

## IS THE NEWLY-FOUND TRICOLOUR LANGUR MORE TOLERANT TO HUMANS THAN WE THINK? INSPECTING HUMAN-LANGUR INTERACTION IN DANAU SENTARUM NATIONAL PARK

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### Abstract

Although formerly found exclusively in Malaysia, in 2019, the tricolour langur was also discovered in Danau Sentarum National Park (DSNP), Indonesia. As this primate lives on Borneo Island, it has been facing its inevitable anthropogenic habitat loss involuntarily. There is no denying that anthropogenic pressures have intruded even on conservation areas, including DSNP. Collision with human contact leads to an inevitable interaction between humans and tricolour langurs, which has not been studied before. Here we investigate human-tricolour langur interaction along with the impacts of anthropogenic activity on coexistence in DSNP. This research was conducted from January to December 2022 through semi-structured interviews using snowball techniques and convenience sampling. There was no reported conflict, hunting, or utilisation of this primate, thus reflecting the positive human-tricolour langur interaction. Furthermore, the tolerance displayed by humans and the tricolour langur towards each other's existence may become the pivotal driver that enables such coexistence. These findings suggest that national park management and local wisdom in understanding biodiversity's role in human life play a significant role in conserving this endemic primate in the DSNP.

**Keywords:** Anthropogenic; Coexistence; Danau Sentarum; National Park; Tricolour langur

### Introduction

Tricolour langur (*Presbytis chrysomelas* ssp. *cruciger* Thomas 1892) is an endemic primate, especially living on the tropical island of Borneo. Its distribution is limited only to northern Borneo. Initially, this primate was found in Malaysia in northern Melalap, Sabah, Baram, and Sarawak [1]. Later in 2019, this species was shockingly discovered in Indonesia, precisely in Danau Sentarum National Park (DSNP), West Kalimantan [2, 3]. Tricolour langur's habitat availability, along with other wildlife in Borneo, is threatened by habitat loss due to forest fires since Borneo is one of the deforestation hotspots even in Southeast Asia [4] and land cover change due to forest conversion to oil and timber plantations [5, 6]. These anthropogenic drivers and the naturally limited distributions [1] have led the tricolour langur to rarity. It was deemed Critically Endangered (CR) by the IUCN Red List in 2008, which formerly was considered Data Deficient (DD) as a consequence of the lack of data [7]. Since assessed as CR, this langur was then protected exclusively in Sarawak, Malaysia [7], while not yet protected on a national scale in Indonesia [3] on account of the lack of bioecological data as a newly-found primate.

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Anthropogenic factors [8, 9] and environmental variables [10] greatly affect wildlife's life. Humans have become the major driving factor behind any being's sustainability. Primates have been reported to live in the anthropogenic landscape [11]. Hence, activities may insinuate major changes to primate habitat characteristics [12, 13] or the natural mechanism to fulfil primate life necessities [9]. Anthropogenic activities have been intruding on primate habitats. Thus, human-primate interaction becomes inevitable, especially in shared landscapes or human-dominated areas [8, 11, 13, 14]. Humans' acceptance of primate existence is influenced by social beliefs, primate morphology, and potentially destructive habituated behaviours such as crop-raiding [15, 16]. These factors can drive humans to either protect or hunt wildlife. Since the human perception of nature is often disregarded in human-dominated nature conservation [17], neglecting to compromise the longevity of humans and primates on shared landscapes can pose a potential threat. The study of human-primate interaction has been a demanding topic for primatology due to the uprising of human-primate conflict in shared landscapes [11]. Later, the term human-primate coexistence was introduced to promote positive interaction and uplift the notorious primate reputation as a disturbance to human life [8, 11].

