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Cover: *Minervarya cepfi* & *Nyctibatrachus petraeus*—mix media. © P Kritika

INTRODUCTION

Order Rodentia is the largest order within the class Mammalia and is represented by 2,277 species globally belonging to 481 genera & 33 families (Wilson & Reeder 2005). Rodents include mice, squirrels, rats, gerbils, and hamsters. Although rodents are highly diverse, numerous species across the globe are poorly studied, leading to ecological data deficiencies (Fleming & Bateman 2016).

Among rodents, porcupines are considered an iconic species, evidently due to their distinctive morphology. Porcupines are divided into two families: the family Hystricidae, known as the Old-World porcupines (Eurasia, Africa, southern & southeastern Asia) and the family Erethizontidae, which are known as the New World porcupines (North & South America) (Voss et al. 2013; Rovie-Ryan et al. 2017). The family Hystricidae consists of four genera namely, *Hystrix*, *Atherurus*, *Thecurus*, and *Trichys*, which are represented by 11 species globally (Rovie-Ryan et al. 2017). The presence of Malayan Porcupine *Hystrix brachyura*, Indian Crested Porcupine *Hystrix indica*, and Asiatic Brush-tailed Porcupine *Atherurus macrourus* has been reported across India (Molur et al. 2005).

The Malayan Porcupine is classified as 'Least Concern' in the IUCN Red List of Threatened Species and is listed under Schedule I of the Indian Wildlife Protection Act, 1972. It is found across southern Asia including India, Nepal, & Bangladesh, in central and southern China, Myanmar, Thailand, Laos, Cambodia, Viet Nam, Malaysia, Singapore, Indonesia, and Borneo (Molur et al. 2005). In India, the Malayan Porcupine is distributed extensively in the north-east (Alfred et al. 2002; Molur et al. 2005).

Also known as the Himalayan Crestless Porcupine, it is found along various forested and agricultural areas with rocky outcrops and bordering forest areas (Lunde 2016). It is a fossorial and nocturnal small mammal and is said to be more active during the winters (Akash et al. 2025). It lives in family units and feeds on fruits, roots, and tubers (Jnawali et al. 2011; Mallick 2012). It is mainly threatened by illegal trade and hunting for medicinal use and consumption. In southeastern Asia, especially in Malaysia, the species is harvested for food and medicinal purposes (Molur et al. 2005). Porcupine farming in Malaysia is heavily regulated; however, captive breeding is unlikely to reduce poaching pressures as they are associated with wild-sourced bezoars, which are high in value (Gomez & Khoo 2024). Habitat loss due to infrastructure development also contributes to threats. Despite having a wide distribution in the regions

of southern and southeastern Asia, it is ecologically understudied (Hasan & Neha 2019; Akash et al. 2025). This study documents, for the first time, the Malayan Porcupine in Sepahijala Wildlife Sanctuary and Clouded Leopard National Park with photographic evidence, providing new insight into its distributional extension in Tripura.

The current record is the result of a rapid assessment survey conducted in all the protected areas (PAs) of Tripura. While this study may add up to a small region in the global distribution of Malayan Porcupine, it underscores the importance of conducting research in parts of India which are rich in biodiversity yet remain understudied. By underscoring the importance and necessity of short yet intensive surveys in regions where long-term studies are challenging, this work simultaneously draws attention to a lesser-known and poorly documented species, bringing it into the conservation spotlight.

MATERIALS AND METHODS

Study Area

The Sepahijala Wildlife Sanctuary (SWS) and Clouded Leopard National Park (CLNP) (23.6167°–23.7000° N, 91.2833°–91.3500° E) combined cover an area of 18.5 km² in the Sepahijala District of Tripura (Figure 1). Due to its proximity to the state capital, Agartala, it is a popular tourist attraction. The SWS was established in 1987; further, in 2007, the CLNP was established as an effort to enhance conservation efforts for the vulnerable Clouded leopard *Neofelis nebulosa*. As the CLNP is situated within the SWS, both protected areas were treated as a single entity for data collection, analysis, and documentation of the Malayan Porcupine record in this study. The Sepahijala Zoological Park is encompassed within the SWS.

