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Short Communication Report

ABUNDANCE AND SPECIES RICHNESS OF BIRDS IN MINED AND NON-MINED SITES OF THE JOS PLATEAU, NIGERIA.

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Mining is the removal of topsoil and vegetation in order to extract minerals found beneath the earth's crust. This can cause negative or positive impacts on bird species diversity depending on the extent of the activity (Botkins & Keller, 1989). It also changes the physical landscape, natural vegetation structure and composition, and may alter the wildlife species present in that area (Gorsira & Risenhoover, 1994).

Mining causes habitat fragmentation which is suggested to be an important factor causing declines in bird populations (Wallis, 1974; Berg, 1997) and the disappearance of the species (American Bird Conservation, 2008). Mining could encourage habitat heterogeneity where new ecological niches are created such as the wetlands and species richness is increased (Bergon *et al*., 1996).

Bird communities change with succession changes. Mining, apart from creating new niches also provide the habitat species displaced during mining to return, thus increasing the diversity (Verner, 1986; Jones, 1997).

Wetlands created through surface-mining provide valuable wildlife habitat. Mining areas can provide refuge for wetland dependent species in providing appropriate habitat for many wading birds and waterfowl (Olson & Barker, 1979; Horstman *et al*.,1998). Such areas often provide (1) islands with grassy upland nesting sites for geese and ducks; (2) interspersion of open water and submersed and emergent vegetation for loafing and feeding; (3) shallow feeding areas for wading birds; and, (4) large open lakes for molting and staging areas (Perkins & Lawrence 1985). These sediment ponds also support several species of wading birds which depend on the ponds for food resources (Renfrow, 1993). If managed correctly, these newly created wetlands can help compensate for the loss of natural wetlands throughout the nation (Horstman et al., 1998).

The Jos Plateau is an important site for mining in Nigeria, and also has an Important Bird Area (IBA). No work has been done to compare bird species diversity and abundance in the mined and non-mined areas, especially when government is making efforts to reclaim the lands. The aim of this study is to compare the bird species diversity and abundance in mined and non-mined sites and see if there is any significant difference.

Study site: The mined site is located at Rayfield (N09º50´ E08º54´) with water bodies, some wetlands and vegetation scattered on the excavated soil, and the unmined sites along Lamingo road (N09º54´ E08º56´) with farmland and some bushes.

Data collection: Every morning (between 6.00am and 11.00am), at each point (points were laid 100 m from each other), a 3-minute settling time was allowed before birds were recorded. All bird species and individuals heard or sighted were recorded with the aid of field guide (Borrow & Demey, 2004). The duration of recording was 4 min, alerted by an alarm clock (Bibby *et al*., 2001).

Statistical analysis: Statistical analyses carried out were based on normality of the data or otherwise. Parametric statistical test was used where data was normally distributed and non-parametric statistical test where data was not normally distributed. The software used was the Statistical Package for Social Sciences (SPSS). Densities of threatened and endemic bird species of the Cameroon Mountain Endemic Bird Area found on the Obudu Plateau were calculated using the Distance software version 5.0. One- way analyses of variance (ANOVA) was used to test the variation among the study sites.

A total of 318 birds, consisting of 51 bird species were recorded in this study (Table 1). The mean number of bird species was higher in non-mined than the mined site (Table 2 & Fig 1). Bird species diversity was higher in the mined (40 bird species) than the unmined (30 bird species) (Table 1). There was a significant difference in the relative abundance of bird species in mined and non-mined sites (Kruska-Wallis One –Way ANOVA, X^2 =799.510, df=1, p=0.036). Nine palearctic migrants (Common Snipe, Common Sandpiper, Common Redshank, Common Greenshank, Tree Pipit, Yellow Wagtail, Whinchat, Garden Warbler and Common Whitethroat) were recorded in this study (Table 1) with 5 in the mined site (*), 3 in the non-mined site (**) and 1 in both sites (***).

The mean number of bird species (abundance) was found to be higher in the non-mined area than the mined site (Table 2). This difference was also significant (Fig 1). Other studies have even shown densities to be higher in non-mined areas than mined areas (Brenner & Kelly, 1981; Krementz & Sauer, 1982).

TABLE 1. RELATIVE ABUNDANCE OF BIRD SPECIES IN THE TWO STUDY SITES.

