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# Ecology of Endemic Primate Proboscis Monkeys at Curiak Island Area, South Kalimantan, Indonesia

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ABSTRACT

The proboscis monkey is an endemic primate of Borneo with an endangered conservation status. Proboscis monkey conservation must be carried out immediately, considering its existence as a biological indicator to maintain the balance of the wetland ecosystem. Proboscis monkey habitat which is outside the conservation area is very prone to changing functions, while the distribution of the proboscis monkey population is more outside the conservation area. The research aims to identify the ecology of proboscis monkeys that are outside the conservation area, namely the Curiak Island area in South Kalimantan. Retrieval of proboscis monkey ecological data for 6 months includes population, daily activities, and home range. The population method uses direct surveys by exploring the area using motor boats in the morning and evening. The daily activity method is the Scan Sampling Method and Ad liebetum Sampling. The home range method is recorded by tracking using a drone, the type of data recorded includes the total distance of daily movement which is calculated from the wake up time to sleep time. The results showed that the proboscis monkey population has the potential to develop with a distribution of 30 individuals divided into 3 groups, proboscis monkeys' daily activities include eating (33.5%), moving (11.63%), resting (41.56%), and social ( 13.28%). The average home range of proboscis monkeys is 86.25 m with a range of 49 m - 136

## INTRODUCTION

Indonesia has 38 endemic primate species of the 61 species (Supriatna, 2019). One of the endangered endemic primates is the Bekantan or in a foreign language it is called the Proboscis Monkey (English) (IUCN, 2015); Nasique (France), Nasenaffe (Germany), Mono narigudo (Spain) (Hutchins et al., 2003). The proboscis monkey has been declared endangered or "red endangered" by the International Union for Conservation of Nature and Natural Resources (IUCN) since 2000 (IUCN, 2015). Proboscis monkeys are categorized into appendix 1, which means they cannot be traded according to the international convention institution Convention International Trading on Endangered Species of Flora and Fauna (CITES) (CITES, 2017).

The proboscis monkey became the mascot of South Kalimantan Province based on the Decree of the Governor of South Kalimantan No. 29 of 1990. The proboscis monkey is an endemic primate of Borneo with a limited population distribution found only on the island of Borneo covering 3 countries, namely Indonesia, Malaysia and Brunei Darussalam. Proboscis monkeys are arboreal primates that inhabit various types of wetland habitats. Proboscis monkey habitat types include mangroves (Bismark, Iskandar, 2002; Kartono, et al., 2008), riverine (Zainudin & Rezeki, 2016; Suwarto et al., 2016; Selpa, et al., 2019; Atmoko, et al., 2020), swamp (Iskandar, et al., 2017). Morphologically, the proboscis monkey is unique compared to other primates, such as its body which is filled with yellow hair, has a long tail, long hanging nose on male proboscis monkeys, and has swimming membranes in its fingers and toes. Proboscis monkeys are primates that have high sensitivity, so they are key species and biological indicators. The proboscis monkey's intolerant nature towards habitat destruction makes it increasingly endangered (Bismark, 2009).

In 2004 at the PHVA symposium on proboscis monkeys, the population was estimated to live at 25,000 individuals, and 5,000 individuals in conservation areas (Manangsang et al., 2005). The research results of Atmoko, et al., (2013) stated that there were 143 individuals in Kuala Samboja, 192 individuals in Swamp Gelam, Tapin District, South Kalimantan (Iskandar et al., 2017), 325 individuals in Kutai National Park (Suwarto, et al., 2016). The number of individual proboscis monkeys from the South Kalimantan BKSDA data in South Kalimantan Province in 2017 is approximately 2,224 individuals. The proboscis monkey population will decrease (Wilson & Wilson, 1975) due to agricultural, gardening and other land management activities that will narrow the proboscis monkey's habitat and reduce the potential for food (Alikodra, 1997).

The decline in the proboscis monkey population is caused by many factors, such as damage to the proboscis monkey's habitat which is under a lot of pressure due to the pace of development, forest conversion and forest fires. The narrowing and decline in the quality of the proboscis monkey's habitat is directly proportional to the decline in the proboscis monkey population. Poaching and animal trade are other contributing factors to the decline in the proboscis monkey population (SBI, 2017).

