

Difference in nest concealment and mortality rate in house sparrow *Passer domesticus* in urban and rural areas of Lucknow, India

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Abstract – We undertook a study to determine whether there was significant difference in nest concealment and mortality rate among house sparrow *Passer domesticus* in urban and rural areas of Lucknow, India. We found significant differences and attributed this result to the loss of natural nesting sites due to anthropogenic factors in urban areas.

INTRODUCTION

Birds breed in urban as well as rural areas. However, differences have been observed in their breeding ecology in the two areas. Salvati *et al.* (1999) studied breeding ecology of kestrels *Falco tinnunculus* in urban, suburban and rural areas of central Italy and found nest density very high at city centre (1.9 pairs/km²) and high in suburbs (0.6 pairs/km²). Breeding success was consistent with that of other European urban areas. Significant differences were found among study areas in density, spacing, use and reoccupation of nest sites. The house sparrow *Passer domesticus* is a resident species and a commonly sighted bird in India. It feeds on insects and grains. It breeds from March to June in north India, September and October in central India and throughout the year in southern India (Ali 1992). These birds build well-concealed nests where lay eggs and raise their young. We studied nest concealment of these birds, attack of predators on their nests and their mortality rate in urban and rural areas of Lucknow, India.

METHODS

We located 40 nests of the house sparrow in urban areas of Lucknow (26°, 55°N, 80°, 59°E: 450 meters above sea level), India, in a 64 km² area and another 80 nests on the city's outskirts (64 km²) among dense vegetation and farmland, from March 2009 to June 2009. For locating the

nests we observed parental behaviour in nest construction wherein birds returning with dry grass and leaves led us to under-construction nests. We searched for nests relying on information from local people. Bird droppings at times led us to the nests. A 8X42 binocular and 40X telescope were used to study predatory attacks on the nests. The nests were marked with a wooden stake at a 10m distance from them. The nests were observed every second day (two hours in the morning, two in the afternoon and two at night). All mean values are accompanied with standard deviation (SD).

We measured nest concealment from four directions (North, East, South, West) at 1m distance from the nest at nest height level. We estimated mean percentage of the nest concealed to nearest 10% (Burhans 1997). For example, a nest visible 20% received an 80% score.

RESULTS

The rural nests were better concealed with a score of 65%-80% (72.2±2.6) as against urban nests 30%-45% (34±3.2). A two-tailed t-test revealed the difference between urban and rural nest concealment as significant (t=20.4, df=120, P<0.05).

We studied the attack of predators on urban and rural nests. In all 15 urban nests were attacked by predators: one attack not harmful to the brood, 5 attacks on eggs, 9 attacks on nestlings in which 36 nestlings were killed. The urban

nests were attacked by cats (8 nests), mongooses (2 nests), kites (2 nests), snakes (3 nests).

As many as 18 rural nests were attacked: two attacks not harmful to the brood, 7 attacks on eggs, 9 attacks on nestlings in which 38 nestlings were killed. The rural nests were attacked by cats (10 nests), mongooses (3 nests), kites (2 nests), snakes (3 nests). Mortality rate among urban nests was 28.75%. In all 46 hatchlings died: 36 killed by predators, bad weather (4), accidentally falling off nests (2), diseases (4). Mortality rate among rural nests was 14.7%. In all 50 hatchlings died: 38 killed by predators, bad weather (4), accidentally falling off nests (3), diseases (5). A two-tailed t-test revealed the difference in mortality rate between urban and rural nests as significant ($t=5.20$, $df=120$, $P<0.05$).

DISCUSSION

We attributed the significant difference in nest concealment among urban and rural house sparrows to better nesting conditions in rural areas, which in turn led to significant difference in mortality rate among house sparrows. We concluded that loss of natural nesting sites due to anthropogenic factors in urban areas was responsible for the significant difference in nest concealment and mortality rate in urban and rural areas.

Hochachka *et al.* (2006) found birds varied across rural to urban gradient for several species. Mac Gregor-Fors *et al.* (2006) studied the effect of urbanization on avian communities in tropical areas. They concluded that species richness is inversely related to urbanization degree while total bird density increases with it.

Stracey and Robinson (2006) studied the nests of northern mocking bird *Mimus polyglottos*, northern cardinals *Cardinalis cardinalis* and brown thrashers *Toxostoma rufum* to assess if there were consistent patterns in nest predation rates for different species. They monitored nests in parking lots, residential areas and natural areas and con-

cluded that nest predation rates are lower in urban areas than non-urban areas.

Fontaine and Martin (2006) demonstrated that birds can assess nest predation risk at large and that nest predation plays a key role in the expression of avian reproduction strategies.

Mazumdar and Kumar (2006) studied the nesting ecology of Redwhiskered Bulbul *Pycnonotus jocosus* in urban and peripheral areas of Lucknow, India. The city centre nests were less in number, showed clumping, had lesser mean depth, clutch size, height, had greater mortality rate, lower nesting success and took a longer duration to complete in comparison to nests on city periphery, which was attributed to better nesting conditions and food availability on city outskirts.

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