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Water Quality River Estuary of Batang Hari, Musi Banyuasin District, the Province of South Sumatera

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Abstract: This study aims to determine the water quality of the estuary of the Batangharileko River based on factors of physics, chemistry and biology. The results showed that the water quality of the estuary of the Batangharileko River by physical factors already meets the criteria of raw water for class I, II, III and IV. While chemical parameters already meet the criteria class III water quality standards. Water Appropriation Category I is for the raw water of drinking water, class II for facilities/infrastructure recreation and freshwater fish breeding, class III for fishery cultivation and watering the plants, the Group IV for watering plants. Biological parameters in this case is the abundance, diversity index and dominance index, Batangharileko River estuary has undergone minor contamination although physiologically not appear on macrozoobenthos life.

Keywords: River Batang Hari; River Estuary; Water Quality

Introduction

Rubber plants is a plants that become are a mainsstay for some Indonesian people because the worlds need for rubber continues to increase to increasing a rubber demand caused by development economic businesses those require rubber as a component. In cultivation rubber is developed by the community independently and some are developed by private parties rubber cultivation activities, both or wether develop by the community and developed privately, sertainly require large enough water. The need for water is absolutely there for the development of rubber as well as the processing of these works so that rubber cultivation is carried out on the riverbank. One of the riverbank that is a place or rubber cultivation is the estuary bank of the batangharileko at located in musibanyuasin regency is of province South Sumatera.

Community efforts in rubber cultivation certainly have an impact on the surrounding environment. The existence of various anthropogenic activities in waters can cause a pollution burden on the environment, one of which is decreasing river water quality (Alfatihah et al., 2022). The real impact is a change in the landscape or the hue of the environment water. Water changes occur due to river bank estuary being used as a place to soak rubber that has been collected as a result will affect the physics, chemical composition water which ultimately affect the species organism in this territorial water. Setyowati (Setyowati, 2015) said that anthropogenic activities along river flows such as agriculture, plantations and household waste can affect water quality so that river water quality is not good.

Based on this, the researcher intends to conduct research in anthropogenic areas, especially rubber plantations. This research aims to determine the quality of the estuary waters of the batang harileko, based on physics, chemical and biological factor.

Method

This research was conducted by survey method at the estuary river of batang hari leko musibayuasin regency, the province of south sumatera. Tools and

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materials in the fields used include Ekman Grab, microscope,sample bottle and formalin, the research population including makrozoobenthos who taken using Ekman grab in purposive random sampling. Analysis of Physics and chemistry is doing carried out in the laboratory.

The population that is accommodated is identified to determine the type. Each type of the abudance analyzed makrozoobenthos, the diversity makrozoobenthos, makrozoobenthos and domination index, data analyzed include abudancemakrozoobenthos, diversity index and dominates index. Analyze Physical-chemical parameters is temperature TDS, BOD5, DO, Ph, Cr sendiment and Pb sendiment. Research design and method should be clearly defined.

Result and Discussion

The existence of living things in an environment is certainly affected by the surrounded environment. As well as makrozoobenthos is there a river estuary batangharileko is also affected by the physical and chemical surrounded of these territorial waters. In general used the parameters of determinate quality of the territorial water included physics factors, such as temperature, color and turbidity, chemical factors include PH, BOD, DO, COD and suspended substance matter by biological factors.

Physics Parameters

Observes result about temperatures, alkalinity, TDS and hardness batangharileko river estuary can be seen of the Figure 1.

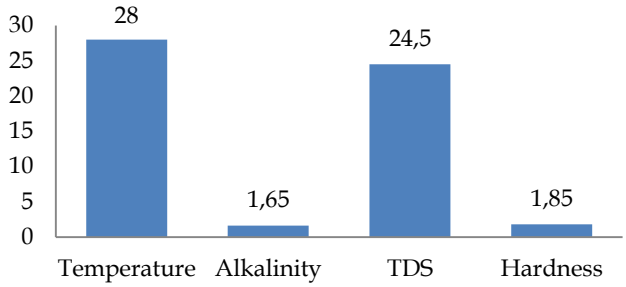

Figure 1. Temperature, alkalinity,TDS and hardness in Batang Harileko river estuary

