



Effect of woody vegetation on grassland birds in Ikwe Wildlife Park

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Abstract

We examined the effect of woody vegetation on the relative abundance of Common waxbill *Estrilda astrild*, Seed cracker *Pirenestes ostrinus*, Sparrow weaver *Plocepasser superciliosus*, Pin-tailed whydah *Vidua macroura*, Village weaver *Ploceus cucullatus*, and Red-vented Malimbe *Malimbus scutatus*, as well as nest site selection and nesting success of Common waxbill, Sparrow weaver and Village weaver within a degraded habitat of Ikwe Wildlife Park. Common waxbill and Village weaver were the most abundant bird species. Numbers of Seed crackers, Sparrow weavers, Pin-tailed whydah and Common waxbill were negatively associated with canopy cover of woody vegetation within 100 metres of survey location. Daily nest survival (DNS) was negatively associated with the amount of woody vegetation within 100 metres of Seed cracker (DNS 0.76 ± 0.001 SE) and Sparrow weaver (DNS 0.94 ± 0.020 SE), and marginally Pin-tailed whydah nests (DNS 0.87 ± 0.006 SE) Keeping away from woody vegetation by grassland birds, suggest that managers of degraded habitat should direct their effort at reducing woody encroachment. Data were collected using systematic random sampling design for the point count, and the relationship between relative abundance and woody vegetation, were tested using regression analysis generalized linear model.

Keywords: Woody vegetation; Encroachment; Degraded habitat; Grassland birds; Nest survival; Ikwe Wildlife Park

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1. Introduction

For over 20 years, grassland birds of Ikwe Wildlife Park have decline considerably in population. Among the noticeable ones are the area-sensitive species, such as common waxbill, sparrow weaver and village weaver. These declines have been largely attributed to changes in agricultural practices (John and Igi, 2001), habitat loss and habitat degradation and fragmentation (Cully and Micheals, 2000; Egwumah et al., 2007). This habitat represents another opportunity to manage grassland bird species (Galligan et al., 2006). Degraded habitat represent conservation paradox in that grassland birds occupy them even though they are highly disturbed and vulnerable to invasion by woody vegetation such as *Vitex doniana* and *Vitellaria paradoxia*. These woody species will naturally invade grassland if left unchecked, thereby affecting the conservation value of the habitat (Grant et al., 2004). Removal of woody vegetation from grassland remains controversial despite known effect it has on grassland birds (Fletcher and Kofored, 2004).

In this study, we focused our attention on six obligate grassland bird species, which caught our attention during the reconnaissance survey. These are; common waxbill, seed cracker, sparrow weaver, pin-tailed whydah, village weaver and red-vented malimbe and we examined (a) how woody vegetation features were related to habitat use and distribution of these birds breeding within degraded habitat; and (b) the extent woody habitat features were related to nest-site selection of common waxbill, sparrow weaver and village weaver.

2. Materials and methods

2.1. Study area

Ikwe Wildlife Park is located in the southern Guinea savanna belt and lies on latitude 7°27' and 7°30'N and longitude 8°37'E. It has as an area of approximately 25km² and it is about 40km south of Makurdi along Makurdi –Aliade road. The reserve is fenced off the road and the adjacent Igbor village, to prevent wild animals from wandering to the village and the main road. This clearly shows that conservation is not completely in-situ but partly ex-situ. Three microhabitats of the park are; the woodland savannah, grassland savannah and cultivated land.

Dominant vegetation types in the study area were grasses which includes the following; *Pennisetum typhoides*, *Thelepogon elegans*, *Pennisetum purpureum*, *Euphorbia kamerunica*, *Andropogon gayanus*, *Acanthospermum hispidum*, *Hyparrhenia cyanescens*, *Imperata cylindrical*, *Hyparrhenia rufa*, *Sorghum arundinaeum*, *Oryza barthii*, *Oryza longistaminata*, *Setaria sphacelata*, *Cymbopogon gigantea*, *Eragrostis tremula* and *Panicum maximum*. Woody vegetation includes, *Vitex doniana*, *Vitellaria paradoxia*, *Prosopis africana*, *Daniella oliveri*, *Syzygium guineense*, *Pericopsis laxiflora*, and *Hibiscus aspera*.

