International Journal of Fauna and Biological Studies
Available online at www.faunajournal.com

IJFBS
International Journal of Fauna And Biological Studies

ISSN 2347-2677
IJFBS 2018; 5(2): 140-147
Received: 08-01-2018
Accepted: 12-02-2018

Mahesh Jadhav
Department of Zoology, School of Life Sciences, Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India

Shivaji Chavan
Department of Zoology, School of Life Sciences, Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India

Pooja Patange
Department of Zoology, School of Life Sciences, Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India

Correspondence
Shivaji Chavan
Department of Zoology, School of Life Sciences, Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, India

Nests and nest materials of birds in SRTM University area at Nanded, Maharashtra State

Mahesh Jadhav, Shivaji Chavan and Pooja Patange

Abstract
Birds are well known for construction of various kinds of nests. It is an instinct behaviour. For protection against rain, environmental temperature difference, to care the brood, a part of breeding process birds construct nests. Nest structure, designs and materials used in nest construction are species specific. The specificity also found in nesting site selection, avoidance of predation risk and easy way to rescue from the nest. Present study on ten species of local birds and their nest structure, nest material used reveals that 54.40 % locally available material was used by these species that includes plant materials mainly. The synthetic materials, soil, silt, mud and the materials of animal origin like human hair, spider net threads, and dropped feathers of birds were used in nest construction. Most diverse selection of nest material was by Indian Common Mayna whereas least type of material used by Baya weaver. Residential buildings and office buildings, buildings of education centres in the University campus were effectively used by the birds in non nesting period as shelter. The brilliance and plasticity of birds was remarkable for survival of fittest with existing conditions. Detailed study on each species nest was recommended to understand and plan for their conservational importance.

Keywords: Birds, nest material, SRTM University, Nanded

1. Introduction
Birds are markers of environmental quality, they amaze us due to their long journey to overcome the unfavourable condition and reach the suitable feeding and breeding grounds. There are about 10,000 species of birds in the world. India harbours 1318 species of which 57 are endemic, 03 are breeding endemic, 85 species of bird are threatened. There are 616 species of birds in Maharashtra. In Nanded region the study reveals that the occurrence of 151 species of bird belonging to 44 families and 16 orders. It includes 86 species of resident birds, 32 species of migratory and two species of passage migrant, 19 species of winter migrant. Fifteen common species found in the region namely Cattle Egret, Red Wattled Lapwing, Blue Rock Pigeon, Eurasian Collared Dove, Rufus Collared Dove, Indian Roller, House Swift, Small Bee Eater, Common swallow, Black Drongo, Common Myna, Red Vanted Bulbul, White Throated Munia found. Recently Chavan et. al., (2015) reported existence of 167 species of birds in this region Similarly there are reports on checklist of birds from Nanded (Kulkarni et. al., 2005); Kulkarni et. al., (2006); Chavan et. al., (2015) but the reports are few on nesting of birds from this region that mainly includes nesting in wire tailed swallow in Godavari river basin (Chavan et. al., 2016; Gulrez et. al., 2017). There are continuous deteriorating changes in the Godavari river ecosystem and nearby due to several anthropogenic activities like sand dredging, release of untreated sewage, over exploitation of water from the river basin, release of agricultural and domestic solid waste. These processes have created deterioration that directly or indirectly affecting essential survival needs of birds. Nest construction for egg laying and brood care is natural instinct in several bird species. There is great variation in nest structure, nest material and nest ecology in the bird species. The present study deals with nest structure and nest material in case of some bird species in Nanded region, Maharashtra especially from Swami Ramanand Teerth Marathwada University, Nanded. A bird nest is a structure made by the bird or used as naturally available place to lay and incubate eggs till hatch of young ones. Although the term popularly refers to a specific structure made by the birds itself (Chavan et. al. 2015). Not all birds' species build nests, some birds lay their eggs directly on the ground as like Lapwings (Shivaji et. al., 2016) or rocky edges, while brood parasites like Cookoo species especially Indian 'Koel' lay their eggs in the nest of other birds. In most species, the female does most or all of the nest construction, though the male often helps but in some polygamous species like Weavers (*Plocius sp*.) and Tits the male does most or all of the nest building

whereas the female select the best nest and add some finishing touch.

