**EnviroUS**
Vol. 5, No. 2, Maret, 2025, pp. 1-7
Halaman Beranda Jurnal: http://envirous.upnjatim.ac.id/
e-ISSN 2777-1032 p-ISSN 2777-1040

# The Pollutant Index (IP) Method for Determining Water Quality Status in the Tambak Oso River Gunung Anyar

Ahmad Abiyu Aji, Abdillah Akmal Karami, Shinfi Wazna Auvaria, Sulistiya Nengse, and Yanfa Dzulfiqar Auliansyah

[1] Environmental Engineering Study Program, Sunan Ampel State Islamic University Surabaya

Email Korespondensi (Penulis): akmalkarami123@gmail.com

**Diterima:** 18-01-2025
**Disetujui:** 10-03-2025
**Diterbitkan:** 31-03-2025

**Kata Kunci:**
Indeks Pencemar, Kualitas Air, Sungai Tambak Oso

**ABSTRAK**

Penelitian ini bertujuan untuk mengevaluasi kualitas air Sungai Tambak Oso saat ini dan mengusulkan rencana pengelolaan pencemaran. Dengan menggunakan purposive sampling, sampel air diambil dari empat lokasi, dan metode Indeks Pencemaran (IP) diterapkan, mengikuti Keputusan Menteri Lingkungan Hidup No. 115/2003. Enam parameter dianalisis: suhu, Total Suspended Solids (TSS), pH, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), dan Total Dissolved Solids (TDS) untuk menilai kualitas air. Temuan tersebut mengungkapkan bahwa kualitas air di stasiun pengambilan sampel dikategorikan terkontaminasi ringan, dengan nilai Indeks Pencemaran sebesar 3,3. Studi ini menekankan perlunya keterlibatan masyarakat dalam pengelolaan sungai dan peningkatan operasi instalasi pengolahan air limbah. Pemantauan rutin dan mengidentifikasi sumber pencemaran sangat penting untuk pengendalian pencemaran yang efektif dan menjaga kesehatan sungai.

***Received:*** *18-01-2025*
***Accepted:*** *10-03-2025*
***Published:*** *31-03-2025*

***Keywords:***
*Tambak Oso River; The Pollutant Index; Water Quality*

***ABSTRACT***

*The research aims to evaluate the current water quality of the Tambak Oso River and propose a pollution management plan. Using purposive sampling, water samples were collected from four locations, and the Pollution Index (IP) method was applied, following the Decree of the Minister of Environment No. 115/2003. Six parameters were analyzed: temperature, Total Suspended Solids (TSS), pH, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), and Total Dissolved Solids (TDS) to assess water quality. The findings revealed that the water quality at the sampling stations is categorized as lightly contaminated, with a Pollution Index value of 3.3. The study emphasizes the need for community involvement in river management and improving wastewater treatment plant operations. Regular monitoring and identifying pollution sources are essential for effective pollution control and maintaining the river's health.*

## 1. INTRODUCTION

Water is an abundant natural resource on earth and is a basic need for human life (Karami & Oktorina, 2024). One of the important sources of water to meet human needs is the river. The water that comes from river springs is of very good quality. However, as long as the river flows across various areas such as agriculture, settlements, and industry, river water can be exposed to various types of pollutants. Increased activity in these various sectors can have a negative impact on river water quality. A decrease in river water quality occurs when the water does not meet the standards for use according to the needs and functions of the water (Sofia, 2010). Unfortunately, it is currently difficult to prevent waste disposal activities into rivers by the community due to a lack of awareness of the impact if the waste accumulates in water bodies (Oktorina et al., 2023). This results in a decrease in river water quality, including a decrease in storage capacity, carrying capacity, usability, productivity, and richness of water resources. As a result, these natural resources cannot be used directly and require special treatment so that the water can be reused.

Rivers can generally be categorized according to their water quality status. Water quality refers to how clean or dirty water is. It tells us if the water is good to use or if it is polluted. Think of it like checking if the water is safe to drink or swim in. According to the Decree of the Minister of Environment No. 115 of 2003 concerning Guidelines for Determining the Status of Water Quality, It helps people understand how to check if water is clean or polluted. They tell us how to compare the water we have now with the water quality standards. Standards are like rules that say how clean water should be.To know if water is clean or polluted, we compare it to these standards. The river is the most widely used source of water and is used

by humans for the necessities of life. Rivers play an important role in fulfilling various household needs such as toilets, environmental sanitation, agriculture such as for irrigating rice fields, industry such as industrial raw materials that allow the use of water in large quantities, tourism such as beautiful natural water tourism, water transportation facilities such as boats and so on, fisheries such as making fish ponds, power plants such as hydroelectric power plants which besides being environmentally friendly also come from nature, flood dealers such as making reservoirs, and as a habitat for flora and fauna ecosystems so they can survive.

