Types and Macrobenthos Abundance in River of Tohor Subdistrict East Tebingtinggen, District of Kepulauan Meranti, Riau Province, Indonesia

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ABSTRACT

This study aims to determine the type and abundance of macro benthos in Tohor river Tebing Tinggi Region, District of Kepulauan Meranti, Riau, Indonesia. The test sample was taken from 35 stations on the Tohor River, using the Surber network. Samples were analyzed in Aquatic Biology laboratories, and Ecological Laboratory and water management to identify species name, character, abundance, species diversity values, species dominance in the Tohor River. The result of identification of macrozoobenthos known that there are 5 species, namely: Melanoidestuberculata, Melanoidesrustica, Sulnospiratestudinaria, Thiarascabra, Pomaceacanaliculata. The species diversity at each station varies from 0.11 to 1.09. The variety of species is still low category. While the highest diversity is found only in station 32.

Keywords: *Abundance, Diversity, species dominance, Macrobenthos, Tohor River, KepulauanMeranti District;*

INTRODUCTION

Indonesia has a larger water area than land area. In terms of aquatic ecosystems, it can be distinguished into freshwater, seawater, and brackish water as found in large estuaries. Of the three aquatic ecosystems, seawater and brackish water, are scattered over 97% (Chen, J. L., et al., 2015). The rest is fresh water with limited amounts and conditions but is needed by humans and many other living organisms for the necessities of life (Shiklomanov, I., 1993).

Benthos is an organism that inhabits the bottom of the waters and lives in or adheres to the bottom sediments of the waters (Pasotti, F., Manini, et al., 2015). Based on the size of the body benthos can be divided into macrobenthos benthos group measuring> 2 mm, meiobenthos is benthos group measuring 0.2-2 mm, and microbenthos benthos group size <0.2 mm (Clarke, A., and Arntz, WE, 2006).

Macrobenthos is an organism that attaches or rests on the basis or lives on the basic sediment of Shannon, M. A. (2010). The polluted waters will affect the viability of macrobenthos because macrobenthos is a water organism that is easily affected by pollutants, both physical and chemical pollutants (Alsdorf, D. E., 2003).

The abundance of macrobenthos also affects waters because the pattern of evenness of macrobenthos abundance in each river station is different. Healthy or uncontaminated water will show a balanced number of individuals from almost all species. In contrast,polluted water, the spread of individual numbers is uneven and there tend to be a dominating species (Odum, 1994).

The study of gender and abundance in the Tohor River of Meranti Islands Regency has never been done by previous researchers. Though the river is planned to be developed as an area of freshwater fisheries development. Related to this intention, the study of the existence of macrozoobenthos is very important in relation to knowing about the condition of the carrying capacity of the waters and the fertility of river waters or public waters, such as the Tohor River. With the knowledge of the carrying capacity and fertility of water, the development and conservation of marine biological resources can be done appropriately. On that basis, the government of KepulauanMeranti Regency

needs to study the condition of Tohor River first, so that later it can be made the policy of

developing and managing its living resources in the future.

Appendix1. *Abundance, dominance and diversity*

No.	Nama species	14		15		16		17		18		19		20		21		22		23		24		25		26		27		28		29		30		31		32		33		34		35		total	
		ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di	ni	Di
1	Melanoides tuberculata	18	5	0	0	0	89	91	0	0	0	0	0	0	0	0	9	10	0	0	0	0	0	0	0	0	0	0	44	4	0	0	0	9	2	0	0	9	5	178	1,47
2	Melanoides rustica	36	9	5	10	1	3	0	8	5	50	9	9	3	0	0	0	0	18	1	9	4	0	0	0	0	41	8	32	80	15	98	17 .4	16	53	17	20 .9	4	19	27	2	34	7	26	28	17	57	8	37	53	2	27. 2	208	17,34
3	Sulcospira testudinaria	44	11 .6	0	0	0	0	0	0	0	0	0	0	0	0	27	1	20	4	88. 4	3	6	79 40	96 1	63 .7	21 49	3	30 41	53 2	21 .9	27	5	62	7	44	4	91 .6	93 .6	47 1	38	62	10 13	22 7	2	0	0	393 8	32,69
4	Thiara scabra	0	0	0	0	1	8	50	0	0	0	0	0	0	0	91	19 .8	97	18	8	4	50	27	4 3	0	24 19	23 1	16 44	28 0	40 .5	71 9	75 84	80 1	73 .4	36 0	4	40 9	13 34	19 3	40 28	13 6	68. .7	1	555 6	46, 13
5	Pomacea canaliculata	284	74 .4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	284	2,35
	TOTAL	382	100	5	10	3	60	10	80	9	30	10	50	5	30	10	100	0	0	0	0	20 36	99 .8	23 1	100 .4	8 9	10 0	81 8	99 .7	12 89	10 40	52 0	10 0	56 .8	99 9	48 0	10 2	94 0	10 93	10 0	10 8	97 .6	99 27	12 0	10 1	47 0	10 0	48 9	99 6	19 .3	100	120 44	99, 98
	Keanekaragaman (H')		0,83		0		0,69		0,30		0		0		0		0,1 1		0,43		0,94		0,1 4		1,0 2		1,01		1,54		0,69		0,80		0,2 8		1,0 9		1, 02		1,06		0,7 5		1,1 6		

