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Study Of Water Quality Effect Due To Floating Net Cages Using The Storet Method In The River Sp.Padang OKI

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Abstract – The Komering River flows through the OKI (Ogan Komering Ilir) district. Along with the number of settlements, there are also many population activities such as floating net cages (KJA) activities, especially in the district of Sp. Padang as well as the disposal of household waste in the Komering River is increasing. Some of the people in the village of Sp.Padang uses the Komering river for their daily needs, where water quality is the main requirement in influencing survival. The purpose of this study was to determine the condition of water quality as the cause of the Sp. river water cage field. The type of data collected is primary data. The study was conducted at 3 stations on the river Sp. Padang field. The physico and chemical indicator of river water used are: turbidity, temperature, pH, TSS, DO, BOD, CO, water discharge and current velocity. The data obtained from the laboratory were then analyzed, then comparisons were made with the Storet method. Sampling for water quality replaces the surrounding area with direct measurements and measurements made in the laboratory. The use of the Storet method refers to PP No. 82 of 2001. The principle of the Storet method is to combine information on river water quality with river water standards and then adjust it according to its use, by classifying water quality into four classes. The results of the activity (KJA) in the waters of the Sp. Padang river are classified as bad (heavy polluted) class D where KJA activity has an influence on the water quality of the Sirah River in Padang Island, OKI Regency.

Keywords – Water Quality; Floating Net Cages; Storet method; OKI

I. INTRODUCTION

Water has an important role from an economic perspective, for example in agriculture, fisheries, and other productive activities. The quality of surface water is getting worse because it is influenced by several factors, for example increasing population, industrial activities, deposition of residents and others (Tyagi, 2013). The river flows through OKI (Ogan Komering Ilir) district. With so many settlements, there are also many community activities such as Floating Net Cages (KJA) activities, especially in the Sirah Pulau Padang Village area (Sp. Padang). This activity can cause the waste load to increase and result in a decrease in river water quality. (Reno, 2017).

Based on direct information from the field on research that had been conducted previously in the Sp Padang river, the number of cages was + 1060 KJA with cage sizes of 3x2 and/or 4x2 meters with a stocking density of 2000-4000 fish/cage. Where each KJA unit itself has an adverse effect on river water. Unconsumed feed residues will settle to the bottom of the river and become toxic, which will indirectly change river waters (Maniagasi, 2013)

KJA activities are part of the activities to fulfill the necessities of life. However, this activity can allow for significant changes to the quality of the water content in the river (Triwuri. N.A, *et all*. 2018). For this reason, KJA activities need to be studied more deeply about their impact on river water quality, one of which can be done through the Storet method.

The Storet method is one of the methods for determining the quality of river water content by making comparisons of water quality raw materials with water quality standards according to their use (PP No. 82 of 2001). Determining water quality

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with Storet does not determine what indicators should be used in determining river water quality. Available water quality parameters can be compared with quality standards, so that the level of river water quality can be determined using this method.

Observation stations were carried out at three river stations, namely Ulak Jermun village, Terusan Menang village and Serdang Menang village. The indicators measured were physical and chemical properties. The data for each indicator were taken in January representing the rainy season, March representing the transitional season and May representing the dry season originating from the Komering river, namely the Sirah Pulau Padang OKI river, then the results of the data obtained were compared with standard water quality data using Storet method (Khairil, 2014).

The purpose of this research was to examine the quality of the waters in the Sp Padang river based on river water quality standards that match the criteria for class B using the Storet method. The physical and chemical indicators of river water used are: turbidity, temperature, Potential of Hydrogen (pH), Total Suspended Solid (TSS), Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), water discharge and current velocity.

II. Material and Methods

Observations were carried out within 5 months, namely from January - May 2021 on the Komering River. Sample analysis of river water physical and chemical indicators was carried out at the UPTD Palembang environmental laboratory. The water sample research were taken from the Sp Padang river; water samples in areas with heavy KJA activities, water samples in areas with little KJA activity and water samples in areas with no KJA activities. The equipment used in this study were thermometers, coolboxes, pH meters, plastic bottles, and label paper.

