

# Water quality and management of Citepus River, Bandung, Indonesia

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## Water quality and management of Citepus River, Bandung, Indonesia

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**Abstract.** Citepus River is one of the urban rivers that pass through Bandung City, Indonesia. Visually, the Citepus River water shows relatively poor condition. This study aims to examine the water quality of the Citepus River, the results of which are used to recommend river management efforts. This research was conducted using secondary data obtained from the Bandung City Environmental Agency for the 2018-2020 time duration. Assessment of river water quality is carried out by comparing water quality monitoring results with the applicable quality standards. In addition, indexation was also carried out using the Storet method. The study results show that almost all parameters exceed the Class 2 of maximum water quality standard based on Government Regulation No. 82 of 2001 concerning Water Quality Management and Pollution Control. The results of calculations using the Storet method stated that the water quality in the Citepus River from the upstream segment to the downstream segment was classified as class D, which means heavily polluted, with the highest score in the middle segment at -54 and the lowest score in the upstream segment at -42, while the downstream segment, the score obtained is -52. Based on these results, management efforts can be recommended by determining the capacity, identification and inventory of wastewater sources, determining requirements and procedures for waste disposal, prohibiting waste disposal into rivers, monitoring river water quality, and monitoring wastewater quality.

### 1. Introduction

Water is a resource that must be preserved and maintained in terms of quality and quantity. Water resource potential differences will affect the difference in river water quality and quantity in each region so that the problems that arise related to water resources are also different in management and planning [1].

Rivers have an essential role in society. Human activities such as industrial and household waste cause deterioration in water quality, especially in urban areas [2]. The activities of residents around the river cause the decline in river water quality due to being polluted by various wastes. Pollution that often occurs in rivers can affect the balance of the ecosystem and decrease aquatic biota [3]. Several sources of water pollution in household waste, agriculture, livestock, industrial or other types of waste come from direct use water bodies, such as toilets and water transportation [4]. Pollution in an ecosystem that is high enough will poison the organisms in it. The decline in species diversity can be considered as one of the signs of pollution [5]. Based on Government Regulation Number 22 of 2021 concerning the



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Implementation of Environmental Protection and Management Article 1 paragraph 33, it is explained that a river basin, from now on referred to as a watershed, is a land area unit that is an integral part of the river and its tributaries which function to accommodate, store and drain water.

Citepus Watershed is a sub-watershed of the Upper Citarum Watershed with a drainage area of 23.15 km<sup>2</sup> (2315 Ha). The sub-districts included in this watershed are Sukasari, Sukajadi, Cicendo, Andir, Astana Anyar, Bojongloa Kaler and Bojongloa Kidul sub-districts. Citepus rivers have length 11.25 kilometers ends in Kampung Bojong Citepus, Desa Cakuang Wetan. The Citepus River does not end directly into Citarum River but first enter other rivers such as the Cirangrang River, Cikamanuman River, Cibojong River, which ends directly into Citarum Rivers.

Therefore, some efforts to control pollution have been carried out. The purpose of this study is to examine the parameters that can affect the quality of Citepus River water; the result can be used as recommendations for efforts to manage the water quality of the Citepus River. This study aims to identify the condition of physical, chemical, and biological parameters that can affect water quality in Citepus River and determine the proper effort in managing water quality in Citepus River.

## 2. Methodology

According to government regulation, water quality analysis was carried out by comparing Citepus River water quality data obtained from the Bandung City Environment Service with river water quality standards. Locations of the monitoring point represent upstream, middle stream and downstream segments.

Regulation No. 82 of 2001 concerning Determination of water quality status using the Storet Method according to the Decree of the Minister of the Environment 115 of 2003 concerning Guidelines for Determining the Status of Water Quality in order to see trends in water quality as a whole, water quality management and water pollution control. The way to determine the status of water quality is to use the value from the US-EPA (Environmental Protection Agency) by classifying water quality into four classes, i.e. Grade A: Very good, score = 0 means it meets the quality standard; Grade B: Good, score = -1 to -10 means lightly polluted; Grade C: Medium, score = -11 to -30 means moderately polluted and Grade D: Poor, score -31 means heavily polluted.

Identification of the river quality management was also conducted. The river water improvement efforts were evaluated based on a 3-years calculated Storet Index. The evaluation will show the effectiveness of the activities on river water quality rehabilitation.

## 3. Result and Discussion

### 3.1. Citepus River water quality

Secondary data for the results of research on the water quality of the Citepus River in 2018 to 2020 was obtained from the Bandung City Environmental Service and carried out in 3 segments, i.e. upstream (Jl. Pajajaran), middle (Jl. Kebon Jati), downstream (Jl. Pagarsih).

