Original Research Article

Water Quality Status OfJatigede Reservoir Sumedang Regency, West Java

ABSTRACT

The function of the capture fisheries sector as a livelihood for residents around Jatigede, it is feared that water quality will decline. Another function of the JatigedeReservoir is to irrigate irrigation canals, control floods, source PLA power, and raw water to serve the people of Sumedang, Indramayu and Cirebon. The intended purpose is to determine the quality of water in the Jatigede Reservoir. This research was carried out in JatigedeReservoir from November 2020 to August 2021, using the survey method. The method of determining the location used a purposive sampling method, carried out at five stations representing Jatigede Reservoir. The water quality parameters used are temperature, pH, dissolved oxygen and brightness. The results of observations of water quality in Jatigede Reservoir with temperatures ranging from 28°C-29°C, pH ranging from 6.67–8.35, dissolved oxygen ranging from 6.8–7.83 mg/l and brightness ranging from 70-93 ,8 cm indicates that the water quality of the Jatigede Reservoir is still categorized into good water quality and is ideal for capture fisheries sector activities in the Jatigede Reservoir. Water quality in Jatigede Reservoir during the research was influenced by the input of river flow in the form of organic and inorganic waste.

Keywords: *water quality, fisheries, Jatigede Reservoir*.

1. INTRODUCTION

Jatigede Reservoir is a reservoir of Jatigede Reservoir located in Sumedang Regency, West Java Province, has an area of ± 4,122 Ha. This reservoir was built by damming the Cimanuk River. In addition, the water source of the Jatigede Reservoir reservoir also comes from the Cialing and Cinambo rivers and several other tributaries. The function of the Jatigede Reservoir is to irrigate 90,000 ha of irrigation canals, control an area of 14,000 ha of floods and a hydroelectric power source capable of generating electricity of 690 GWh/year with a capacity of 110 MW, and other functions of the Jatigede Reservoir are the tourism and capture fisheries sectors. Andani et al. 2017). According to Herawati et al. (2020) Jatigede Reservoir water quality was optimum for fish growth. Changes in water quality can come from the high content of sediment originating from erosion, agricultural activities, and other activities, organic waste from humans, animals and plants, and the speed of increase in chemical compounds originating from industrial activities that dump their waste into the waters (Syamiazi 2015). .

The increasing population around the Jatigede Reservoir is one of the most worrying things because the activities of the surrounding community often cause pollution in the waters (Suharto et al. 2019). Utilization of the Jatigede Reservoir is very diverse so that the quality of the reservoir waters needs to be considered. One of the impacts caused by the activities of the community around the reservoir is domestic waste and agricultural waste carried by the river. The input of domestic and agricultural waste will worsen reservoir sediment conditions (Harsono 2009). Domestic waste is waste that comes from the daily activities of the surrounding community related to the use of water. One of them is the disposal of household waste such as detergent. And agricultural waste in the form of fertilizer residue contains a lot of nitrate and

phosphate elements (Septiningsih et al. 2021). Waste originating from within is organic and inorganic material from the decay of agricultural land, plantations, forests, settlements, ponds, at the bottom of submerged waters and the results of the decomposition process (Herawati et al. 2020).

In addition, around the waters of the Jatigede Reservoir, fish farming activities using floating nets cause environmental conditions to decrease greatly, so that it can disrupt the life of natural biota and even further reduce the diversity of biota such as fish and other organisms in the reservoir (Sukimin 2000). As a place for the capture fisheries sector and floating net cage aquaculture activities, it should have certain natural facilities, especially sufficient water supplies, with appropriate water quality (Bardach et al. 1972 in Riyadi et al. 2006). This is intended with the aim of seeing the quality of the Jatigede Reservoir in general.

2. METHODOLOGY

The research was conducted from November 2020 to August 2021. The method used in determining the stations was carried out by the survey method. The method used in sampling is a purposive sampling method. The research locations were determined based on five stations based on the input of river water flowing through the Jatigede Reservoir, as follows:

