Species composition and community structure of freshwater fish in a newly inundated reservoir, Sumedang Regency, West Java, Indonesia

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Abstract. Jatigede Reservoir is a newly inundated reservoir that collects several rivers such as the Cimanuk, Cialing, Cinambo, Cimuja, and others rivers, located in Sumedang Regency, West Java. The reservoir was inundated in 2015. This journal aims to identify the species composition of fish and analyze the community structure in the Jatigede Reservoir. The type of research used is quantitative research. The sampling technique used is purposive sampling with 7 sampling stations, and this research was conducted in August 2022. This study's results suggest that the water conditions in Jatigede Reservoir are threatening the fish life. This is seen from water quality parameters such as brightness, total suspended solid (TSS), biochemical oxygen demand (BOD), and chemical oxygen demand (COD) that have values out of the the appropriate range of water quality values, in particular for fish life and development. 18 types of fish and 1 type of freshwater crayfish were identified in the Jatigede reservoir. Overall, the species that have the highest abundance are *Cherax quadricarinatus* (19.8%) and *Barbodes balleroides* fish (18.4%). Among the 7 observation stations, station 2, located in the floating net cage area, has 14 fish species, more than other observation stations. The fish diversity index in the Jatigede Reservoir ranges from 0.457 to 2.505 which means the diversity is low to moderate. The fish evenness index is 0.416 to 0.949, moderate to high, and the fish dominance index ranges from low to high with a value range of 0.092-0.778.

Key Words: diversity, abundance, fisheries Jatigede Reservoir, aquatic science.

Introduction. Freshwater ecosystems support a rich biodiversity and provide countless resources and services to humans (Zhao et al 2016). Fish are the main inhabitants of aquatic ecosystems, being distributed in freshwaters, such as lakes, reservoirs, rivers and swamps, as well as in brackish waters and marine waters. Fish have an important role in ecosystems, primarily in the food chain cycle, and they can be used as bioindicators of water quality (Fauziah et al 2017). In Southeast Asia, there are approximately 2917 identified freshwater fish species. Indonesia's freshwater fish species account for almost 44% of the fish species in Southeast Asia. From the records collected by the Fishbase, Indonesia totalizes more or less than 1,193 fish species (Froese & Pauly 2013; Syafei 2017). An ecosystem can be defined as an environmental unit that involves biotic elements (types of creatures) and physical (climate, water, and soil), and chemical factors (acidity and salinity) that interact with each other (Utomo et al 2015). Aquatic ecosystems are divided into freshwater and marine ecosystems. Reservoirs are artificial freshwaters made by damming certain rivers for various purposes, such as flood prevention, power generation, water supply for agricultural irrigation needs, fishing activities and, even for tourism activities. Thus, the existence of the reservoir has provided benefits to the surrounding community (Apridayanti 2008).

Jatigede Reservoir collects several rivers such as the Cimanuk, Cialing, Cicacaban, Cinambo, Cimuja, Cihonje and so on. This reservoir was inundated in 2015 (Nopianti et al 2018). The inundation of this reservoir not only affects the surrounding community but also affects the surrounding ecosystem. The change of ecosystems from terrestrial ecosystems to freshwater ecosystems made the surrounding community switch professions from farmers to fishermen. Fishery resources at the beginning of the inundation camefrom rivers that entered Jatigede Reservoir. According to Andani (2017), there were 17 types of fish species in Jatigede Reservoir in the early stages of reservoir inundation. These fish are native from rivers that enter Jatigede Reservoir such as the Cimanuk River (Andani et al 2017). From time to time there are human activities that can lead to the degradation of ecosystem quality, so that there are several aquatic organisms that are affected and fish are currently recognized as one of the most threatened groups of freshwater organisms (Zhao et al 2016). Over the past 5 years, the ecosystem of Jatigede Reservoir has certainly changed a lot and affected the abundance and structure of the fish community in Jatigede Reservoir. In addition to anthropogenic pressures that can affect fish species, abundance, and fish community structure, there are also ecosystem change factors from rivers that flow into the Jatigede reservoir. The change in the aquatic ecosystem from flowing to stagnant water can force adaptation in fish that enter the Jatigede reservoir. The reservoir has 3 zones. The riverine zone is a flowing zone that tends to have a fairly strong streamflow. The transition zone is situated between flowing and flooded water areas, while the lacustrine zone is an environment that is fully flooded. From the perspective of this ecosystem change, this study analyzes the composition of fish species and the community structure of the fish in the Jatigede Reservoir, Sumedang Regency, West Java.

Material and Method

Description of the study sites. This research was conducted in Jatigede Reservoir, Sumedang Regency in August 2022. The type of research used is quantitative research with a descriptive approach. The sampling technique used is purposive sampling with 7 sampling stations, as illustrated in (Figure 1).

