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Research Article

STRIPES IN THE SHADOWS: A COMPREHENSIVE REVIEW OF THE STATUS, DISTRIBUTION, AND FEEDING ECOLOGY OF THE STRIPED HYENA (*Hyaena hyaena*) IN INDIA

[1]Dhiraj R Parmar, [1]*Suresh K Chovatiya and [2]Nikunj B Gajera

[1] Department of Biosciences, Saurashtra University, Rajkot, Gujarat, India
[2] Gujarat Institute of Desert Ecology, Mundra Road, Bhuj (Kachchh), Gujarat, India

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ABSTRACT

The striped hyena (*Hyaena hyaena*), a solitary and nocturnal scavenger, is the only extant hyena species found in India. Despite its broad geographic range across arid, semi-arid, and human-dominated landscapes, the species remains ecologically understudied, with minimal conservation efforts. This review synthesizes available knowledge on the population status, distribution patterns, and feeding ecology of the striped hyena in India, based on literature published from 2000 to 2024. National estimates suggest a population of 1,000–3,000 individuals, with variable densities reported across protected and non-protected regions. The species exhibits a highly adaptable diet that includes wild prey, domestic livestock, and anthropogenic waste, reflecting its scavenging behavior and resilience in disturbed habitats. However, the striped hyena faces persistent threats from habitat fragmentation, human-wildlife conflict, and retaliatory killings. Our analysis reveals significant research gaps in long-term population monitoring, dietary shifts, and ecosystem service quantification, particularly in Eastern and Northeastern India. The review underscores the need for species-specific conservation strategies, improved ecological monitoring, and public engagement to ensure the long-term survival of this ecologically valuable yet overlooked carnivore.

Keywords: Striped Hyena, *Hyaena hyaena*, Distribution Patterns, Feeding Ecology, Population Density.

INTRODUCTION

The striped hyena (*Hyaena hyaena*), the sole hyena species found in India, is a solitary and nocturnal scavenger that plays a crucial role in maintaining ecosystem health. It is a member of the family Hyaenidae, which also comprises three other extant species: the spotted hyena (*Crocuta crocuta*), the brown hyena (*Parahyaena brunnea*), and the aardwolf (*Proteles cristata*). The striped hyena is currently classified as "Near Threatened" by the IUCN due to declining population trends. It is afforded protection under Schedule I of the Wildlife (Protection) Act, 1972 (Amendment 2022), and is currently listed in Appendix III of CITES, with a recent proposal recommending it uplisting to Appendix I due to increasing conservation concerns (Abi-Said and Dloniak, 2015; CITES, 2025). There are between 5,000 and 14,000 mature striped hyenas globally, and up to 1,000-3,000 of them may reside in India (Mills & Hofer, 1998). The historical distribution of the striped hyena is across Africa, through the Middle East to Central and Southern Asia, and its known Indian range is widespread but patchy (Kruuk, 1976; Kasparek *et al.,* 2004). Overwhelmingly, striped hyena populations occur in India in arid and semi-arid landscapes – Rajasthan, Gujarat, and Madhya Pradesh, although occurrences of striped hyena populations occur across forested areas and human-dominated regions in both northern and southern India (Alam *et al.,* 2014; Mandal *et al.,* 2018). The striped hyena functions as a facultative scavenger with an omnivorous diet. It consumes a variety of food sources, including carrion, bones, fruits, insects, and small to medium-sized vertebrates, often found near areas impacted by human presence (Hofer and Mills, 1998; Ilani, 1975). Regional dietary studies underscore its adaptability and preference for domestic animals in areas with limited wild prey (Jhala, 2013). This review synthesizes the existing body of research on the striped hyena's population, distribution, and

*Corresponding Author: Suresh K. Chovatiya, Department of Biosciences, Saurashtra University, Rajkot, Gujarat, India Email: skchovatiya@sauuni.ac.in.

feeding ecology across India. It also identifies key data gaps and proposes directions for future research and conservation planning.

MATERIALS AND METHODS

The literature review is based on a rigorous review of secondary literature conducted between 2000 and 2024. A total of 62 documents were identified as potential references (citations) to be used in the review, including peer-reviewed journals, government reports, published university theses, and institutional reports, using both Google Scholar and ResearchGate as sources. Potential keywords included "Striped Hyena in India," "*Hyaena hyaena* diet," "Hyena distribution," and "Hyaenidae." Duplicate and irrelevant documents were removed, with 43 original documents from the above reference material being used in this review (Neupane *et al.,* 2021).

