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AVIFAUNA ASSESSMENT OF COAL MINING AFFECTED ZONE WITH COMPARE TO THEIR DOMINANCE AND SPECIES RICHNESS

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ABSTRACT
Birds are highly influenced by the habitat disturbance and their population depends on their favorable habitat, which is free from any kind of disturbance. The study site disturbed by the coal mining activity and was very less suitable for avifauna. The study area divided by the two zones; core, which includes 248.56 ha area and surrounding 5 km area, considered as buffer and then compared diversity for both the areas. A total of 492 individual of 52 bird species belonging to 28 families were observed including core and buffer area. Bird diversity of core is lesser than buffer. There were some major disturbances in core bird diversity due to large amount of sound pollution by blasting, air pollution by mining dust, habitat degradation due to tree felling and ground digging, vehicle moment and anthropogenic pressure. Buffer area was well established with agriculture land and forestland, which may provide suitable habitat for birds, and they may settle down there.

KEYWORDS: coalmines; avifauna; abundance; species richness; diversity.

INTRODUCTION

In India continuous human development and urbanization has changed most natural habitats and Mining is one of them; birds are good indicators as it responds fast to threat and changing environmental condition. Birds provide several ecological functions such as pest control, pollination, seed dispersal and plant reproduction in thousands of economically and culturally important plant species through its consumption of various terrestrial, aquatic and aerial resources (Whelan *et al.,* 2015). The bird population is an indication of environmental changes as they respond fast to threats and changing environment conditions (Barov, 2011). Indian birds, putting the number of species across the country are 1306. With that figure, India accounts for 12 percent of the total number of bird species in the world, amounting to 10,135. Among the 1306 species. Taxonomically, the bird population in the country is divided into 26 orders, 111 families and 492 genera. Of these 72 species of birds are endemic to India,

constituting about 5.5% of the country's bird diversity (Praveen *et al.,* 2018). Safeguarding the unique biodiversity of this important region is therefore a high conservation priority, and extensive research is required to determine more precisely how habitat loss and change impacts upon biodiversity so that effective measures may be taken to mitigate these impacts. However, due to its isolation, current understanding of the ecological associations of avifaunal communities in this area remains poor (Martin & Blackburn, 2010)

Study area
The study area is located within Raigarh District of Chhattisgarh state. Singmouza- Jampali block is located in the east central part of Raigarh, which is adjacent to Kudumkela village under Gharghoda Tehsil, Raigarh district. The external boundaries are defined by latitude $22^0 16'17''$ and $22^0 17'50''$ N and longitude $83^0 16'52''$ and $83^0 19'26''$ E.
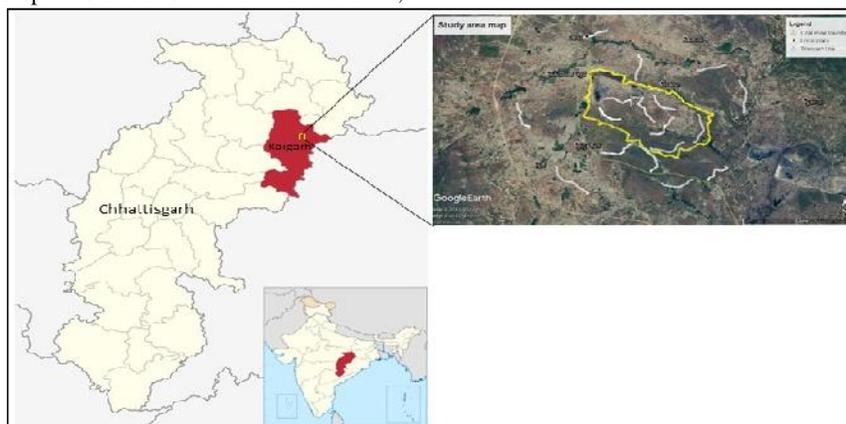

FIGURE 1. Location map of study area

The proposed mining area is located at a distance of about 55 kms from Raigarh and 25 kms from Dharamjaygarh on Dharamjaygarh - Raigarh state highway. The mining block comprises an area of about 4.93 sq. km. The length of the block is about 4.5 km whereas its width varies from 0.8 km to 1.3 km. Area of core boundary 248.56 ha (EIA and EMP report). Study area divided into two parts core and buffer. Area of Buffer boundary Surrounding 5 km of core. According to EIA-EMP report of OCP Jampali. Study area surrounded by open forest in which Mahua (*Madhuca indica*) and Sal (*Shorea robusta*) are dominant tree species.

