JPPIPA 10(12) (2024)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Overview of Water Quality in Maintening Tilapia Fish (*Oreochromis niloticus*) in Floating Net Cages in Lihung Village, Karang Intan, Banjar District, South Kalimantan

Rina Iskandar[1*], Yulius Kisworo[1], Andika Cipta Maulana[1]

[1] Aquaculture Study Program, Faculty of Agriculture, Achmad Yani University Banjarmasin, Banjarmasin, Indonesia.

Received: September 08, 2024
Revised: October 31, 2024
Accepted: December 25, 2024
Published: December 31, 2024

Corresponding Author:
Rina Iskandar
rina.oriens@gmail.com

DOI: 10.29303/jppipa.v10i12.9595

Abstract: Water quality is the quality characteristics required for certain uses of various water sources. The research aims to analyze water quality conditions, water physics (temperature, water color, depth, brightness, and current), water chemistry (pH, BOD, DO, ammonia, and phosphate), and water biology (plankton) in river flows in the village Lihung, diamond coral. This research was conducted in the river waters of Lihung Village, Karang Intan District, Banjar Regency, South Kalimantan Province. Determination of sampling points was carried out using purposive sampling. Physical and chemical parameters in the Lihung Village River that support the development of aquaculture are, temperature, pH, water color, dissolved oxygen (DO), nitrate, while parameters that do not support the development of aquaculture are, brightness, depth, current, biochemical oxygen demand (BOD), ammonia. Physical and chemical parameters still support the survival of fish, although they are still supportive, there are several parameters whose values exceed the water quality standards that have been set. Judging from the pollution index value, the Lihung River is a lightly polluted body of water. So overall the Lihung River is still good for developing fisheries cultivation. The biological parameters of plankton in the Lihung River are 3 genus variants, namely, Bacillariophyceae, Chlorophyceae, and Copepada, with the dominant plankton in the waters being the genus Bacillariophyceae, which is a class of plankton that is good for aquaculture in rivers, with a brownish green river color. Cluster 1 contains stations II and III which are similar in all water quality parameters (temperature, water color, depth, brightness, water flow, pH, DO, ammonia, BOD, phosphate and plankton). From the results of these observations, good water quality results were obtained at both stations. This cluster 2 contains station I which has significant differences in water quality from stations II and III, station I has BOD, ammonia, brightness, depth, and currents that do not support fish cultivation.

Keywords: Lihung village; Tilapia fish; Water quality

Introduction

Tilapia fish cultivation is one of the fisheries sectors that is growing rapidly in Indonesia until now. This fish has advantages such as fast growth, wide environmental tolerance, and quite high market demand. Tilapia fish is a fish that is widely cultivated in many countries, including Indonesia. One cultivation method that is widely used is floating net cages, which allow the

How to Cite:
Iskandar, R., Kisworo, Y., & Maulana, A. C. (2024). Overview of Water Quality in Maintening Tilapia Fish (Oreochromis niloticus) in Floating Net Cages in Lihung Village, Karang Intan, Banjar District, South Kalimantan. *Jurnal Penelitian Pendidikan IPA*, *10*(12), 10547–10555. https://doi.org/10.29303/jppipa.v10i12.9595

development of cultivation in open waters such as lakes, rivers or reservoirs.

Azhari et al. (2018) and Abdel-Wahed et al. (2018), water quality plays an important role in increasing fish farming production. As an effort to increase production, tilapia fish farming is carried out intensively, characterized by high stocking density and high protein feed. Good water quality control is the key to the success of this intensive farming.

Fulazzaky (2014), based on data from the Ministry of Environment and Forestry, it is known that 68 percent of river water in Indonesia is included in the category of heavily polluted. The Ministry of Environment and Forestry can declare that 68 percent of rivers are in a heavily polluted condition, based on the results of water quality monitoring that has been carried out (Awoke et al., 2016). Monitoring river water quality can be a step to monitor or control the presence of pollutants in the water. In this way, the emergence of diseases due to polluted water (water borne disease) can be avoided (Rathi et al., 20121; Altenburger et al., 2015).

Water quality is the quality characteristics required for certain uses of various water sources. Water quality criteria are a standard basis for the quality requirements of water that can be utilized. Water quality standards are regulations prepared by a country or a region concerned. Water quality can be known by conducting certain tests on the water (Uddin et al., 2021; Hamuna et al., 2018; World Health Organization, 2022). The tests carried out are pH, temperature, and color or odor tests. Water quality management is an effort to maintain water so that the desired water quality is achieved according to its intended purpose to ensure that the water remains in its natural condition. Disposal of waste from human activities without taking into account the carrying capacity and carrying capacity of the environment causes a negative impact on the quality of the ecosystem, both physical, chemical and biological, as well as water sustainability (Akhtar et al., 2021; Singh & Singh, 2017; Sahhabuddin, 2014). Floating net cages are a cultivation technique that requires a lot of money, so people who want to cultivate need to think long and hard about starting this business and problems such as fluctuations in fish prices due to fish survival rates starting to decline, as well as reduced intensity of fish deliveries. especially for export deliveries, this is one of the obstacles that is quite influential for society (Widjayanthi & Widayanti, 2020).

