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EFFECT OF PATCHY VEGETATION IN BIRD NESTING SELECTION AND PREFERENCES ADJACENT TO HUMAN HABITATION IN GONDAR, ETHIOPIA

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ABSTRACT

The present study on bird nesting was conducted from eight different patchy vegetation sites viz. Shintha, Azezo, GCMS campus of University of Gondar, Queskum Church, Tewodros campus of University of Gondar, Maraki campus of University of Gondar, Gendma Mountain and Angereb Dam forest area. Enumeration of bird nests were conducted from the field with the objective of assessing the birds nest densities and tree species preference in the study area. A total of 359 bird nests belongs to five types i.e. platform, cup, hanging, ground and hole nests were recorded invariable of species from the study area during this study period. In the site wise analysis, the highest density of the nests (invariable of nest types) were recorded from Shintha site 102 ± 39.02 ha^{-1} and the lowest from GCMS and Queskum 16 ± 3.70 ha^{-1} and 16 ± 1.92 ha^{-1} respectively. In nest type densities the maximum was recorded from hanging nests 34.75 ± 29.89 ha^{-1}and the minimum was from ground nest i.e. 0.5 ha^{-1}. Among the records 308 nests were active and 51 were abandon nests. The tree species preference of nesting birds varied among the bird groups. The current study reveals that, this study area was effectively used by nesting birds as their breeding ground. Further long term study on this aspect is suggested as recommendation.

Key words: Abandon nest, Active nest, Nesting birds, Nest density, Tree species preference.

INTRODUCTION

Birds can live in different habitat conditions and these have been blessed with the plumage and flying capacity. Bird nest is the spot in which a bird lays its eggs and raises its young ones. In order to successful mate, lay eggs, incubate them and produce a new generation of birds, each bird species must have an appropriate scheme that is suitable to their life style[1].

Bird hatches their young in nest. Nests can vary from a smoothed place on the ground to the elaborately woven nest of the orioles. A nest is a not permanent house for a bird rather it is a nursery [2]. Some bird nest in brush or the lower part of the tree. Other prefers tree tops. Some like the shady deep forest and other prefer a single tree or bush in a forest clearing. For some species the nest is simply a shallow depression made in sand for others, it is knot hole left by a broken branch, a burrow dug in to the ground, a chamber, drilled in to a tree, an enormous rotting piece of vegetation and earth, a shelf made of dried saliva or a mud dome with an entrance tunnel.

Not all bird species build nest. Some species lay eggs directly on the ground or rocky ledges, while brood parasite lay theirs in the nest of other birds, letting unwitting "foster parents" do all the work of rearing the young. Although nest are primary used for breeding, they may also be reused in non-breeding season for roosting and some species build special dormitory nests or roost nests (or winter nests) that are used for only roosting. Most bird build a new nest each year, though some refurbish their old nest.

In some species the female does most or all of the nest construction, though the male often helps. in the polygynous species, however the male does most or all of the nest building. The nest also form a part of courtship display such as weaver bird. The ability to choose and maintain good nest site and build high quality is selected for by females in this species. In some species the young from previous broods also act as a helper for adult.

Birds use nests to protect eggs and nestling from predator and adverse weather. To minimize predation, birds may use or build nests that are inaccessible, hidden and nests may also keep eggs and nestlings warm. Birds with in the same species build similar types of nests, but the nest material depends on the surrounding habitat.

Nest building in birds is a widespread commonly observed and yet we understand rather little about how birds construct what appear to be species specific nests. Simple stereotyped building rules seem to be explained even seemingly complex constructions in invertebrates [3], but how relevant such rules are to avian nest construction is unclear. While it is generally assumed that nest building in birds is innate [2,4,5]. There are some species that build nests which seem beyond such simple rule governed, innate construction sticking examples come from the weaver birds (family Ploceidae) which weave and knot plant material in a way that has been linked to weaving in humans [6].

A key to understanding how nest construction achieved is to determine the degree of repeatability of nest morphology as repeatability sets an appear limit on the heritability of a trait[7,8]. As such, it has been used to demonstrate significant potential for genetic control over nest building in stickle backs, penduline tits and barn swallow [1,5,9]. The other side of construction coin is contribution made by previous experience, including that associated with learning and

memory [10]. Little is known about the importance of experience.

