

**THE CAUSES OF DECLINE OF HOUSE SPARROW
(*PASSER DOMESTICUS*, LINNAEUS 1758) IN URBAN
AND SUBURBAN AREAS OF JAMMU REGION, J & K.**

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[Singh, R., Kour, D. N., Ahmed, 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. Munis Entomology & Zoology, 8 (2): 803-811]

ABSTRACT: The house sparrow (*Passer domesticus*) belonging to the family Passeridae is the most widely distributed land bird in the world. In India, it is distributed all over upto 4000 m in the Himalayas. In the recent times, its population had declined drastically in Europe and other countries of world. In India its number has also reported decreased in many cities of Andhra Pradesh, Kerala, West Bengal and coastal areas. In urban and suburban areas of Jammu, its population has been found to decrease drastically in the past 10 years. The study is carried from March 2009 to March 2013 to find out the cause of decline in these areas. The lack of nesting sites in the modern concrete houses and decrease in number of mud houses was found to be the main cause of decline. The lacking of spiny shrubs and trees less than 7 ft. height most preferred by House Sparrow as roosting sites, lack of animal diet in early stage of nestling diet and intense competition for nesting sites from birds like Common Myna, Red -rumped swallow etc. were other major causes of decline reported. Other probable causes reported are electromagnetic radiations from mobile towers, predation and lack of water sites.

KEY WORDS: House sparrow, Passeridae, drastically, decline, competition.

The house sparrow (*Passer domesticus*) is a member of the family Passeridae. House sparrows are abundant near human habitations. The house sparrow has a historical commensal relationship with man and has followed his colonisation of the majority of the earth. It is the most widely distributed land birds in the world, Summers & Smith (1988). It is associated with human habitations e.g. agricultural land, villages and urban areas. It is primarily a seed eater but requires insects and their larvae in the breeding seasons, Lowther & Clink (1992). Despite this historical success, the species has been declining since the early 1980s at several parts of the globe, including many countries across Europe reported by Crick et al. (2002), Prowse (2002), Vincent et al. (2002), Kelcey & Rheinwald (2005), Murgui & Macias (2010), Kekkonen et al. (2011), in North America by Erskine (2006), Lowther (2006), in Australia by Olsen et al. (2003). Robinson et al. (2005) and De Laet & Summers-Smith (2007) reported that this phenomenon is especially well documented in Britain where the most drastic declines have been detected, particularly in urbanized areas. As a result, according to Baillie et al. (2010), the house sparrow is now listed as a species of conservation concern in Europe (SPEC category 3) and of special conservation concern (Red List) in Britain. Chamberlain et al. 2009, Robinson et al. (2005) and Erskine (2006) reported that the timing and rate of decline was found to differ between rural and urbanized populations, De Laet & Summers-Smith (2007) and Shaw et al. (2008) suggested that different mechanisms are driving population trends in different habitats with respect to urbanization.

According to Dandapat et al. (2010), in India, the number of house sparrows has decreased dramatically in several parts of the country especially across Bangalore, Mumbai, Hyderabad and other cities. Ornithologist Survey conducted by Indian Council of Agricultural Research has reported that the sparrow population in Andhra Pradesh alone has dropped by 80% and in other states like Kerala, Gujarat and Rajasthan, it has dipped by 20%, while the decline in coastal areas was as sharp as 70% to 80%. According to the survey at different places of India on the occurrences of house sparrow, it was reported by Rajashekar & Venkatesha (2008), Daniels (2008), Khera et al. (2010), Bhattacharya et al. (2010), Ghosh et al. (2010) that their population has decreased considerably at present. Gulati (2005) reported that once widely distributed species in most parts of Europe and Asia slowly disappearing from urban areas.

In urban and suburban regions of Jammu region, there has been observed a drastic decline of house sparrow. The house sparrow which was once was commonly seen, it has become difficult to locate this bird in the region.

The present communication aims to establish the reasons for the dramatic decline in the population of house sparrows in some urban areas of Jammu division so that in the future, appropriate management strategies could be planned out to conserve this significant bird which is a useful scavenger.