**Table 1.** Citepus River water quality (2018-2020).

No	Parameter	Units	Water Quality Standard**	Year	Upstream	Middlestream	Downstream
1	pH	-	6-9	2018	7.22	7.68	7.49
				2019	7.55	7.34	7.20
				2020	6.5	6.62	6.49
2	BOD	mg/l	3	2018	26.98*	29.23*	21.63*
				2019	28.97*	37.34*	28.29*
				2020	12.76*	7.68*	14.81*
3	COD	mg/l	25	2018	72.53*	77.52*	60.09*
				2019	122.13*	138.56*	119.44*
				2020	41.17*	24.01*	44.89*

No	Parameter	Units	Water Quality Standard**	Year	Upstream	Middlestream	Downstream
4	Cr(+6)	mg/l	0.05	2018	0.0032	0.0041	0.0032
				2019	0.0038	0.0052	0.0040
				2020	0.0436	0.043	0.0173
5	Nitrite	mg/l	0.06	2018	0.2395*	2.0416*	0.0034
				2019	0.0321	0.0592	0.0168
				2020	16.77*	15.820*	4.5826*
6	Grease	mg/l	1	2018	0.94	0.94	1.00
				2019	0.94	3*	2*
				2020	0.94	0.94	0.94
7	MBAS (Detergent)	mg/l	0.2	2018	0.91*	0.4211*	0.04254*
				2019	0.1795	0.2627*	0.2093*
				2020	0.8982*	0.4446*	0.8066*
8	total p	mg/l	0.2	2018	1.1763*	1.2115*	0.6621*
				2019	0.4219*	0.7258*	0.6122*
				2020	0.2358*	0.3307*	0.1857

\*) above maximum standard

\*\*\*) Class II; river water to be used as irrigation, recreational function, farming

The table above shows the water quality of the Citepus River, most of the water quality parameters of the Citepus River show numbers that exceed the quality standards that have been set for river water quality. The quality standard applied in this study is Government Regulation No. 82 of 2001. From the quality standard that has been set, the classification of river water quality is taken for Class II; namely, water whose designation can be used for water recreation infrastructure/facilities, freshwater fish farming, Livestock, water to irrigate crops, and other uses require the same water quality as those uses.

### 3.2. Citepus River water quality index

The analysis using the Storet Index method was carried out to determine the status of the water quality of the Citepus River in the upstream, middle and downstream areas. The data processing results with the Storet method can be seen in Tables 2, 3 and 4.

**Table 2.** Status of water quality by storet method in the upstream segment of the Citepus River.

No	Parameter	Units	Water Quality Standard	River Water Concentration			Storet Index Total score
			Class II	Maximum	Minimum	Average	
1	pH	-	6-9	7.55	6.5	7.09	0
2	BOD	mg/l	3	28.97*	12.76*	22.9	-10
3	COD	mg/l	25	122.14*	41.17*	78.61	-10
4	Cr(+6)	mg/l	0.05	0.043	0.0032	0.016	0
5	Nitrite	mg/l	0.06	16.77*	0.032	5.682	-4
6	Oil and Grease	mg/l	1	0.94	0.94	0.94	0
7	MBAS detergent	mg/l	0.2	0.91*	0.179	0.663	-8
8	Total Phosphate	mg/l	0.2	1.176*	0.235*	0.611	-10
Score							-42

**Table 3.** Status of water quality by storet method in the middle stream of the Citepus River.

No	Parameter	Units	Water Quality Standard	River Water Concentration			Storet Index Total score
			Class II	Maximum	Minimum	Average	
1	pH	-	6-9	7.68	6.62	7.21	0
2	BOD	mg/l	3	37.34*	7.68*	24.75*	-10
3	COD	mg/l	25	138.56*	24.02*	80.04*	-10
4	Cr(+6)	mg/l	0.05	0.043	0.0041	0.0174	0
5	Nitrite	mg/l	0.06	15.820*	0.059	5.973*	-10
6	Oil and Grease	mg/l	1	3*	0.94	1.63*	-8
7	MBAS detergent	mg/l	0.2	0.445*	0.263*	0.376*	-10
8	Total Phosphate	mg/l	0.2	1.211*	0.331*	0.756*	-6
Score							-54

**Table 4.** Status of water quality by storet method in the downstream segment of the Citepus River.

No	Parameter	Units	Water Quality Standard	River Water Concentration			Storet Index Total score
			Class II	Maximum	Minimum	Average	
1	pH	-	6-9	7.49	6.49	7.06	0
2	BOD	mg/l	3	28.29*	14.81*	21.58*	-10
3	COD	mg/l	25	119.44*	44.89*	74.81*	-10
4	Cr(+6)	mg/l	0.05	0.0173	0.0032	0.0082	0
5	Nitrite	mg/l	0.06	4.5826*	0.0034	1.5243*	-8
6	Oil and Grease	mg/l	1	2*	0.94	1.47*	-8
7	MBAS detergent	mg/l	0.2	0.8066*	0.04254	0.3528*	-8
8	Total Phosphate	mg/l	0.2	0.6621*	0.1857	0.4867*	-8
Score							-52

Table 2, 3 and 4 show that almost all parameters are above the maximum standards. There are only pH and Cr(+6) that meet the standard. Table 5 display the status of the Citepus River water quality.