Avoiding predation is a ubiquitous challenge for most birds, and natural selection favors those individuals with effective anti predator defenses. Natural selection exerts selective pressures not only on the design of nests, but also on the birds themselves during the nest-building period while they are collecting and transporting material to the nest site [11]. Accordingly, there are a number of ways in which the design of nests can minimize the risk of predation, including the location in which nests are built. More generally, there is strong evidence that male-built nests act as signals to females, who adjust their reproductive investment accordingly. Meanwhile, there is a growing appreciation that female-built nests reflect the phenotype of the building female in a similar way to male-built nests [12]. However, studies examining the function of female-built nests are less common than studies of male-built nests for two reasons. First, female-built nests are considered to be relatively uncommon when compared to male-built and bi-parentally built nests [4], and Second, the theory of extended phenotypic signals has focused disproportionately on male signals.

The patchy vegetations acts as a potential breeding site for the birds, to explore this, the present study was planned and carried out. The main focus of this study was to investigate the nest density of birds. The finding of the study helps to understand the effect of patchy vegetation in bird breeding.

MATERIAL AND METHODS

Study Area

This research was carried out on birds nesting in eight different sites viz. Shintha (Site I), Azezo (Site II), GCMS campus (Site III), Quskum church (Site IV), Tewodros campus (Site V), Maraki campus (Site VI) Gndima mountain (Site VII) and Angerab dam (Site VIII). The geographic location of these sites extends from 13°9’57’’ to 13°19’58’’ north latitude and from 37°54’48’’ to 38°24’43’’ east longitude (Figure 1). The elevation of these sites ranges from 2000 to 2200 m.a.s.l with a temperature varies from 12^0 to 30^0 and the average annual rain fall is 1800 mm.

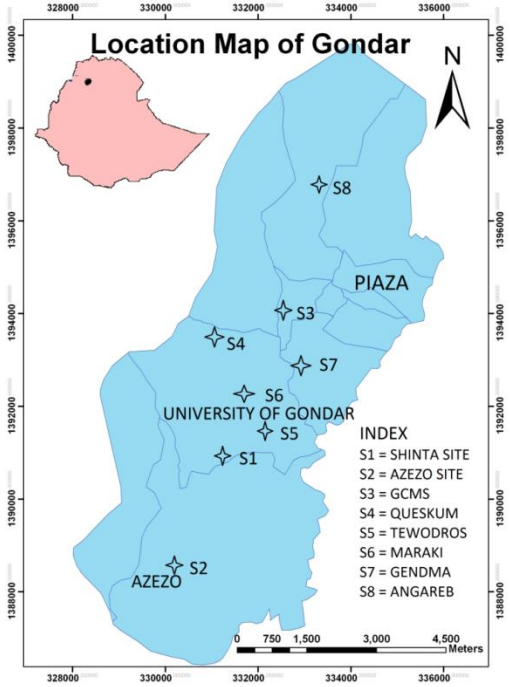

Figure 1: Map of the study area

Study population

This study includes the nesting populations of avian community, types of nests and tree species preference for nesting (Plate 1).

