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HABITAT DEGRADATION OF BENGAL FOX (*Vulpes bengalensis*) DUE TO ANTHROPOGENIC ACTIVITIES IN THE UNIVERSITY OF KOTA, KOTA, RAJASTHAN

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Abstract

The Bengal fox (Vulpes bengalensis) is a threatened species found in variety of habitats across South Asia. However recent sightings of Bengal fox in campus of University of Kota raise concern regarding impacts of anthropogenic activities on their behaviour and habitat use. This is the overview of the observed interactions between Bengal foxes and humans in university settings, focusing of their distinct behaviours. Field observations conducted in university campus revealed instances of Bengal foxes feeding on groundnuts and food waste. Additionally, Bengal foxes exhibits signs of fear or avoidance towards humans, possibly due to past encounters or disturbances caused by human activities. In conclusion, presence of Bengal foxes in university campus highlights the complex interaction between wildlife and human activities. Understanding the dynamics of human-wildlife interactions in urban environments is crucial for promoting coexistence, minimizing conflicts and conserving the biodiversity of native species.

INTRODUCTION

The Bengal fox (*Vulpes bengalensis*), also known as the Indian fox or the Indian desert fox, is a small-sized carnivorous mammal native to the Indian subcontinent (Vanak & Gompper, 2007). This species thrives in diverse habitats, including arid and semi-arid regions, grasslands, and scrub forests (Home & Jhala, 2009). The mother fox, also known as a vixen. The bond between the vixen and her kits is a strong and nurturing one, as she teaches them essential skills such as hunting, grooming, and social behaviors. The den site serves as a central hub for the fox family, where they can bond, play, and learn from each other (Ralls et al., 2001).

The Bengal fox is recognized for its distinctive appearance, characterized by reddish-brown fur with a whitish underbelly, long slender legs, and a bushy tail (Das et al., 2022). It exhibits a secretive and primarily nocturnal lifestyle, emerging from their dens at dusk to forage for food. (Johnsingh, 1978; Vanak, 2003; Gompper & Vanak, 2006). Their diet primarily consists of small mammals, insects, birds, reptiles, and fruits. (Vanak & Gompper 2009) (Garg & Jaipal, 2019) Den ecology of Indian fox by classifying den structures into three distinct types: 1. Simple short den 2. Complex den 3. Den under the rock, based on structural complexity and preferences. (Johnsingh, 1978; Vanak, 2003; Gompper & Vanak, 2006). Indian Foxes are known for their burrowing behavior and often create dens underground or within secluded areas to raise their offspring. These dens provide a safe and sheltered space for the fox family to rest, nurse their young, and seek protection from predators (Vanak & Gompper, 2010).

The Bengal fox (*Vulpes bengalensis*) is a Least Concern (IUCN) and Schedule II Species under the (Wildlife Protection Act) WPA, 1972, that is highly susceptible to habitat degradation caused by anthropogenic activities (Johnsingh & Jhala 2007). This research focuses on assessing the habitat degradation of Bengal foxes in the University of Kota, located in Kota, Rajasthan. The study highlights the various factors contributing to habitat degradation, including urbanization, construction, deforestation, pollution, and human disturbance. The goal of this research is to bring attention to the urgent need for conservation measures to mitigate habitat degradation and ensure the long-term survival of Bengal fox populations in and around the study area.

Within the study area, the Bengal fox plays a vital role in maintaining ecosystem balance and biodiversity. Understanding the specific threats and challenges faced by the Bengal fox population in the University of Kota area is crucial for implementing effective

conservation strategies. Research and monitoring initiatives can help assess the population status, habitat requirements, and behavioural patterns of the Bengal fox, providing valuable insights into their response to urbanization and human activities.
Thus, studying the Bengal fox in the University of Kota area contributes to our understanding of the ecological dynamics of urban environments and the need for sustainable wildlife management practices. By conducting research and raising awareness about the importance of conserving this unique species, efforts can be made to protect the habitat and ensure the long-term survival of the Bengal fox population in the University of Kota, Rajasthan.

(Photo Courtesy: Utkrisht Raj Singh)

Image1. Images A, B, C and D illustrate the nocturnal activity pattern of a fox, showcasing the animal's adaptability to low-light conditions as it moves stealthily through the darkness. The image captures the fox in action, highlighting its agility and keen senses as it navigates its nighttime environment.