Based on the forest classification of Champion & Seth (1968), the forest type of SWS is classified as moist mixed deciduous, with secondary moist bamboo brakes. Additionally, numerous man-made forests featuring Sal *Shorea robusta*, Teak *Tectona grandis*, and patches of Acacia *Acacia auriculiformis*, along with abandoned rubber plantations, remain within and around SWS (Adimallaiah et al. 2014; Patil & Joshi 2024). The terrain is characterized by small hillocks with an average altitude of 50 m. The region faces threats from extraction of timber and non-timber forest products (NTFP), road-kills and unregulated tourism. National Highway 8 (NH8), a vital route connecting various parts of Tripura,

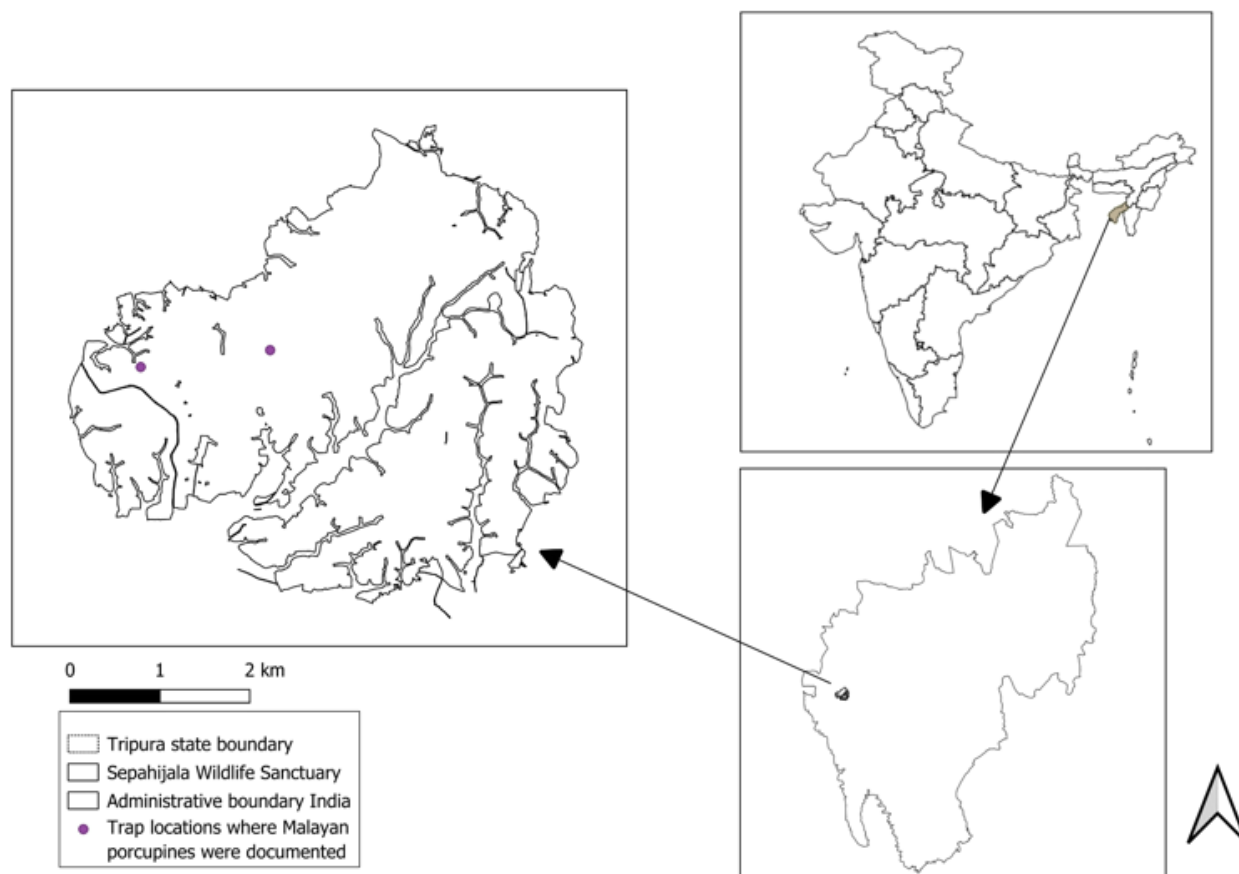


Image 1. Location of Sepahijala Wildlife Sanctuary on the map of Tripura along with locations where Malayan Porcupine was recorded.

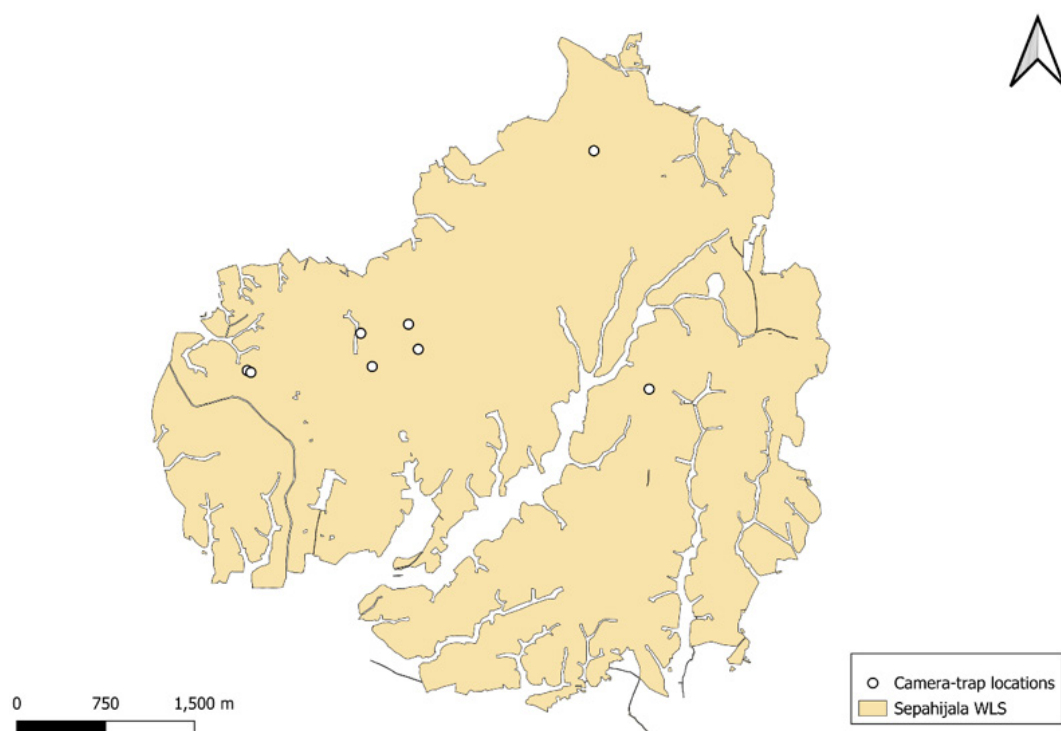


Image 2. Camera trap locations within Sepahijala Wildlife Sanctuary, Tripura, India.

passes through the SWS, which, despite its economic importance, causes significant habitat fragmentation within the sanctuary (Patil & Joshi 2024). Additionally, the PA is surrounded by villages, rice fields alternating with patches of rubber plantations.