The results of the preliminary survey revealed that the condition of floating net cage cultivation in Lihung village, Karang Intan, there is a river that has been filled with land which has become a river which has been used as a place for floating net cage cultivation by the community in Lihung village, after the big flood in 2020, the productivity of floating net cage tilapia fishcultivation in Lihung village decreased by 50%, initially the growth rate of fish which took 3 months, became 6 months, with the same feeding conditions as before the big flood, however the growth rate of fish cultivated after the big flood was very different from the growth rate of fish before the flood large, from the estimates of the cultivators there they assume that there is a problem with the water quality in the river flow in Lihung village. The research aims to analyze water quality conditions, water physics (temperature, water color, depth, brightness, and current), water chemistry (pH, BOD, DO, ammonia, and phosphate), and water biology (plankton) in river flows in the village Lihung, diamond coral.

Method

This research was conducted in the waters of the river of Lihung Kacamatan Karang Intan Village, Banjar Regency, South Kalimantan Province. Determination of the sampling point is carried out purposive sampling (Sugiyono, 2016), purposive sampling is a sampling technique for data sources with certain considerations (Sutrisno et al., 2022). The three sampling points analyzed are as follows:

Station I: In the upstream, observations of water quality are carried out in the form of water physics (temperature, water color, depth, brightness, and water currents), water chemistry (pH, BOD, DO, ammonia, phosphate), and water biology (plankton) carried out 3 times the repetition during the day, every 10 days at the specified point.

Station II: In the middle of the river, water quality observations are carried out in the form of water physics (temperature, water color, depth, brightness, and water flow), water chemistry (pH, BOD, DO, ammonia, phosphate), and water biology (plankton). carried out 3 repetitions during the day, every 10 days at a predetermined point.

Station III: Downstream, water quality observations are carried out in the form of water physics (temperature, water color, depth, brightness and water flow), water chemistry (pH, BOD, DO, ammonia, phosphate), and water biology (plankton) are carried out 3 repetitions during the day, every 10 days at a predetermined point.

Data Analysis

Cluster Analysis

Water quality data analysis is carried out using cluster analysis, which is grouping objects based on similar characteristics between the objects. Objects can be products (goods and services), objects (plants or others), as well as people (respondents, consumers or others). These objects will be classified into one or more clusters (groups) so that the objects in one cluster will be similar to each other (Syukra et al., 2019).

Plankton Analysis

In accordance with the problem and research objectives, the data that has been collected is then processed and analyzed. The data analysis method used to calculate plankton abundance is qualitative, determining the type of plankton that dominates at each observation point. The growth of the Dominance Index based on the Simpson Odum (1998) index in Sukardi & Arisandi (2020) is as follows:

$$D = \sum \left(\frac{n_i}{N} \right)^2 \quad (1)$$

Where:
D : Dominance Index
n_i : Number of individuals of the i-th species
N : Total number of plankton at each sampling point, range of dominance index according to Odum (1998).
$0 < E \leq 0.5$ Low dominance. There is no species that dominates other species to the extreme. Environmental conditions are less stable and there is no ecological pressure on biota in aquatic locations. $0.5 \leq E \leq 0.75$ Medium dominance and environmental conditions are quite stable. $0.75 < E \leq 1.0$ High dominance and there are species that dominate other phytoplankton species. This environmental condition is unstable and there is ecological pressure.

Result and Discussion

Physics Parameters

Based on the results of field observations, data on the physical parameters of the Lihung River waters can be seen in Table 1.

Table 1. Water Physical Parameters

Parameter	Station I	Station II	Station III
Temperature (°C)	28.5	28.3	28.8
Color	Brownish Green	Brownish Green	Brownish Green
Water flow(m/s)	0.072–0.092	0.057–0.077	0.047–0.103
Depth(m)	7.32	2.58	2.77
Brightness(m)	1.63	1.24	1.1

Temperature

Based on the results of observations, the temperature range data obtained at station I during the observation period is 28.1 to 29.0 °C; the temperature range obtained at station II within the observation period is 27.9 to 28.5 °C; the temperature range obtained at station III within the observation period is 27.4 to 31.4 °C.

At station III, the third sampling, there was a significant increase in temperature, this was because when making observations at the third sampling, it had not rained several days before, this caused the temperature at the third sampling at station III to be quite high, this was also due to heat exchange in the water. The water flows and when conducting research the high temperature is found at station III.

Boyd (2015) solar radiation, air temperature, weather and climate will influence the water temperature. The optimal temperature for cultivating tilapia fish is 25–30 °C (Muarif, 2016), from the research results it was found that the temperature range at station I was (28.1–29.0 °C) with an average of 28.5 °C, at station II (27.9–28.5 °C) with an average of 28.3 °C, and at station III (27.4–31.4 °C) with an average of 28.8, the water temperature conditions can be Tilapia fish tolerance ranges from 25–30 °C, it can be stated that the water temperature at the three points on the Lihung River is in the good category for tilapia fish cultivation.