MATERIAL AND METHODS

Study Area: The study was carried out in urban, suburban and rural areas of Jammu region. Geographically, Jammu lies between 32° 27' and 33° 50" North latitudes and 74° 19" and 75° 20" East longitudes. Attitudinally, it extends from 250 meters to 410 meters above the mean sea level. The climatic conditions in and around the study area are dry sub-humid to arid. There are four well marked seasons in a year, winter, summer, Monsoon and autumn. January is generally the coldest month while May and June are the hottest ones. Jammu city is the main urban area in Jammu district. The flora of urban areas is dominated by natural as well as exotic species. Predominant native plant species in the study area are *Ficus bengalensis*, *Ficus religiosa* (Peepal), *Dalbergia sisoo*, *Mangifera indica*, *Acacia modesta*, *Acacia arabica*, *Zizyphus* species, *Gravillea robusta* (Pallavi), *Cannabis sativa* (Bhang), *Dedonia viscosa*, etc.

Methodology: The study was conducted over a period of two years (March 2009 to March 2013). Regular field trips were made throughout this period at regular intervals of one or two days. The status of house sparrows was determined by comparing the population pattern in different localities. Line Transect and Point Count Method were applied for enumerating the population of house sparrows. The birds were observed with naked eye and through binoculars (Bushnell 7X 50 U.S.A. made) whenever found necessary to record the data from quite a long distance in order to avoid any interference to birds due to the presence of observer. Photographs were taken with the aid of Canon EOS camera fitted with 300 mm zoom lens, digital camera and video camera.

Statistical Analysis: Pearson Co-relation co-efficient (R) was used to find positive and negative relationship between variables.

RESULTS

Urbanisation has complex direct and indirect effects on native flora and fauna. The number of house sparrows in urban areas of Jammu region has declined dramatically. The reasons for decline of population are as under-

1. Lack of nesting sites in modern houses:

To study effect of new modern buildings on nesting sites of house sparrow, census of houses and number of nests was done in Jekhane of Udhampur town for a period of five years from March 2009 to March 2013 (Fig. 1). The number of mud houses decreased during the period was 44.44% and decrease in nest count is 64.33%. The increase in concrete houses during the study period was 60.55%. The value of Pearson Coefficient (R) found were $R = 0.97$ (co-relation between no. of mud houses and nest counts) and $R = -0.98$ (co-relation between no. of concrete houses and nest count).

2. Increasing competition for nesting sites:

Five locations were selected to study the impact of competition for nesting sites with other birds of the region. The number of cases where house sparrow was forced to leave its nesting site by other birds was counted (Fig. 3). Common Myna is the biggest competitor (48%, $n=489$) of house sparrow for nesting sites in urban areas as shown in (Fig. 4).

3. Lack of Roosting sites:

During the study period, survey was carried on 447 roosting groups of house sparrow in rural and some suburban regions of Jammu to find the vegetation type preference for roosting. House sparrow used shrubs and trees less than 7 ft. height as dominant vegetation for roosting (Figs. 5 & 6). The roosting trees used by house sparrow in rural regions of Jammu are *Punica granatum*, *Berberis artista*, *Aegle marmelos*, *Berberis lyceum*, *Carissa opaca*, *Rubus elliptica*, *Populus cilata*, *Salix alba*, *Spiraea canescens*, *Zizyphus mauritiana*, *Pyrus pashia*, *Morus alba*. The common vegetation used in urban regions are *Ficus bengalensis*, *Ficus religiosa*, *Dalbergia sisoo*, *Mangifera indica*, *Acacia modesta*, *Acacia arabica*, *Zizyphus* species, *Berberis artista*, *Punica granatum*, *Populus ciliate* etc.

4. Effect of mobile towers on density of house sparrow:

To study the effect of mobile towers on house sparrow behaviour, six rural sites at Tehsil Chenani District Udhampur were selected where newly mobile towers were constructed. The no. of houses, nests and mobile tower were counted in March 2009 (Fig. 7). The number of houses, nests and mobile tower are again counted in the following breeding seasons and tabulated (Fig. 8). There is 17.61% decrease in number of total nests.

5. Increase of predation:

Due to lack of nesting sites, sparrow is forced to form nests in tree holes and outside human habitations where it fell easy prey to predator birds like owl, crow and reptiles like snakes. During this period, two cases were noticed where Rat snake eat the chicks of house sparrow.