In order to mate successfully, lay eggs, incubate and then produce a new generation of birds, each bird species is having an appropriate scheme of nest construction or shelter use. Some birds fly around the world to find safe place that rich in food and favorable environment for the new generation to come. For the purpose they migrate for nesting and breeding for few 1000 km or across the continent. The species like Yellow Wattled Lapwing (*Vanellus malabaricus*) and Red Wattled Lapwing (*Vanellus indicus)* simply use a little depression in the ground to lay their eggs (Chavan et. al, 2016). Some birds never built nest either for shelter or for brood care.

The majority of nests are differentiated structures that are constructed from variety of materials which can generally classified as being either structural material or lining material. Structural material make up the general shape of the nest and provide structural support for parents and offspring's, lining material generally create a suitable microclimate in which parents can raise their offspring (Hilton et. al,, 2004). The exact function of structural material not yet fully understood. An interspecific study of birds that build cup shaped nests suggested that structural support to the eggs and incubating parents was the primary factor in nest design. Other studies have shown that structural materials provide thermoregulatory benefits. Many birds species lines their nest with feathers which is advantageous as insulating materials. It was found that the feathers provide the most insulation to nests where as grasses provide least (Hilton, et al. 2004) the most comprehensive studies on the function of feathers as a nest lining material was carried out in tree swallows (Mark Mainwaring, et al., 2014).

Nest studies are important to understand the ecology and evolution of species. The data on nest building in birds is widely scattered. Studies on material use, mechanics of arrangement of nest materials and evolution in nest building is essential. It gives important database of life of each species. It is one of the essential requirements for reproduction and provides significant clues to find out ecological relationship of a bird species. Nest building is permanent behaviour record of a bird species (frozen behaviour). Since ancient time the nest building in birds especially nests of crow (*Carvous splendance*) as correlated with the onset of monsoon rain and quantity of rain in a particular year in India. This study was also planned to determine the nesting needs of birds that will guideline in artificial nest preparation (Gering and Blair, 1999) as a major towards avian conservation and habitat restoration.

2. Materials and Methods

Nanded district is located in south – west region of Maharashtra state in India. Godavari river basin is the principle source of water for agriculture, industry and biodiversity in this region. The study area is located in the 19.5103"N latitude and 77.3058"E longitude. It is hilly region with isolated natural as well as constructed minor ponds located at south eastern parts while north eastern parts of the district has forest cover in Kinwat taluka. Nanded district is having plane agricultural black soil. The environmental temperature remain 15 ^{0}-42 ^{0}C. The data is scanty and deficient for its details on nesting sites, types of plant species used for nest construction, habitat conditions of nesting sites, details of nest construction process, anthropogenic and environmental impacts on the nest building process and nest proper etc. Therefore the present study was planned to collect the information on nest structure, ecology and nest materials used by the bird species in Swami Ramanand Teerth Marathwada University, Nanded area. Every study yields something good conclusion, present study is limited to an ecological niche but it reflects the overall issues on the nesting in selected species of birds.

The study was conducted from July 2016 to April 2017. The area covered for this study was Swami .Ramanand Teerth Marathwada University campus, Nanded, at lat. 19.5103"N latitude and 77.3058"E longitude. By walking in the study area nesting sites of the birds were identified and micro-flag marked for ease in re-identifications in further study visits and details on nesting process were recorded. Early morning 6. 00 a. m. to 10.00 a. m. and from 4.00 p. m. to 6.00 p. m. In afternoon the nesting sites were visited three days in a weak in the study period of 11 months. Nikon Digital Camera - P510 models with digital data card and having 46X zoom lengths (auto) set and Samsung digital camera was used for the photography and video recording in this study. Common centimetre scale, rolling and windin metal strip tape was used for various measurements. The discard and abandoned nests, unused nest after completion of breeding was collected as samples and brought to the laboratory for morphometric study. For the study of nesting sites and nests the collected data was analyzed by using various statistical methods like average mean. All the details on nest construction process, observation of nest materials and visits to nesting site was collected by precautions and preventions for not to disturb the birds and their life processes. The abandoned and waste, unused nest samples is preserved in Department of Zoology, School of Life Sciences, S. R. T. M. University, Nanded.

