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The 2nd International Conference of Education on Science, Technology, Engineering, and Mathematics (ICE-STEM 2020)

Population Dynamics of Proboscis Monkey in Kuala Barito River Delta

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ABSTRACT

Proboscis monkey (*Nasalis larvatus* van Wurmb, 1787) is entered endangered species, Appendix I CITES and endemic on the island of Borneo. Bakut Island Nature Tourism Park (NTP) is located in the Barito Kuala River Delta in South Kalimantan which is used as a natural habitat for re-release from the evacuation of conflict with humans or the result of community surrender. Monitoring of proboscis monkeys in Bakut Island NTP has been carried out since 2010 with baseline data on 29 individual proboscis monkeys. Data on population development over the past 9 years shows a fluctuating trend. This study aims to determine the dynamics of the proboscis monkey population in Bakut Island NTP of each year. This research was conducted in February to March 2020 in Bakut Island NTP. Bekantan population data collection using census survey methods directly by down the river using a boat in the morning and evening. The results of this study the development of the proboscis population within 10 years between 2010 and 2020 in the Bakut Island NTP experienced a change in the number of individuals from 29 to 90 individuals. Hunting of proboscis monkeys by the community does not occur at Bakut Island NTP because this location is included in a conservation area which is guarded by officers from morning to evening. Bekantan population density of 5.696 ind/ha with the number of individuals in a group between 25 to 39 individuals dominated by young age structure.

Keywords: Dynamics, populations, proboscis monkey

INTRODUCTION

Proboscis monkeys (*Nasalis larvatus* van Wurmb, 1787) belong to family Cercopithecidae, sub-family Colobinae [1]–[8]. The proboscis monkey entered an endangered species and was included in CITES Appendix I [2], [6] because its population has declined by more than 50% over the last 3 generations (36-40 years) [2].

Population proboscis monkeys in Kalimantan in 1994 with a population of 114,000 individuals and in 2004 of 15,000 individuals, the population decline in the last 10 years reached an average of 10% per year. This shows that proboscis monkey is sensitive to habitat fragmentation [9]. proboscis monkeys in 2004 of PHVA (Population and Habitat Viability Analysis) symposium report with an estimated population of 25,000 individuals and 5,000 individuals in conservation areas. Serious degradation of proboscis monkey habitat occurred on the island of Kaget, South Kalimantan in 1996 with a total of 228 individuals [9], which as a result in 1999, monkey proboscis in the Kaget Island Nature Reserve has become extinct due to 90% of agricultural land clearing [10].

Proboscis monkey can be found endemic on the island of Borneo [11] as in Brune [2], [3], [12] in Malaysia, among others Sabah [3], [7], [13]–[15], Sarawak [3], [12], [16]–[18], Berhala, and Sebatik [3]; and in Indonesia include East Kalimantan, West Kalimantan, Central Kalimantan, North Kalimantan and South Kalimantan [4], [8], [19]–[22].

In South Kalimantan, proboscis monkey habitat was found not only in mangrove forests, peat swamp forests, and riparian forests (near the coast or affected by tides), but also found in galam forests (*Melaleuca cajuputi*), rubber forests (*Hevea brasiliensis*), secondary forests on limestone hills [23], and dryland forests upstream of the river [21]. Proboscis monkeys as leaf-eating primates (colobinae) require quite high minerals [9]. Proboscis monkey prefer to eat young leaves for food sources, this is because the buds contain high protein but low fiber and anti-nutrients [19]. Proboscis monkey in South Kalimantan can be found outside conservation areas, including: in the East Coast Mangrove Forest [116_02 / 3_16 S]; Muara Muning [114_50 / 2_50 S]; Sea Island [116_13 / 3_48 S]; Island Areca nut [115_03 / 3_05 S]; Pleihari Martapura [114_56 / 3_56 S]; River Kacang [115_10 / 2_40 S]; River Country [114_56 / 2_47 S]; River Tapin [115_15 / 2_55 S] [10]. Within the conservation area, proboscis monkey

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Bakut Island NTP in Barito Kuala Regency is one of the mangrove forests used as proboscis monkey habitat in South Kalimantan, which is a location for releasing back probes from evacuated conflict or the result of community surrender. Monitoring of proboscis monkeys in TWAPB has been carried out since 2010 with baseline data on 29 individual proboscis monkeys. Data on population development occurring over the last 9 years shows a fluctuating trend [24], [25], so this study aims to determine the dynamics of proboscis monkey population in Bakut Island NTP each year.

