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Occurrence of house sparrow, *Passer domesticus indicus* in and around Bangalore

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Bajnath on the Bageshwar–Kaushani road. Its fibres had been scorched by fire when we saw it in 1995. The palm was originally described on the basis of cultivated tree in Beccari's garden at Florence^{5,6,9}, where the senior authors have seen few plants growing well. However, a thorough search in the other gardens of Europe is necessary because there are reports on the distribution of the seeds and plants to London by its discoverer Major Madden, from where they were distributed around the United Kingdom and to Ireland¹⁰.

As can be seen from the above account, *T. takil* should be considered severely threatened. The causes of depletion of the species are mainly socio-economic. The plants are cut for fibre used to make ropes and local curd churners. The leaves are also cut for making brooms. However, forest fire may also cause mass killing of plants due to the marcescent dried leaves and permanent leaf-sheath fibres which are prone to fire. The situation is made worse by the fact that cultivated trees in Nainital and Chaubattia, which were thought to be *T. takil* and would thus have provided a buffer, have now clearly been identified as *T. fortunei*, the floristic equivalent of the cuckoo. In all, there may not be more than a dozen mature trees surviving in this area, with about 2–300 juveniles. We would therefore assess its status as critically endangered¹¹. It is es-

sentential that immediate and serious conservation measures be put into place.

In our opinion these should include the following:

- Education of local villagers about this palm, in particular about the dangers of continued cutting, the need to conserve them for their own support, and the possibility of fibre harvest without destruction. Also, the provision of free rope to take the pressure off the wild populations for a while.
- Removal of introduced seedlings of *T. fortunei* from the wild and clear labelling of other seedlings in cultivation from the same source as *T. fortunei*.
- Controlled collection of seeds from a wild population, perhaps at Kalamuni, for the production of seedlings to establish an *ex situ* population at a suitable location in the hills and perhaps for later reintroduction into the wild.

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Occurrence of house sparrow, *Passer domesticus indicus* in and around Bangalore

Birds are often common denizens of the ecosystem and have been considered as an indicator species of inhabited areas¹. Studies showed that depressed abundance 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^{2,3}. Among the various species of birds, the house sparrow *Passer domesticus indicus* (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 occur worldwide. Ali⁴ has described in detail the morphology and biology of the house

sparrow. Aggressive flocks of sparrows discourage other species of birds from foraging in the same area. The sparrow is omnivorous and feeds on grains, cereals, fruits, fruit buds, flower nectar, kitchen scrap, insects and insect larvae^{4–8}. House sparrows are monogamous and long-term pair bond is maintained throughout and between breeding seasons. The species breed in small colonies or in loose groups⁹.

House sparrows were abundant in the Bangalore region in the past. Of late, their population has been declining alarmingly in the region (pers. commun.). As no valid data are available, a study was conducted to know incidence of sparrows in different locations in and around the city.

The Bangalore region lies between latitudinal parallels 12°39'–13°18'N and longitudinal parallels 77°22'–77°52'E at an elevation range 839–962 m asl¹⁰. Over 6.52 million people inhabit about 2191 sq. km of the metropolitan area¹¹. Study areas were chosen based on the various types of habitats from four cardinal directions of Bangalore. Outward development continues exponentially in all directions of the city. The Kempegowda Bus Station (KBS) was identified as the central location of the city. We selected study areas to include four busy areas (KBS, K. R. Market, Shivajinagara and Yeshwanthapura) with high vehicular traffic and densely populated central city regions within a radius of 0–5 km from

the KBS; four regions with moderate vehicular traffic and moderately populated (Basaveshwaranagara, Begur, Hebbal and Krishnarajapuram) within a radius of 5–15 km from the KBS; four suburban regions (Gottigere, Hoskote, Tavarekere and Yelahanka) with less vehicular traffic and less population within a radius of 15–25 km from the KBS, and four rural habitats (Anekal, Doddajhala, Devanagondi and Thippagondanahalli) comprising farmlands such as paddy, millet, floricultural and horticultural fields, and scrub vegetation within a radius of 25–40 km from the KBS (Figure 1).

No single survey can provide all the necessary data for every research question¹². However, basic data for any study provide a framework upon which detailed investigations may be conducted¹². Although some general principles have emerged from the study of wildlife in urban areas, not all areas, human cultures, and natural communities are the same. Thus, an efficient protocol that can be adopted in different places should be developed¹². Based on our experience of application in the field considering vehicular traffic and human activities, ten spots in each study location well distributed at equidistance mostly around rice shops and/or vegetable markets (as sparrows are usually found near these places) which could be easily covered by one person by walk, were selected for observation. At each site count of birds was made for 5 min within the visible radius according to earlier methodologies^{12–16}. As our experience showed the number of birds remained almost the same for 5–20 min of counting, 5 min observation was considered as standard for counting of sparrows in any site. Call notes of the birds were also used for locating them. The male and female birds seen in the sites during the observation period were recorded. Counting of the birds was made in the morning during 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. Surveys were conducted once a fortnight in the identified locations from June 2005 to May 2006. Moreover, regular field observations were also made on the nests, nesting sites, feeding habitats and food sources. Observations were also made on the natural predation of the birds and their eggs. Data on the occurrence and abundance of house sparrows at different

study locations were statistically analysed using chi-square test.

