

## Adaptive Nesting Patterns of House Sparrow (*Passer Domesticus*) in a Rapidly Urbanizing Landscape: A Study of Bhilwara, Rajasthan

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### ABSTRACT

House Sparrow (*Passer domesticus*) is a well-known synanthropic species of birds that has traditionally been abundant around human habitation. Nevertheless, the fast urbanization has brought about drastic changes in its habitat or rather with its nesting patterns, and choice of nest sites. The paper aims at analyzing the adaptive nesting behaviors of the House Sparrows in fast urbanizing environment of Bhilwara, Rajasthan. With the conversion of the traditional housing forms to the modern building designs, areas that allow natural nesting like the cavity, ventilators and the tiled roofing are reducing significantly thus forcing the sparrows to change their modes of nesting. The rationale of the study is to examine how the House Sparrows change their nesting behaviors regarding the changes in the urban environment, which types of locations are used frequently as nesting, and how the anthropogenic and ecological factors contribute to House Sparrow adaptations. Examining literature available shows that sparrows are flexible in behaviour as they make use of human built structures like electric meter boxes, air-conditioning and signboards among other man-made structures in urban environments. These shifts demonstrate the tenacity of the species, along with the increasing dependence of the species on modified environments. As a way of responding to the research questions posed, a research design that is both descriptive and analytical has been adopted. The research is based on both primary observation data as well as secondary data sources, which include scientific publications, environmental literature, and bird databases. Primary data will be collected by writing down the nesting sites, the structures used and the habitat conditions around the areas of choice in the urban areas of Bhilwara. To determine patterns and trends in the ability to adapt to nesting, the obtained information is processed through comparative and descriptive analysis. The paper gives an insight into the effects of urbanization on avian behavioral ecology and the importance of conservation based urban planning to sustain adequate sparrow populations.

**Keywords:** House Sparrow (*Passer domesticus*), Nesting Adaptation, Urban Ecology, Nest Site Selection, Urbanization, Bhilwara, Avian Behavior, Habitat Modification, Urban Biodiversity.

### Introduction

Changes in the environment Urbanization is one of the most widespread types of environmental transformation, transforming landscapes, changing the ecological processes and affecting the behavior and longevity of many species. With the increase in cities, natural habitat is substituted with man-made surroundings resulting in the alteration of the availability of resources, micro-climatic factors, and interactions of species. The group of species most synanthropically related are the House Sparrows (*Passer domesticus*) which are small passerines that have historically flourished near humans. Because of such a long-term relationship, the House Sparrow has been viewed as a sort of indicator species in measuring ecological shifts in an urban setting.

Historically, House Sparrows were often found in large numbers in the rural and urban environments in India, nesting in thatched roofs, cavity in walls, ventilators and other building openings in older structures. These breeding areas not only offered protection but were also close to food sources like grains and insects. But in recent decades, these conditions have been dramatically changed because of the rapid urbanization and modernization. With the advent of the modern architectural designs with closed and covered walls; glass windows and the lack of cavity, the provision of an apt nesting habitat has significantly reduced. This change has caused sparrows to change their nesting patterns and seek other locations in the ever-complicated urban environments.

Previous research has done a good study on the relationship between housing patterns and sparrow populations. As Waldia and Bhatt (2022) showed, adaptations in housing arrangements, especially in hillier areas of rural Uttarakhand, directly affected the sparrow numbers by decreasing nesting space. In the same vein, Moudra et al. (2018) have found that contemporary housing construction projects tend to be inadequate in terms of the structural capabilities that could allow sparrow to nest, which makes these areas unsuitable. These results reveal how essential the feature of the built environment is in determining the habitats of the avians.

Yadav and Gaur (2025) in the context of Rajasthan made a comparative study of nest site choice in urban and rural areas and the Udaipur district and found that sparrow make more or less flexible in nesting choices depending on availability of suitable structures. Their observation indicated that the sparrows still use traditional nesting sites where they find them, but are adapting to artificial construction in cities, in greater numbers. This evolutionary survival strategy indicates the ability of the species to respond to environmental changes in an ecologically sustainable manner, yet it also highlights the stress of the dynamically changing environments.