The key to proboscis monkey conservation is protecting their habitat. The proboscis monkey population in South Kalimantan, is not only spread over 13 conservation areas, but mostly outside the conservation area. The proboscis monkey population that is outside the conservation area must be saved immediately because it is vulnerable to habitat conversion. The habitat status of the Curiak Island area is an area outside the conservation area managed by the Sahabat Bekantan Indonesia Foundation (SBI) since 2017 in collaboration with University of Lambung Mangkurat. The area with an area of 11.01 hectares is an area that is very representative as a wetland ecosystem area, namely riparian mangroves. The proboscis monkey population in the Curiak Island area is experiencing a condition with a population curve in the form of a pyramid, that is, the number of adult proboscis monkeys is greater than the number of proboscis monkeys. The results of this study indicate that the chance of the percentage of deaths is higher than the percentage of births (Zainudin & Rezeki, 2016). Efforts to protect the proboscis monkey's habitat outside the conservation area require an appropriate management strategy according to the characteristics of the habitat.

## METHODS

The research was carried out for 6 months from July - December 2021. The research was conducted in the Bekantan Research Station area, Curiak Island, South Kalimantan. An overview of the Curiak Island area can be seen in Figure 1. The Curiak Island area is a delta of the Barito river with an area of ± 11.01

hectares. The riverine-type mangrove area which is the dominant vegetation of the island is a habitat as well as a representative of the wetland ecosystem for proboscis monkeys. Ecological data of proboscis monkeys observed were proboscis monkey population, daily activities of proboscis monkeys, and home range of proboscis monkeys

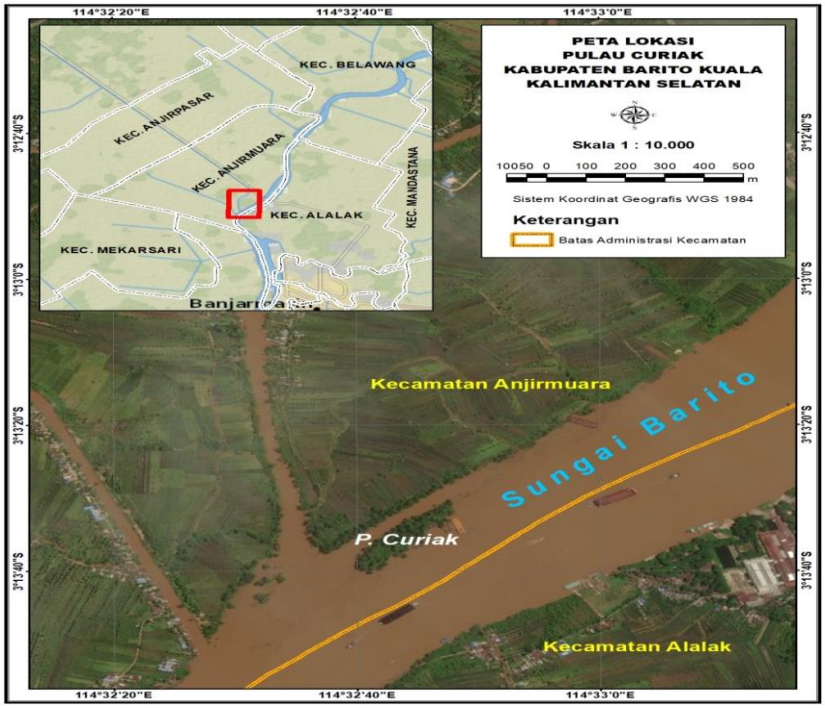


Figure 1. Map of the Curiak Island Area

**Proboscis monkey population**

The proboscis monkey population includes the distribution of groups and the number of individuals in each group as well as the estimated age of the individuals. Data collection is carried out in the following way:

1. Tracing the Curiak river along the Curiak Island area using a motor boat using the total count sampling method. Every encounter with a group of proboscis monkeys,
2. Record the time of encounter, number of individuals, age and sex composition,
3. Observations are made every day from 06.00-18.00 in the morning until evening. The census was repeated twice, to ensure the presence and number of each group of proboscis monkeys.

