PROBOSCIS MONKEY SURVEY IN SULAMAN LAKE FOREST RESERVE, TUARAN, SABAH

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ABSTRACT

Surveying primate populations is important for understanding their distribution and abundance, providing baseline data to guide conservation planning and future monitoring. This is particularly relevant for threatened species such as the proboscis monkey (*Nasalis larvatus*), an iconic Bornean endemic whose population status remains poorly documented in many parts of its range. As part of a scientific expedition for the proposed extension of the Kinabalu UNESCO Global Geopark (KUGGp), a brief boat-based proboscis monkey survey was conducted from 21st to 24th April 2025 in the Sulaman Lake Forest Reserve (SLFR), Tuaran, Sabah. No proboscis monkeys were directly sighted during the survey, although a few solitary long-tailed macaques (*Macaca fascicularis*) were observed. Local residents, however, reported that a small group of six to seven proboscis monkeys is found within an isolated patch of mangrove forest along the Papat River in SLFR, although sightings are rare. This remnant mangrove habitat, despite being disturbed and highly fragmented, appears to support this elusive group, highlighting its conservation value. Yet the rarity of sightings suggests that the group may be close to its ecological limit, increasing the risk of local extinction if further habitat loss occurs. Inclusion of SLFR in the KUGGp expansion could help strengthen long-term protection and management efforts for this species in the area.

Keywords: *Proboscis monkey, Sulaman Lake Forest Reserve, Kinabalu UNESCO Global Geopark*

INTRODUCTION

Habitat loss, degradation, and fragmentation driven by human activities continue to threaten biodiversity, even within protected areas (Davies et al., 2022). The proboscis monkey (*Nasalis larvatus*), a Bornean endemic primate, is especially vulnerable to these pressures (IUCN, 2025). This species depends on wetland forests near coastal areas, which are increasingly affected by urbanisation, settlements, aquaculture, agriculture, and linear infrastructure development (Sabah Wildlife Department, 2019; Atmoko et al., 2024; Bernard et al., 2024). In Sabah, long-term monitoring has focused on population strongholds such as the Lower Kinabatangan and the Klias Peninsula (Matsuda et al., 2020; Bernard et al., 2021; 2025). However, many smaller or isolated groups in lesser-known coastal and mangrove forests remain poorly surveyed, particularly in the north-western region, including Tuaran, Kota Belud, Kudat, Kota Marudu, and Pitas (Sha et al., 2008). Recent efforts have updated knowledge for parts of this region, but overall data remain patchy, making it difficult to track trends and address ongoing threats effectively (Bernard et al., 2024; Suis et al., 2024).

A state-wide survey in 2004/2005 suggested that proboscis monkeys might occur in north-western Sabah, based only on limited interviews with local communities and with no specific mention of Tuaran or the Sulaman Lake Forest Reserve (SLFR) (Sha et al., 2008). Nearly two decades later, Suis et al. (2024) confirmed a small, isolated population in SLFR through direct observations and community interviews conducted in 2021 and 2022. In November 2024, a follow-up survey by the Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah, recorded no direct sightings, although a local tour operator had filmed a lone adult male shortly before the survey. These observations indicate that a remnant group likely persists in SLFR but is rarely seen.

To strengthen this baseline information, an additional primate survey was conducted in the SLFR as part of a scientific expedition for the proposed extension of the Kinabalu UNESCO Global Geopark (KUGGp), organised by Sabah Parks. The survey aimed to reconfirm the continued presence of proboscis monkeys, estimate their distribution and abundance where possible, and identify key habitats and threats. It also documented other non-human primate species to inform conservation actions and support the proposed inclusion of the SLFR within the Geopark boundary.

METHODOLOGY

Study Species

The proboscis monkey is an ‘Endangered’ colobine primate (IUCN, 2025) and has held this status since 2000 (Boonratana et al., 2021). Known for its distinctive large nose and semi-aquatic habits, it primarily inhabits wetland forests near coastal regions, including mangroves, riverine areas, and swamps (Meijaard & Nijman, 2000; Sha et al., 2008). The species is listed in CITES Appendix I, prohibiting international trade (UNEP-WCMC, 2003), and is afforded the highest level of legal protection across its range. In Sabah, for example, it is classified as a ‘Totally Protected Animal’ under the Wildlife Conservation Enactment 1997, which strictly prohibits hunting, trading, or keeping it in captivity. Offenders face fines of up to RM50,000 and imprisonment of up to five years.

The proboscis monkey is also an important ecotourism attraction. In locations where sightings are consistent, such as the Kinabatangan and Klias Peninsula, the number of tour operators has steadily increased (Matsuda et al., 2020; Bernard et al., 2021). Despite this, its population is declining in some areas, and in others its status remains uncertain. Updated local surveys are therefore essential to inform effective conservation planning (Bernard et al., 2025).