3. Results and Discussion

During the present study the nests of ten different bird species were recorded in different numbers. Most of the nests were of common birds inhibiting in the area. There was variation in the nest material used. The aim was to understand about the need of birds in nest construction process. The nesting site selection and nature of nest material used was also recorded (Table 1. 2.). Maximum number of nests amongst observed were 188 that of Baya weaver (*Plocius phillippinus*). The Baya weaver selected *Acacia species*, *Azadirachta indica*, *Zizipus mauritiana*, *Mangifera indica, Dalbergia* and *Ficus religiosa* species of trees for nesting. Achegave et. al. (2016) reported presence of nests and all related details of Baya Weaver nesting pattern. Parts of grass leaf blades were used by this species. It indicates that, this area is one of the most suitable habitat for the nesting for this species. Nicholas Collias et. al., (1984) extensively studied the nesting and nest materials used by Baya weaver. Smith et. al., (2008) explored the use of artificial nests and predation process in New Zealand. Therefore it need to preserve the grass patches during late monsoon and early winter from being destructed by cattle grazing and grass harvesting from the area as forage to domestic cattle, so that the Baya weaver will get sufficient and easily available nest material from nearby. Nests of common Blue rock pigeon was another dominant number in the same area, these observed nests were 58 in number. The pigeon species has used the readily available flat surfaces of the buildings in the university campus. Most of the School buildings in S. R. T. M. University campus were used by Pigeon as roosting shelter and for nesting. Pigeon species used the grasses, small twigs and branches of local trees (Table 2.) in moderate number to make the rim of nest. To

some extent the dropped feathers of other birds were used in the centre and periphery of the nest. It seems to be a crude nest as compared to well managed and planned nest of weaver birds. The site selection for nesting by pigeon was away from easy access for human. It was our curiosity to search the nests or shelters of Parrot (*Psittacula krameri*) but we didn't get any kind of nest as such. The parrots return in evening to the city after foraging in the nearby fields and roost either in the safe areas of large office buildings which remain empty during night or on the trees at public places like railway station, Bus stand and near offices in the city (Chavan et. al., 2017). In this study it was found that the Parrot sp. use the narrow gaps in building area and window shields, uppermost part of the tallest building like main administrative building of the University and building of Computational Sciences School as most preferred site. Little green bee eater population was also considerably good in the University area and they construct the small dug-hole burrows on the wall of dug well, no any additional supporting material was used by this species. Bee eaters also use the crevices readily available in the trees (Table 1.). It was found that from the total material used for nest construction 58.40 % was natural material that includes plant parts and cotton mostly. 9.30 % was material of animal origin that includes human hair bunches; dropped feathers of poultry and heron species; threads of spider web; unknown animal hair pieces. The inorganic materials like stones, gravels, wet soil and mud pellets were also used that include 18.60 % (Table 2). The synthetic materials were also a part of the nests in some birds that includes colourful glass pieces, broken pieces of transparent bottle glass, plastic wires, plastic threads, polythene, fibers of nylon, metal pieces and wires, electric wire/cable pieces, insulations of wire. The synthetic material was mostly used by common Indian Myna (Fig. 1. to Fig. 9.).

The study of nest structure and nest material in detail for each species will be a separate part need to be investigated. In case of Common Indian Myna we observed much plasticity in site selection for nesting and in the nest material used; whereas the Baya weaver was much selective in site selection and nest material used. University campus buildings are shelters used by the birds like Parrot species and Pigeon species as easily available places for their need. It was clear that the bird nests observed in the present study prefers nesting sites and nesting materials available in human habited area like office buildings, residential buildings and the other infrastructures useful in human life. The main nuisance causing bird species for office buildings were Parrot and Pigeons due to their daily droppings. Therefore it is essential to think on design of the office buildings whether we are interested to prefer bird nests or to avoid the nests and bird activities in the residential areas and offices. This study indicates that there is divergence in use of resources in the surrounding by bird species which naturally minimize the competition among themselves to fulfil their survival needs like nests and shelters. Mathews et. al. (1999) reported the influence of habitat fragmentation and its relation with nest predation whereas in this investigation we found the Red Vented Bulbul mostly prepare nesting in ornamental bushes located close to the streets in the area where frequently human movements occur. Mark et. al., (2014) extensively reviewed on design and functions of birds' nest and explained the possible reasons for nest site selection, nest material use, nest and predator interactions etc. It is demonstrates that nest material used by the birds has meaningful reason related to nest microclimate, predation risk, incubation temperature requirements that need further detailed confirmation. Present study reveals data up-gradation on nesting and nest material used by the local birds.