Individual categories based on age are (Bismark & Iskandar, 2002):

1. Adult male: Full body size, large nose, clear genitals, longer hair all over the back, there is a triangular section on the buttocks or above the tail with the hair color in this section lighter than the surrounding hair
2. Adult female: Smaller body size than adult male, small nose, protruding nipples.
3. juvenile /adolescents males: Body size is ¾ the size of an adult male's body, the nose has not grown large, the genitals are clear and the hair on the back is not long.
4. juvenile/adolescent females: Body size is almost the same or ¾ the body size of an adult female, the nipples are not prominent. The hair color in the triangular section on the buttocks or above the tail is rather pale or sometimes still dark (blackish) from the surrounding hair color.
5. Baby/toddler: Body size ½ - 2/3 of adult size, free from slings but still often close to the female parent, hair color starts to change from black to slightly yellow.

infant: Still always in the mother's arms. The head and body hair is brown, the face is still black

The morphology of proboscis monkeys can be seen in Figure 2.

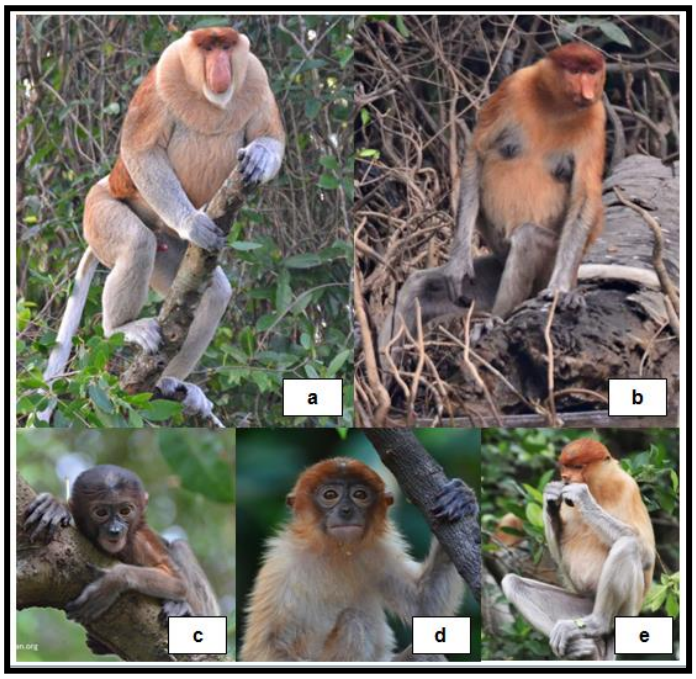


Figure 2. Morphology of Proboscis Monkeys; a) Adult Male, b) Adult Female, c) Infant, d) Baby, e) Juvenile

**Proboscis Monkey Daily Activities**

The object of this study was the proboscis monkey population in the Proboscis Monkey Research Station Area on Curiak Island, Barito Kuala Regency. The method used is the Scan Sampling Method and Ad liebetum Sampling (Altmann, 1974) with recording intervals every 10 minutes. The daily activity category refers to the daily activity category (Soerianegara et al., 1994), namely:

1. Feeding activity: activities of reaching, carrying and putting food into the mouth, chewing and (perhaps) throwing or releasing food that is held with its limbs (hands or feet).
2. Resting: Sit, stand, lie down in place or walk (shift) as needed around the place without doing any activity.
3. Movement: moving aimlessly, whether done alone or together with other individuals
4. Social: playing, grooming, and calling

The data obtained were compiled and analyzed descriptively and presented in tabular form. To deepen the discussion, the results of this study were compared with the results of other published studies. Steps to observe daily activities of proboscis monkeys:

