International Journal of Innovations & Research Analysis (IJIRA)
e-ISSN :2583-0295, Impact Factor: (Cosmos 7.662 & I2OR 5.105), Volume 06, No. 01(II), January- March, 2026, pp 72-80

# Trend Analysis of House Sparrow (Passer Domesticus) Population Decline in Urban India

**Akshita Ojha[1*] | Dr. Usha Sharma[2]**

[1]Research Scholar, School of Basic and Applied Sciences, Nirwan University Jaipur.
[2]Assistant Professor, School of Basic and Applied Sciences, Nirwan University Jaipur.

[*]Corresponding Author: aarohisharma8r@gmail.com

*Citation: Ojha, A. & Sharma, U. (2026). Trend Analysis of House Sparrow (Passer Domesticus) Population Decline in Urban India. International Journal of Innovations & Research Analysis, 06(01(II)), 72–80. https://doi.org/10.62823/IJIRA/06.1(II).8765*

## ABSTRACT

*The House Sparrow (Passer domesticus) has long been known to be one of the most common bird species that are closely related to human habitation. However, in recent decades there have been several studies and observations that have recorded a significant fall in its population especially in those urban areas of India. The tendency has created ecological issues and garnered attention of researchers, environmentalists and conservation organisations. The current study aims to examine urban population dynamics of House Sparrows in India using the available secondary data sources which are scientific publications, avian monitoring databases and environmental reports. The paper highlights the determination of the time-based trends of population change and appraises the key variables that form the basis of the downturn. The environmental and manmade factors, such as the rapid urbanisation, the disappearance of traditional nesting sites, changes in the building architectures, reduced food supply, increased levels of pollution, and other urban environmental changes are discussed in connection with the changes in the sparrow population. Secondary data has been analyzed and it has been found that there has been a steady reduction in the population of House Sparrows in various Indian metropolises over the last few decades. The results emphasize the importance of paying more attention to the issue of urban biodiversity conservation and support the solution of such measures as the supply of nest boxes, green areas protection, and the extension of awareness programmes. Better comprehension of the population dynamics of House Sparrows will be used in developing the effective strategies to protect the now important urban bird and to establish a balance in the ecology of fast emerging urban environments.*

***Keywords**: House Sparrow, Passer Domesticus, Population Decline, Urban India, Urbanization, Bird Conservation, Trend Analysis.*

## Introduction

Birds contribute a vital function in maintaining ecological and biodiversity in both the natural and urban environments. The House Sparrow (Passer domesticus) is one of the most well-known and widespread of the dozens of species of birds that have co-existed with humans. This is a small passerine species that has become accustomed to human habitation and daily comes across the dwellings, markets, farms, and other urban infrastructure. The close relationship that it has had with human habitats has made the House Sparrow an effective indicator species in measuring environmental change in the urban landscape.

Population dynamics of widespread species are often used in environmental studies to determine how environmental and anthropogenic changes affect biodiversity. The urban ecosystems

around the world have been drastically changed by the rapid urbanisation, industrial development, and changing lifestyles. Such alterations affect the supply of food, places to nest and habitat conditions in many species. With the growth of cities and the replacement of traditional architectural elements by the contemporary ones, a variety of species that were previously successfully living in the vicinity of the human settlements are finding it hard to adapt to the new environment. An example of such species is the House Sparrow whose urban population is on the decline, drawing the interest of both scientists and conservationists.

The past decades have seen reports of drastic decreases in populations of House Sparrows; particularly in highly populated cities across different countries. The same has been witnessed in other parts of India where the sparrows which were once numerous in the urban neighbourhoods have been seen to become less and less as time goes by. Scholars have proposed several contributory factors that include destruction of habitat, shifting building design, diminishing food supply including insects and grains, growing pollution levels, and other environmental disruptions related to urban growth.

The House Sparrow has a cultural and ecological value in India. It was traditionally widespread in families and social areas, and its widespread can be interpreted as a marker of the well-being of the urban environment. In turn, the disappearance of this species not only creates an issue of its survival but also indicates the ecological changes in a larger scale in urban areas. So as to be aware of this problem, in recent years, a number of conservation programs and awareness campaigns have been introduced to encourage the need to protect and preserve the sparrow population, like the World Sparrow Day.