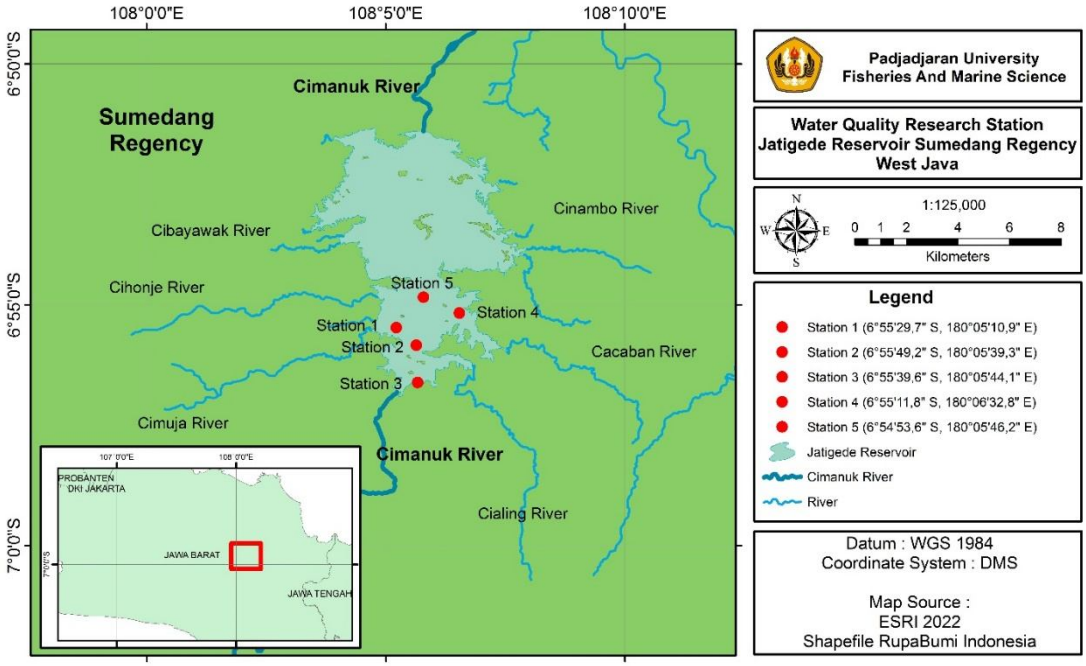

Figure 1. Map of the Jatigede Reservoir research location

- Station 1, coordinates 6°55'29.7" S 108°05'10.9" E. The estuary of the Cimuja river is located in Cimalaka District.
- Station 2, coordinates 6°55'49.2" S 108°05'39.3"E. The estuary of the Cialing river is located in Wado District.
- Station 3, coordinates 6°55'39.6" S 108°05'44.1" E. The reservoir inlet is from the Cimanuk river in Wado District.
- Station 4, coordinates 6°55'11.8" S 108°06'32.8" E. The estuary of the Cacaban river is located in the District of CadasNgampar.
- Station 5, coordinates 6°54'53.6" S 108°05'46,2" E. The estuary of the Cihonje River in Cisitu District.

This research was carried out in November 2020 - August 2021 in the waters of the Jatigede Reservoir at 5 observation stations using the purposive sampling method on each surface of the waters of the observation station. Measurement of physical and chemical parameters was carried out *in situ* which included measuring temperature using a thermometer on the DO meter, measuring brightness using a secchi disk, measuring pH using a pH meter and measuring dissolved oxygen using a DO meter. The method used in this research is a comparative descriptive method.

Table 1.Water quality parameters in water sampling

Parameter	Unit	Method	Analisis Tool	Observation Location
Physical				

Temperature	°C	Potentiometric	*water quality checker*	
Light transparency	cm		*Secchi disk*	
Chemical				Field
pH	-	Potentiometric	*water quality checker*	
DO	mgL^{-1}	Potentiometric	*water quality checker*	

3. RESULTS AND DISCUSSION

The results of the measurement of the physical and chemical parameters of the waters at the study site showed varied patterns of change. The results of the measurement of physical and chemical parameters are presented in Table 2.

Table 2. The results of the measurement of physical and chemical parameters of waters in Jatigede Reservoir

Parameter	Unit	Station					Baku Mutu PP 22 Tahun 2021	
		1	2	3	4	5	Class 2	Class 3
Temperature	°C	29	28	28	28	29	Deviation 3	Deviation 3
pH		8,35	7,57	6,7	7,97	8,27	6-9	6-9
DO	mg L^{-1}	6,8	7,1	7,8	6,8	6,6	4	3
Light Transparency	cm	72,8	73,5	70	93,8	84	4	2,5

Temperature is an environmental factor that can affect the life of aquatic organisms either directly or indirectly. The results of measuring the temperature of the Jatigede Reservoir at the five research stations ranged from 28°C-29°C. The time of temperature measurement for each station is done in the morning. This indicates that the waters are still within the tolerance range for fish life. The temperature range of the five stations is still normal, which according to Frasawi et al. (2013), that the optimal temperature for fish growth, especially with regard to fish appetite, is 28°C-32°C. Seen at the temperature of stations I and 5, the high temperature of the waters at this station is related to the intensity of sunlight and oxygen entering the waters. Temperature is also influenced by seasons, air circulation, water flow and water depth (Kordi 2009). Temperature greatly affects the life and growth of fish in waters, where temperature affects the metabolic activity of fish. Fish metabolism will increase along with the increase in water temperature (Riyadi 2006). Government Regulation Number 22 of 2021, the lake water quality standard for class 3 requires a temperature with a deviation of 3°C, based on this it indicates that the water temperature of the Jatigede Reservoir is suitable as a fish habitat.

