

Mapping The Distribution Of Fish Caught In The Jatigede Reservoir

ABSTRACT

This research aims to map the structure of the fish community that lives based on the catch in the Jatigede Reservoir inundation area. This research uses the field observation method by taking fish samples every 14 days and carried out 6 times. The results of the research show that the number of fish caught during the research was 799 individuals and the types of fish identified at 6 Jatigede Reservoir stations consisted of 9 families consisting of 18 species. The type of fish that had the highest abundance was pepetek fish at station 1. At stations 2, 3, 4 and 5, the fish that had the highest abundance was hampal fish, and at station 6 the fish with the highest abundance was boboso fish. The distribution of native fish is more dominant than introduced fish with a comparison of 11 native fish species and 7 introduced fish species. The water quality at each station still meets the requirements of environmental quality standards based on Government Regulation (Indonesia) Number 22 of 2021 concerning water quality standards and is suitable for fish life.

Keywords: Jatigede Reservoir; mapping; abundance; water quality

1. INTRODUCTION

The waters of the Jatigede Reservoir at the time it was inundated in 2015 experienced a change in the ecosystem, from a river ecosystem with flowing waters (lotic) to a reservoir ecosystem with stagnant waters (lentic). There change from the lotic ecosystem to a lentic ecosystem can affect changes in the abundance and composition of fish species and have an impact on the habitat, behavior, and food habits of fish. This is to Jubaedah's (2006) statement that changes in the ecosystem from flowing to inundated are thought to cause changes in the composition of species and fish populations [1].

At the beginning of the inundation of the original fish species of the Cimanuk River which increased quantitatively and spread evenly, namely lalawak fish and hampal fish. According to fishermen, catches in 2016 reached 25 kg to 50 kg per day. Meanwhile, in 2017 it decreased from 2 kg to 3 kg per day. The decline in catches was due to the increase in the number of fishermen, the number and types of catches, and the absence of institutions that regulate fishing activities in the Jatigede Reservoir [2]. If excessive fishing activities continue to be carried out and there is no management of capture fisheries resources, the fish in the Jatigede Reservoir will eventually experience extinction.

To support capture fisheries activities, it is necessary to manage natural fisheries through restocking, fish introduction, and conservation. This management is one of the efforts to increase the stock of caught fish to be stocked in the waters of the Jatigede Reservoir. However, management for adding fish stocks cannot be done arbitrarily because the presence of new fish or introduced fish does not directly have a positive impact on Indonesian aquatic ecosystems. This introduced fish is known to be aggressive and potentially invasive to native Indonesian fish [3].

Based on these conditions, it is necessary to conduct research on the distribution of fish by mapping. Mapping analysis required a system called Geographic Information System (GIS). Arcview is one of the GIS tools that can visualize, investigate (explore), answer (query) data related to spatial and non-spatial data, and analyze data geographically. The combination of GIS and studies of several ecological aspects of the fish community, such as distribution patterns, the composition of fish species, and fish community structure, will be very useful in providing information on the existence and sustainability of fish [4]. In line with this statement, this research aims to map the structure of the fish community that lives based on the catch in the inundation area of the Jatigede Reservoir.

2. MATERIAL AND METHODS

2.1 Time and Place

This research was carried out from August to October 2021 in Jatigede Reservoir with fish sampling intervals every 14 days, 6 samples were taken, sampling was carried out at 6 stations (Figure 1).

