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MAMMAL SPECIES DIVERSITY BASED ON CAMERA TRAP DATA AT SIPEF BIODIVERSITY INDONESIA

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ABSTRACT

Mammals play a role in maintaining the continuity of ecological processes. The presence of mammals in a forest area helps restore forest condition through their roles as natural predators, seed dispersers, and pollinators. Mammals are abundant at PT Sipef Biodiversity Indonesia (PT SBI), a natural forest management company operating in the forestry sector, whose forest area serves as habitat for various wildlife species, including mammals. This study aimed to determine mammal diversity in the area using camera traps. The camera traps used by PT SIPEF Biodiversity Indonesia are of the Bushnell type, deployed at a total of 42 stations distributed across various locations within the forest area. Cameras trap were placed along trails frequently used by mammals. Based on the randomly installed cameras, 23 mammal species were identified. Some of these are priority key species with a critical conservation status (Critically Endangered) according to the IUCN, namely *Cuon alpinus*, *Panthera tigris sumatrae*, *Lutra sumatrana*, *Symphalangus syndactylus*, and *Symphalangus* sp.

Keywords: Camera Trap, Diversity, Ecology, Mammals, Sipef Biodiversity Indonesia

1 INTRODUCTION

Sipef Biodiversity Indonesia holds a forest utilization business permit under Minister of Forestry Decree No. 622/Menhut-II/2013 dated 17 September 2013. The company operates in the field of biodiversity conservation and management, with a commitment to balancing economic activity and environmental conservation. In view of growing global awareness of the importance of biodiversity conservation and sustainable environmental management, the company is actively engaged in various conservation and research initiatives, particularly those concerning mammals.

Mammals are among the most advanced groups in the animal kingdom and constitute a class of vertebrates characterized by the presence of hair and mammary glands (Pakaenoni, 2019). The presence of mammals in a forest area helps restore forest condition through their roles as natural predators, seed dispersers, and pollinators (Maharadatunkamsi, 2017). Mammals play an important role in maintaining ecosystem balance. For example, mammals

occupy various trophic levels in the food chain, from herbivorous mammals at the lower trophic levels to carnivorous mammals as top predators (Pakaenoni, 2019). From large to small species, each mammal has its own role and function (Zulkarnain, 2018).

Conservation efforts aimed at ensuring the sustainability of flora and fauna diversity—including mammals—are addressed by the International Union for Conservation of Nature (IUCN), an organization that maintains a list of the conservation status of various living organisms, such as animals and plants. The IUCN categorizes the level of threat faced by species through its "Red List," which includes the following classifications: Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Not Evaluated (NE), and Data Deficient (DD).

In general, threatened species are characterized by small population sizes and isolated, fragmented habitats. Now that nearly all lowland forests have suffered extensive and unjustifiable destruction, dozens of bird species—previously classified as "Least Concern"—suddenly find themselves with nowhere left to seek refuge, leaving them immediately at risk of extinction (Sukmantoro, 2007).

Mammals perform important and complex ecological functions in ecosystems, namely as regulators of prey populations and understory vegetation, and as seed dispersal agents for plants (Anjarlina et al., 2023); they also serve as ecological indicators of forest area condition (Putri et al., 2021). However, several studies have noted that mammals are difficult to observe directly because they are elusive and largely avoid human activity. Population estimation or diversity assessment of wildlife, particularly mammals, can be conducted using camera trapping, because camera traps are small and do not disturb animals as they pass by (Setiawan, 2013).

Studies on mammal species diversity at PT SIPEF have been conducted previously, but they have generally focused on particular groups of protected wildlife. The presence of mammals depends heavily on habitat condition. Therefore, given the changes in habitat condition over time and the emergence of various threats to mammals, such as hunting (Zamzami et al., 2021), an inventory and an update of data on mammal diversity in the area are needed.