2.2. Surveys

Grassland birds were surveyed between April to October, 2011 and 2012 at 95 different point count locations in Fete valley and the park plain. We used a systematic random sampling design for the point count

location. Each sampling point-count site has a radius of 50 metres and marked with a green peg, for easy site identification and these locations were further recorded with a Global Positioning System (GPS). Each sampling point-count site was 100m apart from each other, and at every site, the surveyor waits for 3 min to allow the birds adjust to the surveyor's presence, followed with 6 min of counting using a binocular (Bibby et al., 1995). Sampling times was between 6.00 to 10.00am and 1600 to 1800pm.

2.3. Nest survival

Nests were searched using a 20m rope dragging techniques by an individual while the second observer walked 5m behind the rope looking for birds that flushed from the nest. We also relied on behavioural characteristics to find nest, where the observers carefully followed adults carrying food and nesting materials to their nest. We also searched known breeding territories. Nest locations were marked with GPS and a coloured peg placed about 5m from nest to avoid flushing the attending adult. Nests were checked every 3 days using improvised periscope during incubation and every 2 days when the young were about the fledging stage. The number and date when eggs and nestling were checked was recorded. A typical nest period for the three focal species was 25 days (El Good et al., 1994; Ingold, 2002), with 8-10days post hatching fledge young.

2.4. Statistical analysis

We use the 95 survey locations as replicates to identify woody habitat features used by common waxbill, seed cracker, sparrow weaver, Pin-tailed whydah, Village weaver and Red- Vented Malimbe as examples in selecting suitable habitat for breeding. Regression analysis (general linear models) was used to test the relationship between relative abundance and woody vegetation. Bird point counts were transformed to minimize non-normality and variance heterogeneity.

We also examined the order of importance which woody vegetation variables influenced grassland birds during nest-site selection. We used 75 nest as replicates to identify woody habitant features used by these birds; common waxbill, seed crackers and sparrow weaver, to select nest-site locations.

3. Results

Common waxbill and seed cracker were the most abundant species during the studies. We counted 1564 bird species which included 742 seed crackers, 466 common waxbill, 220 sparrow weavers, 58 village weaver 46 Red-vented malimbe and 32 Pin-tailed whydah. The amount of woody vegetation was negatively associated with abundance of common waxbill ($\chi^2 = 11.44$, $P \leq 0.001$), seed cracker ($\chi^2 = 7.75$, $P = 0.005$), Pin-tailed whydah. ($\chi^2 = 7.36$, $P = 0.007$), and Village weaver ($\chi^2 = 11.45$ $P \leq 0.001$) (Fig 1).

Fifty-five common waxbill, 20 seed crackers and 20 sparrow weavers were monitored during the nesting seasons. Habitat variables discriminated between random location and nest sites of common waxbill (F_3 , 142 = 3.24, $P = 0.024$) (Table I). Nest placement by common waxbill was not associated with the number of

woody patches ($F_1, 144 = 1.25, P = 0.19$). Habitat variables did not discriminate between random plot locations and nests of seed crackers ($F_3, 144 = 1.12, P = 0.35$) or sparrow weaver ($F_3, 114 = 1.35, P = 0.26$) (Table I).