Observations made on the abundance, sex ratio and seasonal occurrence of *P. domesticus indicus* populations in different study regions are given in Table 1. A large number (532–784) of sparrows was recorded from Anekal, Doddajhala, Thippagondanahalli (rural area), Hoskote (suburban area) and K. R. Market (urban area). A moderate number (264–428) of sparrows was found in Gottigere, Tavarekere, Yelahanka (suburban area), Begur, Hebbal, K. R. Puram, Yeshwanthpura (urban area) and Devanagondi (rural area), whereas a small number (52–92) of sparrows was found in Shivajinagara, KBS and Basaveshwaranagara (urban area).

In the rural region, the lowest number of birds was found in Devanagondi compared to other rural regions. This could

be due to existence of a few houses with limited availability of nesting sites and food sources. On the contrary, in the urban area, the highest number of birds was found only in K. R. Market. Although sparrows were observed in various locations within the city, nests of the birds were seen only in asbestos sheet-roofed old building at K. R. Market (Figure 2). The availability of plenty of food such as grains, vegetables, fruits, insects, especially caterpillars in the vegetables and the suitable nesting sites could be important factors for the high density of sparrows in K. R. Market. Rana and Idris¹⁷ reported 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 sources¹⁸. Simwat⁸ reported that 84% of the total food of the

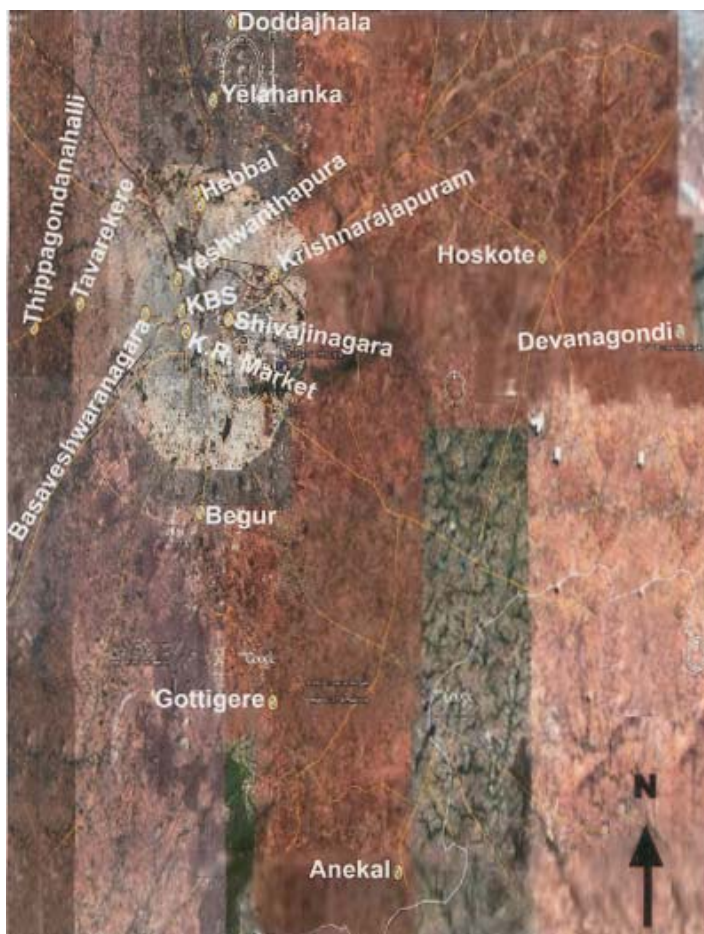


Figure 1. Map of Bangalore showing locations of the study sites. Courtesy: www.GoogleEarth.com

SCIENTIFIC CORRESPONDENCE

Table 1. Abundance, sex ratio and seasonal occurrence of *Passer domesticus indicus* adults in different locations in the Bangalore region during 2005–06

