J. Sci. Innov. Nat. Earth: Vol. 5, Issue 3, 2025, Page No-58-60 ISSN (Online) 2583-2093 OPEN ACCESS

Journal of Science Innovations and Nature of Earth

Journal homepage : https://jsiane.com/index.php/files/index

International, Double-Blind, Quarterly, Peer-Reviewed, Refereed Journal, Edited and Open Access Research Journal

A Review of Population Ecology and Behavioral Adaptations of Indian Peafowl in Western Uttar Pradesh

Lalita Sogarwal*[1] and Meera Singh[1]

[1]Department of Zoology, D.S. College Aligarh, Affiliated to Raja Mahendra Pratap Singh University, Aligarh, Uttar Pradesh, India

*Corresponding Author E-mail: sogarwallalita@gmail.com

DOI: https://doi.org/10.59436/jsiane.483.2583-2093

Abstract

The Indian Peafowl, the national bird of India, is widespread and distributed over various habitats throughout India. It has been particularly prevalent in the agricultural landscapes of Uttar Pradesh (U.P.). This review summarizes the data available on the ecology of peafowl populations, their habitat use and behaviour, and their interactions with humans, focusing specifically on Western U.P. Western U.P. is comprised of mostly rich, fertile alluvial plains, with the majority of its landscape dominated by agriculture, irrigation canals, fruit tree orchards, and remaining forest patches. There is great heterogeneity within the environment of Western U.P., making it suitable for stable populations of peafowl. The density of peafowl varies between the different types of habitat, with the highest peafowl densities being found in agro-forest mosaics and 'culturally protected' areas of the village. Peafowl have a high degree of ecological plasticity and display omnivorous feeding habits, nesting on the ground camouflaged against the substrate, breeding in the wet season only during the monsoon, and developing adaptive behavioural strategies for avoiding predators. Behavioural shifts have resulted in changes to foraging behaviour, along with tolerance of being in close proximity to humans, allowing greater survival opportunities for peafowl in anthropogenically-altered environments. Regions such as western Uttar Pradesh may be impacted by an array of emerging threats, including crop damage related conflicts, pesticides, fragmented habitat, and road mortality, that affect local population dynamics. Although the conservation status is Least Concern globally; region-specific ecological assessments are still necessary. This review illustrates the value of integrating a community-based approach to conservation, sustainable agricultural practices, and conducting long-term ecological monitoring to help ensure that Indian Peafowl populations are sustained in western Uttar Pradesh.

Keywords: Indian Peafowl (*Pavo cristatus*); Population Ecology; Behavioral Adaptations; Agro-ecosystem; Western Uttar Pradesh

Received 12.07.2025 Revised 18.07.2025 Accepted 03.09.2025 Online Available 20.09.2025

