TURNITIN --

TIK-292 analysis of watershed carrying capabilities based on pollution load carrying capabilities of the riam kanan sub wat...

TIK-2

TIK

Lambung Mangkurat University

Document Details

Submission ID

trn:oid:::1:2981005867

Submission Date

Aug 10, 2024, 2:18 PM GMT+7

Download Date

Aug 11, 2024, 10:41 AM GMT+7

File Name

TIK-292.pdf

File Size

369.1 KB

12 Pages

6,542 Words

31,897 Characters

17% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

Exclusions

- 1 Excluded Source
- 12 Excluded Matches

Match Groups

- **58** Not Cited or Quoted 17%
  Matches with neither in-text citation nor quotation marks
- **5** Missing Quotations 1%
  Matches that are still very similar to source material
- **0** Missing Citation 0%
  Matches that have quotation marks, but no in-text citation
- **0** Cited and Quoted 0%
  Matches with in-text citation present, but no quotation marks

Top Sources

- 16% Internet sources
- 11% Publications
- 8% Submitted works (Student Papers)

Integrity Flags

0 Integrity Flags for Review

No suspicious text manipulations found.

Our system's algorithms look deeply at a document for any inconsistencies that would set it apart from a normal submission. If we notice something strange, we flag it for you to review.

A Flag is not necessarily an indicator of a problem. However, we'd recommend you focus your attention there for further review.

Match Groups

- **58** Not Cited or Quoted 17%
  Matches with neither in-text citation nor quotation marks
- **5** Missing Quotations 1%
  Matches that are still very similar to source material
- **0** Missing Citation 0%
  Matches that have quotation marks, but no in-text citation
- **0** Cited and Quoted 0%
  Matches with in-text citation present, but no quotation marks

Top Sources

16% Internet sources
11% Publications
8% Submitted works (Student Papers)

Top Sources

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

1	Student papers	Udayana University	3%
2	Internet	doaj.org	2%
3	Internet	www.mdpi.com	1%
4	Internet	www.researchgate.net	1%
5	Internet	www.scilit.net	1%
6	Publication	Sawitri Subiyanto, Zainab Ramadhanis, Aditya Hafidh Baktiar. "Integration of Re...	1%
7	Internet	media.neliti.com	1%
8	Internet	jurnal.untan.ac.id	1%
9	Internet	terubuk.ejournal.unri.ac.id	1%
10	Publication	A C Ni'am, K D Prasetya, R P Utami. "Analysis of Ammonia in Kali Lamong River Es...	1%

11	Internet	
fishscientiae.ulm.ac.id		1%
12	Student papers	
Sriwijaya University		1%
13	Internet	
repository.unimus.ac.id		1%
14	Internet	
id.123dok.com		0%
15	Internet	
adoc.pub		0%
16	Internet	
ojs.serambimekkah.ac.id		0%
17	Internet	
jtam.ulm.ac.id		0%
18	Internet	
ejournal.undip.ac.id		0%
19	Publication	
Nuning Vita Hidayati, Ariani Dian Kartikaputri, Hernayanti Hernayanti, Arif Mahdi...		0%
20	Internet	
dspace.dtu.ac.in:8080		0%
21	Student papers	
iGroup		0%
22	Internet	
jppipa.unram.ac.id		0%
23	Internet	
journal.unpas.ac.id		0%
24	Internet	
ppjp.ulm.ac.id		0%

25 Internet

repository.unhas.ac.id 0%

26 Internet

mil.pasca.undip.ac.id 0%

27 Internet

proceedings2.upi.edu 0%

28 Publication

Tri Retno Dyah Larasati, Nita Suhartini, Nana Mulyana, Arief Adhari. "Water quali... 0%

29 Student papers

Higher Education Commission Pakistan 0%

30 Internet

public.pensoft.net 0%

31 Publication

K N Sinamo, S Ginting, S Pratama. "Effect of sugar concentration and fermentatio... 0%

32 Student papers

Trisakti University 0%

33 Publication

H S Adriansyah, D M Hartono, N Suwartha, I Gusniani. "The analysis of groundwat... 0%

34 Publication

Andi Tenri Sompa. "Tourism Management in Tahura Sultan Adam (Case Study in ... 0%

35 Publication

Donald R. Rowe, Isam Mohammed Abdel-Magid. " Wastewater Reclamation... 0%

36 Internet

www.bioflux.com.ro 0%

37 Publication

I Gede Cipta Sudewa ATMAJA, Made Sudiana MAHENDRA, I Wayan NUARSA, I Gus... 0%

38 Publication

Noraida Noraida, Abdul Khair. "Analyze of Parameter Values of Sasirangan Home ... 0%

39 Internet

www.ecoeet.com 0%

40 Publication

Kus Indriyani, Hayati Sari Hasibuan, Misri Gozan. "Total Maximum Daily Load of t... 0%

41 Publication

Tarzan Purnomo, Kandilia Sahani, Toni Wahyudi. " Analysis of Carrying Capacity o... 0%

1
RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 11(143), November 2023

UDC 639; DOI 10.18551/rjoas.2023-11.26

ANALYSIS OF WATERSHED CARRYING CAPABILITIES BASED ON POLLUTION LOAD CARRYING CAPABILITIES OF THE RIAM KANAN SUB-WATERSHED, SOUTH KALIMANTAN PROVINCE, INDONESIA

Rahman Abdur*, **Dharmaji Deddy**
Study Program of Water Resources Management, Faculty of Fisheries and Marine Sciences, University of Lambung Mangkurat, Banjarbaru, South Kalimantan, Indonesia

Rahmawati Anifa, **Heldiana Noor**, **Iwhoelyyant M.N.T. Nhandra**, **Anggraeni Nur Vivi**, **Normaida**, **Putra Danny Mahendra**, Students
Study Program of Aquatic Resources Management, Faculty of Fisheries and Marine Sciences, University of Lambung Mangkurat, Banjarbaru, South Kalimantan, Indonesia

Khasanah Ruly Isfatul
Study Program of Marine Science, Faculty of Science and Technology, University of Islam Negeri Sunan Ampel Surabaya, Surabaya, Indonesia

*E-mail: rahmantrk@gmail.com

ABSTRACT
Research was carried out for 6 (six) months in the waters of the Riam Kanan Sub-Watershed located in Banjar Regency. The Riam Kanan sub-watershed is an ecosystem that is important for the life of living creatures and the surrounding environment. Data related to the resources contained in rivers is very necessary for more precise management, which currently is very limited. The increase in population every year and rapid economic development cause environmental problems related to the use of water resources. It is necessary to assess the condition of the water system for monitoring river watersheds to prevent various environmental problems. The aim of this research: (1) Analyze water quality (pH), temperature, depth, NO3, PO4, NH3, E. Coli, BOD, and TSS Mn and Fe) based on the Pollution Index and Water Quality Index; (2) Confirming the Carrying Capacity of the Riam Kanan Sub-Watershed, South Kalimantan Province. The results of the analysis of water quality parameters found that the Pollution Index was lightly polluted at the Riam Kanan Subwatershed observation station and the results of the calculation of the Water Quality Index were included in the medium category; The results of calculations regarding the pollutant load capacity contain several parameters that exceed the quality standards, namely parameters; Phosphate, Fe, DO and BOD.

