

## Observation of Nest Building by Birds at Indore City

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**ABSTRACT:** *The main aim of the current study is to ascertain the avian diversity and their associated nesting preferences in the respect to the local vegetation of the chosen study sites from Indore city during the entire study duration (January - December 2018). Several species were closely observed for the nesting sites. Total twenty nests were observed during the survey.*

**Key Word:** *Bird, Nests, Avian diversity, Nest Building and Species*

### 1. INTRODUCTION

Many birds of different species which are vulnerable to predation usually forage together by forming groups at different levels i.e. trees, bushes and on ground. Birds foraging in trees can detect air predators while those foraging on ground are vigilant for ground predators [1]. Similarly there is protective nesting association between many species of birds, the least aggressive or the most vulnerable species is seen to nest next to the most aggressive species with best defense mechanism against predators or sometimes even near the predator species itself. This behavior is known to increase the reproductive rate of such vulnerable species [2].

Another known peculiar relationship of Brood parasitism is seen in the birds of the Order Cuculiformes. Interestingly, these are parasitic adaptations which these birds have developed over time, exhibiting a perfect example of coevolution. Few such examples are egg mimicry, shorter incubation period than the host bird's eggs and cryptic-hawk like plumage which forces the bird to leave the nest for protection [3] [4].

Relations between insects and birds fall into three categories. Firstly, when a bird build its nest near of nests of aggressive insect, Secondly, when insect lay their eggs inside a birds nest, and then larvae, commensal with the young ones of the birds and lastly, Birds build their nests, in insect nest or structure by scooping out the central part of insect's nest. But this is still an unsolved problem that these insects tolerate these intruding birds but they do not tolerate human interferences (eg. a Pygmy Kingfisher makes its nest near Termitaria, In South America) [5].

There are almost 5 species of genus Gerygone which associate with insects like wasps, that too in tropical areas. There are other species which do their association with Ants in

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temperate areas. Birds purposely choose to Insect society which sanction and tolerate them. Insects which intrude into birds nest include blood sucking parasites of a fly, moth, beetle and fly larvae. They are able to do so because they might be guided by some odour and by some unknown influences [6].

There are several ways by which avian diversity can be protected and enhanced. These following measures can increase species richness. Firstly, maintaining and replanting understory vegetation, removing grazing stock and allowing native grasses and legumes to grow, conserving or preserving a mixture of local trees and shrubs. Old trees should be maintained and if this is not viable then nest boxes should be provided. Flowering plants must be grown to attract many species. Fallen trees and plant debris should be allowed to break down naturally and lastly, trees must be grown in larger numbers having maximum canopy area at the periphery of the desired area where conservation is required [7].

Similarly, activities like tourism pressure, habitat fragmentation, less water availability in dry season and habitat destruction are physical pressures which are imparting risk to avian fauna. Conservation in open areas can be done by avoiding trampling by the visitor's dogs and wild cattle especially during the breeding season [8].

Occasionally fires and pruning makes shrubs and trees look good decorative and their growth is also enhanced. But these exercises destroy some of the nests of species like *Prinia socialis*, as they make their nest in short bushes. These are exertions for birds during nesting period. Local authorities should be taught about the repercussions and loss of avian diversity [9]. Conservation methods include an alternate way of pest control other than chemicals like pesticides as this disrupts the food chain. Collaboration of government and non government organizations must be done to enrich fauna of the area. Lastly, awareness plays a vital role in making local people and tourists sensitive towards these issues [10]. Thus, present study at Indore city is an attempt to study the Nesting preferences of the birds reported in the study area.

## 2. MATERIALS AND METHODS

### 2.1 Study Period

The present study was conducted within the premises of Indore City M.P. for a duration of one year (2018).

### 2.2 Identifications

Identification of birds, trees and nests were done by standard book guides e.g. Nest Building and Bird Behaviour by Collias and Collias (1984)[11].

**2.3 Nesting preferences** and material was studied by methods of Kaur and Kumar (2018)[12].

### 2.4 Nesting preference and material

They were observed through the following: Specific tree location for nesting, Birds prefer particular height for nest building, the selection of nesting sites (location), Nesting material used and Nesting structure.

## 3. RESULTS

These nests belonged to *Prinia socialis*, *Vanellus indicus*, *Psittacula krameri*, *Cinnyris asiaticus*, *Ocyrceros birostris*, *Streptopelia senegalensis*, *Zosterops palpebrosus*, *Athene brama*, *Pycnonotus cafer* and *Columba livia*. *Prinia socialis*'s nest was found in a very short bush with broad leaves and the nest was made up of a curved leaf of the same plant. The stitching material was some filaments of fiber. Only one nest (made by a

female) was recorded. Interestingly, the maximum number of nests recorded was of *Vanellus indicus* i.e. seven nests. These nests were built on the ground (in the canal also) but still on an elevated area to avoid water logging (may be). Eggs were not recorded but soon chicks and then fledglings were observed. All the nests were not recorded at the same time and they were scrape nests and some were platform nests made up of pebbles resembling the eggs. The chicks recorded were of different sizes of different nests. The population of these fledglings reduced gradually in each visit, earlier data showed that the fledglings were nineteen in number but last recorded adults were five.

