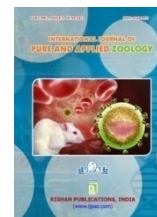




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## INVESTIGATION OF THE CAUSES FOR THE DECLINE OF HOUSE SPARROW, *PASSER DOMESTICUS* IN SIVAKASI TALUK, VIRUDHUNAGAR DISTRICT, TAMIL NADU, INDIA

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### ABSTRACT

In recent years, India has seen a dramatic decline of house sparrow population and ornithologists have observed a sharp decline in house sparrow population. Population of house sparrow is fast declining due to danger posed to their survival by a host of factors, such as, lack of nesting sites due to modern architecture of building, lack of seed food, insect food and proliferation of cell phone towers. The aim of this paper is to provide a summary of the present status of the house sparrow population in different seasons and to investigate the possible causes for the decline of house sparrow in Sivakasi Taluk during December 2011 to December 2012. From the investigation it was found that there is a high abundance of sparrows was observed in hot weather season in all study sites than other seasons. In Naranapuram ( $190 \pm 4.89$ ) and Duraichamipuram ( $83.33 \pm 0.94$ ) were recorded high number of house sparrows. Moderate amount of sparrows were found in Kalayarkuruchi ( $40 \pm 1.63$ ), Anaiyur ( $34 \pm 1.63$ ) and Pudhukottai ( $27.66 \pm 1.24$ ). The sparrows were completely absent in Achankulam and Alankulam. From the result it was observed that the house sparrow population was found to be higher in the rural areas when compared to the urban areas in the selected study sites.

**Key words:** Ornithologists, modern architecture of building, lack of nesting sites, abundance and sex ratio.

### INTRODUCTION

Birds are sensitive to environmental changes and act as an indicator of ecological balance of a particular habitat. House sparrow, *Passer domesticus* is a small bird, locally known as 'Chorui' is closely associated with human habitation. Sparrow population has decreased considerably in many parts of the globe in particular urban suburban gradient (Daniels,

2005 AND Chamberlain, 2007). The nest is built in holes of structures, under the tiles or around roof area of houses. It feeds on grain, insects, weed seeds, fruit buds, nectar, *etc.* (Ali, 1996). In recent years India has seen a dramatic decline of house sparrow population and ornithologists have observed a sharp decline in house sparrow population across West Bengal, Bangalore, Punjab, Rajasthan, Delhi and Haryana, *etc.* (Bandel, 2010; Ghosh *et al.*, 2010; Khera *et al.*,

2010; Rajashekar and Venkatesha, 2008; Daniels, 2005 and Girish *et al.*, 2012). They usually form colonies having 10 to 20 pairs and do not spread far from the natal colony. However, a large decrease of sparrow population is reported by different countries over the globe. High reduction of sparrow population in London (60%), Glasgow (99%) and Hamburg (77%) have led to the inclusion on the UK Conservation Red List (Prowse 2002 and Smith, 2005).

The primary causes of this decline have not yet been ascertained. But lack of weed seeds, insect food intensification of agricultural practices particularly rapid uses of insecticides, competition with the other living creatures are the potential factors of house sparrow decline (Crick *et al.*, 2002). Hence the present study has been carried out to evaluate the present status of house sparrow in urban, semi-urban and rural areas of Sivakasi Taluk, Virudhunagar District, Tamil Nadu, India.

## MATERIALS AND METHODS

### Study area

Sivakasi is an active town and a municipality in Virudhunagar District in the Indian state of Tamil Nadu. It is located between 9.45° N and 77.82° E with an elevation of 101m above Mean Sea Level (MSL). The study area were selected by keeping the Sivakasi town in a cardinal position and dividing the Taluk into four different zones namely north, south, east and west. From each zones three places were selected as a study sites and a total of 15 places covering all the regions of the urban, sub-urban and rural areas of Sivakasi Taluk (Figure 1). The study was conducted for the period of December 2011- December 2012. The studied was carried out in four different seasons namely winter (December-February), hot weather season (March-May), South west monsoon (June-August) and North east monsoon (September-November).

### Methods

With the point count method it is possible to study the yearly changes of bird populations at fixed points, differences in species composition between habitats, and abundance patterns of species. Point counts involve an observer standing in one spot and recording all the birds

seen or heard at either a fixed distance, or unlimited distance. In the present work five points were chosen in each study site with the distance of 250 m and recorded the population by standing in a point by observing the house sparrow within a radius of 10 m (Ralph *et al.*, 1993). Observation was made thrice the study area from December 2011 to December 2012 in the morning from 08.00–11.00 am, when they are the most active and conspicuous. Recordings were not made when it rained or when the wind exceeded a gentle breeze, because during that time the sparrows were not found to be active.