KEY WORDS
Carrying capacity, watershed, Riam Kanan, South Kalimantan.

The current issue as a priority for handling and overcoming damage to natural resources and the environment includes handling the function of water to maintain the sustainability of the ecosystem in supporting human life. In this aspect, improvements are needed in the hydrological cycle and purification system, especially in relation to the ability of land as a living space to accommodate humans and other living creatures. Therefore, an appropriate land use approach is needed that is in accordance with the capabilities of the ecosystem.

As an ecological system that has interaction and interdependence between living organisms and their environment, the existence of a river basin can be used as an indicator of environmental damage through a carrying capacity and capacity approach in the river basin by analyzing each input. into the ecosystem and evaluate the processes that take place in the watershed ecosystem by looking at the output of the ecosystem. In a watershed ecosystem, the input component consists of rainfall, while the output component consists of

RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 11(143), November 2023

flow discharge, sediment load and the nutrients in it. The existence and condition of watershed (DAS) ecosystems or often called river basins has been a national issue in recent years.

Research on carrying capacity in the Riam Kanan Sub-watershed has been carried out by (Rahman et al., 2021; Aulia et al., 2009; Rahman & Sofarini, 2011; Mijani & Prihanto, 2017; Wahyuni et al., 2011; Mijani , 2017; Nida, et al, 2017; Herliwati and Mijani, 2021; Mijani et al, 2012), with research results that there has been a decrease in water quality due to Floating Net cage activities for the parameters Ammonia, DO, BOD5 and COD from August to September where the flow rate and water discharge are deficits and parameters that make a major contribution to the IP value such as phosphate, BOD, COD, Fe, Cd, detergent, E.Coli and Coliform. Cu, Fe, and Zn are metal parameters that have a tendency to exceed the carrying capacity of water pollution loads. The capacity to carry pollutant loads in the Riam Kanan sub-watershed at pH parameters of -0.6, DO of -6.1 (upstream), PO4 of -0.05 (middle) is above the quality standard and PO4 parameters of -0, 03 in the downstream section is above the quality standard with the moderately polluted category (Noormasari, 2016).

The Riam Kanan sub-watershed is the longest river in South Kalimantan Province. The Riam Kanan sub-watershed originates from the Riam Kanan reservoir which is located in the administrative area of Banjar Regency. This river is 80 km long and flows into Banjarmasin City and its upstream is in Banjar Regency (Sudarningsih, 2021). The Riam Kanan sub-watershed has experienced pollution problems, resulting from point source and non-point source sources such as mining activity waste, household waste, both liquid and solid. The results of research carried out by (Normasari et al., 2016), also show that there is a decrease in water quality due to anthropogenic activities in the parameters pH, BOD, COD, Nitrites, TDS, TSS, oil and fat, detergents and Total Coliform, most of which The results show values above water quality standards.

METHODS OF RESEARCH

The research was conducted in the waters of the Riam Kanan Sub-watershed, Banjar Regency, South Kalimantan. Sampling was carried out 3 times in May – June 2023. Sampling was carried out at three stations (Figure 3). Determination of the carrying capacity of the Riam Kanan sub-watershed is limited by 114°86'20" East Longitude - 115°06'33" East Longitude and 03°41'55" South Longitude - 03°54'38" South Longitude located in Banjar Regency, South Kalimantan Province. Analysis of water quality parameters was carried out at the Water Quality and Biohydrology Laboratory, Faculty of Fisheries and Marine Affairs, Lambung Mangkurat University, Banjarbaru.

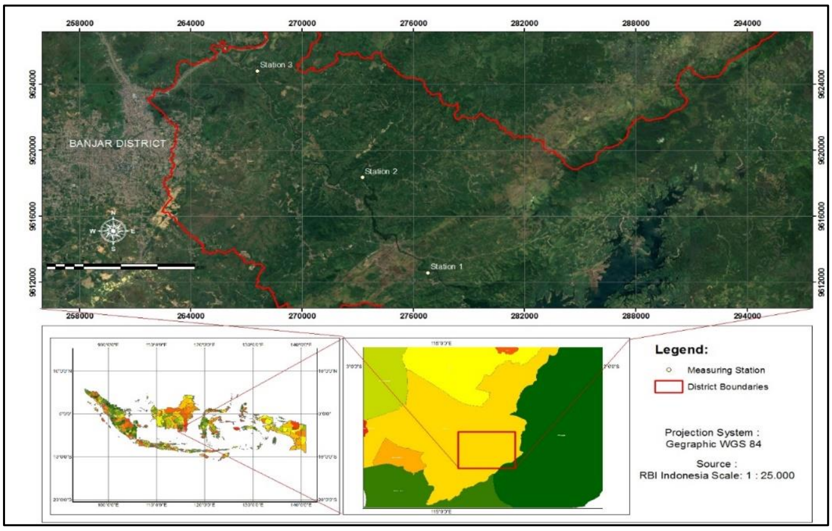

Figure 1 – Research Area Boundaries

RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 11(143), November 2023

The research tools and materials used can be seen in Table 1 as follows:

Table 1 – Tools used in research

No.	Research Tools	Research Tools
1.	Toshiba Notebook (Tecra Satellite) with 16GB Processor capacity and 1 Tera GB Hard Disk	Results processing
2.	Digital camera	study
3.	Stationery	Documentation
4.	Water Quality test kit	Record results
5.	Sample bottle	study
6.	Roll Meters	Taking samples of pH, Temperature, DO
7.	Sechii disk	Take samples of Ammonia, Nitrate Phosphate, and Fecal coli
8.	GPS Garmin 456S Sounding	Measuring the width of the river
9.	Garmin 76S GPS	Measuring River Depth

Table 2 – Research Materials

No.	Research Materials	Source
1.	Sample Water Quality parameters: pH, Temperature, DO, BOD, COD, Ammonia, Nitrate, Phosphate, TSS and Fecal coli	Sample Water

The data collection method uses a mixed method (Sugiyono, 2014), using participant field observation and interviews. Participant Field Observations are intended for researchers to carry out direct observations in the field including activities: field ground checking and observing sources of pollution, taking water samples, measuring river discharge, carried out by means of composite sampling, by collecting sample water samples in the middle and edges of the river, then collect them in one container. The water in the container is then used for water samples to capture water quality parameters. Secondary data for measuring water quality in the same area is obtained from secondary data at the relevant agency.