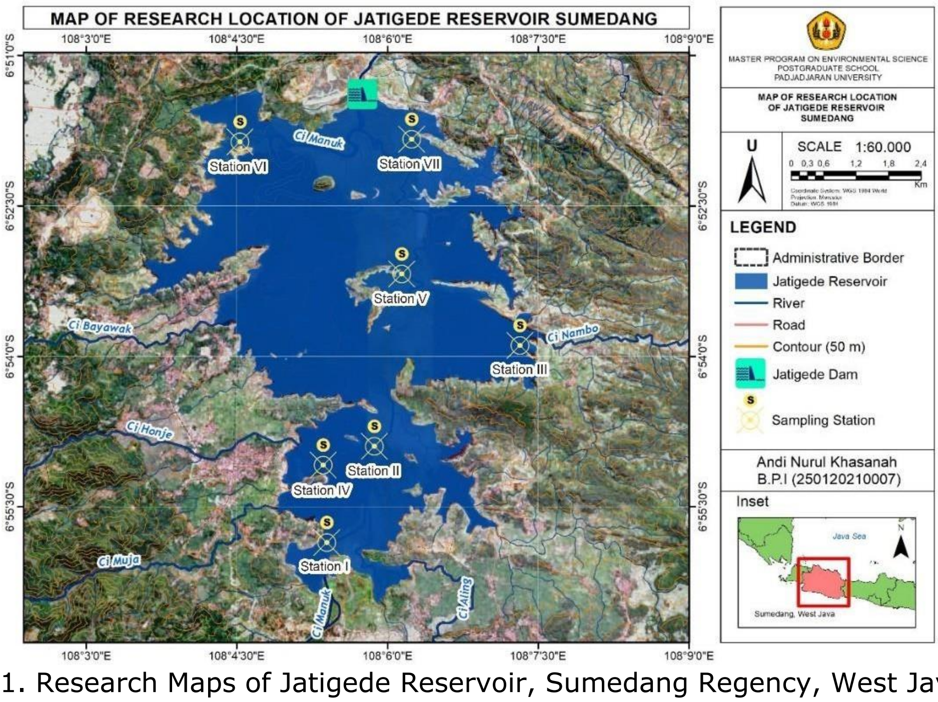

Figure 1. Research Maps of Jatigede Reservoir, Sumedang Regency, West Java.

- Station I: S 06° 56′ 37″ – E 108° 05′ 19″, Cimanuk River inlet
- Station II: S 06° 55′ 02″ – E 108° 05′ 47″, Floating net cage area
- Station III: S 06° 53′ 53″ – E 108° 07′ 18″, Cinambo River inlet
- Station IV: S 06° 55′ 38″ – E 108° 05′16″, Settlement areas
- Station V: S 06° 53′ 06″ – E 108° 06′ 01″, Small island in the middle of Reservoir
- Station VI: S 06° 51′ 51″ – E 108° 04′ 30″, Floating net cage area
- Station VII: S 06° 51′ 49″ – E 108° 06′ 19″, Near dam area

Sampling, measurement, and data analysis. The samples were taken from surface water in 1 L bottles and brought to the ecology laboratory of Padjadjaran University (Center for Environment and Sustainability Science (CESS)). There were analyzed the following parameters: temperature, transparency, and Total Suspended Solid (TSS), pH, Dissolved Oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD). Table 1 shows the water quality parameters tested along with the methods and tools used for water quality analysis. Fish samples were taken using a 4-6 inches net spread out into the water by waiting a few hours then the net was pulled up onto the boat, then the fish obtained were immediately put into the cool box and taken to the laboratory to be identified and measured morphometrically.

Table 1

Physical and chemical aspects of water quality

Parameter	*Unit*	*Measurement method*	*Measuring instrument*
Temperature	°C	SNI 06-6989.23-2005	Mercury thermometer
Transparency	m	Manual	Secchi disk
TSS	mg L^{-1}	SNI 6989.3:2019	Gravimetric calculation
pH	-	SNI 6989.11:2019	pH meter
DO	mg L^{-1}	Direct reading	DO meter
BOD	mg L^{-1}	SNI 6989.72:2009	BOD calculation
COD	mg L^{-1}	SNI 6989.2:2019	Oxidizing and spectrophotometer

Fish abundance (B)*.* Abundance is the proportion represented by each species of individuals in a community. Relative abundance is used to determine the density of fish species at each station which can be calculated using the formula (Brower et al 1990), as follows:

$$B = (ni/N) \times 100$$

Where:
B - relative abundance of fish caught (%);
n_i - total number of individuals of species i;
N - total number of individuals of all species caught.

Fish Diversity Index. The Diversity Index (H') can describe the community structure and analyze information about the variety and number of organisms. In addition, diversity and evenness are highly dependent on the number of species in the community. The higher the number of species, the greater the diversity, although this value is highly dependent on the number of individuals of each species (Wilhm & Dorris 1968). The diversity index can describe the balance in the distribution of the number of individuals of each species. The index can be calculated by the Shannon-Wiener formula (H') (Odum 1993) as follows:

$$H' = - (\sum (ni/N) \ln (ni/N))$$

Where:
H' - diversity index (Shannon-Wiener);
S - number of fish species;
n_i - total number of individuals of species i;
N - total number of individuals.

The value of the diversity index (Shannon-Wiener) is as follows:

- $H' \leq 2.3$ low diversity
- $2.3 < H' \leq 3.3$ moderate/medium diversity
- $H' > 3.3$ high diversity

Fish Evenness Index*.* The evenness index (E) is the composition of individuals of each species in an ecological community. The more even the distribution of individuals between species, the more balanced the ecosystem. The evenness index is a good estimator to determine dominance in an area (Levinton 2017). The value of the species evenness index can illustrate the stability of a community. Pielou evenness index formula, according to Odum (1993), is:

$$E = H' / H'Max$$

Where:
E - evenness index;
H' - Shannon-Wiener diversity index;
H'max - maximum diversity index (ln S);
S - total number of species.

The evenness index values range from 0-1 with the following categories:
- $0 < E \leq 0.4$ low evenness for a depressed community;
- $0.4 < E \leq 0.6$ moderate evenness for an unstable community;
- $0.6 < E \leq 1.0$ high evenness for a stable community.

Fish Dominance Index*.* The fish dominance index will describe the prevalence of a species over other species, in an ecological community. A high dominance index value indicates that the diversity index value and the evenness index value are low. If the dominance index value is close to 0, the community is more complex. The following is the Simpson dominance index formula (Krebs 1978):

$$C = \sum (ni/N)^2$$

Where:
C - dominance index value;
Ni - number of individuals in one species;
N - total number of individual species found.

The dominance index values range from 0-1 with the following categories:
- $0 < C < 0.5$ low dominance;
- $0.5 < C \leq 0.75$ moderate dominance;
- $0.75 < C \leq 1.0$ high dominance.

Results. Jatigede Reservoir is the source of livelihood for the people who live around it. The water condition in August 2022 can be seen in Table 2. There are 7 parameters consisting of physical and chemical aspects of water such as transparency, water temperature, TSS, pH, DO, BOD, and COD.

