



E-ISSN: 2320-7078  
P-ISSN: 2349-6800  
JEZS 2017; 5(4): 493-497  
© 2017 JEZS  
Received: 01-05-2017  
Accepted: 02-06-2017

**Sundaramahalingam Balaji**  
Post-Graduate and Research  
Department of Biotechnology,  
Ayya Nadar Janaki Ammal  
College (Autonomous), Sivakasi,  
Tamil Nadu, India

**Somasundaram Baskaran**  
Post-Graduate and Research  
Department of Zoology,  
Ayya Nadar Janaki Ammal  
College (Autonomous), Sivakasi,  
Tamil Nadu, India

**Jeyaraj Pandiarajan**  
Post-Graduate and Research  
Department of Biotechnology,  
Ayya Nadar Janaki Ammal  
College (Autonomous), Sivakasi,  
Tamil Nadu, India

#### Correspondence

**Sundaramahalingam Balaji**  
Post-Graduate and Research  
Department of Biotechnology,  
Ayya Nadar Janaki Ammal  
College (Autonomous), Sivakasi,  
Tamil Nadu, India

## Impact of urbanization on house sparrow population in Virudhunagar district, Tamil Nadu, India

**Sundaramahalingam Balaji, Somasundaram Baskaran and Jeyaraj Pandiarajan**

#### Abstract

The present study was carried out to assess the impact of urbanization on the present status of house sparrow population in selected rural, sub-urban and urban areas of Virudhunagar District. From the investigation, it was revealed that the number of house sparrow population was found to be more in the rural areas such as, Virudhunagar Taluk (631), Tiruchuli (577), Sivakasi (443), Kariapatti (394), Aruppukottai (350), Srivilliputhur (304), Rajapalayam (292) and Sattur Taluk (271). The present study also correlates the number of house sparrow population with urban and rural population and it was revealed that population of house sparrows was high in the Taluks with high percentage of the rural population like Tiruchuli (94.2%), Kariapatti (71.83%) and Virudhunagar (48.9%). The decline in population in both urban and sub-urban habitats might be due to lack of nesting sites, lack of food grains due to pocketed method of grains in super markets and modern architecture of buildings.

**Keywords:** Biodiversity, urbanization, sub-urban areas, modern architecture and decline

#### 1. Introduction

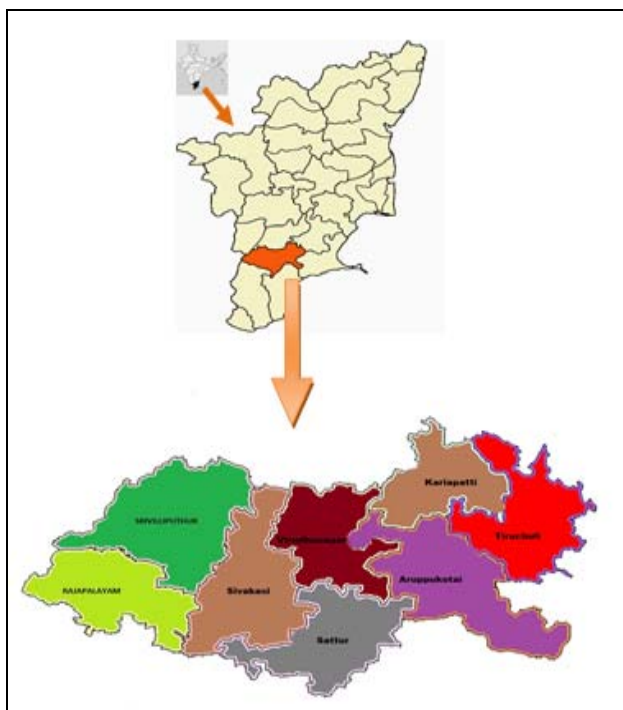
Biodiversity is a key component for sustainable environment, but pressures on the environment caused by economic development, urbanization and other human activities makes it difficult to protect the natural areas that are large enough to accommodate entire eco – system. Reducing the rate of biodiversity loss and averting dangerous biodiversity change are the international goals, reasserted by the Aichi Biodiversity targets for the 2011 - 2020 by Parties of the United Nations (UN) Convention on Biological Diversity (CBD) after the failure to meet the 2010 target [1]. However, there is no global, harmonized observation system for delivering regular, timely data on biodiversity change. Birds are often common denizens of the ecosystem and have been considered as an indicator species of inhabited areas. Studies showed that depressed population of various bird species in most parts of the world today, especially in urban areas, is of particular concern as many cities are growing rapidly both in area and population [2]. Among the various species of birds, the house sparrow *Passer domesticus* (Passeriformes: Ploceidae) is one of the familiar species that has followed man everywhere and is inseparable from human habitations. The non migratory sparrows are widely distributed in the Indian subcontinent and occurs worldwide [3].