MATERIALS AND METHODS

The research materials were macrobenthos taken in Tohor River at 35 sampling stations using surber net. Sampling location maps are presented in Appendix 2 and the sampling location map is presented in Appendix 3. Samples are identified, analyzed abundance, dominance, and diversity values. To know the abundance by converting the number of individuals obtained divided by the area of surber-net that is equal to 0.1125 at each station. To get the average number of individuals/plots used the formula: To get the average number of individuals/plots used the formula:

$$A = \frac{(The\ number\ of\ individuals\ in\ the\ entire\ plot)}{number\ of\ plots}$$

After getting the average individual number/plot then calculated the individual density per square meter is:

$$Individual\ per\ m^2 = \frac{1}{large} \times A$$

The dominant index is used to obtain information about the types of macrobenthos that predominate in a community in each habitat, the dominance index proposed by (Simpson, 1949 in Odum, 1971), namely:

Information:

C = Dominance Index

Pi = Number of individuals per species

S = Total individuals of all species

The criteria of dominance are determined as follows (Torgensen and Baxter, 2006):

Dominant if Di> 50%

Subdomains (General) if At 10-50%

Not dominant (Rarely) if At<10%

To measure the index of macrobenthos diversity using the Shannon-Winner diversity formula based (Romimohtarto and Juwana, 2001):

$$H' = - \Sigma\ Pi\ Ln\ Pi$$

Information :

H '= Shannon-Winner Diversity Index

Pi = Comparison of the number of individuals of a species with the whole type (ni / N)

Ln = Natural logarithm

N = Total individuals of all species

Ni = Number of individual species i

The resulting diversity index was then incorporated into the criteria of diversity (Lee et al., 1978 in Arisandi 1999):

H '<1.0 = Diversity is very low.

1.0 <H '<1.5 = Low diversity

1,6 <H '<2.0 = Medium diversity

H '> 2.0 = High diversity

$$C = \sum_{i-1}^{s} (Pi)^2$$

RESULTS AND DISCUSSION

Based on the results of research that have been done in Tohor River, District of KepulauanMeranti was found Gastropoda class macrobenthos.

Gastropods found at the time of this study were 5 species:

Melanoidestuberculata, Melanoidesrustica, Sulcospiratestudinaria, Thiarascabra, Pomaceacanaliculata. Further abundance, dominance, and macrobenthos Diversity found from this study are presented in Appendix 2.

Appendix2. *Map of Tohor River Location and Map of sampling site on Tohor River, District of KepulauanMeranti, Riau*
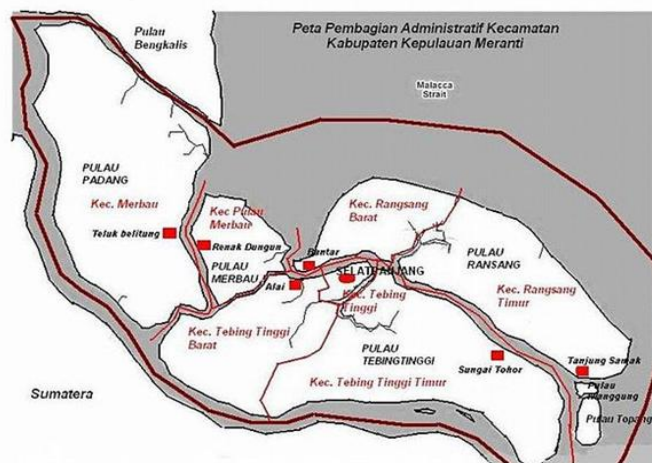
These findings indicate that the highest abundance is at station 21 with a value of 1991 individuals / m2 and the lowest at stations 33 and 35 with a value of 9 individuals / m2. This is because the physical and chemical factors are the type or texture of the substrate that affects macrobenthos abundance. According to Handayani et al., (2001) states that macrobenthos organisms have a spreading range in the type of sandy, or muddy substrate (Hillery, M., et al., 1984), but these organisms tend to favour sandy substrates to muddy. According to Suin (2002) that environmental factors largely dictate the spread and population density of an organism (Hijmans, RJ, and Elith, J., 2015), if the density of one genus in an area is overwhelming, it shows that the abiotic in the station strongly supports life the genus (Hijmans, RJ, and Elith, J., 2013).

