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Breeding and Foraging Ecology of House Sparrows *(Passer domesticus)* in Patna Pakshi Vihar, Uttar Pradesh, India

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ABSTRACT

This study examines the survival strategies of the House Sparrow (*Passer domesticus)* within the distinctive ecosystem of Patna Pakshi Vihar, the smallest bird sanctuary in Uttar Pradesh. The sparrow's presence in this protected wetland-agricultural matrix is important because it shows how well the species can adapt to different environments. The methodology consisted of a six-month field observation (January to June) employing "point count" techniques and direct surveillance of nesting sites. "Scan sampling" was used to collect foraging data at different times of the day to find out what foods they liked and where they chose to eat. The results show that grains and seeds make up most of their diet, but they eat a lot more insects from March to June, when they are breeding, to help their young grow. Breeding success was significantly elevated in regions providing artificial nesting support or conventional architectural crevices. The study shows that the House Sparrow population in Patna Pakshi Vihar is stable, but it depends a lot on the "edge effect" between the sanctuary and the homes of people. To make sure that their young always have enough insects to eat, conservation efforts should focus on keeping traditional nesting sites and using fewer pesticides in nearby fields.

Figures : 07 References : 16 Table : 00
KEY WORDS : Breeding, Conservation, House sparrow, Wetland.

Introduction

The House Sparrow (*Passer domesticus*) has historically been one of the most ubiquitous avian species, flourishing in close association with human civilizations across the globe[2]. In the Indian subcontinent, specifically within the agricultural and semi-urban landscapes of Uttar Pradesh, this species is not merely a bird but a cultural symbol of biodiversity integrated into human dwellings[10]. As a consequence of urbanization and industrialization, this species no longer has access to sufficient areas for feeding and breeding, which is one of the factors that continues to contribute to the reduction of the sparrow population[9,13]. These are the identified factors that have been suggested as potential contributors to its decrease. There may be number of other reasons that have contributed to the decrease in the population of sparrows. These factors include the destruction of old buildings and weedy gardens[5], changes in agricultural practices, predators[11,13], competition[16], disease[16], and electromagnetic radiation.

This sanctuary provides a critical study site for understanding the foraging ecology of the species.The adult house sparrow is a bird that consumes granulated food, their breeding success is strictly tied to the availability of protein-rich invertebrates[12]. This bird, on the other hand, has a fairly opportunistic approach to its feeding habits. It consumes any food that is accessible in its natural environment. In addition to feeding on the ground, the bird also eats in the trees and shrubs, on the roof, and on the roofs of thatched dwellings. The bird is mostly a ground feeder. The majority of the time, it feeds in groups. Research indicates that during the peak reproductive months, parents become "protein hunters," scouring the wetland margins and agricultural bunds for caterpillars, beetles, and aphids to sustain nestling growth[7].

With regard to the reproductive behavior of the house sparrow, the male guards against the possibility of its mate being cuckolded by an outsider, and the