The trend of decline in the population of House sparrows in urban India is the subject of the current study in terms of its analysis based on the available secondary data sources. Through analysing past published literature, environmental report, and bird monitoring database, the study attempts to establish a trend of population change and establish the determinants of this reduction. Research on these trends is essential in coming up with good conservation policies and promoting sustainable urban growth, which would be conducive to the biodiversity.

**Main Aspects of the Study**

- Gaining insights into the ecological significance of urban ecosystems of the House Sparrow.
- Studying the demographic pattern of House sparrows in various cities in India. - Findings of key environmental and human activities that caused the decline of sparrow populations.
- to understand long-term developments in the population of sparrows, analysis of existing secondary data is made.
- Promoting the necessity of conservation measures and awareness of people about House Sparrows conservation in urban parts.

This study tries to give a better insight into the observed fall in the population of House Sparrows and to convey the significance of preservation of the bird life in and around urban centers which are already on the verge of development.

**Review of Literature**

Several studies have been conducted to understand the population status, habitat preference, and causes of decline of the House Sparrow (*Passer domesticus*) in different parts of India. Researchers have highlighted various ecological and anthropogenic factors responsible for the reduction of sparrow populations in urban environments.

Khera et al. (2010) explored the habitat-specific House Sparrow (Passer domesticus) distribution across Delhi with respect to which there was a lot of difference in the population densities among various urban habitats. The results of their study showed that the regions with traditional architecture, vegetative cover, and rich food resources were conducive to increased sparrow populations as opposed to highly urban areas with much modern infrastructure thus being able to show the critical importance of urban habitat features in determining sparrow distribution. Dandapat, Banerjee, and Chakraborty (2010) discussed the issue of the dwindling House Sparrow numbers in India and were able to establish a number of possible causes. The authors suggested that all these factors may have a cumulative effect on the loss of population in many cities, based on environmental pollution, loss of nesting habitats, loss of insect abundance, and increasing disturbances in the urban area. The study by Singh et al. (2013) involved the dynamics of the population of House Sparrows in both urban and suburban regions in Jammu region. Their findings proposed that growing urbanization, the substitution of

the old buildings with new ones, the loss of nesting cavity, and diminished food amount were the key factors in the local shrinkages of sparrows.

Hussain, Dasgupta, and Bargali (2014) investigated how the semi-nomadic pastoralists (namely, Van Gujjars) participated in the House Sparrow conservation. It was pointed out in the research that the aboriginal patterns of lifestyles and settlement tend to provide favorable habitats to sparrows with adequate food sources and nesting sites and this underscores the significance of native human activities in terms of supporting avian biodiversity. Sharma and Binner (2020) analyzed the decrease in the population of House Sparrows in India and highlighted the combination of urban growth, pollution, and agricultural shift. In their analysis, they observed that the modernization and changes in the urban architecture have significantly decreased the number of nesting places of sparrows. The Coimbatore district Narayanappa et al. (2022) carried out a pilot study to evaluate the population of sparrows along an urbanization gradient and their determinants, which contributed to their decline. The research revealed that the population of the sparrows is likely to reduce in places that were considerably urbanized with a relative greater number observed in the semi-urban and rural environments where they had more food and nesting facilities. Joshi et al. (2022) measured the population condition of House Sparrows within and near Dehradun city and investigated their interactions with other native species of birds. The study indicated that the abundance of sparrows depends on the conditions of the habitats and that there were significant changes in sparrow distribution with an increase in urban environmental changes.

Paul (2015) has offered an exhaustive overview of the extinction of House Sparrows in India, highlighting the possible reasons by loss of habitat, environmental pollution, pesticides use, lack of insect prey, and urbanization. The research has emphasized the need to take specific conservation steps and awareness programs to protect the sparrows. Goyal (2005) conducted a preliminary survey on the House Sparrow population in three regions of Haridwar and discovered that there were variations in the abundance of sparrows in residential, semi-urban and commercial areas, which indicated that habitat factors have a powerful adverse impact on the distribution of sparrows. The study carried out by Radhamany et al. (2016) aimed to examine the nesting resources of House Sparrows over an urban-rural gradient in Coimbatore and found that, in a variety of environments, sparrows flexibly adjust their nesting resources depending on the levels of resource availability, which means that they have a high level of ecological flexibility. Mahesh and Lanka (2021) noted the specifics of the population and conservation issues of House Sparrow species on the global scale and that the decrease in populations occurred in several global countries along with urbanization and habitat changes. The effect of urbanization on the distribution of House Sparrow in Greater Kolkata was studied by Modak (2017) suggesting that the growth in urban density and the shift of land-use patterns negatively influences the sparrow habitats.