The presence of temperature in the water in addition to affecting the solubility of a gas in the water also affects the metabolism of water species organisms, one of wich is macrozoobhentos, sudden changes temperature are environmental pressures that can be stressed water species organism, based on the picture 1, is known that the temperature value is 28^{0}C. This value still meets the criteria for macrozoobenthos to sustainability survival so that macrozoobenthos type can be found of these water. Welch (1980) and Prahutama (2013) said that the temperatures upper 35-40^{o}C is a lethal temperature to macrozoobenthos becaused reaches a critical point that causes death the presence of water temperature that can be affected by sampling time because the sampling time decide to this temperature, temperature difference in the morning, afternoon and evening as well as at the moment of taking sample (dry or raining) beside addition to existing landscape. Trisnawaty (2013) said that the environmental arid conditions without trees and more grass domination can be affected the penetration of entering light into water river optimally more because is not blocked. As Wahyuni et al. (2021) said, water temperature is influenced by direct exposure to the sun on the surface of the waters.

Table 1. Temperature Level Standard, alkalinity, TDS and Hardness yang Permitted According to Instruction

Parameters	Unit	Class			
		I	II	III	IV
temperature	^{o}C	Deviation 3	Deviation 3	Deviation 3	Deviation 5
TDS	Mg/l	1000	1000	1000	1000
Alkalinity	Mg/l	-	-	-	-
Hardness	Mg/l	-	-	-	-

Source: regulation of goverment No. 82 year 2001

Fluctuations in water temperature are influenced by several factors, such as the tides and low tides (Burhanuddin, 2013). Then the use of land along the waters such as for plantations, agriculture, housing or industrial activities (Priantari et al., 2017; Setyowati, 2015). Fluctuating temperatures certainly influence aquatic ecosystems (Hamakonda et al., 2019).

Aquatic ecosystems that tend to have high temperatures will result in the decomposition process of organic material being affected (Alfatihah et al., 2022). According to Wulandari et al. (2020), water temperature will increase if there is an increase in the decomposition of organic material by microbes. The temperature range resulting from the decomposition process is still suitable for aquatic biota (Souhoka et al., 2013). However,

temperature parameters that experience drastic changes resulting in aquatic organisms dying need to be monitored. This can occur due to an increase in the speed of metabolism and respiration of aquatic organisms, and subsequently results in an increase in oxygen consumption (Nugraha, 2012).

Total dissolved solids are solids that have a smaller size than suspended solid. This solid consists of compounds, organic cmpounds and soluble organics mineral,water and the salt.

At figure 1 show that TDS values in the river estuary of batangharileko is 24,50 mg/l. when we compared to the values threshold who set by government regulation No. 82 year by 2001, TDS value river estuary of the batangharileko first class qulify of the criteria standards so that it can be used as a drinking water. TDS values decide by suspended presence particles when washed away with the flow of water, then because a water flow is current slowdown or event stop, the suspended particle will collect and form larger particles so that they eventually settle to the bottom of the waters dominated by nudsubtrates.

The estuary of the Batang harileko River is open water and many community activities are carried out apart from the rubber plantations. This may affect the existence of TDS. Priantari et al. (2017) said that anthropogenic activities can affect the presence of TDS in waters. The high TDS of waters is influenced by activities along the water flow such as bathing, washing, agriculture, household waste, industry (Alfatihah et al., 2022; Rinawati et al., 2018). Then Setyowati (2015) said that TDS tends to increase from upstream to downstream, because there are residential areas around the middle and downstream parts. Apart from this, water temperatures which tend to be high will affect the presence of TDS due to chemical reactions in the aquatic environment (Y. Rohmawati et al., 2020).

Alkalinitas describes the amount of wet (alkali) contained in water that can be determined by titration strong acid (H_2SO_4) or HCl up to certain pH extent water alkalinity caused by carbonate ion ion (CO_3^2), bikarbonate(HCO_3^-), hydroxide (OH^-), phosphate (PO_4^-), sylica (SiO_4^{4-})

Table 2. The Relationship between Alkalinity Values and Water Quality Conditions for Water Territory (Emilia et al., 2019; Nurjanah, 2018; Shehane et al., 2005)

Alkalinity (mg/l)	Waters quality
0 – 10	It is very acidic and cannot be utilized
10 – 50	Low alkalinity mortality of fish may occur , supply CO_2 low, pH varies
50 – 200	Medium alkalinity, pH varies, supply CO2 medium, medium productivity
> 200	Rarely found, pH stable, low productivity, of fish life is thought to be threatened

Figure 1 showed alkalinity values river estuary of the batangharileko 1,65 mg/l. based on classification made by Emilia et al. (2019), Nurjanah (2018), and Shehane et al. (2005) alkalinity values river estuary batangharileko included low alkalinity category so can be utilized for daily activities.

