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Growth Pattern of Silver Barb, *Barbonymus gonionotus* (Bleeker, 1850) in the Cipanas Reservoir Plan of West Java Province

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Cipanas Reservoir, Growth, Length, Silver Barb, Weight.

ABSTRACT

Silver Barb (*Barbonymus gonionotus*) is a native fish that is well known in Indonesia and has the potential to become one of the aquaculture commodities. Silver Barb can live well in rivers, flood plains to reservoirs. In 2016 the construction of the Cipanas Dam began to be carried out which will hamper the flow of the Cipanas River so that it changes the pattern of river flow from flowing into stagnant which indirectly impacts on the habitat of aquatic organisms. Changes in river habitat will have an impact on the survival of these organisms, both growth, reproduction and eating habits. Therefore, this research aims to analyze the growth pattern of Silver Barb in the Cipanas River which has the potential to become a cultivation species in the Cipanas Reservoir in West Java Province. The method used is a survey method with purposive sampling technique at the coordinates of the sampling point 6° 41' 51" LS - 6° 38' 53" LS and 108° 01' 32" BT - 108° 02' 53" BT. The research was conducted in June - October 2018. Silver Barb caught in the waters of the Cipanas River consist of seven size classes. The most caught size classes are fish that are still in the growth stage, measuring 125 - 146 mm by 25.71%. Fish growth patterns follow the regression equation y = 3.1692 - 0.000006x. b = 3.1692 means that the growth pattern is positive allometric. Fish reach maximum weight when measuring between 147 - 168 mm in length. The condition factor of Silver Barb fish ranged from 0.82 - 1.10 with weight gain proportional to the increase in length to a certain length (point of reflection).

1. INTRODUCTION

Cipanas River is a river that crosses three regencies in West Java Province, namely Sumedang, Majalengka and Indramayu Regencies, as well as being an administrative boundary for the three regencies. The river has a length of around 90 km which is upstream in Buah Dua Village, Sumedang Regency and downstream in Indramayu Regency which empties into the Java Sea with an area of the River Basin of around 416 km2 (Central Center for Data and Information on Water Resources 2017). Cipanas Reservoir is one of the reservoir plans located on the border of Sumedang Regency and Indramayu Regency, West Java Province with a total inundation area of 1,378.16 ha covering 5 villages in 2 districts, namely Cibubuan, Karanglayung and Ungkal, Conggeang District, Cibuluh Village, Ujung Jaya District in Sumedang Regency and Cikawung Village, Terisi District in Indramayu Regency (Central Researchof River Cimanuk-Cisanggarung 2013). Reservoir is a body of stagnant water due to a transverse construction of a river / dam made of rock, soil or walls made by blocking the flow of the river.

This reservoir is one of the reservoirs entered into one of the strategic projects of seven reservoirs built in West Java that will have several benefits, including flood control by cutting flood discharge by 475 m^3/sec, irrigating 10,500 ha of agricultural land, water suppliers standard of 0.50 m^3/sec, 2.5 Mega Watt capacity power plant, and tourism (Priority Infrastructure Provision Acceleration Committee 2016).

Silver Barb is one of the original Indonesian fish known as "Putuhan or Bander Putihan". Silver Barb are river dwellers with heavy currents. Its slim and tall body is prepared to face the natural conditions of fast flowing waters. Silver Barb easily breed in nature but are also not difficult to develop in ponds and rice fields (Susanto 2000). Tawes fish species are included in native Indonesian fish that live in rivers, have potamodromous properties (migration from upstream to downstream of the river) in their life cycle. According to the IUCN Redlist, Silver Barb is a fish with low risk conservation status or LC (Least Concern) (Thinh, D.V et al. 2012). Even though silver barb enter a low conservation status, these fish may increase in level to become extinct in nature along with damage to the ecosystem due to environmental degradation resulting in loss of habitat from the fish due to environmentally unfriendly development.