The initial stage of this research procedure was to trace the location of river water sampling, namely to find out the geographical conditions that describe the flow of the river and the activities that exist around the watershed. The criteria for river water sampling locations are as follows:

a) Upstream areas or natural source water areas, namely locations where pollution has not occurred

b) River water utilization or allotment area, is a location where river water will be used as raw material for drinking water, water for recreation, industry, fisheries, agriculture and others.

c) Areas that are potential recipients of contaminants, is a locations that experience changes in water quality caused by industrial, agricultural, domestic activities and so on.

d) Areas that are potential recipients of contaminants, is a locations that experience changes in water quality caused by industrial, agricultural, domestic activities and so on.

e) The downstream or estuary area is the tidal area where river water meets sea water.

Primary data collection consists of river hydrolysis data (river discharge and flow velocity), water quality parameter data (turbidity, TSS, temperature, pH, BOD, COD and DO.)

This research was conducted within 5 months with 3 samples taken. The first sampling in January represents the rainy season, the second sampling in March represents the transitional season and the third sampling in May represents the dry season. The research location consisted of 3 stations with 3 sampling points (river bank, middle of river and river bank). The determination of the sampling station consists of:

1) First (I) Station: The upper reaches of the river have little KJA and sand mining activity but in the upstream there are lots of KJA and sand mining activities.

2) Second (II) Station: Middle of the river with dense KJA activity and sand miners.

3) Third (III) Station: Downstream of the river, there is no activity of KJA and sand miners, the distance between stations was + 500 meters.

River water quality is determined by comparing measurement data for each water parameter with quality standard values (Government Regulation No. 82 of 2001) concerning Water Quality Management and Water Pollution Control. Analysis of the

results of the Storet method was carried out to conclude the research results. The results of the parameter analysis were then calculated using the Storet method to determine the quality status at each sampling point. Calculations using the STORET method. The results of these calculations are then analyzed from each change in water quality status. Furthermore, the status of water quality from the Storet Method along the Padang OKI river station.

III. RESULTS AND DISCUSSION

The chemical and physical indicators of the waters at the research location during the rainy season in January 2021 were presented in Table 1.

Table 1. Water Quality at research sites representing the rainy season in January 2021

No	Parameter	Unit	Station I	Station II	Station III
1	pH		9	8,1-8,5	7,6-8
2	Temperature	^{0}C	29	30	30
3	BOD	mg/l	3,34	3,51	3,44
4	COD	mg/l	54,1	75,2	63,3
5	DO	mg/l	4,55	4,05	4
6	TSS	mg/l	149	152	137
7	Turbidity	NTU	9,17	10,4	11,7

Source: Laboratory results from UPTD Environmental Laboratory

The results obtained in this study were the highest values at 30^{0}C at stations II and III, while the lowest values were at 29^{0}C at station I. Thus, the water temperature indicators for all research locations could be tolerated by aquatic plants so they could develop properly.

The pH measurement was in the range of 7.6 to 9. pH at station I had the highest value and at station III had the lowest value. When compared with the quality standards, the waters of the Sp Padang river are included in the quality standards, so that KJA activities can be carried out in the SP Padang river waters. pH has an effect on aquatic animals and plants, so it becomes a reference for good and bad water conditions for the environment for aquatic biota (Syarifudin, 2016).

The BOD measurement at station II had the highest value, was 3.51 mg/l. while the BOD value at station I was the lowest with a value of 3.34 mg/l. an increase in the BOD value indicates that river water that has KJA activities causes an increase in the content of organic compounds.

The large number of organic pollutants in river waters causes the decomposition process of organisms to increase, so that the concentration of BOD is also high (Daroini and Arisandi, 2020).