RESULTS AND DISCUSSION

The population estimate for the global striped hyena is between 5,000–14,000 individuals worldwide (Hofer & Mills, 1998), with the Indian striped hyena population ranging between 1,000–3,000 individuals (Kruuk, 1976; Sharma *et al.,* 2015). A population density estimates in Rajasthan protected areas indicated an average of 8.96 ± 1.73/100 km² (Singh *et al.,* 2010; Gupta *et al.,* 2009; Singh *et al.,* 2014; Panda *et al.,* 2022). Compared to the state of Gujarat, Gir reported a much lower density estimate of 0.07 ± 0.03 individuals per km² (Alam *et al.,* 2015b), while density estimates in Achanakmar Tiger Reserve ranged between 4.54 ± 1.75 individuals/100 km² (Mandal *et al.,* 2017). Photographic capture-recapture techniques in Rajaji National Park reported population densities ranging from 3.91–5.67 individuals/100 km² (Harihar, 2010). In Maharashtra, hyena occupancy originated from 75% of the surveyed landscape, which shows their versatility in occupying semi-arid, human-dominated ecosystems (Majgaonkar *et al.,* 2019).

Table 1. Table showing population density estimates in key Indian regions.

Location / Study Site	Region / State	Estimated Density (individuals / 100 km²)	Method Used	Source
Various Protected areas of Rajasthan	Rajasthan	8.96 ± 1.73/100 km²	Camera trap	Gupta *et al.,* (2009); Singh *et al.,* (2010); Singh *et al.,* (2014); Panda *et al.,* (2022)
Gir National Park	Gujarat	0.07 ± 0.03 per km² (≈7 per 100 km²)	Direct signs/sightings	Alam *et al.,* (2015b)
Achanakmar Tiger Reserve	Chhattisgarh	4.54 ± 1.75/100 km²	Camera trap/sign surveys	Mandal *et al.,* (2017)
Rajaji National Park	Uttarakhand	3.91 – 5.67	Photographic Capture–Recapture (PCR)	Harihar *et al.,* (2010)
Sigur Plateau (near villages)	Tamil Nadu (Nilgiris)	High density in 0.125 km² plots (not extrapolated)	Visual encounter & camera trap	Arumugam (2012)
Western Maharashtra (semidry landscape)	Maharashtra (Pune region)	75% landscape occupancy (density not quantified)	Questionnaire & camera trap surveys	Majgaonkar *et al.,* (2019)
Vansda Taluka (human-dominated)	South Gujarat	Low relative abundance	Camera trap	Dahya *et al.,* (2023)

Hyenas' reliance on human-modified landscapes and their fluctuating distribution. The Zoological Survey of India (2024) states that striped hyenas occur in a broad and fragmented range. It notes their distribution extends from Gujarat and Rajasthan in the west-to-West Bengal in the east, and from the Nilgiri Hills in the south and the foothills of the Himalayas in the north. Occupancy in the Aravalli range (Haryana) is 68% (Habib *et al.,* 2017), and populations can be documented in Himachal Pradesh, Delhi, and Uttarakhand (Harihar *et al.,* 2010; Joshi, 2016; Maurya *et al.,* 2018). Significantly, detailed analyses substantiate that this review confirms the widespread distribution of the striped hyena across Rajasthan, with a consistent presence documented within and surrounding key protected areas including the Mukundara Hills Tiger Reserve, Ranthambhore Tiger Reserve, Kumbhalgarh Wildlife Sanctuary, Esrana Forest Range, Sariska Tiger Reserve, and Sawai Mansingh Wildlife Sanctuary, extending into their buffer zones (Gupta, *et al*., 2009; Singh, *et al.,* 2010; Singh, *et al.,* 2014; Panda, *et al.,* 2022;

Latafat, *et al.*, 2023; Das, 2023). They have been documented in Rajaji, Suhelwa, and Valmiki tiger reserves, with considerable overlap with livestock-rich landscapes. The hyena population and distribution are growing in Central India (Qureshi *et al.,* 2023). The last record of hyenas in Dudhwa was in 2010 (Jhala *et al.,* 2011), with no subsequent sightings. The hyena presence was observed near Corbett Tiger Reserve in 2018, but not in the tiger population estimates of 2022 (Qureshi *et al.,* 2023). Evidence of sympatry and coexistence with feral dogs in Sitanadi illustrates the interactions with feral dogs (Chaudhuri *et al.,* 2024). There is widespread distribution of their population throughout Gujarat and Maharashtra. Kachchh and North Gujarat are highly dependent on human-generated waste and livestock (Gajera *et al.,* 2009; Singh *et al.,* 2010). While a relatively uniform distribution of striped hyenas within Gir National Park and Sanctuary, with density variations linked to vegetation zones (Alam *et al.,* 2015b), a recent study in the human-dominated landscape of Vansda taluka, South Gujarat, reported low relative abundance and restricted distribution (Dahya *et al.*, 2023). In Pune, striped hyenas may not be independent of livestock, and their presence is influenced by livestock availability (Majgaonkar *et al.,* 2019; Gandhe *et al.,* 2021).

