Food Habits of Hampala Fish (Hampala macrolepidota, Kuhl & Van Hasselt 1823) In Jatigede Reservoir Sumedang Regency, West Java Province

Nur Indah Islami[1*] Roffi Grandiosa Herman[1] Titin Herawati [2] Sunarto[3]

[1] *Fisheries Department, Padjadjaran University*
[2] *Marine Conservation Master Department, Padjadjaran University*
[3] *Marine Science, Padjadjaran University*
Jl. Raya Bandung-Sumedang KM. 21 Jatinangor, Sumedang, Indonesia

ABSTRACT

This research was conducted in Jatigede Reservoir, Sumedang Regency, West Java from November 2020 – August 2021 which aims to determine the food habits of the hampala by analyzing the gastric contents of the fish. The method used in this study is a survey method using purposive sampling in sampling and fisheries biology methods in analyzing food habits aspect. Based on the results of the study, the hollow fish has a false stomach and an intestine that is shorter than its body length and bulging in the front intestine. These fish utilize natural food in the form of animal fractions and detritus as the main food, plants and insects as a complementary food, and worms and crustaceans as additional food. The trophic level is at number 2.9, which means that the hollow fish is omnivorous and tends to be carnivorous.

Keywords: *Hampala fish; Food Habits; Jatigede Reservoir*

1. INTRODUCTION

Fishery resources in Jatigede Reservoir consist of native fish and introduced fish. The types of fish identified in the Jatigede Reservoir are 11 families consisting of 25 species, one of which is the Hampala Fish (Hampala macrolepidota [1][2]. Hampala, kebarau or adungan fish are freshwater fish originating from the family Cyprinidae which are still closely related to goldfish [3]. The distinctive feature of this fish is to have a tail fin that is orange to red with a black border that runs along the lobe [4].

Phallus fish have economic value [5] and are sought after quite a lot so fishermen take advantage of these fish to be sold as consumption fish or freshwater ornamental fish because these fish have fairly large black spots on their bodies. Along with the market demand for Hampala Fish, the fishing activity for this fish is increasing and it is feared that there will be a decline in population if development and management are not immediately carried out.

The first step in the management of the Hampala Fish is domestication. For this domestication effort to be successful, one of the important aspects that must be considered is the food habits of fish. Because when doing domestication, it is recommended not to give something new that can cause stress to fish and then die so that it can reduce fish populations [6]. An organism can live and develop because it gets energy from the food eaten by fish. So that one of the most important factors for an organism is food, which can also control the size of a population,

and determine the spread of a species. In the stomach, food is divided into main meals and complementary foods. To determine whether a fish is a predator or a competitor, it can be seen from the food eaten by the fish [7].

In addition, water quality parameters such as temperature, dissolved oxygen, pH, and ammonia have a direct influence on the survival of fish in water. Mass mortality of fish in waters can be caused by several factors such as low dissolved oxygen levels, excessive algae growth, sudden changes in water temperature, parasites, disease, and pollution [8]. Water quality also affects the availability of fish food which has an impact on the growth, condition, and population of fish in these waters and can cause extinction [9].

Based on this background, it is necessary to conduct research on the food habits of fish by analyzing the stomach contents of the Hampala Fish.

2. METHODOLOGY

2.1 Materials and Tools

The main ingredient used in this research is the tuna fish obtained from the Jatigede Reservoir, Sumedang Regency. The materials used in analyzing fish hulls are 5% formalin solution and ice cubes. The tools used during the research were a thermometer, Secchi disk, DO meter, pH meter, gillnet, cool box, ruler, scissors, petri dish, dropper, object glass, and microscope.

2.2 Time and Place

This research was conducted from November 2020 – August 2021. The time of research was carried out based on the determination of the climate and weather around the waters of the Jatigede Reservoir. The climate and weather in the waters of the Jatigede Reservoir are classified by month. The rainy season is from December – April, the transition season from rainy to dry in May, the dry season in June – October, and the transition season from dry to rainy in November [10]. Research activities consist of insitu and exsitu research. Insitu research is sampling and measuring the water quality of Jatigede Reservoir which includes temperature, DO, and pH. While the exitu research is an analysis of the eating habits of the hollow fish (Hampala macrolepidota) with fisheries biology methods at the Laboratory of Aquatic Resources Management, Faculty of Fisheries and Marine Sciences, Padjadjaran University.