Table 2

The analysis of water quality in the Jatigede Reservoir

Parameter	*Station*						
	1	*2*	*3*	*4*	*5*	*6*	*7*
Transparency (m)	0.19	1.11	0.99	0.9	1.08	0.72	1.10
Temperature (°C)	26	29	29	29	29	29	29
TSS (mgL^{-1})	65	13.14	30.86	18.57	14.86	17.71	14.57
pH	8.01	8.4	8.27	7.9	8.45	8.74	8.4
DO (mgL^{-1})	5.3	4.0	4.1	4.0	4.8	4.8	4.6
BOD (mgL^{-1}	7.6	6	5.4	5.6	5	3.6	5.3
COD (mgL^{-1}	30.91	15.46	15.46	20.09	20.09	15.46	20.09

Fish types and abundance in Jatigede Reservoir. In this study, identification and inventory of fish in the Jatigede Reservoir were carried out at 7 sampling stations spread from the inlet of the Cimanuk River to the outlet of the Jatigede Dam. In this study, from the results of the abundance analysis, it was found that there were 18 types of fish and 1 type of freshwater crayfish identified in the Jatigede Reservoir, in August 2022. The calculation of fish abundance can be seen in Table 3. The types of fish found at each sampling station can be seen in Figure 2-8.

Table 3

Fish abundance in Jatigede Reservoir

No.	Fish species	Station							Total	Abundance (%)
		1	*2*	*3*	*4*	*5*	*6*	*7*		
1	*Oreochromis niloticus*	8	1	5	0	0	3	0	17	7.8
2	*Oreochromis mossambicus*	5	2	4	1	0	4	0	16	7.4
3	*Barbodes balleroides*	21	3	5	3	2	3	3	40	18.4
4	*Oxyeleotris marmorata*	7	2	1	1	1	0	0	12	5.5
5	*Osteochilus hasseltii*	2	0	0	2	0	1	0	5	2.3
6	*Hampala macrolepidota*	6	1	2	2	1	2	0	14	6.5
7	*Cyprinus carpio*	1	3	1	1	0	0	0	6	2.8
8	*Channa striata*	2	1	0	0	0	0	0	3	1.4
9	*liposarcus pardalis*	1	2	1	6	0	0	0	10	4.6
10	*Clarias batrachus*	0	1	0	0	0	0	0	1	0.5
11	*Mystus nemurus*	0	1	2	1	0	0	0	4	1.8
12	*Parachromis managuensis*	0	3	0	2	1	0	0	6	2.8
13	*Amphilophus labiatus*	3	1	0	0	2	2	0	8	3.7
14	*Hemichromis elongatus*	4	4	7	2	4	1	3	25	11.5
15	*Mystus nigriceps*	0	0	2	0	0	0	0	2	0.9
16	*Barbonymus gonionotus*	0	1	0	0	0	0	0	1	0.5
17	*Rasbora argyrotaenia*	0	0	0	1	0	0	0	1	0.5
18	*Cherax quadricarinatus*	0	0	0	0	0	0	43	43	19.8
19	*Channa micropeltes*	2	0	1	0	0	0	0	3	1.4
Total	60	26	30	22	11	16	49	217	100	Total

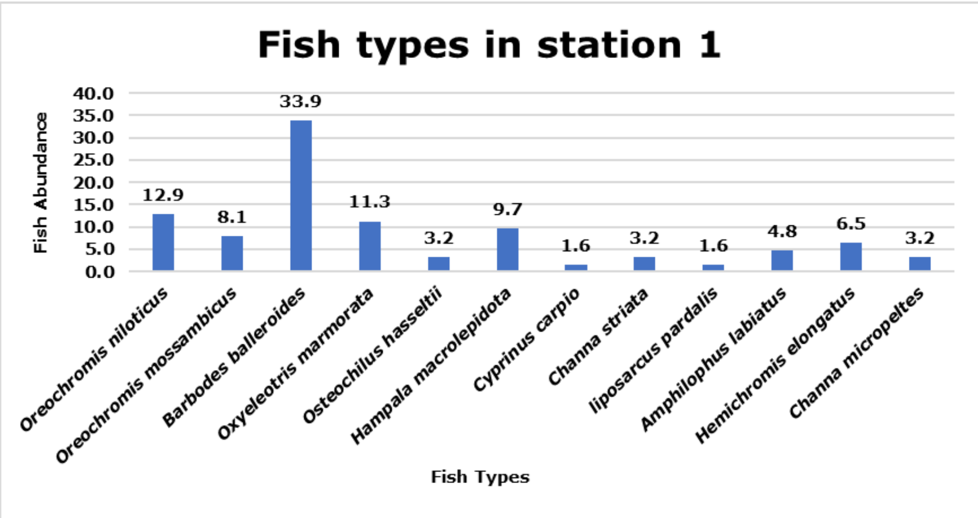

Figure 2. Fish species and abundance in Station 1.

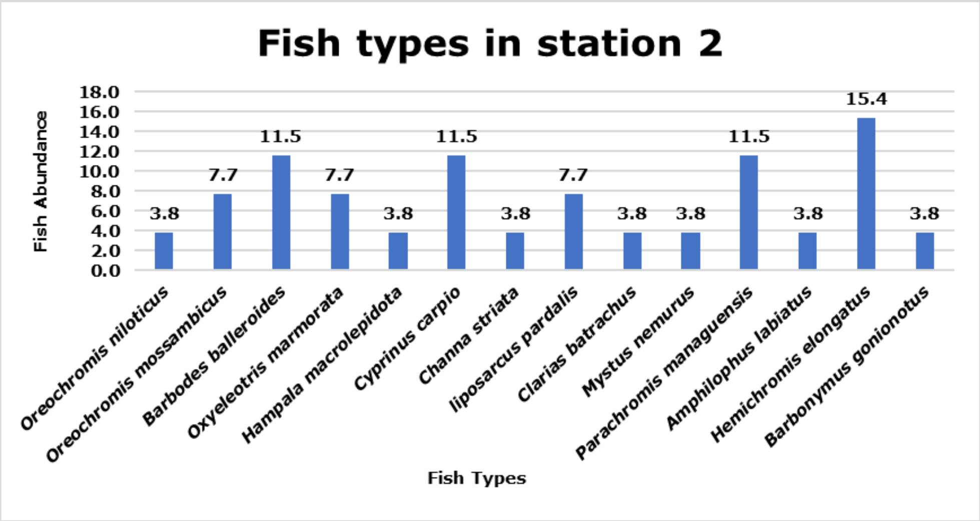

Figure 3. Fish species and abundance in Station 2.