River discharge is calculated using the surface flow discharge formula which is formulated as follows:

$$Q = V \times A \times kc$$

Where: Q = water discharge at the outlet channel (m^3 /sec); A = channel cross-sectional area (m^2); V = Water speed at the outlet (m/sec); kc = Correction factor (0.85).

The quality status of river water quality is determined using the Water Quality Index Pollutant Index method in an equation based on Environmental Government Decree No.115/2003 as follows:

$$PIj = \sqrt{\frac{(C_i/L_{ij})^2_{M} + (C_i/L_{ij})^2_{R}}{2}}$$

Table 3 – Determination of Pollution Levels

No.	Class	Value	Note
1.	A (Very Good)	0 – 1.0	Meet quality standards
2.	B (Good)	1.1 - 5.0	Light Pollution
3.	C (Medium)	5.1 - 10	Moderately Soiled
4.	D (Bad)	≥≥10	Heavy Pollution

Source: Environmental Government Decree No.115 of 2003.

Table 4 – Evaluation of Pollutant Index Values

Value	Pollution index
0 ≤ PI j ≤ 1.0	Meets quality standards (good condition)
1.0 < PI j ≤ 5.0	Light pollution
5.0 < PI j ≤ 10	Moderate pollution
PIj > 10	Heavy pollution

Source: Environmental Government Decree No.115 of 2003.

RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 11(143), November 2023

The pollutant load carrying capacity is calculated using the equation set out in Minister of Environment Decree Number 115/2003 and Minister of Environment Regulation Number 01 of 2010 as follows:

$$C_R = \frac{\sum Ci\ x\ Qi}{\sum Qi} = \frac{\sum Mi}{\sum Qi}$$

$$APL = (Cij) \times D_{PA} \times f$$

$$MPL = (Cij) \times D_{Pm} \times f$$

$$PLCC = BPM - BPA$$

Where: CR: average concentration of constituents for the combined flow; Ci: constituent concentration in the i-th stream; Qi: flow rate of the i-th stream; Mi: mass of constituents in the i-th stream; APL = Actual Pollutant Load (Tons/day); (CA) j = Actual Level of Contaminant Element J (mg/l); DpA = Actual River Discharge (m^3); f = Conversion Factor = $f = \frac{1\ ton}{1000{,}000\ gr} + \frac{86{,}00\ sec}{1} = 0.0864$; PLCC = Pollutant Load Carrying Capacity; BPA = Actual Pollutant Load (Tons/day); MPL = Maximum Pollutant Load (Tons/day).

Determination of the pollution load carrying capacity is carried out by subtracting the maximum pollution load (BPM) from the Actual Pollution Load (APL). If the reduction result is (-) then the pollutant load entering the waters has exceeded the water quality standards in accordance with the class determined based on PP No. 22 of 2021, but if the results of the reduction are positive (+) then the incoming pollutant load has not exceeded this standard.

RESULTS AND DISCUSSION

The results of research on the Carrying Capacity and Capacity of the Riam Kanan Dalam Sub-Watershed were carried out in the upstream, middle and downstream sections. Water quality measurements are carried out in a time series, with a time span of 1 month. Water quality measurements were carried out on 07 July, 07 August 2023 and 04 September 2023 consisting of water quality parameters; temperature, brightness, depth, TSS, pH, DO, BOD, Nitrate, Phosphate, Ammonia, Fe and Mn which refers to Government Regulation of the Republic of Indonesia Number 22 of 2021 concerning Implementation of Environmental Protection and Management.

Table 5 – Class Water Quality Measurement Results, Observations on July 7, 2023 in the Riam Kanan Subwatershed

River Segment	Test Parameters (mg/l)											
	TSS	pH	NO_3-N	NH_3	Fe	Mn	PO_4	BOD	DO	Temp	Bright	Depth
Upstream	2	7.33	0,01	0.15	0.25	0.018	0.48	4	4.5	28	220	3.87
Middle	5	7.43	0.01	0.15	0.17	0.01	0.13	5.32	5.4	29	254	1.63
Downstream	4	7.72	0.01	0.05	0.69	0.01	0.2	2.68	3.2	29	145	6.60
Average	4.5	7.46	0.18	0.10	0.49	0.02	0.20	3.47	4.53	29.17	179	3.85
Std	1.57	0.19	0.57	0.05	0.23	0.01	0.10	1.50	0.75	0.58	35.58	2.05
Max	8	7.8	0,01	0.15	0.72	0.041	0.48	5.33	5.6	30	254	7.5
Min	2	7.25	0.01	0.05	0.03	0.006	0.11	1.32	3.2	28	132	1.2

Source: Primary Data Processing, 2023.

Table 6 – Class Water Quality Measurement Results, Observations on 07 August 2023 in the Riam Kanan Subwatershed

River Segment	Test Parameters (mg/l)											
	TSS	pH	NO3-N	NH3	Fe	Mn	PO4	BOD	DO	Temp	Bright	Depth
Upstream	2	5.78	0.01	0.26	0.76	0.017	0.13	7.33	1.3	27.5	220	4.97
Middle	5	6.51	0.01	0.17	0.54	0.016	0.5	6.83	5	28.8	142	1.17
Downstream	4	6.1	0.01	0.35	0.55	0.014	0.5	2.83	2.5	27.7	145	2.23
Average	4.50	6.36	0.01	0.25	0.60	0.02	0.27	4.64	2.85	27.87	159.58	3.19
Std	1.83	0.30	0.00	0.07	0.12	0.01	0.14	2.24	1.77	0.96	28.82	1.72
Max	8.00	6.80	0.01	0.35	0.87	0.03	0.50	8.00	6.80	29.10	220.00	5.93
Min	2.00	5.78	0.01	0.12	0.47	0.01	0.13	1.50	0.70	25.80	108.00	1.17

Source: Primary Data Processing, 2023.

RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 11(143), November 2023

Table 7 – Class Water Quality Measurement Results, Observations on 04 September 2023 in the Riam Kanan Subwatershed

River Segment	Test Parameters (mg/l)											
	TSS	pH	NO3-N	NH3	Fe	Mn	PO4	BOD	DO	Temp	Bright	Depth
Upstream	3	7.6	0.01	0.42	0.57	0.017	0.13	7.33	2.8	27.8	256	3.97
Middle	1	7.69	0.01	0.47	0.45	0.014	0.09	6.83	6.1	30.5	140	0.50
Downstream	1	7.81	0.01	0.41	0.22	0.007	0.17	2.83	1.9	29.3	176	1.27
Average	3.08	7.62	0.01	0.38	0.37	0.01	0.12	4.64	3.63	29.83	153.50	2.29
Std	2.43	0.14	0.00	0.08	0.17	0.02	0.03	2.24	1.71	0.95	56.93	1.62
Max	8.00	7.81	0.01	0.47	0.63	0.06	0.17	8.00	6.30	31.10	256.00	4.93
Min	1.00	7.27	0.01	0.18	0.09	0.00	0.07	1.50	1.90	27.80	57.00	0.50

Source: Primary Data Processing, 2023.