Introduction

The Indian Peafowl (*Pavo cristatus*) is an incredibly recognizable avian species that play an important ecological role on the Indian subcontinent. As India's national bird, the Indian peafowl also plays a significant cultural, religious, and ecological role. The Indian peafowl is in the family Phasianidae, and throughout the Indian subcontinent, they are distributed in many different habitats from dry deciduous forests and scrublands to agricultural lands and peri-urban settings (Ali & Ripley, 1987; Johnsgard, 1986). The ability of the peafowl to adapt to multiple ecological conditions has allowed them to thrive in a variety of habitats, making the Indian peafowl one of the more important model species for studying population ecology and plasticity of behaviour. Western Uttar Pradesh (WUP) in the Upper Gangetic Plains is a dynamic agro-ecological landscape that is characterized by intensive agronomy, canal irrigation systems, remnant forest patches, tree orchards, and expanding urban development. The districts of Meerut, Muzaffarnagar, Saharanpur, Bijnor, Bulandshahr, and Baghpat provide heterogeneous habitats for the peafowl to survive in. The mosaic of sugarcane, wheat, mango orchards, and dispersed tree groves provides the peafowl with plentiful foraging and roosting opportunities (Sundar & Subramanya, 2010). In addition to the diverse habitats that provide opportunities for peafowl, there are also protected areas such as Hastinapur Wildlife Sanctuary that and culturally protected village groves that allow for viable populations of peafowl. The field of population ecology seeks to understand the relationships between environmental variables and the distribution of species within a certain area as well as their densities, demographic structures, survival rates, and reproductive success (Begon, Townsend, & Harper, 2006). Peafowl (*Pavo cristatus*) populations are greatly impacted by the structure of their habitat, the availability of food, the predation pressure they experience, and any human disturbances which will affect them (Ramesh & McGowan, 2009). Research conducted on peafowl across Northern India has shown that densities of peafowl are usually higher in agro-forested habitats than closed forests due to increased food availability and lowered number of predators (Sathyakumar & Sivakumar, 2007). However, the peafowl face new threats from rapid changes in land-use, use of pesticides for agricultural purposes, expansion of infrastructure, and an increase in human-wildlife conflict. The behavioral adaptations that the peafowl exhibit will help them continue to persist in urban and suburban landscapes modified by anthropogenic influences. Peafowl have flexible foraging strategies, breed synchronously with the onset of monsoon seasons, use social roosts when sleeping, and increase vigilance when in areas populated with predators (Yorzinski & Platt, 2010). The males display elaborate courtship displays, establishing loose leks to attract females, using visual and auditory cues to lure the females to mate (Petrie, Halliday, & Sanders, 1991). Peafowl are exhibiting modified daily activity patterns due to human disturbance in agricultural regions, mainly in Western Uttar Pradesh, where they have adapted by foraging early in the morning or late at night to avoid humans. All of these adaptations provide peafowl with the means of increasing their survivorship in fragmented habitats. Though the IUCN Red List categorizes it as "Least Concern," localized populations of Indian Peafowl show variable fluctuations within intensively cultivated areas Aligarh district. Sometimes peafowls can eat crops, and thus farmers have conflict with peafowl if peafowl are damaging their crops (Kumar and Kumar 2018; BirdLife International 2023). In addition, there have been limited studies in Western Uttar Pradesh that assess how secondary exposure to agrochemicals impacts hatching success and survivorship of peafowl. Due to the ecological variation of Western Uttar Pradesh and the anthropogenic disturbance of the region following human use, understanding the population ecology and adaptive behaviour of Indian Peafowl is important when developing informed conservation strategies. This review will provide a synthesis of current knowledge regarding population ecology and behaviour of The Indian Peafowl in order to give a regionally-specific ecological perspective that integrates habitat use, demographic patterning, and adaptive behaviours as it relates to human land use patterns and changes.

Geographic And Ecological Context of Western Uttar Pradesh

I.Physiographic Setting-Western Uttar Pradesh (WUP) is located in the upper part of the Gangetic Plain, which consists of large areas of alluvial deposits that were received from both the Ganga River and the Yamuna River (Singh & Singh 2015). The WUP landscape is characterized by a predominantly level surface and very good quality loamy soil, which produce a high degree of food diversity because the majority of agricultural practices are intensive (Singh & Singh 2015). The geographic location of this region and its soils also contribute to an unusually high density of rural populations living in rural areas, through which there are agricultural fields, orchards and remaining vegetation.

II.Climatic Conditions-The WUP has a temperature-based subtropical monsoon climate; substantial seasonal variability occurs throughout the year. During the summer months (April to June), the average temperature is hot and dry; many days exceed 40°C during this time. The majority of precipitation occurs during the monsoonal period (July to September), and the monsoon replenishes wetlands and provides water for irrigation systems. In the winter (December to January), the average temperature is cool and relatively dry; some days are below 10°C (IMD, 2020). These seasonal variances greatly impact: the timing of crop cycles and the structure of vegetation, the patterns of wildlife activity.

III.Landscape Composition-The main types of agriculture that dominate the region are sugarcane and wheat, which are the two main crops in the region and provide the majority of jobs and income for people living in that

area. There are many types of orchards growing mangoes and guavas throughout the region, with two particular districts being prominent for orchards: Meerut and Saharanpur.

Figure1. Agro-forest Mosaic Landscape of Western Uttar Pradesh

There are many types of irrigation systems in place to provide farmers access to water, creating an extensive irrigation system providing many rivers, canals, seasonal wetland areas, ponds, and other permanent bodies of water. These systems help create habitat diversity by providing multiple habitats within a small area by providing access to multiple types of habitats of various densities of plant and animal life (FSI, 2021).

IV.Ecological Significance for Peafowl-This heterogeneous mosaic of croplands, orchards, wetlands, and forest fragments provides abundant foraging resources, ground-nesting cover, and elevated roosting trees. Such ecological complexity supports stable populations of Indian Peafowl and facilitates their adaptation within human-dominated agro-ecosystems.