2 RESEARCH METHODS

2.1 Research Location

Mammal monitoring was conducted at three different grid locations. Monitoring took place on 20 June 2025 in the Slagan Raya work area; on 23–25 June 2025 (Monday–Wednesday) in the Sungai Kiang work area; and on 3–4 July 2025 and 1–2 August 2025 at the PRPTE site (Sipef Biodiversity).

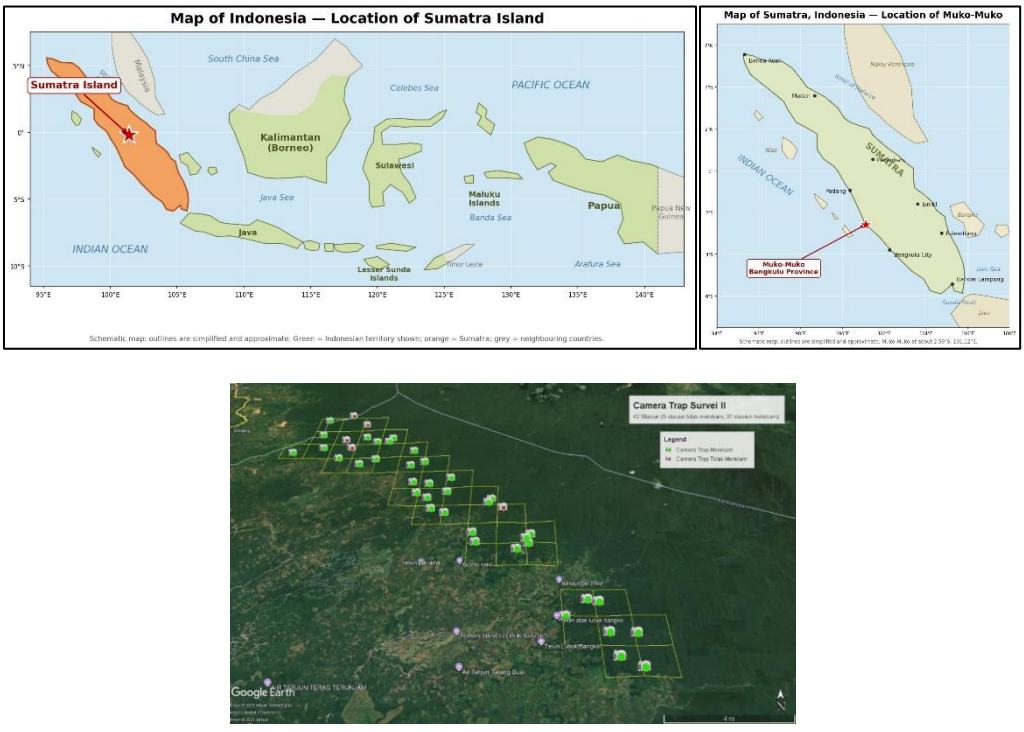


Figure 1: Distribution map of camera trap stations

2.2 Research Procedure

Data collection was carried out in the area of the Sipef Biodiversity, with tools and materials : Camera traps (Bushnell and Trail), Camera protective housing, GPS, Memory cards, Alkaline batteries Chains, Padlocks, Machete,, Stationery. This is reseach procedure:

- Determine the camera trap installation site, ensuring that it is a regular mammal pathway and that a camera trap can feasibly be installed there.
- Installation sites should avoid facing the direction of sunrise and sunset (east–west). To maximize camera detections, cameras should be oriented north or south.
- Select a sturdy tree suitable for mounting the camera. Scrape the tree trunk at a height of approximately 40 cm (depending on the situation) above ground level, with the camera angled approximately 45° from the mammal pathway.
- Clear the area beforehand so that the camera's detections are not obstructed by vegetation or other disturbances.
- Configure the camera trap before mounting and activating it, then place it immediately into its protective housing (box).
- Mount the camera at the position prepared on the tree and secure it with a chain. Once it feels firm, use a padlock and chain to protect the camera from any disturbance at the site.

