
Study on the Communal Resting behaviour of Some Birds with Response to Land Use/Land Cover Change in Guwahati Metro City of Assam

Prabal Sarkar¹, Mukul Kalita², Asif Ekbal Hussain³, Arup Kumar Das⁴, Animesh Bhuyan⁵

¹Associate Professor, Department of Zoology, University of Science and Technology, Meghalaya

²Assistant Professor, Department of Civil Engineering, Assam Don Bosco University, Guwahati, Assam

³Post Graduate Student, Department of Zoology, University of Science and Technology, Meghalaya,

⁴Director, Geo-spatial Division, Aaranyak, Guwahati, Assam

⁵Post Graduate Student, Department of Civil Engineering, Assam Don Bosco University, Guwahati, Assam

ABSTRACT

*A study was conducted between November 2015 and June 2016 to understand the impact of deforestation on the variation of resting pattern among birds in relation to land use/land cover change in Guwahati Metro City of Assam. For this purpose, four methods were followed - (a) Selection of trees as the communal roosting sites (b) Vegetation sampling with 500 metres radii of each roosting site (c) Birds composition during resting in each roosting site and (d) Land use/land cover change analysis between 2003 and 2016 using Google Earth. It was found that all the resting trees selected by different species of birds between Khanapara to Jorabat area of Guwahati Metro City were located within 20 metres from the National Highway. The land cover/land use change analysis showed a significant loss of dense forest (29.4%) and an increase of human settlement (19.1%) that might have resulted in loss of the food plants and suitable nesting trees. No species of trees belong to same roosting tree within 500 metres radius of each site. Moreover, Common Myna (*Acridotheres tristis*) played a dominant role in terms of number irrespective of roosting site, and they share the roosting trees with Pied Myna (*Gracupica contra*), Cattle Egret (*Bubulcus ibis*) and House Crow (*Corvus splendens*) at Adarshanagar, with Jungle Myna at 9th Mile and with Pied Myna at SIRD. In most of the cases, Common Myna appeared at the resting site earlier than other species but found to be late mover from the resting sites. To avoid competition, the timing of arrival as well as departure was found to be different with respect to different species. This clearly indicates that lack of roosting trees due to urbanization may trigger the strategic development of communal roosting at the same roosting site by different species of birds.*

Keywords

Land use/land cover, Guwahati Metro City, communal roosting, Google Earth

1. INTRODUCTION

Roosting is a resting place where a group of individuals or the entire community of the same species congregate for a few hours or for the entire night/day. Hence species select a place or tree as the roosting site where they may have better protection from predators and closeness to the feeding sites.

In some species, individuals prefer to roost alone in pair while others do in group. Some species prefer to roost in group belonging to same species while some share the same roosting tree/site with other species. Such interspecies roosting (also called as communal or community roosting) has been observed between different species of mammals, birds, insect etc. This study was aimed to find out the nature of bird community roosting in the light of land cover and land use change in some highly disturbed areas of Guwahati city of Assam, India.

2. STUDY AREA

Guwahati is the largest city of Assam and North Eastern India. It is a major riverine port and one of the fastest growing cities in India, situated on the South Bank of the Brahmaputra River. The ancient cities of *Pragjyotishpura* and *Durjaya* (North Guwahati) were the capitals of the ancient state of *Kamrupa* under the Varman and Pala dynasties. Many ancient Hindu temples are in the city, giving it the name "City of Temples". Dispur, the capital of Assam, is in the circuit city region located within Guwahati and is the seat of the Government of Assam.

Guwahati lies between the banks of the Brahmaputra River and the foothills of the Shillong plateau, with LGB International Airport to the west and the town of Narengi to the east. It is gradually being expanded as North Guwahati in the northern bank of the Brahmaputra. The noted Madan Kamdev is situated 30 kilometres from Guwahati. Guwahati Municipal Corporation (GMC), the city's local government, administers an area of 216 square kilometres, while Guwahati Metropolitan Development Authority (GMDA) is the planning and development body of greater Guwahati Metropolitan Area.

Khanapara is a locality in Guwahati city of Assam, situated towards the extreme south of Guwahati; it is the hub for regional transportation. The College of Veterinary Science is located here with other offices of Veterinary department of Assam. Ganesh Mandir Indoor Stadium and Regional Science Centre are located here. This study was conducted in between Khanapara to Jorabat area of Guwahati city along the National Highway-37. This includes Adarshanagar, 9th mile and SIRD Khanapara. Details of the locations are given below.