Method

A total of 14 camera traps (Cuddeback Xchange C1 with an infrared flash along with Spartan Lumen (white flash)) were deployed in eight camera trap stations using single & double-sided techniques, accounting for 77 trap nights between 12–22 February 2024 in SWS. Trap nights were calculated by summing the number of 24-hour periods for which each camera-trap station remained operational, with one operational station for one night considered as one trap night; paired cameras deployed at the same station were treated as a single sampling unit (Meek et al. 2014). Camera traps were deployed along trails, water bodies, dry rivulets and stream beds showing mammalian signs. Within SWS, stations were pragmatically selected to minimize vandalism and theft, and chosen using Google Earth Pro and QGIS (v.3.30.2) based on forest cover, vegetation, and low anthropogenic disturbance. Distance between two camera-trap locations ranged 30 m–2 km. Cameras were placed at a height of 0.3 m from the ground on trees. There was no delay between two image triggers, and that successive images were programmed to be captured as fast as possible. Local forest staff, Banmitras (friends-of-forests) & field facilitators helped in the camera-trapping exercise.

RESULTS

During the course of deployment in SWS, we documented the presence of Malayan Porcupine in two camera trap locations (SEP-CT1 and SEP-CT2) (Table 1; Image 2). Both of the camera-trap locations were situated near a small waterbody within the PA, with a distance of 1.45 km from each other. Across the two camera-trap stations, 20 photographs of the Malayan Porcupine were obtained over 10 and nine trap-nights respectively, yielding a total of five independent capture events (Table 2).

The species was identified as *Hystrix brachyura* after examining the morphological characters visible in the photographs (Images 3a,b). Key distinguishing characteristics include a short dorsal crest and long dorsal quill, which has a single dark band, unlike *Hystrix indica*, which possesses two or more dark bands on

Table 1. Camera trap locations in Sepahijala Wildlife Sanctuary, Tripura, India.

Camera-trap location ID	Latitude	Longitude	Height (in m)
SEP-CT1	23.661° N	91.295° E	6
SEP-CT2	23.661° N	91.295° E	17
SEP-CT3	23.665° N	91.308° E	36
SEP-CT4	23.678° N	91.324° E	41
SEP-CT5	23.664° N	91.305° E	26
SEP-CT6	23.663° N	91.309° E	22
SEP-CT7	23.660° N	91.328° E	37
SEP-CT8	23.661° N	91.306° E	23

the quills. Additionally, the individual also possesses a relatively shorter tail than *Hystrix indica* (Menon 2023). These diagnostic characteristics confirm that the individuals captured in the images belong to *Hystrix brachyura*. The images were recorded during the nocturnal and crepuscular times of the day, aligning with the findings of Akash et al. (2025) which studied the nocturnal activity patterns of *Hystrix brachyura*. This confirms the first record of the Malayan Porcupine from the state of Tripura, thereby contributing to an extension of its known global distribution range (Image 4).

Other species such as the Large Indian Civet *Viverra zibetha*, Asian Palm Civet *Paradoxurus hermaphroditus*, Small Indian Civet *Viverricula indica*, Northern Red Muntjac *Muntiacus vaginalis*, Rhesus Macaque *Macaca mulatta*, Northern Pig-tailed Macaque *Macaca leonina*, and Wild Pig *Sus scrofa* were documented by the same camera-trap stations.

DISCUSSIONS

Porcupines are known to play a key role in ecosystem functioning through soil disturbance, seed dispersal and their interactions with vegetation and predators (Ilse & Hellgren 2001). Social associations, including stable reproductive pairs and family groups, have been documented among porcupines of the genus *Hystrix* (Corbet & Van Aarde 1996; Mori et al. 2025). This social behaviour corresponds with our observations, in which pairs of Malayan Porcupines were documented during two independent capture events. In addition to the camera-trap records, porcupine droppings and burrows were observed at several locations within the protected area, indicating continued use of the landscape by the species. Despite their protective quills, porcupines serve



Image 3a. A camera trap image of a pair of Malayan Porcupine *Hystrix brachyura* from Sepahijala Wildlife Sanctuary, Tripura, India.