Table 8 – Pollution Index Calculation Results

River Segment	Sampling Location	Coordinate	Pollution Index			Category*)
			Sampling 1	Sampling 2	Sampling 3	
Upstream	Awang Village, East Bangkal	0275692; 9613676	2.18	2.92	3.08	Light Contamination
Middle	Sungai Alang Village	0273521; 9619162	2.28	2.78	3.21	Light Contamination
Downstream	Pingaran Ilir Village	0266295; 9622925	2.07	2.84	2.97	Light Contamination

*Source: Primary Data Processing, 2023, *) PP, Number 22/2021.*

Table 9 – Water Quality Index Calculation Results

River Segment	Sampling Location	Pollution Index			Category *)
		Sampling 1	Sampling 2	Sampling 3	
Upstream	Awang Village, East Bangkal	63	63	63	Moderate contamination
Middle	Sungai Alang Village	66	63	63	Moderate contamination
Downstream	Pingaran Ilir Village	63	63	66	Moderate contamination

*Source: Primary Data Processing, 2023, *) PP, Number 22/2021.*

Table 10 – Calculation results of pollutant loads in the Riam Kanan subwatershed at Sampling 1 (07 July 2023), Sampling 2 (07 August 2023), Sampling 3 (04 September 2023)

River Segment	Parameter	Pollutant Load Actual (kg/day)			Pollution Load Capacity		
		Month			Month		
		1	2	3	1	2	3
Upstream	TSS	1.72	1.72	2.58	32.68	32.68	31.82
Middle		3.43	3.29	3.02	30.97	31.11	31.38
Downstream		3.81	3.60	2.64	30.59	30.80	31.76
Upstream	pH	6.30	4.97		0.15	1.48	-0.09
Middle		6.37	5.36	6.53	0.08	1.09	-0.09
Downstream		6.41	5.41	6.55	0.04	1.04	-0.11
Upstream	NO_3-N	0.01	0.01	0.01	8.59	8.59	8.59
Middle		0.01	0.01	0.01	8.59	8.59	8.59
Downstream		0.01	0.01	0.01	8.59	8.59	8.59
Upstream	NH_3	0.13	0.22	0.36	-0.04	-0.14	-0.28
Middle		0.11	0.20	0.35	-0.02	-0.12	-0.27
Downstream		0.09	0.22	0.34	-0.01	-0.13	-0.25
Upstream	Fe	0.22	0.65	0.49	0.04	-0.40	-0.23
Middle		0.36	0.58	0.44	-0.10	-0.32	-0.18
Downstream		0.41	0.54	0.36	-0.16	-0.28	-0.11
Upstream	Mn	0.02	0.01	0.01	0.07	0.07	0.07
Middle		0.01	0.02	0.01	0.07	0.07	0.07
Downstream		0.02	0.02	0.01	0.07	0.07	0.07
Upstream	PO_4	0.41	0.11	0.11	-0.24	0.06	0.06
Middle		0.20	0.21	0.10	-0.03	-0.03	0.08
Downstream		0.19	0.23	0.10	-0.02	-0.06	0.07
Upstream	BOD	3.44	6.30	6.30	-1.72	-4.58	-4.58
Middle		3.42	5.36	5.36	-1.70	-3.64	-3.64
Downstream		3.27	4.68	4.68	-1.55	-2.96	-2.96
Upstream	DO	3.87	1.12	2.41	-1.72	-4.58	-4.58
Middle		4.02	2.28	3.31	-1.70	-3.64	-3.64
Downstream		3.98	2.33	3.10	-1.55	-2.96	-2.96

Source: Primary Data Processing, 2023.

RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 11(143), November 2023

Table 11 – Calculation Results of Potential Pollutant Loads

Potential Pollutant Load	Parameter	The calculation results	Unit
Domestic	BOD	1,193,759	kg/day
	TSS	1,134,071	Kg/day
Use of Built-up Land	BOD	7,521	kg/day
	Nitrate (NO_3)	9,266	kg/day
	Phosphate (PO_4)	270	kg/day
Forest Land Use	BOD	172,807	kg/day
	Nitrate (NO_3)	406,431	kg/day
	Phosphate (PO_4)	25,402	kg/day

Source: Primary Data Processing, 2023.

Table 12 – Results of Carrying Capacity Calculation for the Riam Kanan Subwatershed

River segment	Number of floating net cages	Lfish ($g/m^2/y$)	Area (m^2)	Carrying capacity (ton/y)	Number of floating net cage units accepted
Upstream	668	2027.28852	119834.91	10.74955475	3
Middle	60	1126.2714	173972.38	8.669916636	18.8
Downstream	133	2860.729356	170003.08	21.51915051	21.5

Source: Primary Data Processing (2023).

Water Quality Analysis in the Riam Kanan Subwatershed. TSS measurements were carried out using the spectrophotometer method for observation 1 (07 July 2023), observation 2 (07 August 2023) and observation 3 (04 September 2023) in the Riam Kanan Subwatershed. The average value for upstream, middle and downstream was obtained at 4.5 mg/l, standard deviation 1.57, maximum TSS measurement 8 mg/l and minimum TSS measurement 2 mg/l.

The TSS value is still below the quality standard for class II, namely 50 mg/L, so it can still be used as intended. Even though it is still below the quality standard, the TSS value at station III can still be said to be high because it is close to the quality standard. This is because station III is close to the estuary, where as you go downstream the TSS value will be higher and is supported by the many wood factories around station III.

The high TSS in the Riam Kanan Subwatershed is caused by suspended sediment in the waters originating from land carried by surface flows when it rains (Siahaan, 2011). High TSS values in river waters can hinder the reach of sunlight from penetrating into the waters, thereby disrupting the photosynthesis process carried out by autotrophic biota. Insufficient light penetration can reduce the activity of phytoplankton in carrying out photosynthesis, so that the amount of oxygen in the waters is also affected (Wisha, 2016).

pH measurements were carried out using the spectrophotometer method for observation 1 (07 July 2023), observation 2 (07 August 2023) and observation 3 (04 September 2023) in the Riam Kanan Subwatershed, an average value of 7.46 mg/l, standard deviation was obtained. 0.19, maximum pH measurement of 7.8 mg/l and minimum pH measurement of 7.25 mg/l.

The pH value at all stations is within the class I quality standard range, namely, 6-, so that the waters of the Riam Kanan Subwatershed can still be used according to their intended purpose. A low pH value can reduce the quality of water so that it has an impact on the biota in it. These changes will affect the food web in the waters. One of the causes of the decrease in pH levels is the use of detergent which can reduce the pH concentration in the waters of the Riam Kanan Subwatershed, this is supported by the large number of people who still wash clothes on the riverbank (Susana, 2009).