As a newly found species in Indonesia, it gives a chance for more research topics to venture into the bioecology of the tricolour langur. There are two studies found studying this primate, discussing the population density estimation of tricolour langur [2] and its habitat characteristics, along with langur's food preferences [3]. Since one of the tricolour langur's habitats is found in the utilisation zone of DSNP [2, 3], it is suspected that this langur most likely deals with anthropogenic activities around its habitat. Yet, there is no research on understanding human and tricolour langur interaction, especially its positive interaction (coexistence), which allows both to coexist eventually. Meanwhile, research on human-primate coexistence in human-modified landscapes has been done on other primates such as the lion-tailed macaque (*Macaca silenus*) [18], golden langur (*Trachypithecus geei*) [19], long-tailed macaque (*Macaca fascicularis umbrosus*) [20], chimpanzee (*Pan troglodytes verus*) [14], and Verreaux's sifaka (*Propithecus verreauxi*) [21].

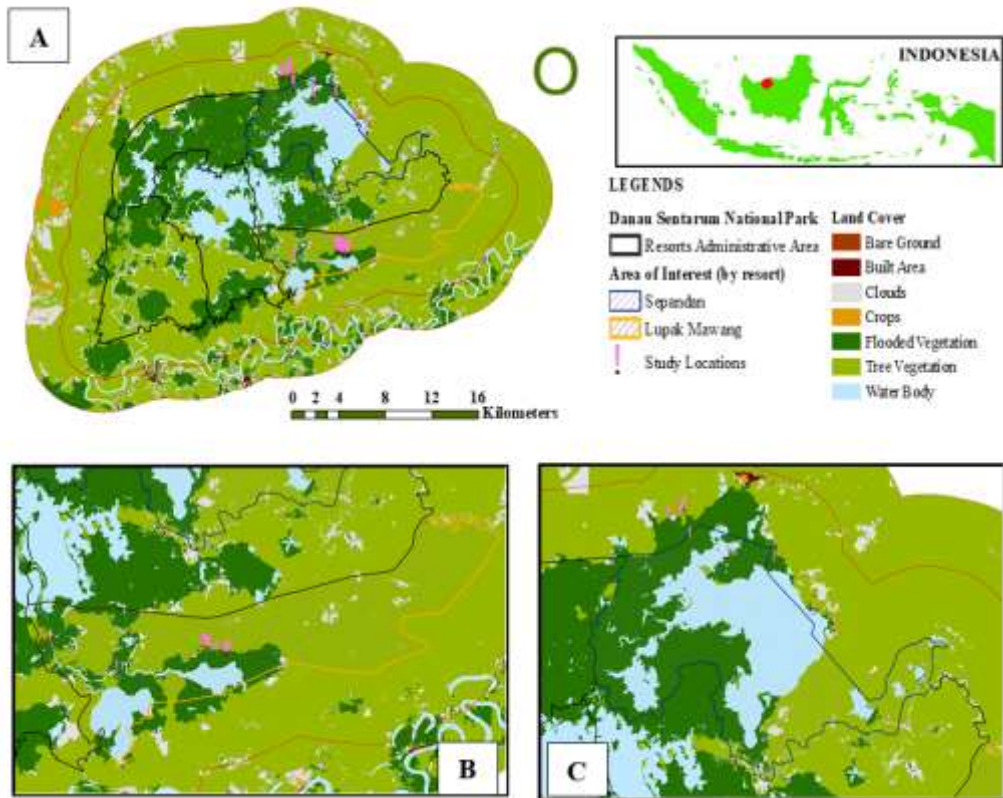
There needs to be a study concerning the socio-cultural topic of how anthropogenic activity by local people may affect the tricolour langur's life sustainability. The mechanism of human-wildlife coexistence requires a firm comprehension of how both sides' tolerance is negatively impacted by their interaction at a tolerable level [22]. It is wise to consider ensuring human-wildlife coexistence in an expanding human intrusion into wildlife habitats to minimise potential conflicts. Therefore, it is important to study human-tricolour langur coexistence (HTLC) in DSNP. We conducted this study to analyse local people's awareness of the tricolour langur in DSNP. We also investigated the exposure of anthropogenic activities to the tricolour langur, which influences its' tolerance towards humans.