The BOD value obtained ranged from 3.34 - 3.51 mg/l, this indicated that the Sp Padang river was outside the quality standard, based on Government Regulation No. 82 of 2001. These results indicated that the BOD value of the Sp Padang river was polluted. River water quality classification consists of four classes (> 3.0 ppm) not polluted, (3.0-4.9 ppm) lightly polluted, (9-15.0 ppm) moderately polluted and (<15.0 ppm) polluted weight (Utami, 2012).

Total Suspended Solid (TSS) is a physical indicator related to turbidity. TSS results during the study gave varying results with values between 137 – 149 mg/l. TSS at station I has the highest value due to feeding activities, soil erosion and erosion carried into the river during the rainy season. According to PP No. water quality standards. 82 of 2001 that the TSS value in the SP Padang River exceeded the threshold. Therefore, the water of the Padang Sp river is not good for the growth of aquatic plants. According to (Ali, 2003) the high TSS value is caused by the conversion of land around the river water flow to become a place for residents to live, resulting in high soil solids that enter the river water flow through runoff to be high.

The DO value in the SP Padang river, OKI Regency, at the sampling monitoring point from station I to station III had DO values ranging from 4.55 to 4.0 mg/l. Based on the data, the values of all sample points meet the quality standards. River waters are good and have low levels of pollution (Salmin, 2005). The DO of natural river water has a DO value of less than 10 mg/l (Effendi, H. 2003). Station II has DO 4 mg/l. Based on PP No. 82 of 2001, the condition of the quality of the river waters of SP Padang, OKI Regency is in accordance with its designation (Fardiaz, 1992).

COD in the SP Padang river ranged from 54.1 – 75.2 mg/l. Based on quality standards, the COD value exceeds the threshold, so the river water in SP Padang is polluted. The COD value of river water illustrates the amount of organic contaminants in the water (Agustianingsih, et al. 2012). A high COD concentration indicates a greater level of pollution that occurs in a waters (Yudo, 2010).

Surface water turbidity is caused by materials in suspension larger than 1 millimicron and 1 micron. Turbidity is very easily removed by precipitation, including bacteria, inorganic materials such as sand and clay and colloidal materials which are removed by a filtering process with a sand filter (Chatib, 1992). The turbidity value of Sirah Pulau Padang river water in OKI Regency ranges from 9.17 – 11.7 NTU or good quality based on quality standards.

Indicators of Water Chemistry and Physics at Research Locations During the Transitional Season in March 2021, are presented in Table 2.

Table 2. Water quality in the study locations represents the Transitional season in March 2021

Num.	Parameters Analyzed	Unit	Station I	Station II	Station III
1	pH		8,8	8,1	7,8
2	Temperature	^{0}C	31	32	32
3	BOD	mg/l	2,94	2,92	1.65
4	COD	mg/l	52,1	65,2	60,3
5	DO	mg/l	5,5	6,3	7,05
6	TSS	mg/l	159	142	127
7	Turbidity	NTU	8,16	9,4	10,6

Source: Laboratory results from UPTD Environmental Laboratory

The water temperature at the study site ranged from 31 ^{0}C-32 ^{0}C. The water temperature at stations II and III has the highest temperature and the water temperature at station I has the lowest value (31 ^{0}C). Temperature conditions are within the range of quality standards.

River water pH at the study site ranged from 7.8 to 8.8. The highest water pH was found at station I and the lowest pH was found at station III, so the condition of the river water at SP Padang was included in the quality standards based on PP No. 82 of 2001.

BOD at station II has the highest value of 2.94 mg/l. while the BOD value at station III has the lowest value with a value of 1.65 mg/l. A high BOD indicates that river water that has KJA activity has an increased content of organic compounds, this is estimated from the waste source of KJA activity (Daroini and Arisandi, 2020). Based on PP No. 82 of 2001 the BOD value obtained in river water in the SP Padang sub-district is not included in the quality standard.