Nitrate measurements were carried out using the spectrophotometer method for observation 1 (07 July 2023), observation 2 (07 August 2023) and observation 3 (04 September 2023) in the Riam Kanan Subwatershed, an average value of 0.18 mg/l, standard deviation was obtained. 0.57, maximum Nitrate measurement of 2 mg/l and minimum Nitrate measurement of 0.01 mg/l.

Nitrate fluctuations in waters refer to changes in the concentration of nitrate (NO3-) in water, which can occur over time due to various natural factors and human activities. Nitrate is a form of oxygen nitrate (N) that dissolves in water and is one of the main forms of

RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 11(143), November 2023

nutrients important for aquatic life. However, excessive fluctuations in nitrate concentrations can have negative consequences for water quality and aquatic ecosystems.

The higher nitrate value at station I can be caused by nutrient input from land, the entry of domestic waste or ship activities. Meanwhile, the low nitrate value at station III could occur due to the use of nitrate by phytoplankton as a limiting element for the growth and development of phytoplankton itself (Fitriyah, 2022).

Ammonia measurements were carried out using the spectrophotometer method for observation 1 (07 July 2023), observation 2 (07 August 2023) and observation 3 (04
3 September 2023) in the Riam Kanan Subwatershed, an average value of 0.10 mg/l was
3 obtained, standard deviation 0.05, maximum Nitrate measurement of 0.35 mg/l and minimum Ammonia measurement of 0.02 mg/l. The ammonia value in all segmentations is above the quality standard for class I, so that water in some segmentation cannot be used according to its intended purpose.

10 Ammonia in waters comes from urine and feces, microbiological oxidation of organic substances as well as industrial waste and community activities. The high ammonia value is thought to be caused by the use of feed in KJA activities, as well as people who still build toilets directly in the waters of the Riam Kanan Subwatershed. High ammonia values in a
10 body of water can cause a decrease in dissolved oxygen due to ammonia dissociation, which can affect the respiration process of aquatic biota (Putri, 2019).

Iron measurements were carried out using the spectrophotometer method for observation 1 (07 July 2023), observation 2 (07 August 2023) and observation 3 (04 September 2023), in the Riam Kanan Subwatershed the average value was 0.60 mg/l, standard deviation 0.12, maximum iron value measured 0.87 mg/l and minimum iron measured 0.47 mg/l. The iron content values in all segmentations are above the quality standard for class I, so that water in some segmentations cannot be used according to its intended purpose.

Manganese measurements were carried out using the spectrophotometer method for observation 1 (07 July 2023), observation 2 (07 August 2023) and observation 3 (04
3 September 2023), in the Riam Kanan Subwatershed the average value was 0.02 mg/l,
29 standard deviation of 0.01, the maximum Manganese Content measurement value is 0.03 mg/l and the minimum Manganese Content measurement is 0.01 mg/l. The iron content values in all segmentations are below the quality standard for class I, so that water in several segmentations can still be used according to its intended purpose.

The presence of manganese (Mn) in waters is also common and important for aquatic ecosystems. Manganese is a transition metal that plays a role in various biogeochemical processes in the aquatic environment. Several aspects of the presence of manganese in waters are as follows; Natural Sources: Like iron, manganese can also be present naturally in waters through the processes of soil erosion, rock weathering, and river flows. Apart from that, geological activity such as volcanic activity can also release manganese into the water. Soil and Sediment Content: Manganese is found in soil and sediment at the bottom of waters. Some waters can have sediments rich in manganese, which can affect manganese concentrations in the water. Biochemically, manganese functions as an essential nutrient for several aquatic organisms and plays a role in various biogeochemical reactions. As an enzyme cofactor, manganese participates in various cellular processes, including photosynthesis, respiration, and metabolism. Effect of pH and Redox: Like iron, manganese concentrations in waters are also influenced by pH and redox conditions (oxidation-reduction potential). Under oxidizing conditions, manganese can oxidize and settle as solid particles at the bottom of the water. However, under less oxidative conditions, manganese can remain
41 soluble in water. Human Influence: As with iron, human activities, such as industrial waste, agriculture, and mining activities, can cause excessive releases of manganese into waters. This increase in manganese concentration can also have a negative impact on water quality and aquatic ecosystems.

The presence of phosphate (PO43-) in waters is important and is the main factor in the
19 biogeochemical cycle of phosphorus. Phosphate is an inorganic form of phosphorus which is an essential nutrient for the growth and survival of aquatic organisms, including algae,

phytoplankton and aquatic plants. Phosphates are present naturally in waters through the processes of soil erosion, rock weathering, and river flows. This natural process releases phosphate from soil and rocks into waters. Anthropogenic Sources: In addition to natural sources, human activities are also a significant source of phosphate in waters. The use of fertilizers in agriculture, industrial waste, domestic waste, and detergents contain phosphates and can pollute waters. Phosphate plays an important nutrient in the growth and metabolism of aquatic organisms.

BOD measurements were carried out using the dark bottle and light bottle methods using Winkler titration for observation 1 (07 July 2023), observation 2 (07 August 2023) and observation 3 (04 September 2023) in the Riam Kanan Subwatershed, an average value of 4 was obtained. .64 mg/l, standard deviation 2.24, maximum BOD level measurement value of 8 mg/l and minimum BOD level measurement of 1.50 mg/l. The BOD values in all segmentations are below the quality standards for class I, so that water in several segmentations can still be used according to its intended purpose.

BOD in river waters comes from biodegradable organic compounds, which can cause problems in waters such as the death of aquatic biota (Wardhani, 2023). The presence of BOD in river waters is related to the presence of dissolved oxygen which is used for the biochemical degradation process of organic substances. The higher the BOD value in river waters indicates that the waters are more polluted. This is because high BOD can cause a decrease in oxygen in the water, which can cause rivers to smell due to high fish mortality (Asrori, 2021).

DO measurements were carried out in situ using a DO test kit for observation 1 (07 July 2023), observation 2 (07 August 2023) and observation 3 (04 September 2023), in the Riam Kanan Subwatershed an average value of 2.85 mg/ l, standard deviation 1.77, maximum measured DO level value 6.8 mg/l and minimum measured DO level 0.70 mg/l. The DO values in all segmentations are below the quality standards for class I, so that water in some segmentations still cannot be used according to its intended purpose.

The low DO levels can be caused by the large amount of waste entering the river waters, this is supported by the fact that there are still people on the banks of the Riam Kanan Subwatershed who still throw household waste into the river waters. Low DO concentrations will cause aquatic organisms to die, this is because DO levels in waters come from photosynthesis, so DO levels depend on the number of aquatic plants in river waters. If we look directly at the conditions in the Riam Kanan Subwatershed, there are still very few aquatic plants found, which can cause DO levels to be low. Decreased DO levels in river waters can indicate water pollution, which makes it difficult for aquatic biota to live, although it is possible that there is still some aquatic biota that can live in it (Simanjuntak, 2017).