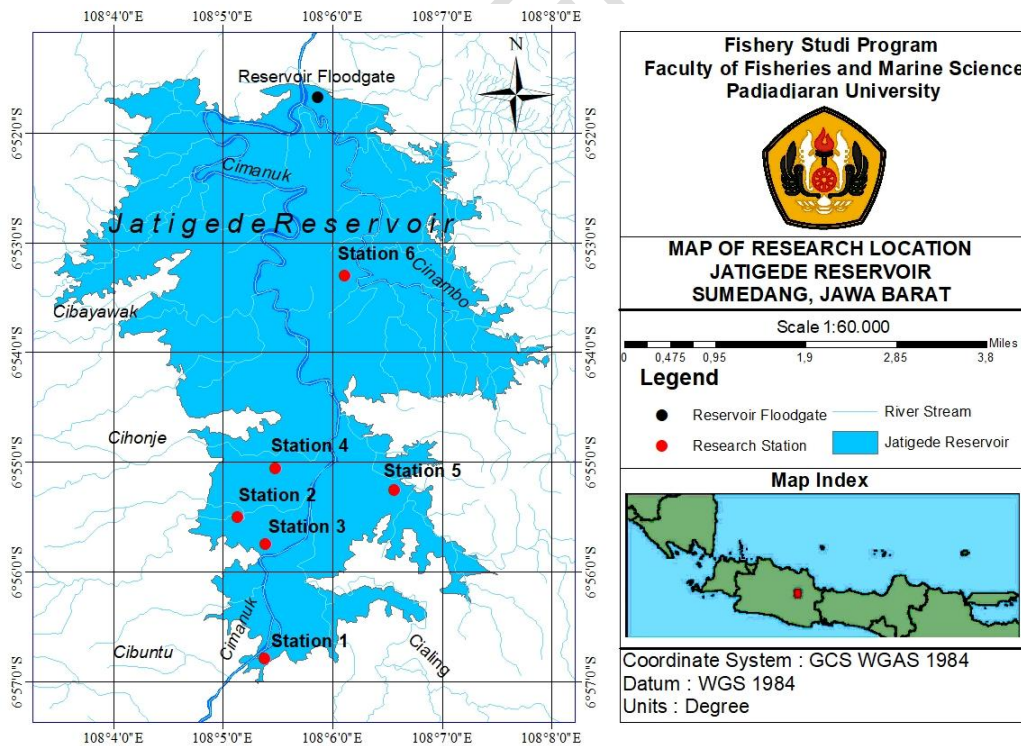


Figure 1. Research Location Map

Station 1 : The main inlet is sourced from the Cimanuk River, this station is a

- riverine zone. With coordinates 6°55'48,9"S & 108°5'24,0"E
- Station 2 : The riverine zone that flows from the cialing river. With coordinates 6°55'50,2"S & 108°5'42,3"E
- Station 3 : The location where water comes from two small rivers, namely the Cimuja River and the Cijajaway River. This station is *riverine zone*. With coordinates 6°55'59,3"S & 108°5'01,2"E
- Station 4 : The transition zone with water supply comes from the Cihonje River, Cimuja River, and Cacaban River. At station 4 there is a catch fishery activity. With coordinates 6°55'02,9"S & 108°5'28,3"E
- Station 5 : The estuary of the Cacaban River and the beginning enter the flooded zone. At station 5 there are fishing activities using gillnets. With coordinates 6°55'18,0"S & 108°6'45,6"E
- Station 6 : The location of station 6 is a flooded zone. At this station, there is rarely catch fishery activity because of the strong winds. with coordinates 6°54'23,6"S & 108°6'19,9"E

2.2 Research Methods

The research method used in the sampling of fish is a field observation method with a purposive sampling technique. The fish caught were identified descriptively to obtain a complete description of each species of fish species at each station.

2.3 Data Analysis

Data analysis used the quantitative descriptive method by providing an overview of the species and abundance of fish. Furthermore, the data from the analysis is depicted on a map with the help of ArcMap GIS 10.3 software and Microsoft Excel. Analysis of catch composition, water quality measurements, and physical and chemical measurements such as temperature, light transparency, carbon dioxide (CO₂), acidity (pH), and dissolved oxygen (DO) were carried out in Jatigede Reservoir. For fish identification and chemical measurements, ammonia (NH₃) was analyzed at the Laboratory of Aquatic Resources Management, Faculty of Fisheries and Marine Sciences, Padjadjaran University.

3. RESULTS AND DISCUSSION

The composition of fish caught in the Jatigede Reservoir was 799 individuals, covering 18 species from 9 families. The following is the composition of caught fish during the research (Table 1).

Family	Local Name	Common Name	Scientific Name	Based On Origin		Based On Biodiversity			Station						
				Native	Introduced	Invasive	Protected	Prohibited	1	2	3	4	5	6	
Cyprinidae	Gengehek	Beardless barb	<i>Mystacoleucus marginatus</i> (Valenciennes, 1842)	√			√ L C		1						
	Paray	Silver rasbora	<i>Rasbora argyrotaenia</i> (Hubbs & Brittan,	√			√ L C		1						

ramp hidae	ng- Julu ng	<i>ng half beak</i>	<i>maxillus</i> (Kuhl & Van Hasselt, 1823)				D							
Presentase (%)				6 1 %	39 %	33 %	61 %	6%						

Table 1. Types of Fish Caught in Jatigede Reservoir

Source : IUCN Redlist and Fishbase.org
Description : LC= Least Concern, VU= Vulnerable, DD= Data Deficient

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The results showed that the distribution of native fish in the Jatigede Reservoir was more dominant than the introduced fish in the Jatigede Reservoir with a ratio of 11 native fish species and 7 introduced fish species identified. At all stations, there are fish 18 species of fish caught, the fish that were included in the red list status were boboso, senggaringan, gengehek, paray, pepetek, sapu-sapu, nila, hampal, lalawak, patin, keting, marinir, oskar, tagih, and bungo with the category of Least Concern (LC). Meanwhile, goldfish and mujair fish are included in the *Vulnerable* (VU) category and julung-julung fish are included in the *Data Deficient* (DD) category.