## Materials and methods

### *Study Area*

This research was conducted in January–December 2022. The study areas were located on two resorts in the DSNP, Lupak Mawang resort and Sepandan resort (Fig. 1). The study areas also encompassed the buffer area of DSNP, which is located 5 to 10km from its' borderline administrative area. Danau Sentarum National Park (DSNP) is located at 25-400masl and is dominated by lakes in West Kalimantan, Indonesia. The lakes surrounding this national park have made it one of the largest wetland ecosystems in Borneo. There are various ecosystems in DSNP, such as kerangas and peat forests. The kerangas ecosystem becomes one of the langur's habitats. This habitat located in DSNP is found on some cultivation lands run by local people in the utilisation zone of the national park [3]. As a wetland ecosystem near the Kapuas River, its hydrology has contributed to the unique ecosystem in DSNP by being waterlogged for about 9 months a year. The precipitation level influences the water level change in Danau Sentarum and

greatly affects the land emergence in some areas. When it is considered the dry season, which usually happens in June-early September, the lake will recede and change into some bare lands. [23].



**Fig. 1.** Map of the study area. (A) Danau Sentarum National Park with 5 and 10 km buffer areas. The satellite image was obtained from Sentinel-2 10 m imagery (<https://livingatlas.arcgis.com/landcover>). We created maps with classified Land Use and Land Cover data from 2021 using ArcGIS 10.7. (B) Lupak Mawang Resort, with study locations inside the DSNP area, and (C) Sepandan Resort, with most study locations located in the 5km-buffer area.

### *Data Collection*

This study conducted semi-structured interviews with local people in DSNP, involving 35 people by snowball technique and convenience sampling (Table 1). The criteria comprised people who live inside or around DSNP, have met tricolour langur at least 2-3 times for the past 5 years, and have seen the behaviour of tricolour langur. Basic socio-demographics (sex and age) for each respondent were collected, including origin (native or immigrant) and socio-economic data such as education level and income source (job). In order to obtain information on the local knowledge of tricolour langur, we asked several questions concerning the existence and awareness of the tricolour langur's protected status in DSNP, occurrence locations, and behaviour of tricolour langur. Furthermore, to assess the influence of anthropogenic factors, respondents were asked what activity they usually did during their encounter with tricolour langur, including the transportation modes that supported them in reaching some locations in DSNP (walking by foot, boat, or motorcycle).

**Table 1.** The socio-demographics of the respondents

Variable	Category	Total (N= 35)	Percentage (%)
Sex	<b>Male</b>	<b>29</b>	<b>82.9</b>
	Female	6	17.1
Origin	<b>Native</b>	<b>22</b>	<b>62.9</b>
	Immigrant	13	37.1
Age	19-27	4	11.4
	28-36	6	17.1
	37-45	8	22.9
	<b>46-54</b>	<b>11</b>	<b>31.4</b>
	55-63	6	17.1
Education Level	<b>Elementary School</b>	<b>14</b>	<b>40</b>
	Secondary School	7	20
	High School	8	22.9
	University	6	17.1
Job	<b>Fisherman</b>	<b>14</b>	<b>40</b>
	Local tourist guide	6	17.1
	DSNP employee	6	17.1
	Housewife	5	14.3
	Farmer	2	5.7
	Others	2	5.7

**Data Analysis**

We performed all statistical analyses using SPSS version 24. The data on anthropogenic activity and transportation modes were used to identify the impact of anthropogenic activity on the langur. We asked the respondents whether the langurs would either approach, stay in place, or avoid their presence during their activities near the langur's habitat. We ran a Chi-square test to determine the association between anthropogenic variables and the tricolour langur's responses. The Chi-square test of goodness of fit is deemed to analyse the data since it is a statistical test to measure the association of two categorical variables [24]. The Chi-square test used a confidence interval of 95% and  $\alpha = 0,05$ . Then, we compared the asymptotic sig value to  $\alpha$  for testing our hypotheses. The null hypothesis (H0) stated that there was no association between anthropogenic activities and langurs' responses towards humans. The alternate hypothesis (H1) was the opposite, meaning there was an association between the two variables. Furthermore, it will reject the null hypothesis if the asymptotic sig value is less than 0.05 ( $\alpha$ ). It will reject the alternate hypothesis if asymp. sig's value is greater than 0.05 ( $\alpha$ ).