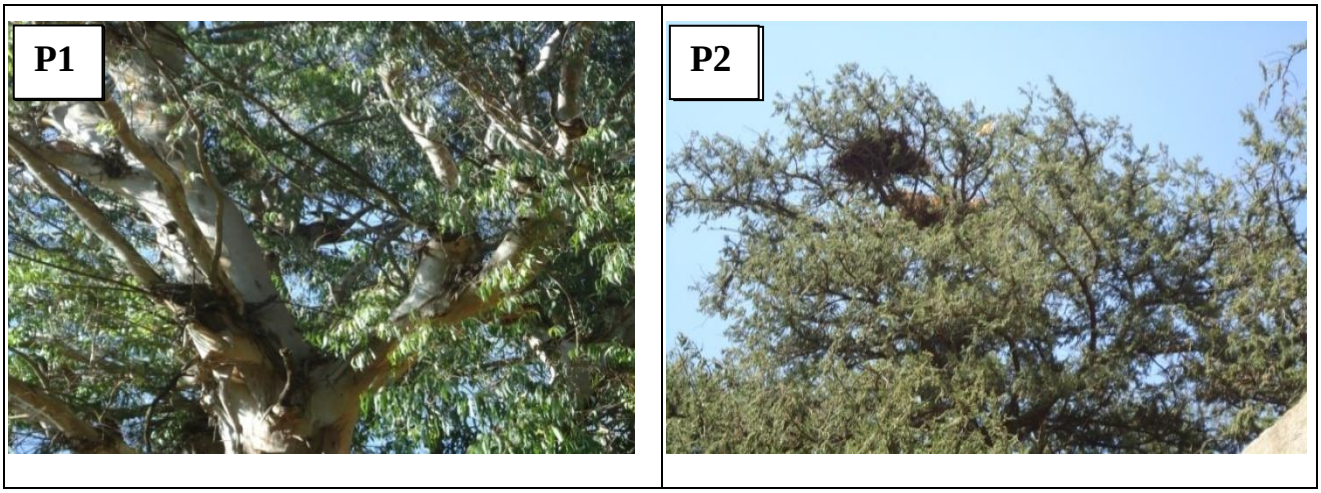

Plate 1: Images of nests taken from field
Index: P1 = Nest of African white backed vulture; P2 = Nest of Hooded vulture; P3 = Nest with egg of African white backed vulture; P4 = Nest construction by a weaver

STUDY DESIGN
The study was conducted from March to May 2017. The data about birds nesting was gathered from eight different sites during the study period.

Methodology
The Line Transect Method [13] was entertained for the nest surveys. A total of eight transects were laid one in each site randomly. The length (1km) and width (100m) of the transects were fixed and a single surveys was made in each transects during this study period. The Direct observation method [14] was entertained to record the nests during morning hours between 7.00 to 10.00 am.

Data collection
For nesting characteristics, data on the number of nests (active and abandoned nests were recorded separately), and their tree species preferences were gathered. The tree species were identified by using a technical manual Useful Trees of Ethiopia [15]. A photographic field guide book to Birds of the Horn of Africa [16] was used for the identification of the birds. Binoculars were used for the observations of the birds and their nests.
Data Analysis
The density is an expression of the numerical strength of a community in an area at a particular time was calculated in each of the sites for comparison.

The density is defined by following formula.

Density = Number of nests / Area sampled

And from the data obtained the basic statistics *viz.*, arithmetic mean and standard deviation were used for the variables by using window based statistical packages mainly Microsoft EXCEL.

RESULTS
This study recorded five types of nests *i.e*. platform nests, cup nests, hanging nests, ground nests and hole nests, which were constructed by 11 different groups of bird species. The bird species were identified in group level not in species level. Type of nests and constructing bird groups were differs as shown in table 1.
A total of 359 bird nests were recorded during this study period. Among these a maximum of 278 hanging nests were recorded from all the sites and a minimum of 4 ground nests were recorded (Table 1).

Table 1: Shows types of nests, numbers and constructing bird groups recorded during study period

Type of nests	No. of nests recorded	Constructing bird groups
Platform nests	19	Vultures, Kites and Hornbills
Cup nests	53	Ring doves, Thrushes, Shrikes, Flycatchers and Red eyed doves
Hanging nests	278	Weaver birds
Ground nests	4	Martins
Hole nests	5	Love birds

In the site wise analysis, the highest density of the nests (invariable of nest types) were recorded from Shintha site 102 ± 39.02 ha^{-1} and the lowest from GCMS and Queskum 16 ± 3.70 ha^{-1} and 16 ± 1.92 ha^{-1}. In nest type densities the maximum was recorded from hanging nests 34.75 ± 29.89

$ha^{-1}$and the minimum was from ground nest i.e. 0.5 ha^{-1} (Table 2).

Table 2: Site wise and overall record of nest density from the study area during the study period

S#	Site	Nest type and Density ha^{-1}					Total density ha^{-1}
		Platform	Cup	Hanging	Ground	Hole	
1	Shintha	6	6	90	0	0	102 ± 39.02
2	Azezo	4	1	55	4	0	64 ± 23.66
3	GCMS	4	9	3	0	0	16 ± 3.70
4	Queskum	4	4	3	0	5	16 ± 1.92
5	Tewodros	0	9	49	0	0	58 ± 21.27
6	Maraki	1	17	17	0	0	35 ± 9.14
7	Gendima	0	1	20	0	0	21 ± 8.84
8	Angerab	0	6	41	0	0	47 ± 17.85
Overall density		2.38 ± 2.39	6.63 ± 5.21	34.75 ± 29.89	0.5	0.625	44.89 ± 29.62