RESEARCH METHOD

The study was conducted in February – Maret 2020 at Bakut Island NTP, South Kalimantan. Geographically, it is located at coordinates 114,555 ° BT - 114,560 ° BT and 3,213 ° LS - 3,220 ° LSm [24]. Bekantan population data collection uses direct census survey methods [14], [26], by river-boat rides in the morning and evening [13], [26]–[29]. The parameters observed were number of individuals, sex ratio, and group density [27], [30].

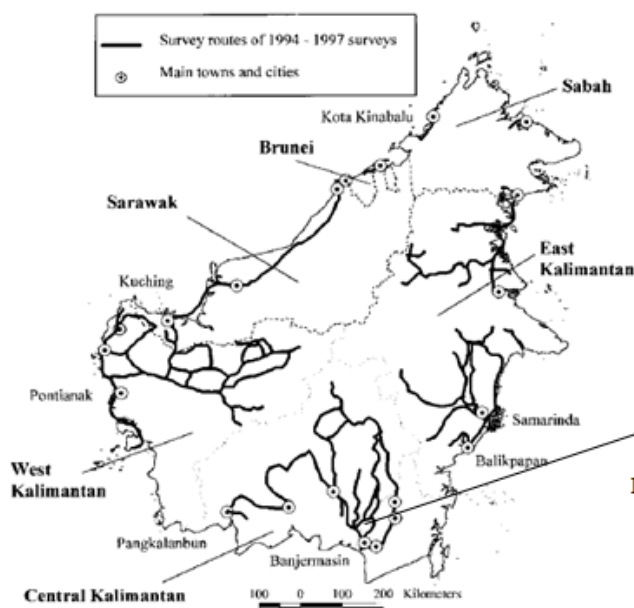


Fig. 1. (River Barito, South Kalimantan, Meijaard and Nijman 2000)



Fig. 2. (Bakut Island NTP, South Kalimantan) <http://bksdakalsei.com>, 2020)

RESULTS AND DISCUSSION

The number of proboscis individuals in the Barito Delta region such as in Bakut Island NTP is 90 individuals [31], 14 individuals of Curiak Islands [32], Kembang Island NTP by 48 individuals [33], and the number of proboscis monkeys in Kaget Island in 1997 was 304 individuals [23] and decreased in 2007 to 100 individuals [34]. The number of proboscis monkeys outside the conservation area in other areas of South Kalimantan such as in gelam swamp forests Tapin Regency amounted to 192 individuals [35], 53 individuals in the Batu Sawar mount [36], and at the conservation location ex PT Indocement Tarjun Kotabaru District there were 6 individuals [37]. The existence of proboscis monkey is influenced by the presence of food and competition for food sources [38]. TWAPB habitat in the south is dominated by *Sonneratia caseolaris* while in the north it is dominated by rengas (*Gluta velutina*) and fires (*Aglaiacucullata*) [24].

In Table 1. it can be seen that the development of the proboscis population in the 10 years between 2010 and 2020 in the Bakut Island NTP experienced a change in the number of individuals from 29 to 90 individuals [24], [25], [31]. Population of proboscis monkey can develop, stable or decrease, in accordance with the conditions of environmental changes. Changes in population size that are irregular according to the time scale (irregular) is called fluctuation. Fluctuations can be caused by three factors

