RJOAS: Russian Journal of Agricultural and Socio-Economic Sciences
ISSN 2226-1184 (Online) | Issue 6(138), June 2023

UDC 631; DOI 10.18551/rjoas.2023-06.18

DISTRIBUTION OF DETERGENT AND PHOSPHATE IN WATER QUALITY STATUS OF BENGARIS RIVER, CENTRAL KALIMANTAN DISTRICT, INDONESIA

Puspa Wahdina Maimun*, Master of Natural Resources and Environmental Management
University of Lambung Mangkurat, Banjarbaru, South Kalimantan, Indonesia

Fatmawati
Faculty of Fisheries and Marine, University of Lambung Mangkurat, Banjarbaru, South Kalimantan, Indonesia

Kadir Syarifuddin
Faculty of Forestry, University of Lambung Mangkurat, Banjarbaru, South Kalimantan, Indonesia

Biyatmoko Danang
Faculty of Agriculture, University of Lambung Mangkurat, Banjarbaru, South Kalimantan, Indonesia

*E-mail: rizaliemuntaha141@gmail.com

ABSTRACT
The Bengaris River is a tributary of the Barito River that crosses the town of Muara Teweh and passes through residential areas from upstream to the estuary as well as the presence of household industrial activities, so that it has the potential to be polluted by domestic waste originating from household activities on the banks of the Bengaris River. This study aims to analyze the distribution of detergent and phosphate parameters on the status of water quality in the Bengaris River, North Barito Regency. Sampling was taken at 10 points along the Bengaris River with repeated samples at point 3, point 7 and point 9 where at these three points water quality samples were taken for detergent and phosphate parameters 3 times. Analysis of the distribution of detergent and phosphate on the status of water quality in the Bengaris River, North Barito Regency, Central Kalimantan, namely the potential for pollution of the Bengaris River water mainly comes from domestic wastewater discharge which can be represented by several phosphate parameters. Status of water quality in the Bengaris River using the pollution index obtained results that meet the Quality Standard (Good Condition) 1 segment, 5 segments of light pollution conditions and 3 segments of moderate pollution.

KEY WORDS
Detergent, phosphate, water quality, Bengaris River, Central Kalimantan.

Disposal of domestic wastewater directly into the environment can cause degradation of surface water and groundwater resources. Biological contaminants that enter these water sources can cause a reduction in the oxygen content in the water which is actually needed by aquatic biota (Sapaty, 2013). The causative factor of River pollution of 60% to 70% is one of them is domestic waste and what can cause damage to aquatic biota is detergent. Detergent is a product that has the function of removing dirt when washing clothes which contains three components, namely surfactants, builders, and additives or are used as bleaches and deodorizers for clothes (Andriani, 2020).

The high use of synthetic detergents over the last decade for both industrial and domestic purposes has resulted in high concentrations of surfactants into the environment because most of the domestic wastewater is discharged downstream without proper treatment. Surfactants enter the environment when effluent is discharged into surface waters and via onshore sludge disposal. Surfactants that are discharged into water bodies cause water pollution. Effluents containing surfactants that are released into water bodies also have

a serious impact on ecosystems (Selambakkannu et al., 2020). One of the contaminants that can reduce the quality of River water is phosphate. The presence of excessive phosphate in water bodies can cause water nutrient enrichment conditions (eutrophication). Water is said to be eutrophic if the total phosphate concentration is within the concentration range of 35-100 µg/L.

Eutrophic conditions trigger the phenomenon of blooming algae (phytoplankton population explosion), namely in calm and non-flowing water conditions such as in lakes, ponds and seas (Sutamihardja et al., 2018). Specifically for cities that have rivers or drainage, such as the Bengaris River in the city of Muara Teweh, generally waste water flows into the river. This can happen because of the behavior/habits of the community throwing their waste in any place without pre-processing it and supported by the presence of the River in a low position. Therefore, pollution of River water and the surrounding environment needs to be controlled along with the pace of development so that the function of the River can be maintained (Yudo, 2018).

