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Knowledge and Perception of Paser Local Community in East Kalimantan on Critically Endangered River Biuku/Beluku (*Batagur borneoensis*) Conservation

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ABSTRACT
Kendilo watersheds in Paser district is the largest of wild Biuku/Beluku (Batagur borneoensis) habitat and distribution. However, lack of knowledge among the local communities based on morphological characteristics, perception and human habit and activities may accelerate population decline in its habitat. To overcome this problem, community-based conservation is a valuable tool to educate community and carry out sustainable conservation program. This study was aimed to identify and analyse the knowledge and perception of a local community in Paser. This research was quantitative descriptive research using analytic observation and online questionnaires. Indicators of perception included knowledge, attitude, and action. Respondents consisted of 48 people who lived around the Paser river. This study found that Biuku/Beluku, identified as Batagur borneoensis has main morphological characters included five fore toes and four hinds with membrane; shell has a keel on the dorsal scales with a greyish black colour; relatively small and medium head; pointed snout; the colour of the legs is brownish black. In addition, the members of the local community in Paser were classified as having good awareness of the presence of Biuku/Beluku, with average 4. A total of 60% of respondents knew that Biuku/Beluku as protected reptile, and 80% noticed that the landings and population were decreasing every year because of degradation habitat and human activities. This study strengthened that a knowledgeable and participative local community can produce better outcome in sustaining a Biuku/Beluku conservation programme.

Keywords: *Knowledge, Attitude, Behaviour, Perception, Batagur borneoensis, Conservation.*

1. INTRODUCTION

Freshwater turtles and tortoises are the most threatened vertebrate species, and their status is below that of birds, bony fish, mammals and other vertebrates [1], [2], [3], [4]. It is estimated that in Indonesia there are 29 species with 5 endemic species [5], [6],[7],[8], they are *Orlitia borneensis*, *Batagur affinis*, *Carettochelys insculpta*, *Chelodina novaeguineae*, and *Elseya novaeguineae*. One of the freshwater turtles listed as critically endangered by IUCN, *Batagur borneoensis,* is still in consideration for protection in Indonesia. In international context, *Batagur borneoensis* currently are proposed to be listed in CITES Appendix II. The distribution of Batagur in Indonesia can only be found in Sumatera and Kalimantan. In Sumatera it is found in the east coast of Sumatera including Aceh, Langkat District and Riau, while In Kalimantan, it can be found in the west coast areas and in the southern coast of Kalimantan, especially in Kendilo waterheads, Paser District.

Biuku/Beluku is a local name from community that live around Kendilo watersheds. The characteristics of this species is migrating in the river flow in the 1st to 5th month before the spawning period arrives. Currently, habitat destruction of rivers, swamps, mangroves, and feeding areas, deaths due to interactions with fishing activities, inadequate management of conservation techniques, climate change, and disease effects threaten this species. Specifically, declining population of Biuku/Beluku in its habitat is hypothesized due to human consumption of both flesh and egg, in addition to habitat damage. Currently, Beluku's habitat is used as sand mining activity for certain purposes. Based on information from the community around the Kendilo watersheds, it was

recorded that adult Beluku from year to year have decreased in population. According to local residents, the number of adult Beluku that returned to lay eggs in the sand in 2017 was 100, while in 2016 it was 150. This decline is thought to be driven by the activities of the surrounding community who consume Biuku/Beluku eggs and flesh.

Not only in Kendilo, Paser district, turtles in Thailand, China and Malaysia are also threatened with extinction due to habitats by humans ([1], [6]. Community participation plays a crucial role in promoting conservation success [9], [10]. Bird [11] stated that successful recovery effort for Batagur in Malaysia was done by combining knowledge gained through scientific investigations with insights of local population. Furthermore, combination of local science and structured monitoring can produce the greatest conservation efforts.