2.3 Research Method

The method used in this research is a survey method. The method used in sampling is purposive sampling, namely the technique of determining the sample so that it is relevant to the research structure with certain considerations [11] and fisheries biology methods in analyzing growth aspects. The study was conducted at 5 research stations with 2 sampling times. In determining the research station, it is based on the fishing activities and the consideration of the maximum catch of Hampala Fish.

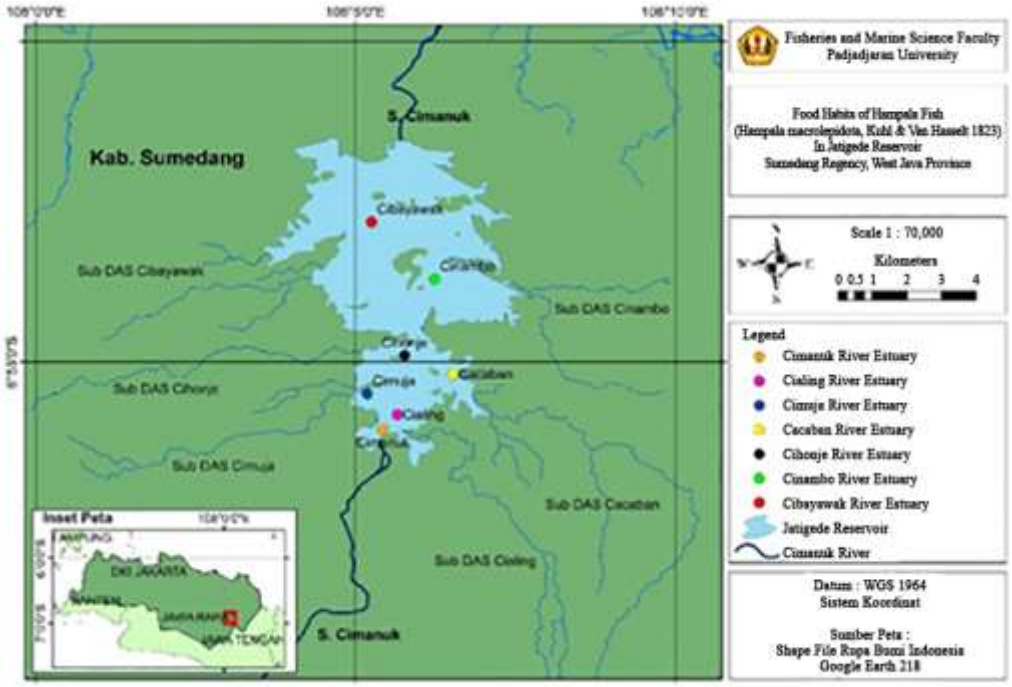

Figure 1. Research Station Location Map

a. Fish Sampling Procedure in Jatigede Reservoir

The samples of the Hampala Fish were obtained directly from fishermen who caught fish in the Jatigede Reservoir using gillnet nets with a mesh size of 4 cm – 6 cm. The samples that have been obtained are put into a cool box, then arranged with the large-size fish under the small fish, then ice cubes are added. After that, the samples were taken to the Laboratory of Aquatic Resources Management, Faculty of Fisheries and Marine Sciences, Padjadjaran University to be analyzed for their food habits.

b. Hampala Fish Eating Habit Analysis Procedure

The intestines of the hollow fish were taken and the length was measured using a millimeter block and a ruler, then the stomach and part of the intestines were cut using a knife or scissors to remove the contents and put into a petri dish. The contents of the intestines of fish in a petri dish were given 4 drops of 5% formalin solution and then placed on an object glass to be observed under a microscope. Types of food available, the amount, and the type are recorded.

c. Procedure for Measurement of Physical and Chemical Factors

Measurement of water temperature using a thermometer which at the end of the tool is inserted for ± 3 minutes into the waters. Then, the scale on the thermometer is read to determine the water temperature, then the results are recorded.

Measurement of light transparency using a Secchi disk whose instrument is inserted into the waters to an extent that is not visible into the body of water, then the distance is measured and the result is recorded as SD 1. The Secchi disk instrument is lifted back up to the extent visible for the first time from the body. water, then the distance is measured and the result is recorded as SD 2. Then, the light transparency is calculated and the result is recorded.