Table 1: Nest population nest material used and the host plant selected for nesting by the bird species in SRT M University campus, Nanded, MS.

Sr No.	Species of bird	No of nests observed	Nest location.	Nest material used by the bird species
1	Baya weaver (*Ploceus phillippinus*)	188	*Acacia nilotica, Prosopis juliflora, Azardirchata indica, Zizipus mauritiana, Acacia karoo, magnifera indica, Dalbergia sisooroxh, cocus mucifera, Ficus religiosa.*	Grass (palm fronds), green leaf blades, leaves, twigs, branches of trees (wet or dry), colourful glass pieces, polythene pieces, parts of shrubs, feathers, soil mud.
2	little swift *(Apus affinis)*	8	Administrative building, boy's hostel, girls hostel of SRTM University and village Pangri near University	Feathers, mud, own saliva, sand, silt and clay, twigs of plants.
3	Red-wattled lapwing (*Vanellus indicus)*	4	Nest on ground. Located near the University ground, boys hostel of Univ. and Village Pangri near the University.	Granular gravel of calcium carbonate, pieces of dry grasses and straws, plant material, dry cow dung pieces.
4	Blue Rock Pigeon /dove (*Columba livia*)	58	Administrative building; Buildings of School of life science; School of Chemical sciences, School of physical sciences, School of Language, Arts and Culture; Drama and fine & performing Arts School; Education School Building; Girls hostel; Social Sciences School Building; Computational Sciences School Building; Commerce and Management Sciences School building; Pharmacy Sciences School area.	Grasses, twigs and branches of tree, feathers of birds.
5	Red Vanted Bulbul (*Pycnonotus cafer*)	06	Near School of Life Sciences, near lake No-1, near Sport Complex, near Lake no-2, front of Administrative building of the University.	Smooth and dry branches , stems; roots of herbs and grasses
6	House Crow (*Corvus splendens*)	5	Near the Village Vishnupuri. And Lake no 2. *Acacia nilotica, Ficus religiosa and Magnifera indica* .	Grasses, twigs of surrounding trees, metal wire, thick plastic and discarded plastic material, feathers, leaves.

7	Parrot (*Psittacula krameri)*	2	School of Computer Sciences.	Nest on the open building space
8	Little Green Bee Eater (*Merops orientaus)*	2	Near the University play ground in a dug well	Nest is in the tree cavity or burrow in the walls of dug well.
9	Moorhen (*Gallinula chloropus*)	1	Lake No. 2 of S.R.T.M. University.	Vegetation dominated by *Typha sp*., Augusta, sparganium etc., floating nest containing leaves of Typha species.
10	Common Myna (*Acridotheres tristis*)	9	Near the School of Computer Sciences School building, near Life Sciences building, Boys hostel, at near Sport Complex of the University (in electric lamp), Language and Literature School Building, Interdisciplinary School Building.	Twigs, grass, Tree branches, roots, plant leaves, flowers, feathers of pigeon, cotton, polythene pieces, paper pieces.

Table2. Nest Materials selected by the bird species at S. R. M. University, Nanded.

S. No	Nest material	A	B	C	D	E	F	G	H	I	J
1.	% Natural Material										
	% Plant Material										
	Twigs	-	21	14	28	21	49	-	-	4	13
	Grass leaves	90	2	3	24	18	8	-	--	72	40
	Branches	-	-	10	27	22	-	-	_	10	12
	Roots	-	-	4	7	11	-	-	-	5	8
	Cotton	-	-	-	-	-	-	-	-	-	-
	Plant leaves	-	-	-	-	-	2	-	-	3	4
2.	% Animal material										
	Animal hair	-	4	-	-	-	-	-	-	-	
	feathers	4	40	-	14	8	16	-	-	2	5
	Insect or spider threads	-	-	-	-	-	-	-	-	-	-
3.	% Other organic material										
	Stones-	2	1	14	-	2	2	-	-	-	-
	Gravels-	1	-	30	-	-	-	-	-	-	-
	Wet soil-	-	5	-	-	-	-	-	-	4	-
	Mud-	-	5	-	-	-	-	-	-		-
	Own saliva	-	20	-	-	-	-	-	-	-	-
4.	% Synthetic Material										
	metal wire	-	-	-	-	-	8	-	-	-	
	Plastic wire	-	-	-	-	-	-	-	-	-	
	Plastic pieces	-		-	-	-	6	-	-	-	2
	Glass pieces	2	-	-	-	-	2	-	-	-	
	% Other material (Dry dung pieces, Polyethene pieces)	1	-	25	-	-	7	100	100	-	16

