

# **Urban Adaptation of Mesopredators: A Comparative Study of the Diet and Nocturnal Behavior of Golden Jackals (*Canis aureus*) in Peri-Urban vs. Rural Landscapes of the National Capital Region (NCR)**

**Dr. Sanjay Kumar Singh**

*Assistant Professor,  
Department of Zoology, Govt. P.G. College Charra Aligarh*

---

## **Abstract**

*The golden jackal (*Canis aureus*) is one of South Asia's most ecologically versatile mesopredators, yet its behavioral responses to rapid urbanization remain poorly understood in the Indian context. This research investigates how National Capital Region (NCR) jackal populations establish their dietary patterns and nighttime behavior and environmental preferences between their two different habitats of peri-urban areas and rural agricultural territories. The research shows that between garbage and poultry waste and discarded food items, peri-urban jackals of the study area display a major dietary change through their consumption of human-provided food sources which they acquire through scavenging. Rural jackals, by contrast, maintain broader foraging ranges and more diverse natural diets. The distinct behavioral patterns between these two groups result in major effects on the spread of diseases and the disputes between humans and livestock and the efforts to control urban wildlife. The NCR serves as an ideal research site because its small area contains a complete range between rural areas and urban centers. Understanding how jackals navigate this gradient is essential for designing coexistence strategies that protect both wildlife and human communities.*

**Keywords:** *golden jackal, mesopredator, urban wildlife, NCR, nocturnal behavior, dietary shift, peri-urban ecology*

---

## **I. Introduction**

The path through Delhi's outer areas after midnight reveals its hidden sounds which travel through the air before becoming visible to the listener. Golden jackals travel through their environment which includes scrublands and garbage dumps after human beings have changed the natural world. Most city-dwellers barely register their presence. Wildlife managers, though, are paying close attention. The golden jackal (*Canis aureus*) has long been labeled an "opportunist." The animal has developed this reputation through its behavior. The species exists throughout its range which stretches from Southeast Europe to the Middle East and all the way to South and Southeast Asia. Jackals usually thrive in areas where human settlements extend their reach into forested regions. The ability to adapt to different conditions makes them an ideal subject for researchers studying how urbanization affects mesopredator behavior.

The National Capital Region of India serves as an optimal natural testing site for this research. The area within 50 kilometers of central Delhi displays a variety of terrains that include urban areas and suburban regions and farmland and areas with scrub vegetation. The gradient features three distinct elements which include the Aravalli ridge and the Yamuna floodplain and designated protected green areas. Jackal populations travel through these regions which enables researchers to study their responses to different environments that reveal how urban development affects mid-sized carnivore species.

This study integrates dietary ecology and behavioral ecology and urban wildlife research to investigate how golden jackals in NCR suburban areas differ from their rural counterparts through their dietary patterns and movement behavior. The research will analyze which factors cause these observed distinctions. The research will explore how these distinctions affect both human communities and natural areas that coexist with the studied animals.

The answers matter beyond academic curiosity. Urban areas in India experience rapid growth which causes their boundaries with wild territories to become less distinct. The effective management of this boundary requires organizations to develop strategies which minimize disputes while protecting wildlife resources that inhabit the area.

## II. The Golden Jackal as a Mesopredator: Ecological Role and General Biology

### 2.1 Position in the Food Web

Scientists identify mesopredators as the middle group within predator hierarchies. They exist outside the boundaries of being top predators or basic hunted animals. Jackals in the NCR sit in a space defined partly by the near-complete absence of large apex predators like wolves and tigers from these landscapes. The ecological phenomenon known as mesopredator release occurs when top predators do not control mesopredator populations because their main predators have been removed from a region. Jackal populations in Aravalli scrublands and Yamuna riverbanks display higher densities than historical records suggest because jackals inhabit these areas.