The high activity of taking Beluku's egg and habitat conversion by the community is expected to harm the sustainability population. Ethnozoological study is related to the perception and role of the community for Biuku/Beluku conservation efforts, because in principle, the success of Biuku/Beluku conservation and its habitat is very dependent on the perception, participation and appreciation of the community for the socio-economic value of Biuku/Beluku and its sustainability as one of the natural resources that are important for people's lives.

The involvement of local communities in *biuku* conservation is an ongoing approach promoted by the government and kelompok Pemuda Peduli Lingkungan Kabupaten Paser. The urgent upon realising that community knowledge may be necessary in building up new approaches and methods, which will increase the sustainability of a conservation program. Community-based conservation is a valuable tool to educate perception to environment, in the knowledge is expected to bring more positive impact on local attitude towards conservation [6], [12]. Therefore, this study was aimed to identify and analyze knowledge and perception of a local community in Paser related to conservation effort and research of Biuku/Beluku in the Kendilo watershed, East Kalimantan.

2. METHODS

2.1. Participant of this study

This research was a descriptive study. Respondents were 48 people who lived around the Paser river. Data was collected through online questionnaires using Google Form distributed to the Paser Community.

2.2. Data collection instrument

This study used a cross-sectional survey of the local community Paser District. Data were collected through an indirect online questionnaire using Google Form. Questionnaire used closed questions using Likert Scale and essay and was distributed for Paser community. The variables of this study were knowledge, behaviour, and attitude for each variable. All of participants especially Pemuda Konservasi Paser filled out a questionnaire based on habits. The instrument used was a mixed questionnaire model with questions combined to explore the perception of local community to protect Biuku/Beluku. It comprised of two sections (A) revolving around demographic details such as age, level of education and length of residency, as well as their monthly income, while section (B) focused on the respondents' knowledge, behaviour and attitude.

Morphological Identification. Identification follows the diagnostic features of the biuku/beluku, such as: the number of fore fronts, fore back, have or haven't membrane, the colour in carapace, plastron. After that, identify using [8], classify and check status in IUCN [13] and CITES.

Research indicators. Research variables include internal factors that influence perceptions, knowledge, attitudes, and behavior. Research variables and data collection methods are formulated in the following table 1.

Table 1. Variable and indicator of research

Variable	Indicator	Data collection
Knowledge	1.Knowledge 2. Understanding 3. Analyse	Questionnaire with closed questions
Attitude	1. Admission 2.Response 3.Assessment 4. Lifestyle formation	Questionnaire with closed questions
Behaviour	1.Engagement 2.Availability 3. Habit	Questionnaire with closed questions

2.3. Data Analysis

The morphological characters of Biuku/Beluku were analysed descriptively. While, measurement of variables was measured based on the respondents' assessments obtained from the answers to interview questions. Respondents provided information on age, educational level, occupation and mailing address. The questionnaires were purposed as self-managed questionnaire. Respondents' answers from interviews were qualitative and quantified using a Likert scale. Likert scale is a data scoring method with the highest weight will be given a score of 5 and the lowest weight will be given a score of 1. The score of the questions was calculated using the equation:

$$Ai = \frac{(a*5)+(b*4)+(c*3)+(d*2)+(e*1)}{a+b+c+d+e} \quad (1)$$

Note:
Ai = public perception for the i-th question
a = the number of respondents who gave answers with a score of 5
b = the number of respondents who gave answers with a score of 4
c = the number of respondents who gave answers with a score of 3
d = the number of respondents who gave answers with a score of 2
e = the number of respondents who gave answers with a score of 1

The scores obtained from each answer to the question were then summed, averaged, and grouped to measure how

far the community's perception of the problem is. The data was presented in graphical and descriptive (narrative) form. Graphic data was processed using Microsoft Excel software. Narrative data was obtained from the results of interviews conducted.