Image 3b. An image of Malayan Porcupine *Hystrix brachyura* from Sepahijala Wildlife Sanctuary, Tripura, India.

Table 2. Details of Malayan Porcupine *Hystrix brachyura* recorded during the camera trapping survey of mammals in February 2024 in Sepahijala Wildlife Sanctuary, Tripura, India.

Date	Time (from) (hhmmss)	Time (to) (hhmmss)	Total number of camera trap images	Camera-trap station	Remarks
15.ii.24	034500	--	1	SEP-CT1	The porcupine walks across the open area.
15.ii.24	234800	235400	2	SEP-CT1	A pair of porcupines walk across the open area.
16.ii.24	020740	022812	7	SEP-CT2	A porcupine was repeatedly observed traversing the trail, likely foraging.
16.ii.24	192600	192800	3	SEP-CT2	A pair of porcupines walk across the open area.
21.ii.24	051232	051254	7	SEP-CT2	A porcupine was observed on the trail, likely foraging.

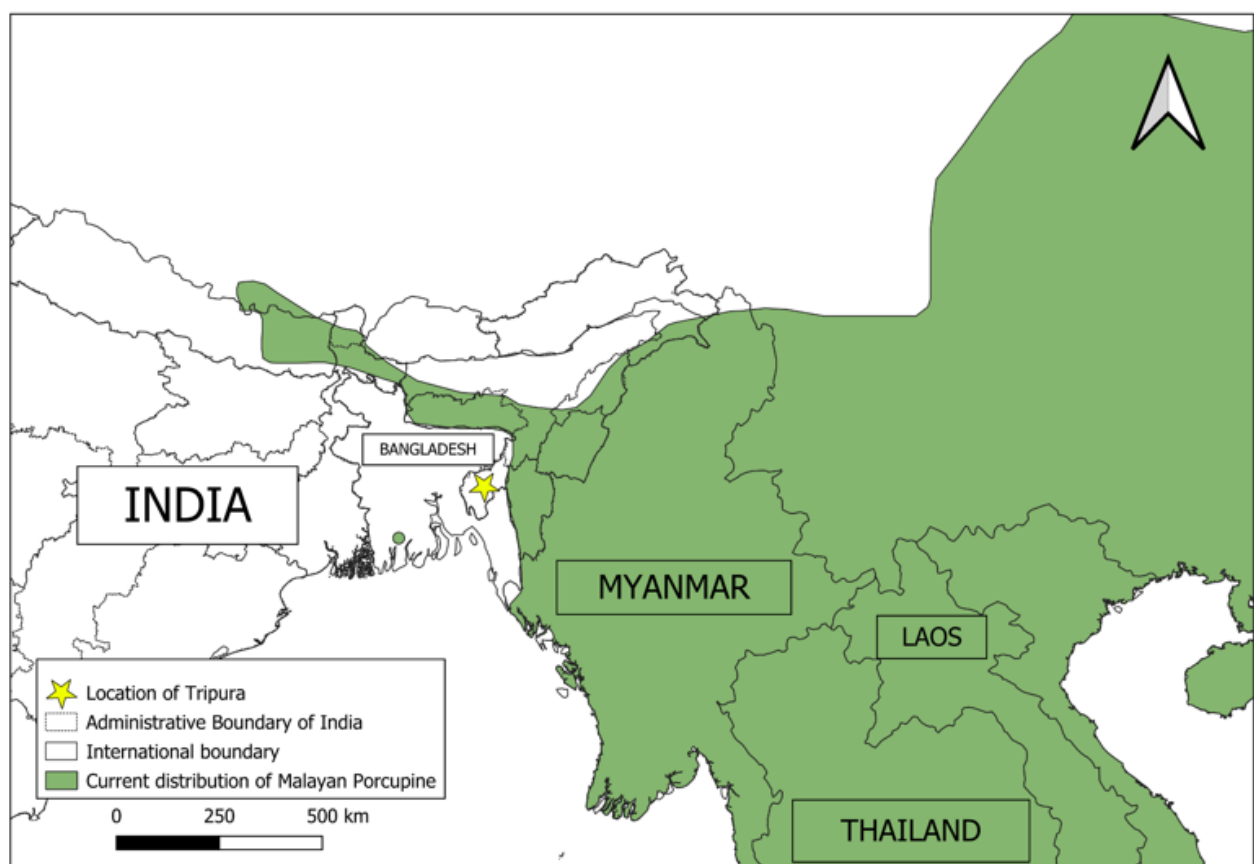


Image 4. Geographical distribution of Malayan porcupine and location of Tripura.

as prey for major carnivores such as leopards and lions. They are also actively hunted for their meat by humans. Che Dah (2017) reports that porcupine meat is consumed as a source of protein in China. Multiple studies document herbivory in porcupines, yet Nowak (1999) mentions that members of *Hystrix* feed on carcasses, thus suggesting that it could be an opportunistic feeder.

The Malayan Porcupine is widely distributed in the Indo-Malayan region and has been reported extensively

from the states of northeastern India. Precise detections have been noted from Sikkim, Assam, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, and West Bengal (Molur et al. 2005; Talukdar et al. 2019). Records in proximity to Tripura include observations from Aizawl in Mizoram & Bangladesh (Agrawal 2000; Hasan & Neha 2019). The occurrence of the species in Tripura had previously been considered likely because the state supports habitats similar to those in the adjoining regions

where the species has been recorded (Mazumdar et al. 2011). The present photographic records therefore provide evidence supporting its occurrence in the state. The CLNP is situated within the SWS, with no physical boundary separating the two protected areas. Consequently, animals can move across the landscape without restriction, and the two protected areas were treated as a single sampling and analytical unit during the study. The records reported here therefore represent the combined SWS–CLNP landscape rather than two ecologically separate sites.