Moreover, regular field observations were also habitats and food sources. The observation were made on the abundance, sex ratio of house sparrow with various characteristics of the study sites were studied.

### Data analysis

Data on the occurrence and abundance of house sparrows at different study locations and different seasons were statistically analyzed using chi-square test and correlation (WASP software package).

## RESULTS AND DISCUSSION

The observations were made on the abundance and sex ratio of house sparrow in different seasons (Table 1) and correlated with various topographical features, such as, number of old storey buildings, area under cultivations and number of cell phone towers in the study sites of Sivakasi Taluk (Table 2). The large number of house sparrows were recorded in the Naranapuram ( $190.00 \pm 4.89$ ), Duraichampuram ( $83.33 \pm 0.94$ ) and Sankaranatham ( $76.66 \pm 2.49$ ) in the hot weather seasons compared to other seasons. The large number of sparrow was due to the high percentage of old storey buildings (70, 80 and 90) and large number of areas under cultivation 15, 46, 50 acres respectively. A moderate number of house sparrows were recorded in the Kalayarkuruchi ( $40.00 \pm 1.63$ ), Anaiyur ( $34.00 \pm 1.63$ ), Pudhukotai ( $27.66 \pm 1.24$ ), Maraneri ( $23.66 \pm 1.69$ ), and Appanaikanpatti ( $24.00 \pm 1.00$ ) (rural area). A low number of house sparrow was recorded in the Keelamarainadu ( $19.00 \pm 1.00$ ) Anupankulam ( $18.00 \pm 1.63$ ), Erichanatham ( $12.00 \pm 1.63$ ) (sub-urban), and Sivakasi ( $9.33 \pm 0.94$ ) (urban) and Nathikudi ( $8 \pm 0.81$ ) (rural area). The house sparrow were found to be completely absent in

the Achankulam (rural) and Alankulam (sub-urban). The abundance of house sparrow in different seasons was correlated with the number of cell phone towers in the study area and it was found that slight decrease in the number of house sparrow population in many sites.

The sex ratios of house sparrows do not show any variation in the number of male and female house sparrow during the study period in all the study sites. The male populations are found to be dominant compared to female population.

**Table 1.** Seasonal occurrence and sex ratio of house sparrow, *Passer domesticus* in different sites of Sivakasi Taluk during the study period December 2011-December 2012.