In recent years India also has seen a dramatic decline of sparrow populations. In recent years, ornithologists have observed sharp decline in house sparrow populations across Bangalore, Mumbai, Hyderabad and other cities in India [4]. Six years ago, soon after the once common sparrow had gone on UK's Red list, a Rajya Sabha MP raised the question in Parliament: is the sparrow population in India decreasing? And if so, what is the government doing about it? The government's answer was standard: there were reports of decline in "certain cities of the country" [5]. But it was not a matter of concern, it reassured the MP, because "there is no immediate threat to its extinction". A year later, however, an ornithological survey conducted by the Indian Council of Agricultural Research confirmed birdwatchers' worst fears: the sparrow population in Andhra Pradesh alone had dropped by 80 per cent, and in other states like Kerala, Gujarat and Rajasthan, it had dipped by 20 per cent, while the decline in coastal areas was as sharp as 70 to 80 per cent [6]. In the few urban pockets where bands of volunteers decided not to wait for the government to act and started a head count of sparrows, the findings were even more alarming. In parts of Thiruvananthapuram, for instance, where volunteers had noticed small flocks of six to eight sparrows till 1998, they had disappeared without a trace in the future [5].

The house sparrow, *Passer domesticus* is unique among wild birds in its close association with virtual dependence on man, not only in the agricultural environment, where presumably this association first evolved, but also in built-up areas [7]. It would be expected that, with man's dominance of the world, the future would be a bright for house sparrows, but it is now becoming an evident that this is not the case, particularly in the urban and sub-urban areas. The house sparrow received more attention in urban areas. They can play vital role in conservation of natural ecosystems health. The nest is build around the human habitation, in wall holes, roof spaces, undisturbed locations in the house, specially windows, or any such places found suitable for nesting around the human house and apartments. It feeds on variety of grains, seeds, insect, nectars, and cooked food left over by man [8]. The present study was conducted to explore the present status and investigate the potential causes for the decline of the house sparrow, *Passer domesticus* in Virudhunagar District, in particular, to look for large-scale trends in house sparrow occurrence in relation to human socioeconomic conditions with a view of identifying factors which may cause the decline and areas where further decline may expected in the future.

## 2. Materials and Methods

The geographic location of Virudhunagar district is 11°56'21.84" North latitude to 79°29'51.23" East longitude with a mean sea level of 53.6 metre. The survey of house sparrows in Virudhunagar District was carried out for a period of two years from December 2011 to December 2013. Regular field trips were made throughout the study period. A census visit constituted three hours a day between 06:00 am and 09:00 am (IST), when the house sparrows were most active and conspicuous. Based on the experience it was noted that the house sparrow had a separate foraging ground, breeding place and roosting place in an area. Recording were not made during raining or when the wind speed exceeded the limit [4].



**Fig 1:** Geographical location of Virudhunagar district and its Taluk in Tamil Nadu, India

The study area was divided into grids of 1 sq.km based on the size of the study area. In each grid of 1 sq.km, 5 points were selected and the population of house sparrow was counted. In a census grid, the points should be 100 m apart from each other points. Along with the number of house sparrows, other details such as, number of old buildings, number of nest built by the house sparrows and number of cell phone towers were also counted and noted. Generally, point counts are used to compare the relative population of birds recorded in different sites. Point count is the main method in monitoring the population changes of breeding land birds. 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 or a fixed radius of 20 metres. The count time of house sparrow in the field was limited to 10 minutes to maximize detections and to minimize error due to double counting or mistakenly counting birds flying into the sampling area [9].