Depth

The depth range obtained at station I during the observation period is 7.03 to 7.80 m. The depth range obtained at station II during the observation period is 2.42 to 2.76 m. The depth range obtained at station III during the observation period is 2.50 to 3.10 m. Station I has a deeper depth than stations II and III, this is because station I is at the intersection between Lihung village and other villages, this is what causes the water volume depth of station I to be different from stations II and III.

The optimum water depth range for fish survival is around 160–182 cm, very good for cultivating (Jefri et al., 2020), from the research results it was found that the depth range at station I was (7.03–7.80 m) with an average of 7.32 mg/l, at station II (2.42–2.76 m) with an average of 2.58 m, and at station III (2.50–3.10 m) with an average the average is 2.77 m, the water depth that tilapia fish can tolerate is in the range of 1.60–1.82m. It can be stated that the water depth at the three points on the Lihung River is in the category of not being good for tilapia fish cultivation. River conditions that are too deep are not very good for tilapia fish, this will cause a lack of desire to spawn for the fish (Susanto et al., 2017).

Brightness

The brightness range obtained at station I during the observation period is 1.30 to 2.40 m. The brightness range obtained at station II during the observation period is 1.13 to 1.45 m. The brightness range obtained at station III during the observation period is 0.90 to 1.30 m. At station I there is higher brightness than at stations II and III. This is because the depth at station I is deeper than at stations II and III. This is due to the presence of an intersection that causes the water volume at station I to be different from that at stations II and III.

Water class criteria, government regulation no. 82 of 2001, that the brightness in waters for cultivating freshwater fish is more than 45 cm. From the research results it was found that the brightness range at station I was (1.2–2.4 m) with an average of 1.6 m, at station II (1.1–1.4 m) with an average of 1.2 m, and at station III (0.9–1.3 m) with an average of 1.1 m, the state of water transparency What tilapia fish can tolerate ranges from more than 0.5 m. It can be stated that the water brightness at the three points on the Lihung River is in the good category for tilapia fish cultivation, because if the water is too deep, it will be difficult for sunlight to enter the water, and this This can affect photosynthesis in waters.

Water Flow

The range of water flows obtained at station I during the observation period is 0.072–0.092 m/s. The range of water flows obtained at station II during the observation period is 0.057–0.077 m/s. The range of water flows obtained at station III during the observation period was: 0.047–0.103 m/s.

Water class criteria government regulation no. 82 of 2001, that the speed of water currents in waters for freshwater cultivation is 0.1–0.5 m/s, from the research results it was found that the current speed range at Station I, the water flow speed at Station I is below the minimum limit set recommended. Water flow speeds lower than this standard can cause the accumulation of aquaculture waste around the cages, such as leftover feed and fish waste. This can have a negative impact on water quality and fish health, due to the high concentration of organic matter and the potential for decreased dissolved oxygen. Likewise, at station II, Current speed range: 0.057–0.077 m/s. The water flow speed at Station II is also below the minimum standards set for freshwater cultivation. This condition indicates that air movement at this location is less than optimal to support a good air exchange process. Slow water flow can inhibit the distribution of oxygen around the cage and cause freezing of organic material which can slow down water quality.

At station III, current speed range is 0.047–0.103 m/s, current speed varies more widely compared to other stations, with a maximum value that slightly exceeds the standard minimum limit (0.103 m/s). Although there are portions of the observation time where current velocities approach minimum standards, most of the current velocities at these locations remain below the recommended limits. It can be stated that the speed of the water flow at three points on the Lihung River is not good for tilapia fish cultivation, this is because the slow flow can cause food waste and fish waste to accumulate in these waters, and this can cause high levels of ammonia in the waters. , which can cause high levels of toxins in waters, and this has an impact on tilapia fish cultivation.

Water Color

Water color obtained at station I during the observation period is Hk (brownish green). Water color obtained at station II during the observation period is Hk (brownish green). Water color obtained at station III during the observation period is Hk (Brownish green).

The water color is brownish green, caused by the content of Bacillariophyta, this water color is good for river areas because it indicates the abundance of phytoplankton which can be directly utilized by zooplankton, from the observation results it was found that the water color was brownish green at the three sampling points, it can be It was stated that the water color at the three points on the Lihung River was in the good category for tilapia fish cultivation (Essa et al., 2024; Estifanos et al., 2022; Pramleonita et al., 2018).

Chemical Parameters

Based on the results of field observations, water chemical parameter data in the Lihung River can be seen in the Table 2.

