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SOME BIO-ECOLOGICAL STUDIES ON CAVITY NESTERS IN AYUBIA NATIONAL PARK, DISTRICT ABBOTTABAD, KHYBER-PUKHTOON KHWA PROVINCE, PAKISTAN

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ABSTRACT

A variety of animals are known to occupy trees and snags as cavity nesters. Cavity makers/nesters of Ayubia National Park were studied in detail as a part of comprehensive project on the ecology of the area. Details of tree selection, cavity size and types of animal and plant species are presented for the first time from a national park. Information about cavities used by 5 species of mammals and 29 species of birds are given for the first time from a national park of Pakistan.

Key words: Cavity nesters, mammals, birds, Ayoub National Park, Pakistan.

INTRODUCTION

Trees and Snags in the Ayubia National Park are often seen utilized for nesting, resting, shelter avenues etc by various types of animals. Nest cavities made by woodpeckers, Himalayan barbet and nuthatches are occupied by non-excavators.

Snags and trees are important to many wildlife species. The removal of snags was found detrimental for many cavity-nesting birds dependent on them (Haapanen, 1965; Scott, 1978; Grinnel and Storer, 1924). Lack of suitable cavities was described as a limiting factor for the population expansion of Red-cockaded Woodpecker (Copeyon *et al.*, 1991). Literature dealing with cavity nesters from Pakistan is nonexistent. Various trees live and snags, in Ayubia National Park were, therefore, examined in search of cavities as a part of baseline research project on bioecology of the Park (Shafique, 2003).

MATERIAL AND METHODS

Trees and snags (stump of trees) of Ayubia National Park (ANP) used by different animals for making nests and other purposes were examined during the period 1997-2000. ANP is situated in the Galliat Forest Division of Abbotabad district, Khaiber Pukhtoon Khawa province between 34^0 01´ - 34^0 3.8´ N latitude and 73^0 22.8´ - 73^0 27.1´ E longitude. Details of study area are given in Shafique and Barkati (2010). Measurements of cavity entrance (diameter) were noted to assess the pressure incurred by different species in selecting plant species for different purposes such as nesting, resting and feeding. The first author climbed up about 250 cavity trees employing ladder and ropes to examine the details of cavities and their utilizers.

RESULTS AND DISCUSSION

Selection of plant species: Analyses of snags and trees used by cavity nesters showed that trees with rough surface or having deep furrowed barks were preferred. Seventeen species of plants in addition to snags and stumps were found employed for making cavities (Table 1). Maximum number of cavities were observed in snags (33) compared to 100 cavities in 17 different plant species. Relatively more cavities were formed in *Pinus wallichiana* (13), *Acer indica* (11) and *Quercus floribunda*. The pine trees selected for making nests by woodpeckers were generally mature as they need heartwood (non-living xylem) large enough to house a cavity (Conner and O'Halloran, 1987; Rudolph *et al.*, 1991). Next step after making the cavity is to shallow the holes in the xylem which is termed as resin walls. The resin flowing out is known to protect the cavities from predators and cavity competitors (Dennis, 1971; Rudolph *et al.*, 1990). *Pinus* and *Quercus* were always in demand by the flying squirrels.

Mostly old trees and snags that were at least 5 to 6 years old were preferred for making cavities. There is a general support in favour of our observations in the literature (Lennartz *et al.*, 1983; Hovis and Labisky, 1985; Conner and O'Halloran, 1987; Hooper, 1988).

Table 1. Selection of plant species for nesting by animal species in Ayubia National Park.

	Plant Species																			
Animal Species	***Abies pindrow***	***Cedrus deodara***	***Picea smithiana***	***Pinus wallichiana***	***Texus wallichiana***	***Acer caesium***	***Aesculus indica***	***Prunus cornuta***	***Cotoneaster bacillaris***	***Populus cilliata***	***Cornus macrophylla***	***Rhododendron arboreum***	***Quercus floribunda***	***Q. glauca***	***Q. incana***	***Salix tetrasperma***	***Ulmus wallichiana***	***Snags***	***Stumps***	Total
Petaurista petaurista albiventer	1	1		1		1	2						5	2	2		1	6		22
Hylopetes (Eoglaucomys)	1		1	1	2		1	1		1	1	1				1	3	4		18
fimbriatus Nyctalus leisleri																		1		1
Psittacula himalayana				1		1	1	1		1	1	1	1	2			3	4	1	18
Ottus spilocephalus	1			2		1		1							1			1		7
Glaucidium brodiei				1				1					1							3
Strix aluco	1	1			1		1													4
Megalaima virens				1			1	1	1		2			1				1		8
Picus canus				1										1						2
Picus squamatus		1		1			2						1	1				3		9
Dendrocopus himalayensis	1		1	2			1	1	1	4	1		1	2	1			6		22
Troglodytes troglodytes																		1	1	2
Phylloscopus occipitalis																1				1
Parus melanolophus																1				1
P. monticolus													1			1		1		3
Psitta leucopsis	1																			1
Certhia himalayana	3	1		2														2		8
Acridotheres tristis							2											3		5
Total	9	4	2	13	3	3	11	6	2	6	5	2	10	9	4	4	7	33	2	135

Table 2. Size of cavity entrance (mm) used by various animal species in Ayubia National Park.