To visualise the HTLC distribution in our study area, we compiled 37 coexistence locations obtained through interviews. We employed Kernel Density Estimation (KDE) in the ArcGIS 10.7 tool and extracted a distribution map for HTLC based on maximum-minimum values to get the distribution map. The extracted map was then reclassified into three classes of HTLC distribution density: low, medium, and high.

**Results and discussion**

**Local knowledge of tricolour langur existence in DSNP**

Generally, two main areas of knowledge consist of the knowledge of the conservation act of the tricolour langur and the langur's behaviour seen during respondents' activities. Initially, we asked 40 people about primates in DSNP to identify which respondents could differentiate the tricolour langur as this research's subject. We showed photos of tricolour langur (*Presbytis chrysomelas* ssp. *cruciger*), long-tailed monkey (*Macaca fascicularis*), orangutan (*Pongo pygmaeus*), and proboscis monkey (*Nasalis larvatus*). Thirty-five people who recognised tricolour langurs were deemed fit to meet the criterion and then were asked further questions regarding their knowledge of the langur's conservation (Table 2) and the langur's behaviour (Table 3).

**Table 2.** The respondents' knowledge concerns the conservation of tricolour langur

Variable	Category	Total (N= 35)	Percentage (%)
Awareness of tricolour langur's protected status in DSNP	Yes	29	82.9
	No	6	17.1
Willing to protect tricolour langur	Yes	33	82.5
	No	7	17.5
a. The reason to agree protecting tricolour langur	<b>Prohibition rule from DSNP</b>	<b>19</b>	<b>54.3</b>
	Understanding the primate's role to spread tree seeds in the forest	4	14.3
	Protecting the biodiversity in DSNP	2	5.7
	Cultural heritage	2	5.7
b. The reason to disagree protecting tricolour langur	<b>Indifferent towards tricolour langur existence</b>	<b>6</b>	<b>17.1</b>
	Potentially harm cultivation lands	1	2.9

**Table 3.** The respondents' knowledge about the tricolour langur's behaviour

Variable	Category	Total	Percentage (%)
Encounter locations	<b>Inside DSNP administrative area</b>	<b>22</b>	<b>62.9</b>
	Outside DSNP administrative area	13	37.1
Encounter time	A. By time per day		
	<b>Morning (6.00 – 11.00 a.m.)</b>	<b>31</b>	<b>44.9</b>
	Afternoon (11.00 a.m. – 2.00 p.m.)	16	23.2
	Evening (3.00 – 6.00 p.m.)	22	31.9
	B. By fruit seasons		
	<b>Swamp fruit season (late September–November)</b>	<b>27</b>	<b>43.5</b>
	No-fruit season (December–May)	18	29
	Hill fruit season (June–early September)	17	27.4
Able to differentiate langur's sex	<b>Can not differentiate</b>	<b>27</b>	<b>77.1</b>
	Male	6	17.1
	Female	2	5.7
The behaviour of tricolour langur	<b>Ingestive (eating)</b>	<b>23</b>	<b>38.3</b>
	Freezing (observing human silently)	13	21.7
	Vocalizing (making alarm calls)	10	16.7
	Flight (moving from place to place)	6	10.0
	Sleeping	5	8.3
	Social (interacting with another individual)	2	3.3
	Epimeletic (taking care of the young)	1	1.7

Table 2 shows that most of the respondents (82.9%) already knew that tricolour langur is protected in the DSNP area. Those respondents affirmed that they had obeyed the rule since the national park's legalisation in 1999 (54.3%). The DSNP management conducted law enforcement by establishing cooperation with the local police. Besides the law, DSNP uses a social approach by holding socialisations routinely. The agendas have increased people's awareness of langur's ecological rule for distributing tree seeds (14.3%). Fructivorous primates, including langurs, have an important role as agents of forest regeneration [25]. Understanding the primate's role in the forest has fuelled respondents' willingness to protect the langur voluntarily as part of the DSNP's biodiversity (5.7%). Both law enforcement and social approaches follow a collaborative approach to conservation area management. They increase the local community's capacity for biodiversity conservation [26].