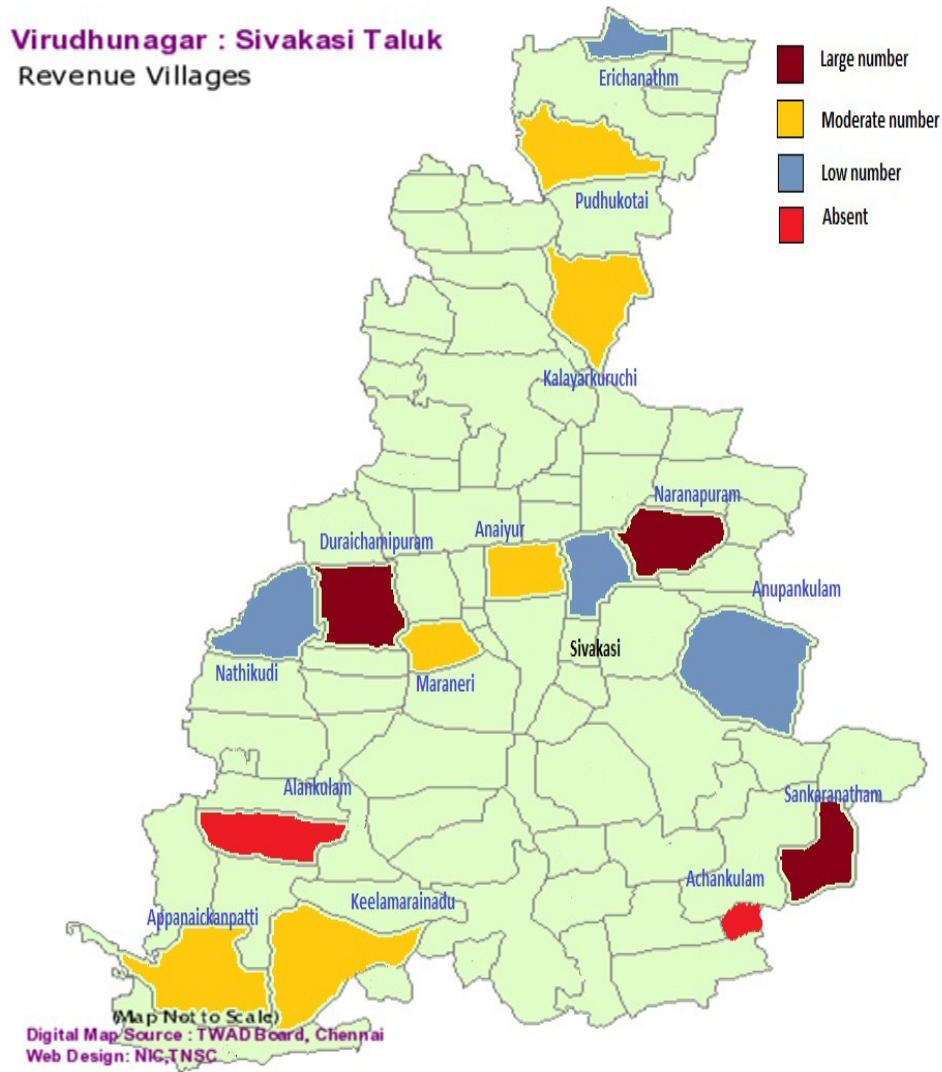
S.No	Name of the Study site <sup>a</sup>	Mean number of Adults in different seasons per sq.km <sup>ab</sup>				Mean No. of Males per sq.km	Mean No. of Females per sq.km	Total
		Winter season	Hot weather season	South west monsoon	North east monsoon			
1	Erichanatham*	11.66 ± 2.05	12.00 ± 1.63	11.33 ± 1.24	11.31 ± 1.24	6.58 ± 0.50	4.75 ± 0.50	11.33
2	Pudhukotai <sup>#</sup>	24.00 ± 1.63	27.66 ± 1.24	26.00 ± 0.81	23.00 ± 0.81	12.75 ± 0.95	12.50 ± 1.73	25.25
3	Kalayarkuruchi <sup>#</sup>	34.00 ± 1.63	40.00 ± 1.63	36.33 ± 1.24	37.00 ± 0.81	18.75 ± 1.70	18.08 ± 0.83	36.83
4	Narnapuram <sup>#</sup>	178.66 ± 4.98	190 ± 4.89	175.66 ± 1.69	169.66 ± 1.24	90.16 ± 4.88	88.41 ± 3.71	178.57
5	Anupankulam <sup>#</sup>	18.00 ± 1.63	15.66 ± 2.05	17.00 ± 0.81	15.33 ± 1.24	08.83 ± 0.33	07.75 ± 0.95	16.58
6	Sankaranatham <sup>#</sup>	65.66 ± 3.09	76.66 ± 2.49	67.66 ± 1.24	65.00 ± 1.63	34.50 ± 3.10	34.41 ± 2.54	68.91
7	Keelamarainadu <sup>#</sup>	18.00 ± 1.00	19.00 ± 1.00	17.33 ± 1.52	16.00 ± 1.00	09.00 ± 0.81	08.58 ± 0.50	17.58
8	Appanaikanpatti <sup>#</sup>	24.00 ± 1.00	23.66 ± 1.52	23.66 ± 2.08	22.33 ± 1.52	12.08 ± 0.16	11.66 ± 0.33	23.74
9	Achankulam <sup>#</sup>	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Alankulam*	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Nathikudi <sup>#</sup>	06.63 ± 1.52	07.00 ± 0.81	08.00 ± 0.81	06.33 ± 1.24	03.83 ± 0.33	03.5 ± 0.81	07.33
12	Duraichampuram *	80.00 ± 1.63	83.33 ± 0.94	83.00 ± 0.81	80 ± 0.81	41.75 ± 0.5	39.75 ± 1.5	81.5
13	Sivakasi <sup>¥</sup>	09.33 ± 0.94	05.33 ± 1.01	07 ± 0.81	05 ± 0.81	03.75 ± 0.95	03 ± 1.15	06.75
14	Anaiyur <sup>#</sup>	32.00 ± 1.63	34.00 ± 1.63	33.00 ± 1.63	31.00 ± 0.81	17.25 ± 0.95	15.25 ± 0.95	32.50
15	Maraneri <sup>#</sup>	22.33 ± 1.24	23.66 ± 1.69	22.33 ± 1.24	18.66 ± 1.24	11.66 ± 1.21	10.88 ± 1.25	22.54

¥ - urban, # - rural, \* - sub urban.

<sup>a</sup>Seasonal abundance of sparrow populations was not significantly different ( $\chi^2 = 3.321$ ,  $df=3$ ,  $\chi^2_{3}(0.05) = 7.81$ ).