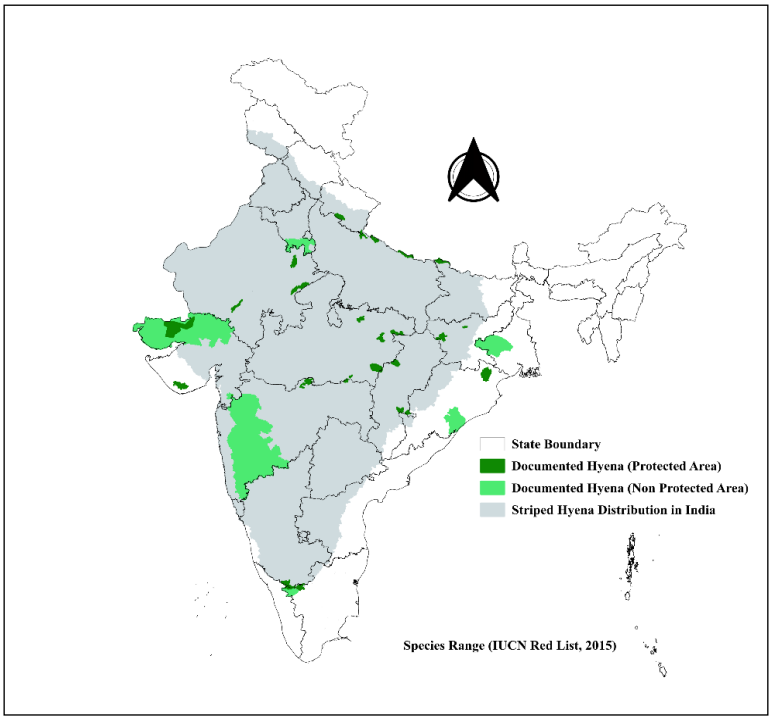

Figure 1. Map of striped hyena distribution across Indian states.

Overall, Striped Hyenas are known to tolerate human habitation, occurring in human-dominated landscapes in western India (Singh *et al.,* 2010). Reports are sparse for Jharkhand, Odisha, and West Bengal populations. West Bengal, particularly, has lost habitat (Akash *et al.,* 2021), with hyena populations now confined to fragmented remaining semi-arid habitats in West Bengal's Terai research area. Despite an estimated 5,867 km² of suitable habitat for Striped Hyaenas in West Bengal's semi-arid wildlands, their actual distribution and status remain unknown (Mukherjee *et al.,* 2021). Striped hyenas inhabit fragmented dry forests in Tamil Nadu and Karnataka. Their distribution spans approximately 3,100 km^2 (Qureshi *et al.,* 2023). Mainly, Presence has been verified in Nilgiri, Bandipur, and Sathyamangalam reserves; however, an absence of records south of the Palghat gap and marginal occupancy in fragmented forests highlight their reliance on human-modified capacities of habitat use and their moderation in fluctuations of distribution. (Kumara *et al.,* 2023; Ashish *et al.,* 2022). The striped hyena has been found to have a flexible diet. Studies of scat from striped hyenas in Gujarat and Rajasthan indicated that much of their diet consisted of domestic livestock (especially cattle, followed by goats and dogs) and carnivore remains (Chakraborty, 2006; Gajera *et al.,* 2009). Mandal et al. (2018) have documented that in terms of biomass, striped hyenas were 56% dependent on large mammals, and the remainder consisted of rodents, reptiles, and plant matter. In Odisha, striped hyena consumption of Olive Ridley turtle eggs has been documented (Karnad, 2017), indicating some dietary flexibility. Alam and Khan (2015a) found that wild prey composed 63.9% of striped hyenas' diets in Gir, with some important seasonal constancy in terms of dietary composition. Boppana (2013) found a highly varied hyena diet from 1460 scat and 466 regurgitated samples, reflecting opportunistic foraging. Beyond plant matter, their diet included garbage/refuse and 21 vertebrate species (19 mammals), indicating adaptability to human-modified landscapes and high local faunal diversity.

Table 2. Summary of Scat Analysis and Habitat Associations from Key Regions in India.