Hardness describe the content of cations as well as other kation Ca^{2+} and Mg^{2+} and kation other polyvalent, the most water hardness is due to the presence of kation Ca^{2+} and Mg^{2+} in water (Boyd, 1988; Emilia et al., 2019; Nurjanah, 2018; Shehane et al., 2005).

Figure 1 showed that hardness value river estuary of batangharileko included low that is 1,85 mg/l water can be utilized by species biota organism water and for daily human activities. This criterion base on classification according Sawyer and Mc Carthy refers to by (Boyd, 1988; Emilia et al., 2019; Nurjanah, 2018; Shehane et al., 2005). The low hardness value is likely due to the small intensity of rainfall so that water decreases and the intake of water into the river body is also reduced due to little discharge from upstream area. Low hardness values were also obtained from residents' wells (Ekawati et al., 2023).

Table 3. Classification of Waters Based on Hardness Value (Nurjanah, 2018; Shehane et al., 2005)

Hardness (mg/l)	Criteria
0 – 75	low
75 – 150	Moderate
150 – 300	hard
> 300	hardness

Chemical Parameters

APHA (2005) says that biochemical oxygen demand or is a measure of the amount of oxygen used by microorganisms to decompose organic matter contained in water in aerobic state incubated at temperature 20^{o}C for 5 days. BOD_5 values is generally used as an indicator in determining the abundance of organic matter in water, assuming that most oxygen is mainly consumed by microorganisms during the course of organic matter metabolism.

Based on figure 2 that the BOD_5 value river estuary of the Batangharileko is 3,15mg/l, this value still comply class 3 water quality standards based on regulation government No.82 year 2001 that is for agriculture necessary BOD_5 value is affected by the activities that are around it. The higher environmental activities also it will be higher to BOD_5 area BOD_5 it is an indication that the organic pollutants contained in the water are known that river estuary of batangharileko area close to residents activities such as daily activities and the presences of oil palm plantation upstream waste then accumulates which causes organic matter pollution.

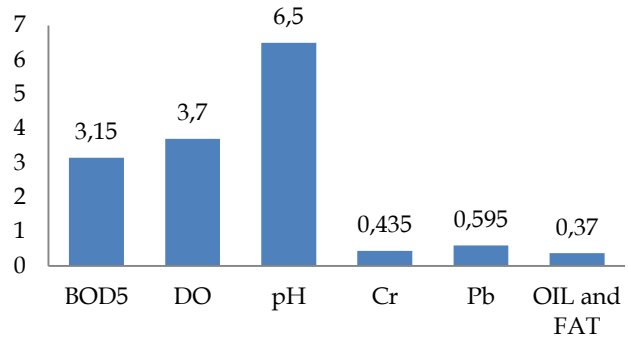

Figure 2. BOD_5, DO, pH, Cr sediment, Pb sediment with oil and sediment fat river estuary of the Batanghari

Alfatihah (2022) said that the high BOD value of waters indicates the presence of organic pollutants which are decomposed by biological bacteria. The existence of residential areas around rivers is thought to provide a burden of organic pollution such as food waste, urine, washing water and so on which are thrown into the river. BOD in waters comes from organic materials which are composed aerobically by microorganisms. According to Salmin (2005), in aerobic conditions, the role of oxygen is to oxidize organic and inorganic materials with the final result being nutrients that can provide fertility to waters. If a body of water has a high level of fertility, algae blooms will occur. Algae blooms prevent sunlight from entering the bottom of the water, thus disrupting the photosynthesis process carried out by aquatic plants such as phytoplankton. If the photosynthesis process in the waters is disturbed, the dissolved oxygen levels in the water are low, thus disrupting the respiration process and the decomposition process of organic and inorganic materials in the waters.

