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Population Density of Red-vented Bulbul *Pycnonotus Cafer* in a Portion of Cauvery Delta Region, Southern India

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Abstract

The population density of Red-vented Bulbul *Pycnonotus cafer* was studied in three different habitats in a portion of Cauvery delata region of Tamil Nadu, between 2011 and 2013. Regardless of habitats and years the bulbul density varied from 16 to 51 birds per km^2. Among the habitats the river banks supported relatively high number of birds than other habitats. Moreover, within habitats the population of bulbuls varied among seasons and summer supported relatively higher number of birds. Yearly variations of density showed that year 2013 had highest densities.

Keywords: Red-vented bulbul, Density, Habitats, Seasons, Years.

Contents

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1. Introduction

The Red-vented Bulbul *Pycnonotus cafer* is a widely distributed tropical songbird found throughout the Indian sub-continent and common birds in gardens and scrub jungle. The Red-vented Bulbul a perky smoke-brown bird with partially crested black head, scale like markings on breast and back, a conspicuous crimson patch below root of tail, and a white rump, the last particularly noticeable in flight. It is arboreal, with quick flight, usually found in pairs, non-territorial, with sexes alike [1]. Although several aspects of its behavior and ecology have been well studied [2-8], little is known about its population status. In this paper, we describe the population density of the Red-vented Bulbul in different habitats, seasons and years in the Cauvery delta of Tamil Nadu, Southern India.

2. Study Area

This study was conducted in two different villages, namely Manganallur (11°.10´N, 79°.65´E) and Vazhuvoor (11°.04´N, 79°.63´E) of Cauvery delta region in Nagapattinam District of Tamil Nadu, Southern India. Agriculture is the major source of income of this area, and contributes a high share of the rice production in the state. Major cultivated crops in the study area include Sugarcane, groundnut, green gram, black gram and cotton. *Cocos nucifera*, *Borassus flabellifer*, *Madhuca indica*, *Mangifera indica*, *Enterolobium saman*, *Tamarindus indicus*, *Ficus benghalensis*, *Ficus religiosa*, *Thespesia populnea*, *Acacia arabica*, *Odina wodier* and *Azadirachta indica* are some dominant tree species in the study area. Plantations of *Casuarina equisetifolia*, *Tectona grandis* and *Bamboosa arundinacea* are found in some area. The study area was usually divided into four distinct seasons, namely post-monsoon, summer, pre-monsoon and monsoon.

3. Methods

The line transect method was used to estimate the population density of the Red-vented Bulbul [9] . The line transect method is most suitable to our study area, because of open landscape with sparsely distributed trees. In each habitat, three one-kilometre long transects were laid following a preliminary survey undertaken one month earlier. The birds were counted within a 50 m strip on either side of transects (100 m wide strip). Bird counts were mostly counducted immediately after sunrise, between 06:00 and 08:00 hrs. Bird counts were carried out fortnightly during the study period in all the three habitats. However, bird counts were avoided during the cloudy, rainy or windy days, but were deferred to the following day. To estimate the Red-vented Bulbul densities as number per square kilometer, the following formula was used: D= Number of birds / (2×L×W), where L= Length of transect and W= ½ width of transect.

One-way ANOVA was also used to compare the mean population density between habitats, seasons and years. Significance of all tests were assessed at $\alpha = 0.05$. All the analyses were done in MINITAB package.

4. Results

The Red-vented Bubul density varied from 16 ± 3.21 birds/km^2 (in monsoon of 2011 at agriculture landscape) to 51 ± 6.56 birds per km^2 (in pre-monsoon of 2012 at river banks). In general, the river banks supported relatively higher number of birds than other habitats (Table 1). Within habitats, densities were higher during pre-monsoon of 2011 (30 ± 5.51 birds/km^2), summer of 2012 (37 ± 3.61 birds/km^2) and summer of 2013 (38 ± 4.00 birds/km^2) in agriculture landscape and during pre-monsoon of 2011 (40 ± 6.00 birds/km^2) and 2012 (51 ± 6.56 birds/km^2) and summer of 2013 (46 ± 3.21 birds/km^2) at river banks. In human habitation, higher density was recorded during pre-monsoon of 2011 (33 ± 5.51 birds/km^2) and 2012 (47 ± 3.00 birds/km^2) and summer of 2013 (41 ± 5.13 birds/km^2). The population density showed a significant habitat variations during monsoon of 2011 (ANOVA: $F = 12.48$, $p < 0.01$), post-monsoon ($F = 7.80$, $p < 0.05$), summer ($F = 7.90$, $p < 0.05$) and pre-monsoon ($F = 10.84$, $P < 0.05$) of 2012 and pre-monsoon of 2013 ($F = 21.36$, $p < 0.01$) (Table 1).

Seasonal variations of population density inferred that agriculture landscape (38 ± 3.45 birds/km^2), river bank (48 ± 6.83 birds/km^2) and human habitation (42 ± 3.76 birds/km^2) had comparatively higher number of bulbuls during summer. The agriculture landscape (ANOVA: $F = 26.67$, $p < 0.01$), river bank ($F = 44.21$, $p < 0.01$) and human habitation ($F = 16.79$, $p < 0.01$) had significant seasonal differences in the density of the Red-vented Bulbuls (Table 2).