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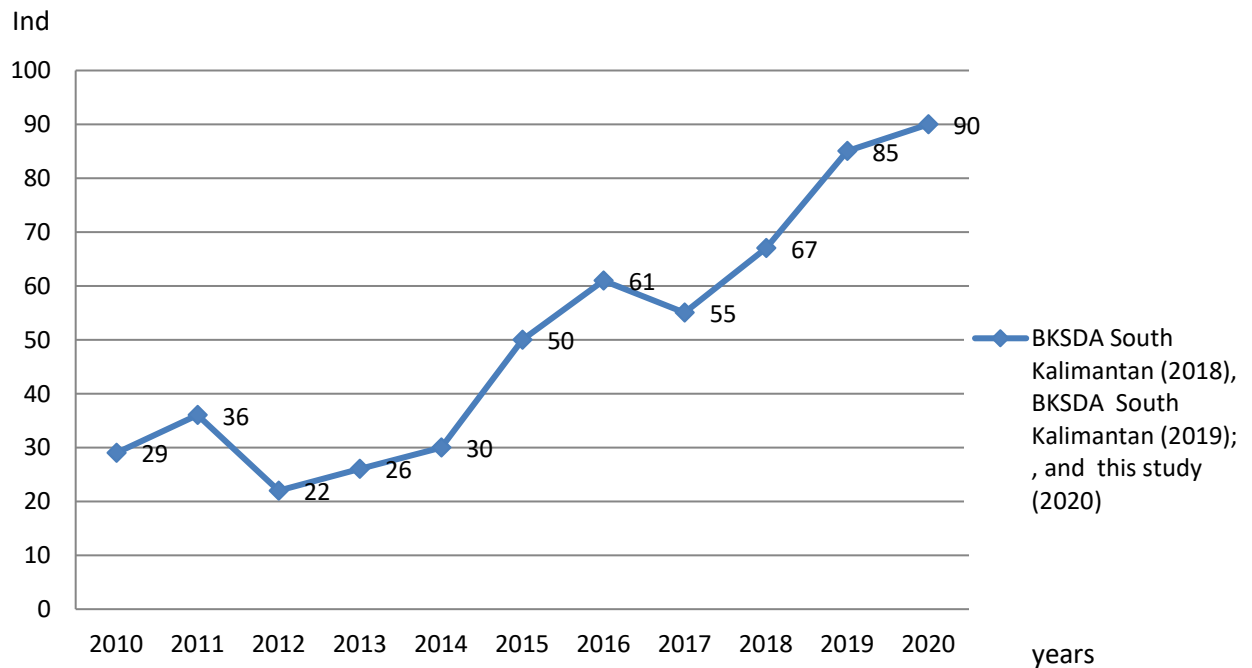


Fig 3. Proboscis monkey population dynamics of Bakut Island NTP

The influence of seasonal conditions that change constantly every year, for example the dry season and the rainy season which causes forage productivity also changes constantly (cyclically). This state of forage productivity is followed by the development or decline of herbivorous populations [39], including proboscis monkeys as leaf-eating primates (sub-family Colobinae) requiring quite high minerals [7], [9], [36], [40]. Therefore, the adequacy of feed is one of the determining factors for the success of animal reproduction [24] Proboscis monkey will choose the preferred feed of leaves, shoots and flowers [39], which has high nutrition and provides energy for individual reproduction [41], group size, and survives for the next generation [18].

Bakut Island NTP is guarded by officers from morning to evening, so there is no possibility of poaching and destruction of the habitat of *Nasalis larvatus* on this island. [36] Mentioned the proboscis monkey in the area of Mount Batu Sawar Timur, Hulu Sungai Tengah District, the occurrence of proboscis monkey hunting was done by local residents but the proboscis monkey was not hunted for consumption but to be traded and made into pets.

At the time of observation, *Macaca fascicularis* was seen at Bakut Island NTP by crossing the river by passing the iron under the Barito Kuala bridge. The presence of *M. fascicularis* can cause interspecies competition with proboscis monkey. [13] Mentioned that *M. fascicularis* is an omnivorous primate that can be any kind of feed such as leaves, fruit, flowers, tubers, or human food scraps so that it can survive and the population will increase. If *M. fascicularis* is allowed to continue living in Bakut Island NTP each year, it can have a negative impact on proboscis monkeys, namely the reduction of home range and the impact on the depletion of food sources which can consequently interfere with reproductive success.

M. fascicularis in Bakut Island NTP has the potential to become a competitor that can suppress the proboscis monkey population if the population is not controlled. In addition, there are several predatory animals in pulau bakut such as buaya sapit (*Tomistoma schlegelii*), ular sawah (*Phyton reticulatus*), elang bondol (*Haliaeetus indrus*), elang laut perut putih (*Haliaeetus leucogaster*), biawak (*Varanus salvator*) [31]. and dogs. The number of predators such as dogs so that many proboscis monkeys who move the place by swimming [42] because the proboscis monkey character is very sensitive and difficult to adapt [43]. Proboscis monkey good swimmers because they have long metacarpus and metatarsus that provide support when walking on mangrove swamp mud and swimming in rivers [44], [45]. One group of proboscis monkeys in the Bakut Island NTP is between 25 - 39 individuals. The difference in the number of individuals in the group is influenced by the habitat environment [46] and affects the

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The 2nd International Conference of Education on Science, Technology, Engineering, and Mathematics (ICE-STEM 2020) distance of the daily movement of proboscis monkeys [47]. High quality habitat can support a larger group size than the same area as low quality habitat [41]. In the afternoon the proboscis monkeys go to a sleeping tree on the riverbanks of the Bakut Island NTP, up to a distance of $\leq 50\text{m}$ from the riverbank and shore at the mouth of the river and at an altitude of 0-15 m [20], [48].