1. to introduce proboscis monkey habitat (habituation)
2. identify the proboscis monkey gathering point, if the proboscis monkey gathering point is in the middle of the island then the researcher explores or uses binoculars, whereas if the proboscis monkey gathering point is on the outskirts of the island then it is enough for the researcher to be in a boat with the help of a camera and binoculars to observe.
3. identify the types of daily activities of the proboscis monkey group
4. calculating the length of time and frequency of proboscis monkey daily activities

Calculation of the percentage of activity is:

Activity Percentage = (A/B) x 100%

Information:

A = Average activity observed in the treatment

B = Total of all observed activities (Martin & Bateson, 1987)

**Proboscis Monkeys Home Range**

Home range area is a function of habitat productivity and distribution of feed resources (Harestad & Bunnell, 1979). In some species of mammals, home ranges decrease as food availability increases (Hulbert et al., 1996). The home range area will reach its maximum size during periods of decreased fruit availability until it reaches very few quantities (Silvius & Fragoso, 2003). Therefore, home range area can be used as an indicator for habitat quality (Tufto et al., 1996). Home range area is inversely related to population density of some species due to resource competition or social interaction (Ostfield & Canham, 1995).

Population increase results in increased competition between individuals of the same species, thereby narrowing the size of the home range. Proboscis monkeys do not use the same tree as a bed on successive days to avoid predators. The distance between sleeping trees averages 192 m (65–502 m). Home ranges are collected by tracking using drones. The type of data recorded includes the total daily movement distance calculated from the wake up time to the sleeping time (Saiful et al., 2001).

Calculation of the proboscis monkey's average home range distance (Iskandar, 2017), namely:

$X = \Sigma$ distance / F

Information :

X = Average daily cruising distance

F = Frequency of observation days

## RESULTS AND DISCUSSION

**Proboscis Monkey Population**

The Curiak Island area consists of Curiak Island and the land area opposite it. Curiak Island is a delta of the Barito river. The dominant plant vegetation is the Mangrove Rambai (Sonneratia caseolaris), which has started to grow and helped form Curiak Island since 36 years ago based on information from the local community. In the Curiak Island area, there are 3 groups of proboscis monkeys named by SBI, namely the Alfa group, the Bravo group and the Charlie group. The group that has the largest number of individuals is the Alpha group. The total number of individuals in the 3 groups of proboscis monkeys that inhabit the Curiak Island area is 30 individuals. In the Alpha group there were 1 adult male proboscis monkey, 6 adult female proboscis monkeys, 2 juvenile proboscis monkeys, 2 baby proboscis monkeys, and 3 infant proboscis monkeys. In the Bravo group there were 1 adult male proboscis monkey, 2 adult female proboscis monkeys, 2 juvenile proboscis monkeys, 1 baby proboscis monkey, and 1 infant proboscis monkey. In Charlie's group there were 1 adult male proboscis monkey, 3 adult female proboscis monkeys, 2 juvenile proboscis monkeys, 2 baby proboscis monkeys, and 1 infant proboscis monkey which can be seen in Table 1.

Table 1. Number of Proboscis Monkeys in 3 (Three) Groups

| No | Group Name | Adult | | Juvenile | Baby | Infant | Σ | area (ha) | Population Density (Ind/ha) |
|---|---|---|---|---|---|---|---|---|---|
| | | Male | Female | | | | | | |
| 1 | Alpha | 1 | 6 | 2 | 2 | 3 | 14 | 11,01 | 1,27 |
| 2 | Bravo | 1 | 2 | 2 | 1 | 1 | 7 | 11,01 | 0,64 |
| 3 | Charlie | 1 | 3 | 2 | 2 | 1 | 9 | 11,01 | 0,82 |
| | Total | 3 | 11 | 6 | 5 | 5 | 30 | | |
| | Sex Ratio | 1 | 3,67 | | | | | | |

The composition of the proboscis monkey group in the Curiak Island area as a whole is 3 adult males (10%), 11 adult females (36.67%), 11 juveniles and baby (36.67%), and 5 infants (16.67%), with an adult individual sex ratio of 1:3. A group of proboscis monkeys in the Curiak Island area can be seen in Figure 3.