The existence of a reservoir is expected to affect the life of native river fish which affects the survival of the fish organisms, both in terms of growth, reproduction and eating habits. Therefore, information is needed about the biological aspects of the growth of Silver Barb in the Cipanas River in the inundation plan of the Cipanas Reservoir in West Java Province as a basic ingredient in the management of fisheries resources.

2. METHODOLOGY

2. 1. Time and Place

Research was carried out on the Cipanas River in the area of the planned inundation of the Cipanas Reservoir in West Java Province in June to October 2018 based on the accessibility of fishing and fishing around the Cipanas River. The research was conducted with 3 times the sampling as a test. The sampling period is once a month from June to August 2018. The location can be seen in Figure1.

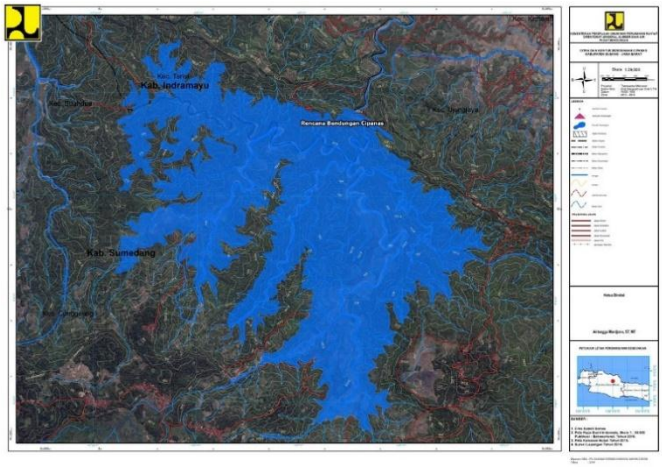

Figure 1. Map of Research Locations in Cipanas Reservoir Plans, West Java
(Source: Water Resources Office, Ministry of Public Works and Public Housing)

2. 2. Methods and Data Collection

Silver barb fish primary data collection was obtained using a survey method with purposive sampling technique. The data collected includes observations on the aspects of length and weight of the silver barb samples around the Cipanas Reservoir inundation plan. The catch fish was analyzed for growth in the Aquatic Resources Laboratory of the Faculty of Fisheries and Marine Sciences, Universitas Padjadjaran. The tools used are digital scales (0.01 g accuracy), millimeter blocks and rulers. The material used is silver barb as the object of observation.

2. 3. Data Analysis

Fish growth patterns can be determined by calculating the weight length relationship using the equation (Effendie 1979) as follows:

$$W = aL^b$$

Information :
W = Fish Weight (gram);
L = Fish Length (mm);
a, b = Constant factor.

The value of b refers to the criteria according to (Ricker 1975) in (Effendie, 1979), which is as follows:
1. If b = 3, fish belong to isometric growth patterns.
2. If b ≠ 3, fish belong to the allometric growth pattern.

Regression equations are used to analyze the relationship between length and weight. The effect of each variable is known by analyzing the coefficient of determination (R^2) and the correlation value (r) is used to analyze the level of closeness of the relationship between variables. The suitability of the environment to the living conditions of fish is analyzed by the condition factor or ponderal index. Calculation of the condition factor or Ponderal Index uses the metric system (K) that refers to the calculation according to Effendi (1979):

$$K_n = \frac{W}{aL^b}$$

Information :
K = Condition Factor;
W = Average Fish Weight (gram);
L = Average Fish Length (mm).

3. RESULT AND DISCUSSION

3.1 Length and Weight Distribution

The number of Silver Barb caught in the Cipanas River in June - August 2018 is 70 fish with a total length range of 125-2278 mm. Based on the classification of length classes, seven classes of total length interval are obtained (Figure 2). The fish group with the highest frequency is in the range of 125-146 mm with a percentage of 25.71% followed by a total length range of 169-190 mm with a percentage of 17.14%. The lowest frequency is in the fish group with a total length range of 235 - 256 mm with a percentage of 14.29%.