Study Area
The Sulaman Lake Forest Reserve (SLFR) is a 2,555 ha Class V Mangrove Forest Reserve located in the Tuaran District on Sabah's northwest coast (Sabah Forestry Department, 2020). Gazetted in 1984, the area was previously affected by mangrove clearing for settlements and small-scale charcoal production, and it remains under pressure from development, including highway construction (Suis et al., 2024). The so-called Sulaman Lake is in fact a lagoon, with forests fringing its edges near the water. Although the reserve is dominated by mangrove forests, with the largest stands found along the Papat River, it also contains pockets of lowland mixed dipterocarp and beach forest (Suis et al., 2024). These habitats have supported proboscis monkey populations, but the extent and status of any remaining groups remain poorly documented. The SLFR is surrounded by several small coastal villages, which have gradually expanded over the years, with some even encroaching into the forest reserve area (Suis et al., 2024).

Survey Design
A focused boat-based survey targeting proboscis monkeys was conducted from 21st –24th April 2025 as part of the scientific expedition for the proposed extension of the Kinabalu UNESCO Global Geopark (KUGGp). Because proboscis monkeys often roost in riverside trees in the late evening and early morning before moving inland to feed, boat-based surveys during these periods are widely recognised as the most effective detection method and are commonly used by researchers across Borneo (Sha et al., 2008; Atmoko et al., 2024). Accordingly, observations were made in the early morning (06:30–09:30) and late afternoon (16:30–18:30). A small motorised boat was used to navigate the Sulaman Lake area and its interconnected rivers and mangrove channels, including the Papat River, at a slow, steady speed to minimise disturbance and maximise detection. Two trained observers continuously scanned the riverbanks and canopy edges using binoculars and the naked eye, recording group size, age–sex composition (where possible), location coordinates (GPS), behaviour, and immediate habitat characteristics. Other primate species were also recorded opportunistically.

To complement direct observations, informal interviews were conducted with local fishermen and nearby residents to gather information on recent (<1 year) proboscis monkey sightings, including group sizes and individual numbers. Reported locations, together with approximate GPS coordinates, were cross-checked against field observations for verification, and any perceived threats—such as encroachment or habitat disturbance—were also documented.

Data Analysis
Any sightings data were compiled to estimate minimum group and population size, and current local distribution. GPS locations of any confirmed or probable sightings were mapped to visualise potential habitat use along the surveyed areas within the SLFR.

Ethical Statements
Fieldwork was conducted under permits from the Sabah Forestry Department, Sabah Wildlife Department, and Sabah Biodiversity Council, following Sabah's wildlife research guidelines. Observations were non-invasive, with no animals captured or handled. Local knowledge on proboscis monkey sightings was incorporated with prior verbal informed consent, and informants remained anonymous.

RESULTS AND DISCUSSION

Four boat-based surveys—conducted in both morning and evening sessions over four field days—yielded no proboscis monkey sightings. However, local residents reported a small group of six to seven individuals in the Papat River area (Figure 1). Only a few solitary long-tailed macaques (*Macaca fascicularis*) were observed, confirming the presence of this common species while highlighting the difficulty of detecting the rarer proboscis monkey. The short survey duration, limited spatial coverage due to tidal constraints and poor weather, and the species' secretive behaviour may have reduced detection probability. The findings should therefore be considered preliminary.