High BOD will affect the activities of living creatures in the waters of Muara Batangharileko. According to Djoharam et al. (2018), the higher the BOD value indicates the lower the water quality. This is because the higher the BOD value, the more dissolved oxygen is needed by decomposing microbes for the decomposition process of organic material and makes the DO value decrease. The decrease in oxygen content in waters causes aquatic biota to die due to the lack of oxygen in the waters. According to Daroini et al. (2020), high BOD content can reduce fish populations in waters.

There will be more and more anthropogenic activities downstream. This will certainly affect the presence of dissolved oxygen. Priantari et al. (2017) said that the further downstream the amount of organic pollutants increases, the more oxygen is needed to oxidize these pollutants. The high level of organic pollutants in the middle and downstream sections is caused by the large number of household activities, tofu tempe businesses, and livestock that dispose of waste water. Then Ningrum (2018) continued that water bodies receive a lot of organic pollution, which comes from industrial, residential (domestic) and agricultural liquid waste. Organic materials and nutritional compounds that appear in water bodies are then decomposed by bacteria using dissolved oxygen for biochemical processes and biodegradation processes.

The waters of the Batangharileko river estuary are waters that have water quality standards. According to Effendi et al. (2013), the state of BOD in waters is influenced by the decomposition process of organic material caused by microbes. The lower the BOD value in the waters, it can be assumed to be an implication of the good decomposition process of organic material that is oxidized by microbes.

APHA (2005) says that the concentration of dissolved oxygen gas is the concentration of oxygen gas dissolved in water. The source of dissolved oxygen in water comes from the result photosynthesis process by phytoplankton or other aquatic plants and from air diffusion. Andika et al. (2020), Winarsih et al. (2016), Muriasih (2012), and Simanjuntak (2012) added that dissolved oxygen in water is always an important parameter to know the quality of the water environment because in addition it is a limiting factor for the environment. Water can also be used as clues about the presence of organic matter pollution.

Based on the figure 2, it is known that DO value at a river estuary of the batangharileko is 3.7 mg/l. this value is fill up the criteria for class III water quality standards, based on government regulation that is for agriculture purposed. DO value can be affected by photosynthesisi activities, plants and diffusion from the air and also location. Fajri et al. (2014) says that the presence of plant vegetation along the river bank can support the continuity of the photosynthesis process so that supply oxygen to the waters is also relatively high added by the lower Sundra (2011) that the low level DO of the coastal water is caused by a large amount of organic matter entering the water, so that a lot of oxygen necessary to microorganism to decompose organic matter and also for photosynthesis.

The range of DO value obtained is a slow movement of water caused by the dry season so that the volume of water is decreses. Odum (1971), Alamanda et al. (2014) that the high dissolved oxygen gas content in river is generally caused by turbulence by water movement and relatively shallow depth. Then Jeffries et al. (1996), and Mukarromah et al. (2016) added that oxygen levels will decrease with increasing altitude temperature and decreasing atmospheric pressure. Too much oxygen can limiting factor at times when the river is in: 1) low turbulence 2) At night where the process of photosynthesis does not a occur and most producers and consumers used oxygen for respiration, 3) high content

of organic pollutants derived from household industrial and agriculture waste, industry and agriculture who that produce high oxygen demand by microbes for the process of remodeling organic matter, 4) increasing altitude temperature and decreasing atmospheric pressure.

This is in line with what Burhanuddin (2013) said, that the DO of waters is influenced by the condition of waters experiencing tides. Apart from this, fishing is also influenced by anthropogenic activities that occur at the Batangharileko river estuary. Anthropogenic activities such as households, home industry and industry will reduce the DO value due to an increase in the oxidation load from organic materials or oxygen-lowering materials (Priantari et al., 2017). With increasing anthropogenic activities, this will cause the water to become cloudy and affect the presence of dissolved oxygen. Raja et al. (2023) said that an increase in organic matter in water bodies will cause water turbidity. Organic materials will decompose when in water, which in the decomposition process requires DO in the water, thereby causing a decrease in the dissolved oxygen content in the water.

