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Large carnivores conflict of Tiger (*Panthera tigris tigris* and Leopard (*Panthera pardus fusca*) in core zone of Sathyamangalam Tiger Reserve, Southern India.

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Abstract

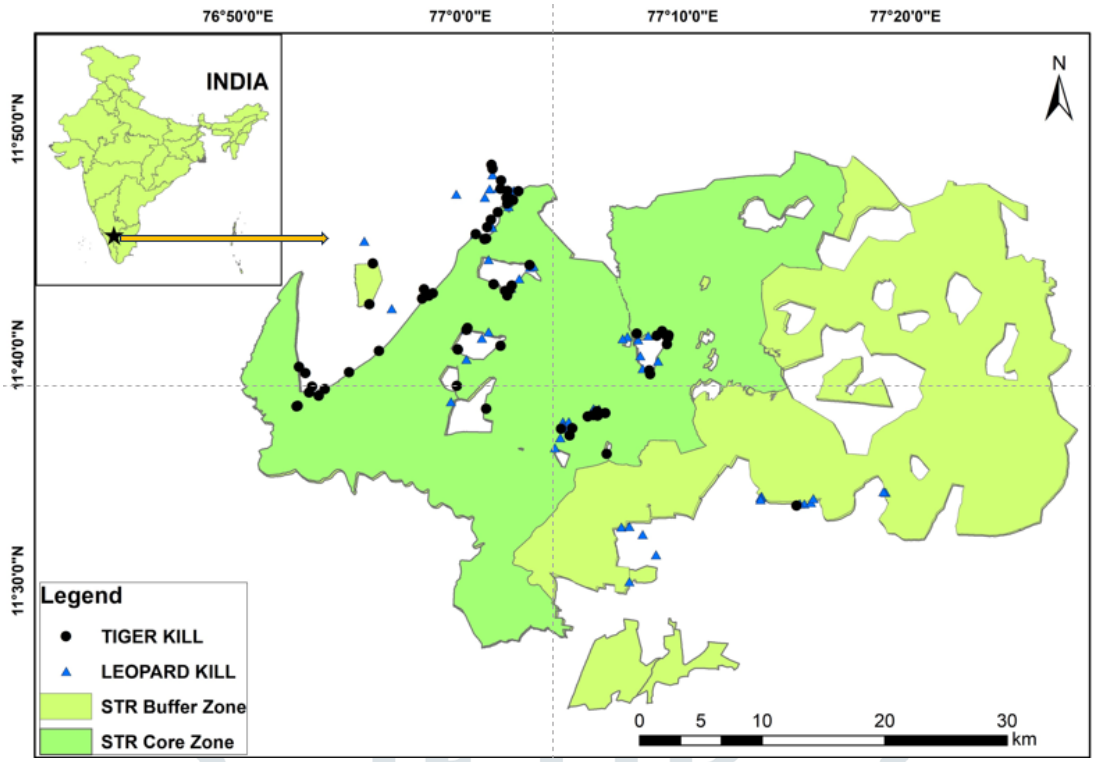
Sathyamangalam Tiger Reserve (STR), the fourth tiger reserve in Tamil Nadu, spanning 1408.4 km², is home to a diverse wildlife population, including 83 tigers (Jhala et al. 2020), 132 leopards(Jhala et al. 2018) along with wild dogs (*Cuon alpinus*)and striped hyaenas (*Hyeana hyeana*). Given extensive human use of area along the reserve's fringes, and parts of it's interiors where there are 28 forest and revenue settlements, the reserve faces the critical issue of livestock depredation by large carnivores. We recorded 127 cattle kills in two years between 2021 and 2022, with 115 of these cases being reported from the in core zone, and only 12 cases from the buffer zone. Questionnaire surveys were conducted with local residents to know the attitudes towards large carnivore conservation. A total of 100 livestock owners and 100 non-livestock owners residing in and around the core zone were interviewed. The results revealed that nearly half of them, both livestock and non-livestock owners expressed a positive approach towards coexistence with large carnivore conservation. Among the forest ranges, Thalavadi range recorded the highest cattle depredation incidences (n=54) followed by Thalamalai range (n=27). Therefore, the result envisaged that these two forest ranges need to be prioritized for human wildlife conflict management measures. Promoting coexistence of humans with wildlife and implement conflict mitigation measures as a crucial component for long run conservation of large carnivores in STR.

Keywords: Livestock, Carnivore, Co-existence, Predator, Density.

