



Research Paper

Study of Nesting and Breeding Ecology of House Sparrow (*Passer domesticus*)

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Abstract

The House Sparrow (*Passer domesticus*), a common member of the Passeridae family, is a synanthropic bird experiencing a sharp population decline across many parts of India, particularly in rapidly urbanizing and semi-urban regions. Increased construction, habitat destruction, and pollution have adversely affected its nesting and feeding opportunities. This study examined the breeding and nesting patterns of House Sparrows in Rewa, Madhya Pradesh, over six months from April to September 2025. Systematic field surveys and observations were conducted to evaluate the influence of anthropogenic environments on nesting preferences and breeding success. A total of 37 active nests containing 168 eggs were recorded across different breeding stages. Of these, 29 nests (78.38%) were successful, producing at least one fledgling, while 8 nests (21.62%) failed. Overall breeding success in the study area was 78%. Among the 168 eggs laid, 139 (82.74%) hatched, and 119 nestlings (85.61% of hatched eggs) successfully fledged. Both male and female sparrows participated in incubation, with females contributing 68% of incubation activity. Behavioural observations were conducted three times daily i.e. morning, evening, and night, using the scan sampling method, and data were analysed through tables and percentages.

1. Introduction

1.1 General information about the study animal

Birds are one of nature's most appealing gifts and are often used to assess environmental quality. The House Sparrow (*Passer domesticus*) has been historically associated with human settlements, often thriving in urban areas where food and nesting sites are readily available. The House Sparrow is a worldwide distributed bird that is of the family Passeridae. However, the population of the House Sparrow has significantly declined in the rural and urban environments in the current scenario, primarily due to factors such as habitat loss, changes in agricultural practices, and increased predation by domestic cats. The species has been introduced in various places such as North America, South Africa, New Zealand, and the Hawaiian Islands. It is native to Arabia, Central Asia, Sudan, North Africa, Iran, Europe, Pakistan, India, Sri Lanka, and Myanmar. The House Sparrow is among the most ubiquitous wild birds worldwide, both intentionally and unintentionally introduced, and it has adapted to a variety of environments, which has contributed to its widespread presence in urban and rural areas alike, including regions such as Arabia, Central Asia, and North Africa, where it thrives in diverse habitats. It is native to large parts of Europe, the Mediterranean Basin, and large parts of Asia.

There are three subspecies of *Passer domesticus* found in India, where *Passer domesticus indicus* is the most common (Ali and Ripley, 1974). The species is mainly found in rural regions and is highly related to human settlements, where it breeds. The house sparrow is important educationally, recreationally, economically, and artistically, and its most important role is that of balancing the ecosystem. This species has been thoroughly studied as a biological indicator of ecosystem health because of its close association with human environments and its susceptibility to ecological changes. The house sparrow is a small bird species that ranges between 14 and 18 cm in length, with an average length of 16 cm. It has a rounded cranium and a strong conical beak designed to feed on seeds, and is of a small size. Female birds are generally smaller than males, with a wingspan of between 19 and 25 cm and a body mass of between 24 and 39.5 gm. Sexual dimorphism is apparent. The plumage of females and juveniles is more subdued, whereas males have more colourful black, white, and brown plumage. The House Sparrow has a wide range of habitats and climates but tends to shun large forests, grasslands, polar lands and remote arid deserts. The species is an opportunistic, omnivorous predator that feeds on insects and insect larvae, primarily when they are in the breeding season; however, its staple foods are grains, seeds and weeds.

Although it has been classified as Least Concern by the IUCN, the declining trends in its population across some areas highlight the need to observe and implement conservation measures, particularly in regions where habitat loss and urbanisation are significantly impacting its numbers.

1.2 Nesting Behaviour and Breeding Patterns

The house sparrow (*Passer domesticus*) would prefer nest sites in natural cavities and human structures such as buildings, bridges, and nest boxes. The nests are mainly built in the eaves and crevices of houses, but cliffs, riverbanks, and hollows of trees are also used. Sparrows will occasionally make nests in rotten branches or on sandy banks, but they usually occupy the nests of other birds, especially those in ancient tree holes or those of swallows on banks and cliffs. In some cases, the original dwellers of the active nests are either killed or pushed away.