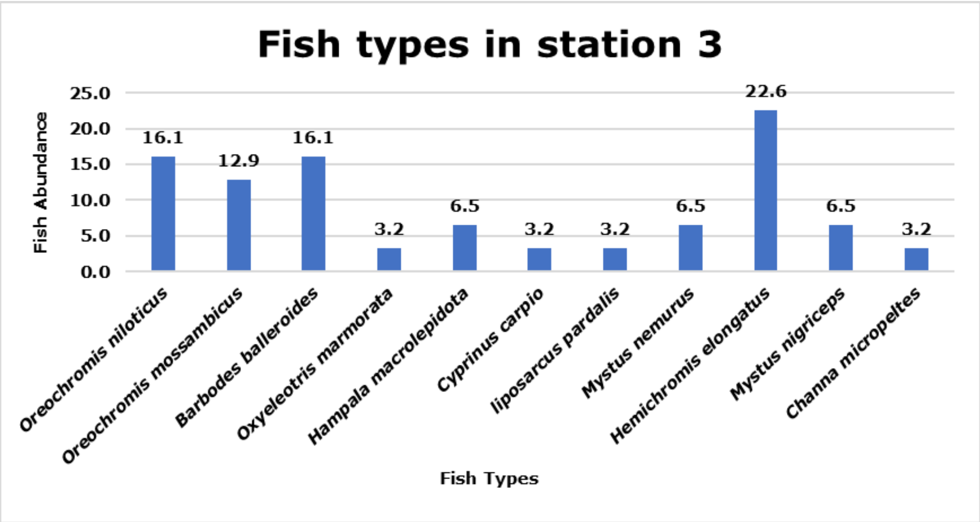

Figure 4. Fish species and abundance in Station 3.

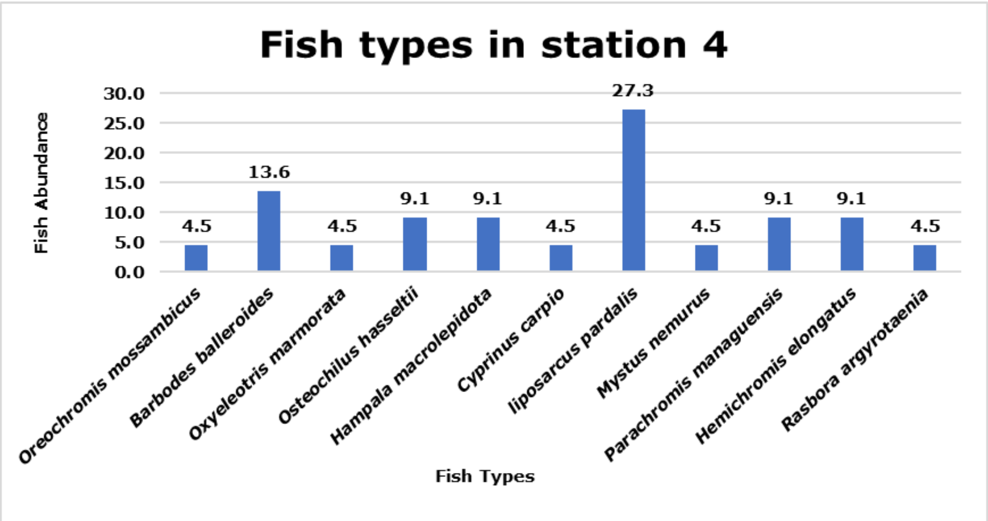

Figure 5. Fish species and abundance in Station 4.

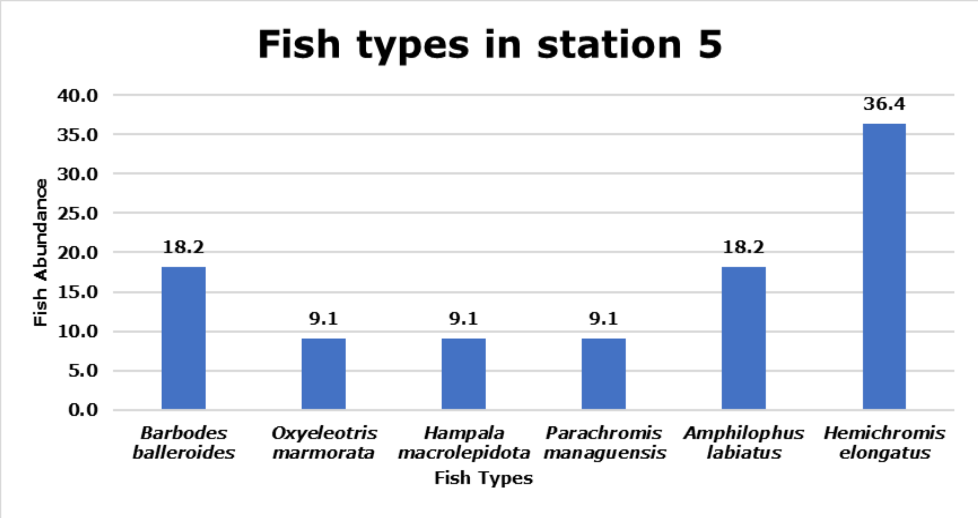

Figure 6. Fish species and abundance in Station 5.