6. Shortage of food:

A study was carried on diet of nestling in rural and urban areas. The nestling of urban areas was found to eat less animal diet as compared to rural nestling and increase in mass was found to be far less. The number of nestling fledged successfully was less in urban areas than rural areas.

7. Lack of Water sites:

The urban areas of Jammu face acute shortage of water during summer season when temperature touches 45° C. During this period, water is not easily available to house sparrow. The modern houses lack water containing wooden boxes, mud boxes and earthen pots.

DISCUSSIONS

The house sparrow has undergone a drastic decline in the last 25 years across the world. It is included in the red list that means high conservation concern. The present decline in house sparrow number appears to be widespread all over the world. Many reasons have been suggested including the widespread use of garden pesticides resulting in the absence of insects needed by newborn sparrows. Joshi (2009) reported changes in agricultural practices, in particular the shift to monoculture crop planting have been suggested as the main cause of decline.

The major cause of decline is the lack of nesting sites. The modern houses are cemented and lack holes. The count of mud houses and nests of house sparrow was found positively co-related during the study period ($R=0.97$). A strong positive co-relation between mud houses and nests count is found since the value is near 1. The count of concrete houses and nests of house sparrow was found negatively co-related during the study period ($R=-0.98$). A strong negative co-relation between mud houses and nests count is found since the value is near 1. Due to lack of nesting sites, house sparrow is forced to make nest on trees and tree holes. During the study period, two nests of sparrow were found on trees *Salix Alba*. Dandapat et al. (2010) reported that decline is due to lack of holes for nesting in modern houses. Raghavendra Rao (2000), Denis Summer-Smith (2003), Cramp et al. (1985) reported that among all, one of the prime reasons is declining nesting sites in urban and suburban region.

Due to lack of nesting sites, house sparrow is facing a tough challenge in urban areas from other birds like Indian Myna, Bank myna, Brahminy Myna, Red rumped swallow Indian Blue Rock Pigeon etc. for the available nesting sites. House sparrow being small in size and less aggressive always has to sacrifice its nesting sites to other birds.

Due to extensive urbanisation and development in urban and suburban regions of Jammu, the vegetation which was used by house sparrow for roosting have now been replaced by concrete buildings, walls, playgrounds, wire fences etc. These vegetation are important sites for sparrow as they use it for roosting, resting, preening their feathers and protection from predators. Thus sparrow is declining and shifting from urban regions.

To study the impact of electromagnetic radiation (mobile towers), rural sites were selected where the availability of nesting sites, food, roosting sites, water is available in plenty. The competition for nesting sites, food and risk of predation is also less. So in such places, the population should increase. But the population found to decrease. The maximum decrease in nests found in Motorshed (30%) where maximum number of mobile towers i.e. 5 were operational. The reduction in mud houses at this station was only 9%. The lack of nesting sites and electromagnetic radiations were possible cause of maximum decline of House sparrow at this station. Joris Everaert & Dirk Bauwens (2007) showed that fewer house sparrow males were seen at locations with relatively high electric field strength values of GSM base stations and therefore support the notion that long-term exposure to higher levels of radiation negatively affects the abundance or behavior of house sparrows in the wild.

The lack of the insect food is one of the main causes of decline of house sparrow on which the young ones of sparrow exclusively feed for first 15 days. The lack of insects is due to the lack of vegetation in urban areas. The food providing plants are replaced by human settlements. There is. The house sparrow has to travel long distance to get food. Kate Vincent (2005) reported the high rate of starvation of chick and low body masses at fledgings in suburban regions of

Britain as main causes of decline of house sparrow. He also reported that scarcity in the larvae which feed on leaves of plants reason as one of the main cause of population decline of *Passer domesticus*.

