HUMAN LEOPARD CONFLICT: A REVIEW IN INDIAN CONTEXT

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Abstract

This review explores the multifaceted dynamics of leopard ecology, behavior, and conservation across diverse geographical landscapes. It scrutinizes the distribution of leopard populations, the anthropogenic impacts on their habitats, and the genetic diversity within the species. Field surveys and tracking data reveal complex interactions wherein leopards coexist with other large predators, such as tigers and wild dogs, sharing high-biodiversity habitats and selecting prey. Furthermore, this research underscores the critical role of local communities in conservation efforts, particularly in regions where predators reside in close proximity to human settlements. Collectively, these studies highlight the intricacies of predator coexistence and the challenges of human-wildlife conflict, advocating for comprehensive conservation strategies that integrate both ecological and sociological dimensions.

Keywords: Human–Wildlife Conflict, Leopard Conservation, Habitat Fragmentation, Predator–Prey Dynamics, Conflict Mitigation Strategies

Introduction

The leopard is a robust feline characterized by a long body, relatively short legs, and a massive skull. Distinguished by its rosette-marked fur, the leopard is an opportunistic hunter with a broad diet and immense strength, capable of adapting to a wide array of habitats ranging from rainforests to arid steppes and montane regions. While typically elusive and prone to avoiding human contact, leopards exhibit remarkable adaptability, often persisting in human-dominated landscapes. In India, populations in areas such as Junnar in Pune, Sanjay Gandhi National Park in Mumbai, and the Jhalana Leopard Reserve in Jaipur survive in close proximity to human settlements, often unnoticed by local residents. In these environments, where wild prey may be scarce, leopards have adapted to subsist on domestic animals, including dogs. Understanding the drivers behind habitat selection and survival strategies in these anthropogenic environments requires rigorous diet studies, camera trap analyses, and population surveys.

Biologically, leopards are territorial and solitary. Research by Kumar et al. indicates that male home ranges average 48 km², while female ranges are approximately 14 km². Interactions between sexes are generally limited to the mating season. Maternal care is prolonged, with mothers feeding and sharing food with offspring even after they have matured. Leopards are skilled climbers, often resting on branches and descending head-first, and are primarily nocturnal with distinct vocalizations resembling a sawing sound.

Problem Overview

Habitat degradation poses a significant threat to wildlife, precipitating human-wildlife conflict (HWC) in both urban and rural settings. HWC is defined by the interaction between humans and wildlife that results in negative outcomes for people, animals, resources, or habitats. This conflict arises primarily when expanding human populations encroach upon established wildlife territories, intensifying competition for space and resources. Leopards pose risks not only to human safety but also to economic stability through livestock depredation. For instance, between 1999 and 2005, Maharashtra alone reported 201 deaths and 902 injuries resulting from leopard attacks. Conversely, leopards face threats from poaching for skins and ceremonial items, retaliatory killings, and poorly managed trophy hunting. Rapid urbanization has fragmented natural habitats into isolated patches within human-dominated landscapes. While these patches support biodiversity, they present significant challenges for territorial carnivores requiring extensive ranges and prey bases. Consequently, effective conservation management for leopards in these areas necessitates a deep understanding of their feeding ecology and the impacts of prey depletion to mitigate conflict and ensure coexistence.

Human Leopard Conflict

Spatial and Temporal Patterns of Human-Leopard Conflict: Insights from Camera Traps and Surveys

A comprehensive review of existing literature reveals diverse methodologies and findings regarding leopard ecology and conflict. Khorozyan et al. (2016) analyzed 218 leopard record databases, utilizing indirect evidence and historical data to study distribution patterns. Genetic differentiation was explored by Uphyrkina et al. (2001) using phylogenetic analysis of mtDNA haplotypes and microsatellite loci, revealing significant variability across sites. Ethnographic approaches were employed by Sarma et al. (2022), who utilized anthropological field methods and observation in relocated villages over a seven-year period to understand the social dimensions of conservation.

Ecological interactions between predators were studied by Karanth et al. (2000) in Nagarhole, Southern India, using radio-tracking. They found that tigers, leopards, and dholes shared habitats and hunted in similar areas, though tigers preferred slightly denser cover. Ramesh et al. (2012) conducted scat analysis in the Mudumalai Tiger Reserve, demonstrating that these three carnivores co-existed despite high dietary overlap, with niche differentiation occurring through prey size selection; tigers targeted prey over 50 kg, while leopards and dholes selected medium-sized prey.

Conflict dynamics were further investigated by Chetri et al. (2019), who surveyed 85 settlements, finding that snow leopards were responsible for significant predation losses. However, perceptions of conflict often differ from reality; LeFlore et al. (2019) noted a discrepancy where local farmers attributed over 80% of depredation to lions, while confirmed data indicated a lower percentage. Such discrepancies highlight the importance of accurate data in managing conflict. Ramesh et al. (2020) suggested that mapping predation risk is a powerful tool for stakeholders to allocate resources effectively for conflict mitigation.

Srivathsa et al. (2019) provided insights into factors facilitating co-occurrence, noting high spatial overlap between predators and free-ranging dogs. In terms of mitigation, Hanwatey et al. (2013) emphasized the need for resident training in identifying carnivore signs to verify attacks. Sociocultural factors also play a role; Bhatia et al. (2016) found that integrating local religious philosophies into conservation practice could be beneficial. Conversely, Datta et al. (2008) highlighted the threat of prey depletion, noting low detection rates of large carnivores in Namdapha due to this factor.

Dietary analysis remains a cornerstone of leopard research. Trites et al. (2005) utilized scat analysis to determine prey frequency, while Phal Desai et al. (2019) created a reference database of hair characteristics to aid in prey identification. In urban contexts, Miller et al. (2015) and Athreya et al. (2013) studied leopards in human-dominated landscapes, finding that domestic animals often constitute a significant portion of the diet, yet these cats can persist with relatively low conflict rates under certain conditions. For instance, Athreya et al. (2013) demonstrated the conservation value of unprotected landscapes where leopards co-occur with high human densities.

Community engagement has shown promise in conservation. Alexander et al. (2022) discussed the 'Shen' programme in Spiti Valley, which successfully involved women in conservation dialogue. Similarly, Kshettry et al. (2017) analyzed compensation records to understand attack patterns in tea plantations, suggesting behavioral modifications like making noise to reduce encounters. Finally, the role of media was scrutinized by Bhatia et al. (2012) and Hathaway et al. (2017), who observed that while initial coverage of conflict can be negative, counseling and sensitization can shift media narratives towards more accurate and constructive reporting.

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