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Extant of Panther *Neurosigma siva siva* in Royal Manas National Park, Bhutan

The Nymphalidae species butterfly, monotypic (Brower 2009) *Neurosigma siva* is a rare species (Nidup et al. 2015; Sondhi & Kunte 2016) found in Bhutan, Bangladesh, Myanmar, Nepal, upper Burma, southeastern Tibet (China), and India (Kehimker 2008; Sondhi & Kunte 2016). A majority of the butterfly species has been thoroughly studied worldwide; however, only limited knowledge and rare sighting of *N. siva* has been recorded so far. The current study is the first of its kind to understand butterfly species wise and showcase the presence of *N. siva* and its preference of habitat use in the RMNP, Bhutan.

***Neurosigma siva siva* at Changazam.**

Neurosigma siva preferred forested region and flies between 300–500 m of altitude. However, Haribal (1992), Wangdi et al. (2013), and Sondhi & Kunte (2016) have recorded this species between 1,350–1,750 m in evergreen broadleaf forest. Dorji (2013) and Nidup et al. (2015) have reported its sighting in September below 500m but Haribal (1992) reported that the species flies in spring and comes back in October.

Wangdi & Sherub (2012); Singh (2017) has mentioned it as a rare species. So, due to its rarity in situ, it is a legally protected subspecies *siva*, under its synonym *doubledayi* (Beccaloni et al. 2019), under schedule II of Indian Wildlife Protection Act 1972 (IWPA 1972), but yet needs to be evaluated in IUCN Red list. However, currently accepted scientific name for the species is *Neurosigma doubledayi siva* (Beccaloni et al. 2019). It came to be learnt during the current study that only six individuals have been sighted till now in the country from different

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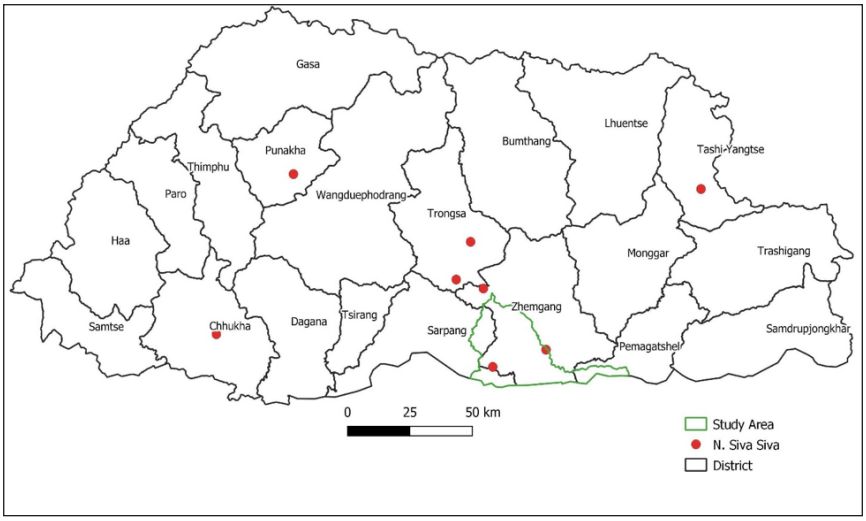

Red dots indicating the occurrence *N. siva* in Bhutan.

locations and only three individuals from RMNP. So, such rare species should receive attention and protection in the country.

The study was carried out along the southern foothills (90.583^{0}E– 91.216^{0}E & 26.766^{0}N–27.133^{0}N) of RMNP- the oldest protected area known for its outstanding biodiversity. The altitude ranges between elevations of 80–2,714 m. Owing to varied climatic and topographic features, the park hosts varities of forest habitat types.

Modified Pollard walk (Pollard 1977) of 1,000m length and 2.5m width on either side (Nidup et al. 2015) were laid within 200–500 m of altitudes in different habitat types. The study area was categorized into three types of habitat: open canopy (OC), closed canopy (CC), and stream bed (SB).

The field survey was conducted during 09.00–12.00 h and 14.00–17.00 h as butterflies generally become active around this time of the day (Nidup et al. 2015). Equal number of transects were laid in every habitat, and same pace of 30–35 minutes were spent to scan for butterflies in every transect. The survey was conducted four times in a year starting from September 2015 to July 2016. However, in the third year (2017), surveys were conducted with a higher sampling effort from 23 to 29 transects in order to increase the probability of encountering *N. siva*.

Only three individuals of *N. siva* were sighted in the high forested area; two from Changazan trail towards Silingtoe (26.914^{0}N & 90.894^{0}E) at 254m under Manas Range and another one along the Gortey trail towards Menchuna (26.847^{0}N & 90.680^{0}E) at 210m under Umling Range. These butterflies were sighted on 5 and 27 June 2016 in Changazam trail and Gortey trail, respectively, and the third one on 11 September 2017 in Changazam trail on the ground. The butterflies were sighted on wet days while they were basking in the sun with open wings.

Due to the elusive nature of the species and its rarity, we could not study in detail since the species was not seen in areas where it was sighted before indicating its intolerance for disturbance

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and other anthropogenic factors. This species was also reported to be sighted rarely (Westwood 1850) in the country (Wangdi & Sherub 2012; Wangdi et al. 2013; Nidup et al. 2015).

Butterflies being genuinely scarce, there is a need for more extensive surveys to determine the species 'status and to provide ecological basis for assessing its conservation status and needs. Further, our findings necessitate careful consideration of its conservation status in Bhutan as they are not legally protected under any Acts and Rules in Bhutan.

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Tshering Nidup
Senior Range Officer, Phibsoo Wildlife Sanctuary, Sarpang, Bhutan.
Email: tsheringnidup@moaf.gov.bt

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For communication, Email: daniel@zooreach.org