The degree of acidity (pH) is a limiting factor for organisms that live in water. Based on the measurement of the pH of the Jatigede Reservoir, the pH ranged from 6.67 to 8.35. Each station experienced a change in pH. Comparison of pH at the time of measurement is not much different. The station that has the highest pH is station I with a pH ranging from 8.35. The condition of the waters of Jatigede Reservoir is still said to be in normal condition and can support fish life. Things are different with station 3 which has a pH value of 6.7. The pH value at station 3 shows a low result compared to the pH of other stations, while judging from the diversity of fish at station 3 the results are higher. This can happen because the pH value of 6.7 fish still supports fish survival. However, according to Akrimi and Subroto (2002) stated that a low pH can cause oxygen absorption by organisms to be disrupted which can affect the resistance of organisms and reduce appetite so that fish growth will be inhibited.

In general, the pH at each station is classified as alkaline and is still in the appropriate range for fisheries. It still meets the criteria for class 3, namely 6.00 – 9.00 according to the Lake Water Quality Standard. 22 of 2021. Judging from the results of pH measurements in the Jatigede Reservoir, it is shown that it is neutral - alkaline. Alkaline water due to inundation areas has a Mediterranean soil texture that contains lime, which affects the growth of organisms in it (Baihaqi et al. 2017).

Mediterranean soil type is soil formed from limestone so that it has a big effect on increasing pH in the Jatigede Reservoir. Based on this, the alkaline pH of Jatigede Reservoir will increase oxygen consumption so that fish appetite will increase and will support fish growth.

Brightness is one of the limiting factors for fish life. The brightness measured in the Jatigede Reservoir during the research, ranged from 70-93.8 cm. (Suparjo 2009) stated that a brightness value of more than 45 cm is good for fish life, especially with regard to the visual organs of fish and the level of predation. The station that has the lowest transparency is station 3, which is 70 cm. This is due to the large amount of suspended solids. The decrease in brightness can also be caused by the amount of material in the water. Suspended solids will reduce oxygen and the process of photosynthesis (Agusnar 2007 in Putra et al. 2012). Effendi (2003) water brightness depends on the color and turbidity. However, some types of fish are tolerant of low light penetration. In general, the results of observations show that there are differences in the value of the transparency range at each station, but the value of transparency at each station is still relatively good, even though there is no stipulation on the brightness parameter in PP. 22 of 2021, however, referring to the designation of the Jatigede Reservoir as a fishery activity facility and infrastructure, according to Kordi&Tanjung (2005) good transparency for aquatic organisms ranges from 30-40 cm, whereas if the brightness value is less than 30 cm, a water is considered not optimal for supporting plankton life (Dahlan et al. 2019) and causing a decrease in dissolved oxygen concentration in the waters.

Dissolved oxygen is an important parameter in water, as well as a limiting factor for the life of aquatic organisms. The results of the measurement of the average dissolved oxygen at each station ranged from 6.8 to 7.83 mg/l. The highest dissolved oxygen value was found at station 3 of 7.83 mg/l and the lowest was at station 5 of 6.6 mg/l. Overall the dissolved oxygen value of each research station still supports fish life in accordance with class 3 water quality standards based on PP no. 22 of 2021 which categorizes the minimum value of dissolved oxygen, which is 3. The availability of dissolved oxygen in water greatly determines the life of fish. The high value of dissolved oxygen indicates that photosynthetic activity is still increasing in these waters. The high value of dissolved oxygen at station 3 can occur because high flow conditions have strong currents so that more oxygen in the air is dissolved. Stations 1, 2 and 5 with low dissolved oxygen values indicate slightly calm water conditions. at stations 1, 4 and 5 indicate that the low value of dissolved oxygen is due to the high organic matter compared to stations 2 and 3. The increase in organic matter will be followed by a decrease in dissolved oxygen due to the degradation process carried out by microorganisms. The value of dissolved oxygen is said to be low because of the large amount of waste that enters the waters so that dissolved oxygen in the waters is used to decompose organic compounds contained in the waters and there is less residual oxygen dissolved in it (Angkasa 2019). According to Salmin (2005) oxygen plays an important role as an indicator of water quality, dissolved oxygen in the process of oxidation and reduction of organic and inorganic materials, because of the oxidation and reduction processes, the role of dissolved oxygen is very important to help reduce the high pollution load in a waters.

4. CONCLUSION

In general, the water quality in the Jatigede Reservoir is still classified as good because it is still limited to the lake water quality standard set for fishery activities, based on the lake water quality standard Government Regulation No. 22 of 2021 is included in class 2 and 3. Water quality parameters include temperature ranging from 28° C -29°C, pH ranged from 6.7-8.35, dissolved oxygen ranged from 6.6-7.83, and brightness ranged from 70-93.8 cm.

