Growth pattern and condition factor of giant catfish (*Arius thalassinus*) in the Cilacap water, Central Java

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Abstract. Giant catfish (*Arius thalassinus*) is one of demersal fish that has important economic potential. In the Cilacap waters, this fish caught by gillnet. Study of giant catfish is still limited. The objective of this study was to obtain the growth pattern and factor condition for giant fish in the Cilacap waters. This study was conducted from January to December 2015 in the Ocean Fishing Port of Cilacap, Central Java. A total number of 1126 individual of *Arius thalassinus* caught by gillnet was observed during the sampling periods. Total length and weight those fishes were analyzed. The result showed that the size of giant catfish caught by gillnet ranged between 20.2-62.2 cm FL with an average was 40.2 cm FL and weight between 147-4,205 g with an average was 1,400.7 g. The growth pattern of giant catfish was positive allometric was expressed by equation W = 0.0158 x L\(^{3.0546}\), \(r^2 = 0.9775\). Condition factor of giant catfish was ranging from 1.8-2.1.

Keywords: Cilacap waters, condition factor, giant catfish, growth pattern

1. Introduction

Giant catfish (*Arius thalassinus*) is one of demersal fish that has important economic potential. This fish belongs to the Ariidae family with an order of Siluriformes. The giant catfish frequently found in estuaries however rarely found in the freshwater. This fish is euryhaline, sometimes moves into freshwater. Temperature ranges between 26°C-29°C. The main foods are crabs, prawns, mantis shrimps (*Squilla* species) but also fishes and mollusks. The distribution of this fish are in Red Sea, Indo Pacific region more west and east coasts of India to Bangladesh, Myanmar, Malacca, Brunei Darussalam, Malaysia, Singapore Indonesia and Pakistan; East Africa, to New Guinea and Australia: East Africa to Philippines, north to southern China, south to Queensland (Australia) (mostly marine). In Indonesia this fish marketed mostly fresh, often dried. In 2000, giant catfish production in Indonesia waters reached 34,782 tons with production value was Rp. 12,483,739,000 and 20% come from Java waters (DKP 2001). DGCF (2011) stated that Indonesia production of giant catfish in 2000-2011 has fluctuated. In 2011, the production of giant catfish reached 90,980 tons and that was the largest production for the demersal fish group.

Cilacap waters are one of regions in Indonesia which is fishing ground of giant catfish. Giant catfish in Cilacap waters (Southern coastal of central Java) was caught by gillnet. Gillnet has been developed in Cilacap since several years ago. Based on the Pelabuhan Perikanan Samudera (PPS) Cilacap 2015,
the number of gillnet in Cilacap Fishing Port is 127 units. The number has declined significantly compared with 2011 (205 units).

The giant catfish has a value economically important and most-liked by people, especially in processed food and fresh condition (Herianti 1991). Because of this, fishing activities for giant catfish are increased. Based on this condition, it is necessary to follow up by arranging more regulations that are stringently related to the management of giant catfish. Availability the information of catch by species, the size of fish was important aspects in the fish stock assessment work. This paper described size distribution, growth pattern and condition factor of giant catfish (A. thalassinus) caught by gillnet in the Indian Ocean based at Cilacap Fishing Port, Central Java. The condition factor was estimated to understand their condition of growth.

2. Materials and methods

2.1. Materials
The fish for this investigation was collected from January to December 2015 in the Ocean Fishing Port of Cilacap, Central Java. The geographical reference of landing site is 07°43’31.2” S and 109°01’18.4” E. A total number of 1,126 individual of A. thalassinus caught by gillnet was observed during the sampling periods. The parameters consisted of length and weight measurements. The measurement fork length used stainless steel measuring board with accuracy 0.5 cm, weight of fish used an electronic balance scale with accuracy 0.5 g. Length and weight data were recorded.

2.2. Methods
Relationship of length and weight was analyzed by the equation (Froese 2006):

\[ W = a \times L^b \]  

(1)

\[ W = \text{weight fish (g)} \; ; \; L = \text{Length fish (cm)} \; ; \; a \; \text{and} \; b \; \text{are constants.} \]

The equation was linearized by logarithmic transformation into:

\[ \log W = \log a + b \]  

(2)

The condition factor was analyzed by the formula:

\[ K = \frac{100 \times W}{L^3} \]  

(3)

Which is \( K \) = the condition factor, \( W \) = the body weight (g) and \( L \) = the total length (cm).

3. Results and discussion

3.1. Length Distribution
Figure 1 demonstrates the length-frequency analysis pattern of the sample caught in the study areas. The lengths of 1,126 fish were obtained from the fishery survey with length ranged from 20.2 to 62.2 cm fork length (FL) and weight ranged from 147 to 4,205 g. The dominant midlength of giant catfish ranged between 40-50 cm FL. Sawant and Raje (2009) informed that the size of A. thalassinus from Vishakhapatnam and Veraval varied between 17.8-45.2 cm and 11.5-59 cm in fork length. The size of the giant catfish in Mafia Island, Tanzania ranged between 39 and 100 cm Total length (TL) (Kamukuru and Tamatamah 2014). Balamurugan et al (2013) stated that the length of A. arius in east coast Tamil Nadu varies between 6.67-36.8 cm FL and between 6.67-36.8 cm TL.
Figure 1. Length of distribution of Giant catfish (*Arius Thalassinus*) in the Cilacap Waters – Central Java from January to December 2015.
3.2. *Relationship between length and weight*