(A= Baya weaver (*Ploceus phillippinus*), B=*Apus affinis* (little swift), C=Red wattled lapwing (*Vanellus indicus*), D=Blue rock pigeon (*Columba livia*), E= (Red vanted bulbul (*Pycnonotus cafer*),F=House crow (*Corvus splendens*), G=Parrot (*Psittacula roseate*), H=Little green bee eater (*Merops Zorientaus*), I=Mooirhen (*Gallinula chloropus*), j=Common Myna (*Acridotheres tristis*

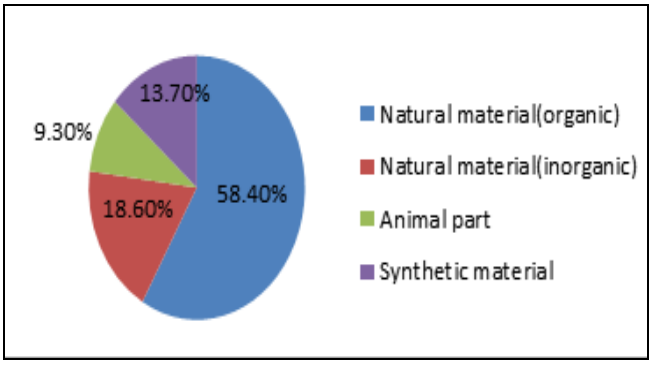

Fig 1: Average number of material used in nest construction by the birds.

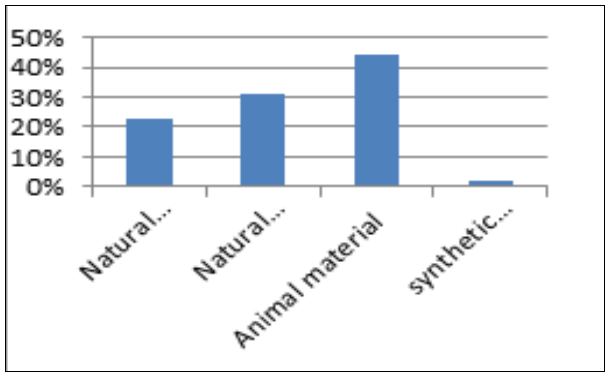

Fig 2: Nest material percentage in little Swift (*Apus affinis*)

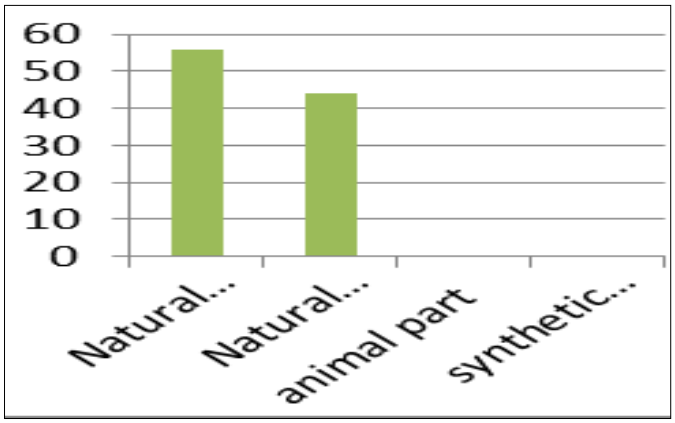

Fig 3: Nest material in Red wattled Lapwing (*Vanellus indicus*)