Figure 3. A Group of Proboscis Monkeys in the Curiak Island Area

The observed proportion of proboscis monkeys in the Curiak Island used daily activity time for 11-12 hours and started daily activities in the morning at 06.00 and ended at 18.00 after entering the sleeping tree. The average proportion of proboscis monkeys' daily activities were eating 33.50%, moving 11.63%, resting 41.56% and social activity 13.28%. The three proboscis monkey groups were recorded to have almost the same daily activity patterns as can be seen in Table 2

Table 2. Daily Activities of the 3 (Three) Proboscis Monkey Groups

| Group | Daily Activities | | | |
|---|---|---|---|---|
| | Feeding | Movement | Resting | Social |
| Alpha | 30,22 | 11,33 | 42,73 | 15,70 |
| Bravo | 34,45 | 11,29 | 41,18 | 13,07 |
| Charlie | 35,84 | 12,28 | 40,78 | 11,08 |
| Total | 100,51 | 34,9 | 124,69 | 39,85 |
| Average | 33,50 | 11,63 | 41,56 | 13,28 |

Daily activities of proboscis monkeys in the Curiak Island area from the highest to the lowest respectively are resting, eating, moving and social activities. The study of daily activities basically studies how animals behave in their habitat, thereby helping the implementation of wildlife conservation management. Proboscis monkeys resting activities based on observations are sleeping, leaning on trees, and hanging from trees. The highest resting activity is carried out during the day (12.00 – 15.00) and at night. During breaks, the proboscis monkeys choose large trees which are found mostly on river banks such as mangrove rambai (Sonneratia caseolaris) and banyan trees (Ficus microcarpa). Daily activities of Proboscis Monkeys can be seen in Figure 4


Figure 4. Daily Activities of Proboscis Monkeys: (a) Feeding, (b) Moving, (c) Social, (d) Resting

**Proboscis Monkeys Home Range**

The average daily movement distance of the three groups of proboscis monkeys is 86.25 m with a range of 56 m - 136 m. The data is shown in Table 4

Table 4. Proboscis Monkey Home Range

| No. | Group | Sleeping Tree | Area (Ha) | Min. Distance (m) | Maks. Distance (m) | Average (m) |
|---|---|---|---|---|---|---|
| 1 | Alpha | Sonneratia caseolaris<br>Ficus microcarpa | 4,01 | 56 | 128 | 90,93 |
| 2 | Bravo | Sonneratia caseolaris<br>Ficus microcarpa | 4,9 | 62 | 136 | 88,88 |
| 3 | Charlie | Sonneratia caseolaris<br>Ficus microcarpa | 2,1 | 49 | 105 | 78,95 |
| | Average | | | | | 86,25 |

The average home range distance of the three groups of proboscis monkeys is 86.25 m with a range of 49 m - 136 m. The Alpha group averages 90,93 m (56 m – 128 m) daily movement with a home range of 4,01 ha. The Bravo group's average daily range is 88,88 m (62 m – 136 m) with a home range of 4,9 ha. The average daily range of Charlie's group is 78,95 m (49 m – 105 m) with a home range of 2,1 ha. In the three groups of proboscis monkeys, the trees that are often used to rest during the day and sleep at night are mangrove rambai (Sonneratia caseolaris) and banyan tree (Ficus microcarpa). The proboscis monkey's daily movement can be seen in Figure 5.