Study site	Mean no. of adults in different seasons ^a				Mean no. of males	Mean no. of females	Grand total of adults ^b	Percentage of birds	Sex ratio ^c Male : female
	Southwest monsoon (June–September)	Northeast monsoon (October–November)	Winter (December–February)	Summer (March–May)					
Kempgowda Bus Station*	24	0	7	33	32	32	64	1.06	50 : 50
K. R. Market*	258	177	68	113	300	316	616	10.21	51 : 49
Shivajinagara*	21	16	35	20	40	52	92	1.52	43.48 : 56.52
Yeshwanthpura*	79	54	79	68	140	140	280	4.64	50 : 50
Basaveshwaranagara [▲]	20	02	15	15	24	28	52	0.64	46.15 : 53.85
Begur [▲]	79	28	139	122	180	188	368	6.10	48.91 : 51.09
Hebbal [▲]	67	49	55	125	140	156	296	4.91	47.30 : 52.70
Krishnarajapuram [▲]	90	84	93	85	176	176	352	5.83	50 : 50
Gottigere [▲]	49	147	33	35	136	128	264	4.38	51.52 : 48.48
Hoskote [▲]	120	248	187	183	354	384	738	12.23	47.97 : 52.03
Tavarekere [▲]	91	51	86	88	144	172	316	5.24	45.57 : 54.43
Yelahanka [▲]	118	118	102	90	216	212	428	7.09	50.47 : 49.53
Anekal [▲]	200	240	174	170	376	408	784	12.99	47.96 : 52.04
Devanagondi [▲]	106	75	68	47	140	156	296	4.91	47.30 : 52.70
Doddajhala [▲]	164	95	104	169	258	274	532	8.82	48.50 : 51.50
Thippagondanahalli [▲]	168	136	152	100	264	292	556	9.21	47.48 : 52.52
Total	1654	1520	1397	1463	2920	3114	6034	99.78	49.39 : 51.61

*Central city regions; [▲]Urban regions; [▲]Suburban regions; [▲]Rural regions; ^aSeasonal abundance of sparrow populations was significantly different ($\chi^2 = 23.72$, $df = 3$, $\chi^2_{3(0.05)} = 7.88$); ^bAbundance of house sparrow in different locations was significantly different ($\chi^2 = 946.56$, $df = 15$, $\chi^2_{15(0.05)} = 25$). ^cSex ratio was not significantly different ($\chi^2 = 5.138$, $df = 15$, $P > 0.05$).



Figure 2. Old hatched asbestos building at K. R. Market.

sparrow nestlings comprised insects, with caterpillars contributing about 38%.

The abundance of sparrows in the K. R. Market area also indicates that the lesser sparrow populations in other areas within the city may not be mainly related to pollution or high anthropogenic activi-

ties. 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. The density of sparrows recorded in different locations was significantly

different (Table 1). During the period of study, the highest per cent of birds was found at Anekal region (12.99) and least at Basaveshwaranagara (0.06; Table 1).

The sex ratio of house sparrows in all the study locations did not vary significantly (Table 1). Rana and Idris¹⁷ have found no significant differences in sex ratio of the sparrow populations, but males outnumbered the females¹⁷; in our observations, the females outnumbered the males.

The highest number of birds was observed during the southwest monsoon (June–September) followed by the northeast monsoon (October–November), summer (March–May) and winter (December–February). There was a significant difference in abundance of birds during different seasons in the Bangalore region (Table 1). No bird was spotted during the northeast monsoon at the KBS area. Specific reasons for seasonal variation in the sparrow populations in general and the absence of birds in the KBS during the northeast monsoon are not clearly understood.

It was noticed that house sparrows usually built their nests in the crevices of hatched roofs of old houses (Figure 3), electric pipelines, in ventilation holes



Figure 3. House sparrow nest in the hatched roof.

and space available on the electricity metres, as reported by Ali⁴. Most of the nests were situated at a height of 2.5–6 m from the ground level. Nest material consisted of grass, straw, jute threads, leaves, weeds, paper strips, feathers, etc. as reported earlier⁴. In the city areas, sparrows in small groups were usually found resting on hanging electric wires.

Domestic/stray dogs and cats were rarely found attacking house sparrows when they were feeding on the ground. According to Cordero¹⁹, predation pressure is of minor importance in the house sparrow population. Although three-striped palm squirrels (*Funambulus palmarum*) were found active in the vicinity of sparrow nests in the K. R. Market building, they were not disturbing or attacking the nests, nestlings, eggs or adults.

The study sites in suburban and rural areas consisted of cultivated fields where rice, millets, pulses, vegetables and ornamental flowers were grown. Moreover, in these areas weeds, shrubs and bushes of various plant species were also common. The sparrows were commonly seen in the rice and maize fields during the harvest season and they were also found in village houses with tiled roof and near the local grocery shops.

Thus it is clear that the availability of a 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. However, it is difficult to understand the adverse effects of other factors such as pollution, high anthropogenic activities, etc. on sparrow populations in the city area. The present study suggests that retaining old hatched roof buildings and native buildings in the city are necessary for sustaining house sparrow populations. Additionally, easily accessible food sources such as seeds, grains, vegetables, etc. in open spaces must be provided over a substantial part of the city. Supermarkets which are now mushrooming ubiquitously in the city where grains and vegetables are sold in a confined area and demolition of old buildings will beyond doubt severely affect the sparrow population. After creating a congenial habitat in and around the city for house sparrows, the concerned State Department should take necessary steps to monitor the sparrow populations regularly to prevent the species from vanishing from the city.

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