(i) Adarshanagar

Adarshanagar (26.1072926N, 91.8533266E) is a small area in Kamrup district of Assam, India. To the west of Adarshanagar is Hastinapur, Amsang forest in north, hilly areas of Meghalaya's Ri-Bhoi district in south and Jorabat area of Assam in east.

(ii) 9th mile CRPF Camp

This area is situated near the CRPF Camp's 2nd gate in 9th mile (26.109162N, 91.8481433E) of Kamrup district, Assam. This area shares the northern boundary with Amsang forest; Hastinapur in east, hilly areas of Meghalaya's Ri-Bhoi district in south and CRPF Camp gate no. 2 in west.

(iii) SIRD Khanapara

This area (26.1194484N, 91.8258953E) is situated near the State Institute of Rural Development, Guwahati, Assam.

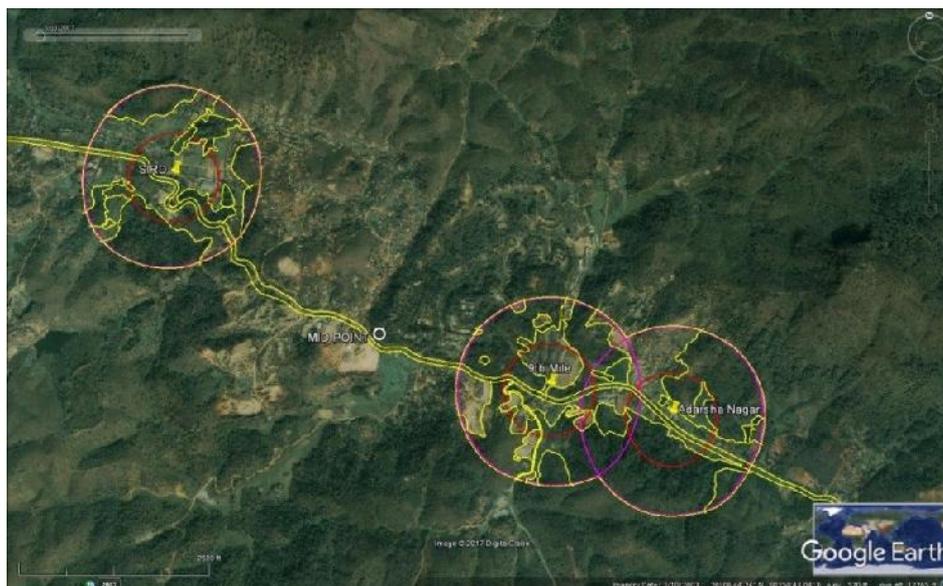


Fig. 1: Map showing the three study locations in Guwahati city of Assam, India

3. METHODOLOGY

(a) Identification of resting sites

During the morning and evening hours, the entire area was surveyed to identify the roosting trees of birds in between Khanapara and Adarshanagar. It was found that there are four locations where community resting take place, namely, Adarshanagar, 9th mile, 8th mile and SIRD Khanapara. Photographs were taken and herbariums were prepared in order to identify the tree species where birds roost.

(b) Identification of community structure

Survey was conducted early in the morning and late evening. During evening hours, one resting tree was targeted and monitored. While birds came, their numbers with respect to species were recorded. The same tree was targeted and monitored next morning for cross verification of species and their number. Each resting tree was monitored for five days.

(c) Vegetation sampling

An area of 500 metres was plotted around each resting tree. Within this area, presence or absence of the same species was recorded to find out the selectivity of resting trees by the birds.

(d) Land use/land cover change

The possible land use land cover change was identified with the help of Google Earth from 2003-2016 and digitization of the geological features in 2003 and 2016 map clusters was done in Google Earth. The layers produced in Google Earth was saved in .kml file formats and was converted to .shp file format in ArcGIS 10.4. A buffer of 5 kilometres was introduced in the identified roosting location(i.e.Adarshanagar,SIRD, 9th mile).Different layers were converted into landscape parameters by using different attributes to compare the major change in LULC. The change detection was calculated between 2003 and 2016.Finally LULC pattern map for both the years were created giving proper indication of different features and their corresponding legend.

4. RESULTS AND DISCUSSIONS

(a) Land cover and land use change matrix

After analysing the land use land cover matrices of the study location for both the years it was found that there was a significant change in almost every topographical features which were both natural and human made. But the impact was mostly due to rapid growth of population and infrastructure which resulted in a rapid increase in human settlement and subsequent decrease in forest areas and trees. Areas like degraded land increased over these years and forest areas decreased exponentially. Agricultural land was also highly affected.Features like water bodies,open lands, etc. have changed in due course of time.