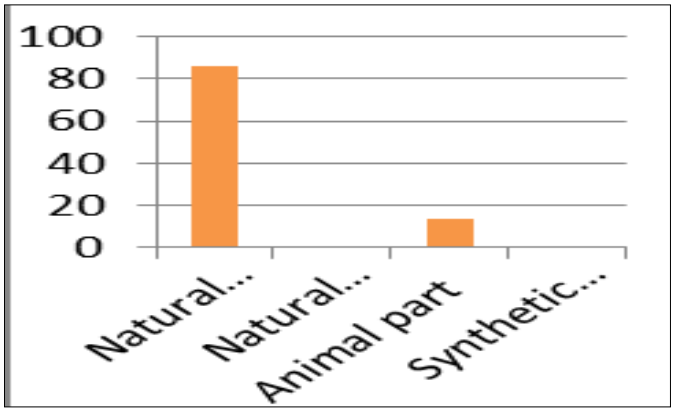

Fig 4: Nest material of Common Pigeon *Columba livia*

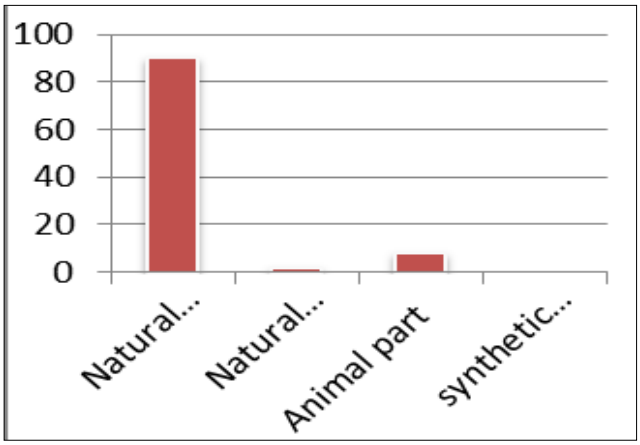

Fig 5: Percentage of materials used in nest of Red Vented Bulbul

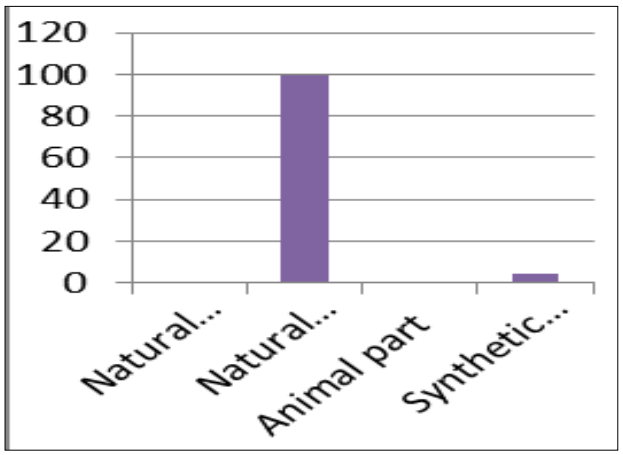

Fig 6: House crow *(Corvus splendens*)

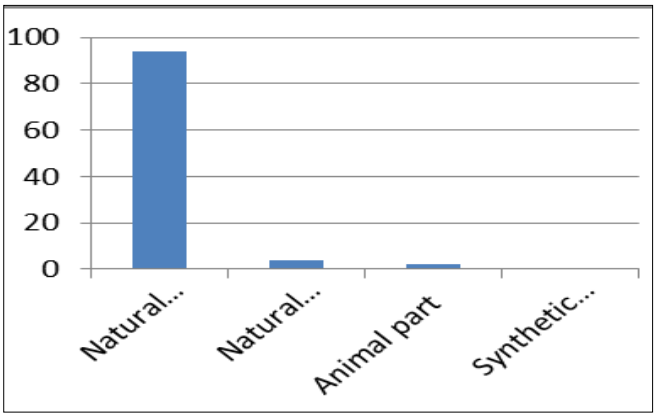

Fig 7: Nest material percentage of Parrot (*Psittacula roseate*)

