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**Dhanya, R. 2011. Status and ecology of House Sparrow *Passer domesticus* along an urban to rural**

**gradient in Coimbatore, India. Ph.D. thesis, Bharathiar University, Coimbatore.**

**Chapter-wise summary**

**Chapter2: The urbanization trend and land use land cover changes in the study area**

**SUMMARY**

* Coimbatore is a part of Coimbatore-Tiruppur-Erode industrial corridor. The major industrial estates are situated at Peelamedu, Kurichi, Singanallur and Uppilipalayam.
* There are nine commissioned Special Economic Zone (SEZ) in Coimbatore.
* Coimbatore is famous in the fields of IT and BPO, Textile, Engineering clusters and Jewellery business.
* The rural population has decreased by 1.76 percent in the last 10 years and the same time the urban population has increased by 27.69 percent.
* The industrial growth due to the availability of raw materials and power supply is a significant factor resulting nearly 52 percent increase in population between 1941 and 1951.
* The Coimbatore city population was 9,30,882 as per 2001 census and the urban agglomeration is 21,51,466 as per 2011 census.
* Rapid industrialization invited large influx of the migrants to the city and yearly around 20,000 people immigrate to Coimbatore. The migration process resulted in the formation of 195 slums in Corporation limits and the population during 2006 was 3,52,219.
* In Tamil Nadu state the city of Coimbatore (73.43%) has the highest proportion of residential houses of permanent nature.
* The Coimbatore city is connected with seven radial roads namely Thadagam, Metupalayam, Sathy, Avinashi, Trichy, Cochin and Perur roads.
* The road connectivity of the place is a very significant cause for rapid urbanization.
* The city Corporation alone maintains a road network of 635.52 kms. Of the total road length 83.6% are black topped roads, 10.4% are concrete roads, and the balance 6% include earthen and other roads.
* The city is connected with main industrial cities such as Chennai and Bangalore, which are about 500 and 350 km respectively.
* Within a span of fifteen years (1989-2004) the extent of the urban area has shown a 58.2 percent growth.

**Chapter 3**

**The status and habitat utilization of House Sparrow (*Passer domesticus*)**

**SUMMARY**

* The Sparrow population showed significant difference among years (F=3.199. *df* = 5, p<0.05).
* The birds were uneven in distribution in village, suburban and urban areas (χ2 = 2.12, p<0.05).
* In the intensive study points total bird sightings were higher in the village (3237) followed by urban area (773) and suburb (603).
* The highest number of individuals was observed during 2006 with 1610 and the least from 2008 with 1428.
* In 2008, both urban and suburban populations showed a decreasing tendency.
* Compared to village the population fluctuation was higher in urban and suburban area.
* The Sparrow distribution of different landscape usage type was high in the area where the shops were more, followed by residential area and open areas with sparse houses.
* Sparrow distribution was examined in view of habitat variables. Pearson rank correlation was performed with the sparrow population and habitat variables. The population was positively correlated with number of provision stores (r=0.840,p<0.001), weedy patches (r=0.729, p<0.001), number of hotels (r=0.229, p<0.001), shutter hood (r=0.708, p<0.001), waste dump (r=0.312, p<0.001) and negatively correlated with number of trees (r=-0.0387, p>0.05) and vehicles (r=-0.018, p>0.05).
* Also the building characteristics were studied in view of sparrow distribution. It is also correlated with the building characteristics such as number of shutter hood (r=0.708, p<0.001), open ventilation (r=0.339, p<0.001), not sophisticated buildings (r=0.870, p<0.001), roof extension (r=0.185, p<0.05) and negatively correlated with covered ventilation (r=-0.039, p>0.05).
* Similarly, in the points which were used by the Sparrow the number of waste dumps, water sources, shutter hood, hotels, provision stores and weedy patches, were high.
* Stepwise Discriminant Function Analysis (SDFA), used to analyse the difference in habitat variables (n=15) between Sparrow used and unused points; retained 11 habitat variables (Wilks’*λ*=0.357, *χ2*= 226.28, *df* = 11, *p*<0.001).
* Similarly, DFA is performed between as class I (≤10 individuals) and as class II (≥ 11 individuals), retained a number of weed patches (Wilks’ *λ* = 0.921, *χ2*= 9.28, df = 1, p<0.05).
* Multivariate statistical technique such as the Principal Component Analysis (PCA) showed high positive loadings for the number of provision stores, hotel, water sources and shutter hood.