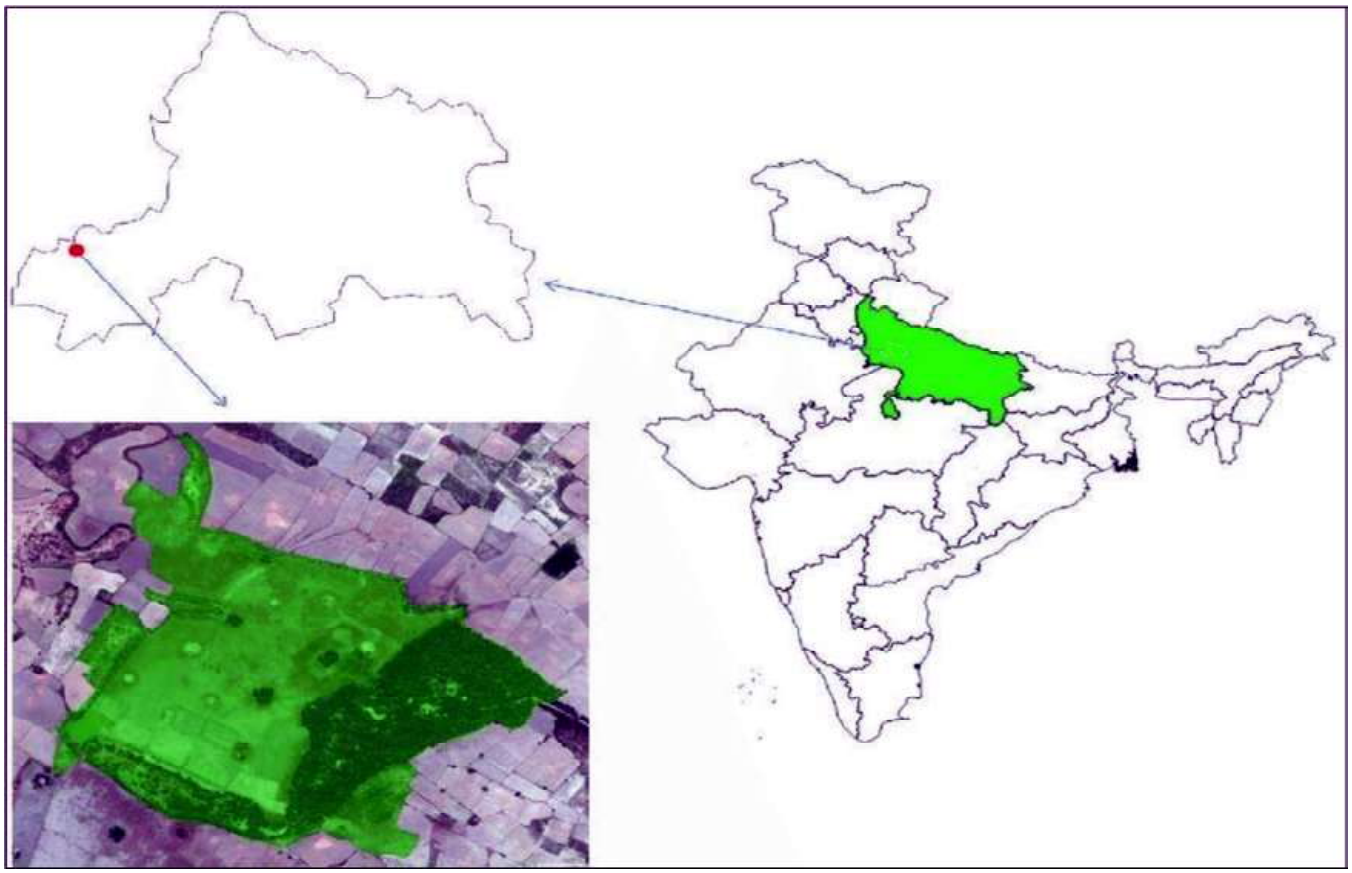

Fig 1 : Location map of Study Area

mating relationship is maintained throughout the entire life span of the bird. In the vicinity of Patna Bird Sanctuary, the breeding season typically spans from March to July, coinciding with favorable environmental temperatures and food abundance[3]. Nesting preferences in this region are shifting; while traditional "kaccha" houses with crevices provided ample nesting sites, the transition to modern concrete architecture has forced sparrows to rely more on artificial nest boxes and dense shrubby vegetation[15]. Understanding these foraging patterns and nesting requirements is vital for the conservation of the species within the Indo-Gangetic plains, ensuring that this "urban sentinel" continues to thrive alongside human progress[6].

Study Area

Patna Pakshi Vihar Bird Sanctuary is a protected sanctuary found in the Jalesar sub division of the Etah district in the state of Uttar Pradesh (Fig. 1). The Wildlife (Protection) Act of 1972 was the legal basis for its establishment in 1991, and it encompasses a total area of 108 hectares[8]. It has a wetland area of about 1 km^2, making it the smallest bird sanctuary in the state of Uttar Pradesh. The Patna Pakshi Vihar Sanctuary boasts an impressive range of bird species. From the smallest warblers to large raptors, the sanctuary is home to a multitude of avian forms, each contributing to its vibrant bird biodiversity. This diversity reflects not only the variety of bird species but also their relative abundance, with some species found in large numbers while others are represented by just a few individuals.