The tree species preference of nesting birds differ group wise, some of them prefers taller trees like *Eucalyptus* and some of them prefers other types. The maximum numbers (119 nests) of nests were recorded from *Eucalypts* species followed by *Acacia* species (116 nests) and the minimum of 2 nests were recorded from the tree species *Pinus radiate* (Table 3)

Table 3: Nest records of tree species preference and other locations

S#	Nest records (Tree species and others)	Nest type					Total
		Platform	Cup	Hanging	Ground	Hole	
1	*Acacia spp.*	0	27	89	0	0	116
2	*Croton macrostachyus*	2	0	1	0	0	3
3	*Cordial Africana*	0	1	15	0	0	16
4	*Cupressus sempervirens*	0	0	3	0	0	3
5	*Elaeocarpus ganitrus*	0	8	0	0	0	8
6	*Eucalyptus spp.*	12	4	103	0	0	119
7	*Ficus spp.*	0	7	5	0	0	12
8	*Grevillea robusta*	0	2	6	0	0	8
9	*Jacaranda mimosifolia*	0	0	7	0	0	7
10	*Juniperus procera*	4	0	1	0	5	10
11	*Oleya eurpaea*	0	1	3	0	0	4
12	*Pinus radiate*	1	1	0	0	0	2
13	*Sespania sespan*	0	0	45	0	0	45
14	Rock and soil	0	0	0	4	0	4
15	Building	0	2	0	0	0	2
	Total	19	53	278	4	5	359

In relation with active nests (nests currently used by the birds) the highest numbers (252) of nests were recorded from weaver group of birds and the minimum was from martin and shrike birds. In general the active nest records exceed many folds of abundant nests. The abundant nests (nests which were not used currently) were low in number, among them the highest was recorded from weavers followed by ring doves as 26 and 13 respectively and there were no records of abundant nests from martin, flycatchers, love birds, hornbills and red eyed doves (Table 4).

Table 4: Bird group wise active and abandoned nest records during this study period

S#	Bird group	Active nests	Abundant nests	total
1	Weaver	252	26	278
2	Vulture	6	1	7
3	Ring Dove	13	13	26
4	Thrushes	14	8	22
5	Black kite	9	1	10
6	Martin	1	0	1
7	Flycatcher	3	0	3

8	Shrike	1	2	3
9	Love bird	5	0	5
10	Hornbill	2	0	2
11	Red eyed dove	2	0	2
Total		308	51	359

DISCUSSION

The weaver bird nests in the study area shows a decreasing trend, the current result was compared with the previous studies conducted in the Gondar University campus it shows there were a total of 107 nests ha^{-1}were recorded during the year 2011[17]; it was reduced in to 37 nests ha^{-1} during the year 2012[18]; further reduced in to 35 nests ha^{-1} in the year 2013[19] and it became 82 nests ha^{-1} during the year 2014[20]. The current study shows a total of 34.75 ± 29.89 nests ha^{-1}. As the data is deficient for other birds nest, the current trend of the nest densities is unknown. Avian nest densities can be influenced by the singular or interactive influence of a variety of factors such as habitat physiognomy, habitat availability, predation, inter and intra species resource completion, parasites and diseases and weather. The climatic factors are the major ones influencing the size of animal population [21]. Birds also have specific habitat requirements for nesting as they select nesting structure based on the vegetation structure over and around the nest site. So it needs further investigation for the proper understanding of these species distribution.

CONCLUSION

Breeding is a vital process helps for the survival of populations. For the success it require some of the facilities. Among them the nests are playing a greater role. In all our observations, this study area was effectively used as breeding ground by many bird species. The present study results revealed that the density of the nests were very high in some areas and low in others. The causes should be studied in detail. This study area should be conserved for the above said reasons. So based on this study a long term study should be planned for the better management of these nesting bird species in this area.

RECOMMENDATIONS

To retain these birds in this habitat the following management recommendations are suggested.

Preserving these habitats may attract the breeding birds to this area and it will also help to conserve these bird species. A watching group may be formed to establish conservation programs. Long term research and monitoring on birds nesting is highly recommended. Eco tourism can be promoted to observe bird nests.

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