Region	Number of Scats	Number of Pray items in Scats	Habitat	Source
Kutch (Abdasa)	86	6	Scrub and grassland habitats	Chakraborty (2006)
North Gujarat	-	12*	Saline Desert, Mixed Habitat, and Dry Forest	Gajera et al., (2009)
Sariska Tiger Reserve	86	9	scrub forest and mixed forest	Chourasia (2012)
Kutch	1460	32	Desert thorn forest, scrub, and grassland habitats	Boppana (2013)
Gir National Park	82	16*	dry deciduous forest, dry teak forests	Alam et al. (2015a)
Odisha (Rushikulya)	Opportunistic (First recorded observation)	-	The Casuarina plantation on the beach at Rushikulya River mouth	Karnad (2017)
Sariska Tiger Reserve	303	23	scrub forest and mixed forest	Mandal et al. (2018)
Maharashtra (Pune)	-	-	primarily semiarid human-dominated landscapes	Majgaonkar et al. (2019)
Anthropogenic landscape, Rajasthan	127	21	scrublands, grasslands, riverine areas, and agricultural lands	Panda et al. (2023a; 2023b)

*Direct data not mentioned by the Author

Recent studies have confirmed that striped hyenas also have an important ecological role in removing waste. In Rajasthan, striped hyenas have been shown to remove, on average, about 23.13 tons of livestock waste from the environment annually, which provides a benefit to livestock between $ USD 7,095 and $49,665 depending on the method of cremation (Panda *et al.,* 2023a). However, living so close to human settlements also poses additional risk for conflict with domestic animals, especially if livestock are regularly predated. Engaging communities is an important step in addressing these conflicts.

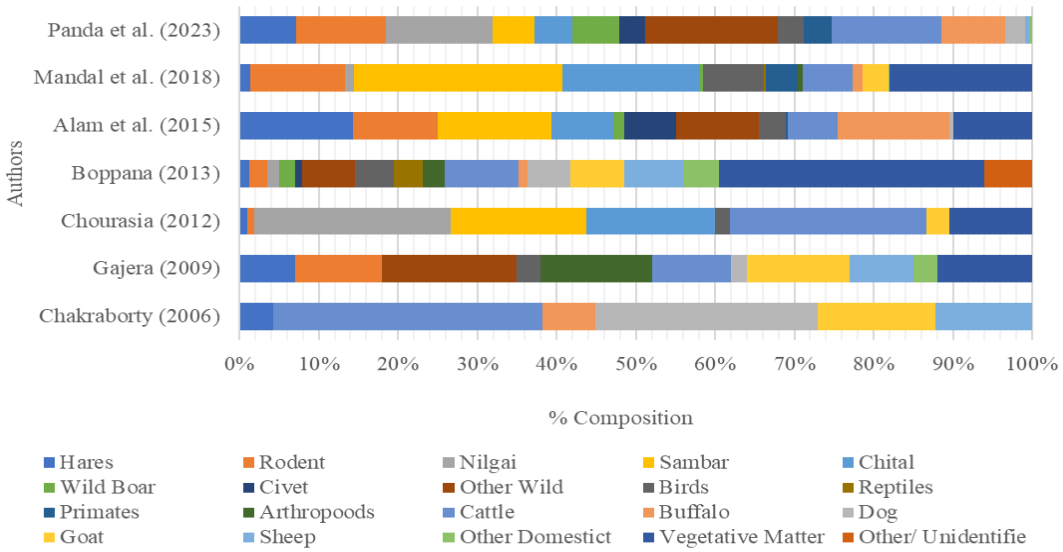

Figure 2. Chart illustrating the relative frequency of prey items in hyena diets by region. Hedgehog, and Badger. Primates included were the Langur, Rhesus macaque, and Birds, mainly Peafowl (Pavo cristatus) were the majorly in the diet. Other Domestic Livestock included were Camel and cat, and Vegetative matters such as Zizyphus spp., grass, Cutiba, Prosopis spp., musk melon (Cumis melo), water melon (Citrullus lanatus), and groundnut.

CONCLUSION

Despite its adaptive diet, the striped hyena faces increasing pressure from habitat fragmentation and human-wildlife conflict. Its patchy distribution, dependence on anthropogenic resources in its diet, and limitations on ecological study make conservation action even more important. We call for more research and effective conservation strategies that include systematic population estimates of striped hyenas, enhancing conflict mediation, and working toward coexistence in anthropogenically altered landscapes.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest

ETHICS APPROVAL

Not applicable

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AI TOOL DECLARATION

The authors declares that no AI and related tools are used to write the scientific content of this manuscript.

DATA AVAILABILITY

Data will be available on request

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