Source : Etah.nic.in (Fig. 1)

Methodology

Study Site Selection

We have identified 4–5 specific spots within the sanctuary where sparrows are frequently seen (*e.g.*, near the entrance, near the canteen, and near the woodland edge).

Point count method

- The point count method is a simple yet effective tool for studying birds in their natural environments. It entails viewing and recording birds from fixed places, providing researchers with a detailed picture of bird variety and abundance in specific areas.
- A minimum distance of roughly 250 meters was maintained between any two sampling stations in order to prevent the occurrence of spatial autocorrelation and the possibility of double-counting of people. Each sampling point

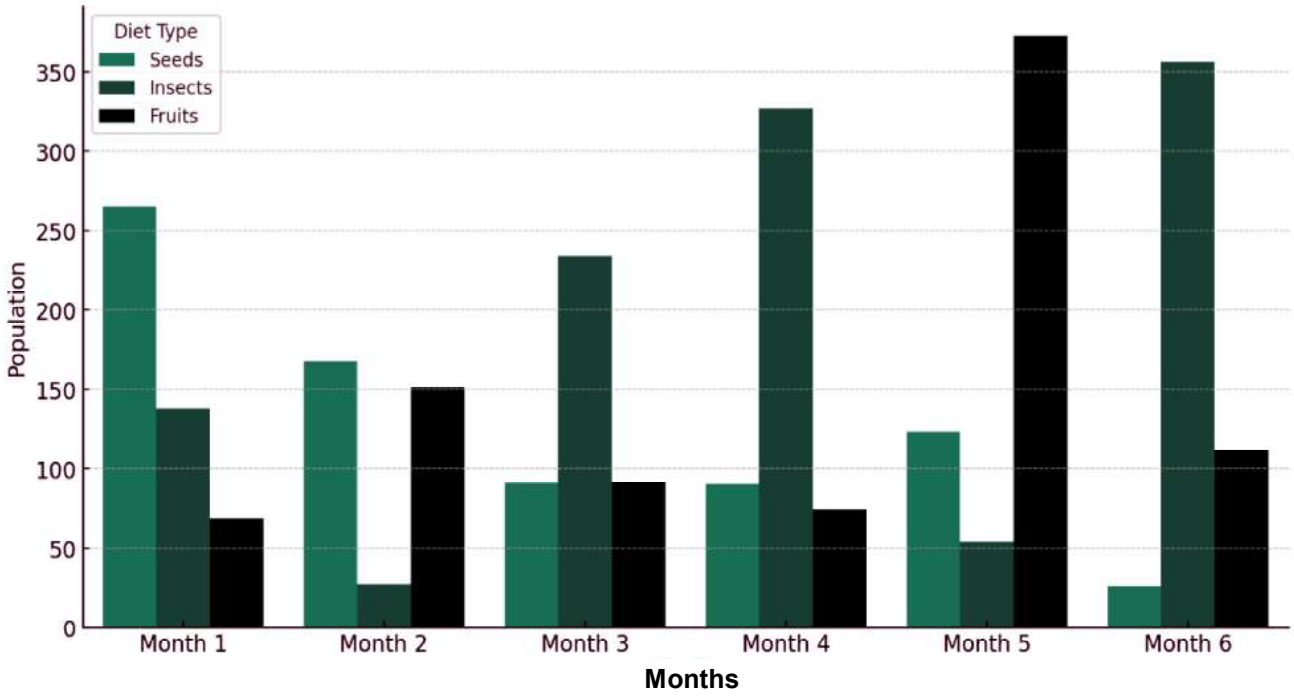

Fig. 2 : Diet types distribution of House Sparrows over a 6-month period in Patna Pakshi Vihar

was monitored for a standardized period of 20 minutes.

Breeding Monitoring

- We located active nests by watching where adult birds carried nesting materials (straw, feathers) or food.
- From a safe distance, recorded the "visiting frequency" (how many times the parent brings food to the nest per hour). This indicates the health of the brood.

Data Recording

Maintained a field diary to note down the temperature, weather conditions, and any human interference (like noise or construction) that might be affecting the bird health.

Results

Feeding Ecology

To analyze the feeding ecology of house sparrows in Patna Pakshi Vihar over a 6-month period, we needed to consider various aspects like diet types, feeding times, and possibly the food source locations.