<sup>b</sup>Abundance of house sparrow in different locations was significantly different ( $\chi^2 = 2.970$ ,  $df = 15$ ,  $\chi^2_{15}(0.05) = 2.145$ ).

<sup>c</sup>Sex ratio was not significantly different ( $\chi^2 = 0.112$ ,  $df = 15$ ,  $P > 0.05$ ).



**Figure 1.** Geographic location of study sites and abundance of House sparrow in Sivakasi taluk, Virudhunagar District.



**Figure 2.** Old storey building in Pudhukotai village.



**Figure 3.** Availability of food for the sparrows in the rural area.



**Figure 4.** House sparrow nest in crevices at Kalayarkuruchi village.



**Figure 5.** Nest of house sparrow hanging from tube light in Sivakasi town.



**Figure 6.** House sparrow nest in pipelines of Sivakasi town.

The availability of food, such as, grains, insects, especially caterpillars and the suitable nesting sites could be important factors for the high density of sparrows in the rural areas. In the present investigation the large number of house sparrow were found in rural areas and this may due to the availability of suitable habitats, such as, nesting sites and feeding sites. The percentage of old storey buildings and the availability of food were maximum in the rural areas (Plate 1 & Table 2). The large number of house sparrows in villages was observed in Naranapuram and Duraichampuram due to availability of grains and agricultural practices throughout the year. The number of sparrows on different study locations was significant in all the seasons at 5% level of significance. Simwat

(1977) reported that 84% of sparrow nestlings were comprised insects, with caterpillars contributing 38%. Thus availability of variety of food sources for both adults and nestlings and essential nesting sites around the food sources primarily play an important role in the abundance of house sparrow populations. From the study it was observed that the number of sparrows was correlated with area under cultivation and found to be very low degree of positive correlation.

The absence of house sparrow in Achankulam due to the shifting of people occupation from agro - based eco-system to a fire works based jobs. Whereas, in Alankulam the sparrows were absent because of presence of cement factory in that area and the agricultural practices were found to be absent, due to the ash

released from the cement industry. As a result there was a scarcity of food in these regions for the sparrows. Rana and Idris (1986) reported that high density of house sparrows in the grain markets in urban areas. Habitat quality is known to have a major influence on the sparrow populations, with availability of food sources.

It was noticed that house sparrows usually built their nests in the crevices of thatched roofs of old houses (Plate 3), electric pipelines, in ventilation holes and space available on the electricity metres Ali (1996). Most of the nests in the study sites were situated at a height of 6-8 feet from the ground level. Nest material consisted of grass, straw, jute threads, leaves, weeds, feathers, etc. In the city areas, sparrows in small groups were usually found resting on electric wires, nesting hanging from the tube lights (Plate 4) and pipe lines that accidentally broken in the house (Plate 5). These kinds of observation show that there were no place for house sparrow to build its nest in the urban areas and the sex ratio of house sparrow did not vary significantly Rajashekar and Venkatesha (2008).

Electromagnetic radiation from towers may be one of the factors for the decline of house sparrow population in rural and urban areas. But there was negative correlation between the number of house sparrow in all the study areas and the number of cell phone towers.

### Conclusion

The study sites in suburban and rural areas consist of cultivated fields where rice, millets, pulses, vegetables and ornamental flowers were grown in rural areas. Moreover, in these areas, weeds, shrubs and bushes of various plant species were also common. Thus it is clear that the availability of a variety of food sources for both adults and nestlings in the rural area when compared to urban areas. Food sources around the nesting sites are primarily play an important role in the abundance of house sparrow populations. The present study suggests that retaining old hatched roof buildings and native buildings in the city are necessary for sustaining house sparrow populations. These reports were supported by Baskaran *et al.* (2010). In modern architecture of building the kitchen waste were directly fed into the drainage system through the pipes and there was no availability of remnants from the kitchen waste for these sparrows in the town region, whereas in the villages the people

are still having the practice of cleaning the utensils in front of their houses. Supermarkets which are now mushrooming ubiquitously in the city where grains and vegetables are sold in a pocketed manner and demolition of old buildings will beyond doubt severely affect the sparrow population. Due to the increasing globalization large acres of land have been transforming into modern cities, as a result there is a loss of habitat for house sparrow population. After creating a congenial habitat it is in the hands of people to place an artificial nest in the city for house sparrows and also the concerned State Department should take necessary steps to monitor the sparrow populations regularly to prevent the vanishing species from the city and villages.

### CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest associated with this article.

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