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J. Appl. Sci. Environ. Manage. *September 2014*
Vol. 18 (3) 397-401

Assessment of Population Density and Disparity of Village Weaverbirds (*Ploceus cucullatus*) Along Three Selected Road Axis in Ogun State, Nigeria

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KEY WORDS: Village weaverbird, *Ploceus cucullatus*, population, nest, density

ABSTRACT: Study of Village weaverbirds *Ploceus cucullatus* along the roads was necessary in order to provide prospect of their population, density and platform for monitoring their distribution. Data were collected through on-site observations and point-count method at thirty-four (34) point-count stations. Collected data were subjected to descriptive statistics and one-way Analysis of Variance (ANOVA). 58.8% of the point-count stations were recorded along Abeokuta/Ibadan road axis, 26.5% along Abeokuta/Shagamu road axis and 14.7% along Ijebu-Ode/Ibadan road axis. Twelve different tree species representing ten families were found colonized by the bird but *Cassia spp, Mangifera indica* and *Terminalia catappa* were most preferred for habitation. Habitat use classifications indicated that Village weaverbirds predominantly nested in human settlements (94.2%). Total population of 1269 Village weaverbirds were recorded along the three road axis and highest population of it was from Abeokuta-Ibadan road axis. Overall, population density for the three road axis was 18 Village weaverbirds per kilometre and among the roads; Abeokuta-Ibadan road axis recorded the highest density. The total population mean Village weaverbirds was 223±13 Village weaverbirds while the total nest population was 129±nest. Total elevation value was 141±6 asl and the mean total of the tree species was 5±1 tree species. Maximum and minimum values of Village weaverbirds population, nest counts, elevation and tree species were recorded along Abeokuta/Ibadan road axis than other road axis. Elevation of point-count station was significantly different (P< 0.05). Elevation of the study locations contributed to Village weaverbirds population, density and population disparity along the road axis.

http://dx.doi.org/10.4314/jasem.v18i3.5

Village weaver was introduced to many other regions but is mainly resident breeding bird species in much of Sub- Saharan Africa (Lahti, 2003). They frequently form large noisy colonies in villages, towns, hotel grounds and are found in a wide range of open woodlands and human habitation. Village Weaverbirds form large foraging flocks and nesting colonies, and are often involved in synchronized competitive actions such as displacing other bird species in foraging areas and mobbing intruders near and within colonies (Lahti, 2003). Village weaverbird builds elaborate, enclosed nests in often dense colonies, and prefers the proximity of human habitation and agriculture (Lahti *et al*., 2002). It nests in often dense colonies in a variety of habitats, places close to source of water but have been found in abundant near agricultural fields. Their life centres on breeding colony and the work of building and repairing their nests which is made by weaving blades of grass or other vegetation into a hanging-nest (Serle *et al*, 1990). The global population size has not been quantified, but it is believed to be large as the species is described as 'common' in at some of its range. Global population trends have not been quantified, but the species is not believed to approach the thresholds for the population decline criterion of the IUCN Red List (Birdlife, 2008). The aim of this study is to determine Village Weaverbird abundance, disparity among the three road axis and their spatial density.

METHODOLOGY

The study was carried out in Ogun State located on latitude 6.2°N and 7.8°N and longitude 3°E and 5°E (Ogun State Government, 2013). Three road axis; Abeokuta/Ibadan road axis- from *Fajol* to *Bakatari* was described road axis A. Abeokuta/Shagamu road axis- from Abeokuta immigration office to *Kajola* round about was tagged road axis B and Ijebu-ode/Ibadan road axis- from *Erunwon* junction to *Adebayo* was named road axis C. The road axes were purposively selected for this study because of closeness of the three roads. Point-count locations along the roads were surveyed between January to June, 2010 and observation was carried out every ten days interval between hours of 6:00 - 10:00 am when Village Weaverbirds are more active and more accurately enumerated (Funmilayo, 1975). Nest on individual host trees including those on the floor of the trees were enumerated and host trees were identified. Elevations of the various point-count stations were determined by GPS device and the

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habitat use classification of the stations was grouped into settlement, farmland and market. Population density was calculated by dividing the total population of Village Weaverbirds encountered by the total length of the road axis covered which was measured in kilometre. Data were analysed using descriptive statistics and one way analysis of variance (ANOVA).