Population Ecology

Distribution and Density- The Indian Peafowl (*Pavo cristatus*) is found throughout the rural and semi-urban areas of western Uttar Pradesh (WUP), demonstrating its ability to adapt well to the agro-dominated landscape. It primarily inhabits agricultural fields, orchards, the banks of canals, and the edge of villages where it can easily find food and places to roost (Ramesh & McGowan 2009). The density of the population in WUP varies widely, depending on the availability of different habitats and the level of disturbance from people. For example, the higher densities found in agricultural fields bordering villages are due to the provision of large quantities of food from crop residues, grains, and insects where they are abundant foraging opportunities. Moderate densities occur in forests and scrub areas, while urbanized areas have low densities due to loss of habitat and human disturbance (Sathyakumar & Sivakumar 2007). Localised studies from northern India estimated densities ranging between 5–25 individuals/km² in favourable agro-forest mosaics. Sacred groves and areas where local culture has protected them have the highest densities of peafowl because protection from persecution and cultural values provide them with minimised persecution (Kumar & Kumar 2018). The variation in density emphasises how habitat structure, availability of food and socio-cultural protection have an influence on the distribution patterns of the Indian Peafowl.

Demographic Structure-In most Indian Peafowl populations, adults can be found with males (peacocks), females (peahens), or juveniles. The sex ratio is often skewed towards females because males are more visible and prone to predation during the breeding season when their plumage is easily identifiable and they compete with one another to attract female mates (Petrie, Halliday, & Sanders, 1991). Additionally, juvenile recruitment varies due to seasonal factors related to the amount of monsoon rain; this season has an increased supply of food and higher rates of nesting success than other seasons.

Seasonal Variation- Peafowl are affected by seasonal fluctuations in their respective populations, with breeding males establishing display territories and engaging in courtship activities during their breeding period (April through September) that coincide with the pre-monsoon and monsoon seasons. After they have bred, individuals will congregate together and become less dispersed, enhancing their ability to find food and remain vigilant. During the winter months, they will congregate together more frequently in food-rich agricultural areas due to seasonality of the distribution of resources and social structure (Ali & Ripley 1987).

Habitat Utilization

A.Preferred Habitats- The Indian Peafowl (*Pavo cristatus*) is an adaptable species and has many options for where it can reside. In Western Uttar Pradesh (WUP), Peafowls often prefer farms, where there are some trees. These trees provide good food sources for Peafowls and also provide a safe night time roost (Ali & Ripley, 1987). The banks of irrigation ditches with dense vegetation and scrub forests also provide important habitat for Peafowls because vegetation (shrubs) helps hide them from predators and provides places to build nests. Mango and guava are the most common trees that provide good roosting trees for Peafowls, as well as providing both food and a place to perch above others. Still, Peafowl will roost in any tree (including Neem (Azadirachta indica), Peepal (Ficus religiosa), Mango (Mangifera indica), and Eucalyptus species). When roosting in trees, Peafowls are above the height of potential predators, and thus the risk of predation is substantially reduced from roosting on the ground.

Figure 2. Indian Peafowl along Canal Banks and Agricultural Fields in Western Uttar Pradesh

Peafowl build their nests on the ground, often in long grasses, shrubs, and stubble from crops, and they build the nests so that they are concealed. They depend on being concealed in order to protect the eggs that they lay in their nests (Johnsgard, 1986). The other major factor that influences habitat selection by Peafowls is their proximity to water, such as irrigation canals, ponds, and seasonal wetlands, particularly during times of prolonged drought when water is difficult to obtain.

B.Agro-ecosystem Adaptation- In WUP's agro-ecosystems, sugarcane and wheat fields are an important part of the habitat matrix for peafowl and they provide numerous insect prey, including grasshoppers and beetles, as well as many seeds and grain that are spilled during harvest (Ramesh & McGowan, 2009). Dense sugarcane also provides cover for protection from predators like stray dogs and jackals. The species ability to utilize agricultural landscapes exemplifies the ecological plasticity and contributes to survival in modified habitats. However, reliance on cropland can also increase susceptibility to pesticide exposure and conflict between humans and wildlife.