## 3. Result and Discussion

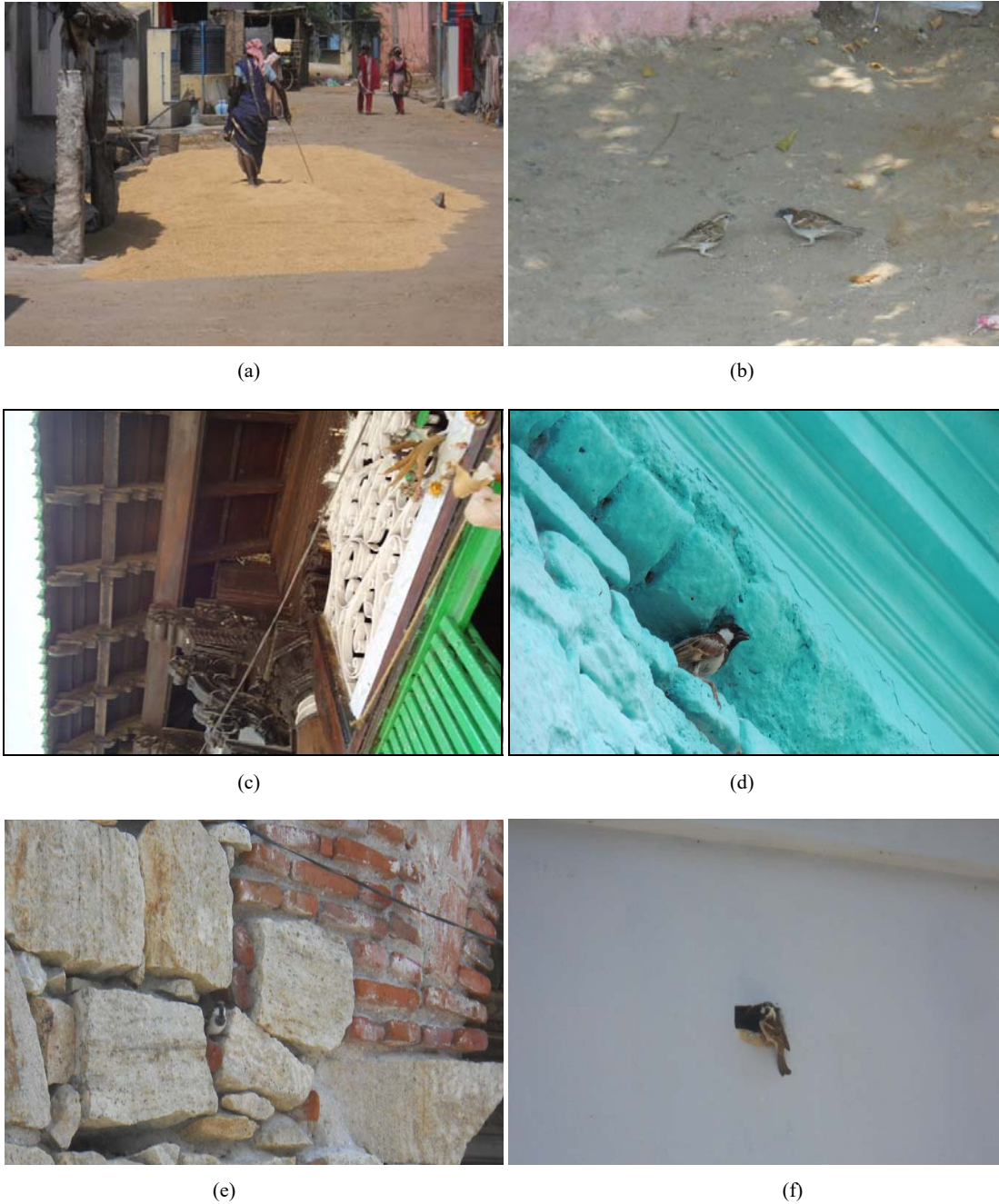
From the result it was ascertained that the population of house sparrows was high in Virudhunagar Taluk (631), Tiruchuli (577), Sivakasi (443), Kariapatti (394), Aruppukottai (350), Srivilliputhur (304), Rajapalayam (292) and Sattur Taluk (271). The relative population of house sparrows was compared with the percentage of rural and urban population in the different Taluks in the District. It was inferred that the population of house sparrows was high in the Taluks with high percentage of the rural population like Tiruchuli (94.2%), Kariapatti (71.83%) and Virudhunagar (48.9%). It was also observed that, the average populations of house sparrows were found to be low in the Taluks like Sivakasi, Sattur and Rajapalayam where there were a high number of modern buildings, micro and small scale industries (Table 1). According to the survey conducted by Rajashekar and Venkatesha [4] in and around Bangalore on the abundance of house sparrows and found to be lesser within the city limits. Although grain shops and vegetable markets are present in various locations within the city, suitable nesting sites are generally absent, which could be the key factor for the low populations of sparrows in the city limits.