Record the coordinates of each camera trap location (grid) using a GPS, write them on a sheet of paper, and document them. The information recorded includes the installation/retrieval team, grid, time/date, coordinates (X, Y), camera trap inventory number, memory card inventory number, and housing box inventory number.

Retrieve the camera traps after approximately one month, to increase the chance of recording mammals, since the memory capacity and battery of the camera last only for approximately one month of recording

3 RESULTS AND DISCUSSION

Mammal monitoring is a systematic process that aims to record the presence, behavior, and population dynamics of mammals in an ecosystem. This monitoring is essential for providing accurate scientific data as a basis for decision-making in developing conservation strategies and sustainable environmental management. At PT SIPEF Biodiversity Indonesia (PT SBI), mammals are monitored using camera traps, which allow the detection of mammal presence without disturbing their natural activity.

The main focus of this activity is on species classified as threatened with extinction. The objectives are to monitor population changes, observe growth trends, and identify potential threats to the survival of these mammals. The results of this monitoring are highly useful in supporting conservation efforts, particularly in identifying threats arising from human activities and from changes in environmental conditions around the habitat. Because most mammals are difficult to observe directly, camera traps are an efficient solution. The number of camera traps must be adequate, since deploying more camera traps increases the likelihood of detecting animals and improves effectiveness within the observation period (R. A. A. Putri et al., 2017). One of the constraints in such studies is the risk of losing camera traps; to address this, security measures can be installed (Meek et al., 2013).

According to Wearn and Glover-Kapfer (2017), camera traps are a highly effective tool for recording the presence, activity, and behavioral patterns of mammals without directly disturbing their habitat. These cameras are typically equipped with motion and infrared sensors that are triggered automatically when an animal is detected. The camera traps used by PT SIPEF Biodiversity Indonesia are of the Bushnell type, deployed at a total of 42 stations distributed across various locations within the forest area. Cameras were placed along trails frequently used by mammals or in areas showing signs of their presence, such as tracks or scratch marks.

Before installation, the cameras were first calibrated. This included setting the time (hours, minutes, seconds) and date (day, month, year), the capture mode (photo or video, although photo mode is generally used), the device ID, the sensitivity level of the motion sensor (usually Fn or Fy mode), the number of photos per motion detection (generally three photos), and the image quality (low or high). Once all settings were completed, the camera was activated by pressing the confirmation button (OK) and was then ready to record mammal activity in the field.



Figure 2: Mammal monitoring and camera trap installation

Monitoring activities also fall within the scope of work of the Research and Development Division. This division carries out two main stages: research, which focuses on gathering scientific information, and development, which aims to apply research results in the form of methods, strategies, or innovations that support environmental sustainability. One of the outputs of the monitoring activities is data on mammal presence in the PT SIPEF Biodiversity Indonesia area. Complete information on the mammal detection results is presented in Table 1 below:

Table 1: Results of Biomass Measurement and Carbon Stock Estimation at Taman Remaja Bengkulu

No	Ordo	Famiy	Scientific Name	Common Name	Local Name	IUCN Status
1	Carnivora	Canidae	*Cuon alpinus*	Dhole	Anjing Ajag	EN
2	Carnivora	Felidae	*Catopuma temminckii*	Asian golden cat	Kucing Emas	NT
3	Carnivora	Felidae	*Neofelis diardi*	Sunda clouded leopard	Macan Dahan	VU
4	Carnivora	Felidae	*Panthera tigris sumatrae*	Sumatran tiger	Harimau Sumatera	EN
5	Carnivora	Felidae	*Felis marmorata*	Marbled cat	Kucing Batu	NT
6	Carnivora	Felidae	*Prionailurus bengalensis*	Leopard cat	Kucing Hutan	LC
7	Carnivora	Mustelidae	*Lutra sumatrana*	Hairy-nosed otter	Berang-Berang Sumatera	EN
8	Carnivora	Mustelidae	*Martes flavigula*	Yellow-throated marten	Musang Leher Kuning	LC
9	Carnivora	Prionodontidae	*Prionodon linsang*	Banded linsang	Linsang-Linsang	LC
10	Carnivora	Ursidae	*Helarctos malayanus*	Sun bear	Beruang	VU
11	Carnivora	Ursidae	*Arctictis binturong*	Binturong	Binturong	VU