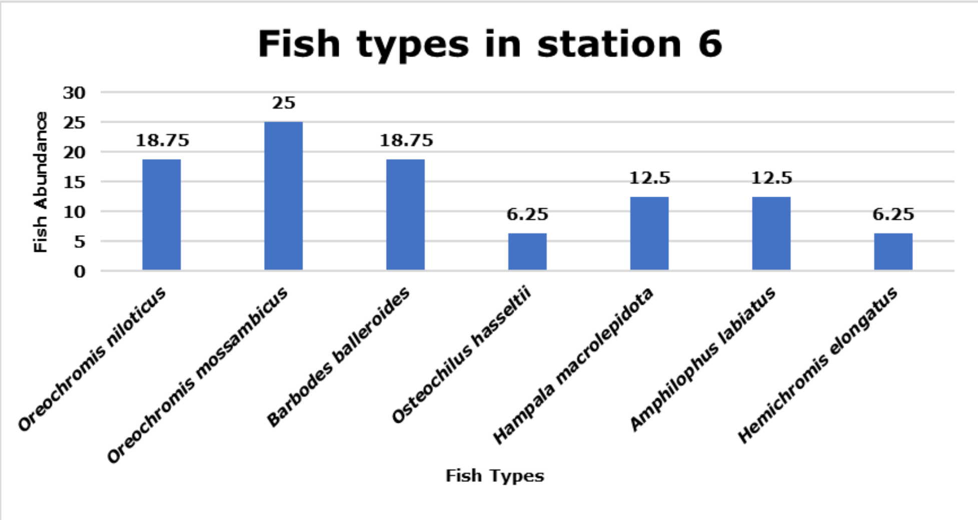

Figure 7. Fish species and abundance in Station 6.

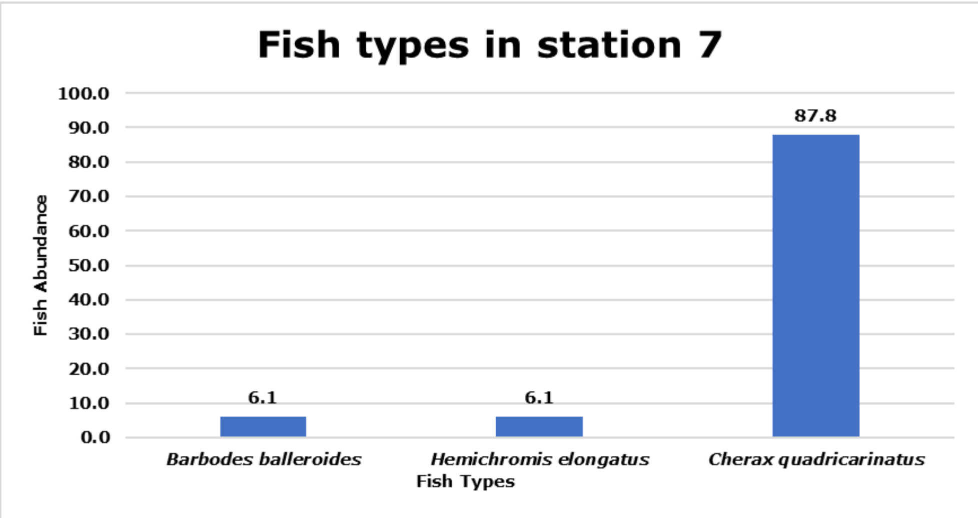

Figure 8. Fish species and abundance in Station 7.

Fish community structure. The results of the fish community structure in Jatigede Reservoir for the 7 sampling stations, adjusted to the scale of each index, are illustrated in Figures 9-11.

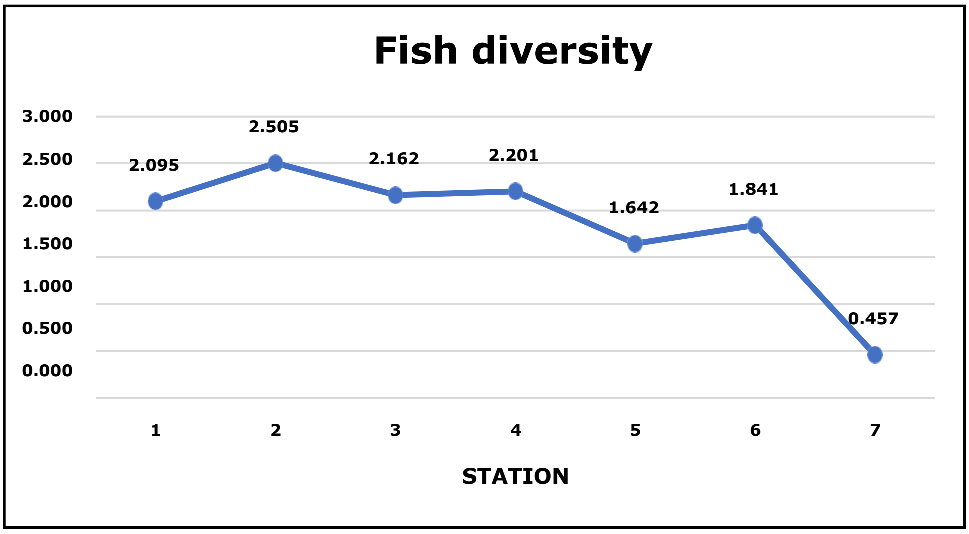

Figure 9. Fish diversity index.

