support macrozoobenthos life in the waters of the Babura river.

V. ACKNOWLEDGMENTS

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