STUDY AREA

The University of Kota is a renowned educational institution located in Kota, Rajasthan. A major city in the south-eastern part of Rajasthan, India. Kota is situated on the eastern bank of the Chambal River. The university campus spans over a sizable area and is surrounded by diverse ecosystems.

Topography:
The topography in and around the University of Kota is predominantly flat, with occasional undulating terrains. The presence of the Chambal River contributes to the formation of fertile floodplains along its banks. The region is also known for its rocky outcrops and hillocks, providing diverse habitats for various plant and animal species.

Vegetation and Biodiversity:
The region falls within the Thar Desert ecozone, featuring arid and semi-arid vegetation types. Thorny scrub forests, grasslands, and riverine vegetation are commonly found in this area, providing habitats for a wide range of plant and animal species. (Kumara & Singh, 2012)

(Photo Courtesy: Utkrisht Raj Singh)

Image 2. The images A, B, C, and D depict the actual habitats utilized by the Indian fox within the University of Kota campus. These habitats, as observed in the images, include bushes, open areas, and secluded corners where the foxes seek shelter and safety.

Map 1. The map indicates the movement occurrence of the Indian fox in the University of Kota campus at night. Within the specified areas A, B, C, and D.

METHODOLOGY

A. Survey Methods:

1. **Daytime Surveys:** Conduct visual surveys during daytime hours using systematic transect walks or vehicle-based surveys (Buckland et al., 2001). Record fox sightings and habitat characteristics, noting the time of observation.
2. **Night-time Surveys:** Conduct night-time surveys primarily during the evening hours, from 7 to 9 pm, when fox activity is expected to peak (Fournier & Krementz, 2017), covering key habitats and known fox territories.

Utilize spotlighting techniques from vehicles or on foot along predefined transects or within designated study areas.
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Record fox sightings using GPS coordinates and document habitat features to understand nighttime activity patterns.
Pay special attention to areas with dense vegetation, open fields, and edges of wooded areas where foxes are likely to forage or hunt.

B. Camera Settings: Set the camera (DSLR 1200D) to a high-resolution mode to capture detailed images. Adjust the ISO and exposure settings for optimal performance in low-light conditions.

C. Torchlight Usage: Use the torchlight to scan the area for reflective eyes or movement, which may indicate the presence of foxes. Employ a sweeping motion with the torchlight to cover a wide area and increase the chances of detection.

D. Photographic Documentation: When a potential fox sighting is detected, focus the camera on the subject and capture multiple photographs from different angles. Ensure the flash settings are appropriate to illuminate the subject without causing disturbance.

E. Recording Observations: Take notes on the location, time, weather conditions, and any relevant behavioural observations associated with the fox sighting. Document the presence of other wildlife or environmental factors that may influence fox activity.

F. Data Management: Transfer the captured photographs and observational notes to a computer for analysis and documentation. Organize the data chronologically or geospatially to facilitate further research or reporting.

OBSERVATION:

Sightings: The Bengal fox was mostly seen during evening hours, from 18:30pm to 20:30pm, as it searched for food and water and exhibited various other behaviours within the University campus. Activities such as parental care, feeding, foraging, maintenance, vigilance, social interaction and interspecific behaviour were all observed during this time period. Our observations were limited to evening surveys. The red wattle lapwing's loud and distinctive call was a helpful tool in alerting us to the presence of a fox in the surrounding. We are grateful for the assistance of the red wattle lapwings in helping us tracking down the fox.
One notable behaviour observed in Indian fox is their propensity to change dens when disturbed. (Home and Jhala, 2010).

Image3. Images A, B, C, and D capture the den site of a family of India fox. (Photo Courtesy: Utkrisht Raj Singh)

Urbanization and construction:
The expansion of the University of Kota has resulted in increased urbanization and construction activities. The conversion of natural habitats into built-up areas has led to the fragmentation and loss of suitable habitats for the Bengal fox.

Deforestation:
Deforestation is another critical factor contributing to habitat degradation of the Bengal fox in the University of Kota. The clearing of forests for infrastructure development, such as buildings and roads, has resulted in the loss of essential resources for these foxes, including shelter and prey. This section explores the consequences of deforestation on the Bengal fox population.

Pollution:

Anthropogenic activities associated with the university, including improper waste management and the release of pollutants, have led to environmental pollution. This pollution significantly impacts the Bengal fox population by contaminating their habitat, depleting prey species, and affecting their overall well-being.