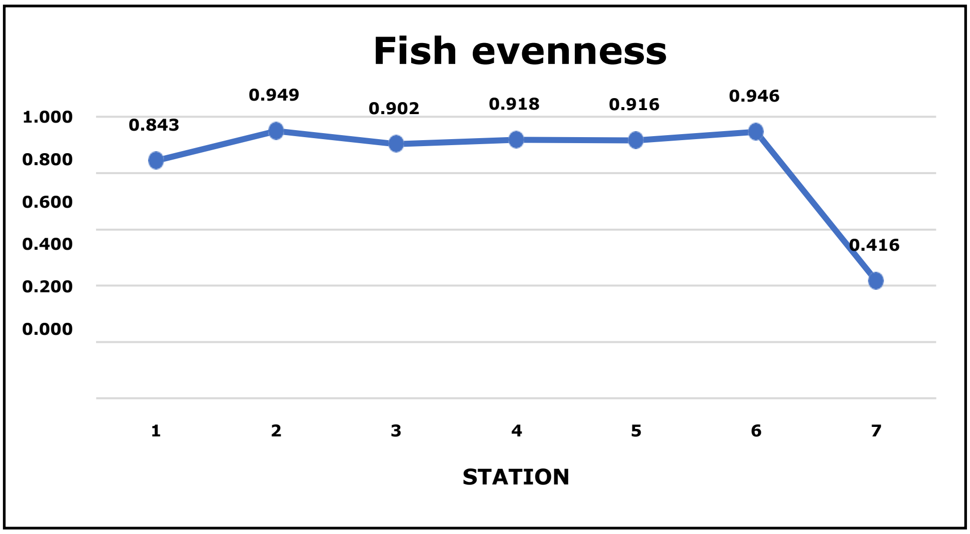

Figure 10. Fish evenness index.

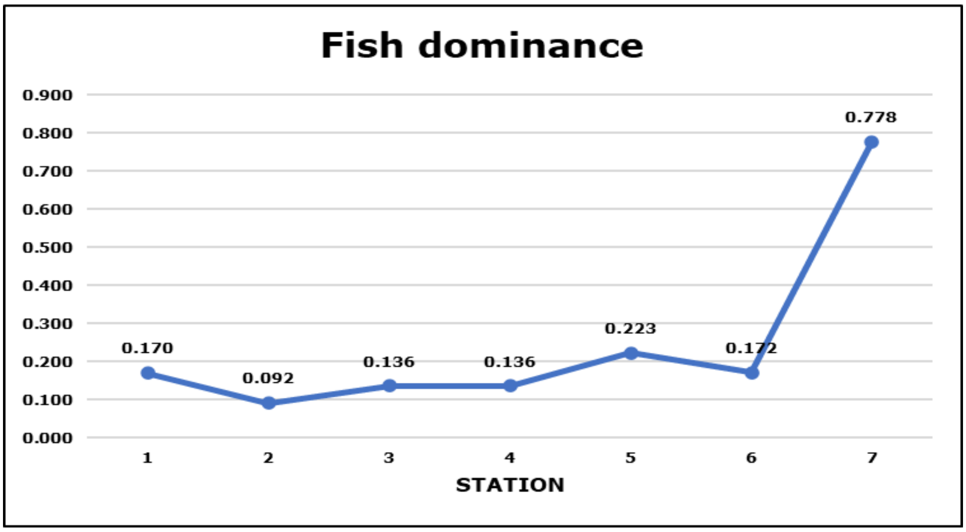

Figure 11. Fish dominance index.

Discussion. Water physico-chemical parameters such as brightness, temperature, TSS, pH, DO concentration of BOD, and COD, are some of the parameters that receive the most attention because they reflect water quality and the health of an aquatic ecosystem (Riyadi et al 2006). The results of water quality analysis in this study show the results of several parameters have exceeded the quality standards of fishery waters (Table 2), while the results of another research showed that the Jatigede reservoir waters are still within the limits to support the growth and breeding of fish resources (Djunaidah et al 2017). The results of water quality analysis in 2022 and 2017 show that there have been changes in the aquatic ecosystem of the Jatigede reservoir, susceptible to affect the lives of organisms. The brightness parameter at stations 1 to 7, show results ranging from 0.19 to 1.11 m, with the lowest brightness value at station 1 (the Cimanuk river inlet). At the time of sampling, in August 2022, the Jatigede reservoir was at a low tide of approximately 10 m from normal. According to Kordi & Tancung (2005), brightness is the ability of sunlight to penetrate towards the bottom of the water, while being affected by the turbidity of the waters. By determining the brightness value of water, it can be checked ifthe assimilation process in the waters is still possible. Good brightness for the life of fish and other biota should reach a minimum depth of 30 to 40 cm (Maniagasi et al 2013).

Climate change has caused water temperatures to rise in rivers, lakes, reservoirs and other freshwaters. Rising water temperatures will directly affect fish belonging to the poikilothermic group. The increase in temperature will increase the metabolic rate. The temperature will decreasethe solubility of oxygen in water (Syafei 2017). Temperature is influenced by several factors, including the level of light intensity arriving at the surface of the waters, weather conditions, clouds, and microbiological processes. Basically, the temperature is very influential on the life and growth of fish (Maniagasi et al 2013; Patty 2013). The temperature of the Jatigede Reservoir ranges from 26 to 29^{o}C, with the lowest temperature value at station 1. Normal temperatures for live fish range from 25 to 32ºC, but sudden temperature changes can stress fish. Temperature functions as a natural stimulus condition that determines several processes such as migration, egg laying and metabolism (Anas et al 2017). Water temperature plays an important role in the biological and chemical processes of aquatic organisms, such as metabolism and certain reactions in the water. Changes in temperature will affect the DO in waters: an increase of 10°C in water temperature causes an increase in oxygen consumption by aquatic organisms (Riyadi et al 2006).

Total Suspended Solid (TSS) are present in waters in the form of organic and inorganic materials which can be filtered through 0.45 µm porous millipore paper. The suspended matter has a negative impact on water quality because it reduces the penetration of sunlight into water bodies, by increasing water turbidity, causing growth disturbances to the organisms (Anas et al 2017; Riyadi et al 2006). Total Suspended Solid (TSS) in the waters of the Jatigede Reservoir range from 13.14 to 65 mg L^{-1}. The highest TSS value is at station 1. The TSS value that can be tolerated by fish, according to Government Regulation No. 22 of 2021, is 50 mg L^{-1} for class 2 and 100 mg L^{-1} for class 3, for fisheries. The higher the total suspended solids, the lower the productivity value of the waters. This is closely related to the process of photosynthesis and respiration of aquatic organisms. This TSS value plays a role in determining the environmental quality of waters (Winnarsih et al 2016). According to Effendi (2003), even though it is not toxic, the excessive suspended matter will hinder the penetration of sunlight into the water.