The Tambak Oso River is one of the rivers in Surabaya and forms the boundary between Surabaya City and Sidoarjo Regency. The Tambak Oso River is located in Gunung Anyar District which is one of the sub-districts in the city of Surabaya. The Tambak Oso River starts from the Sier industrial area and ends in the Gunung Anyar mangrove area. The Tambak Oso River is a class II river whose designation can be used as infrastructure/facilities for water recreation, freshwater fish cultivation, animal husbandry, water for irrigating plantations, and/or other uses that require the same quality of water as those uses. Research conducted by (Islami et al., 2017) on the Tambak Oso River, showed that the Tambak Oso River was polluted. Research conducted (2) on the Tambak Oso River shows that the Tambak Oso River has been polluted. Heavy metal levels in tilapia fish in the Tambak Oso River, Waru District, Sidoarjo Regency, range from 0.027-0.041 ppm for the heavy metal Pb content and range from 0.0013-0.027 ppm for the heavy metal Cd content. Tilapia fish in the Tambak Oso River, Waru District, Sidoarjo Regency is still suitable for consumption because it is still subject to quality standards based on SNI 7387:2009, the maximum limit for heavy metal contamination in food. Apart from that, the area around the Tambak Oso River is dominated by residential, agricultural and industrial areas so there is the potential for contamination of river water quality originating from household waste in the corresponding area, the use of chemicals in agricultural areas, as well as from various industries whose waste flows straight into the river (Rohmawati & Kuntjoro, 2021). In this research, Tambak Oso River water quality will be tested on the parameters of temperature, TDS, TSS, DO, BOD and pH.

One of the main advantages of this method is its ability to simplify complex data into one representative number, making it easier for the public and decision makers to understand (Romdania et al., 2018). This is especially important in the context of water resources management, where informed decisions are needed to maintain environmental quality (Annisa et al., 2022). The IP method has also been shown to be effective in various studies showing pollution status in various locations. For example, research in Wrati River (Karami & Titah, 2024), Angke River (Oktavia et al., 2018) and Donan River (Mukti et al., 2021) shows that this method can be used to identify pollution levels and provide a clear picture of water quality based on physical and chemical parameters.

Based on this, the background for testing the water quality analysis of the Tambak Oso River uses the pollutant index (IP) method. Pollutant Index (IP) is a numerical value used to assess and indicate the level of contamination or pollution in a particular area or environment. It provides a quantitative measure of pollutant concentration in the water being evaluated. The index is calculated based on the levels of various pollutants present in the sample and is often standardized for easy comparison and interpretation. Based on this condition, it is necessary to measure using the water quality standards that have been stipulated in the Government Regulation of the Republic of Indonesia No. 22 of 2021 concerning the Implementation of Environmental Protection and Management, as well as testing the status of water quality and measuring the quality of river water using the Pollution Index Method.

## 2. METHOD

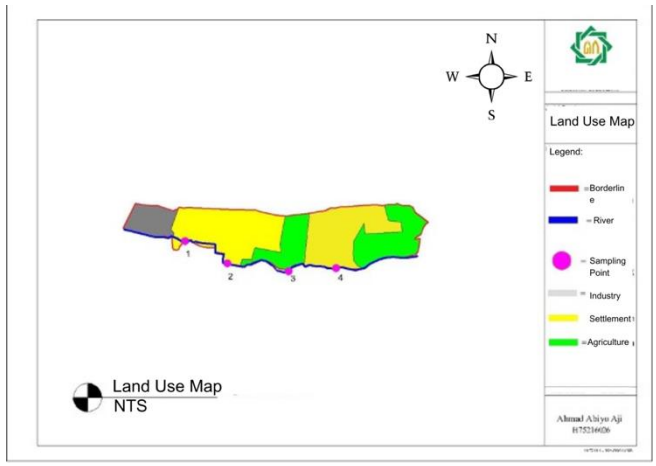


**Figure 1.** Research Location

This research is a qualitative and quantitative descriptive research using observational data collection methods and document recording. This research was conducted to determine the analysis of determining the status of water quality using the Pollution Index (IP) Method in the Tambak Oso river, Gunung Anyar District, Surabaya. then analyzed and studied based on literature studies. Furthermore, from the analysis and discussion, conclusions and suggestions for further research can be drawn. The research was carried out (Figure 1) in the waters of the Tambak Oso River in Gunung Anyar District, Surabaya City, East Java Province, the coordinates of the sampling locations will be presented in Table 1.