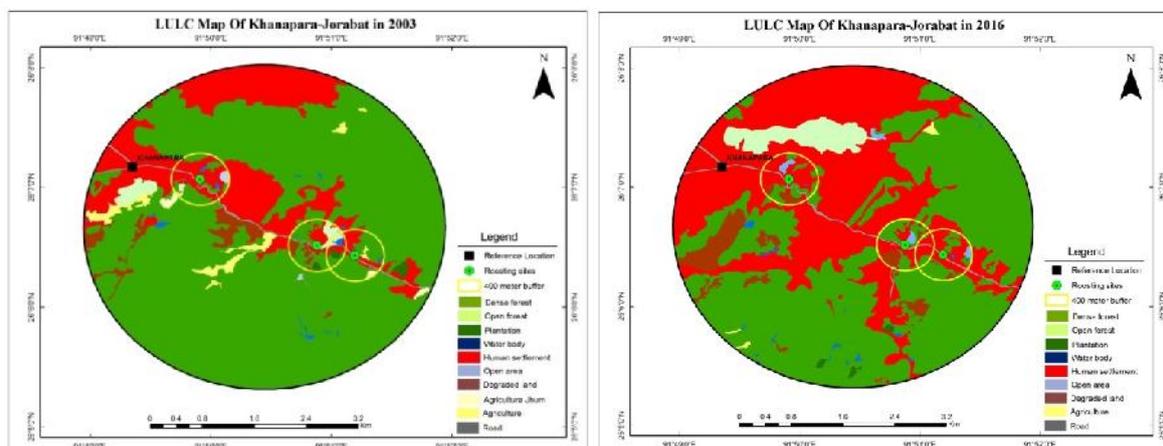


Fig. 2: LULC change matrix of the study location between 2003 and 2016

Table. 1: LULC change matrix of the study area between 2003 and 2016

Land Use/ Land cover class	2003		2016		Net change between 2003 & 2016
	Area (Sq. Km)	Percentage	Area (Sq. Km)	Percentage	
Degraded land area	0.415	2.1	0.6923	3.4	1.3
Dense forest area	14.705	75.0	10.2214	50.3	-24.7
Open forest area	0	0.0	0.691	3.4	3.4
Plantation	0.063	0.3	0.0424	0.2	-0.1
Human settlement area	3.629	18.5	7.6522	37.6	19.1
Open area	0.239	1.2	0.801	3.9	2.7
Road	0.137	0.7	0.1408	0.7	0.0
Water body	0.06	0.3	0.0603	0.3	0.0
Agriculture	0.363	1.8	0.0394	0.2	-1.6

(b) Roosting selection

Sisso was selected highest (53.85%) followed by teak with 30.77% and Gamari with 15.38% (Fig. 3).

