Effect of different bait on the catchment of eels *Anguilla marmorata* in the Brayeun River, Aceh Besar district, Indonesia

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Abstract. The objective of the present study was to determine the best bait to catch the eel *Anguilla marmorata* in the Brayeun River, Aceh Besar District, Indonesia. Five types of baits were tested, namely; shrimps, earthworms, chicken intestine, terrestrial snails, and tilapia fish fingerling. The fishing was conducted for three months based on the Islamic Hijri Calendar (lunar cycle) on Rajab to Ramadhan (April to June 2017). The data were subjective to one-way analysis of variance (one-way ANOVA). A total of 39 eels *A. marmorata* were sampled during the study. The ANOVA test showed that the baits gave a significant effect on the catch volume of eel where the shrimp bait resulted in higher catching compared to other baits. Therefore, it is concluded that the shrimp was the best bait for *A. marmorata* in the Brayeun River, Aceh Besar District, Indonesia.

1. Introduction

Eels are one of the economic group of fishes in Indonesia [1]. At least 17 species of eels have been described in the world [2, 3], where three species of them are found in Aceh waters, namely *Anguilla bicolor*, *A. marmorata* and *A. bangelensis* [4]. The market demand for eels is very promising approximately 300,00 ton per year, but only 3,150 ton can be supplied [5] where most of the production comes from the wild especially for the glass and silver eels.

In Aceh Province, the eels have not been commercially exploited. However, several rivers have been identified as the important habitat for the eels, for example Lambeso River, Aceh Jaya, Beurunut River Aceh Besar, Meurebo River Aceh Barat, Nagan Raya and Singkil peat swamp [4, 6-8]. Besides, our field observation found that Brayeun River in Aceh Besar has potency for the eels.

The local fishermen in Aceh Besar using the traditional fishing practices to catch the eel, for example, hooks and trap. The catchment eels are used for domestic consumption or sold on the roadside not far from the fishing location. Usually, the local fishermen used chicken intestines and shrimp as bait to catch the eels. However, there was no accurate information about what is the best bait to catch the eels in Brayeun...
River. Therefore, the objectives of the present study were to examine the effect of different baits to the success of eel fishing and to determine the best bait for eels in Brayeun River, Aceh Besar district, Indonesia.

2. Materials and Methods

2.1 Location and time
This study was conducted in the Brayeun River, Leupung Sub-district, Aceh Besar district, Aceh Province, Indonesia from April to June 2017 at three locations along the river (upper, middle and lower streams). The sampling was performed six times per month during new and old months based on lunar cycle of Islamic Hijri Calendar when the night was dark for three months or 18 samplings.

2.2 Experimental bait
Five types of baits were tested in this study, namely; shrimps, small fish (tilapia fingerling), terrestrial snail, earthworms, and chicken intestine. The baits were pinned into the hook with has been equipped with polyethylene line and sinking.

2.3 Sampling procedure
The sampling was done at three locations as representative of the river zone, namely; Brayeun village (upper stream), Lamseunia village (middle stream) and Meunasah Ba’ U (lower stream). A total of 30 hooks were settled in every sampling location with ten hooks for every tested bait. The distance between the hook is at least 50 meters.

The hooks are installed in the afternoon (06.00 PM) until the morning (06.00 AM). The hooks were monitored every two hours interval. The caught eel was identified the taxonomic status and documented, then the sample was preserved temporarily using ice cubes in an icebox and transported to the laboratory and followed with 10% formalin. The water quality (dissolved oxygen, water temperature, and pH) were measured in situ at every sampling time.

2.4 Data analysis
The catchment data were subjected to one-way Analysis of Variance (ANOVA) then followed by Duncan's multirange test to determine the best bait. The analysis was performed using the SPSS Ver. 22.0.

3. Results and Discussions
A total of 39 eels were caught during the sampling comprising 38 samples of giant marbled eel *A. marmorata* and 1 sample of shortfin eel *A. bicolor*. The shortfin eel was sampled at lower stream closed to estuary area of the river. The total length of the eels sample ranges from 22.8 to 59.5 cm and body weight ranges between 21.4 g to 465 g. The study showed that the eels were fed on shrimps and earthworms, and no eels were caught using chicken intestine, terrestrial snails, and small/fingerling tilapia fish, and most eels sample were caught using shrimp bait (Table 1). The ANOVA test showed that the difference in bait type gave a significant effect on the catches volume of the eels in Brayeun River (P<0.05) where the shrimp bait resulted in higher catches volume.