**Table 1.** Sampling Point Location

| Sampling Point | Area | Coordinates |
|---|---|---|
| 1 | Industry | 7°20'11.2"S 112°45'17.9"E |
| 2 | Settlement | 7°20'18.2"S 112°45'59.4"E |
| 3 | Settlement and Agriculture | 7°20'43.6"S 112°47'02.6"E |
| 4 | Settlement and Agriculture | 7°20'45.0"S 112°48'16.1"E |

In this study, six key parameters were meticulously observed and measured to assess the water and waste quality of the Tambak Oso River. This evaluation was conducted in accordance with the Indonesian National Standard (SNI) methods, as mandated by Government Regulation No. 22 of 2021, each method is Temperature (SNI 06.6989.23-2005), pH (SNI 06.6989.11-2004), DO (tool manual), BOD (SNI

6989.72-2009), TSS (SNI 06- 6989.3-2004), and TDS (Sni 6898.27-2019). The sampling of these parameters was strategically carried out during the daytime, with each measurement repeated twice to ensure accuracy and reliability. The analysis of the water quality was conducted using the pollution index method, as specified in the Decree of the Minister of Environment No. 115/2003 Appendix II. This method was employed to determine the level of river pollution, utilizing a specific formula designed for this purpose. the following formula for determining the level of river pollution using:

$$PI_j = \sqrt{\frac{(C_i/L_i)_M^2 + (C_i/L_{ij})_R^2}{2}} \quad (1)$$

Where:
PIj = pollution index for designation j
Ci = concentration of water quality parameter i
Lij = concentration of water quality parameter i which listed in the water allotment standard j
M = Maximum
R = Average

The assessment of water quality is based on calculating both the maximum and average values of the concentration ratio for each parameter in relation to the established quality standard. This approach helps in determining the overall water quality status. Additionally, there are four distinct classes of pollution indices, which are outlined in Table 2, to categorize the level of pollution in the water.

**Table 2.** Classification of Water Quality Status Based on Pollution Index (IP)

| No. | Pollution Index Score (IP) | Description |
|---|---|---|
| 1 | $0 \leq PI_j \leq 1{,}0$ | Good |
| 2 | $1{,}0 < PIj \leq 5{,}0$ | Slightly Polluted |
| 3 | $5{,}0 < PIj \leq 10$ | Fairly Polluted |
| 4 | $PIj > 10$ | Heavily Polluted |

Source: *Minister of Environment Decree 115/2003*

## 3. RESULT AND DISCUSSION

The results of monitoring carried out in the Tambak Oso River used the parameters of water quality pollutants reviewed in this study, namely temperature, TSS, pH, DO, BOD, and TDS. These parameters are then compared with Government Regulation Number 22 of 2021 concerning Management of Water Quality and Control of Water Pollution in order to further determine the quality of river water based on the Pollution Index method. Water sampling activities were carried out in July 2023. The results of the assessment of each parameter can be seen in Figure 2 – Figure 7.

### 3.1 Temperature

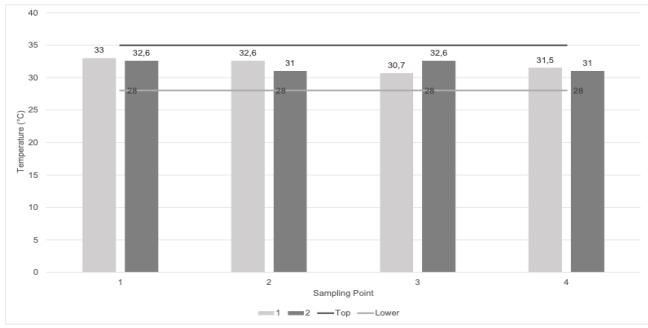


**Figure 2.** Temperature

From Figure 2 it can be seen that the temperature values at sampling point 1 are 33°C and 32.6°C, at sampling point 2 are 32.6°C and 31°C, at sampling point 3 are 30.7°C and 32.6°C, at sampling point 4 are 31.5°C and 31°C. According to Government Regulation no. 22 of 2021, the quality standard for class II temperature parameters is deviation 3 with a value range of 28°C to 35°C. Temperature is an important factor for aquatic biota. This is because the breeding and metabolism of biota in the river is affected by temperature. Changing temperatures can affect the activity of river biota. The high and low temperature of river water is influenced by the conditions around the river. If the river is open, the intensity of exposure to sunlight will be higher, causing the water temperature to increase (Kurnianto, 2019). The temperature of a river can be influenced by the season or weather, the interaction process between air and water, cloud conditions, wind gusts, and the geographical location of a river (Awalliyah et al., 2021)