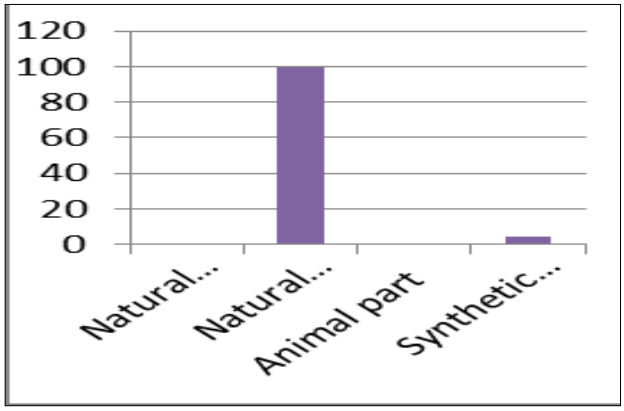

Fig 8: Nest material percentage of Little Green Bee Eater *(Merops orientaus)*

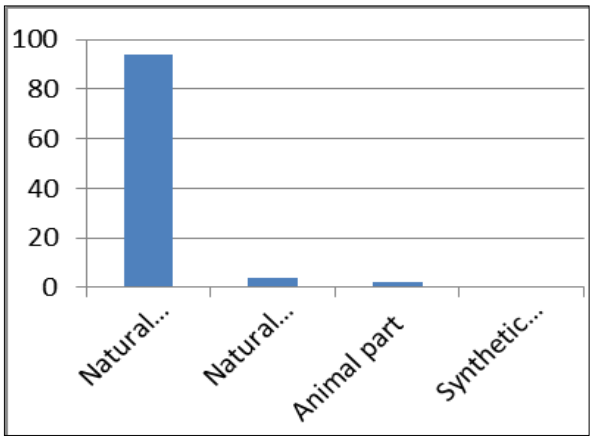

Fig 9: Nest material percentage of Moorhen (*Gallinula chloropus*)

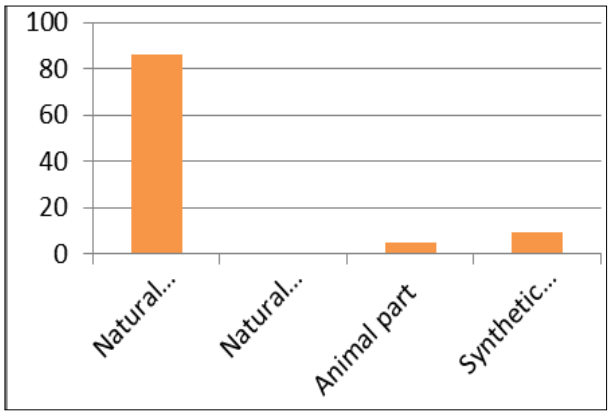

Fig 10: Nesting material percentage in Common Indian Myna (*Acridotherestristis*)

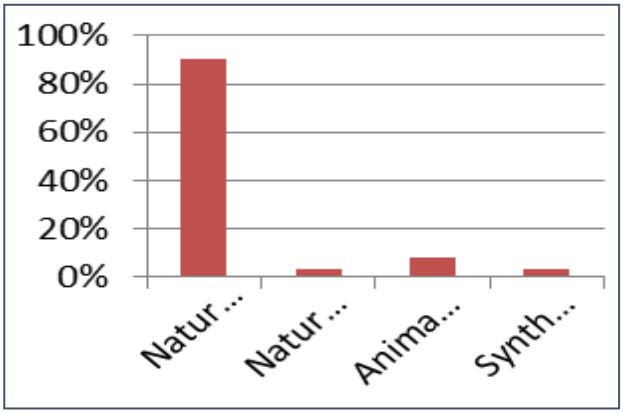

Fig 11: % Nesting material in the nest of *Ploceus phillipinus*

Fig12: Nest of Common Indian Myna (*Acridotheres tristis*) ielectric street lamp.

Fig 13: Platform nest (Abandoned) on Tree of Ashy Lark

Fig14: Nest of Ashy Muniya containg

Fig 15: Location of Nest of munia 80% human hair mixed with dry twigs containg 80% hair on a thorny shrub (Note the shrub height)

Fig 16: Nest of Scaly Munia in a thorny bush on a road side (See the height from ground). It prefers security from the thorns of bush.

Fig 17: Platform nest on interior of building of Blue rock pigeon /dove(*Columba livia*)

Fig 18: In the nest of Red Vented Bulbul (*Pycnonotus cafer*) feather coating by dropped feathers of Peacock and Egret

Fig 19: Cup nest of Red vented Bulbul

Fig 20: *Apus affinis* constructing nest on down side of floor of S. R. T. M. University area building

Fig 21: Location of *Apus affinis* nest attached down floor of SRTM University building.