Table 2. Water Chemical Parameters

Parameter	Station I	Station II	Station III
pH	7.79	7.76	7.76
DO (mg/l)	3.83	3.9	4.15
BOD (mg/l)	16.21	4.2	10.2
Amoniak (mg/l)	0.67	1.08	0.25
Phosphate (mg/l)	0.05	0.05	0.08

pH

The pH range obtained at station I within the observation period is 7.79 to 7.98. The pH range obtained at station II within the observation period is 7.76 to 7.99. The pH range obtained at station III within the observation period is 7.76 to 8.20. The third sampling station III saw an increase in pH up to 8.20, this was due to the weathering that occurred at the third sampling station III, this was due to the former cages having been weathered for too long, and only replaced during the third sampling. Paredes-Trujillo et al. (2022) and Mustapha & Atolagbe (2018), stated that the pH of water that can be tolerated by tilapia fish ranges from 5–11. Optimal growth and reproduction of tilapia fish requires a pH ranging from 7-8, from the research results it was found that the pH range at station I was (7.79–7.99) with an average of 7.79, at station II (7.76–7.99) with an average of 7.76, and at station III (7.76–8.20) with an average of 7.76, the pH of the water that tilapia fish can tolerate is in the range of 5–11, it can be stated that the pH The water at the three points on the Lihung River is in the good category for cultivating tilapia fish. A good pH is needed for tilapia fish, because a pH that is too high or too low can cause freezing or chemically burning the fish's skin.

DO

The DO range obtained at station I within the observation period is 3.69 to 4.10 mg/l. The DO range obtained at station II within the observation period is 3.46 to 4.64 mg/l. The DO range obtained at station III within the observation period is 3.46 to 4.76 mg/l.

The minimum dissolved oxygen content of 2–5 mg/l is sufficient to support the normal life of aquatic organisms (Lastari & Handayani, 2022; Saari et al., 2018; Bulbul & Mishra, 2022), from the research results obtained the DO range at station I (3.69–4.10 mg/l) with an average of 3.83 mg/l, at station II (3.46–4.64 mg/l) with an average of 3.9 mg/l, and at station III (3.46–4.76 mg/l) with an average of 4.16 mg/l, the DO conditions of water that can be tolerated by tilapia fish range from 2–5 mg/l, it can be stated that the DO of water at the three points in the Lihung River is included in the good category for tilapia fish cultivation, good DO fish can be used by tilapia fish to maximize the tilapia fish metabolism system.

BOD

From the results of the water quality lab at Lambung Mangkurat University, Banjarbaru, the BOD range obtained at station I during the observation period is 4.5 to 22.52 mg/l. From the results of the water quality lab at Lambung Mangkurat University, Banjarbaru, the BOD range obtained at station II during the observation period is 2.7 to 5.41 mg/l. From the results of the water quality lab at Lambung Mangkurat University, Banjarbaru, the BOD range obtained at station III during the observation period is 5.4 to 15.3 mg/l.

Water quality standards Government Regulation No. 82 of 2001, the BOD value for cultivation activities is less than 3 mg/l, from the research results it was found that the BOD range at station I was (4.5–22.52 mg/l) with an average of 16.21 mg /l, at station II (2.7–5.41 mg/l) with an average of 4.20 mg/l, and at station III (5.4–15.3 mg/l) with an average of 10.20 mg/l, the water BOD that tilapia fish can tolerate is around 3 mg/l, it can be stated that the water BOD at three points on the Lihung River is in the category of not being good for tilapia fish cultivation.

Ammonia

The range of ammonia obtained at station I within the observation period is 0.25 to 1.5 mg/l. The range of ammonia obtained at station II during the observation period is 0.25 to 1.5 mg/l. The range of ammonia obtained at station III within the observation period is 0.25 mg/l. At stations I and II there is high ammonia, this is due to the large amount of household waste discharged into the waters, the high amount of waste discharge causes high levels of ammonia in the waters.

Ammonia comes from denitrification during waste decomposition by microbes under anaerobic conditions (Anas et al., 2022; Maulana et al., 2021; Paul et al., 2020; Krakat et al., 2017). Supported by the statement in Government Regulation No. 82 which states that the Ammonia value for cultivation activities is a maximum of 0.02 mg/l, from the research results it was found that the Ammonia range at station I was (0.25–1.50 mg/l) with an average of 0.67 mg/l, at station II (0.25–1.50 mg/l) with an average of 1.08 mg/l, and at station III (0.25–0.25 mg/l) with an average of 0.25 mg/l, the water ammonia condition that tilapia fish can tolerate is around 0.02 mg/l, it can be stated that the water ammonia at three points on the Lihung River is in the bad to almost dangerous category for tilapia fish cultivation, because high BOD values will cause too low oxygen content in the water, thus causing death of tilapia fish, high levels of ammonia can cause poison for tilapia fish, fish cannot extract energy from feed efficiently, ultimately Tilapia fish will become lethargic, sick and die.

Phosphate

The range of phosphate obtained at station I within the observation period is 0.1 to 0.03 mg/l. The range of phosphate obtained at station II within the observation period is 0.1 to 0.03 mg/l. The phosphate range obtained at station III during the observation period is 0.1 to 0.03 mg/l.