The dominance of the *Melanoidestuberculata* species has a dominant (non-dominant) dominance level at stations 14, 30, 33, and 35 but at station 23 indicates sub-dominant while station 17 indicates a fairly high level of dominance of 91%. The *Melanoidesrustica* species have a dominant degree (not rare) at stations 14, 17, 21, 22, and 31 but at stations 16, 25-30, 32, 34, 35 show sub-dominant (general) while at stations 15, 18, and 33 shows a fairly high level of dominance at stations 15 and 18

with 100% dominant value while at station 33 the dominant value is 57%.

Species of *Sulcospiratestudinaria* have a dominant level not dominant (rarely) at stations 21, 28-30 but at stations 14, 23, 25, 26, and 32-34 show subdomains (general) while at stations 22, 24, 27 and 31 show the dominant level is quite high at station 22 with 88% dominance value, station 24 with 97% dominance value, station 27 with 54% dominance value and at station 31 with 94% dominance value.

The *Thiarascabra* species have a dominant dominant level (rare) at stations 24, 31 but at stations 16, 23, 25, 26, 27, 32-34 show subdomains (common) while at stations 21, 28-30, and 35 indicate levels dominance is quite high at station 21 with 98% dominance value while at station 28 dominance value equal to 84%, at station 29 dominance value equal to 75%, at station 30 dominance value equal to 73%, at station 35 dominance value equal to 68%.

Pomaceacanaliculata species have 74% dominance level at station 14. Criteria of dominance level at some stations which states are not dominant (rare) and subdominant (general), according to Fachrul, (2007) can be indicated that the spread of macrobenthos type

is evenly distributed, the dominant types of macrobenthos (Cassini, MH, 2013).

Appendix3. *Map of sampling sites in Tohor River, District of KepulauanMeranti, Riau*
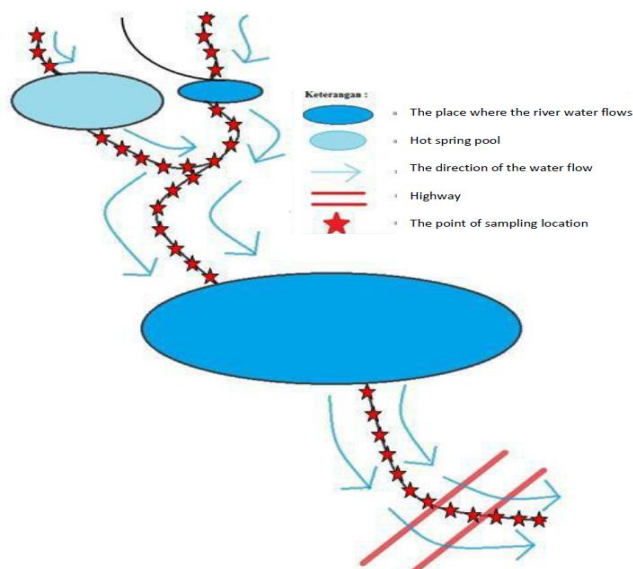
The level of macrobenthos diversity in the Tohor River is very low, ranging from 0.11 to 1.09. Clark (1974) states that the higher the index of diversity in the ecosystem, the higher the balance of the ecosystem. Conversely, the lower the diversity of these ecosystems indicates that the ecosystem is increasingly depressed or degraded environmental quality (Ives, A. R., and Carpenter, S. R., 2007).

From the results of this study can be seen that the diversity, abundance and dominance of macrobenthos that occur in the Tohor River much influenced and determined by the physical and chemical properties of the waters themselves. Physical properties that are quite influential in these waters is a substrate texture consisting of muddy sand. According to Prabu-Jeyabalan, M., et al. (2002) and Hakim et al., (1986) substrate types greatly influence the number of macrobenthos presence, ie, the type of sandy to themuddy substrate is suitable for macrobenthos life (Wenzl, H., et al., 2005).

CONCLUSION

Results of research conducted in Tohor River in January-March 2017, it can be concluded as follows:

- The types of macrobenthos found in the Tohor River are *Melanoidestuberculata, Melanoidesrustica, Sulcospiratestudinaria, Thiarascabra, Pomaceacanaliculata.*

- Average macrobenthos abundance in Tohor River *Melanoidestuberculata* 44 individuals /

m^2, *Melanoidesrustica* 533 individuals / m2, *Sulcospiratestudinaria* 995 individuals / m2, *Thiarascabra* 1413 individuals / m2, *Pomaceacanaliculata* 71 individuals / m2. The total dominance of macrobenthos in Tohor River *Melanoidestuberculata* 2%, *Melanoidesrustica* 17%, *Sulcospiratestudinaria* 33%, *Thiarascabra* 46%, *Pomaceacanaliculata* 2%.

- The level of diversity of macrobenthos species in the Tohor River is very low, ranging from 0.11 to 1.09.

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