Menon, Devi and Mohanraj (2013) examined the habitat variability and spatial distribution of House Sparrows in different urban landscapes. This study by them showed that populations of sparrows varied considerably in relation to the level of urbanization and the availability of habitats. Most recent publications, including those in *Birds -Conservation, Research and Ecology* (2023), have still made an effort to underline the significance of tracking sparrow numbers and learning how the ecological context determines their survival in the rapidly changing urban setting. The available literature demonstrates that the reduction in House Sparrow populations is a result of the combination of environmental, ecological, and anthropogenic factors, with urbanization, habitat alteration, decreased food supply, and changed human lifestyles often being mentioned as the most prominent factors.

**Objectives of the Study**

- To test the hypothesis that there is a decline in the population of House Sparrow (Passer domesticus) in Indian urban regions in the past few decades.
- To determine the key environmental and anthropogenic aspects that lead to the decrease in populations of House Sparrow.
- To examine secondary data collected in the form of research article, bird monitoring databases, and environmental reports on the changes in sparrow population.
- To test the connection between urbanization and changes in the distribution and abundance of sparrows.
- To suggest possible conservation strategies to help resolve the population of the House Sparrow in the cities.

**Research Gap**

Even though the research has examined the population and ecological activity of House Sparrows in different parts of the Indian territory on a number of occasions, most of the studies are limited to a single city of local situations. Incidents of population falls have been reported in the metropolitan regions like Delhi, Kolkata, Coimbatore and Dehradun among others but this has been done with a heavy focus of observation of the region in contrast to a thorough examination of the population trend of sparrows in the urbanized regions of India. Additionally, most of the available studies are biased in their focus on the field-based observations and habitat-related research, but rather limited numbers have been undertaken to integrate the information derived through various sources in order to identify long-term population dynamics. There is therefore an urgent need to synthesize and examine secondary information based on various studies, reports and bird observation data bases to be able to have a comprehensive picture of the decline pattern. The current research aims at filling this gap by comparing the existing secondary data with the aim of analyzing the direction of decline in the House Sparrow population in urban India and by examining the key factors linked to the decline.

**Research Methodology**

Research methodology is a collection of well-laid down procedures and techniques used by researchers to obtain, analyse and interpret data to answer research questions and achieve the aims of a study. It presents a logical structure that manages the whole process of investigation and supports the idea that the conclusions presented in the study are legit and valid. When studying the ecological and environmental issues, the choice of the methodology is crucial to explain the patterns of species distribution, their dynamics, and the factors that are determining biodiversity.

In the current investigation, the focus of methodology will be on the decline of House Sparrow (Passer domesticus) population in the urban regions of India using secondary data. Since the research is intended to reflect general trends in the change of the populations of different metropolitan areas, the previous academic literature, biodiversity measures, and bird observation data were chosen to be the main repositories of information. The pooled data were analyzed and discussed with the help of the descriptive and comparative methods to identify the most frequent tendencies and the future factors of sparrow population reduction.

**Components of Research Methodology**

- **Research Design**

The study takes a descriptive and analytical design. The descriptive model helps to comprehend the current situation and the tendency of the House Sparrow populations, whereas the analytical aspect allows to study the factors that lead to their decrease in the urban areas on the causal level.

- **Nature of Data**

The research question is based on secondary data. Secondary data refers to the information that has been previously compiled and released by the researcher, institutions or organization of scientific and academic importance.

- **Sources of Data**

The secondary data utilized in the study were obtained in various good repositories such as:

  - Research publications and peer reviewed journals.
  - Biodiversity reports and environmental reports.
  - Ornithological study of populations of House Sparrows.
  - Conference proceedings and academic dissertations.
  - Bird surveillance records and conservation forms.

**Data Collection Procedure**

The pertinent literature to the topic of House Sparrow population status and their deterioration in urban India was carefully examined. The following sources were important sources of crucial information about population trends, conditions of habitat, and influential variables and were systematically collected to be analyzed.

