



## Biological Aspect of *Betta raja* of Wild Type at Bandar Tinggi Village

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### ABSTRACT

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*Betta raja* is endemic wild Betta fish whose habitat is found in Sumatera Island. One of the habitat found in Desa Bandar Tinggi, Kecamatan Bilah Hulu, Kabupaten Labuhanbatu. Population *B. raja* is increasingly diminished due to illegal logging and land conversion. The purpose of this research is to know the biological aspects of Lakepe fish (*B. raja*) in their natural habitat in Bandar Tinggi Village, Labuhan Batu Regency. Monitoring of biological aspects of *B. raja* in its original habitat needs to be. Considering *B. raja* as the biological wealth of endemic fish species that needs to be preserved. Methodology: The study uses exploratory methods with the determination of purposive sampling observation stations. Samples of fish captured using a fishing rod. The results of the study showed the value of  $b < 3$ , then the pattern of fish growth is negative allometric, the population density of average fish is 0.33 – 0.40 Ind/m<sup>2</sup>, and sex ratio of females and males (1:1)

**Keywords:** *Betta raja*, Biological Aspect, Desa Bandar Tinggi

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## INTRODUCTION

Indonesia is known as the country with the spread of the largest endemic fish in the world (Rahmawati *et al.*, 2016). The biodiversity of fish in Sumatra has been known to 272 species of fish and 30 of them are endemic (Kottelat *et al.*, 1993). One of them is *B. raja* is a fish endemic to swamp water occupants. The community of Labuhanbatu and its surrounding area call it Lakepe fish, while in Palembang region called Tempalo Rawang (Iqbal, 2011). Furthermore, there are 4 other species of Sumatran Betta fish, namely *B. burdigala*, *B. chloropharynx* (endemic to Bangka Island), *B. betta* and *B. spiloptogena* (endemic to Pulau Bintan), which is categorized as endangered (Wargasasmita, 2002). The threat of species extinction in its natural habitat is caused by illegal logging (Iqbal, 2011), land conversion, and land reclamation for development purposes (Suwelo, 2005). In addition, the existence of foreign fish (invasive species) either intentional or not certainly can cause a negative impact on native fish species (indigenous species) is a decline in population or the extinction of native fish species in its natural habitat (Wargasasmita, 2005).

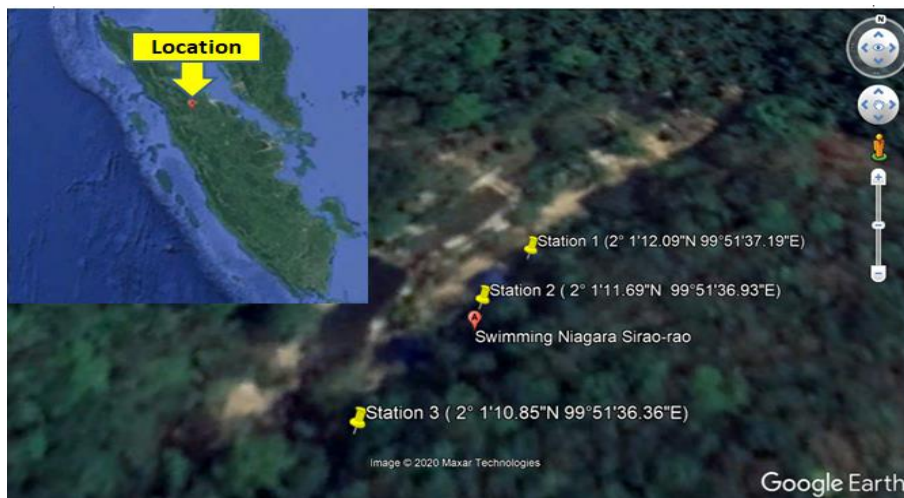
Research related Aspects of fish biology ever conducted (Simanjuntak, 2015); (El-Kasheif *et al.*, 2015); (Putri *et al.*, 2015). The study of the biological aspects of *B. raja* to date has not been a report in Indonesia. Starting from the lack of publications related to

the biological aspects of *B. raja*, attracted the author's attention to do research. The results of this research can certainly be used as a guide in the management of wild fish resources for government and private institutions related. Considering the *B. raja* is a wealth of biological resources in Indonesia, namely as endemic fish of the island of Sumatra that needs to be guarded by its sustainability.