Phosphate conditions are related to the source of nutrients and nutrition in the waters, because of the large number of plankton which are the source of water nutrients, as well as the good dissolved oxygen in the three stations, the amount of phosphate in Lihung waters is included in the good category. Government Regulation No.82 of 2001 good phosphate content for waters is in the range of 0–1 mg/l, from the research results it was found that the phosphate range at station I was (0.03–0.10 mg/l) with an average of an average of 0.53 mg/l, at station II (0.03–0.10 mg/l) with an average of 0.53 mg/l, and at station III (0.03–0.10 mg/l) with an average of 0.77 mg/l, the state of water phosphate that tilapia fish can tolerate is in the range of 0 - 1 mg/l, it can be stated that water phosphate at three points in the Lihung River is in the good category for Tilapia fish cultivation, high levels of nutrition in the waters can increase the amount of plankton in the waters, high levels of plankton in the waters cause sufficient natural food for the tilapia fish.

Biological Parameters

Based on the results of plankton identification at 3 locations, namely upstream, middle and downstream of the Lihung River. 2 classes of phytoplankton were found, namely Bacillariophyceae, Chlorophyceae and 1 class of zooplankton, namely Copepoda. Types of the Bacillariophyceae, Chlorophyceae classes are found at the upstream point, types of the Bacillariophyceae, Copepoda classes are found at the middle point and Bacillariophyceae, Chlorophyceae and Copepoda are found at the downstream point. This shows that Bacillariophyceae, Chlorophyceae and Copepoda. have a wide distribution.

Rahim et al. (2022), Amorim et al. (2021) and Zulfiandi et al. (2014), that in fresh waters, especially rivers and reservoirs, the phytoplankton that are dominant and have a wide distribution and play an important role are Bacillariophyceae, Chlorophyceae. From the results of research at station III, it was found that the genus Bacillariophyceae dominates, the large number of diatoms is due to the large number of species and can be found in various aquatic ecosystems (Sheath & Wehr, 2015). The existence of diatoms (Bacillariophyceae) is also supported by water conditions such as temperature, water color, and water nutrients. The temperature range in the Lihung River is 28.3–28.8 ^{o}C. Aprilliani et al. (2018), Gatamaneni et al. (2018), and Xiao et al. (2018) states that the optimum temperature range for diatoms (bacillariophyceae) is 25–30 ^{o}C and some diatoms cannot grow at temperatures > 34 ^{o}C. Diatoms (Bacillariophyceae) are good for waters, because they include phytoplankton, which is a type of plankton that can produce its own food or is autotrophic, can be used as natural food in waters, and the presence of phytoplankton can produce oxygen for waters.

At station III there are 3 types of plankton, because the water quality at station III is the most optimal for the growth of plankton organisms, in the form of phytoplankton and zooplankton, with optimal waters, this can support the growth of organisms such as plankton, at station III also has the highest dominance of plankton and the best compared to stations I and II, because the highest number of phytoplankton is located at station III, and the most dominant diatoms are Bacillariophyceae which are phytoplankton which are good for waters, because they can be natural food for waters and can produce oxygen in the waters. Phytoplankton is also categorized as the first natural food for tilapia fish, and the nutrition from phytoplankton is very good for tilapia fish seeds (Burhan, 2023).

$0 < E \leq 0.5$ Low dominance. There is no species that dominates other species to the extreme. Environmental conditions are less stable and there is no ecological pressure on biota in aquatic locations. $0.5 \leq E \leq 0.75$ Moderate dominance and fairly stable environmental conditions. $0.75 < E \leq 1.0$ Dominance is high and there are species that dominate other phytoplankton species. This environmental condition is unstable and there is ecological pressure.

Dominance index values range from 0.26–0.83. This indicates high dominance and there are species that dominate other phytoplankton and zooplankton species. This environmental condition is unstable and there is ecological pressure.

Cluster Analysis

Analysis of water quality data is carried out using cluster analysis, namely grouping objects based on similar characteristics between these objects (Yotova et al., 2021; Mutea et al., 2021). Objects can be products (goods and services), objects (plants or others), as well as people (respondents, consumers or others). These objects will be classified into one or more clusters (groups) so that objects in one cluster will have similarities with each other (Ofetotse et al., 2021; Syukra et al., 2019). The following are the results of cluster calculations at 3 sampling points on the Lihung River.

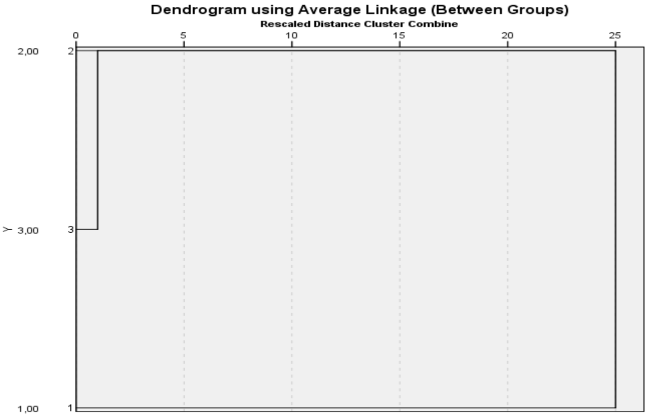

Figure 1. Cluster dendogram

Output Analysis

Cluster 1 contains stations II and III which are similar in all water quality parameters (temperature, water color, depth, brightness, current pH, DO, ammonia, BOD, phosphate and plankton). From the results of these observations, good water quality results were obtained at both stations.