3. RESULTS AND DISCUSSION

Biuku/Beluku is a group of freshwater reptiles. The diagnostic feature of Biuku/Beluku is that it has the characteristics of a carapax and plastron. This animal is classified as a protected animal under the category of Appendix II CITES (*Convention on International Trade in Endangered Species*), so all forms of utilization and distribution must receive serious attention [14]. The characteristics of the conditions that strengthen the protected Biuku/Beluku are very long and unique life cycle, so it can take around 30-40 years to reach a "stable" condition (a condition where the population abundance has been relatively constant for the last 5 years).

3.1. Morphological characters of Biuku/Beluku

The morphological characteristics of the Biuku/Beluku freshwater turtle are hatchlings have a soft shell, younglings have a rather hard shell, and adults have a large, hard shell; they have membrane between the toes, but when mature the toes are not as clearly visible as when young, so it looks like they are grouped together. This is a point, the perception of a community as a turtle because there are no toes as adults. The presence of five fore and four hind toes and membrane on the toes is a diagnostic character that this Biuku/Beluku found in Paser Regency is *Batagur borneoensis*.

During hatchling, the shell has a keel on the dorsal (ventral) scales with a grayish black color; relatively small and medium head; pointed snout pointing upwards. All toes are webbed with 4-5 claws total (Figure 1). The color of the legs is brownish black. There are 5 vertebral bodies located in the spine or in the middle of the upper shell and have 25 marginal scutes. The length of the shell is 6.8 ± 0.02, and the width of the shell when hatching is 7.1 ± 0.01 cm. The snout is pointed upwards (Figure 1). The color of the plastron is uniform light yellow or cream/grey. On the bridge, the inguinal scutes are larger than the axillary scutes, and the anterior/posterior lobes are shorter than the bridges. The back of the head is covered with small scales. The adult male's head is dark gray, it turns white with red on the top of the head. The front and hind legs have four and five claws, respectively. Each forelimb has five claws, and all toes are webbed.

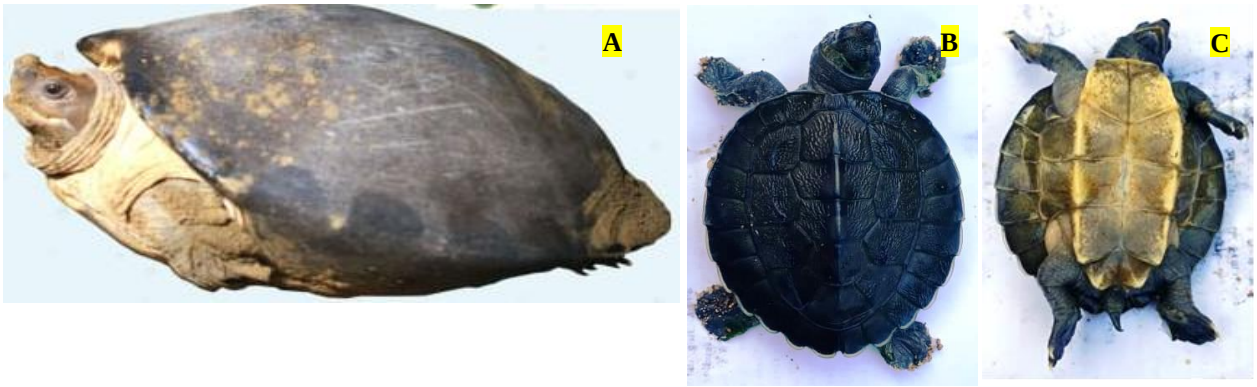

Figure 1 Morphological characters of Biuku/Beluku. A. Adult (photo: Agung Kurniawan), B. Hatchling (Carapax), C. Hatchling (Plastron).

Figure 2 Morphological characters of Biuku/Beluku in habitat. A. Adult. B. Hatchlings (in-situ habitat).