**Chapter 4.**

**Breeding performance and productivity of House Sparrow (*Passer domesticus*) along an urban to rural gradient.**

**SUMMARY**

* The House Sparrow is a discrete breeder with a peak in April and a second peak in January.
* The number of nests showed significant positive correlation with maximum temperature (r=0.455, p<0.05; Figure 4.2) and negatively but not significantly correlated with minimum temperature (r=-0.021, p>0.05), rainfall (r=-0.298, p>0.05) and rainy days (r=-0.299, p>0.05).
* Comparison between successful and unsuccessful nest site variables using Mann-Whitney U showed significant difference for nest height, bush covered area, distance from other bird species nest, distance from road, drainage, water source, artificial light source and food source, ventilation in the building, number of nests, waste dumps and number of vehicles. The Mann-Whitney U test was used to compare nest-site characters with random site and significant differences were recorded corresponding to number of houses, number of shops, are under bush cover, number of trees and number of waste dumps, distance from water source and roof extensions.
* Eight different nest substrata were used by the species for nest construction. Shutter hood (n=135) was the most widely used substratum in suburban and village areas.
* In urban area roof support was the most used nest substratum. Throughout the study period the nest placement was found high in shops.
* The height class mostly used for nest construction was 01-03 m.
* The PCA analysis resulted in components that were positively loaded towards factors such as the nest placement at different buildings, number of vehicles, bush cover and distance from drainage.
* DFA, performed to find important factor which discriminate the nest site from the random site, retained four variables; number of houses, distance from water source; percent bush cover and concrete roof type (Wilks’λ = 0.269, *χ2*= 90.499, df = 4, p<0.001).
* The nest building activities in the House Sparrows were having two peaks, i.e., between 10:00 – 11:00 and 16:00 – 17:00 hrs. The female contributed more (64.96%) than males (35.04%) in the nest building activities.
* The nests were predominantly made of plant matter (91%). Animal matter (1%) and lining materials such as paper, plastic pieces (8%) were seen in lesser quantity.
* In village area nestling diet was dominated by insects followed by cooked food or leftover food items.
* The reproductive success was high in 2006 than that of 2007 and 2008. Urban area had the least success compared to the suburban and village area.
* The nest failure happened mainly because of abandonment and anthropogenic disturbances such as knocking down (while opening/closing the shutter) and removal (while cleaning). The percent of nest abandoned was high during 2006 (41.38%), 2008 (38.10%) and 2007 (28.13%).
* Nest abandonment was high during the initial phase of nest construction or after completion of the nest. In all the three years, the number of removed and knocked down nests were high during nest construction phase.

**Chapter 5.**

**Characteristics of nocturnal roosts of House Sparrow to environmental variables**

**SUMMARY**

* The pre-roosting activities were observed in House Sparrows. Flock synchronization and hovering happened just before roosting. Prior to the roost tree entry a hovering display was also reported.
* During the hovering display each flock covered around 10-25 m radius circle around the roost point.
* Of the seven species of roost trees *Azadirachta indica* (n=8) was mainly used for roosting.
* Number of hovering made prior to the roosting was high in large populations.
* The suburban Sparrow roost aggregation has been usual with very less members and the groups continuously changed the roost site because of local disturbances such as loss of roost trees, pruning of the roost tree and construction activities near the roost sites.
* The Urban roost population was slowly decreasing over the years.
* In the case of village areas all the large roost population (Kanuvai and Thadagam) showed a decreasing tendency.
* The hovering display of the first roost flocks were reported at a mean of 11.75 minutes before the local sunset timings. The entries of the last flock to the roost tree were reported with a mean of 6.37 minutes, before the local sunset timings. It is noted that local sunset timing was affecting the first flock entry to the roost tree (R2=0.499, p> 0.001).
* Local sunset timing was affecting the first flock entry to the roost tree.
* The birds roosted on comparatively smaller trees.
* The adjacent tree was smaller than the roost tree. The roost trees were found comparatively closer to the buildings and roads.
* The roost trees were found closer to bird feeding areas and to the other food sources such as drainage (3.74 m), bus stand (27.39 m) and temples (13.47 m).
* Near to the roosting trees the human activity index was high and there were less green areas surrounding the roosting tree (17.22%).
* To examine the roost site preference Logistic regression was performed. Variables like distance from food sources, HAI and built area would have increased the chance of selecting a roost site would have affected the roost site selection.
* PCA showed first component to have a positive loading with tree height, bole height and average crown radius. The second component was loaded with crown density and tree species.

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