Crick et al. (2002) reported that suburban sparrows were found to experience higher nest failure rates and Peach et al. (2008) explained that it mostly due to reduced nestling survival compared to their rural counterparts in Britain, thus decreased reproductive success has been suggested to account for the decline of urbanized populations. Several reasons have been proposed for the reproductive failure of urban sparrows. First, nestlings require an arthropod diet, and parents may be unable to find nestling food of sufficient quantity and/or quality due to the scarcity of native vegetation. According to Shaw et al. (2008) recent development of cities often results in losses of green space such as gardens being replaced by paved parking lots. Southwood (1961) reported even existing vegetation may harbor poor insect fauna if it consists mainly of exotic or evergreen plants. Supporting this view, Peach et al. (2008) carried a study in and around the city of Leicester, Britain found that the survival of sparrow nestlings correlated negatively with high amounts of vegetable material in their diet and positively with high abundance of aphids around the nest. Second, according to Summers-Smith (2007), arthropod density may be reduced in cities by environmental pollution, especially traffic emissions. Raupp et al. (2010), Zvereva & Kozlov (2010) reported although the effects of traffic related air pollutants on animals are not well understood, they may affect invertebrates. Eeva et al. (2003), Swaileh & Sansur (2006) reported they might also have direct adverse impact on vertebrates such as the nestlings and adult birds.

Dandapat et al. (2010) reported introduction of unleaded petrol, use of chemically treated seeds, flow of electromagnetic waves from cellphone towers, reducing areas of free growing weeds or reducing numbers of badly maintained buildings, competition for food by other species etc. are possible reasons for this disappearance. Thus present study gives firm evidences to some of these causes. He also observed that other birds like pigeons, crows, mynas eat seed and are in direct competition with sparrow. Moreover, he is of the view that the availability of grains in pre-cleaned and packed packets has lead to the disappearance of larvae thereby depriving the sparrow of food.

Thus a single reason is not responsible for cause of the decline of House sparrow in urban and suburban region of Jammu. A combination of several factors is responsible for the urban declines of house sparrows.

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Year	No. of mud houses	No. of concrete houses	Total Houses	Nest count
Mar-2009	90	180	270	157
Mar-2010	81	201	282	151
Mar-2011	72	235	307	120
Mar-2012	52	280	332	82
Mar-2013	50	289	339	56
TOTAL	345	1185	1530	566

R (no. of mud houses v/s nest counts) = 0.97

R (no. of concrete houses v/s nest count) = -0.98

Figure 1. Table showing the year wise data of mud houses, concrete houses and Jekhane area of Udhampur Town.

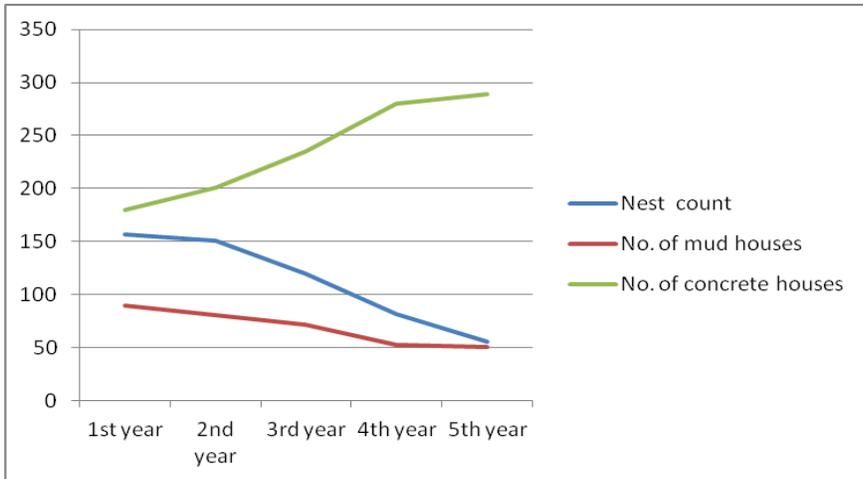


Figure 2. The graph shows the relation between number of nests, mud houses and concrete houses during the study period.

Location	Name of Birds competitor for nesting sites	No. of nests studied	No. of case House Sparrow was thrashed out
Jewel	Indian Myna <i>Acridothere tristis tristis</i>	123	12
Bag-e- Bahu	Bank myna <i>Acridotheres ginginianus</i>	80	4
Chenani	Brahminy Myna <i>Sturnus pagodarum</i>	123	2
Udhampur	Red -rumped swallow <i>Hirundo daurica</i>	76	5
ReharChungi	Indian Blue Rock Pigeon <i>Columbia livia</i>	87	2
	Total	489	25

Figure 3. Table showing the main competitors for nesting sites of House Sparrow at different locations.