Measurement of Dissolved Oxygen (DO) using a DO Meter. The DO meter probe is calibrated using a buffer solution, then the DO meter probe is inserted into the water until the numbers on the monitor do not change, then the DO value of the water is read, then the results are recorded.

Measurement of the degree of acidity (pH) using a pH meter. The pH meter probe is calibrated using a buffer solution, then the pH meter probe is inserted into the water until the numbers on the monitor do not change, then the pH value of the water is read, then the results are recorded.

2.4 Observed Parameters

a. Index of Preponderance

According to [12] the largest part index is a combination of the frequency of occurrence and volumetric methods with the formula:

$$Ii = \frac{\text{Vi x Oi}}{\sum_{i=1}^{n} \text{Vi x Oi}} \text{ x 100} \quad \text{…….. (1)}$$

Where:
Ii = Index of Preponderance;
Vi = volume percentage of one kind of food;
Oi = percentage of the frequency of occurrence of one type of food;
∑(Vi x Oi) = the amount of Vi x Oi of all types of food

b. Trophic Level

The formula used in determining the trophic level is as follows.

$$Tp = 1 + \sum \left(\frac{Ttp \times Ii}{100} \right) \quad \text{…….. (2)}$$

Where:
Tp = trophic level;
Ttp = trophic level of feed;
Ii = Index of Preponderance

c. Water Quality

The measured water quality includes physical parameters such as temperature using a thermometer, light transparency using a Secchi disk, as well as chemical parameters such as pH using a pH meter and DO using a DO meter.

2.5 Data Analysis

The index of Preponderance, trophic level, and water quality from observations were analyzed descriptively.

3. RESULT AND DISCUSSION

3.1 Anatomical Structure of the Digestive Tract of Hampala Fish

Based on observations, Hampala Fish have hard gill filters and stiff and sharp spikes. The mouth cavity of the Hampala Fish has a large and strong opening with a terminal mouth position, which is the position of the mouth at the tip of the nose. The hollow fish has a false stomach and an intestine that is shorter than the length of the fish's body and is bulging at the front of the intestine.

This is per the statement [13], that carnivorous fish have stiff gill filters, a strong and sharp oral cavity in general, a stomach with a variety of shapes, and a short intestine that is shorter than the body. The hollow fish has a terminal mouth position with a large mouth opening, and in its mouth cavity, it has no teeth, hard and spiny gill arches, and a false stomach or modified intestine or in the front part of the intestine bulging.

3.2 Index of Preponderance

The index of propenderance can be seen in figure 2 below:

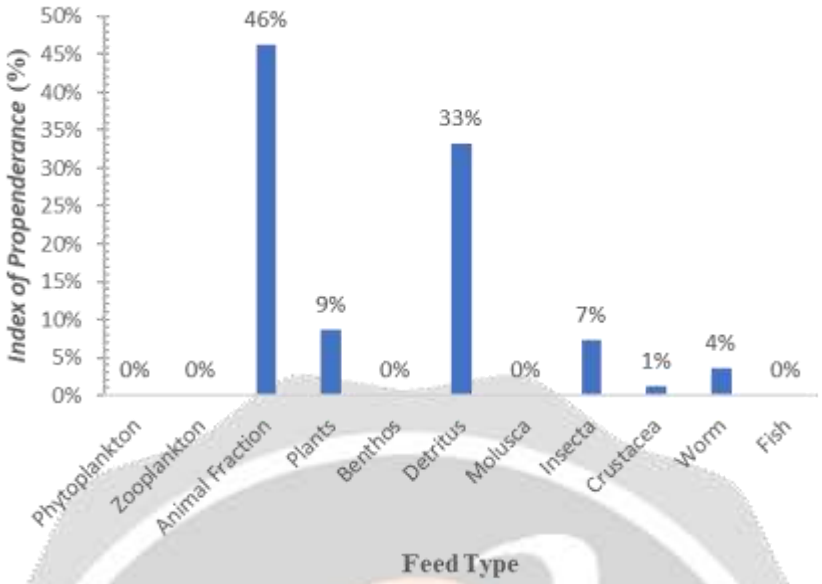

Figure 2**.** Indeks of Propenderance Hampala Fish

Based on observations, the highest IP value of all types of food contained in the stomach of the Hampala Fish is the animal fraction with a percentage of 46%, then detritus by 33%, plants by 9%, insects by 7%, worms by 4%, and crustaceans by 1 %. From the results of the analysis of the IP value, it can be categorized as the main food, complimentary food, and additional food for Hampala Fish in the transitional season. The main types of food for Hampala Fish during the transitional season were animal and detritus fractions because their IP values reached 46% and 33%, respectively. Meanwhile, the complementary food for Hampala Fish is plants and insects, and the additional food is worms and crustaceans.