Animal Species	Range (mm)	Average (mm)
Petaurista petaurista albiventer	98 - 206	121.55 (n= 22)
Hylopetes (Eoglaucomys) fimbriatus	78 - 117	95.72 (n=18)
Nyctalus leisleri	87	87.00 (n=1)
Psittacula himalayana	80 - 158	112.17 (n=18)
Ottus spilocephalus	86 - 137	110.71 (n=7)
Glaucidium brodiei	70 - 128	105.00 (n=3)
Strix aluco	116 - 170	139.40 (n=5)
Megalaima virens	71 - 93	80.00 (n=8)
Picus canus	66 - 81	73.50 (n=2)
Picus squamatus	61 - 98	83.11 (n=9)
Dendrocopus himalayensis	54 - 79	65.86 (n=22)
Troglodytes troglodytes	30 - 36	33.00 (n=2)
Phylloscopus occipitalis	38	38.00 (n=1)
Parus melanolophus	36 - 53	44.00 (n=3)
P. monticolus	30 - 37	14.29 (n=3)
Psitta leucopsis	50 - 61	55.29 (n=7)
Certhia himalayana	49 - 71	58.13 (n=8)
Acridotheres tristis	78 - 101	87.8 (n=5)

Cavity Size: Cavities differ in entrance size depending upon the species (Table 2). Flying squirrels and some bird species preferred cavities of large entrance size. The average cavity size made by different animals ranged from 14.29 to 139.4 mm. Cavities of more than 100 mm average size are those of *Strix aluco* (139.4), *Petaurista p. albiventer* (121), *Psittacula himalayan* (112.17), *Ottus spilocephalus* (110.7) and *Glaucidium brodiei* (105).

A variety of vertebrate and invertebrate species (Table 3) were observed using these cavities for different purposes viz. breeding, diurnal roosting, food exploration, insect eating, predation etc. Five species of mammals were recorded as cavity users. The most common use was diurnal roosting.

Five species of mammals were seen in ANP employing tree cavities (Table 3). The yellow throated marten (*Martes flavigula*) was often seen climbing up the trees in search of its prey but was never found roosting or breeding in the cavities. Two species of flying squirrels (*Petaurista petaurista albiventer* and *Hylopetes (Eoglaucomys) fimbricatus*) breed and roost in the cavities.

Birds are the main occupants of these cavities which use them either solely for roosting or breeding or both. Thirty species of birds were found associated with cavities (Table 3), of which 26 bird species breed in cavities. There are 10 bird species which breed as well as roost whereas 13 species were found roosting only. Two species of birds viz. blue- headed redstart (*Phoenicurus caeruleocephalus*) and nutcracker (*Nucifraga caryocatactes*) never used the cavities for roosting or breeding; they visit the cavities in search of insects.

Woodpeckers are the main engineers or architects of the cavities. Their abandoned cavities are used by other species. They require a year or more to make a cavity. Five species of woodpeckers are recorded from ANP. Woodpeckers are known to form a greater proportion of the breeding avifauna in the forests of Sweden (Nilsson, 1979).

Spiders, ants, bees and wasps, and bark beetles were also found using these cavities for breeding, roosting, food searching etc.

Table 3. List of animal species using tree snags for various purposes in Ayubia National Park.