The Bengaris River is a tributary of the Barito River that crosses the town of Muara Teweh and passes through residential areas from upstream to the estuary as well as the presence of household industrial activities, so that it has the potential to be polluted by domestic waste originating from household activities on the banks of the Bengaris River. The Bengaris River is not used as raw water for community needs, but the Bengaris River water empties into the Barito River, so it is feared that it will contribute to pollution because Barito River water is the raw water used by the community on a daily basis. This River flows across urban areas which are places for domestic waste disposal, hospitals, livestock and agriculture, so that it has the potential to cause water pollution which can ultimately disrupt aesthetics and threaten environmental health (Kurniawan et al., 2021). This study aims to analyze the distribution of detergent and phosphate on the status of water quality in the Bengaris River, North Barito Regency, Central Kalimantan.

MATERIALS AND METHODS OF RESEARCH

Study implemented in the Bengaris River area, administratively the government is in Teweh Tengah regency and in 2 ward name Lanjas ward and Melayu ward, North Barito Regency, Central Kalimantan. Sampling was taken at 10 points along the Bengaris River with repeated samples at point 3, point 7 and point 9 where at these three points water quality samples were taken for detergent and phosphate parameters 3 times. Preparation and testing of River water quality samples is carried out at the UPT. South Kalimantan Government Environmental Laboratory.

Table 1 – Sampling Points in the Bengaris River Corridor

No.	Point Name	Coordinate	
		South Latitude (LS)	East Longitude (E)
1	Point 1	00 ^{0} 57'2 5 ” S	114 ^{0} 53'01” E
2	Point 2	00 ^{0} 57' 26 ”S	114 ^{0} 53' 19 ” E
3	Point 3	00 ^{0} 57'1 4 ” S	114 ^{0} 53'35” E
4	Point 4	00 ^{0} 57'13” S	114 ^{0} 53'38” E
5	Point 5	00 ^{0} 57'0 3 ” S	114 ^{0} 53'50” E
6	Point 6	00 ^{0} 56'5 4 ” S	114 ^{0} 53' 49 ” E
7	Point 7	00 ^{0} 56'4 8 ” S	114 ^{0} 54' 00 ” E
8	Point 8	00 ^{0} 56'4 3 ” S	114 ^{0} 54'0 1 ” E
9	Point 9	00 ^{0} 56'1 1 ” S	114 ^{0} 53' 34 ” E
10	Point 10	00 ^{0} 5 5 ' 54 ” S	114 ^{0} 53'3 7 ” E

Water quality analysis data used in this study is based on sampling in the Bengaris River, which is then subjected to laboratory tests for water quality parameters, including detergent and phosphate as well as water quality status. Data analysis technique uses descriptive method with a quantitative approach to analyze River water quality parameters.

RESULTS AND DISCUSSION

Distribution of Detergent And Phosphates. The results of the environmental laboratory measurements of the Government of South Kalimantan showed that in the detergent parameters all were still below the quality standards at 9 points of the Bengaris River; except for at point 3 of the 3rd repetition the results of the detergent parameters exceeded the class 2 surface water quality standard.

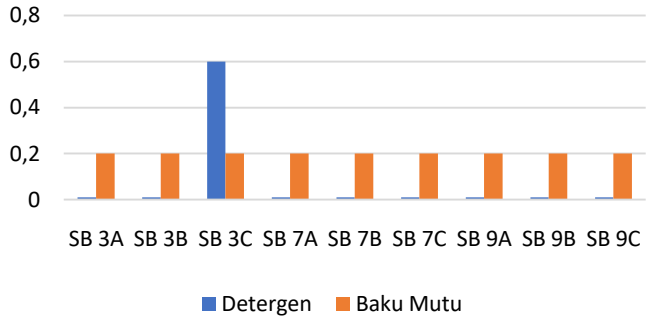

Figure 1 – Graph of Detergent Parameters at 3x Repetitions in the Bengaris River

The figure above shows the highest concentration of detergent parameters in the Bengaris River in the Bengaris River 3C in the afternoon with a value of 0.6 mg/L exceeding the surface water quality standard for detergent parameters in the treatment of 3 repetitions in the Bengaris River. Segment 3C has a segment which is already approaching the downstream of the Bengaris River, there is a possibility of accumulation of segments in the upstream from the Bengaris 9 River to the Bengaris 3 River.