REFERENCES

Andani, A., Herawati, T., &Hamdani, H. 2017. Identification and inventory of adaptable fish in Jatigede Reservoir at the early inundation stage. *Journal of Marine Fisheries*, *8*(2), 28-35.

Angkasa, S. (2019). The Relationship of Plankton Abundance WithJatigede Reservoir Water Quality. Thesis. Faculty of Fisheries and Marine Science. Sumedang.

Akrimi, S. (2002). Techniques for Observing Water Quality and Plankton in the Arang-Arang Jambi lake reserve. *Agricultural engineering bulletin*, *7*, 02.

Agusnar, H. (2007). Chemical environment. USU Press: Medan.

Baihaqi, Rahman, M., & Ibrahim. (2017). *Bioremediation of Palm Oil Liquid Waste Using Spirogyra Sp*. *6*(2), 61–77.

Bardach, JE, Ryther, JH, &McLarney, WO (1972). *Aquaculture. The farming and husbandry of freshwater and marine organisms*. John Wiley & Sons, Inc. 868p.

Dahlan, A., Zahidah, YA, &Herawati, H. (2019). Plankton community structure as a bioindicator in Jatigede Reservoir, West Java, Indonesia. 13(5), 3086-3095.

Effendi, H. (2003). Study of Water Quality for Management of Canisius Aquatic Resources and Environment. Yogyakarta: Kanisius. 258p.

Frasawi, A., Rompas, R., &Watung, J. (2013). Potential of fish farming in EmbungKlamalu Reservoir, Sorong Regency, West Papua Province: A study of the physical and chemical quality of water. 1(3), 24-30.

Harsono, E. (2009). Study of the Relationship Between Phytoplankton and Water Flow Velocity Due to Jatiluhur Reservoir Operation. *Indonesian Journal of Biology*, 7(1). 99-120.

Herawati, T., Saputra, RN, Lili, W., Suryadi, IBB, Kurniawati, N., Hedianto, DA, Herawati, H., & Bon, AT (2020). The food habits, niche breadth and niche overlap of the fish community in Jatigede reservoir, west java. *Proceedings of the International Conference on Industrial Engineering and Operations Management*, *August*, 2558–2568.

Kordi, KMGH. (2009). Aquaculture. PT Citra Aditya Bakti. Bandung.

Kordi, MG, &Tanjung, AB (2005). *Water Quality Management*. RinekaCipta Publisher.

Government Regulation No. 22 of 2021. (2021). Government Regulation Number 22 of 2021 concerning Guidelines for Environmental Protection and Management. *State Secretariat of the Republic of Indonesia*, *1*(078487A), 483 p.http://www.jdih.setjen.kemendagri.go.id/

Riyadi, A. (2006). Study of Water Quality of TirtaShinta Reservoir in Kotabumi, Lampung. *Journal of the Hydrosphere*, 1(2), 75-82.

Salmin. (2005). Dissolved Oxygen (DO) and Biological Oxygen Demand (BOD) As One Indicator to Determine Water Quality. *Oceana*, 30(3), 21-26.

Septiningsih, VS, Zahidah, HH, & Herman, D. (2021). Distribution of phosphate concentration and its impact on fertility of Jatigede reservoir Sumedang, West Java. International Journal of Fisheries and Aquatic Studies 9(4), 223-229.

Suharto, B., Dewi, L., Mustaqiman, AN, &Marjo, TRAK (2019). The Study Of Water Quality Status In The Ngebrong River With Physical And Chemical Parameters In The Tawangsari Barat Region, Pujon District, Malang Regency. *Indonesian Journal Of Urban And Environmental Technology*, 164–180. https://doi.org/10.25105/urbanenvirotech.v2i2.4361.

Sukimin, S. (2000). Development of sustainable fisheries management in the Ir. *H. Juanda. Workshop on Fish Cultivation Management in Floating Cages in Jatiluhur Reservoir.* Research and Development Center, Research and Development Center of Agriculture, Ministry of Agriculture.

Suparjo, NM (2009). Conditions of Pollution of Babon River Waters in Semarang. In *Journal of Fisheries Science*, 4(2), 38-45.

Syamiazi, FDN, &Indaryanto, FR (2015). Water Quality in the NadraKerenceng Reservoir, Cilegon City, Banten Province. *Journal of Aquatics*, *6*(2), 161-169.

Putra, AW, Zahidah, &Walim, L. (2012). Plankton Community Structure in the Upper Citarum River, West Java. *Journal of Fisheries and Marine Affairs*, *3*(4), 313–325.