Conversely, there was a socio-cultural motive to protect this langur. Some native respondents (5.7%) told a myth not to disturb the tricolour langur in DSNP. This primate was believed to have a magical aptitude, like illusions, for confusing people and causing langurs to become lost in the forest. This myth may be a way for older generations to teach the younger generation to protect nature. We also found the study concerning the myth of preserving nature among Kampung Kuta natives in West Java, Indonesia. Mythological thinking positively impacts

environmental preservation, such as the prohibition of forest and water resource exploitation in their sacred areas [27]. A primate that shares the same landscapes as humans has subsequently become an integral part of people's religious and cultural beliefs [28]. These beliefs influence the community's perception of primates [29], which can lead to either primate exploitation for religious rituals or primate conservation through local prohibitions [16]. Primate myths often emerged from native people's cultural beliefs, as this kind of myth was also found among the Nalu in Cantanhez National Park, Guinea-Bissau. The Nalu people believe in the intricate relationship of all beings that form a social system, averting the killing and eating of canine-teethed animals, including primates [30].

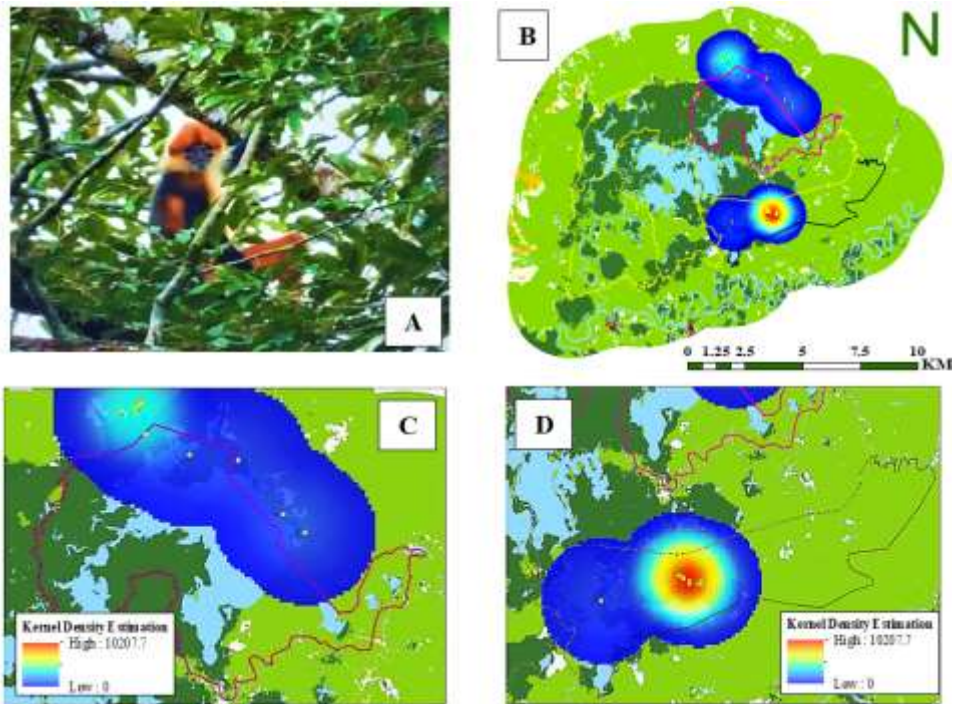
On the other hand, seven people intended to refrain from participating in tricolour langur conservation willingly. Six people needed adequate information on tricolour langur. It rendered them indifferent towards conserving this endemic primate (17.1%), even though sometimes they encountered the langur in their daily lives. Meanwhile, a farmer in Bukit Semujan expressed his worries about any potential crop raid by tricolour langur. It is an expected fear for farmers since primates are well known for their raid attacks on crops [8, 31]. Crop raiding by primates has become the most perceived advantage for farmers near protected areas such as Uganda [32]. Bukit Semujan is in a protected area and has been cultivated for farming until now [2, 3], hence this finding should raise concerns about considering farmers' welfare in DSNP's conservation programmes. Even though only a minority experiences the disadvantage, any conservation area's management must validate their concern by understanding the negative impact of human-primate interaction [33].