The LC category is a category given to species that have been evaluated but do not fall into any category. Meanwhile, the VU category is vulnerable or near endangered, this category is given to species that are facing the risk of extinction in the wild in the future. And the DD category is a taxon that is declared “uninformed” when the available information is insufficient to estimate its extinction risk based on the distribution and status of the population [5].

3.1 Fish Abundance

The abundance of fish at each station in the waters of the Jatigede Reservoir during the research can be seen in Figure 2.

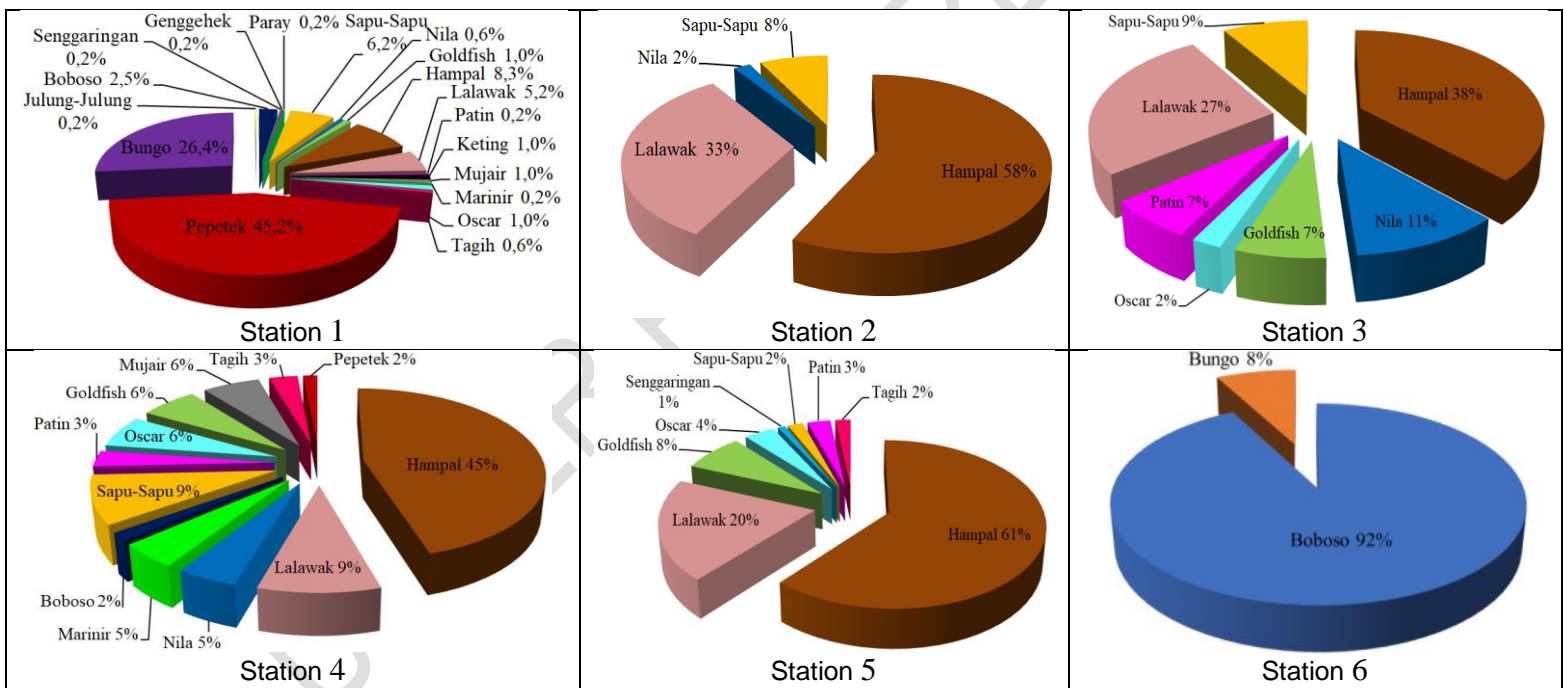


Figure 2. Graph of Fish Abundance Caught at Stations 1,2,3,4,5, and 6

The fish that had the highest abundance at station 1 was pepetek fish, stations 2,3,4, and 5 were hampal fish, and at station 6 boboso fish. Fish species that have a high abundance value are due to their ability to adapt to the surrounding environment and utilize the potential of existing resources to carry out their necessities of life. According to Gonawi (2009) Individuals who are in groups or *schooling* and have large numbers can affect the high abundance because they are usually found in very abundant quantities in each identification [6].