### 3.2 TDS

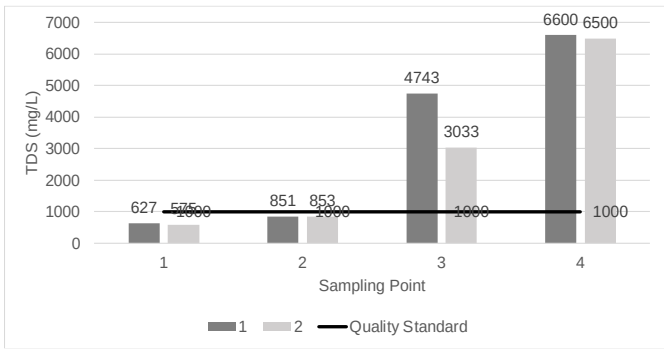


**Figure 3.** TDS

From Figure 3 it can be seen that the TDS values at sampling point 1 were 627 mg/l and 575 mg/l, at sampling point 2 were 851 mg/l and 853 mg/l, and at sampling point 3 were 4743 mg/l and 3033 mg/l, and at sampling point 4 were 6600 mg/l and 6500 mg/l. For the results of point 3 there are 2 different results because they are done in different places. Experiment 1 was carried out in an area where there was no water hyacinth, then experiment 2 was carried out in an area where there was water hyacinth. This causes TDS to decrease significantly because there is a tendency for TDS to be absorbed by water hyacinth according to (Purwati et al., 2021). According to Government Regulation no. 22 of 2021, the quality standard for the TDS parameter in class II rivers is 1000 mg/l. Based on the graph above, the measurement of the TDS parameter in the Tambak Oso River at each location has

a value below a predetermined quality standard. The highest TDS value is located at point 4. This is because at that point it is close to a densely populated area. The high TDS value comes from the overflow of household waste, agricultural and industrial waste. The higher the TDS value, the higher the turbidity (Nurjanah, 2018).

### 3.3 TSS

Figure 4 shows that the TSS value at sampling point 1 is 144 mg/L and 132 mg/L, at sampling point 2 is 220 mg/l and 210 mg/L, and at sampling point 3 is 264 mg/l and 338 mg/L, and at sampling point 4 is 414 mg/L and 352 mg/L. According to Government Regulation no. 22 of 2021, the quality standard for TSS parameters in class II rivers is 50 mg/l. Measurements were taken during the day. From the graph above, the TSS value in samples taken during the day at all TSS value points exceeds the quality standard. This is because the determination of the sampling points represents residential and industrial areas which are the largest contributors to domestic and industrial waste. Another thing that causes a high TSS value is caused by the weather. Where, 1 day before the sampling was carried out it had rained. According to (Nurjanah, 2018), samples taken during the rainy season can affect TSS concentrations. This is because during the rainy season soil erosion is very easy to occur so that the TSS content can increase. The high content of TSS can cause turbidity then photosynthesis will be disrupted due to inhibition of light penetration into the water. The elevated Total Suspended Solids (TSS) levels in the Tambak Oso River can be attributed to the impact of human activities in the surrounding regions, including residential and agricultural sectors. These areas are known to contribute organic materials to the river, as highlighted by (Rosarina & Laksanawati, 2018). The correlation between the high value and water temperature parameters in the river is significant, as evidenced by the positive relationship between river water temperature and Total Suspended Solid concentration in surface water bodies (Marlina et al., 2017).

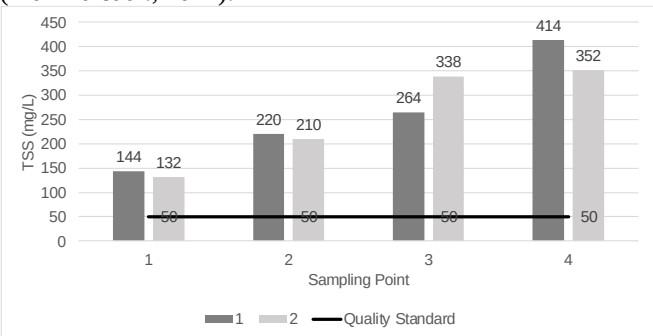


**Figure 4.** TSS

### 3.4 DO

Figure 5 shows that the DO values at sampling point 1 were 5.87 mg/L and 4.75 mg/L, at sampling point 2 were 5.08 mg/L and 4.09 mg/L, and at sampling point 3 were 4.13 mg/L and 4.06 mg/L, and at sampling point 4 were 3.83 mg/L and 4.04 mg/L. Based on the graph above, all DO parameters at each point are still above the quality standard specified in (SNI 06-6989.14, 2004) except point 4 in experiment 1. DO concentration is in the range of 3.83 mg/L – 5.87 mg/L.