The degree of acidity (pH) is a description of the amount or activity of hydrogen ions in water. The degree of acidity indicates whether the water is acidic or alkaline. Waters with a pH value = 7 are neutral, pH <7 is considered acidic, while pH >7 alkaline (Effendi 2003). The degree of acidity has a great influence on aquatic plants and animals, so it is often used as a guide to indicate the good or bad state of water as the living environment for aquatic biota. The pH value in the Jatigede Reservoir ranges from 7.9–8.74, the highest pH value is at station 6, which is the floating net cage area and the lowest pH value is at station 4, which is the area near the settlement. The ideal degree of acidity (pH) for aquatic life is in the range of 6.5-8.5. The pH parameter is an important indicator in determining water quality. If the water pH <5 and or pH >9, it indicates that the water conditions are not good enough to support the life of organisms (Kostanti 2021). Changes in the pH value of the water can be influenced by several factors including one of the photosynthetic activities, temperature, and waste disposal (Anas et al 2017). Aquatic organisms require an optimal pH for growth and survival (Arum et al 2017).

Dissolved oxygen is a limiting parameter for fish, affecting survival, growth, spawning, swimming performance, larval development, and migratory behavior. The amount of oxygen needed by fish varies widely and depends on species, size, amount of food taken, activity, water temperature, dissolved oxygen concentration, and so on. Reduced dissolved oxygen will lead to hypoxic conditions (lack of oxygen), and can even become anoxia (lack of oxygen). This condition will greatly stress the fish and can be deadly (Syafei 2017). The DO values in the Jatigede Reservoir range from 4.0 to 5.3 mg L^{-1}; the lowest DO values are at station 2, which is in the floating net cage area and at station 4, the area near settlements. Dissolved oxygen in the water is a limiting factor for aquatic organisms in carrying out activities. The availability of oxygen for aquatic biota determines the cycle of activity, feed conversion, as well as the rate of growth. The minimum concentration limits and the role of DO in aquatic ecosystems reflect the ability of water bodies to adapt to the presence of pollutant loads. The minimum DO requirement for tropical freshwater fish is ±5 mg L^{-1}. The decrease in dissolved oxygen in the waters will be very dangerous, especially for aquatic life. Most fish in some polluted waters die, not because of the direct toxicity of the waste materials, but because of a lack of oxygen in the waters, which is consumed for the degradation of organic matter by microorganisms (Riyadi et al 2006).

BOD is a parameter that can also be used to describe the presence of organic matter in water. This is because BOD can describe the amount of organic matter that can be decomposed biologically, that is the amount of dissolved oxygen needed by microorganisms to break down or oxidize organic matter into carbon dioxide and water (Anas et al 2017). According to the Government Regulation No. 22 of 2021, the appropriate BOD value for live fish in freshwaters is 3 mg L^{-1} for class 2 and 6 mg$L^{-1}$for class 3, for fishery purposes, while the BOD value in the Jatigede reservoir has exceeded the limit, ranging from 3.6 to 7 mg L^{-1}. The highest BOD value is at station 1, which is the Cimanuk river inlet. The BOD in this station is high because this station has an excess of household waste arriving with the Cimanuk river and generated by the human activityaround the area, in particular agriculture.

COD is a value that describes the total oxygen required to chemically oxidize organic matter, both biodegradable and non-biodegradable to CO_2 and H_2O (Anas et al 2017). The COD value in the Jatigede reservoir ranges from 15.46 to 30.91 mg L^{-1}, with the highest COD value observed at station 1. The COD value can describe the amount of organic matter present in the waters. The COD that can be tolerated by fish, according to the Government Regulation No. 22 of 2021, is 25 mg L^{-1} in class 2 for fisheries.

Fish types and abundance in Jatigede Reservoir. Jatigede Reservoir is a freshwater ecosystem that provides fish, which can be a source of food and a source of income for the community. The fish identification and calculation of their abundance at the 7 stations showed that the most abundant species are freshwater crayfish, alias *Cherax quadricarinatus* (19.8%), and *Barbodes balleroides* (18.4%). In previous studies that have been conducted by (Andani et al 2017), the presence of crayfish was not observed, but there were discovered fish species that were not reported in this research work. Types of fish and their abundance based on each station can be seen in Figure 2-8. 12 species were identified at station 1 (the Cimanuk River inlet): *Oreochromis niloticus*, *Oreochromis mossambicus*, *B. balleroides*, *Oxyeleotris marmorata*, *Osteochilus hasseltii*, *Hampala macrolepidota*, *Cyprinus carpio*, *Channa striata*, *Liposarcus pardali*s, *Amphilophus labiatus*, *Hemichromis elongatus*, *Channa micropeltes.* The highest abundance at station 1 was observed for the species *B. balleroides* (33.9%), a native fish from the Cimanuk River (Herawati et al 2018). There are 103 species of fish from 41 families and 14 orders identified in the Cimanuk River (Tampubolon et al 2018). At station 2, 14 fish species were identified: *O. niloticus*, *O. mossambicus*, *B. balleroides*, *O.*

marmorata, H. macrolepidota, *C. carpio*, *C. striata*, *L. pardalis*, *Clarias batrachus*, *Mystus nemurus*, *Parachromis managuensis*, *A. labiatus*, *H. elongatus*, *Barbonymus gonionotus.* The type of fish that has the highest abundance is the type of fish *H. elongatus* (15.4%). At this station there are 3 types of species that have the same abundance, of 11.5%, namely the *B. balleroides* fish, *C. carpio* (an introduced invasive species, widely cultivated in the floating net cage, which can harm the ecosystem, according to Herawati et al 2020), and *P. managuensis* (an introduced predator fish). Station 2 has more types of fish than other stations because at this station there are many floating net cages and there are also 2 river inlets in the proximity, Cimuja and Cihonje rivers.