Short note

The core zone of STR has a higher tiger density 5.56 individuals per 100 km², while the buffer zone reports a lower density of 1.44 per 100 km² (unpublished data WWF-India). Leopard behaviour indicates a tendency to avoid areas with a higher tiger presence (Mondal et al. 2012; Bargali & Ahmed 2018; Letro et al. 2022), leading them to the edges of human settlements. In STR, since these human-use areas are also found within the core zone, and the higher tiger density likely pushes the leopards to hide within villages during the day (Krishnakumar et al. 2023), particularly in abandoned mining quarries and forest edges, contributing to instances of livestock depredation. Tigers, in contrast, exhibit a preference for abandoned agricultural fields adjacent to forest habitats. Of the total of 127 livestock depredation 77 incidents recorded outside the reserve and 50 inside, with 53% occurring within half a kilometer from

the forest boundary. Notably, 24% of these incidents happened between 15:30 to 18:30 hours, suggesting an active temporal pattern to livestock depredation by large carnivores.



Map: Showing the study area and livestock kill locations in Sathyamangalam Tiger Reserve

Our study results revealed that livestock depredation by tigers accounted n=66 (52%), with leopards accounting for n=59 (46%), and an unknown species contributing to the remaining 2%. Interestingly, our findings indicate that both large carnivores involved in livestock depredation predominantly within 500-meter buffer on either side of the forest boundary. Cattle grazers adopt a proactive approach to minimize livestock kills by large carnivores, with 87% success when accompanied by herders. To repel predators, the herders periodically vocalize loudly deterring carnivores and averting potential conflicts. This practice showcases a supportable coexistence strategy, emphasizing the importance of human-wildlife understanding in shared environments.

	
Tiger killed adult cow 400 meter away from forest boundary	Leopards camera trapped 1.4 kilometre from the forest boundary in the sugarcane field

Following cattle kills by large carnivores, the people's inclination is to inspect the carcass with the intention of disturbing the predator, thus prompting it to leave the area, inadvertently leading to increased livestock depredation. Our study indicates that when predators are disturbed, they may abandon their existing prey and search for another prey without consuming the first one kill, potentially escalating the overall livestock kills. Our findings reveal that 60% of livestock kills are partly eaten, 37% remain untouched, and 9% are fully consumed, with an additional 8% categorized as unknown or missing within the forest. This underscores the importance of understanding the intricacies of human-

wildlife interactions and the potential consequences of community actions on predator behaviour. This can also provide insights for more effective strategies in reducing livestock depredation.

The inquiry with cattle herders regarding livestock carcasses after carnivore predation provided intriguing results. A significant portion, 41%, reported burying the carcasses, while 45% chose to leave them for the carnivores. However, 11% remained unknown, and a small percentage, 3%, mentioned the carcasses being consumed by people. Leaving carcasses for carnivores is generally seen as a positive practice, and the forest department monitor these carcasses to prevent incidences of retaliatory killings where poison is poured on the carcasses.

Addressing the challenges in the core zone of STR, a matrix of forested areas and human-use areas, requires a comprehensive approach that combines efficient compensation mechanisms with community engagement and preventive measures. Currently, it is recorded that 28% of livestock cattle kills go unreported to the forest department due to prolonged compensation processes, exacerbating negative sentiments among cattle owners and potentially fuelling antagonism towards conservation efforts. Streamlining the compensation process and ensuring fair and timely reimbursement for livestock losses are essential steps to alleviate these concerns. Implementing a prompt 50% on-the-spot compensation, with the remaining amount settled within two weeks, can significantly reduce the number of unreported cases and discourage retaliatory actions such as carcass poisoning, ultimately promoting a more positive relationship between local communities and the forest department.

Moreover, community involvement is paramount in mitigating human-wildlife conflict. By offering incentives for protective measures, such as the installation of cattle sheds and clearing of vegetation near forest boundaries, there is potential to reduce livestock kills. Currently, a suggested model of Interim Relief Scheme (IRS) (Bargali & Ahmed 2018; Miller et al. 2018) aims to minimize retaliatory killings. Education programs on the importance of reporting incidents and the role of large carnivores in the ecosystem are crucial for building awareness and garnering support. Collaborating with local authorities, leveraging technology for better monitoring, and investigating cases of poisoning are additional measures that can contribute to a more effective and sustainable large carnivore conservation strategy in the core zone of STR.

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