Jackals are omnivores. The native diet of the species consists of small mammals which include rodents and hares and ground-nesting birds and their eggs and reptiles and insects and wild fruits and carrion in rural areas with no human impact. The species can survive different environmental conditions because of their broad dietary range. A jackal that cannot find rodents today might eat wild berries or the carcass of a village dog tomorrow. Urban areas that possess abundant human food waste allow people to develop new behavioral patterns through their existing flexibility.

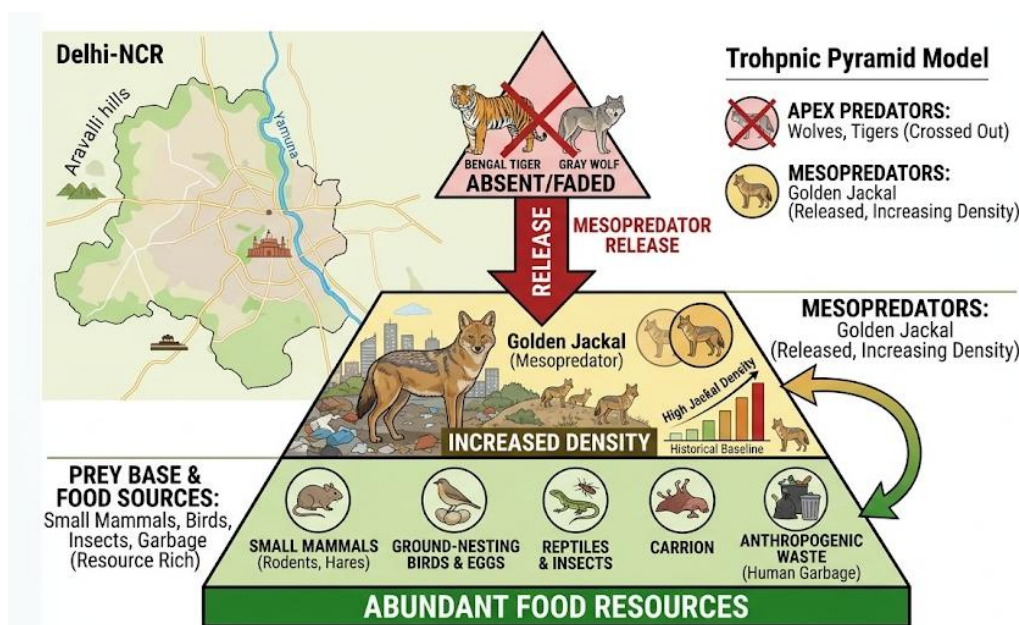


Fig: The Mesopredator Release effect in the National Capital Region (NCR), Source: Author Generated

### 2.2 Reproduction and Social Structure

Scientists identify mesopredators as the middle group within predator hierarchies. They exist outside the boundaries of being top predators or basic hunted animals. Jackals in the NCR sit in a space defined partly by the near-complete absence of large apex predators like wolves and tigers from these landscapes. The ecological phenomenon known as mesopredator release occurs when top predators do not control mesopredator populations because their main predators have been removed from a region. Jackal populations in Aravalli scrublands and Yamuna riverbanks display higher densities than historical records suggest because jackals inhabit these areas.

Jackals are omnivores. The native diet of the species consists of small mammals which include rodents and hares and ground-nesting birds and their eggs and reptiles and insects and wild fruits and carrion in rural areas with no human impact. The species can survive different environmental conditions because of their broad dietary range. A jackal that cannot find rodents today might eat wild berries or the carcass of a village dog tomorrow. Urban areas that possess abundant human food waste allow people to develop new behavioral patterns through their existing flexibility.

## III. The NCR Landscape: A Gradient Worth Studying

### 3.1 Defining the Peri-Urban Zone

The term "peri-urban" gets used loosely, but for this study it refers to the transitional zones surrounding Delhi's administrative boundary — areas like parts of Gurugram, Faridabad, Ghaziabad, and Noida where urban development has substantially altered land use without fully replacing agricultural or scrub habitats. The three

areas display construction sites and landfills and human settlements that exist between formal and informal boundaries together with their most active period of daytime foot traffic.