Cluster 2 contains station I which has significant differences in water quality from stations II and III, station I has BOD, ammonia, brightness, depth, and currents that do not support fish cultivation. From the results of these observations, it was found that the water quality was not good at station I, and different treatment should be carried out from stations II and III.

The treatment that must be carried out are: Reduce the disposal of household waste in rivers, to maintain the stability of BOD and ammonia in waters; Reduce excessive use of feed so that leftover feed and fish waste do not accumulate at the bottom because the current in this river is quite slow which causes leftover feed and fish waste to accumulate; Make an appeal to the surrounding community not to carry out activities of dumping waste into the river which causes damage to the stability of the waters for fish farming; For fish farming, it would be best to review the floating net cage system, namely measuring the depth according to the condition of the river, because the Lihung River has a fairly deep depth and river brightness but the width is very narrow which results in the flow becoming slow due to obstruction by the size of the cages. floating nets that are not suitable for the conditions of the Lihung river.

Conclusion

The results of measuring the water quality of the Lihung River can be concluded that: Physical and chemical parameters in the Lihung Village River that support the development of aquaculture, namely, temperature, pH, water color, dissolved oxygen (DO), nitrate, while parameters that do not support the development of aquaculture are, brightness, depth, current, biochemical oxygen demand (BOD), ammonia; Physical and chemical parameters still support the survival of fish, although they still support, there are several parameters whose values have exceeded the established water quality standards, seen from the pollution index value that the Lihung River is included in waters with mild pollution conditions. So overall the Lihung River is still good for the development of fisheries cultivation; Biological parameters of plankton in the Lihung River, there are 3 genus variants, namely, Bacillariophyceae, Chlorophyceae, and Copepada, with the dominant plankton in the waters being the genus Bacillariophyceae, which is a class of plankton that is good for aquaculture in rivers, with a brownish green river color; Cluster 1 contains stations II and III which have similarities in all water quality parameters (temperature, water color, depth, brightness, current pH, DO, ammonia, BOD, phosphate and plankton), from the results of these observations we obtained good water quality results at both of these stations; Cluster 2 contains station I which has significant differences in water quality from stations II and III, station I has BOD, ammonia, brightness, depth, currents that are not supportive for fish cultivation.

Acknowledgments
Thanks to the Aquaculture Study Program, Faculty of Agriculture, Achmad Yani University, Banjarmasin.

Author Contributions
This authors in this research are divided into executor and advisor.

Funding
This research received no external funding.

Conflicts of Interest
The author declares no conflict of interest in this research.

References

Abdel-Wahed, R. K., Shaker, I. M., Elnady, M. A., & Soliman, M. A. M. (2018). Impact of Fish-Farming Management on Water Quality, Plankton Abundance and Growth Performance of Fish in Earthen Ponds. *Egyptian Journal of Aquatic Biology and Fisheries*, *22*(1), 49-63. https://dx.doi.org/10.21608/ejabf.2018.7705

Akhtar, N., Ishak, M. I. S., Bhawani, S. A., & Umar, K. (2021). Various Natural and Anthropogenic Factors Responsible for Water Quality Degradation: A Review. *Water*, *13*(19), 2660. https://doi.org/10.3390/w13192660

Altenburger, R., Ait-Aissa, S., Antczak, P., Backhaus, T., Barceló, D., Seiler, T. B., ... & Brack, W. (2015). Future Water Quality Monitoring—Adapting Tools to Deal with Mixtures of Pollutants in Water Resource Management. *Science of the Total Environment*, *512*, 540-551. https://doi.org/10.1016/j.scitotenv.2014.12.057

Amorim, C. A., & Moura, A. D. N. (2021). Ecological Impacts of Freshwater Algal Blooms on Water Quality, Plankton Biodiversity, Structure, and Ecosystem Functioning. *Science of the Total Environment*, *758*, 143605. https://doi.org/10.1016/j.scitotenv.2020.143605

Anas, P., Ruchimat, T., & Jubaedah, I. (2022). Dampak Aktivitas Manusia Terhadap Keberlanjutan Sumberdaya Perikanan Danau Lido Kabupaten Bogor Provinsi Jawa Barat. *Prosiding Seminar Nasional Ikan*, *1*(1), 305-317.

Apriliani, I. M., Nurrahman, Y. A., Dewanti, L. P., & Herawati, H. (2018). Determination of Potential Fishing Ground for Hairtail (Trichiurus sp.) Fishing Based on Chlorophyll-a Distribution and Sea Surface Temperature in Pangandaran Waters, West Java, Indonesia. *Aquaculture, Aquarium, Conservation & Legislation*, *11*(4), 1047-1054. Retrieved from http://www.bioflux.com.ro/docs/2018.1047-1054.pdf

Awoke, A., Beyene, A., Kloos, H., Goethals, P. L., & Triest, L. (2016). River Water Pollution Status and Water Policy Scenario in Ethiopia: Raising Awareness for Better Implementation in

Developing Countries. *Environmental Management*, *58*, 694-706. https://doi.org/10.1007/s00267-016-0734-y