RESULTS AND DISCUSSION

The study carried out in three different road axes resulted in 34 different point count stations and the road distance covered at Road A was 27.4 km, site B was 22.7 km and site C was 21.3 km. Study Road A had 20 point-count locations; site B had 9 point-count stations and site C had 5 point-count locations (Table 1). 57%, 27% and 16% of Village Weaverbirds population was found in the sites respectively. Habitat use classifications results revealed that Village Weaverbirds predominantly nested in human settlement (94.2%) area compared to (2.9%) for market and (2.9%) for farmland (Table 2). The results showed that Village Weaverbirds colonised 12 different species of trees. The tree species are; *Terminalia catappa, Mangifera indica, Gliricidia sepium, Spondias mombim, Cassia spp, Hura crepitans, Pinus caribaea, Azadirachta indica, Gmelina arborea, Elaeis guineensis, Psidium guajava* and *Bambusa vulgaris.* Cassia trees (23.5%) were mostly preferred followed by Terminalia trees (20.6%) and Mango trees (14.7%). The least preferred trees were Gliricidia tree, Oil Palm tree, Pine tree, Spondia tree and Bamboo tree each accounted for 2.9% (Table 3). Total population of Village Weaverbirds encountered along the three road axis was 1269 Village Weaverbirds. Road axis A, road axis B and road axis C total population was 722 Village Weaverbirds, 337 Village Weaverbirds and 210 Village Weaverbirds respectively. Village weaverbird population density for the three road axis was 18 Village Weaverbirds per kilometre. Road axis A, B and C had village weaverbird population density of 26 Village Weaverbird, 15 Village Weaverbirds and 10 Village Weaverbird per kilometre respectively (Table 2). The total population mean was 223±13 Village Weaverbirds while the total nest population was 129±nest. Total elevation value was 141±6 asl and mean total of tree species was 5±1 tree species. Maximum and minimum population recorded at road axis A was 436 Village Weaverbirds and 103 Village Weaverbirds respectively. The mean population of 216 ± 18 Village Weaverbirds was found in the location. The mean population at road axis B was 224 ± 17 Village Weaverbirds and accounted for minimum and maximum population of 149 Village Weaverbirds and 279 Village Weaverbirds respectively. The road axis C, maximum and minimum population recorded was 152 Village Weaverbirds and 368 Village Weaverbirds separately, and the mean value was 252 ± 22 Village Weaverbirds. The mean nest population of 131 ± 6 nests was found along the road axis A with the maximum and minimum nest population of 188 and 75 nests accordingly. The mean nest population along road axis B was 122 ± 5 nests and the road accounted for minimum and maximum nest population of 106 and 156 nests respectively. Maximum and minimum nests population recorded at the at road axis C was 106 nests and 172 nests separately, and the mean value was 131 ± 13 nests. The mean elevation value recorded at the road axis A was 162 ± 6 asl with the maximum and minimum elevation of 122 and 238 asl accordingly. The mean elevation value at the at road axis was 121 ± 2 asl and the road accounted for minimum and maximum elevation value of 112 and 131asl respectively. Maximum and minimum elevation value recorded at the at road axis C was 46 and 158 asl separately, and the mean value recorded was 95 ± 22 asl. The mean tree species value of 6 ± 1 trees was found at at road axis A with the maximum and minimum tree species of 12 and 1 tree species accordingly. The mean tree species at at road axis B was 5 ± 1 species and the road accounted for minimum and maximum tree species of 1 and 11 tree species respectively. Maximum and minimum tree species recorded at the at road axis was 12 and 1 tree species separately, and the mean value was 4 ± 2 tree species (Table 4). Table 5 showed that the results of one-way ANOVA showed significant contribution of elevation (F = 13, df = 2 and 31, P< 0.05) and the least significant difference (LSD) test (α = 0.05) revealed that road axis A and B had more elevation-mean values significantly higher than road axis C. Bird population, nest population, tree heights and tree species were not significant (P> 0.05) (Table 6).