Only one cavity nest of a *Psittacula krameri* was recorded. It was a tree cavity on a height, after a few weeks two chicks and then fledglings were also recorded. Similarly, two cavity nests of *Ocyrceros birostris* were observed in tree cavities but no nestlings were seen during the entire season. A pendant shaped long nest which was made up of plastic rags, straws, and many fibrous material was seen of *Cinnyris asiaticus*. But it was an abandoned nest, it was situated at the pole of a building structure just above the ground. A nest made up of small sticks was found on a tree branch, it was similar to the platform nest as that of lapwing but it's on a tree flat branch. It was a rough nest with no special structure. Male and female *Streptopelia senegalensis* were observed but no eggs and nestling or chick were seen further. The height of this platform nest was less as it was not made on a fully grown tree. Another nest was seen in a tree with dense canopy and several branches. The nest was located on the network structure of several stems (or branches).

The nest of *Zosterops palpebrosus* was found in the dense bushes with a firm stem. This cup nest was quite small and two nestlings or chick were recorded. The nest was a bowl shaped nest but very small in size made up of twigs, leaves and some branches. Adults were seen regularly at the nest. The nest of *Athene brama* was a cavity in a huge indigenous old tree. Only one such nest was recorded. This tree cavity was quite high and male and female owlets were seen regularly. Eggs and chicks were not observed. Nest of the *Pycnonotus cafer* was seen abandoned on the ground with three eggs in it. It was on a dense canopy exotic tree, it was the only nest recorded. A platform nest of *Columba livia* was seen at one of the man made sheds inside the park. The nest was made up of sticks and dried twig leaves. Two eggs were recorded and no chicks were found afterwards.

While studying the nesting preferences, various observations were made. Firstly, *Psittacula krameri* preferred *Azadirachta indica* for nesting, *Vanellus indicus* preferred canal and normal bare land for nesting, *Prinia socialis* preferred *Golden thuja* for nesting because of its dense foliage and short height. *Cinnyris asiaticus* preferred poles for firm support for building their nests. *Ocyrceros birostris* made their nest on *Ficus religiosa* because of its dense foliage and fruit. *Delonix regia* (shorter tree) was preferred by *Streptopelia senegalensis* for nesting. *Oriental white-eye* preferred bushes of *Giants Thuja* for nest building and *Athene brahmas* made a cavity nest on *Tamarindus indicus*. *Pycnonotus cafer* preferred *Ficus benjamina* for nesting and *Columba livia* occupied the edge of a building structure for nesting (Figure 1).

The dominant trees in these areas are as follows: *Dillenia indica* (Chalta), *Cochlospermum religiosum* (Kumbi), *Shorea robusta* (Sal), *Elaeocarpus augustifolius* (Rudraksh), *Boswellia serrata* (Salai), *Azadirachta indica* (Neem), *Toona ciliata* (Toon), *Ziziphus mauritiana* (Ber), *Schleichera oleosa* (Kusum), *Anacardium occidentale* (Kaju), *Lannea coromandelica* (Jhingan), *Mangifera indica* (Aam),

*Semecarpus anacardium* (Bilwa), *Moringa oleifera* (Sainjna), *Acacia nilotica* (Babul), *Prosopis cineraria* (Jand), *Albizia lebbeck* (Siris), *Saraca asoca* (Ashoka), *Cassia fistula* (Amaltas), *Bauhinia variegata* (Kachnar), *Tamarindus indica* (Imli), *Butea monosperma* (Dhak), *Erythrina variegata* (Pangara), *Pterocarpus marsupium* (Bijasal), *Dalbergia latifolia* (Satsal), *Terminalia arjuna* (Arjun), *Syzygium cumini* (Jaman), *Tectona grandis* (Sagun), *Santalum album* (Sandal and chandan), *Ficus benghalensis* (Bar and vad), *Ficus religiosa* (Pipal) and *Phoenix dactylifera* (Khajur).

#### 4. DISCUSSION

Several bird species were closely observed for the nesting sites. Total twenty nests were recorded during the survey. These nests belonged to *Prinia socialis*, *Vanellus indicus*, *Psittacula krameri*, *Cinnyris asiaticus*, *Ocyrceros birostris*, *Streptopelia senegalensis*, *Zosterops palpebrosus*, *Athene brama*, *Pycnonotus cafer* and *Columba livia*. Similarly, the nesting preference of various common species were observed and their findings clearly establishes that bulbul green pigeon common iora koel etc preferred similar trees for nesting example: *Ficus religiosa*, *Ficus benghalensis*, *Psidium guajava* etc [13]. These trees were also a source of food for associated birds. *Prinia socialis*'s nest was found in a very short bush with broad leaves and the nest was made up of a curved leaf of the same plant. These observations were also made in their study that small species like Small minivet and Common iora make cup nest swing grass, fibres, cobwebs etc [14]. The nest of *Vanellus indicus* built on the ground (he canal also) but still on an elevated area and they were scrape nests and were platform nests made up of pebbles resembling the eggs. The population of these fledglings reduced gradually. Workers have pointed out that a successful growth rate of a bird species is possible in a human dominated landscape but this can be achievable through local awareness among people so that eggs and nest can be protected from dogs. They have successfully achieved this goal in case of *Passer domesticus* [15].