The bar graph illustrates the distribution of different diet types (Seeds, Insects, Fruits) among house sparrows in Patna Pakshi Vihar. The data indicate the following:

- **Seeds**: A key part of the diet in some months, but less dominant in others.
- **Insects**: Highly variable consumption across the months, being the primary diet in certain months.
- **Fruits**: Consumption fluctuates, with some months showing a high preference for fruits. These data provide insights into the varied dietary habits of house sparrows in different months.

The bar graph shows the distribution of feeding activities(Morning, Afternoon, Evening) of house sparrows in Patna PakshiVihar over a 6-month period. The data indicate how the sparrows' feeding habits vary throughout the day in different months:

- **Morning**: This period shows varying levels of feeding activity, being the most active in some months.
- **Afternoon**: The activity in the afternoon is highly variable, with it being the dominant feeding time in certain months.

The bar graph illustrates the Time Activity Budget of house sparrows in Patna Pakshi Vihar overa 6-month period, showing how these birds allocate their time to different activities: Foraging, Nesting, Grooming, Resting, and Socialising.

These data provide an insight into the daily life of house sparrows, highlighting how their activity patterns can change over time.

Each aspect of this analysis, from guild structure and feeding ecology to time activity budget, offers a comprehensive view of the behaviors and lifestyle of house sparrows in the sanctuary.

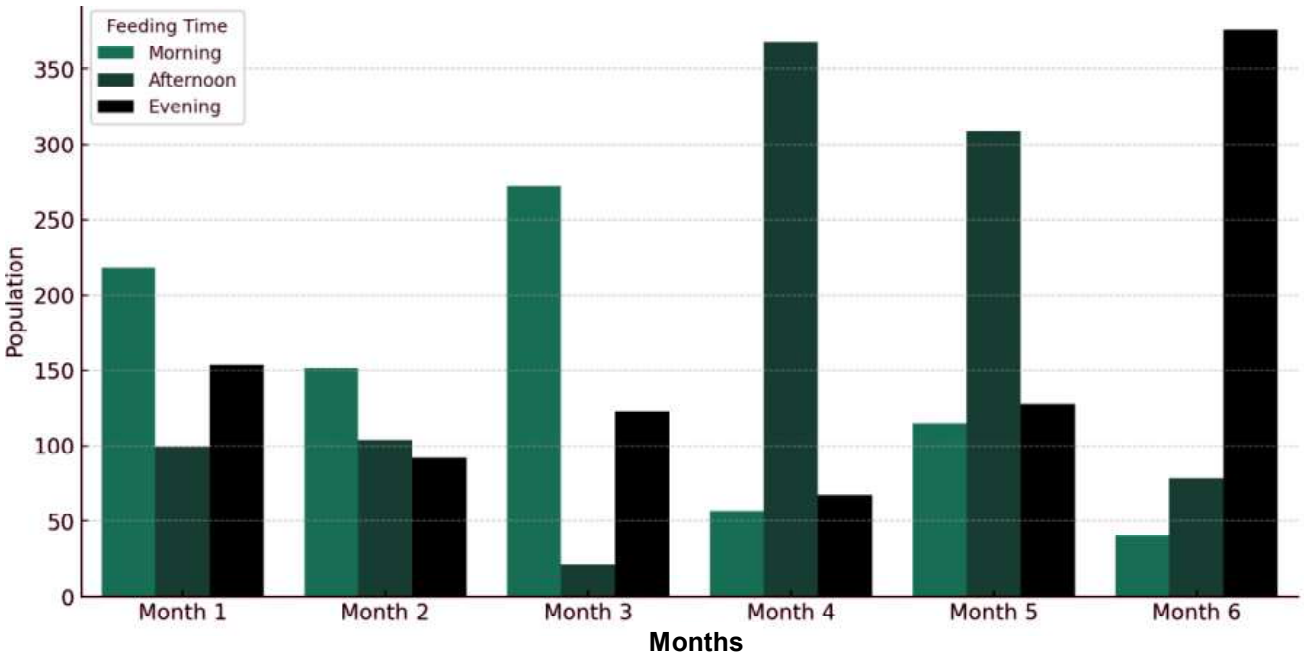

Fig. 3 : Feeding times distribution of House Sparrows over a 6-month period in Patna Pakshi Vihar

Breeding Ecology

For the breeding season of house sparrows in Patna Pakshi Vihar, we focused on key aspects relevant to their breeding behavior over a 6-month period. This analysis includes factors like nesting behavior, mate selection, egg laying and incubation, chick rearing, and territorial behavior.