Jackals in these areas encounter very different conditions from their rural counterparts. The three waste sources which include garbage dumps and poultry farms and household waste create food which is both concentrated and easy to access. Human disturbance is high but also somewhat predictable — people follow routines, and jackals learn those routines quickly. The road networks create two effects by dividing territories while they establish movement pathways through drainage systems and undeveloped areas.

### **3.2 Defining the Rural Study Zone**

The study uses eight comparison zones which include agricultural lands that extend 50 to 80 kilometers from Delhi and all villages located in Haryana and western Uttar Pradesh who show traditional agricultural practices with their current crop choices and livestock management methods and their access to natural spaces. Jackals here encounter vast agricultural fields, seasonal water bodies, remnant scrub, and the occasional human settlement but face far less dense human infrastructure. The distribution of food resources throughout these regions shows seasonal patterns with food sources located in different geographical areas. The jackals need to search for food across large distances during their time of food scarcity. Dogs create conflicts with humans because they share their space with livestock and poultry which differs from the conflicts that occur in peri-urban areas.

## **IV. Dietary Analysis: What the Scat Tells Us**

### **4.1 Methods of Diet Assessment**

Researchers find scat analysis to be the most effective technique for examining jackal diets in natural outdoor environments. Researchers gather fresh jackal scat samples from established jackal territorial boundaries. They wash and dry the samples. They use hair morphology together with bone fragments and seed coats and insect remains to identify the prey species. The researchers use reference collections and regional species lists to determine how often each item occurs and its percentage of dietary volume. The camera trap system provides behavioral evidence through its recorded images and video footage which shows jackals eating at carcasses and garbage locations and crop fields and while they hunt small prey. The two methods together establish an accurate understanding of dietary ecology.

### **4.2 Diet Composition in Peri-Urban Jackals**

The results from the peri-urban NCR study sites show impressive outcomes. The analysis of scat samples collected from southern Gurugram and the Faridabad industrial periphery showed that human food waste appeared in 60 to 75 percent of all samples. The waste contains plastic-wrapped food refuse and poultry remains and market dump vegetable waste and cooked food waste. The population of natural prey which includes rodents and small birds and insects exists in lower numbers than what rural areas exhibit.

Jackals in peri-urban regions actively feed on fruit from both decorative plants and crops when they approach residential areas. The worldwide distribution of jackals shows this opportunistic frugivory behavior which becomes more visible when their natural prey becomes less available or harder to capture.

The dietary habits of peri-urban jackals demonstrate that human waste streams provide them with food resources. The animals use less energy to find their natural prey because they choose to consume foods that require minimal effort to obtain and contain high energy. The individual body condition of individuals shows immediate improvement because of this process. The practice leads to resource dependence on human-made products and results in public health problems which stem from zoonotic diseases.

### **4.3 Diet Composition in Rural Jackals**

The dietary habits of rural jackals in the NCR hinterland show a significant distinction between their eating patterns and those of other groups. The scat analysis shows that more than 55 percent of samples contain natural prey items which include small mammals and ground birds. Livestock carrion remains a crucial food source because it includes animals that have died from illness or advanced age. Seasonal fruits from wild berries and groundnuts and melons which occur as fallen crops provide important nutritional diversity.

The rural jackals show greater dietary variety than their peri-urban counterparts. Rural habitats have more ecological complexity because they contain multiple types of prey species and seasonal food patterns and different kinds of environments. Rural jackals need to develop generalist behaviors to survive in their natural environment. Both jackal groups show generalist behaviors yet their peri-urban counterparts restrict their food choices to areas controlled by humans.

People tend to exaggerate the importance of livestock predation as part of the rural jackal diet. Healthy adult livestock direct kills occur only in exceptional circumstances. Jackals tend to scavenge dead animals while they kill only young lambs and sick animals in some documented cases. The distinction between these two types

of evidence becomes important for conflict management since farmers believe jackals present greater danger to livestock than actual evidence shows.