Based on the sampling time, there was no significant difference in catches volume between the month of the sampling time; however, there was a significant difference among the week of the sampling time, where the eels were only caught at first (new moon) and fourth weeks (old moon) based on Islamic Hijri Calendar (lunar basis) when the night was dark.
Table 1. Total catches of the eels based on monthly sampling in Brayaeun River.

| Bait type          | Rajab (29 March – 27 April 2017) | Sya’ban (28 April – 26 May 2017) | Ramadhan (27 May – 24 June 2017) | Total | Average          |
|--------------------|----------------------------------|----------------------------------|----------------------------------|-------|------------------|
| Shrimps            | 9                                | 7                                | 10                               | 26    | 8.67 ± 1.528     |
| Earthworms         | 3                                | 6                                | 4                                | 13    | 4.33 ± 1.528     |
| Chicken intestine  | -                                | -                                | -                                | -     | -                |
| Terrestrial snail  | -                                | -                                | -                                | -     | -                |
| Tilapia fingerling | -                                | -                                | -                                | -     | -                |
| Total              | 12                               | 13                               | 14                               | 39    |                  |

Table 2. Total catches of the eels based on weekly sampling in Brayaeun River

| Bait type          | Rajab (29 March – 27 April 2017) | Sya’ban (28 April – 26 May 2017) | Ramadhan (27 May – 24 June 2017) | Total |
|--------------------|----------------------------------|----------------------------------|----------------------------------|-------|
| Shrimps            | 6                                | 2                                | 2                                | 10    |
| Earthworms         | 1                                | 2                                | 2                                | 5     |
| Chicken intestine  | -                                | -                                | -                                | -     |
| Terrestrial snail  | -                                | -                                | -                                | -     |
| Tilapia fingerling | -                                | -                                | -                                | -     |

Note: I= First week/new moon  II= Second week  III= Third-week IV= Fourth week/old month.

The study showed that shrimps are the most preferred food by the eels. This is probably due to the availability of the shrimps in the Brayaeun River is higher compared to earthworm and tilapia fingerling, while terrestrial snail and chicken intestine are the stranger food items for the eels, this is because these food items are not from the aquatic ecosystem. In general, the fish has preferred the food item that most available in their natural aquatic habitat [9]. Several studies showed that the eels are carnivorous, they feed on small fish, crabs, shrimps, and earthworms [10-14].

The study showed that the eels samples caught at night have a full stomach, while the eels sampled in the afternoon mostly have emptied stomach. This is an indication that the eels in Brayaeun River are active feeding during the night or nocturnal carnivorous feeding habitat. This finding is in agreement to Setiyanto et.al [15] who noticed that the eels in Segara Anakan Cilacap are also nocturnal. Based on the sampling time that the catch is higher in the first and the fourth weeks, this is due to the light factor, which at that time is the dark moon phase. Probably, this is related to the habit of eel, which avoids light during feeding (nocturnal). This finding was also in regard with Tesch [16], and Muchlisin et al. [8] who reported that the eels catching has mostly occurred during the early and end of the lunar cycle when the moon is dark and the higher tide. Besides being influenced by the circulation of the moon, the catch volume of eel is also influenced by the season, wherein generally, the catch volume is higher in the dark months during the rainy season [17, 18]. This might be related to high food availability during the rainy season. The high intensity of the rain causes the river to overflow and flooded the lowlands which are rich in humus, this condition
causes the waters to become fertile and plankton to develop well as an important food for fish larvae including eels [19-21].

**Figure 1.** Total catches of the eels during three months sampling in Brayeun River

4. Conclusion

It is concluded that the catches volume of eels were influenced by type baits, where the shrimp bait was the best baits for the eel *A. marmorata* in Brayeun River, Aceh Besar district, Indonesia.

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