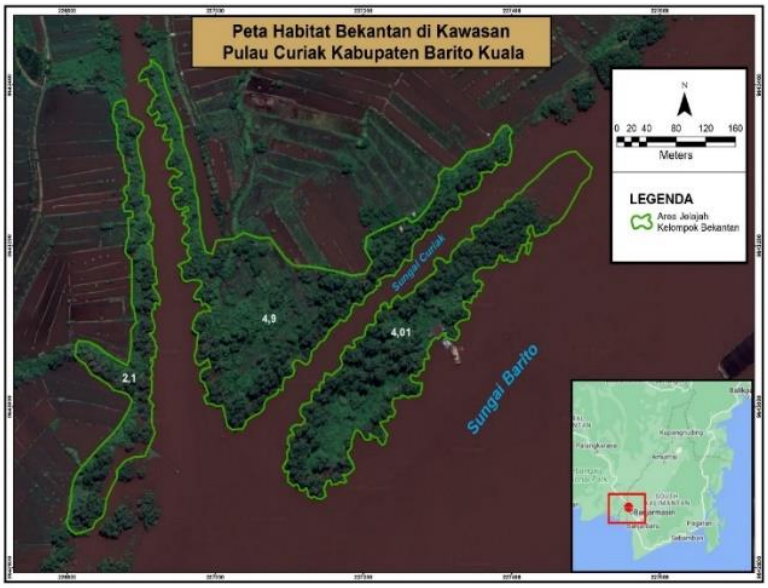


Figure 5. Map of Proboscis Monkeys Home Range Area of Curiak Island

**Proboscis monkey population**

The Curiak Island area is a barito delta which is administratively located in the Barito Kuala Regency, South Kalimantan, Indonesia. The Curiak Island area is a natural habitat for proboscis monkeys which is classified outside the conservation area. The Curiak Island area is experiencing huge pressure over its function because it is located on the Barito River which is the main route for water transportation, close to industrial and residential areas. Proboscis monkeys were first seen on Curiak Island in 1994 based on information from the local community, and there were only 3 proboscis monkeys with unidentified sexes. The Curiak Island area has great potential for development because there is a population of proboscis monkeys which are endemic primates endangered, apart from that it has unique riverine mangrove vegetation. This great potential is guarded by Sahabat Bekantan Indonesia – a non-profit foundation focused in the conservation of proboscis monkeys and other protected wild animals, and continues to develop initiatives for conservation programs by building collaboration with local governments, communities, the private sector and the media. The development of the Curiak Island area has been initiatives and carried out by SBI since 2015. The proboscis monkey population in the Curiak Island area has become increase after efforts made by conservation programs so that the number of individuals continues to increase. This number increased to 11 individuals in the routine census of Indonesian Proboscis Monkeys in 2015 (SBI, 2016). The number of proboscis monkeys on Curiak Island increased by 3 individuals in a period of 1 year, and became 14 in 2016 which were divided into 2 groups (Zainudin & Rezeki, 2016). The social structure of proboscis monkeys is flexible, small groups often merge into large groups temporarily. One group consists of 12-27 individuals (Nowak, 1983), 15-61 individuals (Alikodra, 1997), 25 individuals (Supriatna & Wahyono, 2000), 6-15 individuals (Atmoko, et al., 2012), 15-36 individuals (Iskandar, 2017). Comparison of proboscis monkey populations in various types of habitat outside the conservation area can be seen in Table 5.

Table 5. Comparison of Proboscis Monkey Populations of Various Types of Habitat Outside the Conservation Area

| Location | Individu (percentage) | | | | Source |
|---|---|---|---|---|---|
| | Adult Male | Adult Female | Juvenile | Baby | |
| Delta Mahakam, East Kalimantan Timur | 17% | 28% | 50% | 5% | Ma'ruf et al., 2005 |
| Combination forest with plantation, Pararawen, Central Kalimantan | 14,7% | 29,41% | 29,41% | 26,47% | Riyawan, 2014 |
| Riverine forest, Sungai Kepuluk, West Kalimantan | 11,06% | 23,45% | 49,56% | 5,31% | Rizal et al., 2016 |
| Melaleuca Swamp, South Kalimantan Selatan | 8,85% | 29,17% | 56,77% | 5,21% | Iskandar, 2017 |
| Curiak Island, South Kalimantan | 10% | 36,67% | 36,67% | 16,67% | Result of research, 2021 |

monkey reproductive success, with a polygynous mating system, adult male proboscis monkeys marry many adult female proboscis monkeys (Boonratana, 2011). The social system of proboscis monkeys in mangrove forests is more towards a multi-male system, where in each group there is more than one adult male. The ratio of adult males to adult females is 1:2.55. Movement of members between groups also occurred (Bismark, et al., 1994). Research by Ruhyat (1986) showed that the group of proboscis monkeys had between 1-5 adult males for a group of 11-56 individuals. The more mature females there are in the group, the higher the reproductive chances.