Human presence and anthropogenic activities:

This University is located an area influenced by anthropogenic activities. There is significant urbanization and infrastructural development in Kota, including residential areas, commercial centres, and educational institutions. Fox found in university campus were seen afraid of humans as some locals use to chase them, which disrupt their natural behaviour, trigger stress responses, and impact their overall wellbeing.

Human activities have altered their natural habitat. Food waste thrown by locals in the campus are the easy source of food for foxes. They were seen feeding on groundnuts and trying to open the polythene bag filled with food waste. This opportunistic feeding behaviour suggests that foxes are adapting to urban environment. However, such interactions may lead to concern about potential conflicts with humans, altered foraging preference and habituation.

(Photo Courtesy: Utkrisht Raj Singh)

Image 4. Images A, B, C, and D depict the ongoing construction work taking place within the University of Kota campus. Activities such as, building new structures and other infrastructure developments, can be a significant cause of habitat loss for Indian fox.

Wildlife conflicts:

The encounter between the Bengal Fox and the Spectacled cobra (*Naja naja*) highlights the intense wildlife conflict that can arise in their natural habitats. The fox's vigilant behaviour and quick reflexes are key in navigating a danger of facing off against a venomous snake. The cobra's defensive display of raising its hood is a clear warning sign to the fox and fox's response of staring and remaining alert demonstrates its respect for the potential threat posed by the snake. The ability of Bengal fox to assess and response to threat in its environment is crucial for its survival. This observation highlights the constant challenges and risks that wildlife must navigate to coexist in their shared habitats.

Another observation was of the Bengal fox chasing a hare during the dark hours. Bengal fox being a carnivore often hunt small mammals like hare for food. The chase witnessed in university campus demonstrates the opportunistic behaviour of the fox, as it seeks out prey for sustenance. Predators like Bengal fox play a crucial role in maintaining ecological balance by controlling prey population. While the chase may seem intense and predatory, it is a natural behaviour for the fox as it relies on hunting for survival.

Image 5. The image depicts a tense conflict between an Indian fox (Vulpes bengalensis) and an Indian cobra (Naja naja) as they face off against each other, showcasing the intense potential danger present in their confrontation. (Photo Courtesy: Utkrisht Raj Singh)

CONCLUSION

The foxes are likely using these areas for den building, feeding and foraging for food sources such as small rodents, and fruits. The presence of such varied habitats within the campus indicates the adaptability of the Indian fox to urban environments and its ability to find suitable shelter and resources within a human-populated area. These images provide valuable information on the specific habitats preferred by the foxes in UoK, aiding in conservation efforts and wildlife management within the campus.

The habitat degradation of Bengal foxes due to anthropogenic activities in the University of Kota is a pressing issue that requires urgent attention. It is essential to raise awareness about the importance of conserving natural habitats and implementing effective conservation measures to mitigate the impacts of anthropogenic activities. By doing so, we can conserve the fragile ecosystem and secure the long-term survival of the Bengal fox population in Kota, Rajasthan.

Habitat restoration initiatives are imperative to restore the degraded areas within the university campus and establish green spaces. Providing suitable vegetation cover and prey availability through habitat restoration can support the survival and breeding success of the Bengal fox population.

Stricter regulations and enforcement mechanisms are crucial to control anthropogenic activities that directly impact the fox's habitats. Collaborating with relevant stakeholders, such as local government authorities, wildlife conservation organizations, and research institutions, can strengthen conservation efforts and ensure effective implementation of regulations. Sustained efforts in conserving the Bengal fox's habitats will not only protect this vulnerable species but also contribute to the overall biodiversity conservation in the region.

DISCUSSION

Our analysis revealed significant correlations between habitat conditions, terrain features, and den preparation strategies employed by fox during periods.

Urban expansion and infrastructure development have significantly encroached upon the natural habitats of the Bengal fox in the University of Kota. As the university campus expands and urban areas develop, the natural territories of these elusive creatures are being encroached upon, leading to loss of suitable habitats and displacement of the foxes. (Kumara and Singh 2012) This habitat fragmentation further isolates their populations, hindering gene flow and increasing the risk of their local extinction.

To address the habitat degradation of the Bengal fox in the University of Kota, it is crucial to recognize the importance of conservation efforts and implement measures to mitigate the anthropogenic impacts on their habitats. This can be achieved through a combination of awareness campaigns, habitat restoration initiatives, and stricter enforcement of regulations to control anthropogenic activities. Engaging students, faculty members, and local communities through educational programs, workshops, and outreach initiatives can foster empathy and encourage responsible behaviour towards the conservation of these species.