The presence of dissolved oxygen can be used as an assessment of the quality in the Batangharileko estuary. Sutriati (2011), said that the dissolved oxygen (DO) parameter can be used as an indicator of the level of water freshness. The presence of dissolved oxygen in water allows oxidation and reduction reactions to take place which can change the form of metals and other compounds.

Wardhana (2001) said that normal water that qualifies for life has a pH with range between water 6.5 – 7.5. That can be acidic or alkaline depending on the size pH water or the concentration of hydrogen ions in a water. Water that has pH smaller than normal pH will be acidic, while water that has a pH greater than normal will be wet. Wastewater and waste materials. Industrial activities that are discharge into river will reduce the pH of water which can ultimately disrupt the life of organisms in water

Base on figure 2 it is known that the pH value batangharileko river 6.5 is value fill up the element of water quality standards based on regulation of government No. 82 years 2001 (table 4) it can be said that pH estuary river of batangharileko on stable. According Zonneveld (1991), Emilia et al. (2019) stability of the pH value of water is affected by the high and low minerals content of these water, where these minerals are used of nutrients in the water to production cycle. Hynes (1978) added the value that value pH is not benefit to macrozoobenthos it is low value under 5 or upper 9.

Effendi (2013) said that pH is a picture of the amount or activity of hydrogen ions in water. The degree of acidity indicates the atmosphere of the water (acid or wet). Fajri et al. (2014) says that the degree of acidity of the (pH) in a water has a very large affected especially for plant, growth and biota. Among others it affects respiration, nutritional content and productivity and endurance of organism

Trisnawaty et al. (2013) saying that the pH in water on below standard or above standard will put pressure on water organism, especially macrozoobhenthos is stressed. Connell et al. (1995) say that a rise in pH in waters will be followed by a decrease in the solubility of heavy metals, so heavey metal tend to precipitate. Conversely, when pH of water is low the toxic from heavy metela will increase.

Potential of hydrogen (pH) is a condition that can indicate whether water conditions are acidic or alkaline. As stated by Hamakonda et al. (2019), the degree of acidity (pH) of water indicates the presence of hydrogen ions in the water. This is because hydrogen ions are acidic. pH becomes unstable if it receives input from outside the waters such as organic acid fertilization and waste water (Burhanuddin, 2013; Priantari et al., 2017), so that pH can become a limiting factor for the life of living creatures in waters. Rahawarin (2020) says that pH is a limiting factor for organisms that live in water. The degree of acidity or pH of water shows the activity of hydrogen ions in water. Changes in water pH depend on water pollutants, water that has a pH that is smaller or greater than the normal range will affect the life of microorganisms.

Effendi (2003) says that chromium is hard metal and good conductor of heat. Insiade this element does net exist in the form of pure metal. Natural source of chromium are very few and are usually is forms Cr^{3+} that are widely available in the textile industry heksavalen (Cr^{6+}) glass and chromium ceramics originating from the metal plating industry of aquatic organism can be exposed to chromium trough the medium itself, sentiment and food from the measurement result, it was found that the value of chromium contained in river estuary of batangharileko 0,435 µg/g (figure 2) from table 4 found that the content in the river estuary of the batangharileko still below the threshold of water quality standards (regulation of government No 82 year 2001.

United Stated Environmental Protecting Agency (US EPA) (1986) saying that the concentration Cr (VI) in sendiments> 0,006 mg/kg categorized as heavily polluted and affecting the number mortality types and distribution pattern of macrozoobhentos. Fakhrudin (1996) added that high chromium content in sediment was a basic nature of the role in the form of muddy sand which can accelerate the accumulation of heavy metals. In addition, the disposition of heavy metals in water occurs of hydroxyl, carbonate and chloride anions then it is added Hawkes (1979), Andika et al. (2020), and

Yohanes et al. (2014) that the metal entering the waters will undergo precipitation,dilution and disperse. The presence of metal elements will indicate the quality of the waters against metal pollutants. Rohmawati et al. (2018) said that the presence of Cr indicates that there is Cr metal pollution in water flows originating from industry in the area.

Palar (2004) says that lead and its plumbum (Pb) naturally can be in water and as a result of human activities can naturally enter water through (Pb) crystallization in the air with aid rainy. In addition the verification process of mineral assistance to wave and wind in also one of the (Pb) source routes that will enter the water.