Because of the heavier use of tree hollows in North America than in Europe, House Sparrows compete with native cavity-nesting species like bluebirds in those areas, leading to decreases in their populations. In warmer climates, avian nest-builders like storks and magpies can nest in the open on branches of trees, particularly of evergreen types such as hawthorns. In most cases, delayed breeding and increased exposure to storms and predators have linked open nesting sites to lower breeding success. The abandoned open-topped nests of other songbirds, as well as streetlights and neon lights, which are preferred due to the warmth, are less common nesting areas.

Even in tight areas without a roof, the sparrow nests are normally made in a dome-shaped structure. The nest is lined with feathers, paper, and other soft materials on the inside; stems and roots on the outside; and a middle layer of dried grass and leaves. The size of the nest is highly variable, though the average size of the nest is around 20 x 30 cm; the courtship male often begins to build the nest, with the female adding a smaller portion. Construction of the nest may take place at any time of the year, but especially in the period following the autumn moult. In colder temperatures, sparrows will either make special roost nests or use man-made nests, like street lights, to keep warm in winter.

House Sparrows strongly defend their nests against intrusion by same-sex individuals but not territories. Spores of a range of beetle species, blowflies (*Protocalliphora* spp.), nest flies like *Neottiophilum praestum*, and other scavenging species are supported by sparrow nests, suggesting a complex micro-ecosystem around the breeding process. Nesting and breeding ecology are important life history factors that determine the population structure and survival of the avian species. The House Sparrow displays social monogamy, and in Rewa, the local name is either "Goraiya" or "Chidiya"; it generally establishes long-lasting pair bonds during and outside the mating seasons. Breeding success depends on habitat type, climatic conditions, and the extent of human disturbance. The copulation is common during the breeding season and repeated on numerous occasions in a short time. Reproduction can take place shortly after fledging, especially in tropical areas. The age of breeding success typically increases, with older birds tending to breed earlier and have more offspring than inexperienced breeders. Hormonal changes and increased daylight also lead to enlargement of sexual organs, and males vocalise around nesting areas before mating. In order to capture females, males usually perform fancy dances and mark nesting areas in the pre-breeding season. The copulation

is usually instigated by the female, and mated pairs often mate until oviposition starts.

Although extra-pair copulations are common, the House Sparrow is mostly monogamous and tends to have a lifelong pair bond; hence, about 15 percent of fledglings are genetically dissimilar to their social mate. In order to minimise the chances of extra-pair fertilisation, males protect their mates; these copulations are usually done outside nesting areas. Whereas female aggressiveness limits bigamy, males can occasionally maintain many partners.

Figure 1: House Sparrow (Male and Female)



The birds, which are deprived of nesting opportunities, can become helpers to improve their chances of successful mating in their future breeding activities. Inbreeding depression can lead to reduced survival and breeding success in small and isolated populations, as seen on islands. According to urban ecological studies, air pollution, noise, and human disturbance are major factors that limit nesting success in highly urbanised habitats, but breeding success is more likely to be high in semi-urban and rural habitats. The need for expert ecological research on the House Sparrow is underlined by the deficiency of studies in India, but the existing data indicate similar tendencies.

The present study aims to investigate the nesting and breeding ecology of the House Sparrow (*Passer domesticus*) in Salaiya village, Rewa District, Madhya Pradesh, during the breeding season from April to September 2025. The study focuses on identifying nesting site preferences, nest materials, clutch size, incubation behaviour, hatching and fledging success, and parental care patterns. It also aims to assess the influence of anthropogenic environments, food availability, and habitat conditions on breeding success. The research intends to provide baseline ecological information that may support future conservation and management strategies for the declining House Sparrow population in rural and semi-urban habitats.