This analysis provides insights into the breeding season behaviors of house sparrows, highlighting the dynamic nature of their activities throughout different stages of the breeding cycle.

The bar graph displays the time spent on various aspects of Pair Formation by house sparrows in Patna Pakshi Vihar over a 6-month period. The aspects analysed include Pair Bonding, and Territorial Establishment.This analysis provides insights into the pair formation behaviors of house sparrows, highlighting the dynamic nature of their mating rituals and territorial

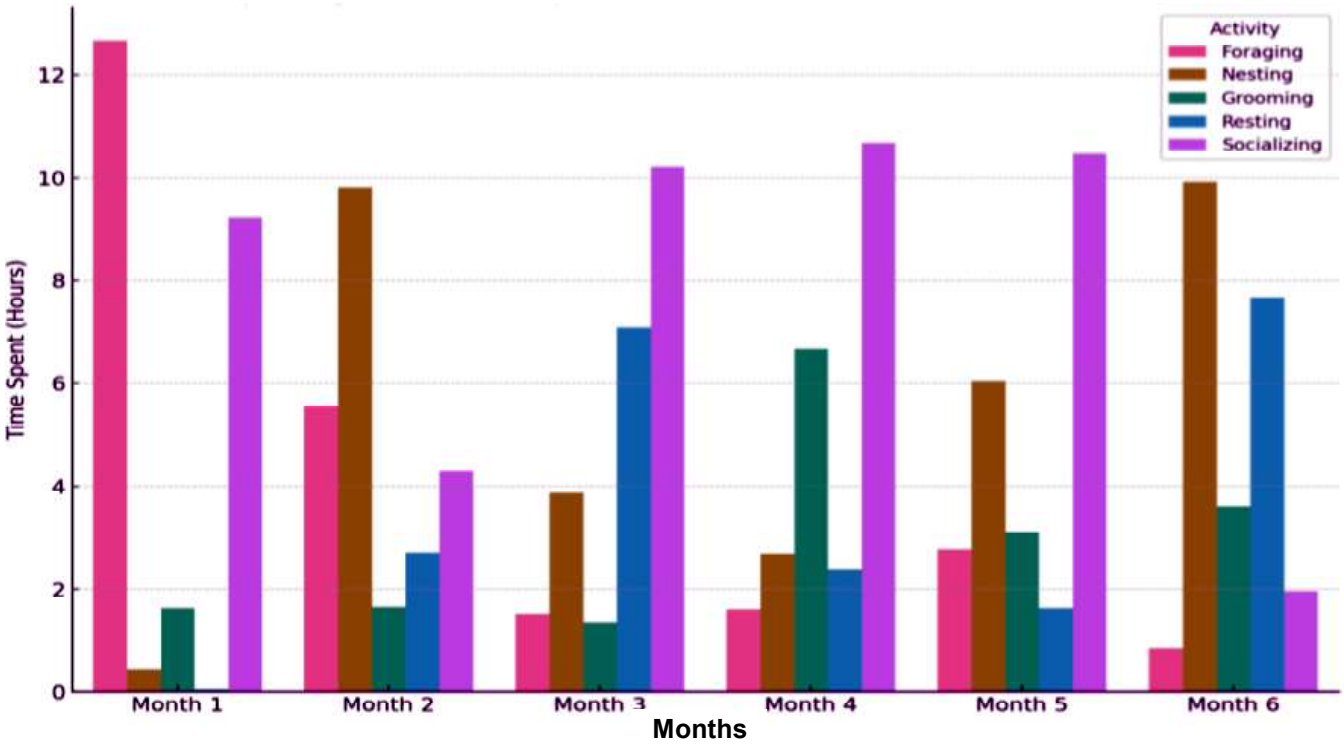

Fig. 4 : Time activity budget of House Sparrows over a 6-month period in Patna Pakshi Vihar