Morphology of adult Biuku/Beluku that are ready to be released into the Kendilo watersheds, which has a keel on the dorsal scales with a blackish brown color in the middle (Figure 2). Its color is brown and different from when hatchings. Based on the diagnostic characteristics that have been identified, it can be concluded that the classification of Biuku/Beluku of Paser district is:

Kingdom : Animalia
Phylum : Chordata
Class : Reptile
Order : Testudines
Suborder : Cryptodira
Family : Geoemydidae
Genus : Batagur
Species : *B. borneoensis*
CITES Status : Appendix II
IUCN status : Endangered (*critically endangered*) [8], [15]

3.2. Perception of Biuku/Beluku

3.2.1. Demography

This study was collected 48 questionnaires filled out online using Google Form. Respondent came from five village. Most of them (88%) were from Damit, then Belangkong, Suwatang, and Sangkurimang village. As many as 31,76% of the respondents were students/bachelor graduates/unemployed, and 20% worked as Ecopreneur, while 8,24% as housewife. The socio-demographic characteristics of the respondents are presented in Table 2. This study used online questionnaires using google form, so it only certain respondents who have access to technology and understand how to fill out questionnaires online based on their experience.

Table 2. Respondents' socio demographic characteristics

Category	Frequency (n)	Percentage (%)
Age Range		
22-35 years old	7	14,58
36-50 years old	38	79,17
Above 51 years old	3	10,42
Occupation		
Self-employed	24	50,00
Entrepreneurs	5	10,42
Unemployed	10	20,83
Government employees	10	20,83

3.2.2. Knowledge of the Role and Benefits of Biuku/Beluku

The results of the Likert scale analysis obtained based on knowledge of the role and benefits of Biuku/Beluku can be seen in Figure 2. Public perception was high regarding the role and benefits of turtles for the ecosystem (above 3). A total of 60% of the local community already knew that turtles are animals that must be protected. This finding showed that Paser local community can be trained to be more responsible over management of their own natural resources. Waylen [16] stated that there are several possible explanations of this, Firstly, these local villagers used to have occupation as poachers of *Batagur borneoensis* eggs for decades; however, they may not be familiar with the science behind the conservation. Secondly, they felt empowered by being involved in a conservation that helped to conserve a Critically Endangered species. Hence, all local villagers must care for the environments.

Many respondents believe that Biuku/Beluku had benefits or roles in the ecosystem, although there were respondents who do not know it and are less able to explain or provide examples of benefits and roles. The knowledge of the local community collected consisted of knowledge about biuku/beluku habits, prohibitions and the conservation status are good (likert scale value 3-4). This category was classified into medium, this showed that there were still negative behaviors in the community such as catching, raising, consuming eggs, and even selling turtles. One way of conservation that has been carried out by youth Paser conservation groups was the release ceremony of hatchlings with the name Biuku endemic animal release. In the ceremony, there were cultural traditions such as making young belinjo in every year and budaya Nutu Punta. This finding included that local community in Paser could develop aspects of conservation strategy and commitment to keep the continuity of Biuku/Beluku life.

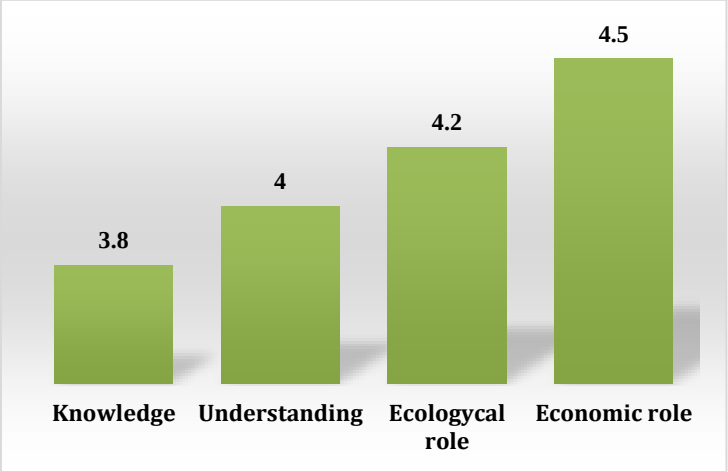

Figure 3 Results of the likert scale regarding respondents' knowledge of Biuku/Beluku Paser.