NAME OF SPECIES							
SCIENTIFIC NAME	**COMMON NAME**	**CAVITY MAKING**	**BREEDING**	**DIURNAL ROOSTING**	**FOOD EXPLORATION**	**INSECT EATING**	**PREDATION**
Mammals							
Martes flavigula	Yellow-throated Marten				*		*
Petaurista petaurista albiventer	Red Himalayan Giant Flying Squirrel		*	*			
Hylopetes (Eoglaucomys) fimbriatus	Small Kashmir Flying Squirrel		*	*			
Apodemus rusiges	Himalayan Wood Mouse			*			
Nyctalus leisleri	Leisler's Noctule			*		*	*
Birds							
Accipiter nisus	Eurasian Sparrow Hawk			*		*	*
Falco tinnunculus	Eurasian Kestrel			*		*	*
Psittacula himalayana	Slatty-headed Parakeet		*				
Ottus bakkamoena	Indian Scops Owl		*	*		*	*
O. spilocephalus	Mountain Scops Owl		*	*		*	*
Glaucidium brodiei	Collard Owlet or Collard Pygmy Owl		*	*		*	*
Strix aluco himalayana	Himalayan Tawny Owl		*	*		*	*
Megalaima virens	Great Himalayan Barbet	*	*	*			
Picus canus	Black-naped Green Woodpecker	*	*	*		*	*
P. squamatus	Scally-bellied Green Woodpecker	*	*	*		*	*
Dendrocopus himalayensis	Himalayan Pied Woodpecker	*	*	*		*	*
D. hyperythrius	Rufous-bellied Pied Woodpecker	*	*	*		*	*
D. auriceps	Brown-fronted Woodpecker	*	*	*		*	*
Phoenicurus caeruleocephalus	Blue-headed Redstart					*	
Troglodytes troglodytes	Northern wren		*				
Phylloscopus occipitalis	Western-crowned Leaf Warbler		*		*	*	
Nittava sundra	Beautiful Nitava		*		*	*	
Ficedula tricolor	Slaty-blue Flycatcher		*		*	*	
F. superciliaris	Simla or Black-crested Tit		*			*	
Parus melanolophus	Crested Black Tit		*		*	*	
P.major	Great Tit		*		*	*	
P.monticolus	Green-backed Tit		*		*	*	
Sitta leucopsis	White-checked Nuthatch	*	*			*	
S. europaea cashmirensis	Brooks or Kashmir Nuthatch		*		*	*	
Certhia himalayana	Himalayan Tree Creeper		*			*	
Cephalopyrus flammiceps	Fire-capped Tit		*			*	

Table 3… Continue

NAME OF SPECIES							
SCIENTIFIC NAME	**COMMON NAME**	**CAVITY MAKING**	**BREEDING**	**DIURNAL ROOSTING**	**FOOD EXPLORATION**	**INSECT EATING**	**PREDATION**
Dicrurus leucophaeus	Ashy or Grey Drongo			*			
Nucifraga caryocatactes	Nutcracker					*	
Acridotheres tristis	Common Myna		*		*		
Invertebrates							
	Spiders		*	*	*	*	
	Ants		*	*	*	*	
	Bees and wasps		*	*			
	Bark Beetles		*	*	*		

REFERENCES

Conner, R. N. and K. A. O'Halloran (1987). Cavity tree selection by red-cockaded woodpeckers as related to growth dynamics of southern pines. *Wilson Bull*., 99: 398-412.

Copeyon, C. K., J.R. Walters and J. H. Carter (1991). Induction of red-cockaded woodpeckers group formation by artificial cavity construction *J. Wildli. Man.*, 55: 549-556.

Dennis, J. V. (1971). Species using Red-cockaded Woodpecker holes in northeastern South Carolina. *Bird-Banding*, 42: 79-87.

Haapanen, A. (1965). Bird fauna of the Finish forests in relation to forest succession, *I. Ann. Zool., Fenn*., 2: 153-196.

Grinnel, J. and T. I. Storer (1924). Animal life in the Yosemite Univ. California Press, Berkely. 752 pp.

Hooper, R. G. (1988). Longleaf pines used for cavities by Red-cockaded Woodpecker colonies in Florida. *Wild. Soc. Bull*., 13: 307-314.

Hovis, J. A. and R. F. Labisky (1985). Vegetative associations of Red-cockaded Woodpecker colonies in Florida. *Wildl. Soc. Bull*., 13: 307-314.

Lennartz, M. R., P. H. Geissler, R. F. Harlow, R. C. Lang, K. M. Chitwood and J. A. Jackson (1983). Status of the Red-cockaded Woodpecker on federal lands in the South Pp. 7-12. In: Red-cockaded Woodpecker Symposium II proceedings (D. A. Wood, ed.). State of Florida Game and Fresh Water Fish Comm., Tallahassee, Florida.

Nilsson, S. G. (1979). Effect of forest management on the breeding bird community in southern Sweden. *Biol. Conserv*., 16: 135-143.

Rudolph, D. C., R. N. Conner and J. Turner (1990). Competition for Red-cockaded Woodpecker (*Picoides borealis)* roost and nest cavities: the effects of resin age and cavity entrance diameter. *Wilson Bull.* 102: 23-36.

Rudolph, D. C., H. Kyle and R.N. Conner (1991). Red-cockaded Woodpeckers versus rat snakes: the effectiveness of the resin barrier. *Wilson Bul*. 102; 14-22.

Scott, V. E. (1978). Characteristics of ponderosa pine snags used by cavity-nesting birds in Arizona. *J. For*., 76: 26-28.

Shafique, C.M. (2003). *Some aspects of bio-ecology of Ayubia National Park, NWFP, Pakistan*. Ph.D. thesis, University of Karachi, 445 pages.

Shafique, C.M. and S. Barkati (2010). Mammalian Fauna of Ayubia National Park, district Abbottabad, Khyber-Pukhtoonkhwa Province, Pakistan. *International J. Biol. Biotech*., 7(4): 455-461.

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