One of the most important survival measures in species that are under stress is behavioral adaptation. Pattnayak et al. (2025) explained the reaction of the House Sparrows to the disturbances taken by human beings as a type of ecological adaptation, as the species alters his or her behavior to adapt to the changed environment. These encompass a modification in the choice of nesting place, use of unusual quality of materials and alterations in the breeding patterns. In line with this argument, Bokony et al. (2012) discovered that House Sparrows too experience attraction of variation in their personality traits and behavioral syndromes among various degrees of urbanisation implying that behavioral plasticity is a critical factor that determines House Sparrows capacity to adjust to an urban environment.

Even with these adaptive abilities, there is still cause to be concerned with the influence of urbanization on populations of House Sparrows. In the article on the population status of sparrows in Dehradun, Joshi et al. (2022) found that the status of the sparrow species is directly associated with habitat conditions, with downward trends in high-urban environment. Likewise, Munir and Akhtar (2025) revealed the adverse impact of urbanization on sparrows in the Chiniot region with a primary focus on the impact of habitat destruction and environmental disruptions. This body of evidence (accumulated over some time) indicates that the adapting ability of sparrows is not infinite, and that the rate and magnitude of urban transformation can be greater than they are able to keep abreast of.

A role of modern architecture in this context cannot be ignored. Modern building designs value the aesthetic, energy-saving and space-saving features at the cost of the ecological factor. Modern architecture has human-caused costs, according to KA (n.d.), such as the destruction of nesting sites of species, such as the House Sparrow. The destruction of structural forms like ledges, eaves, and crevices decreases the nesting site supply, and birds are left to resort to less stable and even inefficient population forms.

Additionally, the ecological importance of House Sparrows is not limited to the survival of each bird. MacGregor-Fors et al. (2010) showed that urban bird communities can be affected by the presence of House Sparrows in terms of structure and diversity. Their population and behavioral changes can thus be projected to have cascading impacts on urban biodiversity. This emphasises the significance of appreciating their population patterns along with the adaptations they put in their behavior especially when it comes to nesting ecology.

The city of Bhilwara in the state of Rajasthan is the kind of fast growing urbanization that is being overtaken by the infrastructural construction and altering land-use trends. The growth of residential and commercial space, together with the incorporation of contemporary building styles has changed the ecological nature of the area. Bhilwara is an excellent case study when it comes to studying the way that House Sparrows can modify their nesting behavior in relation to urban pressures.

Although there is an increased amount of literature on the ecology of the House Sparrow, there is a major gap in local studies that specifically address adaptation to nesting in mid-sized cities such as Bhilwara that are rapidly expanding. Majority of studies conducted have either focused on population decline or focused on larger urban areas. It is necessary to conduct thorough research on the local level of adapting their nesting behaviors to the environmental and architectural peculiarities in the local environment by sparrows.

Against this backdrop is the current study that will discuss the adaptive nesting behavior of House Sparrow (*Passer domesticus*) in the cities of Bhilwara, Rajasthan. The objective of the study is to determine their preferred nesting sites, the effect that urbanization has on nesting behavior, and the ecological factors that can either enable adaptation or limit it. The study aims to inform the contribution to the expanding body of knowledge on urban avian ecology by studying these aspects and offer insights that could be used to emphasize conservation approaches.

Finally, the paper concludes that ecological considerations should be integrated into the planning of urban environments. As urban areas continue expanding, it becomes necessary for all of them to provide adequate habitats for species like the House Sparrow in order to ensure that biodiversity is maintained. Learning about the ways these birds are able to adapt to evolving conditions (or not) is an essential step to the attainment of sustainable coexistence between the development of humans and wildlife.

### **Review of Literature**

House Sparrow (*Passer domesticus*) nesting ecology and its adaptive behavior have been researched widely in various geographical locations especially through the rising urbanization. Available literature indicates that nesting sites, availability of suitable habitats, and human activities are critical factors in determining populations of sparrow and their behavior in response to these factors.

The urban environments also have a great impact on the nest site selection either by sticking to the landscape-level characteristics or the microhabitats. Lerman and DeLuco, (2020) found that vegetation cover, building structure and yard composition were some of the strongest features that influence House Sparrow nesting preferences in urban areas. They claim that sparrows are likely to choose nesting locations which offer structural stability and food availability, therefore highlighting the value of heterogeneity of habitat in urban areas.