Azhari, D., & Tomasoa, A. M. (2018). Kajian Kualitas Air dan Pertumbuhan Ikan Nila (Oreochromis niloticus) yang Dibudidayakan dengan Sistem Akuaponik. *Akuatika Indonesia*, *3*(2), 84. https://doi.org/10.24198/jaki.v3i2.23392

Boyd, M. T. (2018). Comparative Performance and Model Agreement of Three Common Photovoltaic Array Configurations. *Journal of Solar Energy Engineering*, *140*(1), 014503. https://doi.org/10.1115/1.4038314

Bulbul, A., & Mishra, A. (2022). Effects of Dissolved Oxygen Concentration on Freshwater Fish: A Review. *International Journal of Fisheries and Aquatic Studies*, *10*(4), 113-127. https://doi.org/10.22271/fish.2022.v10.i4b.2693

Essa, D. I., Elshobary, M. E., Attiah, A. M., Salem, Z. E., Keshta, A. E., & Edokpayi, J. N. (2024). Assessing Phytoplankton Populations and Their Relation to Water Parameters as Early Alerts and Biological Indicators of the Aquatic Pollution. *Ecological Indicators*, *159*, 111721. https://doi.org/10.1016/j.ecolind.2024.111721

Estifanos, G. B., Gebre-Meskel, D. K., & Hailu, T. F. (2022). Water Quality Parameters Affect Dynamics of Phytoplankton Functional Groups in Lake Hawassa, Ethiopia. *Limnologica*, *94*, 125968. https://doi.org/10.1016/j.limno.2022.125968

Fulazzaky, M. A. (2014). Challenges of Integrated Water Resources Management in Indonesia. *Water*, *6*(7), 2000-2020. https://doi.org/10.3390/w6072000

Gatamaneni, B. L., Orsat, V., & Lefsrud, M. (2018). Factors Affecting Growth of Various Microalgal Species. *Environmental Engineering Science*, *35*(10), 1037-1048. https://doi.org/10.1089/ees.2017.0521

Hamuna, B., Tanjung, R. H. R., Suwito, S., Maury, H. K., & Alianto, A. (2018). Kajian Kualitas Air Laut dan Indeks Pencemaran Berdasarkan Parameter Fisika-Kimia di Perairan Distrik Depapre, Jayapura. *Jurnal Ilmu Lingkungan*, *16*(1), 35–43. https://doi.org/10.14710/jil.16.1.35-43

Krakat, N., Demirel, B., Anjum, R., & Dietz, D. (2017). Methods of Ammonia Removal in Anaerobic Digestion: A Review. *Water Science and Technology*, *76*(8), 1925-1938. https://doi.org/10.2166/wst.2017.406

Lastari, L., & Handayani, L. (2022). Studi Fisika Kimia Perairan untuk Budidaya Ikan Nila (Oreochromis niloticus) yang Dipelihara pada Keramba Jaring Apung di Desa Pematang Limau. *Budidaya Perairan*, *10*(2), 97–108. https://doi.org/10.14341/Conf05-08.09.22-191

Maulana, M. R., Supendi, S., & Fajar, S. (2021). Kualitas Air (Amonia, Nitrit, dan Nitrat) pada Pemeliharaan Glass Eel dengan Aplikasi Mikroba Berbeda. *Buletin Teknik Litkayasa Akuakultur*, *19*(1), 43–46. https://doi.org/10.15578/blta.19.1.2021.43-46

Muarif, M. (2016). Karakteristik Suhu Perairan di Kolam Budidaya Perikanan. *Jurnal Mina Sains*, *2*(2), 96–101. https://doi.org/10.30997/jms.v2i2.444

Mustapha, M. K., & Atolagbe, S. D. (2018). Tolerance Level of Different Life Stages of Nile Tilapia Oreochromis niloticus (Linnaeus, 1758) to Low pH and Acidified Waters. *The Journal of Basic and Applied Zoology*, *79*, 1-6. https://doi.org/10.1186/s41936-018-0061-3

Mutea, F. G., Nelson, H. K., Au, H. V., Huynh, T. G., & Vu, U. N. (2021). Assessment of Water Quality for Aquaculture in Hau River, Mekong Delta, Vietnam Using Multivariate Statistical Analysis. *Water*, *13*(22), 3307. https://doi.org/10.3390/w13223307

Odum, O. (1996). *Dasar-Dasar Ekologi*. Yogyakarta: Gadjah Mada University Press.