This research is important to do, considering there is still no information on the results of research related to the biological aspects of *B. raja* in Indonesia. *B. raja* is an endemic fish in Indonesia that needs to be preserved. *B. raja* have an important ecological role in nature, considering they are mosquito larvae eaters so they can control them. In addition, it is also an environmental bioindicator, considering that this fish likes unpolluted waters. The lack of publication related to the bioecological aspect of *B. raja* attracted the attention of the author to share knowledge related to endemic fish in Indonesia, especially *B. raja* in North Sumatra (Lamoureaux *et al.*, 2004); (Poff *et al.*, 2006). Accurate data and information related to biological aspects of fish including growth patterns, population density, and the sex ratio of fish is one of the factors that can be used as the basis for the management of fish populations in a waterway

## METHOD

The study was conducted in March-May 2019. Research site in Sirao-rao waterfall area, Desa Bandar Tinggi, Kabupaten Labuhanbatu, Provinsi Sumatera Utara, Indonesia. The observation station is determined based on the habitat of *B. raja* found in the area, at the top, middle, and bottom of the Swimming Niagara Sirao-rao. Samples of fish were taken using fishing rods. The research location map can be seen in Figure 1.



**Figure 1.** Map of the Research Location

The captured *B. raja* is then counted in number, measured in total, and then weighed in the total weight. Data on the results of subsequent research related growth patterns are calculated using the formula (King, 2007), population density is calculated by formula (Krebs, 1989), and sex ratio with formula (Dahlan *et al.*, 2015). Next the data processing uses the Microsoft Excel 2010 device

## RESULT AND DISCUSSION

### Growth Patterns

The growth pattern of *B. raja* fish based on the research result data is known as the value  $W = 1.1634$ ,  $b = -6.5166$ , and the value  $R^2 = 0.8025$ . More data can be found in Figure 2.

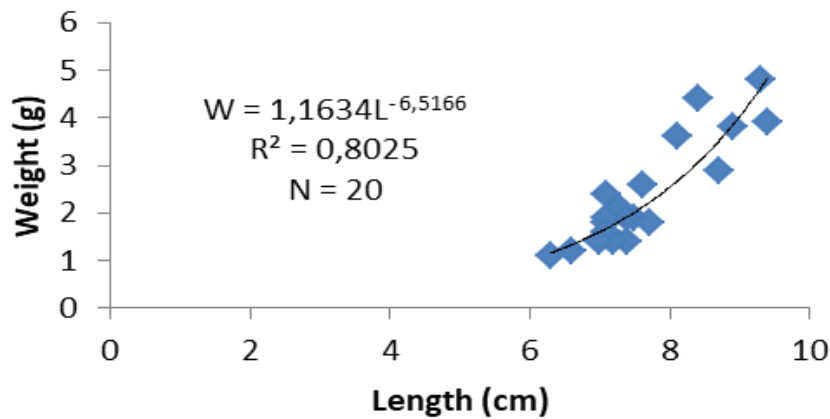


Figure 2. Growth Pattern *B. raja*

The estimation of fish growth pattern was conducted by testing the  $b$  value of  $< 3$  Using Test-T at 95% confidence interval (Jusmaldi & Hariani, 2019). The test result of the  $b$  value with the T test on *B. raja* has a value of  $b$  smaller than 3 which shows of the growth pattern is negative allometric (long growth is faster than weight increase). In accordance with the opinion (Primanita *et al.*, 2016) the growth of Betta fish in nature indicates the increase of body weight faster than the body length. Fish growth is sometimes negative or positive (Jusmaldi & Hariani, 2019). Factors that affect fish growth are usually food and environmental factors (Jia & Chen, 2011). Betta sp in the wild, they feed on zooplankton, crustaceans, the larvae of mosquitoes and other water bound insect larvae (Biokani *et al.*, 2014). Physical, chemical, and biological factors are also thought to affect fish growth patterns both directly and indirectly (Al-Saleh *et al.*, 2012).

### Population Density

The population density of Lakepe fish is different from each observation site, at Station 1 (0.33 individual/m<sup>2</sup>), Station 2 (0.28 individual/m<sup>2</sup>), and station 3 (0.40 individual/m<sup>2</sup>). More data can be viewed in Figure 3.