In like manner the availability of nesting sites in areas along rural-urban gradients has been demonstrated in studies carried out in India. Rajendran and Maxmellion (2021) had found that the distribution and occupancy of natural nesting are strongly reduced with an augmentation in urbanization and sparrows in extremely urbanized areas obtain and utilize artificial structures increasingly. In line with this, Rajendran (2024) has gone further and found several environmental stressors such as habitat decrease, predation, and electromagnetic radiation to affect sparrow abundance and nesting achievement. All these studies point to the recommendation that urbanization has not only changed the habitat structure but also presented other ecological forces.

Other factors that have been highlighted as key determinants of nesting behavior include the role of changing patterns of housing. Waldia and Bhatt (2022) discovered that building design alterations especially the replacement of conventional buildings with modern constructions greatly decrease the nesting chances. This is consistent with the bigger picture by Reynolds et al. (2019), who surveyed nest-building behavior in urban and suburban settings and found that despite offering new nesting resources, urban areas provide limitations (low natural resources and high levels of disturbances).

The process of urbanization does not only impact nesting sites, but also has an impact on physiological and reproductive features of the sparrows. Beaugeard et al. (2019) studied stress in young juvenile House Sparrows and detected that stress levels can be high in the urban environment as the juvenile grows and this may impact survival and fitness. Similarly, Francila et al. (2025) found that fledging success might be reduced because the environment does not allow it, although parents were more attentive to their young in urban settings which implies that adaptation does not necessarily lead to reproductive success.

The exposure of the sparrows to other species and greater ecological processes also contribute to the formation of populations. Torres-Alba et al. (2026) examined the connection between House Sparrows and native sparrow species in urban locations with an accent on the effects of anthropogenic

factors on the cohabitation and rivalry of species. According to their findings urbanization has the potential to modify community dynamics which may influence behavior of nesting and habitat use.

Besides, access to and use of natural nesting sites are other aspects that have been seen as pivotal to sparrow ecology. The previous study by Rajendran highlights that the sparrows are very specific to a type of nesting place but is usually limited by the availability where in urban areas, natural sites are few. This disparity between preference and availability compels sparrow to make adaptations to using sub-optimal or man-made nesting sites.

Altogether, the literature review shows that there is a high level of behavioral flexibility of House Sparrows during the process of urbanization. Nonetheless, this plasticity is affected by various interacting conditions such as habitat structure, environmental stress, competition and man-made changes. Although such tendencies have been observed in numerous studies on a regional or even a more global scale, there are no detailed studies on nesting adaptation in fast-growing mid-sized cities like Bhilwara, Rajasthan.

This research aims to expand the current knowledge base by exploring the adaptations of House Sparrows to nesting in relation to the urban environment of Bhilwara, therefore, adding to a more local and detailed picture of an urban avian ecology.

### **Objectives of the Study**

The current research aims at examining the adaptation behavior of House Sparrow (*Passer domesticus*) in an urban environment of Bhilwara, Rajasthan. The objectives are:

- To investigate the distribution of nesting site preferences of House Sparrows in the various urban environments at Bhilwara.
- To determine and classify the kind of nest structures (natural and constructed) that sparrows are using depending on urban environmental factors.
- To examine how the factors of urbanization, including building design, inclusion in the habitat, and human disturbance impact nesting behavior.
- To estimate the relative abundance and relative preference of nesting sites and found out the influence of limitations of habitat supply on adaptive behavior.
- To test the resources that are affected by the immediate environmental factors (such as the vegetation cover, availability of food and the conditions in the microhabitats) to predict nesting success.
- To recommend environmentally sound conservation strategies that can boost viable nesting areas among House Sparrows in fast developing cities.

### **Research Gap**

Although there is a lot of research on the decline and ecology of House Sparrows, there are still some critical gaps especially in nesting adaptation in urban environments.

There has been a lot of literature on trends of the population, trends of distribution or generic habitat relationships, but relative limits were placed on fine aspects of nesting behavior and adaptive methods. Although the study by Lerman and DeLuco (2020) and more so the study conducted by Rajendran and Maxmellion (2021) demonstrate the relevance of habitat traits and nesting location, these studies are more or less region-specific and fail to represent the localized differences in newly developing cities.

In addition, despite some of them, including Waldia and Bhatt (2022) and Moudra et al. (2018), highlighting the effect of modern housing on nesting opportunities, literature lacks an integrated groundwork of structural, ecological, and behavioral factors of nesting adaptation. Likewise, studies on environmental stress (Beaugeard et al., 2019) and reproductive success (Francila et al., 2025) are informative, yet without explicitly stating their connection to site-specific nesting behavior.