Total population of Village weaverbirds found along the three road axis could be a reflection of geographical areas covered and more ecological corridors provided by the avenue trees for the birds. This was compared with Fernandez-Juricic (2000) that birds spreading are enhanced by improved wooded road sides for movement and other activities. The population of the bird recorded could further be attributed to the generalist behaviour of the birds as described by Kassen, 2002 that the ecological generalist description of bird permits benefit in heterogeneous environs. More bird population in the study locations were more than Inah, *et al* (1999) findings and this could be linked increased sample size and gaps in the year of studies that might influence Village weaverbirds population. Moreover, the highest population of birds from Abeokuta/Ibadan road axis could be attributed to availability of many human settlements and more point-count stations than other road axis. The characterised dense nature of the Ijebu-ode/Ibadan road axis because of Onigambari Forest Reserve and less human settlement along both Ijebu-ode/Ibadan road axis and Abeokuta/Shagamu road axis could be responsible factors for the low

population of Village weaverbirds along the two roads. Less number of preferred trees in this study compared Inah, *et al* findings in 1999 could be as a result of physical development along the roads. Population density of the Village weaverbirds could be influenced by food availability, abundance, and less predation involvement. Habitat use classification of all the stations colonized were predominantly characterised by human settlement and this was in agreement with Lahti *et al* (2002) that Village weaverbirds are mostly well-known for affinity to settle around human community. The observed colonized Bamboo stands could be as results of the closeness of the point-count station to farmland and wetland which was in accordance with Lahti and Lahti (2002) that Village weaverbirds inhabit area close to water sources and agricultural farms. Elevation of the three road axis contributed to Village weaverbirds population and density in the location. Village weaverbirds have much tendency to thrive in locations that is up to 238m above sea level. This compared with Cheke (1987) findings that the birds are rarely found in elevation above 300m.

Conclusion Population disparity and population density of the Village weaverbirds was associated to the degree rise of study locations above sea level. Population variability is a good tool for predicting risk of menace, hence monitoring study on the Village Weaverbirds is recommended.

Table 1 Name of each point-count location and the total distance covered along each road axis

	Road Axis A	**Road Axis B**	**Road Axis C**
Distances (km)	27.4	22.7	21.3
1	Carwash	Kajola-a	Adebayo
2	Fajol	Kajola-b	Ibusogboro
3	Somorin	Kajola-c	Ago-IwoyeJunction
4	Odo-Eran	Kajola-d	Odolalati
5	Aregbe	Logbara	Iperin
6	Eleweran-a	Araromi	
7	Eleweran-b	Orile-Imo	
8	Kotopo	Akibo	
9	Camp-a	Isiun	
10	Camp-b		
11	Idera-a		
12	Idera-b		
13	Itoko-Ajegunle		
14	Irogun-Awala		
15	Baagbon		
16	Olodo-a		
17	Olodo-b		
18	Olokuta		
19	Orile-Ilugun		
20	Bakatari		

Table 2 Frequency and percentage of habitat usage at the study sites

			Habitat Use Classification			
	Village Weaverbirds Population (N)	Density (N/km)	Settlement	Market	Farmland	Point-counts locations (N)
Road A	722 (57)	26	19	1	0	20 (57)
Site B	337 (27)	15	9	0	0	9 (27)
Site C	210 (16)	10	4	0	0	5 (16)
	1269 (100)		32 (94.2)	1(2.9)	1(2.9)	34 (100)

Values in bracket are percentages.