By comparing the overall population of house sparrows in different Taluks, it was found that the population was high in Virudhunagar, Tiruchuli, Sivakasi and Kariapatti Taluks. When compared to the other Taluks there was a maximum number of rural populations in the above mentioned Taluks. The increase in the population of house sparrows in winter season (December, January and February) in many study sites may be due to the heavy rainfall received during the North east monsoon season which results in the availability of insect larva for its nestlings from the greenery areas. During the period of investigation it was found that the house sparrows began to lay eggs after the commencement of rain in an area (Table 2). Similar kinds of results were supported by Rajashekar and Venkatesha [4] in which the highest number of birds was observed during the southwest monsoon (June–September) followed by the north-east monsoon (October–November) in Bangalore.

By comparing the overall population of house sparrows in different Taluks, it was found that the population was high in Virudhunagar, Tiruchuli, Sivakasi and Kariapatti Taluks. When compared to the other Taluks there was a maximum number of rural population in the above mentioned Taluks. These kinds of results were also supported by Manjula *et al.* [10] who studied the habitat variability and spatial assemblages

of house sparrows along a gradient of urbanization in Trichirapalli. They also found that areas with low socio-

economic status with rural population had higher population of sparrows.



**Plate 1:** (a) Practice of drying the seeds in villages (b) spilled grains in villages (c) (d) (e) & (f) house sparrow nest in olden styled building, nest in crevices and holes

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When comparing the population of house sparrows with agricultural crop sowing and harvesting seasons in the

Virudhunagar District, it was revealed that the maximum crops in the District were harvested during the month of November, December, January and February (Table 3). The population of house sparrows in each Taluk was also found to be high during the winter season (December, January and February) in the maximum study sites of Virudhunagar District.

The house sparrow is primarily a seedeater, in rural areas specialising on the seeds of cultivated grain crops such as oats, wheat, barley, corn, and maize. The other major food source is the seeds of annual herbs such as grasses (Graminae), rushes (Juncidae), goosefoot (*Chenopodium*), docks (Polygonaceae) and chickweed (*Stellaria spp.*). Birds

living in built up areas, supplement their diet of natural vegetable matter with a variety of household scraps, deliberately put out by humans. In contrast, nestlings are fed almost exclusively on insects and other invertebrates (both in the larval and adult form), with the prey species varying with season. The most important taxa being aphids (Aphidoidea), spiders (Arachnida), beetles (Coleoptera), weevils (Curculionidae), grasshoppers (Orthoptera) and caterpillars (Lepidoptera) [11].

In the present investigation there is more number of house sparrows in villages found which may be due to the presence of large hectares of agricultural lands, old buildings and thatched roof houses which were good enough for the house sparrows to build its nests (Plate 1). In the present study, it was found that agricultural practices in an area were found to be an important factor for the population of house sparrows.

The number of house sparrows was correlated with land under cultivation and it was found to have a positive degree of correlation. Bokotey and Gorban [12] reported that the changes in the population of house sparrows were mainly due to changes in the urban habitats resulting from urbanization processes such as, contracting of green areas, development of new microhabitats with very little greenery and architecture unsuitable for nest construction, building houses in areas covered with weeds.