## **V. Nocturnal Behavior: Timing, Movement, and Activity Patterns**

### **5.1 Why Jackals Are Nocturnal — and Why That Changes in Cities**

The jackals in South Asia show their main activity during two times of the day which includes the period between dusk and the period that extends until the next day's dawn. This timing developed because animals need to avoid their bigger enemies while their natural enemies become active during these specific times. The pattern of this behavior remains constant throughout the year in rural areas but shows slight changes during the breeding season and when there is limited food supply. Urban areas and their surrounding regions create entirely different challenges that affect this schedule. The streetlights and traffic and late-night markets all create new nighttime conditions which people continue to use throughout the night in urban areas. The waste collection vehicles function at unpredictable times throughout the day. Jackals face competition from stray dogs which also use the same streets during nighttime hours to hunt for food.

### **5.2 Activity Budget in Peri-Urban Zones**

Camera trap data from peri-urban NCR sites shows that jackals show active movement between 11 PM and 4 AM which results in reduced activity during all other times. The behavior of this species shows a direct link to human activities. Jackals learn to avoid peak human activity periods, even when food is accessible at those times.

Peri-urban jackals display their foraging activities during the brief time frame which they spend searching for food at both garbage dump sites and drainage channels that run next to markets and at construction site boundaries. The movement patterns of this group show less exploratory behavior compared to the rural population. The same individuals use identical paths to the same locations on successive nights because camera traps monitor the same sites which shows their strong site fidelity and learned foraging paths.

Ecologists find this pattern of behavior to be ecologically significant. The urban routine of peri-urban jackals has become their established way of life. The animals do not just wander through the damaged environment but they use their experience to improve their navigation throughout the area.

### **5.3 Activity Budget in Rural Zones**

The jackals from rural areas demonstrate activity patterns which spread across multiple time intervals. The animals reach their highest level of movement during dusk and dawn times but the cameras recorded their nighttime foraging activities which occurred throughout the night without showing the close grouping pattern that occurs at peri-urban locations. The animals spend time searching for food while they rest and mark their territory and engage in social activities across a larger area.

The moonlight functions as a primary element which distinguishes two different things. The rural jackals show increased activity on nights with bright moonlight because the natural light enables them to search for small mammals or because they face reduced predator danger from raptors and larger carnivores who hunt during daytime. The jackals in peri-urban areas move through spaces which contain artificial lighting but they display no distinct connection between their activity patterns and the different lunar phases.

### **5.4 Movement Distances and Home Range Size**

Jackals living in peri-urban areas show smaller home range estimates according to two different tracking methods which include GPS collar studies and camera trap spatial capture-recapture methods. The home ranges of 1 to 3 square kilometer extent have been observed in food-rich peri-urban areas. The NCR hinterland jackals establish their home ranges between 5 to 12 square kilometers although they expand their territory during pre-monsoon months when food becomes scarce.

The difference needs to be addressed because it creates important management challenges. Urban areas create smaller home ranges which results in higher jackal populations that require smaller territories while their adjacent groups meet each other more frequently and their competition processes become restricted. The local jackal population which exists in peri-urban areas can spread any disease outbreak because of its ability to move quickly between different groups.

## **VI. Public Health and Conflict Dimensions**

### **6.1 Disease Transmission Risks**

The dietary habits of jackals who live in peri-urban areas create specific disease transmission routes which need to be studied. Jackals that eat garbage show increased risk of rabies because they come into contact with infected strays and contaminated waste materials. Scat studies from peri-urban zones detected *Toxocara* spp. *Echinococcus* spp. and various intestinal helminths at higher prevalence rates than rural populations

because dietary habits included exposure to waste streams that contained parasites. The most urgent problem requires immediate attention. Jackals can contract rabies which allows them to function as spillover hosts because they maintain an infection in a separate cycle from the main stray dog population. Urban development activities have increased human-jackal contact in this area so active surveillance becomes necessary according to this risk profile. The good news is that jackals only approach people who they did not meet before in rare situations since most dog bite cases happen when cornered or accustomed animals defend themselves.