2. Materials and Methods

2.1 Study Area

This was done in Salaiya village, which is located in Rewa District, Madhya Pradesh, India. The Rewa district lies in the northeast of Madhya Pradesh and on the Vindhya plateau. Salaiya village is found at 24.53°

N latitude and 81.30° E longitude and has an altitude of approximately 300-350 meters above mean sea level. The area is surrounded by farmlands and village settlements, which provide the right habitat to synanthropic birds such as the House Sparrow (*Passer domesticus*). The climate of the research area is subtropical, characterised by three seasons: summer (March-June), monsoon (July-September), and winter (October-February). High temperatures, usually more than 40°C in summer and temperate to cool with minimum temperatures sometimes falling to below 10°C in winter, characterise the weather. The southwest monsoon brings in moderate to high precipitation, which improves agricultural production and influences seasonal food availability to birds.

Salaiya village is predominantly agricultural, with major crops such as wheat, paddy, pulses and oilseeds. The residential buildings are mainly single- and double-storey houses made of brick, cement, and concrete, and only a few traditional houses are made of mud and tiles. The architectural features, such as roof cavities, cracks around the walls, open eaves, and ventilators, provide suitable nesting sites for the House Sparrows. Additional features such as livestock sheds, grain storage facilities, and small retail outlets enhance nesting and foraging opportunities. The plants surrounding the settlement are scattered trees such as neem (*Azadirachta indica*), peepal (*Ficus religiosa*), banyan (*Ficus benghalensis*), and mango (*Mangifera indica*) plants, as well as shrubs and grasslands. These flora species offer perching, roosting, and feeding spots. Insect numbers greatly increase in the monsoon and post-monsoon seasons, necessary to meet the protein requirement of nestlings. Moderate human participation, primarily linked to agricultural and household activities, characterises Salaiya village. Vehicle traffic is restricted, leading to comparatively little noise and air pollution levels. The combination of traditional housing structures, farm landscapes, and low human disturbance creates a desirable environment to study the nesting and breeding ecology of the House Sparrow in rural environments.



Figure 2: Study Area

The present experiment was carried out during the period of half a year, between April 2025 and September 2025, which included the main breeding period of the House Sparrow (*Passer domesticus*). Systematic field observations were conducted during the study period to record nesting and breeding behaviours. This research observed 37 active nests containing 168 eggs. Active nests of House Sparrows were located in Salaiya village, Madhya Pradesh, Rewa District, by conducting systematic surveys. Possible nesting sites such as residential buildings, rooflines, cracks in walls, ventilation systems, open eaves, livestock barns, and trees near them were carefully inspected. Informally, residents were surveyed to identify commonly used nesting sites. Upon identification, all the nests were given a unique identification number, and the location was recorded. The height of the nest above the ground level, substrate type, and the features of the surrounding habitat were noted. Only active nests with signs of breeding activity (nest construction, egg deposition, hatching or nestlings) were eligible to participate in the study. The identified nests were observed at specified intervals, usually every 2-3 days, to minimise disturbance and ensure accurate data collection.

This was observed in the early morning hours, late afternoon, and evening when the avian activities were at their peak. The use of binoculars would be applied in cases where direct observation might disturb the birds. The state of the nest (egg laying, incubation, hatching, nestling development, or fledging) was recorded on a visit. Hands avoided touching eggs or nestlings to prevent nest desertion. The nest location was fully observed; the type of nesting substrate, the materials used, breeding seasonality, the variation in clutch size, successful hatching, the survival of fledglings, and parental care behaviour were thoroughly observed. The success of the nest was measured using the apparent nest success method, which was calculated as the proportion of nests that had at least one fledgling. Cases of nest failure, such as predation, anthropogenic activities, unfavourable weather conditions, or desertion, were recorded wherever possible. The qualitative observations were undertaken regarding environmental and anthropogenic causes that can influence breeding success. These observations included the availability of food resources, natural cover, proximity to human activities, presence of predators, and structural attributes of nesting sites. The indirect estimation of seasonal changes in insect population was through the feeding patterns of adult sparrows during the nestling stage. The data collected were summarised and examined using descriptive statistics. Key breeding traits such as the size of the clutch, incubation period, and the success of hatching and fledging were calculated as mean values, ranges, and percentages. Findings were discussed under different nesting platforms and ecological settings to identify trends in nesting and breeding ecology.