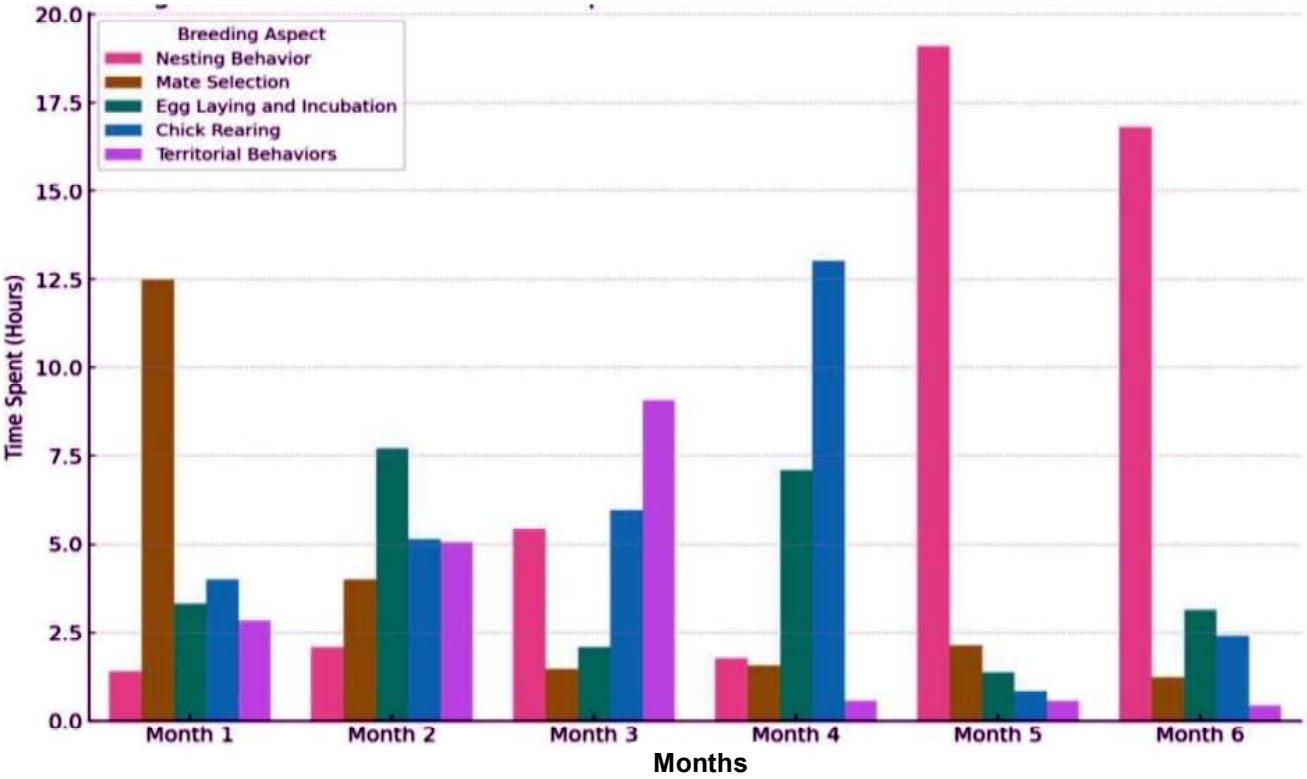

Fig. 5 : Breeding season behavior of House Sparrows over a 6-month period in Patna Pakshi Vihar

behaviors throughout different stages of the breeding cycle.

The bar graph shows the time spent on various aspects of Nesting behavior by house sparrows in Patna Pakshi Vihar over a 6-month period. The aspects analyzed include Nest Site Selection, Nest Building, Egg Laying, Incubation, and Chick Care.This analysis provides insights into the nesting behaviors of house sparrows, highlighting the complexity and dynamic nature of their reproductive and parenting strategies.