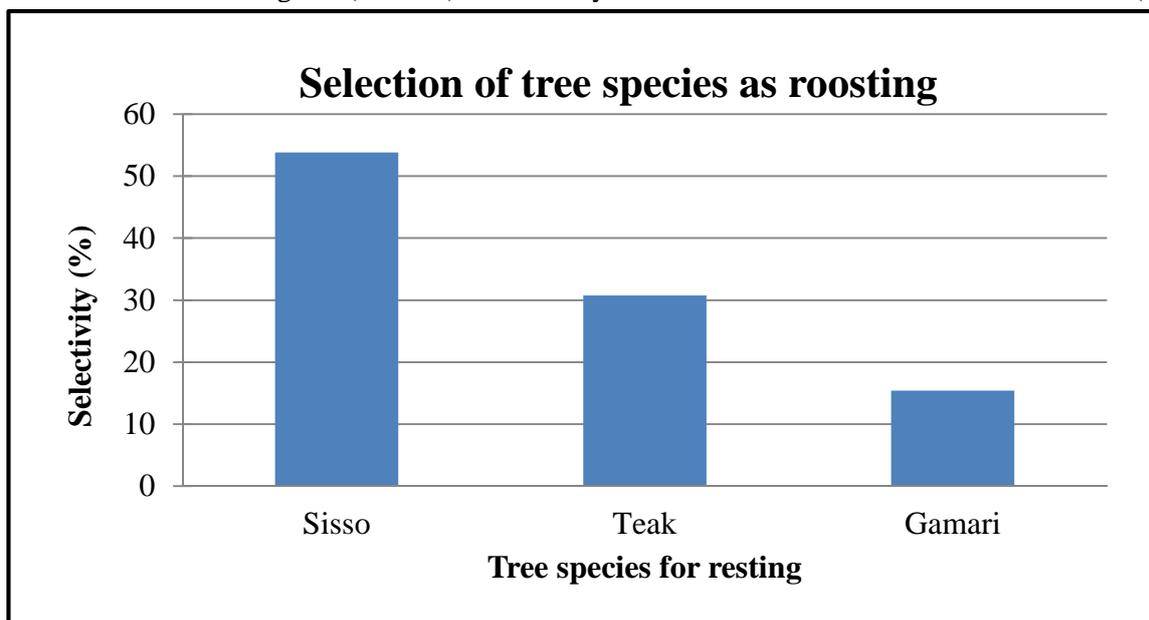


Fig. 3: Selection of tree species as resting site

In all the study areas, the resting trees were located within 20 metres from the National Highway. Unfortunately, no resting site was found as the distance from the highway increased. This is an interesting phenomenon that might have a relationship with anti-predator strategy of the bird species.

(c) Birds association

Interestingly, in all the resting sites, Common Myna (*Acridotheres tristis*) was predominant. At Adarshanagar, Common Myna share the resting trees with Pied Myna (*Gracupica contra*), Cattle Egret (*Bubulcus ibis*) and House Crow (*Corvus splendens*) (Fig. 4)

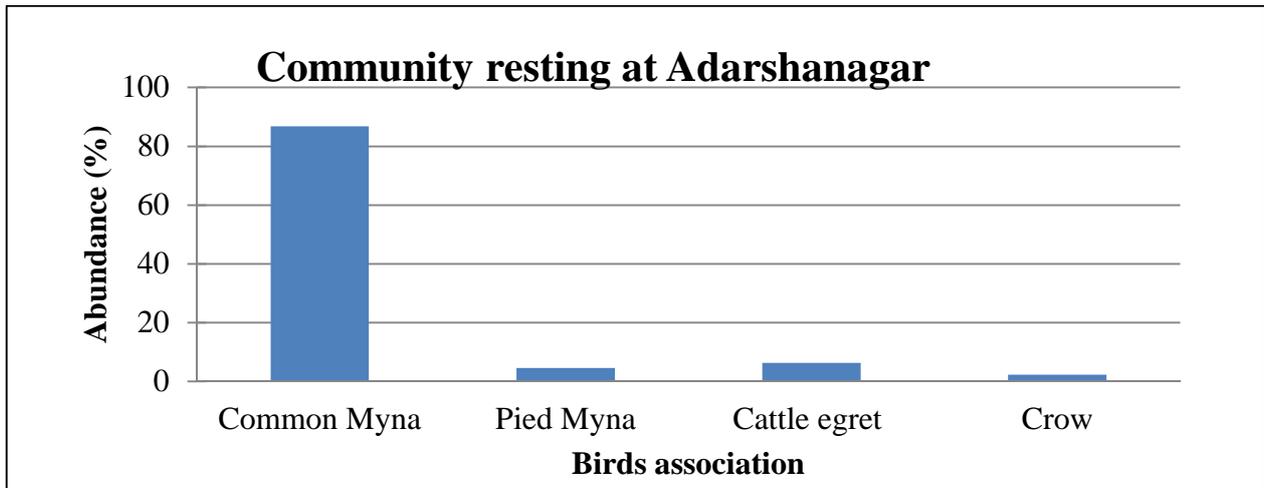


Fig. 4: Community resting at Adarshanagar

At 9th Mile, Common Myna had association with Jungle Myna. They roost in the same trees (Fig. 5).