Table 3 provides knowledge regarding tricolour langur. Frequently, people met the primate in the DSNP area (62.9%). The locations were distributed in both resorts (Fig. 2). It shows that the tricolour langur prefers living in the national park area, favouring more natural habitats and foods [34, 35]. In Sepandan Resort, langurs were often spotted outside the DSNP administrative area, especially in swamp forests along many lakes such as Batang Dagin, Sumpak, Sumpak Puduk, Temukupkulu, Baung, and Pitong.

Meanwhile, in Lupak Mawang resort, langurs tended to be encountered on land, especially in lowland forests, mainly in Bukit Semujan. We suspected that the difference was influenced by food availability and human existence. Primate movement and distribution were mainly driven by food availability [36, 37] and anthropogenic landscapes [13]. Since Bukit Semujan was planted with fruit and rubber trees, fewer humans went there. Tricolour langurs got another food resource and were at ease with human interventions. On the other hand, Sepandan's vicinity has fewer coexistence locations, with more human settlements posing as intrusions into the tricolour langur. Consequently, this place has fewer coexistence locations.

Respondents were able to meet the primate mainly between 6.00 a.m. and 9 a.m. (88.6%) for the encounter time. It came across that the tricolour langur commences its daily activity around 6.00 a.m. [3]. Moreover, the time was also in line, and most respondents, as fishermen, started looking for fish in the lake near the langur's habitat. Even though respondents could spot langurs at another time, the morning had the highest chance for langurs and humans to meet each other. It emphasises that the most crucial time of human-primate interaction happens when both parties share the same particular time of day. Later on, we asked about which months they could meet tricolour langurs. The information gathered from respondents was categorised into three fruit seasons throughout the year. Respondents who just sailed on lakes near swamp forests were more likely to run into tricolour langurs during swamp fruit season. It follows most of the respondents (43.5%). Meantime, there was only a slight difference in humans who came across tricolour langur either on hill fruit season (29%) or no fruit season (27.4%).





**Fig. 2.** Mapping the human-tricolour langur coexistence (HTLC) in DSNP. (A) The tricolour langur is a newly-found species in DSNP; hence, it's been getting more spotlight to study the bioecology of this endemic primate. The photo of a male tricolour langur was taken when we spotted the primate at a rubber plantation in Bukit Semujan. (B) HTLC is distributed both inside and outside DSNP, including the 5-km buffer zone. (C) Kernel Density Estimation (KDE) by minimum-maximum value in Sepandan Resort with low to medium density. Its distribution tends to spread along local lakes in Sepandan. (D) KDE in Lupak Mawang Resort with low to high density of HTLC. Most coexistence locations were concentrated in one location, respectively, in Bukit Semujan.

Regarding the tricolour langur's behaviour, we asked the respondents whether they could identify the difference by sex. We guessed that there would be more information on some behavioural distinctions. Unfortunately, we found a lack of knowledge to detect such differences, chiefly among the respondents (77.1%). Respondents confirmed that they should have paid more attention to langur's physical appearance meticulously. Compliant with tricolour langur sexual dimorphism, this primate does not exhibit clear distinctions between male and female [1], hence the difficulty in telling langurs' sexes apart. On the contrary, some respondents could point out male tricolour langurs by the mane around their face, a much longer tail than females, and louder voices for the alarming call (17.1%) or female langurs by more developed breasts for breastfeeding infants (5.7%). It brings to attention that there is a serious lack of information regarding tricolour langur's dimorphism, and a deeper investigation is urgently needed for a better inventory method of this species.

Ingestive behaviour was the most common behaviour seen by respondents (65.7%). Tricolour langurs usually commence their daily activity at 6.00 a.m. [38]. This primate starts foraging for fruits, which become the dominant part of langur's diet, such as *Diospyros coriacea*, *Nephelium sp.*, *Whiteodendron moultonianum*, and *Xanthophyllum vitellinum*. Sometimes langurs were also observed eating the seed of *Hevea brasiliensis* in rubber plantations, the seed of *Sloetia elongata*, the seeds or young leaves of *S. balangeran*, and even *Eichhornia crassipes*. Some foods were able to be obtained during this research (Fig. 3).