3.1 Constitute of the nest Structure

A total of 37 nests were spotted. House sparrow nest observations demonstrate the use of a wide range of natural materials and artificial materials that are locally available to build their nests. The loosely built, dome-shaped nests with a unique interior lining were evidence that the species used the adaptive behaviour of nesting in human-dominated environments. The exterior of most of the nests was made of dry grasses, straw, small twigs, and agricultural remnants, which insulated the nest and gave it a skeleton. Fragments of jute fibre, coconut fibre, and slender plant stalks were discovered in some nests. The adjacent open areas and agricultural lands were abundant in these elements.

The inside of the nests was lined with feathers, small pieces of grass, and hair of animals, which helped to make the surface softer and probably helped in keeping the right temperature of the eggs and nestlings. The use of feathers of domesticated fowl and other avian species was customary. Sparrows often incorporate synthetic materials into their nests along with natural materials. These included paper scraps, cotton strands, polythene strips, fabric strands, and plastic fibres, especially in nests found in homes and cow sheds. They were more frequently used in nests built near human settlements.

Tables 1 and 2 show that plant materials were the most preferred material in the construction of House Sparrow nests. The nest is a two-tiered masterpiece that is an example of the skill of avian construction. The structural layer, which was mainly composed of the plant components, provides a strong base. The complexity of the structural layer increases due to the intricate interlacing of the flower parts, foliage, stems, and withered herbs. The stratum layer shows the diversity of the bird spectrum, like a tree painting. The inner lining is a delicate cocoon of eggs and nestlings, and it is like a tapestry of delicate fabrics. Fine jute strands, cotton, and pieces of paper are webbed to form a warm shelter. The flaky remains of leaves, flowers and stalks further confirm the aesthetic sense of the birds in their nesting environment.

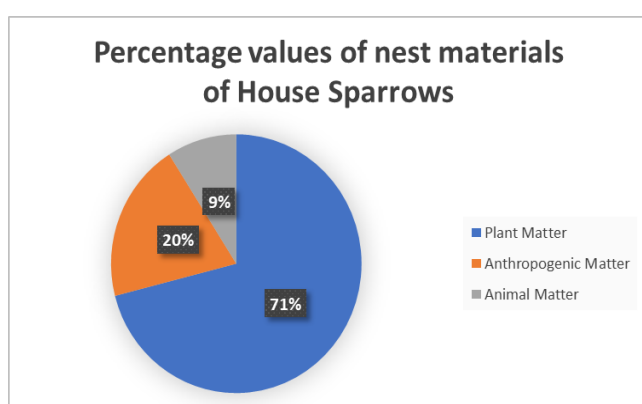


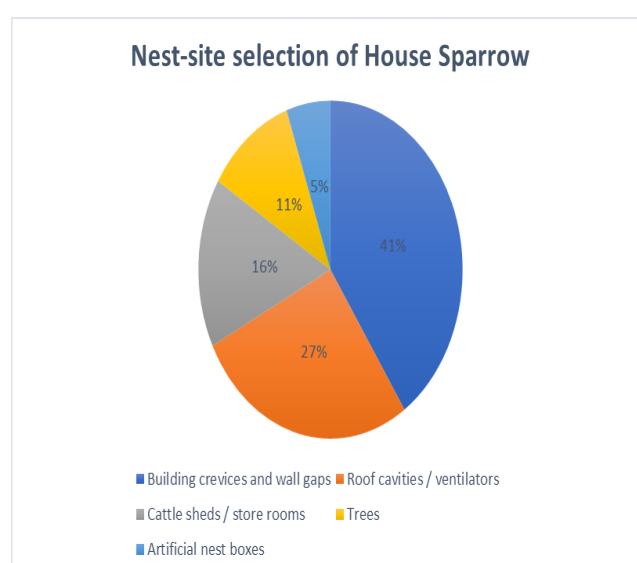
Figure 3: Percentage values of nest materials of House Sparrows

House sparrows are skilful in adjusting to the environmental challenges, including the use of artificial materials in their nest, which allows them to create more durable and insulated nesting sites compared to those made solely from natural materials.

The graphic shows that animal matter is the lowest percentage at 9, and plant matter is the highest percentage at 71. Utilising plant matter as nesting material has been increasing steadily in comparison to other materials. The least common element in the nest is animal materials. The above study indicates that house sparrows prefer to use plant materials in building their nest, and this study is no exception. Both male and female house sparrows helped to build the nest. It was not until the egg hatched that they finished construction of their nest.