Temperature measurements were carried out in situ using a temperature test kit for observation 1 (07 July 2023), observation 2 (07 August 2023) and observation 3 (04 September 2023), in the Riam Kanan Subwatershed an average value of 27.87 ^{o}C was obtained. The standard deviation is 0.96, the maximum temperature measurement value is 29.0 ^{o}C and the minimum temperature measurement value is 25.80 ^{o}C. The temperature values in all segmentations are within the quality standard deviation for class I, so that water in some segmentations still cannot be used according to its intended purpose.

Temperature measurement is an absolute thing to do in research. This is because all biological and physiological activities that take place in aquatic ecosystems are greatly influenced by temperature. Microorganisms require an optimum temperature to carry out metabolism. An increase in temperature can cause an increase in the metabolic rate so that oxygen consumption increases and causes dissolved oxygen in the water to decrease (Zammi, 2018).

Brightness measurements were carried out in situ using sechi disks for observation 1 (07 July 2023), observation 2 (07 August 2023) and observation 3 (04 September 2023), in the Riam Kanan Subwatershed an average value of 15.58 was obtained. cm, standard deviation 28.82, maximum brightness measurement value of 220 cm and minimum brightness measurement of 108 cm. The brightness values in all segmentations are within

RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 11(143), November 2023

the quality standard range for class I, so that water in some segmentations still cannot be used according to its intended purpose.

Depth measurements were carried out in situ using an echosounder for observation 1 (07 July 2023), observation 2 (07 August 2023) and observation 3 (04 September 2023) in the Riam Kanan Subwatershed, obtaining an average value of 3.19 m, standard deviation 1 .72 m, the maximum measurement depth value is 5.3 m and the minimum measurement depth is 1.17 m. The temperature values in all segmentations are within the quality standard range for class I, so that water in some segmentation still cannot be used according to its intended purpose.

Water Quality Status of the Riam Kanan Sub-Watershed Using the Pollution Index and Water Quality Index Methods. The pollution index is used to determine the level of pollution relative to several permissible water quality parameters. The pollution index has a concept that is quite different from the Water Quality Index. The pollution index is determined for a particular designation, which is then developed for several designations for the entire river or parts of the river. Water quality management using the Pollution Index can provide input to decision makers so they can assess water quality for a particular use and take action to improve if there is a decline in water quality due to pollutant loads. The pollution index can be used to determine the quality status of river water even with just one sampling.

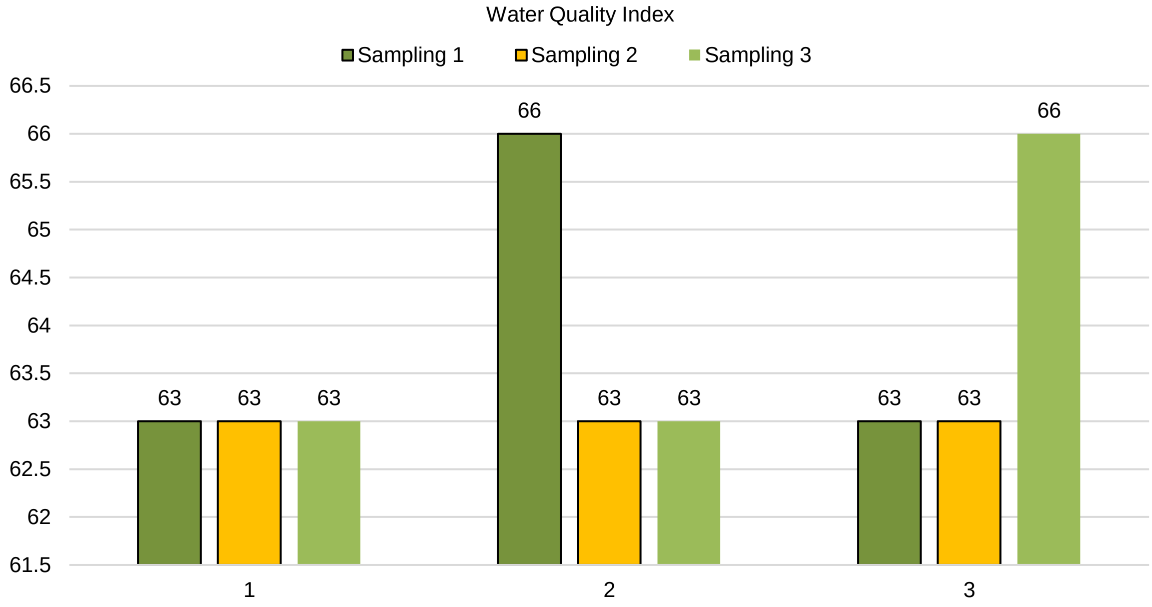

Figure 2 – Graph of Pollution Index Calculation Results

Based on the results of the analysis which can be seen in Figure 2, from Upstream to Upstream the pollution index value was obtained at 1.19 - 3.23, so it can be said that the waters in sampling I fall into the lightly polluted category, because the pollution index value corresponds to with an evaluation of the pollution index value, namely 1.0 > PIj ≤ 5.0..

Based on observations made in the field, there are several activities of the surrounding community which are considered to be sources of pollution. Some sources of pollution come from the domestic activities of communities living around the Riam Kanan Subwatershed and the activities of floating net cages. Apart from that, sources of pollution can also come from livestock activities and mining activities. Human activities which along with the increase in population will produce pollutants in both solid and liquid form with direct sources of pollution such as household waste, industrial waste and so on (Suprabawati, 2007) .

The Pollution Water Quality Index value at each observation station shows that the water quality status of the Barito River is in a lightly polluted condition, this condition is

RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 11(143), November 2023

included in the moderate category according to the evaluation of the pollution index value against the water quality index value, namely 50 ≤ x < 70 = moderate.

Capacity of Pollutant Loads in the Riam Kanan Subwatershed. Pollutant load capacity is the ability of a river to receive waste input into the waters without causing the river waters to become polluted. The pollutant load carrying capacity analysis in the Riam Kanan Subwatershed was carried out on 6 (six) parameters. The parameters analyzed in Capacity of Pollutant Loads are parameters that have weight. The parameters analyzed include TSS, pH, DO, nitrate, phosphate, ammonia, DO, and BOD. The pollutant load carrying capacity calculation results for each parameter are made in the form of tables and graphs.