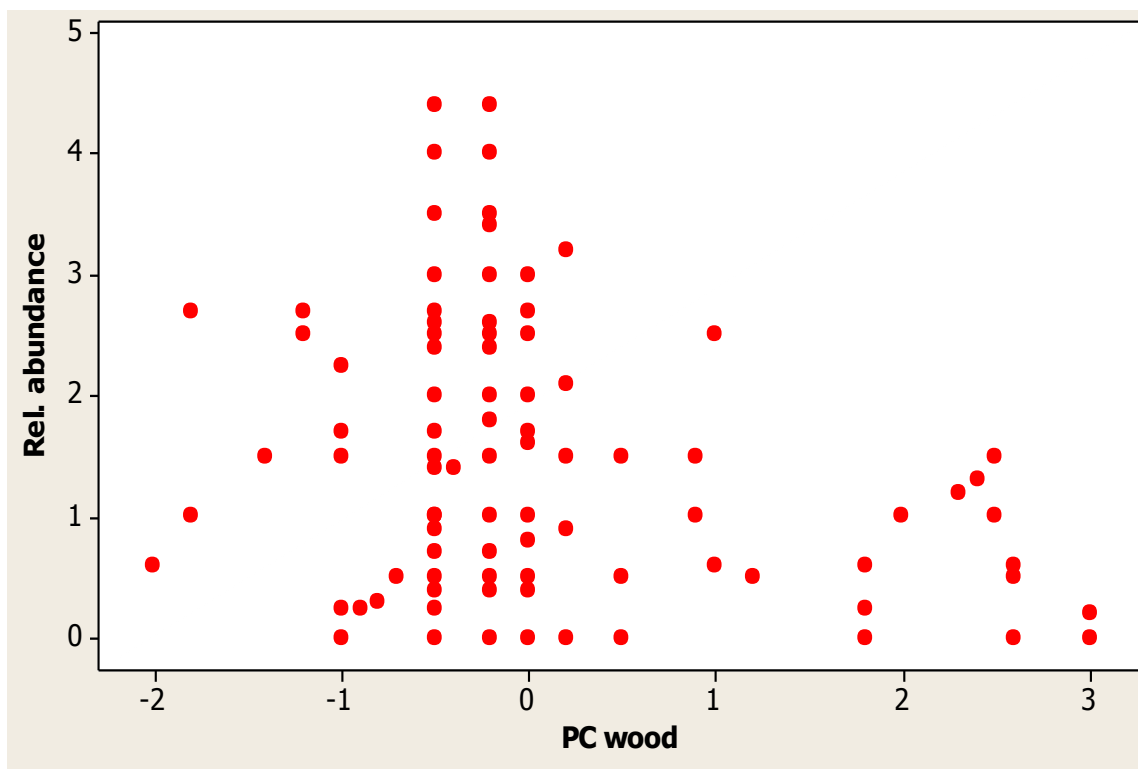


Figure 1 (a). Relative abundance of common wax bill *Estrilda astrild* within 100m radius of 95 point count locations in relation to woody vegetation

Table 1. Percent woody vegetation and distance to woodland edge (\pm SE) for nest-site location of common waxbill and seed cracker, and sparrow weaver

Common Waxbill				Seed Cracker			Sparrow Weaver			Random
Variable	X ² ±SE	F	D	X±SE	F	P	X±SE	F	P	X±SE
% Woody Vegetation	1.5±0.29	5.4	0.021	2.3±1.38	1.0	0.325	1.5±0.64	2.2	0.137	4.0±0.70
Distance to Woodland	165.3±11.70	1.0	0.331	161.1±16.09	0.7	0.396	201.8±19.39	0.7	0.391	181.1±49

Twenty five of 55 (45%) common waxbill nests, 18 of 20 (90%) seed crackers nest and 10% 20 (50%) sparrow weaver nests were successful.