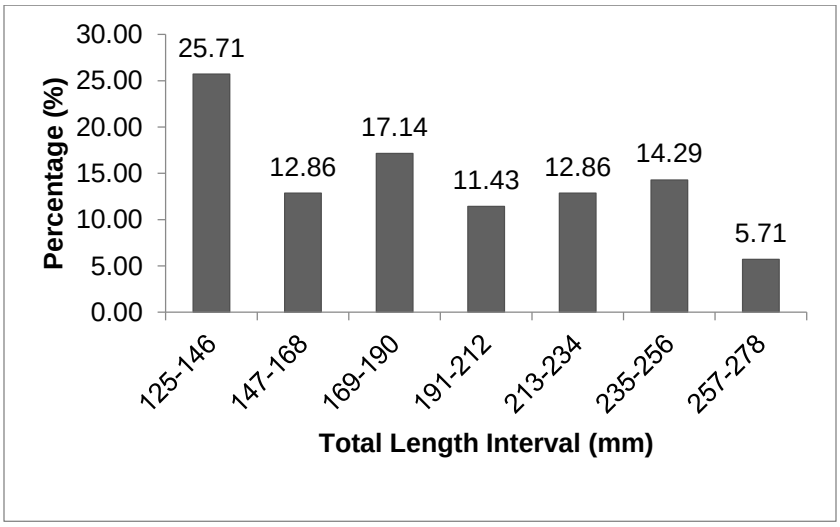

Figure 2. Total length distribution of Silver Barb

Based on the measurement results, the smallest of Silver barb caught by a 1 inch throwing net, has a total length of 125 mm with a weight of 28 g and the largest fish has a total length of 278 mm with a weight of 346 g. When compared with the size of Silver Barb fish that live in the Linggahara River, Labuhan Batu Regency, North Sumatra with Silver Barb in the Cipanas River are different, Silver Barb fish in the Linggahara River have a maximum length of 437 mm with a weight of 1711 grams and the smallest has a size of 126 mm with a boobot 110 gram (Laila 2018). The difference in size is thought to be caused by environmental factors such as water

quality, substrate and feed availability that affect the length and weight of the fish.

3.2 Relationship between Length and Weight

Relationship between Length and Weight of Silver Barb caught from Cipanas River waters in June - August 2018 followed the logarithmic equation, which was y = 3.1692 - 0.000006 x (Figure 3).

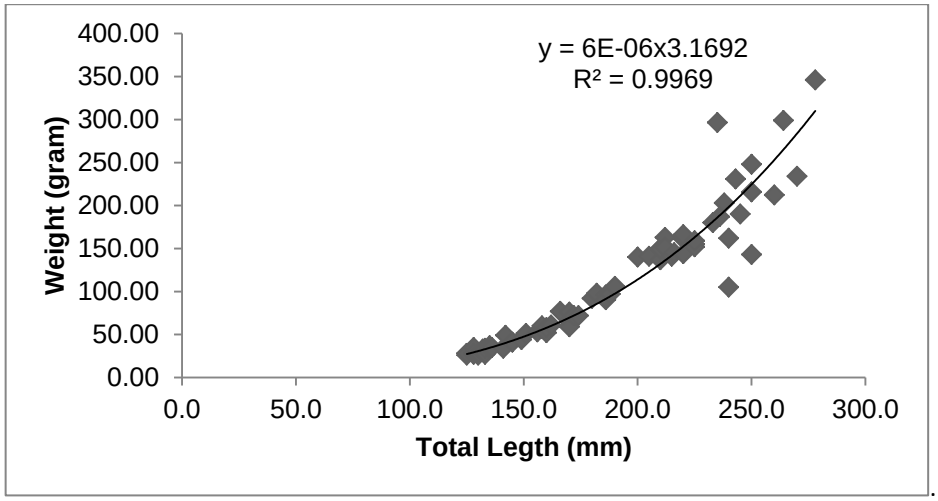

Figure 3. Relationship between Length and Weight of Silver Barb

The pattern of fish growth can be known from the coefficient b value obtained from the regression equation of fish weight length. The growth of Silver Barb caught in the Cipanas River follows a positive allometric pattern, ie the growth of weights is faster than the growth in length. This is different from Silver Barb found in Linggahara River, Labuhanratu Regency, North Sumatra which states that Silver Barb are included in fish that have negative allometric growth.