In urban study sites the modern architecture of buildings makes harder for the house sparrows to find its nesting sites. The area of barren land covered with weeds and shrubs, where sparrows forage for the small insects frequently, especially in the post breeding period, is shrinking in the urban and sub-urban areas and this has leads to the decline in the population of house sparrows.

**Table 1:** Comparison on the abundance of house sparrows with reference to various demographical features in different Taluks of Virudhunagar District during the study period 2011-2013

| Name of the Taluk | *Urban population in % | *Rural population in % | *No. of Micro & Small scale industries | No. of House sparrows in the Taluk |
|-------------------|------------------------|------------------------|--|------------------------------------|
| Sivakasi          | 66.26                  | 33.74                  | 3743                                   | 443                                |
| Virudhunagar      | 51.10                  | 48.9                   | 2675                                   | 631                                |
| Srivilliputhur    | 51.02                  | 48.98                  | 916                                    | 304                                |
| Rajapalayam       | 54.92                  | 45.08                  | 2063                                   | 292                                |
| Sattur            | 25.96                  | 74.04                  | 3047                                   | 271                                |
| Aruppukottai      | 48.68                  | 51.32                  | 1470                                   | 350                                |
| Tiruchuli         | 5.8                    | 94.2                   | 181                                    | 577                                |
| Kariapatti        | 28.17                  | 71.83                  | 312                                    | 394                                |

\*Source: Census of India 2011

**Table 2:** Average season wise rainfall received during 2011-2013 in Virudhunagar District

| Seasons                        | *Normal Rainfall in mm | *Actual Rainfall in mm |
|--------------------------------|------------------------|------------------------|
| Winter Season (Jan – Feb)      | 31.30                  | 22.15                  |
| Summer season (March - May)    | 127.80                 | 113.1                  |
| South West Monsoon (Jun – Sep) | 321.20                 | 273.2                  |
| North East Monsoon (Oct – Dec) | 441.20                 | 455.65                 |

\*Source: Office of the Assistant Director of Statistics, Virudhunagar

**Table 3:** Peak harvesting and sowing seasons of different crops in Virudhunagar District

| S. No. | Crop                       | Peak Sowing season | Peak Harvesting Season |
|--------|----------------------------|--------------------|------------------------|
| 1      | Samba / thaladi / pishanam | March April        | July Aug               |
| 2      | Kar / kuruvai / sornavari  | Sep Oct            | Jan Feb March          |
| 3      | Cholam (irrigated)         | Feb March          | Feb March              |
| 4      | Cholam (un-irrigated)      | Sep Oct            | Dec Jan                |
| 5      | Cumbu (irrigated)          | Jan February       | April May              |
| 6      | Cumbu (un - irrigated)     | Sep October        | Jan December           |
| 7      | Ragi (irrigated)           | May June           | Dec Jan                |
| 8      | Ragi (un - irrigated)      | Aug Sep Oct        | Nov Dec Jan            |
| 9      | Green gram                 | Oct Nov            | Nov Dec Jan            |
| 10     | Black gram                 | Oct Nov            | Nov Dec                |
| 11     | Redgram                    | June July Aug      | Dec Jan Feb            |
| 12     | Sugarcane                  | July Aug Sep       | May June July Oct Nov  |
| 13     | Cotton (irrigated)         | Aug Sep Oct        | Apr May                |
| 14     | Cotton (un - irrigated)    | Feb Mar            | --                     |
| 15     | Groundnut(irrigated)       | June July Aug      | Apr May                |
| 16     | Groundnut (un - irrigated) | Dec Jan            | Sep Oct Nov            |
| 17     | Gingelly (irrigated)       | Sep Oct            | Oct Nov Dec            |
| 18     | Gingelly (un - irrigated)  | May June           | June July              |

Source: Office of the Assistant Director of Statistics, Virudhunagar

#### 4. Conclusion

If suitable nesting sites were not provided, the house sparrows will become extinct in the near future.

#### 5. Acknowledgement

The authors are thankful to the Management of Ayya Nadar Janaki Ammal College (Autonomous), Sivakasi for providing necessary facilities to carry out this research project.



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