MATERIALS & METHODS

Major surveys for the estimation and counting of avifauna were conducted between the month of May 2016 to October 2016 by using a transect line approach (Bibby *et al*., 1992) for extensive survey of whole Mining area including core and buffer zones; so as to assess the status of avifauna and to identify the habitats pattern used by the birds. For each line transect, three observers had walked along the path, and independently recorded the number of species and individual birds in the study area with the aid of binoculars. If possible, photographs had also taken to aid in the identification process. Total 17 line transect were taken including the core and buffer zone; out of which 07 line transects were surveyed in core area and rest 10 transects surveyed in the buffer area. During the field surveys, we made a line transect of 1.20 km (mostly used a path / trail followed by the villagers to enter in the forest) in which distance sampling were taken in every 300 m in

the transect to estimate the population of avifauna, its habit, habitat and nesting pattern including the floral diversity of the proposed mining area). A circular sample plot of 10 m radius had been taken in each transect at an interval of 300 m i.e. total 5 sample plots made in one transect in which vegetation composition (grass, herb, shrub and regeneration) and all tree species data had been taken including height and girth (using meter tape) along with the counting of avifauna. Instead of transect line, birds were also recorded between two transect line and considered only in checklist. Perch heights of individuals have also recorded to find out the utilization of vertical dimension by birds. Perch height class of all the birds has recorded in case of all direct sightings. All the birds were identified using the standard field guides (Grimmett *et al*., 2013).

RESULTS & DISCUSSION

Since density estimated from raw counts may be highly biased due to differential detectability of species. So we corrected for this detection bias in density calculation by fitting a detection function in program DISTANCE (Thomas *et al*., 2010). Density estimation was tested by using DISTANCE 7.0. Species diversity was determined using Shannon-Weiner diversity Index in the Paleontological Statistics (PAST) program. Shannon-Weiner diversity Index takes into account the number of species richness as well as evenness. The index of dominance was also measured in order to find the probability of taking randomly two individuals belonging to different species.

COMPRISION OF CORE AND BUFFER AREA
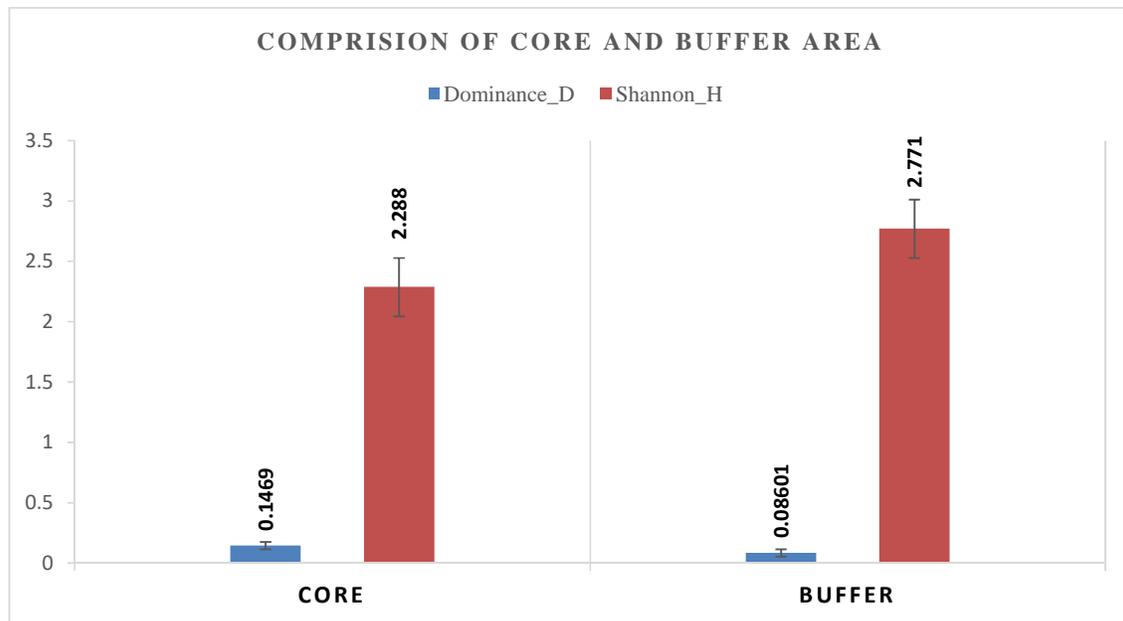
Dominance measures the extent of common species in the habitat and it ranges from 0 to 1. According to field survey; 497 individuals belongs to 28 families, 52 different species has been recorded. As per recorded data, Indian pond heron (*Ardeola grayii*), Black drongo (*Dicrurus macrocercus*), Red vented bulbul (*Pycnonotus cafer*), Indian roller (*Coracias benghalensis*) and Common myna (*Acridotheres tristis*) dominate the population of avifauna species. Moreover, before starting to our study

the coalmines have already started and about 20-30% area had already degraded for coals and this is the only reason that we took only seven transects in core. Mostly the birds are endemic and resident found during the survey. We have not compared this data seasonally because we had limited time in which we could not give time for next replicate. So statistically, we have calculated overall density including core and buffer area.