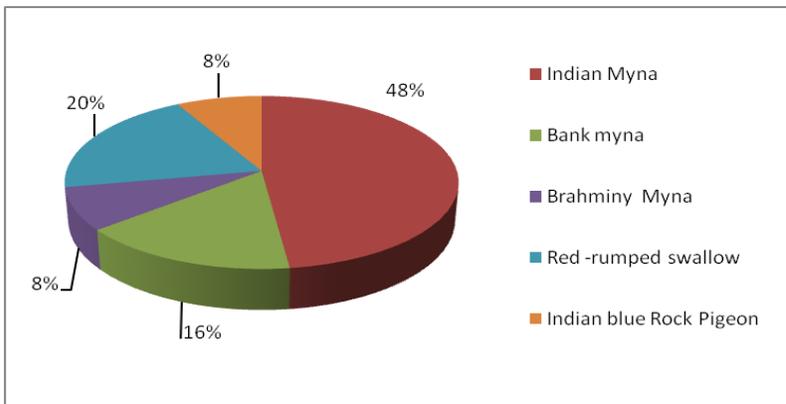


Figure 4. Pie diagram showing % competitor for nesting sites of House Sparrow in different locations of Jammu division.

Height of vegetation	No. of House Sparrow groups roosted
shrubs and trees < 7 ft.	262
trees between 7-15 ft	89
Trees >15 ft.	96
Total	447

Figure 5. Table showing type of vegetation used by House Sparrow roosting groups in some rural and urban regions of Jammu.

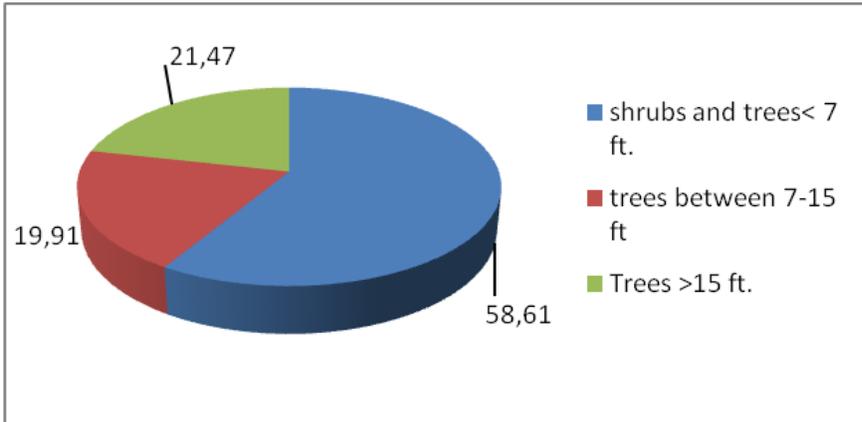


Figure 6. Pie diagram showing relative percentage of type of vegetation and height used by roosting groups of House sparrow for roosting locations of Jammu division.

Location	No. of Houses within 500 m approx.			No. of nests	No. of towers
	Mud	Cemented	Total		
Sewna	49	3	52	68	0
Motorshed	40	5	45	72	1
Mandal	32	4	36	55	0
Mantalai	38	5	43	68	0
Sudhmahadev	53	12	65	72	0
Karlaw	16	9	25	34	0
Total	228	38	266	369	1

Figure 7. Table showing census of houses, nests/ breeding pairs of House Sparrow and mobile towers of five sites at Tehsil Chenani in March 2009.

Location	No. of Houses within 500 m approx.			No. of nests	No. of towers
	Mud	Cemented	Total		
Sewna	47	12	59	62	1
Motorshed	36	9	45	51	5
Mandal	38	11	49	45	2
Mantalai	42	10	52	56	2
Sudhmahadev	50	30	80	59	2
Karlaw	25	13	38	31	2
Total	228	85	322	304	14

Figure 8. Table showing census of houses, nests/ breeding pairs of House Sparrow and mobile towers of five sites at Tehsil Chenani in March 2013.