Behavioral Adaptations-

a.Foraging Behaviour- By being omnivores, the Indian Peafowl has the ability to prosper ecologically in many different environments through its eating behaviour. The Indian Peafowl's diet consists of a wide range of food types including; grains (such as wheat and rice), insects (including grasshoppers and termites), small reptiles and amphibians, and fruits and seeds (Ali & Ripley, 1987; Johnsgard, 1986). In Western Uttar Pradesh (WUP), agricultural fields provide many seasonal food sources for the Indian Peafowl, especially during harvest times. The Indian Peafowl forages on crop residues and on the many insects that thrive in sugarcane and wheat fields. Behaviourally, the Indian Peafowl shows flexibility by adjusting its feeding times as they often forage between the hours of early morning and late evening when there is less human disturbance and when temperatures are cooler (Ramesh & McGowan, 2009).

b.Anti-Predator Strategies- WUP has been subject to various predatory threats, including feral dogs, golden jackals, and birds of prey. Peafowl use different adaptive behaviours to lessen the threat of predation. One method that peafowl employ is limiting potential ambush points of predators by roosting high up on tall trees. In addition, peafowl will make loud alarm calls to warn other peafowl of the presence of an approaching predator. Group vigilance is enhanced amongst post-breeding flocks by increasing the probability that someone will spot a predator and increase the likelihood of survival among group members through predator detection (Yorzinski & Platt, 2010).

c.Breeding and Courtship- Breeding activity tends to be elevated during the pre-monsoon and monsoon periods because of an increase in food sources. Males build territories and exhibit a variety of behaviours designed to attract females from within leks, including raising the train feathers, displaying vibrationally, and calling vocally (Petrie, Halliday, & Sanders, 1991).

Figure 3. Courtship Display of Male Indian Peafowl during breeding season

Males are also more likely to utilize open display areas close to human habitation potentially because of the reduced predation in those areas.

d.Human Tolerance and Cultural Protection-Peafowl in many areas of WUP receive his/her assurance through both cultural respect and legal protections. These behaviours include becoming comfortable around human homes, not fleeing, and actually resting on buildings or farm buildings because of their adaptability to the existence of people.

Human–Peafowl Interactions

i.Crop Raiding-Near agricultural lands in Western Uttar Pradesh (WUP) are often used as a habitat for peafowl, which contribute to crop loss. In addition to eating insects, peafowl commonly eat precious crops like different vegetable crops and growing wheat and pulses during the early growth period of these seedlings when they are soft and nutritious (Kumar and Kumar, 2018).

Figure 4. Indian Peafowl Foraging in Wheat Fields illustrating Human–Wildlife Interaction- Foraging on cultivated lands will peak during the post-monsoon and fall to winter months, when natural food sources are low. Farmers often view peafowl as raiders of their crops, due to visible damage on their relatively small farms; despite peafowl's contributing to the control of pest insects, peafowl are viewed negatively by farmers because of the loss of crops, leading to tension and conflict between the two due to economic hardship. However, many rural communities in WUP practice a deep cultural reverence for the peafowl, reducing their persecution (Ramesh and McGowan, 2009).

ii.Road Mortality- The construction of new infrastructure projects (e.g., highway expansion, construction of new rural roads and canal embankment) has increased the risk of vehicle/passenger collision. Peafowls frequently eat along the side of the road due to grain and insect spills. Peafowls are located on the ground level and do not respond quickly when shocked, making them susceptible to being struck by vehicles. Due to the development of the road network, local movement and the ability of peafowls to establish breeding territories has been disrupted.

iii.Pesticide Exposure-In WUP, intensive agriculture relies on large amounts of agrochemicals. Pesticides can indirectly expose peafowl to pesticides when they consume prey that has ingested insecticides or when they eat treated seeds. Secondary poisoning can cause physiological problems, reproductive failures, and reduce chick survival; however, there have been few toxicological studies on peafowl in the regions they inhabit (Mineau & Whiteside, 2013). Long-term monitoring will be essential to assess whether agrochemical exposure is causing sub-lethal effects on peafowl.

Ecological Plasticity and Adaptation Mechanisms

•Dietary Flexibility-*Pavo cristatus* (Indian Peafowl) is known for its high degree of omnivorous dietary plasticity that provides the ability to utilize various food items such as grains, seeds, invertebrates, small reptiles and fruits as food items (Ali & Ripley, 1987). The use of agricultural habitats, like Western Uttar Pradesh (WUP), allows *Pavo cristatus*, due to its omnivorous dietary plasticity, to switch between food sources (natural) and food sources (agricultural) based on seasonal changes in availability of both type of food sources (by identifying which food source is available). This trophic plasticity provides greater levels of survivorship for *Pavo cristatus* due to the variability of its surrounding environment (Ramesh & McGowan, 2009).

•Ground Nesting and Camouflage- Peafowl utilize their coloration and concealment in their habitats as ground nesting birds. They typically build their nests at the base of shrubs, under crops, or in the height of tall grass, to blend into the surrounding vegetation and hide from potential predators (Johnsgard, 1986). This is a very effective strategy for peafowl, especially in agricultural settings where crop fields and adjacent brushy areas provide a natural source of cover.