Table 3 Host tree species frequency and percentage at the study sites

Tree Species	Scientific Name	Road A	Site B	Site C	Total
Cassia Tree	*Cassia spp*	3	2	3	8 (23.5)
Gmelina Tree	*Gmelina arborea*	3	0	0	3(8.8)
Pine Tree	*Pinus caribaea*	1	0	0	1(2.9)
Mango Tree	*Mangifera indica*	3	1	1	5(14.7)
Oil Palm Tree	*Elaeis guineensis*	1	0	0	1(2.9)
Dynamite Tree	*Hura crepitans*	2	0	0	2(5.9)
Tropical Almond Tree	*Terminalia catappa*	3	4	0	7(20.6)
Guava Tree	*Psidium guajava*	1	1	0	2(5.9)
Gliricidia Tree	*Gliricidia sepium*	1	0	0	1(2.9)
Neem Tree	*Azadirachta indica*	2	0	0	2(5.9)
Spondia Tree	*Spondia mombim*	0	1	0	1(2.9)
Bamboo Tree	*Bambusa vulgaris*	0	0	1	1(2.9)
	Total	20	9	5	34(100)

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Values in bracket are percentages

Table 4 Mean values of Village Weaverbirds counts, nest counts, elevation values and Tree species at the point-count stations

	Locations	N	Mean ±	Minimum	Maximum
Bird Counts	Road A	20	216 ± 18	103	436
	Road B	9	224 ± 17	149	279
	Road C	5	252 ± 22	152	368
	Total	34	223 ± 13	142	416
Nest counts	Road A	20	131 ± 6	75	188
	Road B	9	122 ± 5	106	156
	Road C	5	131 ± 13	106	172
	Total	34	129 ± 4	75	146
Elevation (asl)	Road A	20	162 ± 6	122	238
	Road B	9	121 ± 2	112	131
	Road C	5	95 ± 22	46	158
	Total	34	141 ± 6	56	187
Tree Species	Road A	20	6± 1	1	12
	Road B	9	5 ± 1	1	11
	Road C	5	4 ± 1	1	4
	Total	34	5 ± 1	1	10

Table 5 One-Way Analysis of Variance (ANOVA) of the variables

		Sum of Squares	Degree of freedom (df)	Mean Square	*F*	Significance
Bird Counts	Between Road Axis	5060.387	2	2530.193	0.408	0.669
	Within Road Axis	192285.172	31	6202.747		
		197345.559	33			
Nest Counts	Between Road Axis	483.902	2	241.951	0.311	0.735
	Within Road Axis	24105.039	31	777.582		
		24588.941	33			
Point Count Elevation	Between Road Axis	23362.570	2	11681.285	13.254	0.000
	Within Road Axis	27322.489	31	881.371		
		50685.059	33			
Tree Height (m)	Between Road Axis	14.713	2	7.357	1.380	0.267
	Within Road Axis	165.294	31	5.332		
		180.007	33			
Tree Species	Between Road Axis	14.332	2	7.166	0.637	0.536
	Within Road Axis	348.639	31	11.246		
		362.971	33			
Land usage class	Between Road Axis	0.585	2	0.293	2.186	0.129
	Within Road Axis	4.150	31	0.134		
		4.735	33			

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Table 6 Means of Variable Multiple Comparisons

Variables	Locations (I)	Locations (J)	Mean
Bird Population	Road A	Site B	-8.[a]
		Site C	-36[a]
	Road B	Road A	8[a]
		Site C	-28[a]
	Road C	Road A	36[a]
		Site B	28[a]
Nest Population	Road A	Site B	9[b]
		Site C	0[b]
	Road B	Road A	-9[b]
		Site C	-8[b]
	Road C	Road A	-0[b]
		Site B	8[b]
Elevation (asl)	Road A	Site B	41.5[*c]
		Site C	67.4[*b]
	Road B	Road A	-41.5[*a]
		Site C	25.9[e]
	Road C	Road A	-67.4[*d]
		Site B	-25.9[e]
Tree Species	Road A	Site B	0-.94[g]
		Site C	1.15[g]
	Road B	Road A	0.94[g]
		Site C	2.09[g]
	Road C	Road A	-1.15[g]
LSD = 0.05		Site B	-2.09[g]

Values with the same superscript along the same column are not significantly different (P>0.05) and values are means of variables

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