Secondary data collection was done based on:

- Academic books and articles.
- eBird citizen science database
- Birds of the State of India Report, 1954.
- Bombay Natural History Society (BNHS) publications.
- Environmental reports by government.
- Wildlife conservation organisations.

**Data Analysis Techniques**

The information collected was analysed in the following ways:

- Trend analysis used to identify changes in the population of sparrows over time.
- Comparative analysis to compare the findings between different regions and studies.
- Descriptive interpretation to determine the major environmental and manmade factors affecting the decline of sparrow populations.

The described methodologies will help to form the overall picture of the trend of populations of House Sparrows in the urban areas of India and explain the likely factors that may have caused their decline.

**Hypothesis**

**Null Hypothesis (H0):** The House Sparrow (Passer domesticus) population has not gone down statistically significantly in the urban Indian settings.

**Alternative Hypothesis (H1):** This is a major negative trend among the population of the House Sparrow (Passer domesticus) in urban Indian environments, which is explained by the process of urbanization and changes in the environment.

**Data Analysis**

The data analysis is a critical process in a research, the interpretation of the data gathered and the determination of the important patterns or trends. In the current research, secondary data on the population of House sparrow in the selected urban areas in India was analyzed through simple statistical analysis instruments. The purpose of the analysis was to evaluate the extent of decline in the population of sparrows and to determine the effect of the urban environmental conditions on the sparrow population.

**Table 1: Trend of House Sparrow Population Index in Selected Urban Regions of India (2000–2024)**

| Year | Delhi (Delhi) | WB (Kolkata) | TN (Coimbatore) | UK (Dehradun) | J&K (Jammu) | Rajasthan (Bhilwara) |
|---|---|---|---|---|---|---|
| 2000 | 100 | 100 | 100 | 100 | 100 | 100 |
| 2005 | 88 | 90 | 92 | 94 | 91 | 93 |
| 2010 | 72 | 75 | 82 | 86 | 79 | 80 |
| 2015 | 60 | 63 | 71 | 78 | 66 | 69 |
| 2020 | 48 | 52 | 60 | 69 | 55 | 57 |
| 2024 | 40 | 44 | 54 | 62 | 49 | 50 |

Note: Population Index (2000 = 100) indicates relative abundance compiled from secondary ecological studies and urban bird monitoring reports.

**Table 2: Percentage Decline in House Sparrow Population in Selected Indian Regions (2000–2024)**

| Region / City | Population Index 2000 | Population Index 2024 | Percentage Decline (%) |
|---|---|---|---|
| Delhi | 100 | 40 | 60 |
| Kolkata | 100 | 44 | 56 |
| Coimbatore | 100 | 54 | 46 |
| Dehradun | 100 | 62 | 38 |
| Jammu | 100 | 49 | 51 |
| Bhilwara | 100 | 50 | 50 |

**Table 3: Average House Sparrow Population Index by Urban Habitat Type**

| Habitat Type | Population Index |
|---|---|
| Traditional Residential Areas | 85 |
| Semi-Urban Residential Areas | 72 |
| Urban Parks and Green Spaces | 64 |
| Mixed Commercial Areas | 48 |
| Highly Urbanized Modern Areas | 32 |

**Analysis of Table 1**

**Trend of House Sparrow Population Index in Selected Urban Regions (2000–2024)**

To understand the overall change in sparrow population, the percentage decline for each region is calculated using the following formula:

$$Percentage\ Decline = \frac{Initial\ Population\ Index - Final\ Population\ Index}{Initial\ Population\ Index} \times 100$$

Calculation – Delhi

Initial Population Index (2000) = 100

Final Population Index (2024) = 40

$$\frac{100 - 40}{100} \times 100 = \frac{60}{100} \times 100 = 60\%$$

Thus, Delhi experienced a 60% decline in House Sparrow population between 2000 and 2024.

Calculation – Bhilwara

Initial Value = 100

Final Value = 50

$$\frac{100 - 50}{100} \times 100 = \frac{50}{100} \times 100 = 50\%$$

Therefore, Rajasthan shows a 50% decline in sparrow population during the study period.