3.2 Nesting Site

A total of 37 nests were identified during the research. Most of the nests (40.54) were built in crevices and structural fissures in the walls, especially in old houses that were irregular in construction, openings, and cracks. Such places protected against predators and adverse weather. The nests were found in roof cavities and ventilators (27.03), which gave them high and secure nesting places that were always used during breeding seasons. Nearly one-sixth (16.22) of total nests were found in storerooms and cattle barns. The lower percentage of nests (10.81) was observed in trees, mainly in heavy foliage of neem (*Azadirachta indica*) and mango (*Mangifera indica*), suggesting that natural substrates were used infrequently. Artificial nest boxes recorded only 5.40 percent of the nests, suggesting that they were unavailable or unused in the study area. The success of the nests in artificial buildings was higher than that of the



nests in trees, as they were more exposed to environmental factors, as well as predators.

Figure 4: Nest Site selection

Table 1: Constituents of House sparrow nest layers

SI No.	Nest Material	Nest Layer
Plant Matter		
01.	Dry grasses/ Grass Blades	Structural/Lining
02.	Straw	Structural
03.	Small twigs	Structural
04.	Crop residues	Structural
05.	Jute fibres	Structural
06.	Coconut fibres	Structural
07.	Thin plant stems	Structural
Anthropogenic Matter		
01.	Paper scraps	Lining
02.	Threads	Structural/Lining
03.	Cotton fibres	Lining
04.	Polythene strips	Structural/Lining
05.	Cloth fibres	Lining
Animal Matter		
01.	Feathers	Lining
02.	Animal hair	Lining

Table 2: Percentage values of nest materials of House Sparrows

SI No.	Nest Material	Percentage Value (%)
01.	Plant Matter	71
02.	Anthropogenic Matter	20
03.	Animal Matter	9
Total		100

Table 3: Nest-site selection of House Sparrow

SI No.	Nest Site	Number of Nests	Percentage (%)
01.	Building crevices and wall gaps	15	40.54
02.	Roof cavities/ventilators	10	27.03
03.	Cattle sheds / store rooms	6	16.22
04.	Trees	4	10.81
05.	Artificial nest boxes	2	5.40
Total		37	100

Table 4: Clutch size distribution of House Sparrow

SI No.	Clutch size (eggs/nest)	Number of nests	Total eggs	Percentage of nests (%)
01.	3	6	18	16.22
02.	4	11	44	29.73
03.	5	14	70	37.84
04.	6	6	36	16.22
Total		37	168	100

Table 5: Nest success of House Sparrow

SI No.	Breeding parameter	Number	Percentage (%)
01.	Successful nests (≥ 1 fledgling)	29	78.38
02.	Failed nests	8	21.62
Total		37	100

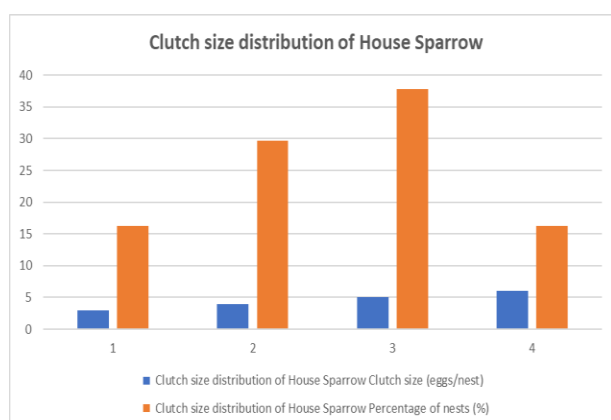
Table 6: Breeding outcome of House Sparrow

SI No.	Breeding parameter	Number	Percentage (%)
01.	Eggs hatched	139	82.74
02.	Unhatched eggs	29	17.26
03.	Nestlings fledged*	119	85.61
Total eggs laid		168	

The data indicate that roof cavities and ventilators were the most favoured nesting sites, whereas artificial nest boxes were the least favoured.