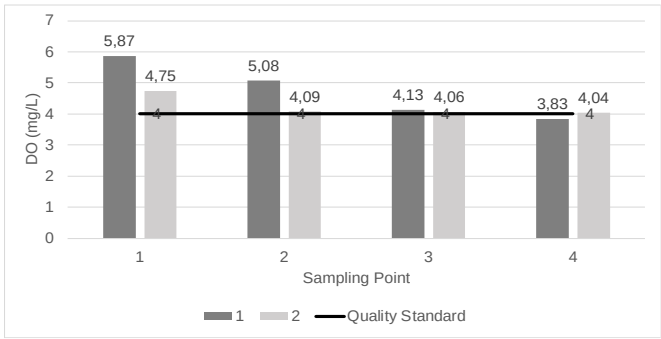


**Figure 5.** DO

The highest DO was found at sampling point 1 with a value of 5.87 mg/L. Dissolved oxygen is useful for decomposing organic matter. The higher the organic matter content, the more dissolved oxygen is needed. In other words, the higher the DO value, the less dirty the river is. The high DO level at point 1 is because the pollutant sources at that point are still small. Whereas at points 2 and 3 there was a decrease in DO levels due to the addition of pollutant sources originating from industry and household waste. The deeper the water, the lower the oxygen level. This is due to the lack of light intensity that enters the water which can result in decreased phosphosynthesis of aquatic biota (Kurnianto, 2019). Organic or inorganic solids that settle on the riverbed can trigger low DO concentrations. In addition, floating materials in the form of suspensions can also process the photosynthesis of aquatic plants. DO levels (Astuti & Lismining, 2018).

### 3.5 BOD

Figure 6 shows that the BOD values at sampling point 1 are 5.07 mg/L and 4 mg/L, at sampling point 2 are 4.24 mg/L and 2.88 mg/L, and at sampling point 3 are 3.35 mg/L and 3.17, and at sampling point 4 are 2.99 mg/L and 3.09 mg/L. Based on the graph above, the BOD parameter is still above the quality standard specified in (SNI 6889.72, 2009). The quality standard for class II for the BOD parameter is 3 mg/L. In this study, the highest BOD was found at sampling point 1 with a value of 5.07 mg/L. The high BOD value is caused by the large amount of organic waste originating from settlements and industrial waste (Akmal et al., 2022). The higher the BOD level, the higher the activity of organisms to decompose organic matter in the water. The high BOD value is also due to run off when the weather is rainy so that the organic matter in the water increases. The presence of domestic waste generated from household activities causes the water to become dirty, turbid, causing the oxygen content in the water to decrease (Aminulloh, 2022). The elevated biochemical oxygen demand (BOD) observed during the rainy season can be attributed to several factors. Firstly, the deteriorated water quality characterized by dirtiness and turbidity contributes to the increased BOD levels. Additionally, the discharge of domestic waste from household activities further exacerbates the BOD levels. Lastly, the presence of microbes, known to consume oxygen, in large water bodies also plays a role in the observed BOD increase (Bahagia et al., 2020).