S/NO	COMMON NAME	SCIENTIFIC NAME	SITE 1 Mined	SITE 2 Unmined
1	Grey Heron	*Ardea cinerea*	2	0
2	Cattle Egret	*Bubulcus ibis*	19	1
3	Great Egret	*Egretta alba*	1	0
4	Hamerkop	*Scopes umbretta*	7	0
5	Black Kite	*Milvus migrans*	0	1
6	Black-shouldered Kite	*Elanus caeruleus*	0	1
7	Common Snipe*	*Gallinago gallinago*	2	0
8	Egyptian Plover	*Pluvianus aegyptius*	15	0
9	Spur-winged Plover	*Vanellus spinosus*	2	0
10	African Wattled Lapwing	*Vanellus senegallus*	1	0
11	Common Sandpiper*	*Actitis hypoleucos*	4	0
12	Common Redshank*	*Tringa tetanus*	2	0
13	Common Greenshank*	*Tringa nebularia*	2	0
14	Adamawa Turtle Dove	*Streptopelia hypopyrrha*	5	4
15	Red-eyed Dove	*Streptopelia semitorquata*	1	0
16	Laughing Dove	*Streptopelia senegalensis*	8	13
17	Western Grey Plaatain-eater	*Crinifer pisctor*	2	6
18	Senegal Coucal	*Centropus Senegalensis*	0	2
19	Pied Kingfisher	*Ceryle rudis*	5	0
20	Grey-headed Kingfisher	*Halcyon leucocephala*	1	0
21	Red-throated Bee-eater	*Merops bulocki*	2	0
22	Vieillot's Barbet	*Lybius vieilloti*	1	0
23	Crested Lack	*Galerida cristata*	2	4
24	Rock Martin	*Hirundo fuligula*	2	0
25	Tree Pipit**	*Tree Pipit*	0	2
26	Plain-backed Pipit	*Anthus leucophrys*	1	0
27	Yellow Wagtail*	*Motacilla flava*	2	0
28	Yellow-throated Longclaw	*Macronyx croceus*	3	0
29	Common Bulbul	*Pycnonotus barbatus*	1	4
30	Whinchat***	*Saxicola rubetra*	2	10
31	Northern Anteater Chat	*Myrmecocichla aethiops*	5	0
32	Cliff Chat	*MYrmecocichla Cinnamomeiventris*	5	0
33	Garden Warbler**	*Sylvia borin*	0	2
34	Common Whitethroat**	*Sylvia communis*	0	1
35	Croaking Cisticola	*Cisticola natalensis*	1	8
36	Pygmy Sunbird	*Hedydipna platura*	3	0
37	Scarlet-chested Sunbird	*Chalcomitra senegalensis*	1	6
38	Variable Sunbird	*Cinnyris venustus*	9	4
39	Emin's Shrike	*Lanius gubernator*	0	1
40	Yellow-billed Shrike	*Corvinella corvine*	0	5
41	Yellow-crowned Gonolek	*Laniarius atroflavus*	0	5
42	Black-crowned Tchagra	*Tchagra senegalus*	0	1
43	Pied Crow	*Corvus albus*	1	9
44	Northern Grey-headed Sparrow	*Passer griseus*	1	5
45	Village Weaver	*Ploceus cucullatus*	2	3
46	Black-winged Bishop	*Euplectes hordeaceus*	0	5
47	Northern Red Bishop	*Euplectes franciscanus*	4	19
48	Red-cheeked Cordon-blue	*Uraeginthus bengalus*	4	4
49	Zebra Waxbill	*Sporaeginthus subflavus*	6	0
50	Red-billed Firefinch	*Lagonosticta senegala*	0	2
51	Rock Firefinch	*Lagonosticta sanguinodorsalis*	1	3
52	Bronze Mannikin	*Spermestes cucullata*	26	6

* Palearctic migrants in mined site
** Palearctic migrants in unmined site
*** Palearctic migrant in both sites.

TABLE 2. MEAN NUMBER OF BIRD SPECIES AND TOTAL NUMBER OF BIRDS OBSERVED (± 1 SE)

Site	Mean No bird species	Total No bird species
Non-mined	21.19(±1.127)	189
Mined	17.96(±0.836)	129

Overall richness, or number of species counted in each site, was greater in the mined area than the non-mined area, agreeing with Brenner & Kelly (1981) who observed a change in avian species as the vegetation successional stage changed, therefore increasing species richness on the overall area.on a 20-year-old reclamation site. Bergon *et al*., (1996) reported that disturbance created by mining and the changes in vegetation structure encourage habitat heterogeneity where new ecological niches are created such as the wetlands and species richness is increased.

Nine palearctic migrants were recorded in this study, 5 in the mined area, 2 in the non-mined area and 1 shared by the 2 sites. Four of the palearctic migrants (Common Snipe, Common Sandpiper, Common Redshank, Common Greenshank) only found on the mined site were wetland birds which increase the species richness of the site. Similar observation made by earlier workers (Allaire, 1978; Olson & Barker, 1979; Perkins & Lawrence, 1985; Renfrow, 1993; Horstman *et al*., 1998) noted that mined areas provide refuge for wetland dependent species and open lakes and ponds for molting and food resources.

In conclusion, mined lands have been found to have a high species richness and supports wetland birds that are palearctic migrants. In view of the present move to reclaim these lands, there is the need to maintain land with different successional stages and maintain the open grasslands and wetlands so that the species that are dependent on this do not go locally extinct.

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