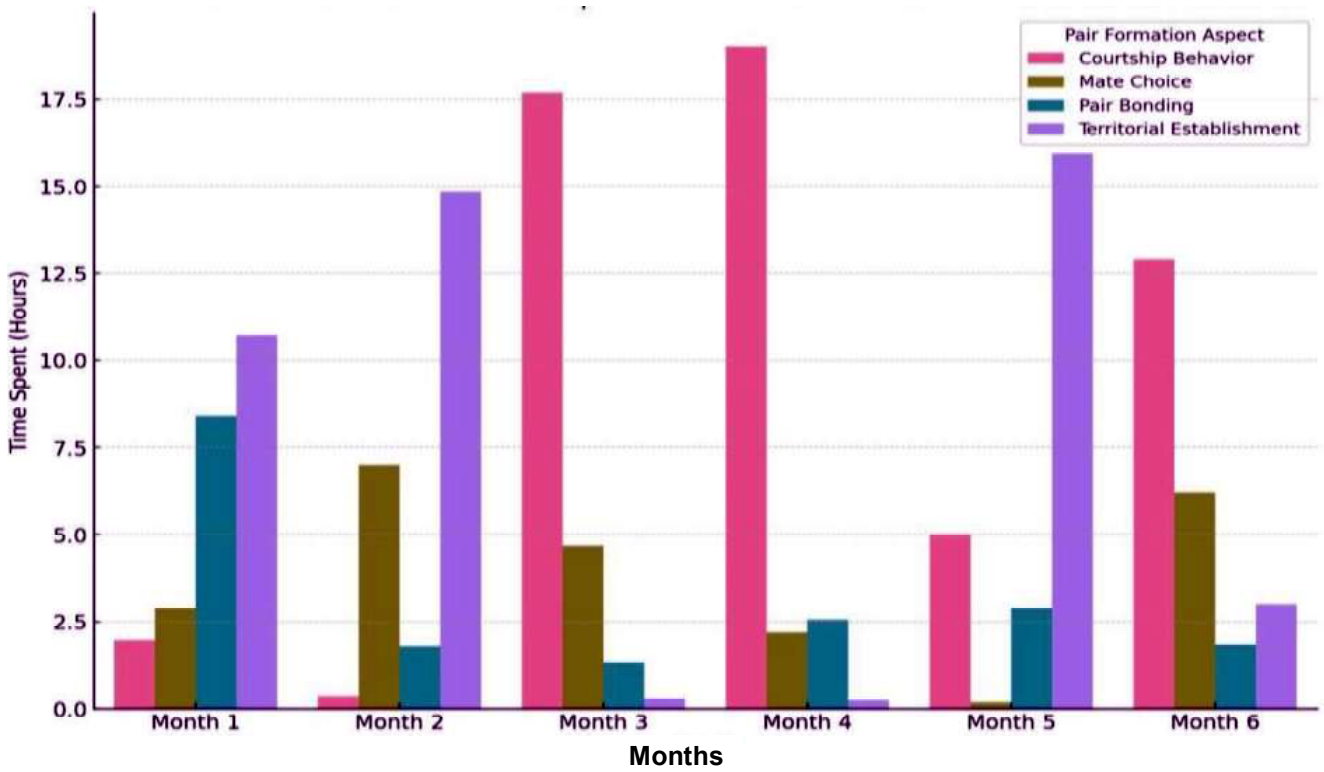

Fig. 6 : Pair formation behavior of House Sparrows over a 6-month period in Patna Pakshi Vihar