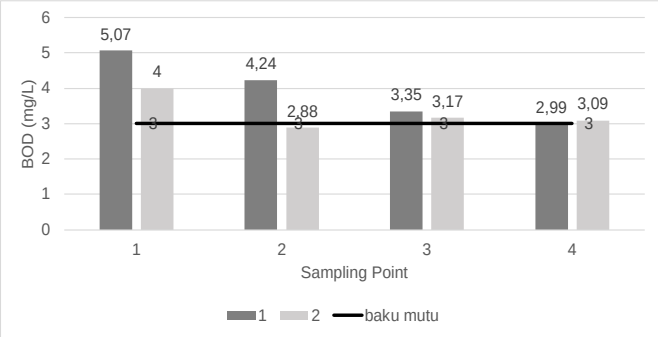


**Figure 6.** BOD

### 3.6 pH

Figure 7 shows that the pH value at sampling point 1 is 7.8 and 7.7, at sampling point 2 is 7.2 and 7.3, and at sampling point 3 is 7.4 and 6.5, and at sampling point 4 is 7.1 and 7.2. Based on the graph above, the pH parameter is still above the quality standard specified in (SNI 06-6989.11, 2004). The highest pH is at sampling point 1 with a value of 7.8. This resulted in the Tambak Oso river having an alkaline nature. According to (Aminulloh, 2022), if the pH value is higher, the alkalinity value will also be higher, while the lower pH value will cause the river to have corrosive acid properties. The cause of the high pH value is the existence of residential areas near the river. Disposal of waste from household activities such as water used for washing dishes into rivers can result in high pH values (Nasution & Afdal, 2016). The high pH value in the Tambak Oso River is caused by the presence of settlements around the river. Liquid waste in the form of water used for washing clothes and washing dishes which affects the pH value. This is because detergents contain dedocyl benzene sulfonate which has alkaline properties and can increase the pH value.

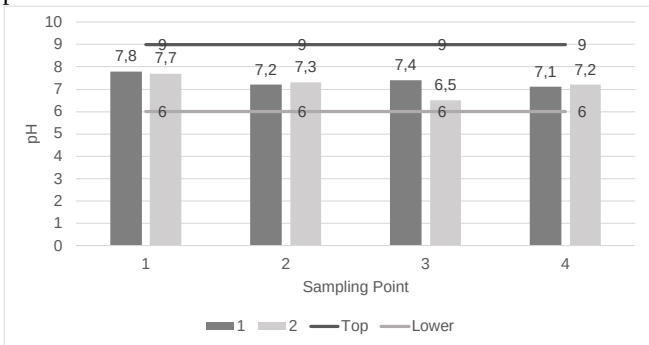


**Figure 7.** pH

### 3.7. Analysis of Water Quality Status Using the Pollutant Index Method (IP)

From Table 3, it is obtained that the largest pollutant index value occurs at sampling point 4 with a value of 4.08 which is categorized as slightly polluted and the smallest value occurs at sampling point 1 with a value of 4.08 which is categorized as slightly polluted. The average pollutant index value in the Tambak Oso River is 3.3 and is categorized as slightly polluted. It is known that all location points are indicated to be slightly polluted, where the TSS parameter plays a major role in determining the level of pollution, this is evident from the pollutant index score from TSS which is the largest at all points. This is because at sampling points 3 and 4, Gunung Anyar Village and Tambak Oso have poor sanitation and industrial waste. At the same sampling point, 2 Wadungasri Villages have poor sanitation and residents' activities that cause the TSS parameter to be high.

Table 3 based on Minister of Environment No. 115 of 2003 concerning guidelines for Determining Water Quality Status based on pollution index shows that at sampling points 1 – 4 the water quality status is lightly polluted, with the highest pollution index value found at point 4. Point 4 is a densely populated residential location that has the possibility of river water experiencing mild pollution. Lightly polluted river refers to the condition of the river where the level of water pollution in the river is still in the low or mild category. This means that there are very few contaminants or harmful substances that enter the river which can disrupt the balance of aquatic ecosystems and water quality. Light pollution can occur due to several factors, such as little or no domestic waste that has gone through processing before being discharged into rivers, well-controlled agricultural use, and industrial activities that have implemented environmentally friendly practices and effective waste management (Karami & Auvaria, 2023). Even though the level of river water pollution is relatively mild, proper monitoring and management is still needed to maintain the sustainability of water quality and river ecosystems.

This aims to prevent an increase in the level of pollution and ensure that rivers continue to function as habitats for various forms of life, sources of safe water, and support human life and economic activities that depend on water resources (Febrita, 2023). Therefore, efforts and control strategies are needed to reduce pollution in the Tambak Oso River. Control efforts that can be carried out at this location are (Sari & Wijaya, 2019) The first step in reducing pollution in river involves actively engaging the community in managing the river environment. This means that local residents should be encouraged to participate in efforts to keep the river clean and to understand the impact of their actions on the river's health. Public awareness campaigns are crucial, especially in densely populated areas, to educate people about the importance of managing household waste responsibly and avoiding the disposal of garbage into the river. By fostering a sense of community responsibility, the pollution load on the river can be significantly reduced (Aminulloh, 2022).