The accumulation of juvenile proboscis monkeys, baby and infant phases is the most common age structure in the three groups of proboscis monkeys compared to the number of proboscis monkeys in the adult phase, and infant proboscis monkeys are still found, indicating that the proboscis monkeys in the Curiak Island area are breeding well. In the age structure of each proboscis monkey group, it can be seen that all proboscis monkey groups have a group structure that indicates good population growth. This is indicated by the presence of individual babies in most groups of proboscis monkeys. The number of individual children (juveniles, babies and infants) is greater than the number of adults, namely 46.67% of adults and 53.34% of children. Monitoring of population and habitat conditions needs to be done regularly to prevent the extinction of the proboscis monkeys, so that the proboscis monkeys' habitat in the Curiak Island area needs to be managed intensively by regulating spatial use patterns.

Primate daily activity patterns are generally influenced by the quality and size of the habitat, the availability of food sources, both the abundance of species and their distribution, as well as disturbances and threats to these primates. Proboscis monkey habitat in the Curiak Island area, has an abundance of types of food such as mangrove rambai (Sonneratia caseolaris), banyan (Ficus microcarpa), waru (Hibiscus tiliaceus), putat (Planchonia valida), jingah (Gluta renghas), galam (Melaleuca leucodendron), jeruju (Acanthus ilicifolius), piai (Acrostichum aureum), bakung air (Crinum asiaticum).

Three types are used as preferential feed, namely mangrove rambai, banyan and waru. The preferential feed in the Curiak Island area has similarities with the preferential feed in the Kutai National Park area, research by Suwarto et al., (2016) regarding the suitability of proboscis monkey habitat based on distance, the results indicate that proboscis monkeys really like and are very close to Sonneratia because they are a source of food and bedding for

proboscis monkeys that grow on tidal shores and also grow on river banks and river estuaries. Proboscis monkeys prefer to take shelter in mangrove vegetation during the day and rest in Sonneratia trees at night. These types of plants are evenly distributed in the Curiak Island area, so that proboscis monkeys do not do much movement, but spend more time for resting. Rest is an activity that has the largest proportion of time among other daily activities, while movement activity is an activity that has the smallest percentage of time (Bismark, et al., 1994; Matsuda, et al., 2009; Iskandar, et al., 2017). Comparison of daily activities of proboscis monkeys found in various types of habitat based on the results of the literature can be seen in Table 6.

Table 6. Comparison of Daily Activities of Proboscis Monkeys with Various Habitat Types

| Location | Daily Activities (%) | | | | Citation |
|---|---|---|---|---|---|
| | Feeding | Movement | Resting | Social | |
| Wildlife reserve, Samunsam Malaysia – mangrove, riverine | 13,1 | 18,8 | 65,1 | 0,7 | Salter et al., 1985 |
| Kuala Samboja, East Kalimantan – mangrove, riverine | 39,25 | 23,18 | 33,33 | 3,63 | Alikodra & Mustari, 1994 |
| National Park Kutai, East Kalimantan - mangrove | 23,2 | 25,2 | 42,3 | 9,3 | Bismark, et al., 1994 |
| National Park Gunung Palung, West Kalimantan - riverine | 26,86 | 20,67 | 48,54 | 3,93 | Rubminto & Djuwantoko 2000 |
| Sungai Menanggul Sabah, Malaysia - riverine | 20,4 | 3,6 | 75,9 | - | Matsuda et al., 2009 |
| Wildlife sanctuary Muara Kaman Sedulang, East Kalimantan - riverine | 32,9 | 15,6 | 51,2 | 0,3 | Winardi et al., 2017 |
| Galam forest, Tapin, south Kalimantan – swamp | 31,1 | 14,3 | 52,1 | 2,5 | Iskandar, 2017 |
| Curiak Island, South Kalimantan – mangrove, riverine | 33,50 | 11,63 | 41,56 | 13,28 | Result of research, 2021 |

The proboscis monkey chooses a sleeping tree based on the type and physical characteristics of the tree. There are factors those are thought to significantly influence the selection of dormant trees, namely: distance from the river bank, tree height, tree diameter, diameter of the lowest branch, number of main branches, crown connectivity, ground cover (Bernard et al., 2011). The choice of proboscis monkey sleeping trees is closely related for avoiding predator attacks (Matsuda et al., 2008a) and mosquito attacks (Feilen & Marshall, 2014).