3.3 Clutch size distribution

A total of 37 House Sparrow nests were sampled during the study period, which led to 168 eggs and a mean of 4.54 ± 0.51 eggs/nest. There was also a great deal of breeding output variance, though the number of eggs per clutch ranged between 3 and 6 eggs.

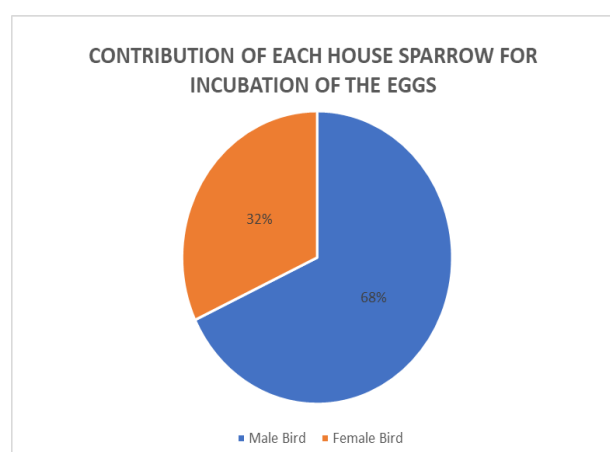
**Figure 5:** Clutch size distribution

The predominant nest size was five eggs (37.84%), followed by clutches of four eggs (29.73%). There were diminished reports of clutches that were larger (six eggs) and smaller (three eggs). Consistent with other findings about *Passer domesticus* populations in rural regions, the occurrence of four- and five-egg clutches signifies optimal breeding conditions in the study area.

3.4 Incubation of Egg

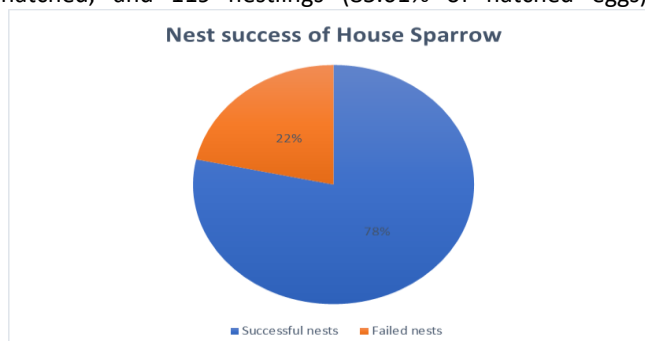
When the nest is complete, the female house sparrow starts laying eggs. In the morning, eggs were laid at dawn. The female house sparrow laid three eggs. The house sparrow was approximately 0.81 inches in length and 0.62 inches in width, with its egg being oval-shaped. The eggs were pale white. The markings, though varied, were frequently marked on the larger side with a mixture of brown and grey dots and speckles. After laying the second-to-last egg, the female sparrow started incubating the eggs. The hatching period of eggs in house sparrows takes an average of 14 days.

The incubation percentage in the female bird is the highest at 68%. The male bird makes up 32 percent of the entire population. The initiation of the incubation process was also alternated between the male and female. At first, the male spent several hours incubating the eggs, but with time, he increased it to about 30% of the total incubation time. Toward the conclusion of the incubation period, the female remains sedentary for around 70% of the time after undertaking the majority of the initial incubation duties. The facts gathered indicate that both of the birds mostly incubated at night. This could have been a result of the lower temperatures at night than during the daytime.

**Figure 6:** Contribution of male and female House Sparrows to the incubation of the eggs.

3.5 Nest success and Breeding outcome

Out of the 37 nests observed, 29 nests (78.38%) were successful, producing at least one fledgling, while 8 nests (21.62%) failed. Of the 168 eggs laid, 139 eggs (82.74%) hatched, and 119 nestlings (85.61% of hatched eggs)



successfully fledged, but 29 eggs (17.26%) remain unhatched.

Figure 7: Nest success of House Sparrow

The observation of this chart shows a substantially higher number of successful nests compared to failed nests. Apparent nest success rate is 78.38%.

The extreme nest success witnessed in this study can be attributed to the slight disturbance caused by humans, the presence of food, and the protection offered by nesting in enclosed artificial structures. Human intervention, unintentional destruction during home renovations, predation and bad weather were the main causes of nest failure.