The relationship between length and weight is important to fisheries (Pauly 1993; Entsua-Mensah et al 1995; King 1996 and Rajkumar et al 2006) as it serves several practical purposes. This study found the relationship between length-weight was \( W = 0.0158 \times L^{3.0546} \) \((r= 0.9776)\) as shown in figure 2. For monthly, b value ranged from 2.81 to 3.21 (table 1). The maximum was in November and minimum was in May. The overall b value was 3.05, less than the values reported earlier by Sawant and Raje (2009) for *A. thalassinus* from Vishakhapatnam (3.62-3.96) and comparable with *A. thalassinus* from Veraval (3.02-3.04) and b value of *A. thalassinus* in Hormozgan coastal waters was 3.056 (Daliri et al 2012). Ambily and Nandan (2010) found that b value for *A. subrostratus* in Kerala ranged between 2.6224 to 3.091. Rizvi et al (2002) stated that ‘b’ value is generally close to 3 and can vary between 2.5-4.0. However, fish usually does not retain the body shape throughout their life span. According to Abujam and Biswas (2014 2016) the variation is caused by seasonal fluctuation in environmental parameter, the physiological condition of the fish, sex, gonadal development and nutritive condition of the environment of the fishes.

![Figure 2. Length-weight relationship of Giant catfish (A. thalassinus) in the Cilacap Waters –Central Java from January to December 2015.](image)

| Month     | Equation        | a     | b     | r       | Growth Pattern         |
|-----------|-----------------|-------|-------|---------|------------------------|
| January   | \( W = 0.027x L^{2.9243} \) | 0.027 | 2.9243 | 0.9611972 | Negative Allometric   |
| February  | \( W = 0.0109 x L^{3.1588} \) | 0.0109 | 3.1588 | 0.9811728 | Positive Allometric   |
| April     | \( W = 0.0163 x L^{3.0357} \) | 0.0163 | 3.0357 | 0.9800000 | Positive Allometric   |
| May       | \( W = 0.0365 x L^{2.8142} \) | 0.0365 | 2.8142 | 0.9555627 | Negative Allometric   |
| June      | \( W = 0.021 x L^{2.9716} \) | 0.021 | 2.9716 | 0.9823950 | Negative Allometric   |
| August    | \( W = 0.0096 x L^{3.1899} \) | 0.0096 | 3.1899 | 0.9775480 | Positive Allometric   |
| September | \( W = 0.0313 x L^{2.8872} \) | 0.0313 | 2.8872 | 0.9667988 | Negative Allometric   |
| October   | \( W = 0.0123 x L^{3.1296} \) | 0.0123 | 3.1296 | 0.9815294 | Negative Allometric   |
| November  | \( W = 0.0091 x L^{3.2101} \) | 0.0091 | 3.2101 | 0.9815294 | Positive Allometric   |
| December  | \( W = 0.011 x L^{3.1633} \) | 0.011 | 3.1633 | 0.9891410 | Positive Allometric   |
| All       | \( W = 0.0158 x L^{3.0546} \) | 0.0158 | 3.0546 | 0.9776502 | Positive Allometric   |

*Table 1. Monthly length weight relationship of giant catfish (A. thalassinus).*
3.3. Condition factor

The condition factor for 10 months ranging from 1.8-2.1 (figure 3). The highest value was occurred in September (2.1) and the lowest value was occurred in May (1.8). The K-value in the present study was higher than the result of study by Daliri et al (2012) in Homozgan waters that k value of A. thalassinus ranged between of 0.98±0.17. Tesch (1971) stated that the K values above 1 suggested that condition of fish was good; however, several factors can influence the "b" and "K" values such as season, maturity, sex, habitat, feeding, stomach fullness, health, and preserving techniques. Deori et al (2017) added that the fish condition is affected by seasonal changes of the gonads and intensity of feeding. Another reason for the bad condition of fish probably caused by scarcity of food or spawning fast.

**Figure 3.** Monthly condition factor of giant catfish (*A. thalassinus*) in the Cilacap Waters–Central Java from January to December 2015.

![Graph showing monthly condition factor of giant catfish](image)

**Figure 4.** Length and condition factor relationship of giant catfish (*A. thalassinus*) in the Cilacap Waters–Central Java from January to December 2015.

![Graph showing length and condition factor relationship](image)

Relationship between length and condition factor of giant catfish showed that K values were fluctuated by size. Figure 4 showed that the highest of K values were in length 25 cm and the lowest
of K values were in 60 cm. According to Le Cren (1951) fluctuations in K values were commonly conditioned in fish due to feeding intensity, fish size and food availability.

Pantulu (1963) added that K value was fluctuated by size of fish. Small size has high K values then it decreased when the size was big. This condition associated with the changes for planktivorous to carnivores. Blackwell et al (2000) stated that the high value of condition factors may indicate favourable environmental conditions (such as habitat conditions, many prey availability) and low values indicate environmental conditions that are less supportive.

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