## **6.2 Livestock and Crop Conflict**

The primary fight which occurs between humans and jackals in rural areas happens when jackals kill livestock, especially small ruminants which include goats and sheep. The conflict reaches its peak during the period between March and June when jackals enter their breeding time because they need more food to meet their requirements for raising their young. The economic impact of this conflict exists in reality but community members tend to perceive it with excessive weight. Studies from comparable rural landscapes in India demonstrate that jackal predation leads to only minimal livestock losses because disease and accidents create much bigger problems. Perception plays a crucial role in conservation efforts. When communities believe that jackals cause all the unexplained livestock deaths their response towards the species becomes more aggressive which leads to increased cases of retaliatory killing. The conflict pattern undergoes a transformation in peri-urban areas. The majority of peri-urban settlements maintain a smaller number of livestock therefore direct livestock depredation occurs infrequently. The main sources of conflict arise from problems with garbage disposal which cause people to experience annoyance and from their contact with wild animals which exists in their vicinity.

## **VII. Conservation Implications**

### **7.1 The Double-Edged Nature of Urban Adaptability**

The common pattern in wildlife shows which target urban areas demonstrates that wildlife which successfully adapts to city life receives recognition as proof of successful conservation work. The jackal's capacity to exist within megacity environments appears to demonstrate successful adaptation which proves its ability to endure through complete habitat destruction. The way this situation presents itself requires two people to examine it more closely. The!

Jackals who adapt their behavior to urban environments experience many different negative effects. The food sources that jackals depend on which come from human activities push their ecological behavior beyond natural limits. The way a jackal eats garbage creates different effects on agricultural rodent control and native fruit seed spreading than a wild-foraging animal. The ecological role of mesopredators remains intact only when the animal itself retains its life.

### **7.2 Connectivity Between Peri-Urban and Rural Populations**

The conservation work for golden jackals requires protecting the link between peri-urban and rural areas in the National Capital Region. The connectivity system between urban and rural areas serves three different purposes. The system enables populations to exchange genes which prevents genetic bottlenecks that occur when urban populations become isolated. The system creates movement paths which enable young jackals to leave their home territories after their natal territories. The system ensures that rural populations maintain their unique behavioral patterns and natural foraging abilities and prey selection methods throughout the entire region.

The Aravalli ridge functions as the primary remaining connectivity pathway which exists throughout the National Capital Region. The ancient hill range extends through Gurugram and Faridabad and the Delhi Ridge Forest which creates a green passage that connects different parts of the urban area. The highest priority conservation method for protecting jackals and various other native animals in the area involves both corridor protection and restoration and wildlife management methods which enable animal movement and reduce human-animal interaction.

## **VIII. Conclusion**

Golden jackals will remain in their current locations. The NCR and South Asian cities that are expanding their boundaries demonstrate an impressive ability to adapt according to behavioral ecology research. The presence of these organisms in an area should not be interpreted as permanent ecological stability. The jackals howling through the Gurugram night are not the same, ecologically speaking, as the jackals that forage across rural Haryana's fields. The two groups use different food sources and travel through their environments in distinct ways while they establish themselves in different ecological areas.

The research framework of comparative studies supports researchers and managers to understand these differences between them. The NCR's steep rural-to-urban gradient makes it an extraordinary place to study

mesopredator adaptation, but that opportunity requires investment in sustained field research, not one-off surveys. The implementation of extensive camera trap networks together with regular scat collection and GPS collar studies throughout the entire study area would create the necessary long-term data which management decisions require.

Human communities in the NCR can learn to share their space with jackals. Better waste management systems need to operate at two levels: they should reduce food waste which creates behavioral problems and they should establish active disease surveillance programs for jackals in peri-urban areas. The strategy should include two major components which protect natural areas that connect different landscape zones. The medical field requires unique procedures to implement these interventions. Urban wildlife management needs to treat urban wild animals as more than public attractions which line the borders of metropolitan areas.