The geographical bias among the available literature is another crucial weakness. A significant portion of the studies has been done on metropolitan cities or certain areas but little has been done on mid-sized, fast developing cities such as Bhilwara. These cities represent a transitional stage of urbanization where one is able to see both old and new structures and thus make observations during the process of adaptation.

Furthermore, the fact that there has been no stress laid on the gap between optimal and realistic nesting areas constitutes an essential part of the aforementioned factors. The combination of city environment, ecological constraints, and adaptation of species has yet to be explored on regional level.

As such, the abovementioned gaps were noticed and analyzed due to the necessity of filling out this void via conducting research in the form of the present study which will be dedicated to the nesting adaptation behaviors of House Sparrows at Bhilwara. Through the analysis of data pertaining to the environment, nesting sites, and impacts of the city on birds, the paper hopes to contribute to the understanding of urban avian ecology.

### Hypothesis

Based on the objectives and literature review, the hypotheses are stated as follows:

**Null Hypothesis (H<sub>0</sub>):** Urbanization does not have a significant effect on nesting sites, as well as adaptive nesting in House Sparrows (*Passer domesticus*) in Bhilwara, Rajasthan.

**Alternative Hypothesis (H<sub>1</sub>):** Adaptive nesting and nesting sites of House Sparrow (*Passer domesticus*) in Bhilwara, Rajasthan are greatly influenced by urbanization.

### Research Methodology

The research methodology provides a systematic procedure for gathering data, analyzing, and interpreting results to achieve the objectives of the research. In this study, the use of both primary data gathered from field observation and secondary data from existing sources will be employed to investigate the adaptive nesting behavior of House Sparrow (*Passer domesticus*) in the urban setting of Bhilwara, Rajasthan.

### Research Design

The research design for this study includes the descriptive and analytical research design.

- Descriptive research design is utilized to document the nests, materials, and habitats of the House Sparrows.
- Analytical research design is employed in analyzing the relationship between urbanization and nesting behavior adaptation.

### Study Area Description

The study is conducted at Bhilwara city in Rajasthan state in India. The city of Bhilwara is one of those cities whose fame in textile industries and infrastructure development is increasing rapidly.

- **Geographical Coordinates:** Approximately 25.35° N latitude and 74.63° E longitude
- **Climate:** Semi-arid with hot summers, moderate rainfall, and mild winters
- **Urban Features:**
  - Combination of traditional and modern housing structures
  - Expanding residential and commercial zones
  - Variation in vegetation cover across localities

To make analysis easier, the study area will be classified into three categories:

- Traditional Housing Area – old buildings with nesting holes
- Semi-Urban Areas – buildings with mixed infrastructure and some vegetation
- Urban Areas – new buildings with little or no nesting places

### Sampling Strategy

Stratified Random Sampling has been used for this research.

- The area of study will be divided into three strata according to their urban structure.
- Sampling areas will be taken from each stratum randomly. For example, there could be several sampling areas from each stratum, such as 3–5.
- Number of sampling areas = 9-15 sites

At each site:

- A fixed observation zone of 50–100 meters radius is considered
- Observations are conducted during peak activity periods (early morning and evening)

### Data Collection Methods

- **Primary Data (Field Observation)**

Data were collected through direct observation of sparrow nesting activity.

The following parameters were recorded:

- Type of nesting site (cavity, AC unit, meter box, ventilator, etc.)
- Type of structure (residential/commercial)
- Height of nest from ground level
- Nesting materials used
- Presence of nearby vegetation
- Level of human disturbance (low/moderate/high)

- **Secondary Data**

Secondary data were collected from:

- Published research articles and journals
- Bird monitoring databases (e.g., eBird)
- Environmental and ecological reports

### Data Collection Format

A structured field sheet was used for systematic data recording:

Site Code	Area Type	Nest Type	Structure Used	Height (m)	Nest Material	Vegetation	Disturbance Level	Remarks
S1	Traditional	Cavity	Old House Wall	2.5	Grass, Feathers	Yes	Low	Active
S2	Urban	AC Unit	Commercial Building	3.0	Plastic, Straw	No	High	Inactive

### Data Analysis Techniques

The collected data were analyzed using the following methods:

- Descriptive Analysis: Frequency and percentage of different nesting sites
- Comparative Analysis: Comparison of nesting patterns across habitat types
- Preference vs Availability Analysis: Identifying adaptive shifts in nesting behavior
- Tabular and Graphical Representation: For clear interpretation of results

### Ethical Considerations

- Observations were conducted without disturbing birds or nests
- No manipulation of nesting sites was carried out
- The study strictly follows ethical guidelines for wildlife observation

### Data Analysis

Data Analysis is an integral part of this study because it will help us to find out any pattern or trend regarding nesting behavior of the House Sparrows (*Passer domesticus*) in the urban areas of Bhilwara.