The TSS values at the study sites ranged from 127 – 159 mg/l. TSS at station I had the highest value due to feeding activities, soil erosion and erosion carried into water bodies during the rainy season. 82 of 2001.

DO values in SP Padang river waters at all study points have DO values ranging from 7.05 to 5.5 mg/l. When compared with class II water quality standards for the DO indicator based on Government Regulation No. 82 of 2001, which is 4 mg/l, where the water quality of the SP Padang river is not in accordance with its designation.

The COD value in the SP Padang river waters ranged from 52.1 – 65.2 mg/l. According to the water quality standard, the COD value exceeds the threshold, so it can be said that the SP Padang river water in OKI Regency is polluted by organic matter.

The turbidity value of the water in the SP Padang river waters ranges from 8.16 – 10.6 NTU, when viewed from the established water quality standards, the rivers in the SP Padang sub-district can still be said to be good.

Chemical and physical indicators of waters at research locations during the dry season in May 2021, are presented in Table 3.

Table 3. Water quality in research locations representing the dry season in May 2021

Num.	Parameters Analyzed	Unit	Station I	Station II	Station III
1	pH		9	8,8	8
2	Temperature	^{0}C	31	32	32
3	BOD	mg/l	3,45	3,51	3,48
4	COD	mg/l	69,3	74,5	65,3
5	DO	mg/l	3,12	3,02	3,12
6	TSS	mg/l	273	225	173
7	Turbidity	NTU	27,2	20,2	22,8

Source: Laboratory results from UPTD Environmental Laboratory

The water temperature in the research location ranges from 31 0C-32 0C. The air temperature at station II and station III has the highest value. The water temperature at station I has the lowest value (31 0C). The temperature conditions are within the range of quality standards.

The pH at the study sites ranged from 8 to 9. The pH at station I had the highest value and the pH at station III had the lowest value. Based on this quality standard, the condition of river water in Sirah Pulau Padang is included in the water quality standard based on Government Regulation No. 82 of 2001.

BOD value at station II has the highest value of 3.51 mg/l. while the BOD value at station I has the lowest value with a value of 3.45 mg/l. The BOD at station II increased, this indicates that the air river which has more KJA activity experienced an increase in organic compound content which is estimated from the waste source of KJA activity.

The results of the BOD analysis obtained at the study site with values between 3.45 - 3.51 mg/l, indicate that Sirah Pulau Padang water conditions are not included in the quality standards based on PP No. 82 of 2001.

The TSS value of the research location showed that the temperature ranged from 173 – 27.3 mg/l. The value at station I has the highest TSS value, so based on PP No water quality. 82 of 2001 the water quality of the Sirah Pulau Padang river crosses the class I and class II limits and is classified as polluted.

The DO value of Sirah Pulau Padang river water at station I to station III has a DO value between 3.02 – 3.12 mg/l. the DO value at station II is based on the appropriate quality standard for its designation.

From a study of river water quality in Sirah Pulau Padang, OKI Regency, the COD value ranged from 65.3 to 74.5 mg/l. COD value crossed the line. The magnitude of the COD value is due to the influence of KJA activities.

The turbidity value of Sirah Pulau Padang river water in OKI Regency ranges from 20.2 – 27.2 NTU. The turbidity value is still included in the quality standard, so that the Sirah Pulau Padang sub-district river can still be said to be good.

River Debt.

The average discharge of the river in the study location was 6.99 m3/s, there was a gradual increase in water discharge from upstream to downstream (station I, station II and station III), this was due to KJA activities and other sources that entered the river. the waters of the Komering River.

Flow Speed.

The speed of the Sirah Pulau Padang river current ranges from 10.00-10.44 m/s. Current at the research location station II has the highest value, and at the research location station III has the lowest value. According to (Simatupang et. al., 2016) the current velocity of river waters with a value of more than 10 m/s is included in fast-flowing waters.

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