•Reproductive Potential- High reproductive output further strengthens population resilience. Females lay multiple eggs per clutch during favourable monsoon periods, increasing recruitment success when food resources are abundant (Petrie, Halliday, & Sanders, 1991).

•Cultural Co-existence-Cultural coexistence of wildlife with humans in India, including: cultural respect and legal protection provided by wildlife laws; and behaviourally habituated wildlife that has become tolerant of human activities in densely populated areas such as WUP.

Conclusion

The Indian Peafowl (*Pavo cristatus*) in the agriculture of Western Uttar Pradesh exemplifies ecological flexibility in human-dominated ecosystems. Through their heterogeneous agricultural landscape composed of agricultural fields, orchards, canal systems, sacred groves, and remaining forest patches, there are many feeding, nesting, and roosting sites needed to maintain stable populations. Areas where peafowl occur at higher population densities—those composed of agro-forest mosaics or near villages—indicate the peafowl's ability to use cultivated landscapes while benefiting from cultural protection and being less persecuted. Behavioural plasticity has a critical role in enabling the persistence of peafowl populations within the region. The peafowl's ability to adapt their foraging strategy, reproduce seasonally with the monsoon rains, have higher roost heights and teamwork for detecting predators increases their chances for survival during changes in their environment. The ability to habituate to human activities and to adapt to agricultural cycles shows the ability of this species to remain resilient after moderate human disturbances. Although having been afforded legal protections since they are considered a Least Concern species globally, limited resources could affect local populations within highly cultivated parts of Western Uttar Pradesh due to growing urbanization, road expansion, pesticide use, and localized crop destruction conflicts. Future conservation initiatives involving community participation, sustainable agricultural methods, habitat conservation, and population monitoring will need to be considered when developing conservation actions. Additionally, long-term ecological research that includes demographic studies and toxicity testing should be done in order to evaluate how small changes in the environment may affect populations over time. Overall, while the Indian Peacock appears to thrive in Western Uttar Pradesh due to its flexible ecological behaviours and long-standing cultural presence, proper management approaches must be taken to ensure that it continues to have a stable population within these quickly changing areas.

Reference

Ali, S., & Ripley, S. D. (1987). Compact handbook of the birds of India and Pakistan. Oxford University Press.

Begon, M., Townsend, C. R., & Harper, J. L. (2006). Ecology: From individuals to ecosystems (4th ed.). Blackwell Publishing.

BirdLife International. (2023). *Pavo cristatus*. The IUCN Red List of Threatened Species 2023. https://www.iucnredlist.org

Forest Survey of India. (2021). India state of forest report 2021. Ministry of Environment, Forest and Climate Change, Government of India.

Indian Meteorological Department. (2020). Climatological tables of observatories in India (1981–2010 normals). Government of India.

Johnsgard, P. A. (1986). The pheasants of the world: Biology and natural history. Oxford University Press.

Kumar, A., & Kumar, P. (2018). Human–peafowl interactions in agricultural landscapes of North India. Indian Journal of Ecology, 45(2), 345–350.

Mineau, P., & Whiteside, M. (2013). Pesticide acute toxicity is a better correlate of U.S. grassland bird declines than agricultural intensification. PLoS ONE, 8(2), e57457. https://doi.org/10.1371/journal.pone.0057457

Petrie, M., Halliday, T., & Sanders, C. (1991). Peahens prefer peacocks with elaborate trains. Animal Behaviour, 41(2), 323–331. https://doi.org/10.1016/S0003-3472(05)80484-1

Ramesh, K., & McGowan, P. J. K. (2009). On the current status of Indian Peafowl (*Pavo cristatus*) in India. Journal of the Bombay Natural History Society, 106(3), 222–232.

Sathyakumar, S., & Sivakumar, K. (2007). Status and distribution of Indian Peafowl in northern India. Indian Forester, 133(7), 897–904.

Singh, R., & Singh, G. S. (2015). Land use dynamics and agricultural intensification in the Upper Gangetic Plains of India. Environmental Monitoring and Assessment, 187(6), 1–12. https://doi.org/10.1007/s10661-015-4563-2

Sundar, K. S. G., & Subramanya, S. (2010). Bird use of agricultural landscapes in the Gangetic Plains of India. Indian Birds, 6(3), 65–74.

Yorzinski, J. L., & Platt, M. L. (2010). The gaze of a peahen during courtship. Journal of Experimental Biology, 213(17), 2920–2926. https://doi.org/10.1242/jeb.044503