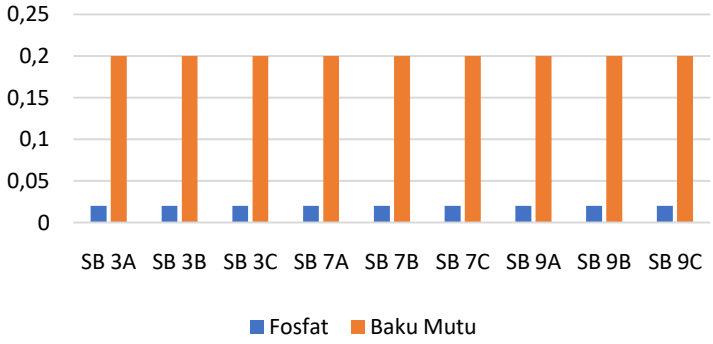

Figure 2 – Graph of Phosphate Parameters at 3x repetitions in the Bengaris River

The graph of the phosphate parameter at 3 repetitions shown in the figure shows that the phosphate parameter is still below the surface water quality standard with a value of <0.03 while the quality standard is 0.2 mg/L. The presence of Phosphate (PO_4) in natural water or wastewater is as orthophosphate, polyphosphate and organic phosphate compounds. Where for public waters Phosphates usually come from detergents in domestic wastewater, pesticides and insecticides from agricultural land.

Status of Water Quality in the Bengaris River, Central Kalimantan. The status of River water quality obtained using the Pollution Index method as stated in the Decree of the State Minister for the Environment No. 115 of 2003 concerning Guidelines for Determining Water Quality Status, namely by comparing the concentration of water quality parameters listed in the quality standard of a water allotment with the concentration of water quality parameters obtained from the analysis of water samples at a sampling location from the Bengaris River channel.

Table 2 – Data from Laboratory Analysis of Water Quality Parameters at 3 Points (Repeat) on the Bengaris River

No.	Sampling Locations	Pollutant Index Value	Category
IIIA	Jl. Pineapple	1,2	Light Black
IIIB	Jl. Pineapple	6,2	Medium Black
IIIC	Jl. Pineapple	2,5	Light Black
VIIA	Jl. Gen. Sudirman	5,5	Medium Black
VIIB	Jl. Gen. Sudirman	2.0	Light Black
VIIC	Jl. Gen. Sudirman	1,3	Light Black
IXA	Wonorejo	6,8	Medium Black
IXB	Wonorejo	0.8	Meet Quality Standards (Good Condition)
IXC	Wonorejo	1,3	Light Black

Source: Primary Data, April 2023.

Data from laboratory analysis at the 3 repetition points on the Bengaris River shown in the table above, shows that the condition of the water quality status of the Bengaris River at the 2nd repetition at point III shows moderate pollution compared to in the morning and evening which shows light pollution. Point VII in the morning sampling actually shows moderate pollution, while in the afternoon and evening it shows mild pollution. Point IX in the morning shows moderate pollution, meets the quality standards in the afternoon and shows mild pollution in the afternoon. This shows that community activities in carrying out activities at point IX in this watershed segment in residential areas are indeed rare and land use is more for plantation activities so that the pollutant components can be diluted by themselves.

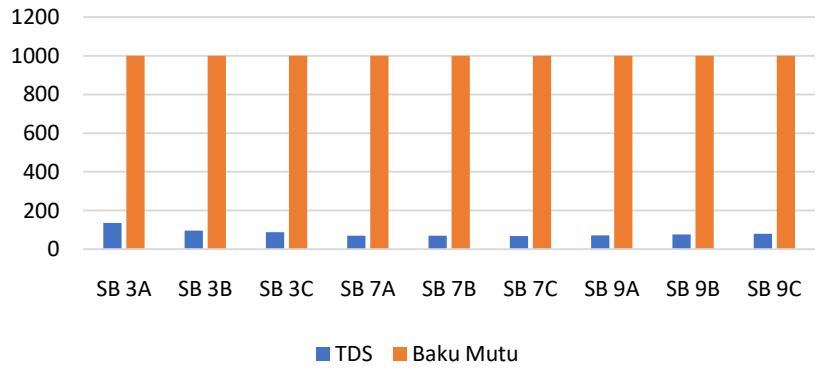

Figure 3 – Graph of TDS parameters and quality standards at 3x repetitions in the Bengaris River

The graph above shows that the TDS parameter values for all segments of the Bengaris River at all points from the Bengaris 3A - Bengaris 9C Rivers are below the quality standard, namely 3 mg/L in the morning, afternoon and evening collection.