In research [14], Hampala Fish in Djuanda Reservoir has the main food in the form of fish. Then in research [15], the main food of the pangasius fish in the Kampar Kiri River is fish with an IP value of 100%. Meanwhile, the Hampala Fish in the Jatigede Reservoir research area had animal and detritus fractions as the main food, as well as plants and insects as a complementary food. This may be because the availability of food in the study area has an unequal distribution, and is caused by factors that affect the waters, such as seasons. The statement [16], that in general the fertility of water bodies to the availability of food always fluctuates due to changes in climate and environmental conditions that depend on the season. The difference in the proportions of Hampala Fish shows that each fish has different eating habits depending on how the fish get food, where the food is obtained when the fish are actively looking for food, and the environmental conditions the fish live in [15].

3.3 Trophic Level

Based on observations, Hampala Fish caught in the Jatigede Reservoir during the transition season from the dry season to the rainy season has a trophic level of 2.9, which means that the shark is omnivorous and tends to be carnivorous. This can be seen from the type of food in the stomach of the Hampala Fish in the form of animal fractions and detritus as the main food, plants, and insects as a complementary food, and worms and crustaceans as additional food.

Meanwhile in the study [17], Hampala Fish in Wadaslintang Reservoir had a trophic level of 3.5. This trophic level difference can be caused by several factors such as fishing, availability of food in different waters caused by seasons, and environmental changes. This is per the statement [12], that the eating habits of fish can change if there is a change in the environment. Thus, the possibility that can occur is that the porpoise fish which was originally a true carnivore became a carnivore that tends to be omnivorous because of environmental changes in the research location which caused the availability of food to be large.

3.4 Water Quality as Support for Hampala Fish Growth

The water temperature at the five research stations ranged from 28ºC – 29ºC, while the optimum water temperature for fish life in tropical waters ranged from 25ºC – 32ºC. To produce optimal energy for fish growth, an optimum temperature is needed to encourage digestive and metabolic enzymes to work effectively [18]. If the activity of metabolic enzymes increases, the rate of metabolic processes will be faster and the levels of metabolites in the blood will be higher which will cause fish to have an appetite and get hungry quickly [19].

The brightness at the five research stations ranged from 70 cm – 93.8 cm, which means this value is above the water quality criteria that have been determined. Good brightness for fish life has a value of more than 45 cm [20]. The high value of brightness at the five research stations is due to the observation time being carried out during the transition season from dry to rainy which causes the water to not be too cloudy so that there is no stirring of the water mass.

At the five research stations, the pH values ranged from 6.7 to 8.3. The pH value is considered ideal based on the criteria of Class III Water Quality Government Regulation no. 82 of 2001. If the pH value is low, the solubility of metals in the water will increase and be toxic so that it can cause various disorders such as metabolism and respiration which will endanger the survival of aquatic organisms including benthos, whereas if the pH value is high then the concentration of ammonia in the water will increase which is also toxic for the survival of aquatic organisms [21].

Dissolved oxygen is an indicator of water quality, productivity, ecological status, and the state of a water body [22]. Dissolved oxygen is used in metabolism or the exchange of substances that will produce energy for growth and reproduction [23]. Dissolved oxygen at the five research stations ranged from 6.6 mg/L – 7.8 mg/L. According to [24]), if the dissolved oxygen is greater than 5.0 mg/L then aquatic organisms will live well. The condition of the water that is always moving causes the diffusion of oxygen from the air to produce highly dissolved oxygen.

4. CONCLUSIONS

The type of food caught by Hampala Fish fish is in the form of animal fractions and detritus as the main food, plants, and insects as a complementary food, as well as worms and crustaceans as additional food, and are omnivorous and tend to be carnivorous. Water quality in the form of temperatures ranging from 28ºC - 29ºC, with brightness ranging from 70 cm – 93.8 cm, pH ranging from 6.7 to 8.3, and DO ranging from 6.6 mg/L – 7.8 mg/L.

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