**Table 5.** Pollution quality of the Citepus River.

Segment	Score	Grade	Information
Upstream	-42	D	Heavily polluted
Middlestream	-54	D	Heavily polluted
Downstream	-52	D	Heavily polluted

The analysis results using the Storet Index method found that overall, from upstream to downstream, the Citepus River had experienced heavy pollution. It can be seen in Table 5 that the lowest score is in the middle segment with a score of -54, and the highest is in the upstream segment with a score of -42; the lower the score indicates the condition of river water quality violates the quality standard. The presence of a low score at the centre of the sampling point indicates that the highest level of pollution occurs in the middle segment [6]. Of all the segments studied, they fall into class D. According to the



US-EPA, which classifies water quality classes, a score of -31 is classified as class D, which means heavily polluted.

Poor river water quality, with a low Storet index score and polluted quality status, is either lightly, moderately or heavily polluted and often found in Indonesia's urban rivers [7]. In addition, other surface waters affected by domestic waste also have poor quality status [8], [9].

### 3.3. Citepus River management

River water quality management is one part of river hydrology restoration [10]. Water quality management is carried out by controlling water pollution by maintaining water functions to meet quality standards [11]. The process of preventing the occurrence of pollution is better than dealing with the pollution that has occurred. Such prevention efforts can be carried out following Indonesian Government Regulation No. 38 of 2011 concerning Rivers, in article 27 it is stated that the prevention of river water pollution can be done through (1) Determination of pollution load capacity; (2) Identification and inventory of sources of wastewater entering rivers; (3) Determination of requirements and procedures for wastewater disposal; (3) Prohibition of dumping waste into rivers; (4) Monitoring river water quality; (5) Supervision of wastewater entering the river.

River water quality management must also be carried out by various parties, namely the government, the private sector, academics and the general public. The participation of all parties will facilitate efforts to rehabilitate the water quality of the Citepus River for the better and restore its functions as determined, i.e. Class II. The river water quality information system is also an essential means of disseminating data on the Citepus River, especially in the information digitalization era [12].

## 4. Conclusion

The results of secondary data research obtained from the Bandung City Environmental Agency from 2018-2020 show that almost all parameters above maximum standard of Class 2 water quality standards based on Government Regulation No. 82 of 2001 and No. 22 of 2021 concerning Water Quality Management and Pollution Control. From the results of the analysis using the Storet Index method, it was found that the Citepus River entered from the upstream segment to the downstream segment into class D, which means heavily polluted, with the highest score in the middle segment of -54 and a score of -54 the lowest was in the upstream segment of -42, while the downstream segment the score obtained was -52. Based on PP No.38/2001, prevention efforts can be carried out by determining the capacity, identification and inventory of wastewater sources, stipulating requirements and procedures for waste disposal, prohibiting waste disposal into rivers, monitoring river water quality, and controlling wastewater.

## References

- [1] Sudarmadji H P and Widyastuti M 2013 *Pengelolaan Sumberdaya Air Terpadu* (Yogyakarta: Gadjah Mada University Press)
- [2] Yustiani Y M, Wahyuni S and Dewi SNF 2019 *International Journal of Geomate* **16(56)** p 118-122
- [3] Yustiani Y M 2016 *Pollution Research* **35(3)** p 475-481
- [4] Baherem B, Suprihatin S and Indrasti N S 2014 *Jurnal Pengelolaan Sumber Daya Alam dan Lingkungan* **4(1)**
- [5] Singh V, Shukla S and Singh A 2021 *Open J Plant Sci* **6(1)** p 011-014
- [6] Amop O, Budiyanto B and Saefuddin R 2019 *Naturalis* **8(1)** p 16-24
- [7] Gannes Cs, and Wisnu W 2021 *Jurnal Teknologi* **14(1)** p 28-38
- [8] Aristawidya M, Hasan Z, Iskandar, Yustiawati and Herawati H 2020 *Limnotek Perairan Darat Tropis di Indonesia* **27(10)** p 27-38
- [9] Asuhadi S and Manan A 2018 *Jurnal Kelautan Nasional* **12(2)** p 109-119
- [10] Yustiani Y M, Hasbiah AW, Matsumoto T and Rachman I 2019 *IOP Conference Series: Earth and Environmental Science* **245** 1 012033

- [11] Pohan D A S, Budiyono, Syafrudin 2016 *Jurnal Ilmu Lingkungan* **14(2)** p 63-71
- [12] Yustiani Y M, Lidya L, Matsumoto T, Rachman I and Komariah I 2017 *International Journal of Engineering and Technology* **9(1)** p 137-142



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