3.2 Mapping The Distribution of Fish Species

The mapping of the distribution of fish species in the Jatigede Reservoir based on fish abundance can be seen in (Figure 3).

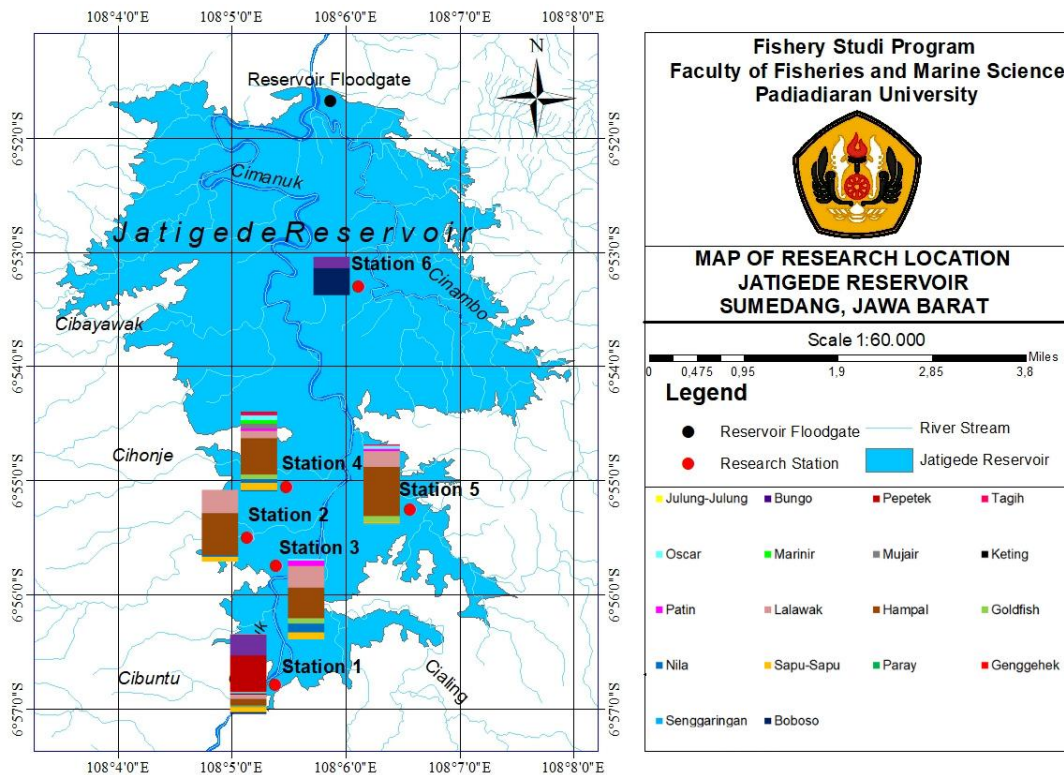


Figure 3. Map of Fish Species Distribution of Jatigede Reservoir

The distribution of fish species in Jatigede Reservoir can be distinguished based on origin, namely native fish (indigenous) and introduced fish, and differentiated based on protected fish species based on data from the IUCN (International Union for Conservation of Nature and Natural Resources) Redlist. The results showed that the distribution of native fish in the Jatigede Reservoir was more dominant than the introduced fish in the Jatigede Reservoir with a ratio of 11 native fish species and 7 introduced fish species.

At station 1, the fish identified were boboso, senggaringan, genggehek, paray, pepetek, sapu-sapu, nila, goldfish, hampal, lalawak, patin, keting, mujair, marinir, oscar, tagih, pepetek, bungo, and julung-julung. There are 11 native fish species and 7 introduced fish. At station 2, the fish identified were hampal, lalawak, nila, and sapu-sapu. There are 2 native fish species and 2 introduced fish. At station 3, the fish identified were hampal, nila, goldfish, oscar, patin, lalawak, and sapu-sapu. There are 2 native fish species and 5 introduced fish. At station 4, the fish identified were hampal, lalawak, nila, marinir, boboso, sapu-sapu, patin, oscar, goldfish, mujair, tagih, and pepetek. There are 5 native fish species and 7 introduced fish. At station 5, the fish identified were hampal, lalawak, goldfish, oscar, senggaringan, sapu-sapu, patin, and tagih. There are 4 native fish species and 4 introduced fish species. At station 6 the fish identified were boboso and bungo. There are 2 species of native fish.