Yearly variations of population density showed that agriculture landscape (32 ± 7.74 birds/km^2), river bank (41 ± 6.19 birds/km^2) and human habitation (36 ± 7.23 birds/km^2) had mean higher density during 2013. Significant yearly variations in the Red-vented Bulbul densities existed only in river bank (ANOVA: $F = 12.70$, $p < 0.01$) (Table 3).

5. Discussion

Mean density of the Red-vented Bulbul in the study area varied from 16 to 51 birds/km^2 and estimated density suggest that this species can be considered to be common in the study area. The Red-vented Bulbuls density differed among habitats and in general, the density was relatively higher in river bank followed by human habitation and agriculture landscape. Density fluctuations in different area reflect the differences at the habitat level [10]. For example, higher number of Red-vented Bulbuls at river bank might be related to relatively rich supply of food like flowers, buds, fruits, etc in river banks. Food availability is one of the main factors to determine the habitat use by bird species [11], but other factors also influence habitat use. For example, occurrence of Red-vented Bulbuls may be influenced by vegetation type rather than by food availability, because habitat structure is essential for protection, roosting, nesting and perching sites. The river banks provide adequate roosting and nesting sites, more foraging perches and dense vegetation for camouflage and food.

The seasonal variations of Red-vented Bulbul population inferred that density was increased from post-monsoon to summer and declined from pre-monsoon to monsoon seasons. The increased response could be related to the reproductive success/period of this species. The Red-vented Bulbuls breeding season in the study area sets in March

and ends in May. The high density during summer may be reflected by the additions of recently emerged independent bulbuls. During this time food availability such as flowering plants and insects are high. Earlier reports in the study area showed that insectivorous bird's density was greater during summer seasons due to greater food availability [12-15]. Relatively lower density during monsoon season may be associated not only with post-reproductive status and dispersal of bulbuls and also with fewer food resources during colder seasons.

We did not research possible reasons for yearly variations of numbers of this species, but it is likely that predation, intra- and interspecific-competition, parasites and diseases, habitat availability, weather, food habits and migration status may be factors [16-21]. We believe that this preliminary or baseline data will be helpful to know the number of bulbuls operating in the study area in various habitat types and investigating factors attributed to the decline in the population of Red-vented Bulbuls.

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Table-1. Habitat-wise variations in the density (birds/km^2) of the Red-vented Bulbul in the study area. Values are mean ± SD. *p < 0.05

Year	Season	Agriculture landscape	River bank	Human habitation	One-way ANOVA		
					df	F	p
2011	Pre-monsoon	30 ± 5.51	40 ± 6.00	33 ± 5.51	2,6	2.55	0.157
	Monsoon	16 ± 3.21	19 ± 3.06	27 ± 1.73	2,6	12.48	0.007*
2012	Post-monsoon	33 ± 3.51	40 ± 2.65	30 ± 3.51	2,6	7.80	0.021*
	Summer	37 ± 3.61	49 ± 4.98	43 ± 2.65	2,6	7.90	0.020*
	Pre-monsoon	34 ± 4.04	51 ± 6.56	47 ± 3.00	2,6	10.84	0.010*
	Monsoon	17 ± 3.06	17 ± 4.35	18 ± 3.88	2,6	0.08	0.921
2013	Pre-monsoon	25 ± 2.65	36 ± 2.08	30 ± 1.53	2,6	21.36	0.001*
	Summer	38 ± 4.00	46 ± 3.21	41 ± 5.13	2,6	3.00	0.124

Table-2. Seasonal variations in the density (birds/km^2) of the Red-vented Bulbul in the study area. Values are mean ± SD. *p < 0.05

Habitat	Post-monsoon	Summer	Pre-monsoon	Monsoon	One-way ANOVA		
					df	F	p
Agriculture landscape	29 ± 5.34	38 ± 3.45	32 ± 4.84	16 ± 2.80	3,20	26.67	0.000*
River bank	38 ± 2.93	48 ± 6.83	47 ± 8.24	18 ± 2.35	3,20	44.21	0.000*
Human habitation	30 ± 2.42	42 ± 3.76	40 ± 8.47	22 ± 6.08	3,20	16.79	0.001*

Table-3. Yearly variations in the density (birds/km^2) of the Red-vented Bulbul in the study area. Values are mean ± SD. *p < 0.05

Habitat	**2011**	**2012**	**2013**	**One-way ANOVA**		
				df	**F**	**p**
Agriculture landscape	23 ± 8.25	30 ± 8.96	32 ± 7.74	2,21	1.81	0.187
River bank	29 ± 12.44	39 ± 14.52	41 ± 6.19	2,21	12.70	0.003*
Human habitation	30 ± 5.04	34 ± 12.73	36 ± 7.23	2,21	0.45	0.638