

CAT

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news





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First record of a leopard preying on a flying fox

The leopard *Panthera pardus* is an adaptable large carnivore with a varied diet and found in a wide variety of habitats. Its diet is well-documented across its distributional range. However, in this study from southern India, we document an unusual prey species; the Indian flying fox *Pteropus giganteus giganteus*. This is possibly the first-ever documentation of a leopard preying on this highly arboreal, frugivorous prey species. This observation brings to the forefront the possible role of leopards in diploendozoochory as they prey on a variety of primates, viverrids, rodents and ungulates which rely on seeds and fruits as part of their diet. We recommend further studies on the role of this large feline as a secondary disperser which will help add new dimensions to possible trophic relationships.

The leopard is a large felid categorised as Vulnerable on IUCN's Red List of Threatened Species (Stein et al. 2024). It is widely distributed across a variety of habitats, and its adaptability is also reflected in its catholic diet which varies from large (>200 kg) to small prey (ca. 1 kg) such as birds and rodents (Hayward et al. 2006). Leopards have the most diverse diet of any felid (Hunter 2015). From 29 published and four unpublished studies from 13 countries, Hayward et al. (2006) documented 111 prey species recorded as leopard prey and proportionally the most common prey were large and medium-sized ungulates, and primates.

If all vertebrates are included (birds, herptiles and fish), the number of leopard prey species exceeds 200 (Hunter 2015). Various interesting prey species have been recorded from the leopard's diet including catfish *Clarias gariepinus*, birds, eland *Taurotragus oryx* (Hayward et al. 2006), Indian gerbil *Tatera indica*, and large bandicoot rat *Bandicota indica* (this study). Leopards also prey on domestic livestock, poultry, and occasionally upon people. Leopards preferentially prey upon species within the weight range of 10 to 40 kg, with mean body mass of preferred prey being 23 kg (Hayward et al. 2006).

We carry out long-term studies on Indian leopards *Panthera pardus fusca* in southern India, and as part of our population assessment, we deploy camera traps in protected areas, non-protected areas and human-dominated landscapes. Between 24 August and 8 September 2023, we set camera traps up in Devarayanadurga Reserved Forest (41.8 km²) and its adjoining areas, amounting to a total of 69.1 km² of leopard habitat in the south-central part of Karnataka state (Latitude: 13.307367 to 13.434513, Longitude: 77.150111 to 77.232648, Fig. 1). The area consists of dry deciduous and thorny scrub forests, and rocky outcrops as the predominant habitat types with *Terminilia tomentosa*, *Santalum album*, *Butea manosperma*, *Terminilia arjuna*, *Tectona grandis*, *Wrightia tinctoria*, *Acacia polyacantha*, *Chloroxylon swietenia*, and *Adena paronina* as some of the principal vegetation species.

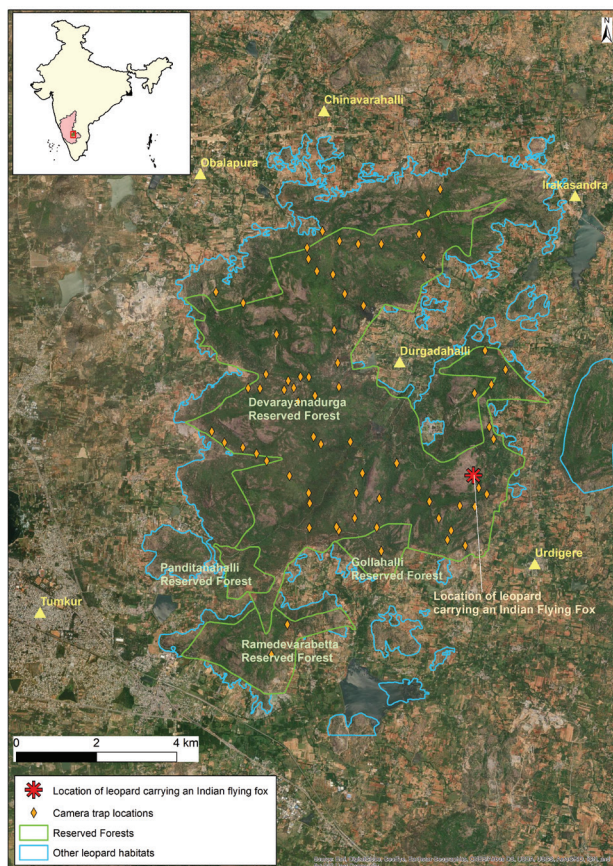
Camera trapping was carried out using standard field protocols for assessing large cat populations. Camera traps were set up at a total of 69 locations for 16 days, resulting in a trapping effort of 1,104 days.

We recorded a female leopard carrying an adult Indian flying fox, a bat species belonging to the Pteropodidae family (Fig. 2), on two different occasions (26 and 28 August 2023) at the same location, and both the records were at nighttime (22:38 h and 22:55 h). The bat was easily identified due to its body colourings (chestnut-brown head, tan belly, and black wings) and key body features (pointed ears, long-hairy snout and large body size). The sex of the bat could not be identified from the images. Leopards generally kill small prey by biting the back of the skull or the neck (Hunter 2015). In these instances, the leopard was seen carrying the flying fox by the side of its torso (Fig. 2).

The Indian flying fox is a widely distributed bat species found all over India. It has also been recorded in Bangladesh, Bhutan, Maldives, Myanmar, Nepal, Pakistan and Sri Lanka, with uncertain presence in China (Tsang 2020).

This is perhaps the first documentation of a leopard preying on the Indian flying fox. Other studies that have focused on leopard diet have not documented this unusual, arboreal prey either in India or elsewhere (Ramakrishnan et al. 1999, Hayward et al. 2006, Ott et al. 2007, Andheria et al. 2007, Athreya et al. 2016, Sharbafi et al. 2016, Sugimoto et al. 2016, Rostro-García et al. 2018; Kshetry et al. 2020, Dhar & Bhat 2022, Baral et al. 2024). Our record adds to the existing diet literature of leopards, especially from a non-protected area from where such information is lacking. This unique prey also

Fig. 1. Devarayanadurga Reserved Forest with its adjoining leopard habitats in southern India, and locations where the leopard was camera trapped with the Indian flying fox (map layers by ESRI et al.).



highlights the high adaptability of leopards, allowing them to expand their diet and utilise small, arboreal mammals.

Leopards are stalk-ambush hunters, and we are not certain how this individual leopard managed to hunt Indian flying foxes which are arboreal and mostly feed in large, fruit-bearing trees at night. Our extensive search within a radius of 2–3 km of the camera trap location where the leopard was photographed did not uncover any flying fox roosting trees. However, it is possible that we did not invest enough effort to locate them.

Indian flying foxes mainly feed on fruits and flowers and act as key pollinators for some plant species (Menon 2014). Our new record therefore also highlights the potential role large carnivores such as leopards are playing as secondary seed dispersers, a process known as diploendozoochory. Endozoochory and epizoochory are two critical processes in plant population spatial dynamics whereby herbivores act as seed dispersers (Picard et al. 2016). However, the leopard's role in diploendozoochory has not yet been recorded, and we recommend more scientific attention to this topic. Given that leopards feed on several seed-dispersing species such as primates, viverrids, rodents and large herbivores, their role in diploendozoochory may be a critical part of their ecosystem function. With leopards having large home ranges (Snider et al. 2021), their role in plant spatial distribution could be important.

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Fig. 2. A female leopard carrying an Indian flying fox in Devarayanadurga Reserved Forest, southern India (Photo Holématthi Nature Foundation).

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