12	Carnivora	Viverridae	*Paguma larvata*	Masked palm civet	Musang Bulan	LC
13	Cetartiodactyla	Cervidae	*Muntiacus muntjak*	Red muntjac	Kijang	LC
14	Cetartiodactyla	Cervidae	*Rusa unicolor*	Sambar deer	Rusa	VU
15	Cetartiodactyla	Suidae	*Sus scrofa*	Wild boar	Babi hutan	LC
16	Cetartiodactyla	Tragulidae	*Tragulus kanchil*	Lesser mouse-deer	Pelanduk Kancil	LC
17	Cetartiodactyla	Tragulidae	*Tragulus napu*	Greater mouse-deer	Pelanduk Napu	LC
18	Peramelemorphia	Peramelidae	*Microperoryctes murina*	Mouse bandicoot	Tikus Tanah	DD
19	Perissodactyla	Tapiridae	*Tapirus indicus*	Asian tapir	Tapir asia	DD
20	Primates	Cercopithecidae	*Macaca nemestrina*	Southern pig-tailed macaque	Beruk	VU
21	Primates	Cercopithecidae	*Symphalangus syndactylus*	Sumatran surili	Lutung Simpai	EN
22	Primates	Hylobatidae	*Symphalangus sp.*	Siamang	Siamang	EN
23	Rodentia	Hystricidae	*Hystrix brachyura*	Malayan porcupine	Landak	LC

Note: EN (Endangered), NT (Near Threatened), VU (Vulnerable), LC (Least Concern), DD (Data Deficient)

Based on the results of the study, 23 mammal species from 13 families were recorded. The dominant family was Felidae, for example *Catopuma temminckii*, *Neofelis diardi*, and *Panthera tigris sumatrae*. According to Subagyo et al. (2020), several animal species from the Felidae family (Sumatran tiger, clouded leopard, leopard cat, and marbled cat) have been recorded as active during both the night and the day. Among the mammals, *Hystrix brachyura* (family Hystricidae) had the lowest encounter rate. This could be due to the relatively small size of this species compared to other mammals, making it less likely to be captured by camera traps. According to Mustari et al. (2015), bait can be placed near camera trap locations to attract specific wildlife species whose presence researchers wish to document. Another possibility is that the population of this wild animal has become increasingly scarce within its habitat.

There remain numerous threats to wildlife, which could lead to a decline in the populations of various species if the areas surrounding their habitats are not protected. Although efforts to safeguard conservation areas are frequently undertaken, illegal activities still occur—posing a risk that could further reduce the populations of certain wildlife species. Many wildlife species are categorized as protected, including some mammals (Wiranto, 2019). Several of the protected and threatened species are priority key species with a critical conservation status (Critically Endangered) according to the IUCN, namely *Cuon alpinus*, *Panthera tigris sumatrae*, *Lutra sumatrana*, *Symphalangus syndactylus*, and *Symphalangus* sp.

4 CONCLUSION

Based on the study conducted using camera traps, 23 mammal species from 13 families were recorded.). Several of the protected and threatened species are priority key species with a critical conservation status (Critically Endangered) according to the IUCN, namely *Cuon alpinus*, *Panthera tigris sumatrae*, *Lutra sumatrana*, *Symphalangus syndactylus*, and *Symphalangus* sp. The diversity of mammal species found indicates a positive impact of the company on its management of the forest area.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare no conflict of interest.

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