Rose-ringed parakeet's cavity nest was recorded in our study area. This type of nesting conserves energy and is also at low risk of predators. These nests are generally used again and again over the years. These species are also called cavity nesting birds [16]. Similarly, two cavity nests of *Ocyrceros birostris* were observed. The nest of Hornbill is protected by mud lining at the entrance and it also provides insulation against fluctuation outer temperature, it is done by female hornbill [17]. A pendant shaped long nest which was made up of plastic rags, straws, and many fibrous material was seen of *Cinnyris asiaticus*. Doomed nest is another term for such types of nests. Its a non woven nest made from insect or spider silk, this leads to inaccessible and a safe nest [18].

A nest made up of small sticks similar to the platform nest but on a tree flat branch. Both male and female doves make the nest but larger contribution is done by females. The nest is loose and not firm and it allows evaporation and cooling [19]. The cup nest was quite small and two nestlings or chick were recorded. The nest of *Athene brama* was a cavity in a huge indigenous old tree. *Pycnonotus cafer* was a cup shaped and seen abandoned. A platform nest of *Columba livia* was seen at one of the man made sheds inside the park. Birds preferring the cavity or shrub nesting include the family of corvidae and paridae species. Several species like columbidae have successfully colonised in an urbanised environment for breeding and nesting. Their population has increased over the years and they have occupied all sorts of habitat in cities [20] [21] [22].

In Present study we observed that, *Psittacula krameri* preferred *Azadirachta indica* for nesting, *Vanellus indicus* preferred canal and normal bare land for nesting, *Prinia socialis* preferred *Golden thuja* for nesting because of its dense foliage and short height. *Cinnyris asiaticus* preferred poles for firm support for building their nests. *Ocyrceros birostris* made their nest on *Ficus religiosa* because of its dense foliage and fruit. *Delonix regia* (shorter tree) was preferred by *Streptopelia senegalensis* for nesting [23][12]. Canopy volume of a tree is of special significance in establishing high or ultra high density planting of perennial fruit trees, because such trees are preferred by frugivorous birds. In the traditional planting system wider spacing is followed to avoid intermingling of branches; such techniques are often adopted by authorities in maintaining trees and shrubs in Parks and Gardens. Within a canopy, tree shape strongly influences the density and spatial distribution of branches, leaves and fruits; these distributions will ultimately lead to differences in light intensity, temperature and relative humidity, this will form unique micro- climate that differs from the external environment which can ultimately affect nesting preference of a bird [24] [25] [26].

Canopy volume: The data on canopy volume were recorded by measuring tape fastened on a bamboo stick from the root base of a tree in East to West and North to South up to maximum spreading of vegetation growth of trunk [27]. Canopy volume ( $m^3$ ) =  $4/3\pi r^2h$ ; Where,  $r$  =diameter/2,  $h$ = height of the plant. Canopy volume is used to define nesting habitat suitability for passerine birds in willow (*salix* spp.) communities along the blitzen river in Oregon. It can also be used to describe seasonal changes in Montana willow communities subjected to wildlife and livestock herbivory [28] [29].

Oriental white-eye preferred bushes of *Giants Thuja* for nest building and *Athene brahmas* made a cavity nest on *Tamarindus indicus*. *Pycnonotus cafer* preferred *Ficus benjamina* for nesting and *Columba livia* occupied the edge of a building structure for nesting. These greenescapes in the city have provided a perfect habitat for terrestrial birds and their nest building. The vegetation here is of dense foliage and few have larger canopy areas. Due to canopy, the smaller vegetation does not get dried up in hot summers. Our findings corroborates with the above mentioned authors.

## 5. CONCLUSION

The above study clearly highlights the importance of trees for nesting of an avian fauna. Different bird species have different trees and shrubs for their nesting. In general old and indigenous trees are preferred by Cavity nesting birds and smaller shrubs with dense foliage are preferred by smaller species. Hence the vegetation should be taken care at regular monitoring by the authorities and pruning and other anthropogenic activities should be properly regulated so that nests are not damaged and destroyed as this will affect the avian species diversity and their number to a larger extent.

## ACKNOWLEDGEMENT

The authors are very grateful to Head, Dr. M.M.P. Shrivastava and Principal, Dr. Suresh T. Silawat, Govt. Holkar Science College, Indore (M.P.) and Osho Rao Bhonsle for their immense help and support for conducting this study.

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**Figure 1. Images of various nests recorded at Indore city**