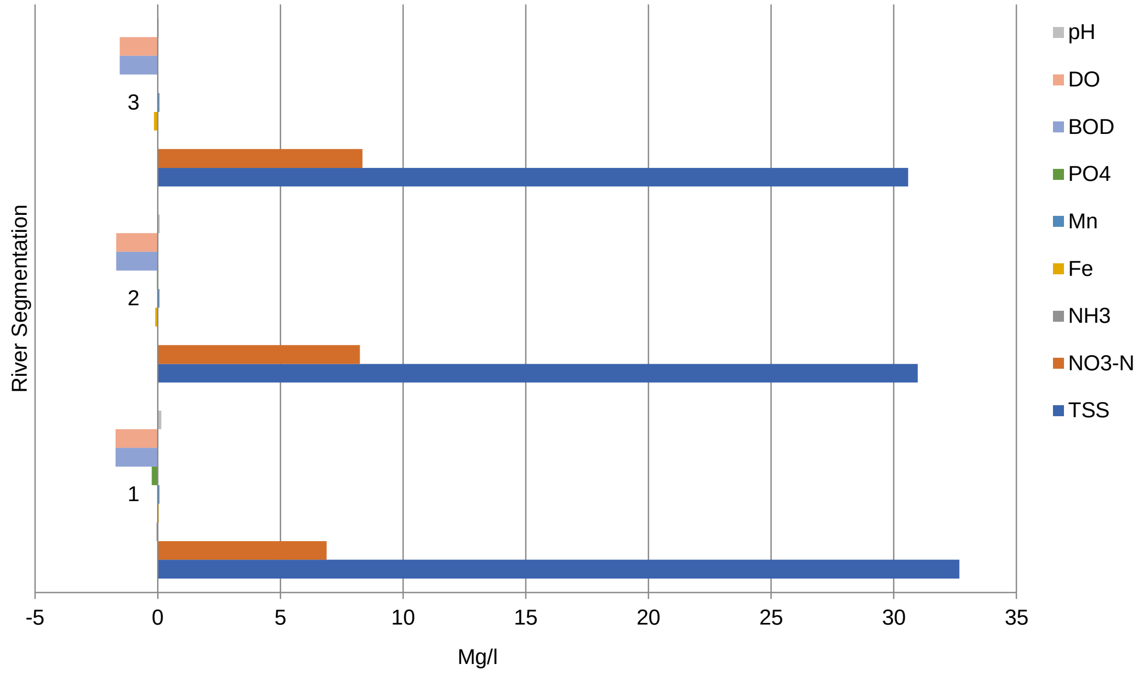

Figure 3 – The Pollutant Load Carrying Capacity Calculation Results for the 1st Observation

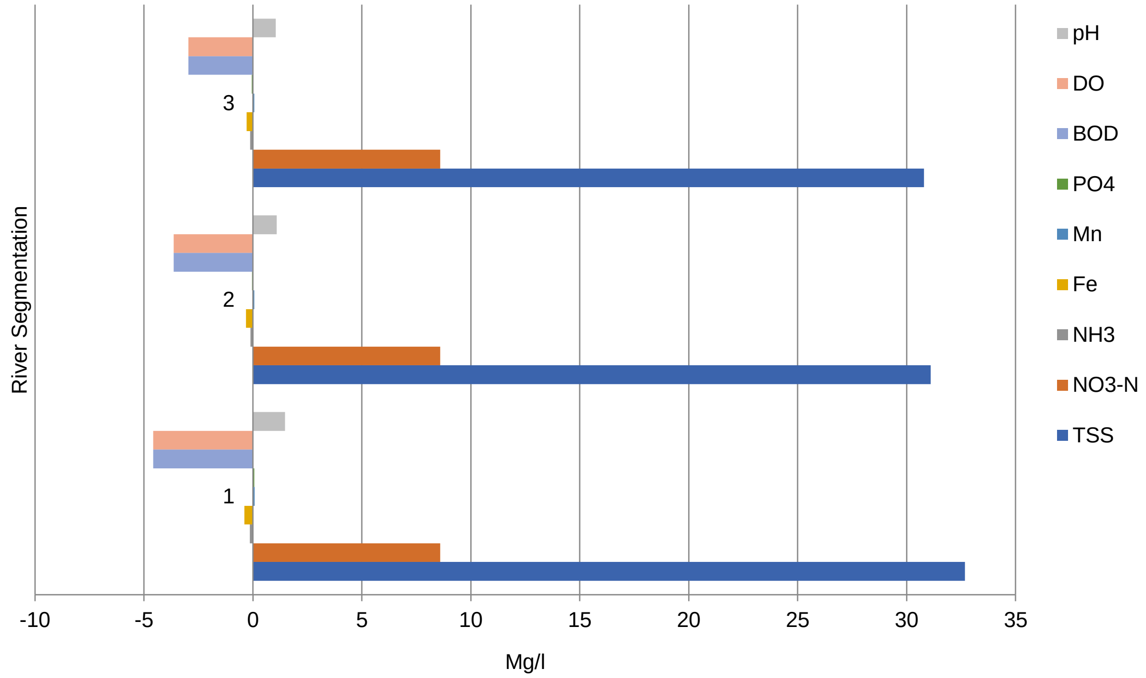

Figure 4 – The Pollutant Load Carrying Capacity Calculation Results for the 2nd Observation

RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 11(143), November 2023

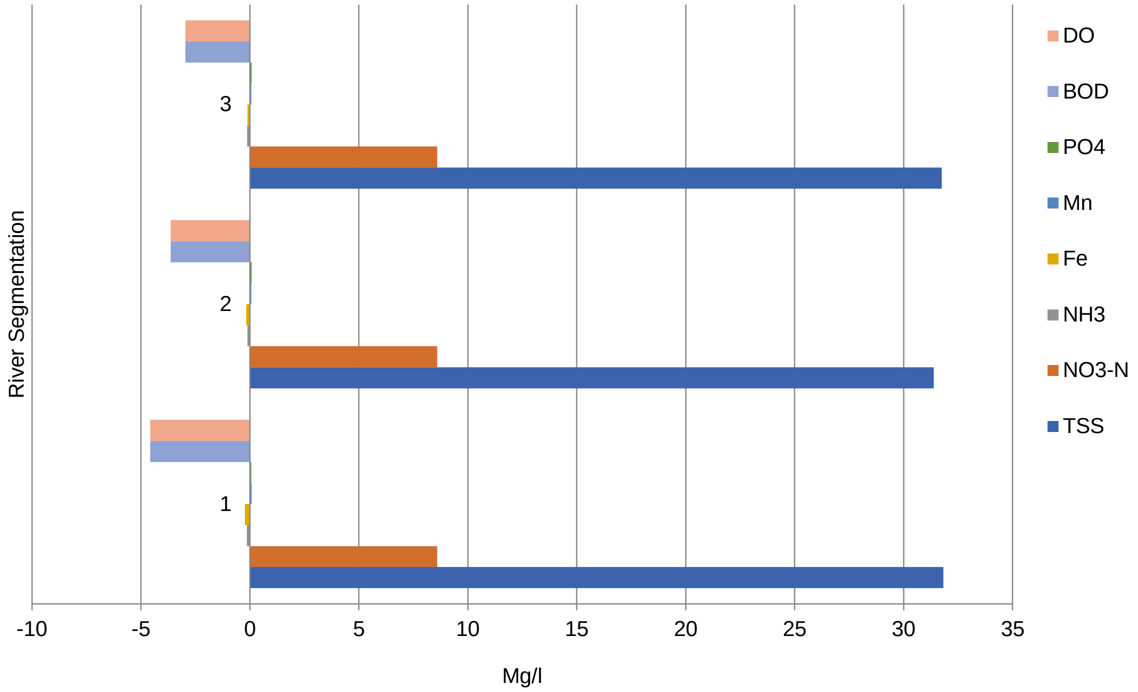

Figure 5 – The Pollutant Load Carrying Capacity Calculation Results for the 3rd Observation