3.3 Water Quality of Jatigede Reservoir

The results of observations of physical and chemical parameters can be seen in (Table 2).

Table 2. Water Quality Parameters

Parameters	Unit	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Class II*	Class III*
Physical									
Temperature	°C	28,0	28,3	28,4	28,2	28,4	28,6	Dev 3	Dev 3
Light transparency	cm	45	47	43	65	69	81	-	-
Chemical									
pH	-	6,0	6,6	7,1	6,8	6,1	6,3	6-9	6-9
CO ₂	mgL ⁻¹	33,3	23,3	23,3	20,0	26,7	20,0	-	-
DO	mgL ⁻¹	5,50	4,63	5,13	5,43	4,53	5,53	4	3
NH ₃	mgL ⁻¹	0,0025	0,0023	0,0030	0,0025	0,0018	0,0028	0,2	0,5

The results of temperature measurements in the Jatigede Reservoir ranged from 28,0°C to 28,6°C. The temperature range showed that the water conditions of the Jatigede Reservoir were still good in supporting fish life. Aquatic organisms such as fish and shrimp are able to live well in the temperature range between 20°C to 30°C [7]. The range of temperature values is in accordance with Government Regulation Number 22 of 2021, the temperature value in class II and class III waters is a deviation of 3. So that the temperature value in the Jatigede Reservoir has met the water quality standards. The results of the measurement of light transparency in the Jatigede Reservoir ranged from 43 cm to 81 cm. The value of transparency is influenced by suspended materials, in the form of fine particles and colloids which can cause turbidity and result in a lack of light penetration into the waters. High turbidity can cause disruption of the osmoregulation system such as breathing and disrupt the life of fish in foraging because of impaired vision and can cause stress and even death in fish.

The results of pH measurements in the Jatigede Reservoir ranged from 6,0 to 7,1. The pH value obtained in the waters of the Jatigede Reservoir is still good enough to support the life of aquatic organisms such as fish. This is by Government Regulation No. 22 of 2021, the pH value in class II and class III waters is 6 to 9. So that the pH value in the Jatigede Reservoir has met the quality standard for fisheries. The results of CO₂ measurements in the Jatigede Reservoir at each station ranged from 20,0 to 33,3 mgL⁻¹. In general, carbon dioxide levels in the waters range from 10 to 30 mgL⁻¹, this range is very good for aquatic plants and not harmful to fish. However, if it is more than that, it will be very dangerous because it inhibits the binding of oxygen (O₂) and if the CO₂ level has exceeded 40 mgL⁻¹, the fish will die [8]. So the range of CO₂ values in the waters of the Jatigede Reservoir is still quite good for aquatic organisms such as fish.

The results of the measurement of dissolved oxygen in the Jatigede Reservoir at each station ranged from 4,53 to 5,53 mgL⁻¹. If the dissolved oxygen concentration decreases, it will affect aquatic organisms, especially organisms such as fish. According to Government Regulation No. 22 of 2021, the DO value in class II waters is 4 mgL⁻¹ and class III is 3 mgL⁻¹. So the DO value in Jatigede Reservoir at each station still meets the quality standards for fish life. The results of the analysis showed that the ammonia value in the waters of the

Jatigede Reservoir ranged from 0,0018 to 0,0030 mgL⁻¹. This value is by the water quality standards set according to Government Regulation no. 22 the Year 2021 the value of ammonia in class II waters is 0,2 mgL⁻¹ and class III is 0,5 mgL⁻¹. So the ammonia levels in the waters of the Jatigede Reservoir at each station still meet the quality standards for fish life. According to Makmur *et al.* (2012) Ammonia in the waters generally comes from the decomposition of organic matter residues and the results of fish metabolism [9]. The higher the organic matter in the waters, also the higher the concentration of ammonia in the waters.

4. CONCLUSION

Fish species identified at 6 stations in Jatigede Reservoir consisted of 9 families, namely Cyprinidae, Cichlidae, Bagridae, Eleotridae, Ambassidae, Loricariidae, Pangasiidae, Gobiidae, and hemiramphidae which consisted of 18 species. The distribution of native fish in the Jatigede Reservoir is more dominant than the introduced fish in the Jatigede Reservoir with a ratio of 11 native fish species and 7 introduced fish species. The water quality at each station still meets the requirements of environmental quality standards based on Government Regulation Number 22 of 2021 concerning water quality standards and is suitable for fish life.

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