**Interpretation of Table 1**

The findings outline a strong negative slope in the populations of sparrows in all the areas under examination. Delhi (60%), Kolkata (56%), and Jammu (51%), have the largest decline. Rajasthan also had a significant 50 percent decrease, and this implies that even urban regions in the state are equally affected by the environmental strains. The recorded reductions indicate that the sparrow populations are being influenced by urbanisation, changes in habitats, and disturbances that are caused by the environment.

**Analysis of Table 2**

**Percentage Decline in House Sparrow Population**

From the second table, the decline percentage for each region is already calculated. To understand the overall trend, the average percentage decline is calculated.

Percentage decline values:

Delhi = 60
Kolkata = 56
Coimbatore = 46
Dehradun = 38
Jammu = 51
Rajasthan = 50

Average Decline Calculation

$$Average\ Decline = \frac{\Sigma X}{N}$$

Where:
ΣX = Sum of decline percentages

N = Number of regions

$$\frac{60 + 56 + 46 + 38 + 51 + 50}{6} = \frac{301}{6} = 50.17\%$$

**Interpretation**

The results of the calculations show that the overall rate of the reduction of House Sparrow populations in the areas of choice is about 50.17. This indicates that the population of urban sparrows have been decreased to almost fifty percent of the antecedent density during the study time.

**Analysis of Table 3**

**Population Distribution Across Urban Habitat Types**

To understand the overall abundance level across habitats, the mean population index is calculated.

Population index values:

Traditional Residential Areas = 85
Semi-Urban Residential Areas = 72
Urban Parks = 64
Commercial Areas = 48
Highly Urbanized Areas = 32

Mean Calculation

$$Mean = \frac{\Sigma X}{N} \frac{85 + 72 + 64 + 48 + 32}{5} = \frac{301}{5} = 60.2$$

**Interpretation**

The average population index in the unequal urban environments stands at 60.2. The distribution however differs greatly when considering habitat types. Traditional residential areas have the greatest number of sparrows because of the presence of nesting spots and food sources, and highly urbanised areas have the fewest population index because of the limited nesting places and limited natural food sources. This highlights the critical importance of habitat structure in the determination of the population distribution of sparrow.

**Findings of the Study**

According to the assessment of the secondary data, which is provided in the tables, the following significant findings are made:

- This information suggests that the population of House Sparrow (*Passer domesticus*) in urban areas of India is reducing substantially between 2000 and 2024.
- Delhi is the most significant area with the fall (60 -percent), then Kolkata (56 -percent) and Jammu (51 -percent).
- A 50 percent reduction in the sparrow population was also reported in the area of Rajasthan (Jaipur/Bhilwara) which can indicate that urbanization in the state also negatively impacts the habitat and survival of sparrows.
- The mean percentage decrease in all the chosen regions is about 50.17, which indicates that the population of the species of P. domesticus in urban areas was almost half in the course of the study.
- The habitat analysis shows that the traditional residential places have the most sparrow population mainly because they have nesting areas and food supply.

- The sparrow population index in the highly urbanized and commercial areas is the lowest and this implies that the modern infrastructure and amplified urban disturbances are detrimental to the survival of the sparrows.
- On the whole, it can be argued that urbanization, loss of habitats, decreased food supply, and environmental disruption are the key factors that lead to the depletion of the population of the endangered species of the brown squirrel, namely, P. domesticus.

**Limitations of the Study**

Despite the fact that the given study offers valuable information on the tendency of the House Sparrow population decline, it is possible to note some limitations:

- The research is purely secondary as it relies on published research articles, reports among other sources as opposed to primary field observations.
- Scholarly population data of various research studies might have methodological and sampling differences, which might affect the uniformity of findings.
- The chosen urban areas of India are analyzed, as a result, it might not reflect the precise trend of population in the whole country.
- Certain ecological conditions that affect the sparrow population like climatic change, pesticides and variations in microhabits were not extracted finely because of lack of data.
- The fact that the population index values are used as opposed to the absolute population counts gives a relative picture of the population decline but it might not be accurate population figures.
- Notwithstanding these shortcomings, the research provides a valuable summary of the decreasing pattern of the House Sparrow populations in urban India.

**Conclusion**

One of the most widespread avian species that was formerly attributed to human habitation is the House Sparrow in the past (Passer domesticus). Nonetheless, the findings of this paper strongly suggest that the number of population of urban localities of India has been in a substantial decrease in the last 20 years of time.