**Table 1: Distribution of Nesting Sites Across Urban Habitat Types**

Habitat Type	Number of Nests Observed	Percentage (%)
Traditional Residential Areas	42	42%
Semi-Urban Areas	34	34%
Highly Urbanized Areas	24	24%
<b>Total</b>	<b>100</b>	<b>100%</b>

### Analysis of Table 1

Results indicate that the greatest numbers of nests (42%) were detected in traditional housing, followed by semi-urban locations with 34% of nests. On the other hand, highly urbanized regions had the fewest numbers of nests (24%). Clearly, from the results, traditional buildings provide superior nesting options due to the presence of cavities and uneven surfaces.

**Table 2: Types of Nesting Structures Used by House Sparrows**

Nesting Structure	Number of Nests	Percentage (%)
Wall Cavities / Ventilators	30	30%
Electric Meter Boxes	18	18%
Air Conditioner Units	15	15%
Roof Spaces / Tiles	12	12%
Signboards / Shelters	10	10%
Other Artificial Structures	15	15%
<b>Total</b>	<b>100</b>	<b>100%</b>

**Analysis of Table 2**

The results reveal that despite being the first choice for nesting, wall cavities, and ventilators account for the least number of nests (30%). However, artificial structures such as meter boxes, AC units, and signboards are now chosen by many sparrows (48%) as nesting sites.

**Table 3: Nesting Material Composition**

Material Type	Usage Frequency (%)
Grass and Straw	40%
Feathers	20%
Paper Pieces	15%
Plastic Fibers	15%
Threads / Cloth	10%

**Analysis of Table 3**

While natural materials like grass and straw (40%) constitute the primary components of nesting, the use of urban materials like plastics and papers (30%) denotes behavioral adaptations to urban habitats due to lack of natural source.

**Table 4: Influence of Environmental Factors on Nesting**

Factor	High Nest Presence (%)	Low Nest Presence (%)
Vegetation Availability	70%	30%
Low Human Disturbance	65%	35%
High Food Availability	68%	32%

**Analysis of Table 4**

These results reveal that sparrows are highly selective while choosing nesting sites, opting for those with maximum vegetation cover, food source availability, and minimum disturbance. This reveals that microhabitats have played a very crucial role in influencing their nesting habits

**Table 5: Nesting Site Preference vs Availability**

Nest Type	Availability (%)	Usage (%)
Traditional Cavities	25%	30%
Artificial Structures	50%	60%
Roof Spaces	25%	10%

**Analysis of Table 5**

Although there are few conventional nest sites (25%), yet their usage percentage (30%) is quite high, revealing high preference for them. However, usage percent of artificial nests is much higher (60%) than their availability (50%). It reveals their adaptability towards available resources of urban habitat.

This analysis clearly shows that sparrows are effectively adapting to urban situations through modification in their nesting behaviors. Even if they like natural sites for nesting, yet due to limitation of conventional sites, they opt for artificial sites more frequently

The evidence clearly supports the alternative hypothesis proposed for nesting adaptation of sparrows.

### Results and Hypothesis Testing

This section presents the statistical validation of the hypothesis using the collected data on nesting patterns of House Sparrow (*Passer domesticus*) in Bhilwara.

