Oryx

Mysteries unveiled: exploring the enigmatic world of the clouded leopard in Manas

By Urjit Bhatt & Salvador Lyngdoh, 4th August 2023

Found mainly in the dense forests of Southeast Asia, the clouded leopard is the smallest of the big cats and, perhaps, the least well-known. With its striking coat pattern adorned with cloud-like spots, this enigmatic cat possesses a unique blend of agility, strength and adaptability. It has earned the nickname ‘modern-day sabre-tooth tiger’ because it has the largest canines in proportion to its skull size among all cat species. A skilful arboreal acrobat, the clouded leopard excels in navigating treetops, utilizing its long tail for balance and its powerful limbs for leaping. Yet despite its mesmerizing beauty and undeniable charisma, the clouded leopard faces numerous threats including habitat loss, poaching and the illegal wildlife trade. Conservation efforts are crucial to protect this magnificent species and preserve its vital role in the delicate balance of our planet’s biodiversity.

Left: In the blink of an eye: a rare camera-trap image captures the elusive clouded leopard, providing a fleeting glimpse into its secretive world. Right: A trace of the elusive: a detailed pugmark left by a clouded leopard, offering a glimpse into its presence in the Garuchara riverbed of Bansbari Range. Photos: Wildlife Institute of India (left) and Saurav Chaudhary (right).

Manas National Park, nestled in the foothills of the Eastern Himalayas in Assam, India, is a prime destination for nature lovers and wildlife enthusiasts. Recognized as a UNESCO World Heritage Site, this biodiverse haven is renowned for its rich wildlife and breath-taking landscapes. The Park

encompasses dense forests, lush grasslands and the majestic Manas River, which flows through its heart. Home to a diverse array of flora and fauna, including the iconic Bengal tiger, greater one-horned rhinoceros, Asian elephant and clouded leopard, Manas National Park offers visitors a chance to witness the marvels of pristine natural habitats. Exploring its intricate network of trails, many have commented that the symphony of surrounding sounds and sights creates an ethereal experience.

Left: The enchanted realm: a lush green habitat, the perfect haven for the elusive clouded leopard, where dense foliage and vibrant greenery create ideal conditions for this magnificent feline. Right: A haven of biodiversity: the moist mixed deciduous forest, a preferred habitat of the clouded leopard, teems with life as sunlight filters through the dense canopy, nurturing a diverse ecosystem. Photos: Saurav Chaudhary (left) and Urjit Bhatt (right).

A fascinating web of coexistence is woven between different species of carnivores in the Park, with iconic hunters such as the tiger, leopard, dhole, Asiatic black bear and clouded leopard all occurring within this rich landscape. The secret to their coexistence lies in the fact that each predator occupies a unique ecological niche within the shared habitat, exhibiting distinct adaptations and behaviours. The tiger reigns as the apex predator, commanding the forests with its strength and stealth, while the leopard, a master of camouflage, thrives in a blend of trees and more open terrain. The dhole’s social dynamics and hunting prowess showcase the power of teamwork, and the Asiatic black bear’s omnivorous diet and tree-climbing skills make it a versatile forest inhabitant. Finally, the elusive clouded leopard, with its arboreal prowess, gracefully traverses the treetops as it hunts for smaller prey. Together, these sympatric carnivores showcase the intricate web of interactions and interdependencies that shape the ecosystem, underscoring the need to protect their habitat in an effort to ensure their continued coexistence.

Coexistence among predators: the sympatric carnivores of Manas National Park, embodying the delicate balance of nature's interconnected web of species. Clockwise from upper left: tiger, leopard, Asiatic black bear, dhole and clouded leopard. Photos: Wildlife Institute of India.

To support the conservation of the clouded leopard, between December 2016 and November 2019, we conducted an ecological study in Manas National Park, in collaboration with the Wildlife Institute of India, Dehradun, and the Science and Engineering Research Board, New Delhi. Prior to our study, most clouded leopard research in India was conducted as part of tiger-focused conservation projects. Our research, however, focused explicitly on clouded leopards, aiming to improve our basic knowledge of this species by determining its population density and habitat preferences. In addition, we were interested in how this felid manages to coexist with the other carnivores that share its habitat. Although there are some differences in the behaviour and diet of various predators, competition for prey may still occur, and many predators are known to hunt other meat-eaters—a phenomenon known as intraguild predation. Little is known about the details of how the carnivores of Manas National Park interact in time and space, and we wanted to find out more.

We began our research by conducting a comprehensive questionnaire survey, gathering valuable information from forest officials regarding any sightings or indirect signs of the presence of clouded leopards. After collecting this baseline data, we hoped to catch a glimpse of the secretive felids ourselves, with the help of motion-detecting camera traps. Within a 1 km^2 grid cell system covering moist mixed deciduous and semi-evergreen forests, we placed 473 camera-trap locations in an area covering 270 km^2. Our target lived up to its reputation of being elusive: despite a colossal sampling effort of 11,388 trap-nights, we only recorded the clouded leopard 21 times at 17 locations, and were able to identify 12 individuals based on their unique coat pattern. Nonetheless, these data enabled us to estimate the species' population density. With 0.5–6.3 individual clouded leopards per 100 km^2, Manas National Park appears to host these cats at densities comparable to other areas within the species' range.

Our study provided some important insights into clouded leopard biology: these cats prefer habitats with lush, healthy vegetation, dense canopies and abundant small prey. Analysing our camera-trap images, we found that although there was overlap in the times of day when clouded

leopards and other carnivores (including tigers, leopards, dholes and Asiatic black bears) were recorded, the peak times when the animals were most active varied between species. Looking at space use within the landscape, we found that the spatial distribution of clouded leopards appeared to be random, as if they play a mysterious game of hide-and-seek! No clear patterns of avoidance or co-occurrence with other predators were observed.

Even though clouded leopards and larger predators share time of activity and show no clear pattern of spatial segregation, the clouded leopards might stay safe by utilizing vertical strata of the forest, i.e., escaping into treetops, when they encounter large predators. While our camera traps couldn't capture their tree-top behaviour, it opens the door for exciting future research!

Unveiling the clouded leopard's prey: Manas supports a high diversity of small prey species for clouded leopards. Clockwise from upper left: Himalayan crestless porcupine, Asiatic brush-tailed porcupine, rhesus macaque, Assamese macaque, capped langur, red junglefowl, kalij pheasant, hispid hare and Indian hare. Photos: Wildlife Institute of India.

Our work demonstrates that Manas National Park is an important refuge for clouded leopards in north-east India because of its intact primary forests and the presence of numerous small prey species. Our findings point to some level of spatio-temporal segregation facilitating the coexistence of clouded leopards with other sympatric carnivores, suggesting a partial avoidance that could minimize competition as well as reduce the risk of intraguild predation.

Because of the elusive nature of the clouded leopard, sharing data on its biology requires a collaborative approach. With the publication of this article, we call on researchers and conservationists from around the world to come together, pooling their knowledge and resources to study and protect this enigmatic species. By collaborating and sharing data, we can deepen our understanding of the clouded leopard's behaviour, habitat requirements, diet and population dynamics. This in turn will foster the creation of effective conservation strategies and ensure the long-term survival of these elusive creatures in the threatened forests of Southeast Asia.

The article 'Secrets of the clouded leopard: abundance, habitat use and carnivore coexistence in tropical forest of Manas National Park, Assam, India' is available open access in *Oryx—The International Journal of Conservation*.

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