Knowledge influenced by several factors were included: education, experience, age, and information. In general, the higher person's level of education, so the better of their knowledge [17],[18]. Public perception was categorized as moderate this was result of a positive impact of annual activities releasing Hatchlings, so that people could understand the benefits of Biuku/Beluku (*Batugur Borneoensis*). The findings included that Conservation education strategy for community through socialization, and

discussion on all levels of elements can improve the Biuku/Beluku conservation.

3.2.3. *Respondents' Attitude towards Biuku/Beluku*

The results of the Likert scale analysis on respondents' attitudes showed higher than average value than the knowledge variable. The questions about agreeing or not that Biuku have a role in the ecosystem, all the majority of respondents answered agree with a value of 3.73, but many respondents were hesitant or could not answer when asked for their opinion. on the role of Biuku in the ecosystem, the majority of respondents also believe that the existence of Biuku had positive impact on the environment and the highest score was obtained from the turtle conservation question with a score of 4.23 which means that almost all respondents agreed that turtles must be preserved. Local community attitudes taken from this research include: the role of Biuku/Beluku; public opinion regarding the role of Biuku/Beluku, community beliefs related to the tradition in Biuku/Beluku conservation. Some previous research showed that attitude of the local community is very important in conservation efforts [2,7,], [6], [19].

3.2.4. *Respondents' behaviour in Biuku/Beluku*

The results of behaviour analysis showed that the local community often gets information about Biuku/Beluku (score 3.46) and involvement in Biuku/Beluku conservation efforts got the lowest score (3), which means that there were still few people involved in Biuku/Beluku conservation efforts, as well as the environment around the community. The local community should know the benefits of having Biuku/Beluku in the Kendilo watersheds which are decreasing and threatened with extinction. However, people still hunted them for economic reasons. Some of negative behaviour was local villagers collected all wild-laid *B. borneoensis* eggs for consumption. The eggs were considered a local delicacy and sold in the market, while positive behaviour some local community was prior to the initiation of this *B. borneoensis* egg protection program, especially in situ conservation. This finding is in line with Chen [6] stated that in Kemaman River Malaysia already have egg protection programs to conserve this Biuku/Beluku

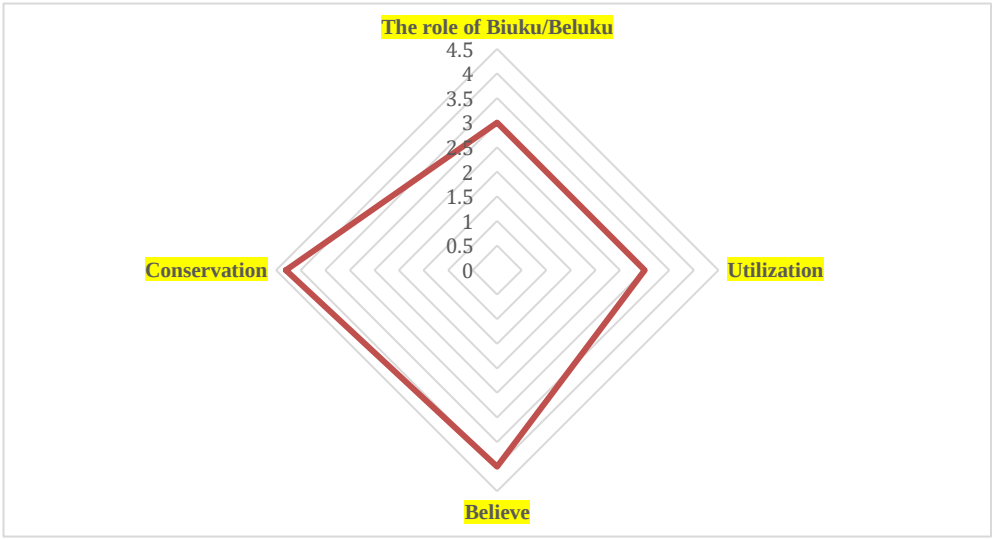

Figure 4 Results of the Likert Scale regarding respondents' attitude of Biuku/Beluku Paser.