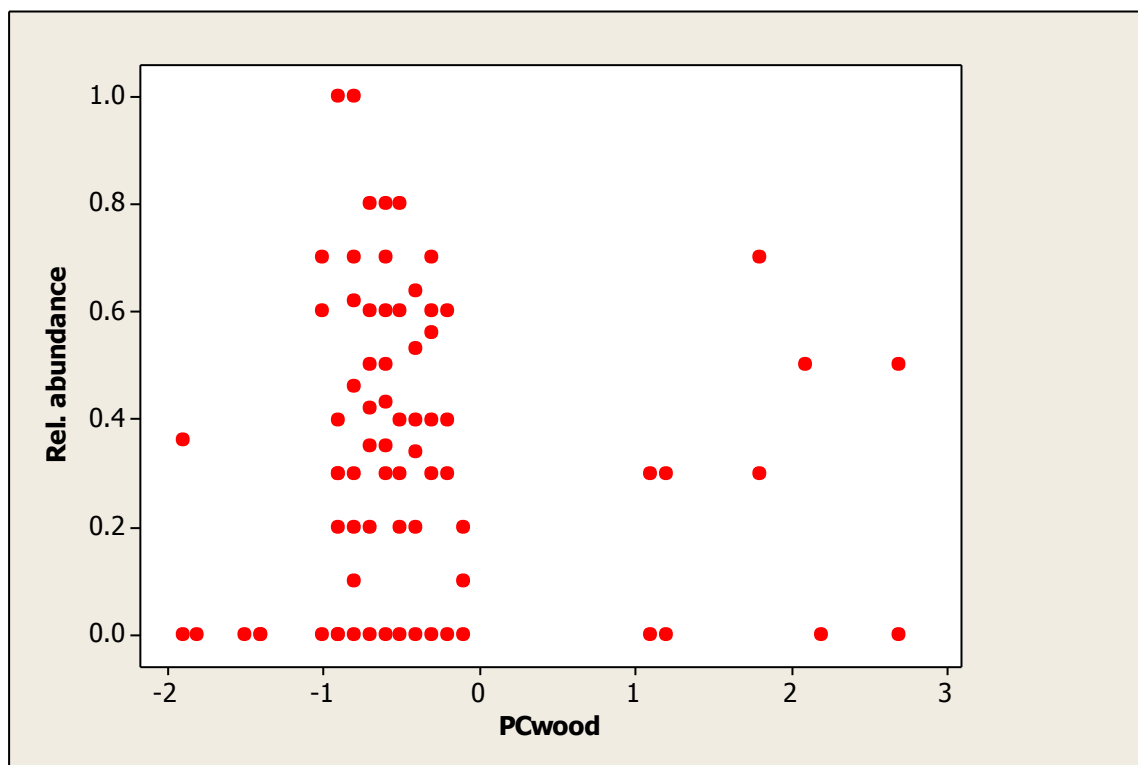


Figure 1 (b). Relative abundance of Sparrow weaver *Plocepasser supersiliosus* within 100m radius of 95 point count locations in relation to amount of woody vegetation

4. Discussion

We found that woody vegetation negatively influence, abundance, nest placement and nesting success of some grassland bird species in the degraded habitat. These results are consistent with the studies of Galligan et al. (2006), and Grant et al. (2004), whose work on the abundance of grassland birds in Minnesota and Dakota (USA) were negatively related to woody vegetation.

The numbers of common waxbill, seed crackers, Pin-tailed whydah, and village weavers were negatively related to percent cover of woody vegetation within 100m of survey locations which showed a strong evidence of selecting nest patches with lower woody vegetation than random locations. Mean while, nest locations of sparrow weaver had more than two times less woody cover and fewer wood patches within 100m which is not at variance with the results of (Thomas and Taylor, 2006). Grassland nesting birds may use the absence of woody vegetation as a cue during nest-site selection, given that some predators, for example, mice and other brood parasites such as brown ants frequently use wood vegetation as cover.

Effort to remove woody vegetation will enhance the value of degraded land for grassland birds, given the apparent avoidance of woody vegetation and the overall low nest survival of common waxbill and sparrow weaver. This process will decrease the numbers of woodland predators, thereby making the habitat more

productive and attractive to many communities of grassland-nesting birds. Our study emphasizes the effect of woody vegetation on grassland birds within degraded habitat, but the strength of habitat use vary among species of the same ecological area, so that natural variation in local topography combined with forest management practices, leads to a variety of localized habitat types that differ in plant species composition and structure, thereby, making the environment beneficial to all other species.

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