There are 11 types of fish species at station 3, which is the inlet area of the Cinambo River: *O. niloticus, O. mossambicus, B. balleroides, O. marmorata, H. macrolepidota, C. carpio, L. pardalis, M. nemurus, H. elongatus, Mystus nigriceps, C. micropeltes*. The most abundant fish species at station 3 is the *H. elongatus*, an introduced predatory fish. Introduced fish have the ability to adapt better, compared to native fish (Tampubolon et al 2014). Introduced fish can be a strong competitor. Coupled to a high fishing activity, they pressure the native fish populations (Hendrawan et al 2020). Station 4 is an area close to community settlements located on the edge of the Jatigede Reservoir. At this station, there are 11 types of fish species: *O. mossambicus, B. balleroides, O.marmorata, O. hasseltii, H. macrolepidota, C. carpio, L. pardalis, M. nemurus, P. managuensis, H. elongatus, Rasbora argyrotaenia.* The fish that had the highest abundance at station 4 was *L. pardalis* (27.3%), which lives at the bottom of the waters, due to the shallow waters at this location. Station 5 is positioned in the central area of the Jatigede Reservoir, with 6 species of fish: *B. balleroides, O. marmorata, H. macrolepidota, P. managuensis, A. labiatus, H. elongatus*. The fish that has the highest abundance is the *H. elongatus* (36.4%), an introduced predatory fish that can endanger the waters of the Jatigede Reservoir. The abundance of *H. elongatus* fish in the Jatigede Reservoir is

Station 6, in the floating net cage area (with only 4 unit floating net cages, which is less than in station 2), hosts 7 types of fish species, namely: *O. niloticus, O. mossambicus, B. balleroides, O. hasseltii, H. macrolepidota, A. labiatus, H. elongatus*. *O. mossambicus*, an introduced fish that has economic value and which is cultivated in floating net cages, has a higher abundance value (25%). The sampling station 7 is located near the dam. At this station, samples were taken in the waters near the surrounding land. There were found 2 types of fish, *B. balleroides* and *H. elongatus*, and 1 type of freshwater crayfish, *C. quadricarinatus* in this area. The highest abundance was found in *C. quadricarinatus* (87.8%), which is one of the many introduced species of crayfish (either intentionally or accidentally). Freshwater crayfish (*C. quadricarinatus*) have a wide tolerance, so that they can survive in various environmental conditions (Nurtami 2018).

Fish community structure. Community structure is an assemblage of individuals from several species, that are organized as a community (Krebs 1978). Community structure is usually determined by composition, diversity, abundance, dominance, and distribution (Odum 1971). Community structure is a concept that studies the arrangement or composition of species and their abundance in a community (Duwiri 2013). Community structure in freshwater can be seen from environmental conditions and food availability. Community structure can be studied based on the results of the size composition and species diversity in the habitat (Herawati et al 2020). The fish community structure in an ecosystem is determined by the availability of food resources (Moreno & Castro 1995; Tjahjo & Purnamaningtyas 2008). Competition and predation are one of the factors that affect the distribution patterns of fish, both temporally and spatially (Akin et al 2005; Warsa et al 2016). Fish community structure can be described by looking at the fish diversity index, fish evenness index, and fish dominance index. Diversity is the relationship between the number of species and the number of individuals of each species in a community (Kottelat et al 1993). Diversity in fish species describes the entire scope of ecological adaptation and the evolution of species in a particular environment. Therefore, the diversity of fish can differ from one location to another. The spatial (geographic) distribution of fish is called ichthyography (Syafei 2017). The fish diversity index in the Jatigede reservoir ranges from 0.457 to 2.505 which means low to moderate fish diversity (Figure 9). The lowest fish diversity was recorded at station 7, which is the area near the dam, while the highest fish diversity was at station 2, that is the floating net cage area. The highest fish diversity in station 2 is in line with the fish abundance value. The evenness index (E) indicates that the fish species are not distributed homogenously and there are fish species that dominate (Hendrawan et al 2020). The fish evenness index in the Jatigede reservoir ranges from 0.416 to 0.949. Jatigede Reservoir has an evenness of fish which are moderate to high or in the unstable community to stable community. The lowest evenness index value is at station 7 and the highest evenness index is at station 2 (Figure 10). The dominance index in Jatigede Reservoir ranges from low to high, with an index value of 0.092–0.778 (Figure 11). The lowest dominance index is at station 2 and the highest is at station 7. The dominance index (D) indicates a more prevalent fish species (Hendrawan et al 2020) and also that the water body has been degraded. This has an impact on the instability of fish communities, where only a small proportion of fish species are able to grow and develop rapidly. Fish that are able to dominate tend to be opportunistic towards existing environmental conditions (Hedianto & Purnamaningtyas 2011). The community structure reflects the quality of body water and its ability to provide fish resources to the surrounding community, as a provisioning ecosystem service. Moreover, the fish resources in the Jatigede reservoir are needed by the local community as a source of income (Sjafrie 2016). The data from the abundance and fish community structure can be an input to make a sustainable fisheries resource management plan in Jatigede Reservoir.

Conclusions. In general, the water quality in the Jatigede Reservoir shows water conditions that threaten fish life. This can be seen from the water quality parameters such as brightness, TSS, BOD and COD, which have values out of the range of appropriate water quality values for fish life and development. In the Jatigede reservoir, there were identified 18 species of fish and 1 type of freshwater crayfish. Overall, the fish with the highest abundance was the crayfish *C. quadricarinatus* (19.8%) and the fish *B. balleroides* (18.4%). Of the 7 observation stations, only station 2 (in the floating net cage area), has a higher diversity than the other observation stations, namely 14 fish species. The fish diversity index in the Jatigede Reservoir ranges from 0.457 to 2.505, which means low to moderate. The fish evenness index is 0.416–0.949, which is moderate to high, and the fish dominance index ranges from low to high with an index value of 0.092–0.778.

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