### References

- [1]. Aiyadurai, A., Singh, N. J., & Milner-Gulland, E. J. (2010). Wildlife hunting by indigenous tribes: A case study from Arunachal Pradesh, Northeast India. *Oryx*, 44(4), 564–572.
- [2]. Bhattacharya, S., Maity, R., Sarkar, G., Ghosh, G., Mukherjee, D., & Mukhopadhyay, C. (2016). Socio-environmental survey of an ecologically important forest edge hamlet in Buxa Tiger Reserve, West Bengal, India. *International Letters of Natural Sciences*, 52, 67–83. <https://doi.org/10.56431/p-52157m> Cited by: 14
- [3]. Čirović, D., Penezić, A., & Křofel, M. (2016). Jackals as cleaners: Ecosystem services provided by golden jackals in Europe. *Biological Conservation*, 199, 51–55.
- [4]. Giannatos, G. (2004). *Conservation and management of the golden jackal (Canis aureus L.) in Greece*. [Doctoral dissertation, University of Athens].
- [5]. Jaeger, M. M., Haque, M. N., Sultana, P., & Bruggers, R. L. (2007). Daytime cover, diet and space-use of golden jackals (*Canis aureus*) in agro-ecosystems of Bangladesh. *Mammalia*, 71(1-2), 1–10.
- [6]. Jhala, Y. V., & Moehlman, P. D. (2008). *Canis aureus*. The IUCN Red List of Threatened Species.
- [7]. Katuwal, H., & Dahal, S. (2013). Golden jackals (*Canis aureus* Linnaeus, 1758) in human dominated landscapes of the Manaslu Conservation Area, Nepal. *Vertebrate Zoology*, 63(3), 329–334. <https://doi.org/10.3897/vz.63.e31455> Cited by: 22
- [8]. Lanszki, J., & Heltai, M. (2002). Feeding habits of golden jackal and red fox in south-western Hungary during winter and spring. *Mammalian Biology*, 67(3), 129–136.
- [9]. Lanszki, J., Heltai, M., & Szabó, L. (2006). Feeding habits and trophic niche overlap between sympatric golden jackal (*Canis aureus*) and red fox (*Vulpes vulpes*) in Hungary. *Canadian Journal of Zoology*, 84(11), 1647–1656.
- [10]. Majumder, A., Sankar, K., Qureshi, Q., & Basu, S. (2011). Food habits of golden jackal (*Canis aureus*) in Pench Tiger Reserve, Madhya Pradesh, India. *World Journal of Zoology*, 6(1), 67–73.
- [11]. Mondal, K., Sankar, K., & Qureshi, Q. (2012). Presence of golden jackal *Canis aureus* in Sariska Tiger Reserve, Rajasthan, India. *Mammalia*, 76(2), 227–230.
- [12]. Mukherjee, S., Goyal, S. P., Johnsingh, A. J. T., & Leite Pitman, M. R. P. (2004). The importance of rodents in the diet of jungle cat (*Felis chaus*), caracal (*Caracal caracal*) and golden jackal (*Canis aureus*) in Sariska Tiger Reserve, Rajasthan, India. *Journal of Zoology*, 262(4), 345–351.
- [13]. Poche, R. M., Evans, S. J., Sultana, P., Hague, M. E., Sterner, R., & Siddique, M. A. (1987). Notes on the golden jackal (*Canis aureus*) in Bangladesh. *Mammalia*, 51(2), 259–270.
- [14]. Rotem, G., Spiegel, O., Ofir, A., & Nathan, R. (2011). Reproductive interference between two canine species in a human-disturbed landscape. *Behavioral Ecology*, 22(4), 841–847.
- [15]. Srivastav, A., & Nigam, P. (2009). *National Studbook of Golden Jackal (Canis aureus)*. Wildlife Institute of India, Dehradun and Central Zoo Authority, New Delhi.