The results have shown that the availability of nest sites and the habitat configuration play a crucial role in determining the breeding success of House Sparrows. Traditional housing in rural areas offers better nesting opportunities, resulting in higher nest size and fledging success compared to highly urbanised areas. The findings support previous studies indicating a decline in sparrow populations in areas with modern concrete buildings that lack nesting opportunities. Conservation plans that preserve old architectural features, utilise nest boxes, and expand green areas could significantly enhance breeding success.

4. Discussion

The current research involved the examination of the nesting and breeding ecology of the house sparrow (*Passer domesticus*) in rural Salaiya village, Rewa District of Madhya Pradesh. The results give a lot of new knowledge about nest-site preferences and reproductive characteristics and conditions affecting breeding success in anthropogenic habitats. The average of 4.54 ± 0.51 eggs per nest in the present study is compared to the previous studies of House Sparrow populations in rural and semi-urban areas. The favourable breeding conditions of the study area are reflected in four and five-egg clutches, which might be facilitated by the presence of a sufficient food supply and an appropriate nesting environment. The difference in the size of the clutch between nests can be explained in many different ways, such as the age and health of the breeding couple, the time of the breeding season, and the availability of resources.

The nest success rate of the study was very high, and 78.38 percent of the nests had at least one fledgling. Salaiya village has a favourable breeding environment, which is exhibited by a high hatching rate (82.74) and fledging rate (85.61) of hatched eggs. It has been reported that there are similar breeding success rates in rural areas of moderate human disturbance with relatively secure nesting sites. On the other hand, higher disturbance, pollution and lack of nesting habitat have frequently been linked to low nest success that has been witnessed in the urban areas. Nest-site selection patterns revealed that there was a strong preference for artificial nest sites, such as roof holes, wall crevices, and building fissures. The observation of this finding underscores the synanthropic nature of the House Sparrow and its links with human environments. Natural nesting sites appear to play second fiddle to appropriate artificial cavities, with very little use of trees and man-made nest boxes. The low occupancy of nest boxes suggests that

good conservation plans can be possible when properly planned and located.

The environmental effects that appear to have a significant impact on breeding success include seasonal vegetation cover and the availability of insects during the nestling stage. The large land area and agricultural activities in the village probably guaranteed the availability of food. Anthropogenic events cause nest failure mainly due to human interference and accidental destruction of the nest, which means that more attention needs to be paid to residents. The research highlights the importance of conventional rural habitats in supporting the house sparrow population and the effects of human activities on nesting and breeding success.

5. Conclusion

The paper gives a detailed report on the nesting/breeding ecology of the house sparrow (*Passer domesticus*) in Salaiya village, Rewa District, Madhya Pradesh. The average clutch size was 4.54 eggs/nest with a perceived nest success rate of 78.38%. The number of nests recorded was 37 with 168 eggs, which is a good indication that there were good breeding conditions in the study area. The researchers report that House Sparrows extensively rely on the artificial nesting sites that are linked to old housing buildings. The species continues to reproduce successfully in rural areas that have limited human influence, adequate food supplies, and sufficient nesting places. However, there can be a great deal of difficulty in the future because of the alteration of the architectural design and the growing human influence on sparrows, which may lead to habitat loss and decreased nesting opportunities for these birds. The results highlight the need to have effective and precise conservation initiatives, including maintenance of green areas, placing nest boxes, preservation of historic buildings, and reduction of pesticide use. This study can be used as baseline data for further ecological and conservation-based studies on the House Sparrow, which will further improve our understanding of the breeding ecology of the species.

6. Statements and Declarations

Ethical Approval: Not Applicable

Conflict of Interest: No conflict of interest was reported by the authors.