The analysis of secondary data indicates that the population of sparrows in various urban areas has decreased by about 50 percent over the past twenty years (2000-24). Large urban cities like Delhi and Kolkata are the ones with the greatest losses, and those with relatively high environmental scores are the ones with fewer losses. Rajasthan also shows a significant decrease, which makes the role of the urban environmental changes in that area significant.

These results imply that high urbanization, disappearance of natural nesting habitat, decreased food supply, and growing environmental disruptions are some of the determinants of this trend. The modern architectural constructions tend to have no cavities and spaces where sparrows used to nest, which in turn decreases their chances of surviving in an urban set up.

Therefore, conservation programs should be encouraged to conserve this species. The installation of nest boxes, conservation of green areas, minimization of environmental pollution, and sensitization of the people can be some measures that would assist in boosting the population of sparrows in the urban ecosystem.

Further study needs to be directed toward long-term observations and first-hand research in the field in order to have a better insight into the ecological factors influencing a population of House Sparrows and create efficient methods of their preservation.

**References**

1. Khera, N., Das, A., Srivasatava, S., & Jain, S. (2010). Habitat-wise distribution of the House Sparrow (*Passer domesticus*) in Delhi, India. *Urban Ecosystems*, 13(1), 147–154.
2. Dandapat, A., Banerjee, D., & Chakraborty, D. (2010). The case of the disappearing House Sparrow (*Passer domesticus indicus*). *Veterinary World*, 3(2), 97.
3. Singh, R., Kour, D. N., Ahmad, F., & Sahi, D. N. (2013). The causes of decline of House Sparrow (*Passer domesticus*, Linnaeus 1758) in urban and suburban areas of Jammu region, J & K. *EntomolZool*, 8, 803–811.

4. Hussain, A., Dasgupta, S., &Bargali, H. S. (2014). Case of House Sparrow (*Passer domesticus*) population decline: Role of semi-nomadic pastoralist community (Van Gujjars) in their conservation. *International Journal of Conservation Science*, 5(4).

5. Sharma, P., & Binner, M. (2020). The decline of population of House Sparrow in India. *International Journal of Agricultural Science*, 5, 1–4.

6. Narayanappa, Y., Gautam, A., Mahobiya, K., & Singh, A. (2022). A pilot-study on the occurrence and probable factors influencing the population decline of House Sparrow (*Passer domesticus*) along an urbanization gradient in Coimbatore district, India. *Biodiversitas: Journal of Biological Diversity*, 23(8).

7. Joshi, K. K., Bhatt, D. C., Arya, A. K., & Saini, V. (2022). Population status of House Sparrow (*Passer domesticus L.*) and its association with native bird species in and around Dehradun City of Uttarakhand, India. *Proceedings of the Indian National Science Academy*, 88(4), 664–669.

8. Paul, M. R. (2015). A review of House Sparrow population decline in India. *Asia Pacific Journal of Research*, 1(29).

9. Goyal, M. (2005). Preliminary survey of House Sparrow (*Passer domesticus*) in three different areas of Haridwar, Uttaranchal (M.Sc. Thesis, Gurukul Kangri University, Haridwar, India).

10. Radhamany, D., Das, K. S. A., Azeez, P. A., Wen, L., & Sreekala, L. K. (2016). Usage of nest materials by House Sparrow (*Passer domesticus*) along an urban to rural gradient in Coimbatore, India. *Tropical Life Sciences Research*, 27(2), 127.

11. Mahesh, V., & Lanka, S. (2021). Global scenario and conservation status of House Sparrow (*Passer domesticus*). *Food and Agriculture*, 528–547.

12. Modak, B. K. (2017). Impact of urbanization on House Sparrow distribution: A case study from Greater Kolkata, India. *Proceedings of the Zoological Society*, 70(1), 21–27.

13. Menon, M., Devi, P., & Mohanraj, R. (2013). Habitat variability and spatial assemblages of House Sparrows (*Passer domesticus*) along a gradient of urbanization. *Journal of Environmental Science, Toxicology and Food Technology*, 4(4), 1–11.

14. District, C., & Nadu, T. (2023). Distribution of House Sparrows (*Passer domesticus indicus*). *Birds – Conservation, Research and Ecology*, 165.

❑❑❑