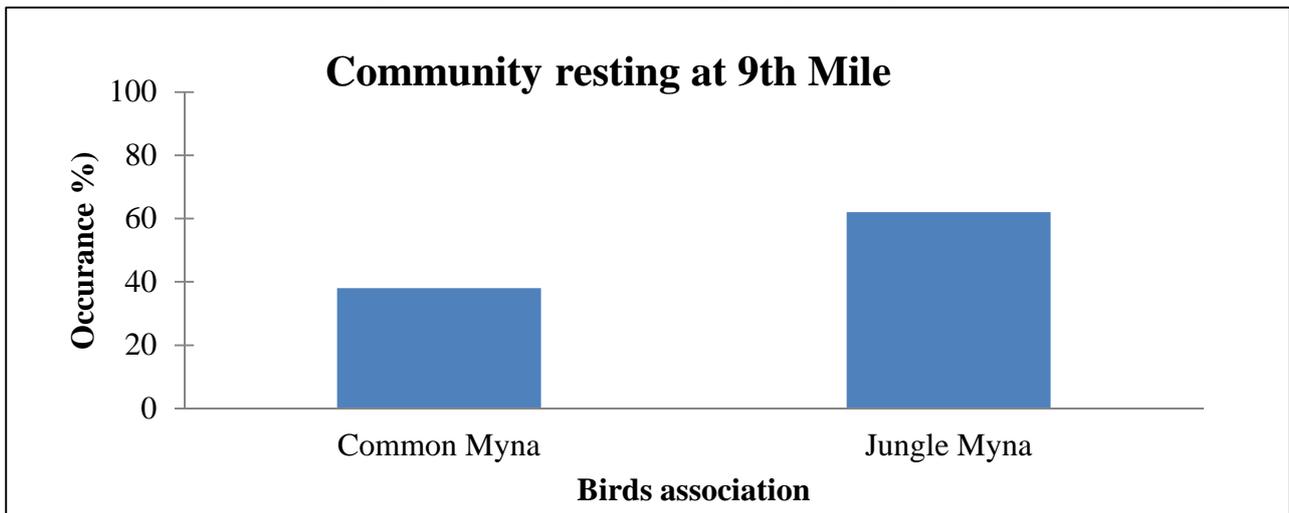


Fig. 5: Community resting at 9th Mile

At SIRD, Common Myna shared the resting trees with Pied Myna (Fig. 6).

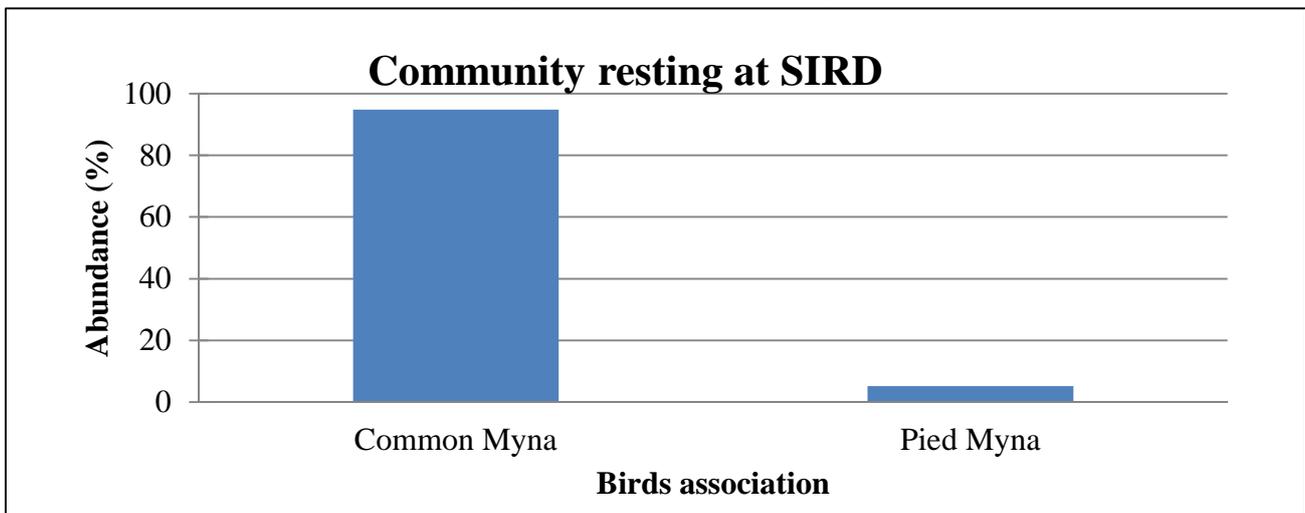


Fig. 6: Community resting at SIRD

The population size of Common Myna was highest with 53.5% followed by Jungle Myna with 40.6%, Cattle Egret with 2.1% and House Crow with 0.8% (Fig. 7). This clearly indicates that Common Myna plays a dominant role in terms of number at the resting sites.