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References

- Ali, S., & Ripley, S. D. (1974). Handbook of the Birds of India and Pakistan (Vol. 10). Oxford University Press, New Delhi.
- Anderson, T. R. (2006). Biology of the Ubiquitous House Sparrow: From Genes to Populations. Oxford University Press, Oxford.
- Balmford, A., Green, R. E., & Jenkins, M. (2003). Measuring the changing state of nature. *Trends in Ecology & Evolution*, 18(7), 326–330.
- Bhattacharya, R., Roy, R., & Ghosh, S. (2011). Urbanisation and its impact on House Sparrow populations. *Urban Ecosystems*, 14, 23–34.
- Biddle, L. E., Goodman, A. M., & Deeming, D. C. (2017). Parasites and nestling growth in passerine birds. *Avian Biology Research*, 10(3), 139–148.
- BirdLife International. (2023). *Passer domesticus*. The IUCN Red List of Threatened Species. IUCN, Gland, Switzerland.
- Breeding Bird Survey Report. (2004). Breeding biology of Indian birds. Bombay Natural History Society, Mumbai.
- Chamberlain, D. E., Toms, M. P., Cleary-McHarg, R., & Banks, A. N. (2007). House Sparrow (*Passer domesticus*) habitats are used in urbanised landscapes. *Journal of Ornithology*, 148(Suppl. 2), 453–462.
- Choudhary, R., & Chishty, N. (2022). Anthropogenic stressors and sparrow decline in Indian cities. *Environment and Ecology*, 40(3), 1021–1028.
- Crick, H. Q. P., & Siriwardena, G. M. (2002). National trends in the breeding performance of House Sparrows (*Passer domesticus*). *Journal of Applied Ecology*, 39(5), 793–805.
- Daniels, R. J. R. (2011). Common Birds of India. Oxford University Press, New Delhi.
- Dhanya, R. (2012). Decline of House Sparrow in Indian urban ecosystems. *Zoo's Print Journal*, 27(5), 22–26.
- Ghosh, S., Roy, R., & Bhattacharya, R. (2010). Population trends of the House Sparrow in India. *Proceedings of the Zoological Society*, 63, 101–108.
- Griffith, S. C., Owens, I. P. F., & Thuman, K. A. (1999). Extra-pair paternity in birds: A review of interspecific variation and adaptive function. *Molecular Ecology*, 8, 219–237.
- Hole, D. G., Whittingham, M. J., Bradbury, R. B., et al. (2002). Widespread declines of farmland birds in Britain. *Journal of Applied Ecology*, 39, 187–197.
- Kler, T. K., Kumar, R., & Singh, J. (2015). Habitat use of House Sparrow in rural and urban Punjab. *Indian Birds*, 10(3), 61–66.
- Lowther, P. E., & Cink, C. L. (2006). House Sparrow (*Passer domesticus*). The Birds of North America Online. Cornell Lab of Ornithology, Ithaca.
- Mainwaring, M. C., Hartley, I. R., Lambrechts, M. M., & Deeming, D. C. (2014). The design and function of birds' nests. *Ecology and Evolution*, 4, 3909–3928.
- Mirza, Z. B. (1972). Breeding biology of the House Sparrow in Pakistan. *Pakistan Journal of Zoology*, 4, 123–134.
- Naik, R. M., & Mistry, J. J. (1972). Breeding biology of the House Sparrow at Baroda. *Pavo*, 10, 45–56.
- Newton, I. (1998). Population Limitation in Birds. Academic Press, London.
- North, P. M. (1972). Breeding success in urban House Sparrows. *Bird Study*, 19, 181–190.
- Pullin, A. S. (2002). Conservation Biology. Cambridge University Press.
- Quinn, J. L., & Ueta, M. (2008). Nest parasites and breeding success. *Ecological Research*, 23, 123–130.
- Rajashekar, S., & Venkatesha, M. G. (2008). Occurrence of House Sparrow in urban Bangalore. *Current Science*, 94(2), 235–240.
- Robinson, R. A., Siriwardena, G. M., & Crick, H. Q. P. (2005). Size and trends of the House Sparrow population in Great Britain. *Ibis*, 147(3), 552–562.
- RSPB. (2003). The State of the UK's Birds. Royal Society for the Protection of Birds, Sandy.
- Summers-Smith, J. D. (2003). The decline of the House Sparrow: A review. *British Birds*, 96, 439–446.
- Vincent, K. (2005). Investigating the causes of the decline of the urban House Sparrow. *British Birds*, 98, 138–156.
- Wikipedia Contributors (2019). House sparrow. [online] Wikipedia. Available at: https://en.wikipedia.org/wiki/House_sparrow.