In addition to community involvement, the management of wastewater treatment plants (WWTPs) needs to be improved. This involves not only enhancing the technical efficiency of these plants but also involving the community in their management. By doing so, the waste produced by both industry and the general public can be treated more effectively, ensuring that it does not harm the Tambak Oso River or the surrounding environment, For densely populated settlements, public awareness is needed in managing household waste and not throwing garbage in the Tambak Oso River body (Shofi et al., 2023). Another critical aspect of the strategy is increasing law enforcement against industries and other actors who pollute the river. This requires cooperation between the community and authorities to monitor industrial activities and ensure compliance with environmental regulations. If industries are found to be disposing of waste directly into the river, strict legal sanctions should be imposed to deter such behavior. This legal framework is essential to protect the river

from industrial pollution. Routine monitoring of river water quality and mapping potential pollutant sources are also necessary. By regularly assessing the river's condition and identifying sources of pollution, authorities can quickly address any issues that arise, preventing further degradation of the river's health.

**Table 3** Results of Water Quality Status Pollution Index Method

| No | Location | IP | Description |
|---|---|---|---|
| 1 | Sampling Point 1 | 2,38 | Slightly Polluted |
| 2 | Sampling Point 2 | 3,05 | Slightly Polluted |
| 3 | Sampling Point 3 | 3,67 | Slightly Polluted |
| 4 | Sampling Point 4 | 4,08 | Slightly Polluted |
| Average | | 3,3 | Slightly Polluted |

## 4. CONCLUSION

Based on the results of the research above, it can be concluded that there are 2 parameters that have exceeded the applicable quality standards, namely PP No. 22 of 2021 for class II, namely DO, TSS and TDS. This causes the use of the Tambak Oso River to be inappropriate as a Class II River which functions as livestock, fish farming, water recreation infrastructure, and drainage for parks. Based on the results of the analysis, the water quality status value obtained from the Pollutant Index Method is "Sightly Polluted". Need for pollution control strategies to protect the Tambak Oso River, involving community participation in river management and stricter law enforcement against polluting industries. It also highlights the importance of regular monitoring of water quality, effective WWTP management, and public awareness to prevent further harm to the river and surrounding environment.

## DAFTAR PUSTAKA


Akmal, A., Munfarida, I., Auvaria, S. W., & Negoro, Y. T. (2022). Studi Model Domenico-Robbins dan Ogata-Banks Terhadap Pola Persebaran Lindi di TPA Ngipik Kabupaten Gresik. Al-Ard: Jurnal Teknik Lingkungan, 7(2), Article 2.

Aminulloh, M. F. (2022). Perbandingan status mutu air dengan menggunakan metode indeks pencemaran, STORET, CCMEWQI, dan BCWQI di Kali Surabaya segmen Karang Pilang [Undergraduate, UIN Sunan Ampel Surabaya]. http://digilib.uinsa.ac.id/54044/

Annisa, N. A. N., Hakim, A., & Setyowati, R. D. N. (2022). Analisis status mutu air Sungai Mahakam Kota Samarinda menggunakan metode indeks pencemaran. Jurnal Serambi Engineering, 7(4). https://ojs.serambimekkah.ac.id/index.php/jse/article/view/5106

Astuti, Y., & Lismining, P. (2018). Respon Oksigen Terlarut Terhadap Pencemaran dan Pengaruhnya Terhadap Keberadaan Sumber Daya Ikan di Sungai Citarum Dissolved Oxygen Response Againts Pollution and The Influence of Fish Resources Existence in Citarum River. Jurnal Teknologi Lingkungan, 19(2), 203.

Awalliyah, T., Ghitarina, G., & Suryana, I. (2021). Indeks Pencemaran Perairan Pangempang Kecamatan Muara Badak Kabupaten Kutai Kartanegarai. Jurnal Aquarine, 6(1 Mar), 47.

Bahagia, B., Suhendrayatna, S., & Ak, Z. (2020). Analisis tingkat pencemaran air sungai Krueng Tamiang terhadap COD, BOD dan TSS. Jurnal Serambi Engineering, 5(3).

Febrita, J. (2023). Pengaruh Tata Guna Lahan terhadap Kualitas Air Sungai Cisadane di Kota Bogor. Jurnal Teknik Sipil Dan Lingkungan, 8(1), 9–18.

Islami, N., Gayatri, Y., & Wikanta, W. (2017). Analisis Kadar Logam Berat Timbal (Pb) Dan Cadmium (Cd) Pada Ikan Mujair (Oreochromis Mossambicus) Di Sungai Tambak Oso Kecamatan Waru Kabupaten Sidoarjo Dan Implementasinya Sebagai Bahan Ajar Materi Pencemaran Lingkungan Di SMA [PhD Thesis]. Universitas Muhammadiyah Surabaya.