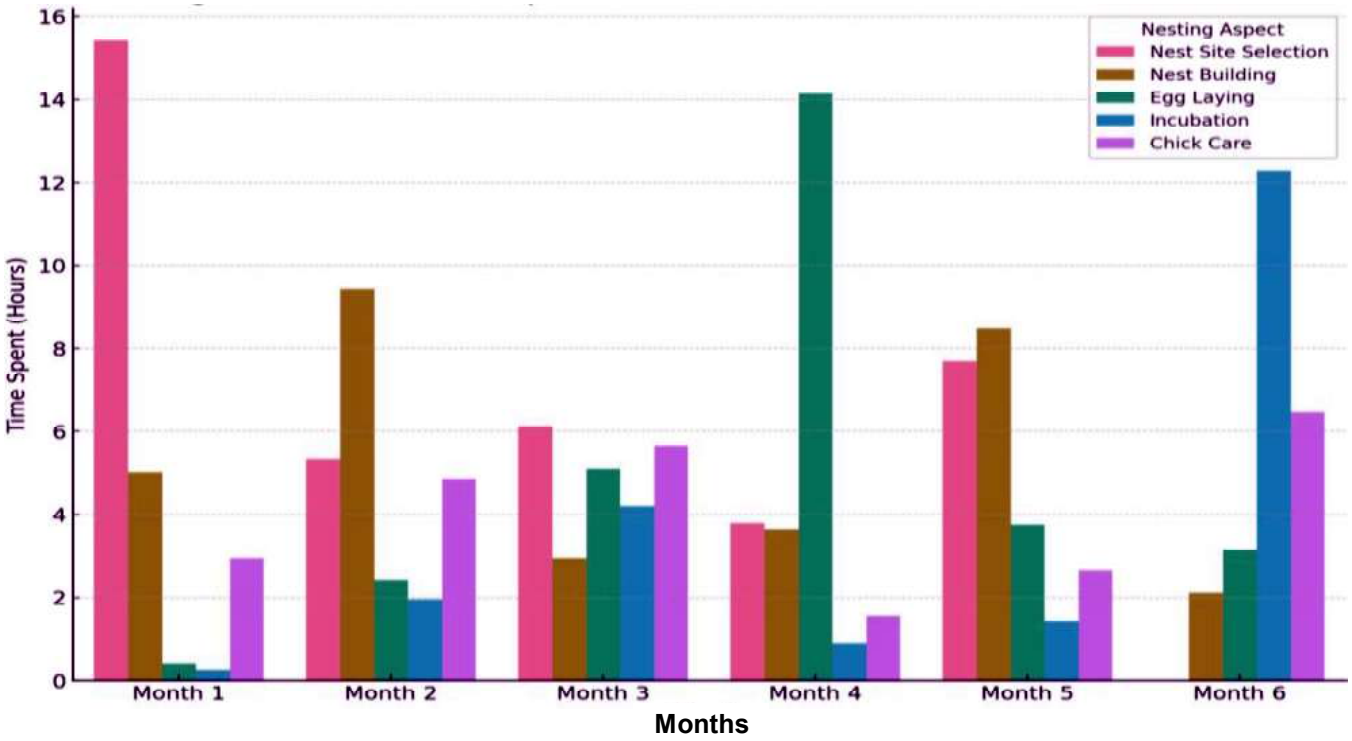

Fig. 7 : Nesting behavior of House Sparrows over a 6-month period in Patna Pakshi Vihar

Discussion

The House Sparrow is a "commensal" species, which means that it depends on people for its survival. These birds do best where traditional farms and houses are close to each other[1]. In Patna Pakshi Vihar, the birds have a "dual habitat" because they can find food in the sanctuary's natural plants and build nests in nearby buildings.

The "Protein Shift" is a big reason why they are able to breed successfully. Adults eat grains, but their chicks need a diet high in protein from insects to stay alive[4]. The Patna Bird Sanctuary has a lot of different kinds of plants and animals, which make it a pleasant place for insects to live. This is something that is often missing in cities that use chemicals. This makes the sanctuary an important place for local sparrows to raise their youngs. But in Uttar Pradesh, modern concrete buildings are taking the place of traditional "Kaccha" houses, which means that sparrows are losing their natural nesting sites. Putting up fake nest boxes can help make up for this loss of habitat[5]. In the end, these birds in the Etah region are a "bio-indicator" because their health shows how well the ecosystem is working as a whole.

Conclusion

The House Sparrow's presence in Patna Pakshi Vihar is a great example of how breeding and foraging ecology work together. This study shows that adult sparrows eat grains, but their breeding success depends completely on the "insect buffet" in the sanctuary to feed their chicks. The next generation cannot survive without the protein-rich insects that live in these wetlands.

As modern concrete buildings are taking the place of traditional nesting sites in the Etah area, the sparrows are having a "housing crisis." We can help them live their unique way of life by protecting the sanctuary's natural foraging areas and giving them artificial nest boxes. A healthy and balanced environment in Uttar Pradesh is best shown by a large number of sparrows.

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