Based on the results of the analysis of the pollutant load carrying capacity, three parameters were obtained that exceeded the quality standards, namely Fe with a range of -0.17 - -0.40, Phosphate with a range of -0.03 - -0.24, DO with a range of -0.96 - - 3.99 and BOD with a range of -0.96 - -0.399.

CONCLUSION

The results of the analysis of water quality parameters found that the Pollution Index was lightly polluted at the Riam Kanan Subwatershed observation station and the results of the calculation of the Water Quality Index were included in the medium category. The results of calculations regarding the pollutant load capacity contain several parameters that exceed the quality standards, namely parameters; Phosphate, Fe, DO and BOD.

ACKNOWLEDGMENTS

Acknowledgments are conveyed to the Institute for Research and Community Service at Lambung Mangkurat University (LPPM ULM) which has funded this research through the PNBP Research Grant Fund on the skin of the 2023 Compulsory Lecturer Program.

REFERENCES

1. Keputusan Menteri Lingkungan Hidup, Nomor. 110 tahun 2003, Tentang Pedoman Penetapan Daya Tampung dan Beban Pencemaran, 2003, Jakarta 27 Juni 2003
2. Keputusan Menteri Lingkungan Hidup, Nomor. 115 tahun 2003, Tentang Pedoman Penentuan Status Mutu Air, 2003, Jakarta, 10 Juli 2003
3. KLHK DMLHBTL. 2014. Pedoman Penentuan Daya Dukung dan Daya Tampung. Jakarta: Kementerian Lingkungan Hidup
4. Normasari, E.,R., "Model Pengendalian Pencemaran Sub-Sub DAS Riam Kanan di Kota Banjarmasin" (Disertasi tidak diterbitkan, Program Studi Ilmu Lingkungan, Program Pascasarjana, Universitas Sebelas Maret, Surakarta, 2016

RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 11(143), November 2023

5. Nida, Rahman, M., & Rahman, A. (2017.). Pencemaran Dengan Kegiatan Keramba Jaring Apung Di Waduk Riam Kanan Kecamatan Aranio Kabupaten Banjar Provinsi Kalimantan Selatan The Relationship Water Quality Status Methods Pollution Index With Activities Of Floating Net Cage In The Riam Kanan Dam Aran. 1–17.
6. Normasari, E. R., Budiastuti, S., & Ramelan, A. H. (2016). Mitigation of Martapura River in Banjarmasin using. 11(3), 825–832.
7. Nuryanti, D. S. (2020). Review Analisis Daya Dukung dan Daya Tampung Lingkungan Hidup dalam Kajian Lingkungan Hidup Strategis Rencana Detail Tata Ruang Studi Kasus Kajian Lingkungan Hidup Strategis Rencana Detail Tata Ruang Kecamatan Kedungwuni Kabupaten Pekalongan Tahun 2020-20. 119–128.
8. Peraturan Menteri Negara Lingkungan Hidup, Nomor. 01 tahun 2010 tentang Tata Laksana Pengendalian Pencemaran Air, 2010 (Jakarta), h. 38
9. Simanjuntak, R & N. Siahaan.(2011). Pengaruh Konsentrasi Gula Dan Lama Fermentasi Terhadap Mutu Teh Kombucha. Jurnal Ilmiah Pendidikan Tinggi .4(2).
10. Sudarningsih, Zainuddin A, Siregar SS. 2021. Kandungan Logam Berat Pada Sedimen Sungai Martapura Kalimantan Selatan. Jurnal Fisik Flux: Jurnal Ilmiah Fisika 18(1): 1-4.
11. Sugiyono. (2014). Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta
12. Wisha, U. J., & Heriati, A. (2016). Analisis Julat Pasang Surut (Tidal Range) dan pengaruhnya terhadap Sebaran Total Sedimen Tersuspensi (TSS) di Perairan Teluk Pare. J. Kelautan, 9(1), 23-31.
13. Susana T., 2009. Tingkat Keasaman (pH) dan Oksigen Terlarut Sebagai Indikator Kualitas Perairan Sekitar Muara sungai Cisadane. Http://puslit2.petra.ac.id Vol 5, No 2 (2009) › Tjutju Susana. Diakses tanggal 24 April 2017.
14. Fitriyah, "Pengolahan limbah cair menggunakan metode adsorpsi in 1001 cara menangani sampah kota". Edisi 1. Serang: PT.Nusantara Persada Utama. Bab. 3, hal. 12-31, 2021.
15. Putri, W.A.E., Purwiyanto, A.I.S., Fauziyag., Agustriani, F & Suteja, Y. 2019. Kondisi Nitrat, Nitrit, Amonia, Fosfat dan BOD di Muara Sungai Banyuasin, Sumatera Selatan. Jurnal Ilmu dan Teknologi Kelautan Tropis, 11 (1), 65 – 74.
16. Asrori, M. Khadik. 2021. “Pemetaan Kualitas Air Sungai Di Surabaya.” Jurnal Envirotek 13(2): 41–47.
17. M. Simanjuntak, "Oksigen Terlarut dan Apparent Oxygen Utilization di Perairan Teluk Klabat, Pulau Bangka, Ilmu Kelautan", pp. vol.12, no.2, pp.59-66, 2007.
18. Zammi, Muhammad dkk. (2018). Analisis Dampak Limbah Buangan Limbah Pabrik Batik di Sungai Simbang Kulon Kabupaten Pekalongan. Walisongo Jurnal of Chemistry. 1(1)
19. Sali, G. P., Suprabawati, A., dan Purwanto Y. 2018. Efektivitas Teknik Biofiltrasi dengan Media Sarang Tawon terhadap Penurunan Kadar Nitrogen Total Limbah Cair. Jurnal Presipitasi: Media Komunikasi dan Pengembangan Teknik Lingkungan. 15(1): 1-6.