The daily movement of proboscis monkeys horizontally in their home ranges is basically a movement towards feeding locations, resting locations, then returning to feeding locations in the afternoon and looking for sleeping trees in riverside trees (Matsuda et al., 2008b; Matsuda et al., 2010; Bernard et al., 2011). In general, proboscis monkeys choose sleeping trees by the river as a strategy to avoid predators and spread of disease (Nekaris & Munds, 2010).

The proboscis monkey's daily roaming is part of the daily activities of the movement. Movement activities are carried out by proboscis monkeys to find food sources and places to rest. Based on the results of the study it was found that the average proportion of proboscis monkeys' movement time was 11.63%, movement activity was the smallest

portion compared to other daily activities. In the Colobinae subfamily, moving and foraging activities tend to be lower in habitats that are still good and rest is higher than in damaged habitats (Yang et al., 2007).

Differences in the size of the proboscis monkey's home range can be caused by various factors, including: a) differences in the availability, distribution and abundance of food sources, b) the quality of the available food, c) habitat structure, d) movement barriers, e) social organization and systems breeding, f) population density, and g) presence of predators. Home range area is a function of habitat productivity and distribution of feed resources (Harestad & Bunnell, 1979). In some species of mammals, home ranges decrease as food availability increases (Hulbert et al., 1996). The home range area will reach its maximum size during periods of decreased fruit availability until it reaches very few quantities (Silvius & Fragoso, 2003). Therefore, home range area can be used as an indicator for habitat quality (Tufto et al., 1996). Home range area is inversely related to population density of some species due to resource competition or social interaction (Ostfield & Canham, 1995). Increasing population density results in increased competition between individuals of the same species, thereby narrowing home ranges (Saiful et al., 2001). Proboscis monkeys like mangrove forests near river mouths and lowland forests in the interior where rivers pass as their habitat. In addition, proboscis monkeys are also known as one of the types of monkeys that most like the habitat above the river flow. The river is an ecological component that influences the choice of habitat by the proboscis monkey population in mangrove forests. For the proboscis monkeys themselves, the river serves as a source of drinking water and a means for swimming (Bismark et al., 1994). The proboscis monkey's walking activities include traveling through the tree canopy and swimming. Encounters with proboscis monkeys at the time of observation between 0-50 m from the riverbank and beach at the mouth of the river and at an altitude of 0-15 m. This is as reported by Bismark et al., (1994) that proboscis monkeys daily travel between 200-1100 m with a distance of 50-400 m from the river.

Since the existence of conservation activities in the Curiak Island Area, there has been an increase in the population which is thriving well, from 14 individuals to increase to 30 individuals. The conservation program developed by SBI includes (a) outreach and education; (b) improvement of proboscis monkey habitat through restoration of mangrove trees; (c) research; (d) development of special interest ecotourism. Even though the Curiak Island area is small, it has great potential by continuing to increase conservation efforts. The proboscis monkey social group is still growing naturally, which is marked by the presence of one male group and multi male group. The Curiak Island area can be a role model for conserving the endangered primate proboscis monkeys that are outside conservation areas based on community empowerment.

## CONCLUSION

Data on proboscis monkey ecology is very important for determining proboscis monkey conservation strategies and actions, especially proboscis monkey populations outside conservation areas. The proboscis monkey population living in the curiak island area has a significant development from 14 individuals to 30 individuals in a period of 6 years. The daily activities of proboscis monkeys show the highest percentage of resting activities and the lowest activity is movement. The daily home range of the three proboscis monkey groups ranged from 49 m to 136 m. In general, the ecological data of proboscis monkeys in the Curiak Island area show great potential for protection and development

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