Karami, A. A., & Auvaria, S. W. (2023). Penilaian Teknis Tempat Pengelolaan Sampah di TPST Taman Kabupaten Sidoarjo Jawa Timur. Jurnal Serambi Engineering, 8(3).

Karami, A. A., & Oktorina, S. (2024). Food Safety Analysis Based on Halal Food with The Use of Water as a Food Need in Indonesia. Proceedings of International Conference on Halal Food and Health Nutrition, 2(1), 13–21.

Karami, A. A., & Titah, H. S. (2024). Penentuan Status Mutu Air Sungai Wrati Pasuruan Jawa Timur dengan Indeks Kualitas Air. Jurnal Serambi Engineering, 9(1), 7774–7780.

Kurnianto, A. (2019). Analisis Kualitas Air Sungai Kalimas Kota Surabaya Menggunakan Metode Indeks Pencemaran. Jurnal Ekonomi, 18, 1–73.

Marlina, N., Hudori, H., & Hafidh, R. (2017). Pengaruh Kekasaran Saluran dan Suhu Air Sungai pada Parameter Kualitas Air COD, TSS di Sungai Winongo Menggunakan Software QUAL2Kw. Jurnal Sains & Teknologi Lingkungan, 9(2), 122–133.

Mukti, G. T., Prayogo, T. B., & Haribowo, R. (2021). Studi Penentuan Status Mutu Air dengan Menggunakan Metode Indeks Pencemaran dan Metode Water Quality Index (WQI) Di Sungai Donan Cilacap, Jawa Tengah. Jurnal Teknologi Dan Rekayasa Sumber Daya Air, 1(1), 238–251.

Nasution, F. D., & Afdal, A. (2016). Profil Pencemaran Air Sungai di Muara Batang Arau Kota Padang dari Tinjauan Fisis dan Kimia. Jurnal Fisika Unand, 5(1), 1–6.

Nurjanah, P. (2018). Analisis Pengaruh Curah Hujan Terhadap Kualitas Air Parameter Mikrobiologi dan Status Mutu Air di Sungai Code, Yogyakarta.

Oktavia, S. R., Effendi, H., & Hariyadi, S. (2018). Status mutu air Kali Angke di Bogor, Tangerang, dan Jakarta. Jurnal Pengelolaan Lingkungan Berkelanjutan (Journal of Environmental Sustainability Management), 220–234.

Oktorina, S., Sudanawati, I., & Karami, A. (2023). Analisis Faktor Pengelolaan Sampah Sebagai Upaya Penanggulangan Banjir di Desa Leu dan Tambe Kabupaten Bima. HIGIENE: Jurnal Kesehatan Lingkungan, 9(1), 36–41.

Purwati, M. I., Pratiwi, F. D., & Nugraha, M. A. (2021). Potensi Eceng Gondok (Eichhornia crassipes) Sebagai

Fitoremediator Limbah Cair Industri Tahu Skala Rumah Tangga. Journal of Tropical Marine Science, 4(2), 73–78.

Rohmawati, Y., & Kuntjoro, S. (2021). Studi Kadar Logam Berat Kadmium (Cd) Pada Tumbuhan Air di Sungai Buntung Sidoarjo. LenteraBio: Berkala Ilmiah Biologi, 10(1), 86–93.

Romdania, Y., Herison, A., & Susilo, G. E. (2018). Kajian penggunaan metode IP, Storet, dan CCME WQI dalam menentukan status kualitas air. Jurnal Spatial, 18(1), 1–13.

Rosarina, D., & Laksanawati, E. K. (2018). Studi Kualitas Air Sungai Cisadane Kota Tangerang Ditinjau Dari Parameter Fisika. Jurnal Redoks, 3(2), 38–43.

Sari, E. K., & Wijaya, O. E. (2019). Penentuan status mutu air dengan metode indeks pencemaran dan strategi pengendalian pencemaran sungai ogan kabupaten Ogan Komering Ulu. Jurnal Ilmu Lingkungan, 17(3), 486–491.

Shofi, N. C., Auvaria, S. W., Nengse, S., & Karami, A. A. (2023). Analisis Aspek Teknis Pengelolaan Sampah di TPS 3R Desa Janti Kecamatan Waru Sidoarjo. Jurnal Teknik Sipil Dan Lingkungan, 8(1), 1–8.

Sofia, Y. (2010). Penelitian pengolahan air sungai yang tercemar oleh bahan organik. Jurnal Sumber Daya Air, 6(2), 145–160.