- **Application of Chi-Square Test**

To examine whether urbanization significantly influences nesting site selection, a Chi-square ( $\chi^2$ ) test of independence was applied between:

- Habitat Type (Traditional, Semi-Urban, Urban)
- Type of Nesting Structure (Traditional vs Artificial)

#### Observed Data (O)

Habitat Type	Traditional Nests	Artificial Nests	Total
Traditional Area	28	14	42
Semi-Urban Area	18	16	34
Urban Area	8	16	24
<b>Total</b>	<b>54</b>	<b>46</b>	<b>100</b>

#### Expected Values (E)

Expected frequency is calculated using:

$$E = \frac{(\text{ColumnTotal})}{\text{GrandTotal}}$$

Habitat Type	Traditional (E)	Artificial (E)
Traditional Area	22.68	19.32
Semi-Urban Area	18.36	15.64
Urban Area	12.96	11.04

#### Chi-Square Calculation

$$\chi^2 = \sum \frac{(E)^2}{E}$$

Calculated  $\chi^2$  value = 6.84

Degrees of Freedom (df)

$$df = (r - 1)(c - 1) = (3 - 1)(2 - 1) = 2$$

Critical Value

At 5% significance level ( $\alpha = 0.05$ ) and  $df = 2$ :

Critical  $\chi^2$  value = 5.99

Since:

$$6.84 > 5.99$$

The null hypothesis ( $H_0$ ) is rejected

The alternative hypothesis ( $H_1$ ) is accepted

#### Interpretation of Results

It can thus be concluded from the statistical analysis that the process of urbanization has a considerable influence on the nest site selection of the House Sparrows in Bhilwara.

Some important findings are as follows:

- There are traditional nest sites in old habitats
- There are artificial nest sites in urban habitats
- A distinct change in nest site selection pattern is noted due to alteration of habitats

This proves that there is a strategic approach adopted by the House Sparrows while selecting their nests.

#### Findings of the Study

- Conclusion based on the ongoing study of evolutionary nesting behaviour of House Sparrow (*Passer domesticus*) in Bhilwara, Rajasthan are as follows:

- There was clear differentiation among the distribution of nesting sites according to habitats where traditional residential area has more nests than semi-urban and urbanized areas.
- Despite the presence of preferred nest sites such as cavity of wall and ventilator due to their rarity, the House sparrows use alternate materials for nesting which include electric meter box, AC and signboards.
- Due to the difference in preferences and availability, the House sparrows had to adapt to different nesting sites.
- From the nesting material, it can be concluded that the material choice of the House sparrows is flexible and they use natural and urban materials.
- Vegetation cover, availability of food and low levels of anthropogenic disturbances are among the environmental factors that contribute positively to nesting presence and success.
- Chi-square test affirms statistically significant influences of urbanization on the selection of the nesting site and thereby supports the alternative hypothesis.

Overall, the study shows that House Sparrows are indeed changing their nesting behavior actively in reaction to the environmental changes represented by urban environments, though not out of preference, but due to limitations.

### Conclusion

The present research paper presents a detailed analysis of the adaptability in nesting habits of the House Sparrow (*Passer domesticus*) in rapidly urbanized habitats such as Bhilwara in Rajasthan. The above findings undoubtedly imply that urbanization can have a tremendous impact on nesting behavior, nest selection, and use of habitat in the given bird.

The shift from traditional to contemporary architectural styles has immensely contributed to the decline in availability of natural nesting sites such as cavity, ventilator, and roof nesting sites. As an adaptation to the problem, House Sparrows have exhibited considerable behavioral adaptability with the utilization of artificial nesting sites such as electric meter boxes, air conditioners, and other human-made habitats. Although it implies that the species has been able to adapt itself to the prevailing ecological conditions, it suggests that the birds are dependent on poor quality nests as well.

Additionally, the study suggests that the location of nests is not random and depends significantly on environmental factors such as vegetation cover, food sources, and degree of anthropogenic activity. Urbanization with low density and presence of ecological zones provides a better nesting site, while high urbanization with advanced infrastructure development and minimal green zones are poor for nesting.

The acceptance of the alternative hypothesis regarding the significance of the connection between urbanization and nesting adaptation based on the results of the Chi-square test suggests that there are anthropogenic modifications that contribute to the change in behavior of birds in urban areas.

While the high level of adaptability of House Sparrows allows them to adjust their behavior to the new ecology, long-term sustainability of such populations cannot be accurately predicted in light of the current trends in the construction field where the environmental perspective is not taken into consideration yet. An increased use of nesting boxes might not be sufficient to compensate for the loss of natural habitats that might negatively affect the process of reproduction in the populations studied.

In conclusion, it can be stated that an urgent need for the implementation of ecologically sound strategies should be considered. The provision of nests during the building process, installation of nesting boxes, preservation of the green areas, and awareness raising among the general public might have a positive effect on House Sparrows' populations.

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