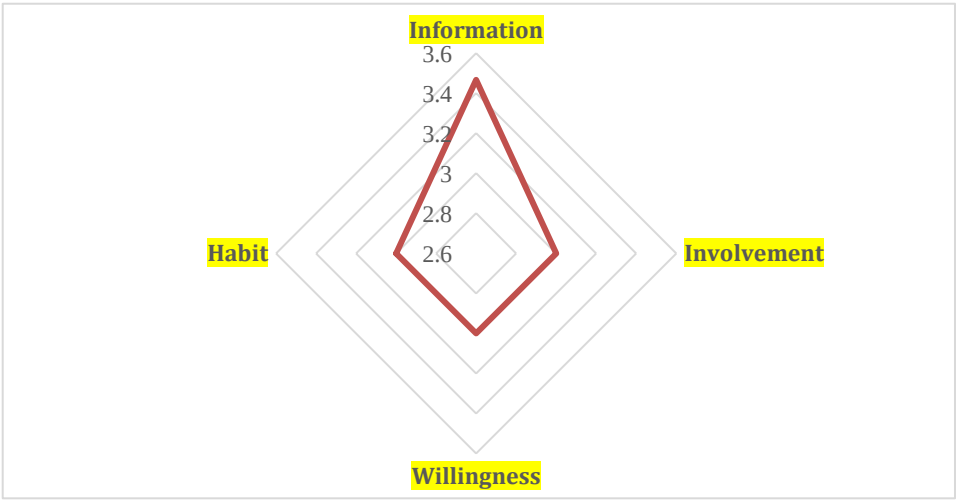

Figure 5 Results of the Likert Scale regarding respondents' behaviour of Biuku/Beluku Paser.

Conservation activities are pursued by providing perception to the community strengthen the value of local wisdom. The community was aware that they have become members of the rescue group for Biuku/Beluku. Animal conservation actions can be carried out properly through the traditional wisdom approach in the area. The government needs to strive to encourage the value of community wisdom which is integrated with conservation policies, so that the role of the community in supporting the Biuku/Beluku conservation program becomes higher.

3.2.5. Recommendation Biuku/Beluku strategic conservation

The efforts to increase knowledge can be carried out in various ways, including holding formal socialization and training activities carried out by government agencies, universities, or non-governmental organizations, approach to local wisdom by inserting knowledge material about Biuku/Beluku when there are Annual reintroductions events involving many people such as religious activities or community social activities, utilization and improvement of the functions of the information center, internet media, and face to face, introduction of Biuku/Beluku values to children from an early age in playgroups, kindergartens, and elementary schools, and appropriate and adequate management of conservation techniques to help Biuku/Beluku conservation run optimally. It was demonstrated that the participation of the local community is not only a viable conservation strategy, but also ensures the sustainability of the Biuku/Beluku conservation (ex-situ conservation).

4. CONCLUSION

It can be concluded that Biuku/Beluku as *Batagur borneoensis*. In addition, the members of the local community in Paser were classified good aware of the existence of Biuku/Beluku, and 80% noticed that the landings and population were decreasing every year because of degradation habitat and human activities. This study strengthened that a knowledgeable and participative local community could produce better outcome in sustaining a Biuku/Beluku conservation programme.

AUTHORS CONTRIBUTION

All authors conceived and designed this study. All authors contributed to the process of revising the manuscript, and at the end all authors have approved the final version of this manuscript.

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