This is suspected because there are differences in habitat and food availability for fish in these waters. The condition of the waters of the Cipanas River which is quite calm during the dry season makes the Silver Barb fish not too active swimming against the current so that the energy expended is not too large. In addition, it is suspected that nutrient intake in the waters of the Cipanas River is quite high due to the abundance of allochtonus nutrient sources that enter the waters from riverbank litter.

3.3 Condition Factor.

According to the analysis of the results of the Ponderal Index or Condition Factor, it can be obtained that the condition of the Silver Barb Fish from the catch in the Cipanas Reservoir inundation plans in June - August 2018 ranges between 0.82 - 1.10. During the growth period, the weight gain of the Silver Barb is directly proportional to the length increase to a certain length (inflection point), then the weight gain decreases (Figure 4). Age, food, sex and gonad maturity become one of the factors in decreasing body weight in fish (Effendie 2002). The Niyonkuru and Laleye (2012) in Herawati (2017) also argues that the condition factor is not constant because it is influenced by biotic and abiotic factors.

The increase in the value of the condition factor is in line with the increase in fish weight, this is in accordance with the statement (Ali 1981) in (Hutomo *et al*. 1985), that the condition factor will decrease in line with the increase in fish length. This can be caused by other factors, namely spawning time, because energy is used to do the maturation of the gonad so that the weight of the gonad will affect the total weight of the fish's body. Fish that are in good condition can use energy for reproduction rather than bad conditions (Blackwell *et a*l. 2000).

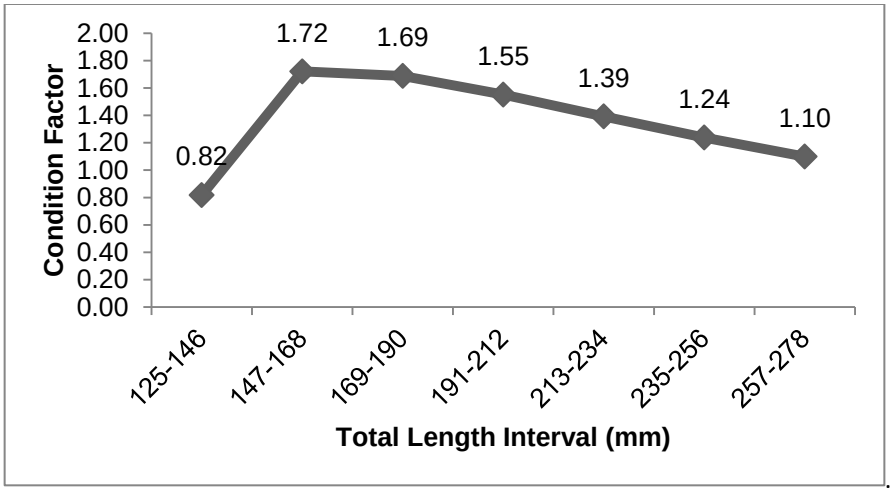

Figure 4. Factors Condition of Silver Barb in the Cipanas River

Conclusion

Based on research results in the Cipanas Reservoir inundation plans area from 70 fish caught, it can be concluded that:
1. The growth pattern of Silver Barb (*Barbonymus gonionotus*) is positive allometric, the weight gain is faster than the length increase, the value of b = 3.1692.
2. Fish are generally fat, a condition factor ranging from 0.82 - 1.72, fish measuring between 147 - 168 mm in length have the highest condition factor.

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