Base on figure 2 it is known that Pb value at river estuary of the batangharileko larger 0.595 µg/gr. Value below the threshold of quality standards that enter water (regulation of government No. 82 year 2001) are likely caused by fuels containing pB exposed in water. Palar (2004) said impact of human live activities there are various forms including wastewater from industries related to pB, waste water from mining, black soil seed and waste fro the battery industry the discharge will fall on waterways such as trutaries and then carried by current to the sea, generally the discharge routes from industrial side that uses it will damage the water environmental system it enters, (making the rivers and grooves polluted).

Table 4. Standard BOD_5, DO, pH, Cr Sediment, Pb Sediment with Oil and Fat Sediment Allowed Water According to Their Designation

Parameters	Unit	Class			
		I	II	III	IV
BOD_5	°C	2	3	6	12
DO	mg/l	6	4	3	0
pH	mg/l	6 – 9	6 – 9	6 – 9	5 – 9
Cr	mg/l	0.05	0.05	0.05	0.01
Pb	mg/l	0.03	0.03	0.03	1
Oil and fat	µg/l	1000	1000	1000	-

Source: regulation of government No. 82 year 2001.

The condition of the aquatic environment which receives input from external factors such as water flow, anthropogenic activities and air movement, will influence the condition of the waters. Faisal et al. (2019) said that particles entering the water will affect the pH of the water in particular. Apart from that, it is also influenced by wind movements which carry nitrogen and ammonia. And it is also influenced by the use of urea fertilizer in agriculture around the area. Then the use of pesticides in agriculture will also affect the spring water sources at Pura Taman. However, contents such as pH, hardness, nitrate, nitrite, iron, fluoride, sulfate and organic substances. This is what causes the water quality standards of the Batangharileko estuary to be at the threshold for agricultural water based on physical and chemical parameters.

Biologicaly Parameters

Macrozoobenthos can be used as a biological parameter for pollution in a water the existence of macrozoobenthos in an environment is strongly affected by various environments.biotic an abiotic to schematic Hawkes (1979) is 14 factor to affected addition animals benthon on a water. Then Atima (2015), Emilia et al. (2019), Andika et al. (2020), Urbasa et al. (2019) make some realtion between lifes parameters on physics, chemical water macrozoobenthos (table 5) Odum 1971, Yanti (2017), and Yulianti (2016) added that lot of more macrozoobenthos on a water it is affected by factor factors include: physical factor, chemical factor and biological factor, between the factos is temperature, pH, turbudity, sharpness, and liquid interaction gas to other organism

Table 5. Relation between Amount a Physical Parameters Chemical Water Parameters with a Life Macroozobenthos (Atima, 2015; Emilia et al., 2019; Urbasa et al., 2019)

Paramaters	Affected on Makrozoobenthos
Parameters	
physicaly	Metabolism growth and mortality to
temperature	migration
current	type and characteristic organism
Substrat basic	Numbers and type
Suspended charged	respiration
turbidity, TSS	numbers, type and characteristic
the depth	organism
tides	number type, number individual and biomass
	deployment pattern
Chemical parameters	Number, type and mortality
DO	Lower stress resistance
pH	Number,type, type composition and
BOD	mortality
Amonia-N	Mortality rate
DHL	Stress physiology
Salinitas	Distribution species

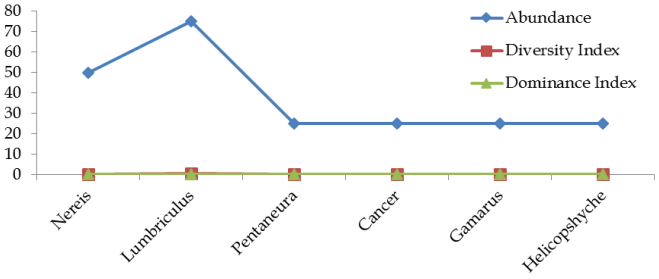

Figure 3. Abudance value of diversity index and macrozoobenthos dominance index in the river estuary of batanghari

Based on Figure 3 it can be seen that the abudance *Lumbriculus* sp is higher than other species. Its high abudance is likely known *Lumbriculus*sp ability to adapt well to the environment. It is known that is a tolerant organism. Tolerant according Gaufin in Wilhm (1975), Andika et al. (2020), Winarsih et al. (2016) is organism who growth and develop in environment achieve the highest density in polluted moderat or polluted waters. Added that based on sensitivity to pollutans macroozobenthos is devided into groups is intolerant, facultative, and tolerant.