Support and promote research projects that focus on studying the habitat requirements, behaviour, and population dynamics of the Bengal fox in the University of Kota. Regular monitoring of the fox population and their habitat will provide valuable insights into their conservation needs and help guide future management strategies. By implementing these suggestions, the University of Kota can contribute to the protection and conservation of the Bengal fox and its habitat, ensuring the long-term survival of this species in the region.

REFERENCE

Buckland, ST, Anderson, DR, Burnham, KP, Laake, JL, Borchers, DL & Thomas, L (2001) Introduction to distance sampling: Estimating abundance of biological populations, New York, USA., Oxford University Press.

Das, U. P., Acharya, A., & Palei, H. S. (2022). The diet of Indian foxes in a peri-urban area of eastern India. Acta Ecologica Sinica, 42(6), 679–683.

Fournier, A. M. V., & Krementz, D. G. (2017). Nocturnal distance sampling all-terrain vehicle surveys for nonbreeding rails. Wildlife Society Bulletin, 41(1), 151–156.

Garg, N., & Jaipal, B. R. (2019). Food Compositions of the Indian Fox (Vulpes Bengalensis) In the Desert Region of Rajasthan, India. The Scientific Temper, 11(1 & 2).

Gompper, M.E. & Vanak, A.T. (2006). Vulpes Bengalensis. Mammalian Species, 795, 1–5.

Home, C. And Jhala, Y. V. (2010). Estimating Breeding Pair Densities of The Indian Fox in Kutch, Gujarat, India. Canid News, 13(2):1-6.

Home, C., & Jhala, Y. V. (2009), September. Food Habits of the Indian Fox (Vulpes Bengalensis) In Kutch, Gujarat, India. Mammalian Biology, 74(5), 403–411.

Johnsingh, A. J. T. (1978). Some Aspects of the Ecology and Behavior of The Indian Fox Vulpes Bengalensis Shaw. J. Bombay Natural History Society, 75: 397-405.

Johnsingh, A.J.T. & Y.V. Jhala (2004). Indian Fox (Vulpes bengalensis), Pp. 219-22. In: Sillero-Zubiri, M.H.C. & D.W. Macdonald (Eds.). Canids: Foxes, Wolves, Jackals and Dogs: Status Survey and Conservation. Iucn/Ssc, gland, Switzerland.

Johnsingh, A.J.T. & Y.V. Jhala (2007). Vulpes Bengalensis. In: Iucn 2010. 2010 Iucn Red List of Threatened Species <Www.Iucnredlist.Org>.

Kilgore, D. L. (1969). An Ecological Study of the Swift Fox (Vulpes velox) In the Oklahoma Panhandle. The Ame Mid Nat, 81:512-534.

Kumara, H., & Singh, M. (2012). Distribution, Den Characteristics and Diet of the Indian Fox Vulpes Bengalensis (Mammalia: Canidae) In Karnataka, India: Preliminary Observations. Journal Of Threatened Taxa, 04(14), 3349–3354.

Manakadan, R. & Rahmani, A. R. (2000). Population And Ecology of the Indian Fox Vulpes Bengalensis at Rollapadu Wildlife Sanctuary, Andhra Pradesh, India, J. Bombay Natural History Society, 97: 3-14.

Ralls, K., Pilgrim, K. L., White, P. J., Paxinos, E. E., Schwartz, M. K., & Fleischer, R. C. (2001). Kinship, Social Relationships, and Den sharing in kit foxes. Journal of Mammalogy, 82(3), 858.

Vanak, A. & Gompper, M. (2009) Dietary Niche Separation Between Sympatric Free-ranging Domestic Dogs and Indian Foxes in Central India. Journal Of Mammalogy, 90, 1058–1065.

Vanak, A. T. (2003). Preliminary Survey of Indian Fox Vulpes Bengalensis Distribution in Southern India. Wildlife Conservation Society – India Program, Bangalore, India.

Vanak, A. T., & Gompper, M. E. (2007). Effectiveness of non-invasive techniques for surveying activity and habitat use of the Indian fox Vulpes bengalensis in southern India. Wildlife Biology, 13(2), 219–224.

Vanak, A. T., & Gompper, M. E. (2010). Multi-scale resource selection and spatial ecology of the Indian fox in a human-dominated dry grassland ecosystem. Journal of Zoology, 281(2), 140–148.