ANNEXURE 1: Checklist of Bird species reported in OCP Jampali

S. No	Family	Species	Scientific Name	IUCN status	Habitat status
1	Accipitridae	Shikra	*Accipiter badius*	LC	R
2		Black Kite	*Milvus migrans*	LC	R
3	Acrocephalidae	Blyth's Reed-Warbler	*Acrocephalus dumetorum*	LC	R
4	Alcedinidae	Common kingfisher	*Alcedo atthis*	LC	R
5		White-throated Kingfisher	*Halcyon smyrnensis*	LC	R
6		Little bittern	*Ixobrychus minutus*	LC	R
7	Ardeidae	Little Egret	*Egretta garzetta*	LC	R
8		Cattle Egret	*Bubulcus ibis*	LC	R
9		Indian Pond-Heron	*Ardeola grayii*	LC	R
10	Campephagidae	Black-headed Cuckooshrike	*Lalage melanoptera*	LC	R
11	Cisticolidae	Common Tailorbird	*Orthotomus sutorius*	LC	R
12		Ashy Prinia	*Prinia socialis*	LC	R
13		Spotted Dove	*Streptopelia chinensis*	LC	R
14	Columbidae	Laughing Dove	*Streptopelia senegalensis*	LC	R
15		Yellow-footed Pigeon	*Treron phoenicopterus*	LC	R
16	Coraciidae	Indian Roller	*Coracias benghalensis*	LC	R
17	Corvidae	Rufous Treepie	*Dendrocitta vagabunda*	LC	R
18		House Crow	*Corvus splendens*	LC	R
19		Indian Cuckoo	*Cuculus micropterus*	LC	R
20		Common Hawk-Cuckoo	*Hierococcyx varius*	LC	R
21	Cuculidae	Asian Koel	*Eudynamys scolopaceus*	LC	R
22		Sirkeer Malkoha	*Phaenicophaeus leschenaultii*	LC	R
23		Southern Coucal	*Centropus sinensis*	LC	R
24	Dicaeidae	Thick-billed Flowerpecker	*Dicaeum agile*	LC	R
25	Dicruridae	Black Drongo	*Dicrurus macrocercus*	LC	R
26	Estrildidae	White-rumped Munia	*Lonchura striata*	LC	R
27	Hirundinidae	Barn Swallow	*Hirundo rustica*	LC	R
28		Wire-tailed Swallow	*Hirundo smithii*	LC	R
29	Leiothrichidae	Jungle Babbler	*Turdoides striata*	LC	R
30	Megalaimidae	Coppersmith Barbet	*Psilopogon haemacephalus*	LC	R
31	Meropidae	Green Bee-eater	*Merops orientalis*	LC	R
32	Muscicapidae	Indian Robin	*Copsychus fulicatus*	LC	R
33		Oriental Magpie-Robin	*Copsychus saularis*	LC	R
34	Nectariniidae	Crimson-backed Sunbird	*Leptocoma minima*	LC	R
35		Purple Sunbird	*Cinnyris asiaticus*	LC	R
36	Oriolidae	Black-hooded Oriole	*Oriolus xanthornus*	LC	R
37	Passeridae	House Sparrow	*Passer domesticus*	LC	R
38		Jungle Bush-Quail	*Perdicula asiatica*	LC	R
39		Rain Quail	*Coturnix coromandelica*	LC	R
40	Phasianidae	Common Quail	*Coturnix coturnix*	LC	R
41		Red Junglefowl	*Gallus gallus*	LC	R
42		Gray Francolin	*Francolinus pondicerianus*	LC	R
43	Phylloscopidae	Sulphur-bellied Warbler	*Phylloscopus griseolus*	LC	R
44		Greenish Warbler	*Phylloscopus trochiloides*	LC	R
45	Picidae	Black-rumped Flameback	*Dinopium benghalense*	LC	R
46	Psittacidae	Rose-ringed Parakeet	*Psittacula krameri*	LC	R
47		Plum-headed Parakeet	*Psittacula cyanocephala*	LC	R
48	Pycnonotidae	Black-headed Bulbul	*Pycnonotus atriceps*	LC	R
49		Red-vented Bulbul	*Pycnonotus cafer*	LC	R
50	Sturnidae	Brahminy Starling	*Sturnia pagodarum*	LC	R
51		Common Myna	*Acridotheres tristis*	LC	R
52	Sylviidae	Lesser Whitethroat	*Sylvia curruca*	LC	R

Probability of observing birds in defined area (ds) is 3.83±0.6, density of cluster (d) is 6.95 ±1.25 and number of birds in specified area is 7.0 ±1.26. Species richness is higher (1.02) in buffer and lesser (0.36) in core and abundance is greater (26) in core and lesser (15) in buffer, this is due to core area is disturbed with mining activity i.e. blasting, continuous vehicle movement, habitat degradation and anthropogenic pressure etc. Due to these disturbances, birds are moving outside the core area and establishing their selves in buffer where they got suitable habitat. Bird species was dominant in core in compare to buffer area and Shannon diversity is again high in buffer 2.771 and low in core 2.288. As per the study objective and methodology the species diversity and population dynamics of avifauna in core area seems to be below average as compared to any other disturbed place.

institute, Raipur for providing Guidelines & field equipment

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