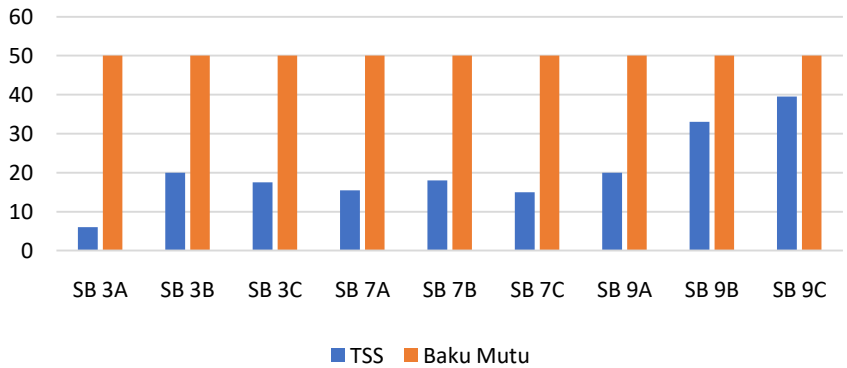

Figure 4 – Graph of TSS Parameters and Quality Standards at 3x Replications in the Bengaris River

The graph above shows that the value of the TSS parameter is still below the quality standard for surface water quality in repetitions taken in the morning, afternoon and evening with the lowest value in the Bengaris 3A River which is 6.00 mg/L and the highest 39.5 mg/L L on the Bengaris River 9C. This happens because most community activities are carried out in the afternoon.

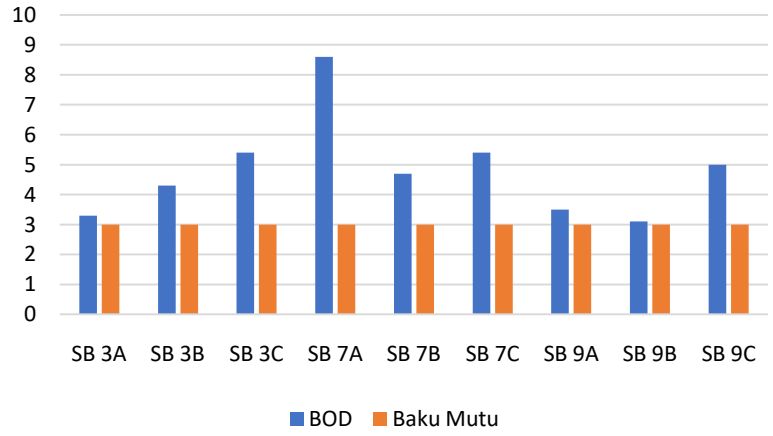

Figure 5 – Graph of BOD Parameters and Quality Standards at 3x Replications in the Bengaris River

The graph above shows that the value of the BOD parameter is above the surface water quality standard in repetitions taken in the morning, afternoon and evening with a value of 3.5 mg/L, 3.1 mg/L in the afternoon and 5 mg in the afternoon /L, with surface water quality standard of 3 mg/L. The addition of organic pollutant loads into River water in the Bengaris 3 River which can cause an increase in BOD concentrations. The concentration of BOD is relatively low, this shows that organic compounds that enter the River flow can undergo a *self-purification process* so that the River is able to restore its quality (Saily *et al.,* 2019).

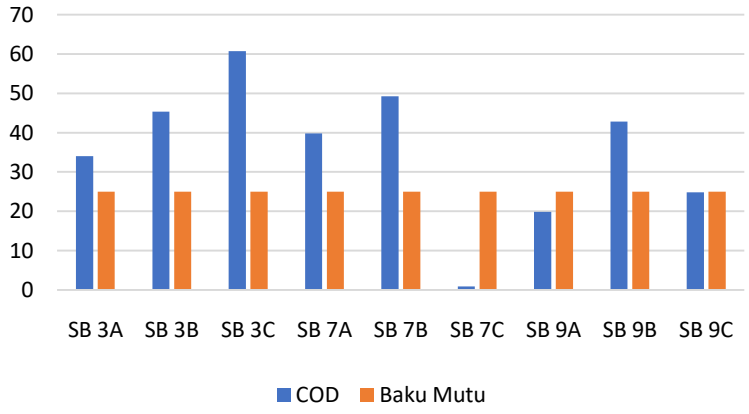

Figure 6 – Graph of COD and standard parameters at 3 x repetitions in the Bengaris River

The graph above shows that the highest COD parameter at 3x repetitions is in the Bengaris 3C River segment with a value of 60.7 mg/L and the lowest in the Bengaris 7C River with a value of 0.90 mg/L.