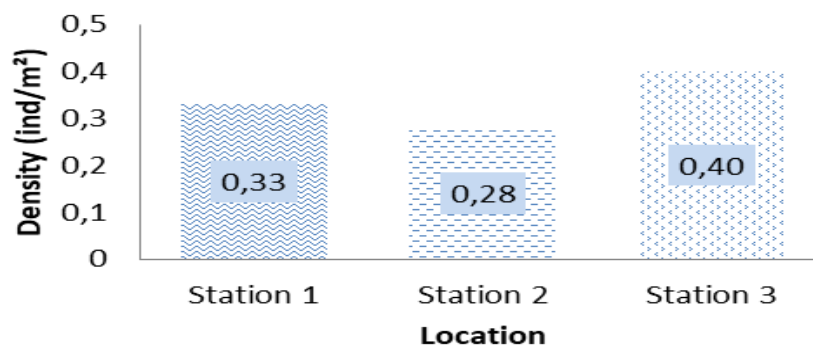


Figure 3. Population Density *B. raja*

There are suspected differences in the population density of *B. raja* at the research site due to environmental factors and the predators of other aquatic biota that are found during sampling. In addition, the natural properties of *B. raja* are thrilled when there is a food that determines the population density of fish at the time of arrest. Factors affecting the population density of fish are the change in the condition of the chemical physics factors of water, food, predators, illness, and excessive arrest (Season *et al.*, 2004). Adaptability to environmental changes, which are incapable of being able to be located will experience death, this contributes to the density of fish populations living in nature (Science for Environment Policy, 2015). Factors that affect fish population density are changes in the condition of chemical physical factors of water, food, predators, & diseases. River pollution can affect the condition of organisms in these waters, including damage to the internal organs of fish, altering the structure of fish populations, to the death of fish (Aryani *et al.*, 2004). The damage to the river ecosystem also impacts the reduced fish population, both in quality and quantity (Suryani *et al.*, 2019). In addition to over-arrest (Season *et al.*, 2004); (Huwae *et al.*, 2019). Low density will have an impact on the decline in fish resource stocks. According to Faizah & Anggawangsa (2019) fish resources should be able to recover, but if the management is not appropriate then there will be a decrease in stock due to overfishing.

#### Sex Ratio

Female *B. raja* is more widely caught than a male. Females are caught as many as 12 individuals and 8 males, so if it is a female fish (60%) and the male (40%) or 1,2: 1.

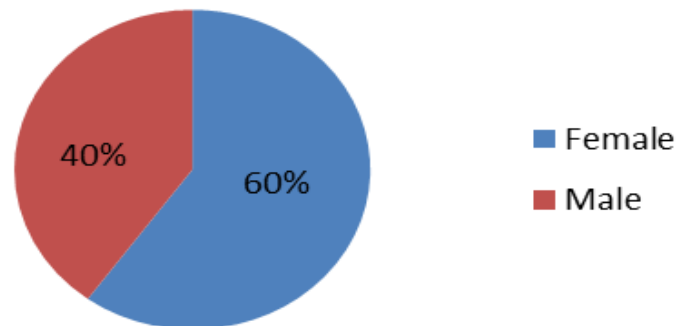


Figure 4. Sex Ratio *B. raja*

This still shows that the sex ratio of *B. raja* in Swimming Niagara Sirao-Rao area is still feasible for continuity of its regeneration process. The Data on this research is almost close to the research results obtained in fish *Barbodes binotatus* (Valenciennes, 1842) by comparison 1:1.12 (Jusmaldi & Hariani, 2019). The research of wild Betta (*B. imbellis*) acquired the value of females and males with a ratio of 1:2 (Purnomo, 2019). Both conditions are still very supportive of the male and female fish to conduct reproduction in nature. Spawning is an event of encounter between a male fish and a female fish that aims for the fertilization of eggs by spermatozoa. Male fish will generally secrete spermatozoa into the water around the egg cells released by female fish (Wahyudewantara, 2017). According to Bal & Rao (1990) when the water

conditions are normal, it is estimated to have a comparison of male and female fish ranging from 1:1. Sex ratio constitutes basic information in assessing reproductive potential in fish populations (Vicentini & Araújo, 2003); (Jega *et al.*, 2017).

## CONCLUSIONS

The biological aspect of *B. raja* based on the results of the research still shows stable conditions, but over time if this cannot be maintained, it will significantly decrease in population. Need attention and support from various parties to preserve the preservation of *B. raja* in its natural habitat

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## AUTHOR CONTRIBUTION STATEMENTS

First author had contribution for collecting data in this research. Corresponding author was a corresponding person with editor, from submission until publish for this article. Another authors help to improve this research paper before submit to journal.

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