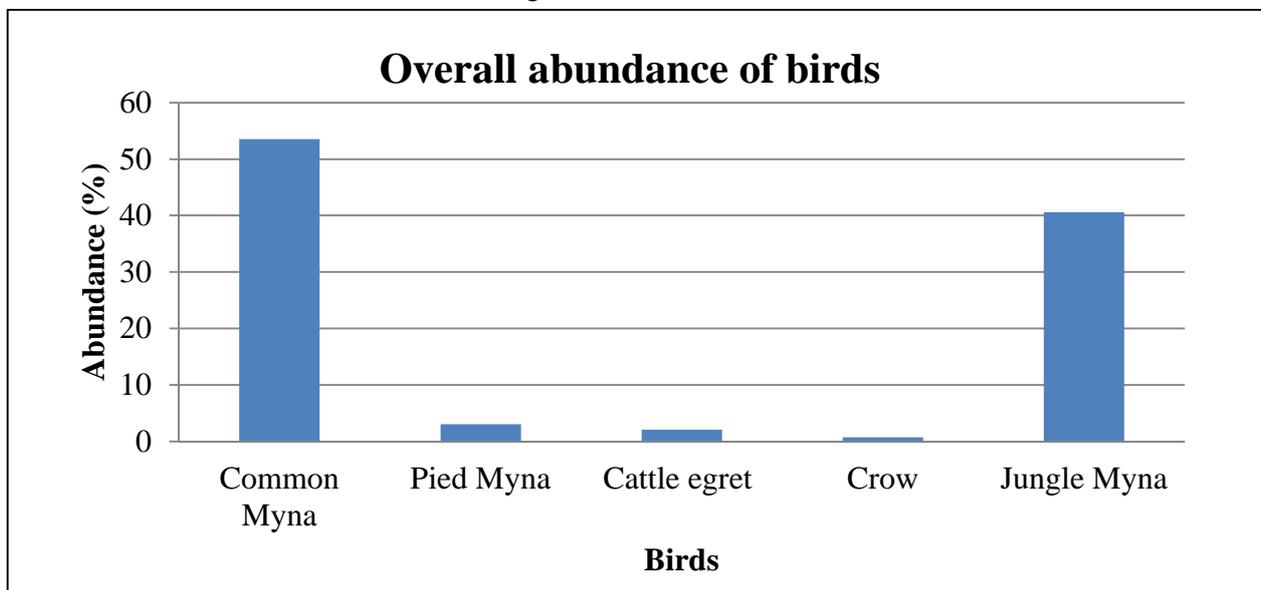


Fig. 7: Overall species composition at the resting sites

(d) Competition for accessing resting sites

(i) Agonistic interaction

Competition among the birds for accessing better resting sites was observed during the study period. In all the cases, Common Myna showed aggression over others especially with the Pied Myna and in some occasions, with Cattle Egret.

(ii) Timing of arrival and departure

To avoid competition, the timing of arrival as well as departure was found to be different with respect to different species. In most of the cases, Common Myna appeared at the resting site earlier than other species but found to be late mover from the resting sites.

5. CONCLUSION

In Guwahati metro area, there is a lot of LULC change over the last 45 years since its declaration as the capital city of Assam in 1972. Large scale expansion of the urban area has resulted in marked shrinkage of the forest cover that has caused loss of prime habitat for animals especially mammals and birds. Drastic change in their abundance along with the rise of conflict with human indicates an alarming situation for conservation of mammals in this landscape. Similar situation was also found in case of birds due to loss of the forest cover.

In the present study, interspecies aggression among the different species was also recorded at different roosting sites. This may be because of interspecies competition for accessing the most suitable site at the roosting tree. To avoid such confrontation, they have strategically changed their arrival as well as departure timings. Previous studies also reported such interspecies competition where Egrets, Herons, Snowy Egrets and Great Egrets displace other species presumably from the safer positions in the trees.

In conclusion, it may be assumed that large scale destruction of the forest habitat along with the expansion of urban area has resulted in shortage of feeding and roosting ground. This may have an impact on the development of new behavioural adaptation for sharing the same roosting tree by different species of birds.

REFERENCES

- [1]Ali, S., Ripley, S. D., 1969, “Handbook of the birds of India and Pakistan”, Vol. 3. Bombay: Oxford University Press.
- [2] Stewart, P.A.,1973, “Estimating numbers in a roosting congregation of blackbirds and starlings”, Auk 90: 353–358.
- [3] Beauchamp, G., 1999, “The evolution of communal roosting in birds: origin and secondary losses”, Behavioural Ecology, 10(6): 675–687.
- [4]Bibby, C.J., Burgess, N.D., Hill, D.A.,& Mustoe, S.H.,2000, “Bird Census Techniques”, 2nd Ed. London: Academic Press.
- [5]Del Hoyo, J., Elliott, A. & Christie, D.A.,2010, “Handbook of the Birds of the World”,Vol.14, Bush shrike to Old World Sparrows, Barcelona: Lynx.