**Fig. 3.** Some tricolour langur foods in DSNP comprise (A) seed and a leaf of *S. balangeran*, (B) a tree of *D. Coriaceae*, (C) fruit of *X. Vitellinum* fallen on the ground, and (D) some leftover of *H. brasiliensis*'s seeds. We suspected tricolour langurs were the ones who ate these seeds in Bukit Semujan, Lupak Mawang Resort.

Even though langurs mostly eat fruits, they will eat other replacement foods once fruits become scarce. These facts, coupled with the tricolour langur's encounter time by season, might predict the tricolour langur's year-long movement. This langur's movement starts by staying in their natural habitat, such as deep forests on hills with abundant fruits, then going down into swamp forests as foods become scarce in the hills, and eventually foraging near anthropogenic landscapes. Primate movement patterns are categorised into Brownian walks with abundant resources such as leaves [39] or Lévy walks with rare foods like fruits [39, 40]. Since tricolour langur is mostly frugivorous, it will likely adapt Lévy-walks to face the uncertainty of fruit distribution [40]. However, tricolour langur moves from hills, swamp forests, and anthropogenic lands; hence, this endemic primate might adjust to both strategies [41] between highly localised fruits and abundant seeds or leaves. The seeds of *H. brasiliensis*, which are obtainable throughout the year, and *S. elongata*, available in January [42], may have compensated for the lack of fruit to forage during the no-fruit season.

Tricolour langurs ended their day by preparing to sleep on trees around 6.00 p.m. [38]. Contrastingly, respondents mostly ended their daily activities before 6.00 p.m. since it would be dangerous to sail in darkness. Some respondents spotted langurs that would likely sleep on tall trees, including *Koompassiana* sp., *Shorea balangeran*, and *Gluta renghas*. It was assumed that tricolour langurs preferred tall trees to be their sleeping sites, which linked to their anti-predator strategy whenever they lowered their guard when asleep. We also encountered a male tricolour langur (presumably by the mane in the face), which was seen readily sleeping in Bukit Semujan by around 6.00 p.m. local time (Fig. 4).

The least-seen behaviours of tricolour langur were socialising (5.7%) and epimeletic (2.9%). Even though the tricolour langur has a group size of 10–20 individuals [38], it was rare for respondents to see langurs interact. Respondents mostly spotted a lone langur (presumably the alpha male), thus decreasing the opportunity to observe the social interaction in a langur's group. It was noticed that the females and infants of *Presbytis* sp. would likely hide silently during the leader's vocalisation performance upon the predator's intrusion [43]. Consequently, the alpha



male became more noticeable, so respondents spotted it easier. Social behaviour refers to some langurs competing for fruits on the same tree. Lastly, the epimeletic behaviour of an adult female taking care of the young was scarce (2.9%) due to most respondents' inability to differentiate langur by sex. It might also be impacted by langurs' behaviour, especially the females and infants hiding once humans intrude on their habitat.



**Fig. 4.** We spotted a presumably male tricolour langur preparing to sleep in Bukit Semujan, Lupak Mawang Resort. We observed this langur across a cultivation land owned by a family, which the land distanced around 200 metres from the langur. (A) The langur was sitting on the *Koompassia* sp. tree, for some time. (B) Then, the langur moved to the lower branch, put his head on the higher branch, and sat still, ready to sleep.

#### ***Anthropogenic impacts on langur's tolerance towards human***

Anthropogenic activities by respondents comprised eight activities, along with three transportation modes used by respondents. Some anthropogenic activities were able to be observed during this research (Fig. 5). Tricolour langurs mostly avoided fishermen looking for fish (34.3%) by speedboat (57.1%). In contrast, this langur also exhibited some tolerance to these anthropogenic disturbances by not fleeing from either fisherman (11.4%) or speedboat noise (20%). On a closer look at these percentages, tricolour langurs still performed more vigilance behaviours to avoid these disturbances. It was assumed that the intensity of the anthropogenic factors, especially looking for fish by speedboat, had some influence on the tricolour langur's langur tolerance. This langur might need to be more proficient in tolerating anthropogenic activities to certain degrees.