The limited duration and spatial extent of the camera-trap survey do not allow an assessment of the population size, density or trend of the Malayan Porcupine within the SWS landscape. However, repeated camera-trap detections, records of pairs and the presence of droppings and burrows indicate that the species currently occurs across multiple parts of the protected area. These observations should not be interpreted as evidence of a stable population, and systematic long-term monitoring is required to assess its population status. No cases of porcupine hunting were recorded in and around the protected area during the study. Nevertheless, habitat loss, fragmentation and disturbance remain potential threats, while hunting for meat and medicinal use is known to affect the species elsewhere in its range (Molur et al. 2005; Kumawat et al. 2013).

Despite its wide occurrence, *Hystrix brachyura* remains poorly studied, and information about its ecology, abundance and local population trends remains limited. The species is affected by habitat destruction and hunting for food; and is not listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Molur et al. 2005; CITES 2023). Owing to this, the Malayan Porcupine is more prone to being poached and hunted for bushmeat and medicinal purposes. In several regions of Java, porcupines are still hunted from the wild to supply food stalls selling delicacies made with their meat (Farida et al. 2019). This persistent hunting to meet culinary demand exerts heavy pressure on wild populations, contributing to their continued decline. Effective monitoring, control, and captive-breeding efforts are therefore essential to prevent further depletion. Molur et al. (2005) suggest that all of the Indian species of porcupines have declined by 20% and are showing a downward trend.

Conservation measures within the SWS landscape should therefore focus on reducing disturbance and maintaining connectivity between forest patches. Practical measures may include restricting non-essential

vehicular movement during nocturnal hours, enforcing speed limits along the section of National Highway 8 passing through the protected area, identifying frequently used wildlife-crossing locations and installing appropriate warning signs or traffic-calming measures. Strict enforcement against littering, regulation of tourist movement and control of unrestricted access from peripheral villages would further reduce disturbance. Continued camera trapping, monitoring of indirect signs and documentation of road mortality or hunting incidents are required to determine changes in the occurrence and conservation status of the Malayan Porcupine within the protected area.

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