Fig 22: Nest of Indian Common Mynaon switch box of school of interdisciplinary studies

Fig 23: Nest of Baya waever hanging on dugwell at SRTM Univ. campus

Fig 24: Nest on switch box of Indian common Indian Myna *(A. tristis*)

Fig 25: Nest of Indian common Myna

Fig 26: Nest of Common crow *Carvus splendens*

Fig 27: Ground nest of yellow Wattled Lapwing (*V. malabaricus*)

Fig 28: Abbandoned Nest of Red wattled Lapwing

Fig 29. Crude type of nest of Red Wattle Lapwing with eggs on coastal open land of a reservir

4. Acknowledgements

Authors (especially SPC) are thankful to University Grants Commission, New Delhi Project on Fish Taxonomy (F. No. 41-65 (SR) 2012- 11/07/2012.) The Digital Camera purchased under equipment grants of this project was extremely useful in the present study. We are thankful to our student friends Ashwini Sawant, Kalyani Aglave, Mohini Salmote who informed us on the nest of birds they located.

5. References

1. Achegawe RM, Chavan SP, Patil PV, Tarte SH. Nesting of Baya Weaver (*Ploceus phillippinus)* in S. R. T. M. University Nanded and field along Asana River at Nanded, Maharashtra, India. Int. J. Curr. Res. Aca. Rev. 2016; 4(6):51-60.
2. Chavan SP, Dudhmal D, Walke D. Mud nest of Wired-tailed Swallow (*Hirundo filifera*): Biomarkers of ecological niches in Godavari river ecosystem, Nanded. Maharashtra state. Adv. Biores. 2016; 7(2):170-175.
3. Chavan S, Dudhmal D, Hambarde SS, Kulkarni AN. Birds from Godavari river basin in Nanded district of Maharashtra: Annotated status and new reports. Int. J. Cur. Res. Aca. Rev. 2015; 3(4):328-351.
4. Chavan S, Jadhav R, Patange P, Walke D. Rose-ringed parakeet (Psittacula krameri manilensis): Population estimate and habitat preference in and around Nanded city, M. S., India. Bioscience Discovery. 2017; 8(4):820-827.
5. Gering JC, Blair RB. Predation on artificial birds nest along an urban gradient: predatory risk or relaxation in urban environment. Ecography. 1999; 22:532-541.
6. Germaine SS, Rosenstock SS, Schweinsburg RE, Richardson WS. A relationships among breeding birds, habitat and residential development in greater Tucson, Arizona. Ecological Applications. 1998; 8:680-691.
7. Hilton GM, Hansell MH. Ruxton GD, Reidand JM, Monaghan J. Using artificial nests to test to importance of nesting material and nesting shelter for incubation energetic. American ornithological Society. 2004.
8. Kulkarni AN, Kanwate VS, Deshpande VD. Birds in and around Nanded city, Maharashtra. Zoos Print Journal. 2005; 20(11):2076-2078.
9. Kulkarni AN, Bhowte CS, Kanwate VS. Bird Senses in Nanded region, Maharashtra, Bioinfolet. 2006; 3(3):73-178.
10. Mark CM, Ian RH, Marcel ML, Charles D. The design and function of birds' nests. Ecology and Evolution. 2014, 3909-3928.
11. Matthews A, Dickman CR, major RE. The influence of fragment size and edge on nest predation in urban bushland. Ecology. 1999; 22:349-356.
12. Nicholas EC, Elsie C, Collias C. Nest building and bird behaviour" Princeton university press \Princeton, USA.1984.
13. Raval JV. Morphmetric study of bird nests. Biology Department Christ college. Rajkot Gujarat. International Journal of Zoology Research. 2011.
14. Shivaji C, Rajesh A, Sharda P. Characters of nesting sites, ground nests and eggs of Yellow-Wettled Lapwing (*Vanellus malabaricus*)Aves (Charadridae). Int. Journal of Zoology Studies. 2016; 1:12-17.
15. Smith DV, Wilsons DJ, Moller H, Murphy EC. Using artificial nest explore predation by introduction predators inhabiting alpine areas in New Zealand. New Zealand journal of zoology. 2008; 35:119-128.