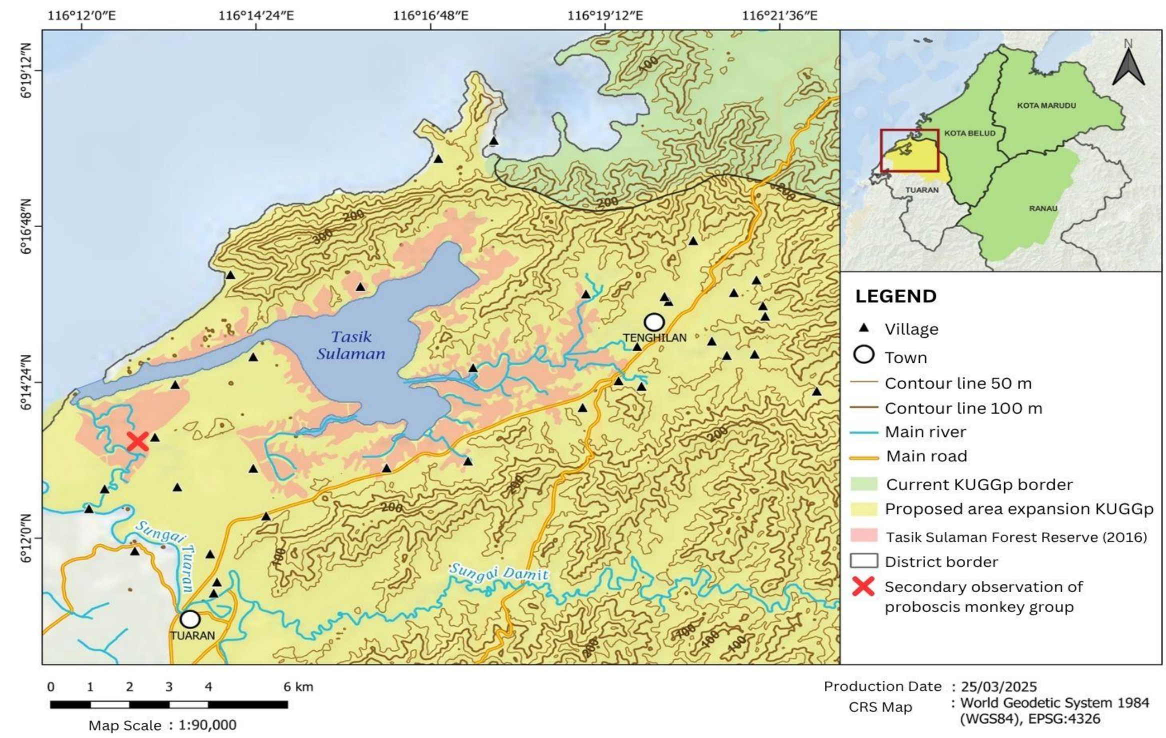

Figure 1. Map of the Sulaman Lake Forest Reserve (SLFR) and surrounding area in Tuaran, Sabah, showing the fragmented forest habitats and the location of proboscis monkey sighting reported by local residents during the proboscis monkey survey conducted from 21st –24th April 2025 as part of the Scientific Expedition for the Kinabalu UNESCO Global Geopark (KUGGp) extension, 14th –30th April 2025.

Nevertheless, the continued scarcity of sightings, particularly over the past five years, suggests that the local population is very small and may be declining further. Fewer residents now report sightings compared to previous years, which may indicate that the population is approaching local extirpation. Suis et al. (2024) documented direct sightings of only adult males, all within the same general area of isolated mangrove forest around the Papat River. Most respondents in their study also reported seeing lone individuals rather than family groups, implying that only solitary males persist. Reports of proboscis monkey groups exceeding five individuals are rare, further suggesting that any remaining groups are very small. The frequent sightings of solitary males may reflect their larger home ranges, but the absence of evidence for stable groups remains concerning and points to a population possibly nearing local extirpation.

A land-use and land-cover assessment of the SLFR in 2024 identified approximately 1,140 hectares of mangrove forest, which constitutes the primary habitat for the proboscis monkey in this area. Of this total, an estimated 80% is designated as Mangrove Forest Reserve (Sabah Wildlife Department, 2025). Other forest types are present but are likely less suitable, particularly in the northern parts of the reserve where elevations are higher. Despite this protection, the total mangrove area remains relatively small and highly fragmented, with many patches isolated from one another, threatening habitat connectivity and the species' long-term survival.

The planned construction of the Pan Borneo Highway is expected to pass through the SLFR (Suis et al., 2024). If it proceeds, it will cause further destruction and fragmentation of the remaining mangrove habitat. Combined with existing localised degradation and the small, vulnerable proboscis monkey population, this would place the species at even greater risk. These factors emphasise the urgent need for targeted conservation measures and careful land-use planning to safeguard any remaining proboscis monkey groups in the SLFR.

Incorporating the SLFR into the proposed extension of the Kinabalu UNESCO Global Geopark could help address these challenges by strengthening habitat protection and promoting more coordinated management of the area. This would involve managing the forest, nearby villages, and local activities in a way that balances conservation with the needs of local communities. While SLFR is already protected under the Sabah Forest Enactment 1968, inclusion within the Geopark could complement this existing legal protection by enhancing inter-agency collaboration, increasing access to conservation funding, and promoting integrated land-use planning that extends beyond the reserve boundaries. This dual framework may provide synergistic benefits—combining the statutory authority of the Forest Enactment with the broader awareness, education, and sustainable development initiatives, including ecotourism associated with UNESCO Global Geoparks. However, it would also be important to ensure that management objectives under the Geopark align with the core mandates of the Forest Enactment to avoid overlapping jurisdictions or conflicting priorities.

CONCLUSION

The findings of this brief survey suggest that the proboscis monkey population in the SLFR is small and at risk. No individuals were directly sighted, and only a single group of about six to seven individuals was reported by local residents along the Papat River in mangrove forest. Although most of the remaining mangrove habitat is protected, it is limited, degraded, and highly fragmented. Ongoing habitat loss from settlement expansion and the proposed Pan Borneo Highway poses additional threats that could further reduce this critical habitat. Extending the Kinabalu UNESCO Global Geopark status to include the SLFR could help strengthen protection of the reserve's mangrove forests and support the long-term survival of this vulnerable species.

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