Ofetotse, E. L., Essah, E. A., & Yao, R. (2021). Evaluating the Determinants of Household Electricity Consumption Using Cluster Analysis. *Journal of Building Engineering*, *43*, 102487. https://doi.org/10.1016/j.jobe.2021.102487

Paredes-Trujillo, A., & Mendoza-Carranza, M. (2022). A Systematic Review and Meta-Analysis of the Relationship between Farm Management, Water Quality and Pathogen Outbreaks in Tilapia Culture. *Journal of Fish Diseases*, *45*(10), 1529-1548. https://doi.org/10.1111/jfd.13679

Paul, I., Panigrahi, A. K., & Datta, S. (2020). Influence of Nitrogen Cycle Bacteria on Nitrogen Mineralisation, Water Quality and Productivity of Freshwater Fish Pond: A Review. *Asian Fisheries Science*, *33*(2). https://doi.org/10.33997/j.afs.2020.33.2.006

Pramleonita, M., Yuliani, N., Arizal, R., & Wardoyo, S. E. (2018). Parameter Fisika dan Kimia Air Kolam Ikan Nila Hitam (Oreochromis niloticus). *Jurnal Sains Natural Universitas Nusa Bangsa*, *8*(1), 24–34. https://doi.org/10.31938/jsn.v8i1.107

Rahim, S. A., Radhika, R., & Mathew, S. (2022). A Review on the Effect of Seasons and Pollution on Plankton Diversity in Indian Freshwaters. *Uttar Pradesh J. Zool*, *43*(11), 58-67. http://dx.doi.org/10.56557/upjoz/2022/v43i113053

Rathi, B. S., Kumar, P. S., & Vo, D. V. N. (2021). Critical Review on Hazardous Pollutants in Water Environment: Occurrence, Monitoring, Fate, Removal Technologies and Risk Assessment.

Science of the Total Environment, *797*, 149134. https://doi.org/10.1016/j.scitotenv.2021.149134

Saari, G. N., Wang, Z., & Brooks, B. W. (2018). Revisiting Inland Hypoxia: Diverse Exceedances of Dissolved Oxygen Thresholds for Freshwater Aquatic Life. *Environmental Science and Pollution Research*, *25*, 3139-3150. https://doi.org/10.1007/s11356-017-8908-6

Sheath, R. G., & Wehr, J. D. (2015). Introduction to the Freshwater Algae. In *Freshwater Algae of North America* (pp. 1-11). Academic Press. https://doi.org/10.1016/B978-0-12-385876-4.00001-3

Singh, R. L., & Singh, P. K. (2017). Global Environmental Problems. *Principles and Applications of Environmental Biotechnology for a Sustainable Future*, 13-41. https://doi.org/10.1007/978-981-10-1866-4_2

Sugiono, S. (2016). *Metode Penelitian Kuantitatif, Kualitatif, dan R & D*. Bandung: Alfabeta.

Sukardi, L. D. A., & Arisandi, A. (2020). Analisa Kelimpahan Fitoplankton di Perairan Bangkalan Madura. *Juvenil: Jurnal Ilmiah Kelautan dan Perikanan*, *1*(1), 111-121. https://doi.org/10.21107/juvenil.v1i1.6869

Sutrisno, S., Tannady, H., Wahyuningsih, E. S., Supriatna, D., & Hadayanti, D. (2022). Analisis Peran Gaya Hidup dan Kualitas Produk Terhadap Keputusan Pembelian Produk Automotif City Car. *Management Studies and Entrepreneurship Journal*, *3*(6), 4139–4145. https://doi.org/10.37385/msej.v3i6.1304

Syukra, I., Hidayat, A., & Fauzi, M. Z. (2019). Implementation of K-Medoids and FP-Growth Algorithms for Grouping and Product Offering Recommendations. *Indonesian Journal of Artificial Intelligence and Data Mining*, *2*(2), 107. https://doi.org/10.24014/ijaidm.v2i2.8326

Uddin, M. G., Nash, S., & Olbert, A. I. (2021). A Review of Water Quality Index Models and Their Use for Assessing Surface Water Quality. *Ecological Indicators*, *122*, 107218. https://doi.org/10.1016/j.ecolind.2020.107218

Widjayanthi, L., & Widayanti, Y. A. (2020). Dampak Penggunaan Keramba Jaring Apung pada Pembudidaya Ikan Kerapu Berdasarkan Perspektif Sosial Ekonomi. *Jurnal Kirana*, *1*(1), 12–18. Retrieved from https://jurnal.unej.ac.id/index.php/jkrn

World Health Organization. (2022). *Guidelines for Drinking-Water Quality: Incorporating the First and Second Addenda*. World Health Organization.

Xiao, W., Liu, X., Irwin, A. J., Laws, E. A., Wang, L., Chen, B., ... & Huang, B. (2018). Warming and Eutrophication Combine to Restructure Diatoms and Dinoflagellates. *Water Research*, *128*, 206-216. https://doi.org/10.1016/j.watres.2017.10.051

Yotova, G., Varbanov, M., Tcherkezova, E., & Tsakovski, S. (2021). Water Quality Assessment of a River Catchment by the Composite Water Quality Index and Self-Organizing Maps. *Ecological Indicators*, *120*, 106872. https://doi.org/10.1016/j.ecolind.2020.106872

Zulfiandi, M., Zainuri, Z., & Widowati, W. (2014). Kajian distribusi/sebaran fitoplankton dan zooplankton di perairan dan estuaria banjir kanal Barat Kota Semarang Jawa Tengah. In *Prosiding Seminar Kelautan Nasional IX* (pp. 24-31). Retrieved from https://shorturl.at/xQr6c