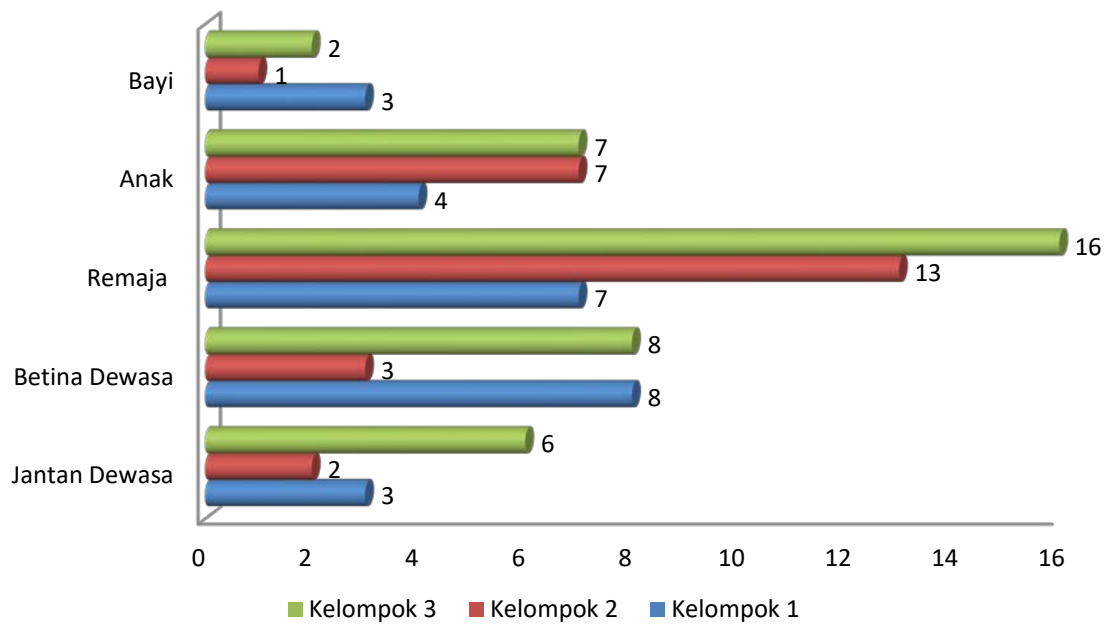


Fig. 4. Sex ratio proboscis monkey in Bakut Island NTP

This research, proboscis monkey, there are three groups divided into five age structures namely infants, children, adolescents, adult females, and adult males. Proboscis social system is more directed to a multi-male group system, namely in a group of proboscis monkeys there are more than one adult male [47]. Bekantan sex ratio in TWA Bakut Island is 1: 1.73 (Fig. 4); in the Rubber Plantation of Pararawen Hamlet in Central Kalimantan for 1: 2 [47]; in the Samboja Koala River for 1: 4 [27].

The number of adolescents, children and infants combined into 60 individuals, then the number is more than the number of female and adult individuals by 30 individuals so that it can be interpreted that the reproductive power of proboscis in Bakut Island NTP is good because it has babies in each group. Regeneration of adult individuals, can sooner or later be sure to be replaced by young individuals [47]. The age structure of the population is said to be declining, if it is a situation where the number of proboscis monkey children is less when compared to the number of adults and young people [36].

Habitat inhabited by proboscis monkey in the Bakut Island NTP area has an area of 15.8 ha with a population density of proboscis monkey of 5.696 ind/ha; 0.50 to 2.82 ind/ha in the Kepulok River area [29]. Batu Sawar mountain area of 0.088 ind/ha [36]. A daily average movement of 483 m (Nowak 1999). *N. larvatus* is known to spread over the lowlands with an altitude of fewer than 200 meters and is reported to have been found at an altitude of 350 meters [49].

Proboscis density at this location is greater than in mountainous areas with the characteristics of limestone (marble) in the Batu Sawar Mountain area of 0.088 ind/ha [36]. Habitat condition is a factor that greatly influences population growth. Low population density is likely due to population control factors such as poaching, high level of competition, low productivity and availability of food [36], timber utilization, and agricultural land clearing [29]. If the carrying capacity of the habitat cannot keep up with the rapid population growth, the proboscis monkey population in this area will decrease dramatically. This condition will potentially make the proboscis monkey population endangered [36].

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