We tried to run a Chi-square test to determine the significant relation of the anthropogenic disturbances to the tricolour langur's responses (Table 4). In line with tricolour langur's tolerance found in this research, there was no significant relation between either respondents' activities (asyp. sig= 0.647 >  $\alpha$ = 0.05) or transportation modes (asyp. sig= 0.193 >  $\alpha$ = 0.05). These findings contradict the Risk Disturbance Hypothesis (RDH) that animals will increase their antipredator vigilance when stimulated by anthropogenic stimuli [44]. Hence, primates will avoid frequenting areas dense with such disturbances [45]. Even though our finding here differed from most studies concerning anthropogenic impacts on primates [13, 46], these anthropogenic factors could not be overlooked. As transportation has facilitated humans' access to deeper parts of forests, it will also enhance deforestation or change in primate behaviour by human intrusions [47, 48]. Primates have become susceptible to transportation impacts all around the world. Death by vehicle collisions was most commonly reported in the Cercopithecidae family in Asia [46]. Tricolour langur might face an impending threat from motorcycles used by some respondents (17.1%), even though there are lower chances of this will happen since this langur is mostly arboreal.



**Fig. 5.** Summary of some anthropogenic activities near the tricolour langur's habitat. Local people do their activities near the tricolour langur's habitat to fulfil their daily needs; for example, (A) Fishermen usually look for fish around swamp forests along local lakes, as shown by the photo of two fishermen in Sepandan Resort. (B) We found a boat, presumably owned by a local, accompanied by chainsaw noises from afar in the swamp forest. This finding led to (C) a newly cut tree in the same area, as we assumed it was done by the same person. According to the interviews of both local people and DSNP employees, it is allowable to cut some trees, but only for household-scale needs such as building village bridges or repairing people's homes. DSNP management has made it a strict policy to continue this traditional wood harvesting as long as the woods are not sold for economic benefits. (D) A cultivation land owned by a family of four in Bukit Semujan, Lupak Mawang Resort. This family planted some vegetables in this area. It was located next to the tricolour langur's habitat, the hill forest behind the commodity, as shown in the photo. Therefore, people often encountered the langurs near this land.

**Table 4.** Tricolour langur's responses toward anthropogenic activity

Variable	Category	Tricolour langur's response				Asymp. sig value
		Fleeing		Remain staying		
		Total	Percentage (%)	Total	Percentage (%)	
Activity	<b>Looking for fish</b>	<b>12</b>	<b>34.3</b>	<b>4</b>	<b>11.4</b>	0.647
	Routine wildlife inventory	5	14.3	2	5.7	
	Washing crops around the lake	4	11.4	0	0	
	Ecology researches	3	8.6	2	5.7	
	Tourism	3	8.6	1	2.9	
	Farming	2	5.7	1	2.9	
	Sailing on lakes	2	5.7	1	2.9	
	Traditional wood-harvesting	2	5.7	0	0	
Transportation modes	<b>Speedboat</b>	<b>20</b>	<b>57.1</b>	<b>7</b>	<b>20</b>	0.193
	Walking by foot	14	40	3	8.6	
	Motorcycle	6	17.1	0	0	

## Conclusions

The human-tricolour langur coexistence (HTLC) in Danau Sentarum National Park (DSNP) was compromised by human knowledge and conservation of this primate, along with tolerable anthropogenic impacts on its population. Most respondents agreed with protecting this endemic primate and were encouraged by DSNP's conservation programmes. However, there was a minority who rejected conserving the langur due to their ignorance or worries about potential crop raid attacks. The shared time encounter between humans and tricolour langurs mainly occurred in the morning between 6.00–9.00 and 9.00 a.m. and during swamp fruit seasons lasting from October to December. These times were compatible with the foraging times of the tricolour langur. Hence, foraging became the most-seen behaviour by humans, and fisherman started looking for fish on the lakes in DSNP. Considering the tricolour langur's tolerance of human existence around its habitat, our research found that neither human activities nor transportation modes had significant relations to the primate's tolerance. Regardless, ensuring a long-term coexistence between these two needs better consideration and understanding of human social beliefs and perceptions towards the primate's existence and the primate's tolerance to anthropogenic impacts around its habitat.

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