The DO parameter is still below the quality standard, namely 4 mg/L in the Bengaris 3A-7C River, while the Bengaris 9A- Bengaris 9C River exceeds the quality standard for River water quality. An increase in DO concentration can occur when water undergoes a process of turbulence or re-aeration, where oxygen is transferred from the air into the water.

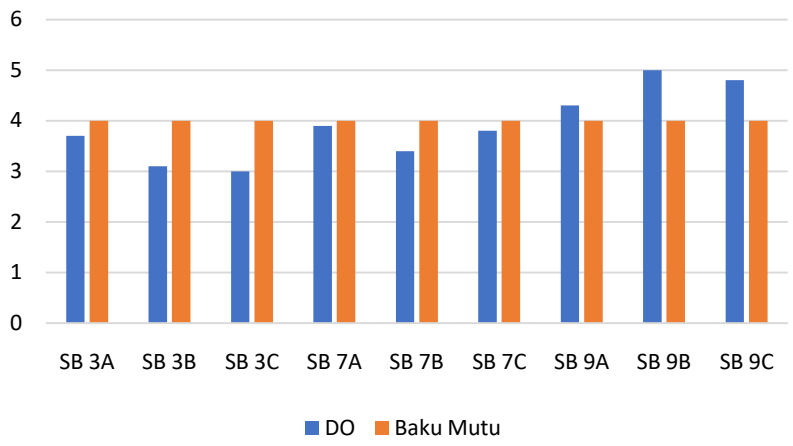

Figure 7 – Graph of DO parameters with 3 repetitions in the Bengaris River

According to (Saily et al., 2019) DO concentration greatly affects the life of living things in the water. However, in the flow process, River water can absorb oxygen from the atmosphere so that it can increase the DO concentration in River water. Oxygen absorbed into the water becomes a raw material in the decomposition process of organic compounds.

CONCLUSION

Analysis of the distribution of detergent and phosphate on the status of water quality in the Bengaris River, North Barito Regency, Central Kalimantan, namely the potential for pollution of the Bengaris River water mainly comes from domestic wastewater discharge which can be represented by several phosphate parameters. Status of water quality in the Bengaris River using the pollution index obtained results that meet the Quality Standard (Good Condition) 1 segment, 5 segments of light pollution conditions and 3 segments of moderate pollution.

REFERENCES

1. Andriani, DLD (2020). Effect of Detergent Waste Pollution on Aquatic Ecosystems. Indonesian Journal of Science Learning, 2 (2), 8–25.
2. Kurniawan, S., Novarini, Yuliwati, E., Ariyanto, E., Morsin, M., Sanudin, R., & Nafisah, S. (2021). Greywater treatment technologies for aquaculture safety: Review. Journal of King Saud University - Engineering Sciences. https://doi.org/10.1016/j.jksues.2021.03.014
3. Saily, R., Fauzi, M., & Suprayogi, I. (2019). Wasp Model Approach on River Pollution Control With Cod Test Parameters. Indonesian Journal of Construction Engineering and Sustainable Development (Cesd), 2 (1), 13–21.
4. Sapaty, MJ (2013). Domestic Wastewater Management Using Ecological Concepts in Tallo River Settlements, Makassar City (Case of Sengka Batu Village, Buloa Village) (Vol. 53, Issue 4, p. 130).
5. Selambakkannu, S., Othman, NAF, Bakar, KA, Thailan, KM, & Karim, Z. (2020). Degradation of surfactants from domestic laundry effluent by electron beam irradiation. Materials Today: Proceedings, 46, 1807–1812. https://doi.org/10.1016/j.matpr.2020.10.061
6. Sutamihardja, R., Azizah, M., & Hardini, Y. (2018). Study of the Dynamics of Phosphate Compounds in the Water Quality of the Upper Ciliwung River, Bogor City. Journal of Natural Science, 8 (1), 43. https://doi.org/10.31938/jsn.v8i1.114
7. Yudo, S. (2018). Water Quality Conditions of the Ciliwung River in the DKI Jakarta Region in View of Organic, Ammonia, Phosphate, Detergent and Coli Bacteria Parameters. Journal of Air Indonesia, 6 (1). https://doi.org/10.29122/jai.v6i1.2452