The existence of difference in abudance between species related to environmental condition that can support the life of cape water biotic. Arizuna et al. (2014), and Tanjung (1994) says that abundance of macrozoobenthos is affected by the topography of the habitat in which they are located, food availability and sendiment-type oxygen levels, adaptation levels competition and predatorism.

Physical and chemical factors that affect the abudances of macrozoobenthos in a water are seen from figure 1 and 2. The presence of TDS, alkalinity, hardness, temperature BOD_5, DO, pH, Cr, Pb and the presence of oil at river estuary of the batangharileko is giving impact to macrozoobenthosliving, wether it is the number, types or the distribution pattern. Zulkifli (2009) said that the high content of organic matter will affect the abudance of organism where there are certain organism that are resistant to the high content of organic matter.

Activities around waters and residues dumped into waters will certainly influence physical and chemical factors. Furthermore, these changes will affect the presence of benthos in the waters of the Batangharileko river estuary. Activities that contribute to the existence of benthos are anthropogenic activities, both household, home industry, agriculture, plantations and industry (Marisi et al., 2016; E. Yanti et al., 2024; Yogaswara et al., 2019).

Based on the macrozoobenthos diversity index obtain in river estuary of the batangharileko river is classified as low diversity of macrozoobenthos at the river estuary of the batangharileko indicated that waters were polluted although not significantly affected it is Wihlm (1975) and Andika et al. (2020) said that heavily polluted water has a diversity index of less than one. If it ranges from one to 3, then the waters are half polluted. Clean water will be obtained if diversity index above 3.

The low diversity of macrozobenthos at the Batangharileko river estuary is not related to the presence of sediment in these waters. On the other hand, diversity is influenced by the high level of organic material present, which allows many aquatic organisms to survive as well as physico-chemical factors. This is in line with Mangallo et al. (2023) who said that low diversity is not related to aquatic sediments, then Isman et al. (2018) related to the presence of organic matter as well as the physico-chemical relationship and abundance of aquatic organisms (Fitrianesia et al., 2024; Rahawarin, 2020; Rinawati et al., 2018)

Individuals who dominate at a river estuary of the batangharileko do not exist. Based on the simpsondominace index the absence of individuals dominating in these water indicates that the physiological stress of the water is not too great for macrozoobenthos life so thet many types macrozoobenthos species will be able to continue there is lives Purnama (2011) saying the high dominance indicates that the place has low species wealth with an uneven distribution. These condition reflect that the structure of the community is in a labile state or ecological stree is occuring. Silaban et al. (2021) say that the dominance of organisms in waters shows the role of these organisms, such as producing oxygen and natural food sources. Physicochemical factors generally influence each other so that they influence water conditions (Mutaqin et al., 2020; Pingki et al., 2021; Revansyah et al., 2023; Yolanda, 2023). Meanwhile, former anthropogenic activities have no effect on aquatic organisms (Sofarini, 2011). As Alfin (2014) said environmental changes can put pressure on waters, thus affecting the existence of benthos.

Alamanda et al. (2014) and Fisesa et al. (2014) saying that the higher the burden of pollutant entering the water will reduce the quality of water quality will affect the condition of aquatic organisms, especially macrozoobenthos organism. The introduction of pollutan from residential, industrial, urban, and agriculture waste cause a decrease in the diversity of macrozoobenthos of intolerant and facultive types. Sahidin et al. (2021) said that biological indices can determine water quality.

Conclusion

The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion sectionthe water quality of the river estuary of batangharileko based on physical factors fill up the raw water criteria for group I, while chemical parameters have the criteria for group III water quality standard for group I water designation is for raw water drinking water group III for aqua culture fisheries,plantwater,biological parameters, namely the presence of macrozoobenthos, in this case are the abudance,diversity index and dominance index of river estuary of batangharileko has been polluted although physiologically not yet seen in the life of macrozoobenthosPuljas (2010) said that the quality of waters greatly determines life for

macroozoobenthoswahen environmental quality changes will have impact to such a life of the organism.

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