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BIRDS IN FRAGMENTED EASTERN MAU FOREST

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ABSTRACT

Birds distribution was studied in two natural forest fragments and two plantation forest fragments all near each other in Mau Forest complex, a montane tropical forest and an important bird area. Mist netting was the major method used. Mist nets were set in a concealed position in the forest early morning and operated from a set station per site. Birds were extracted every twenty minutes from the mist and studied. A comparison of birds' composition between natural forest and plantation forest fragments showed significant difference. Zero birds were captured in plantation forest fragments despite being next to the natural forest fragments that recorded high number of bird species. Habitat quality and diversity of resources available for birds play a major role in distribution of birds. Forest edge bird species were more abundant than forest specialist species. Fragmentation of forest habitat has showed possible increment of habitat types adjacent to one another but poor for habitat specific species due to lack of continuity.

Keywords: *birds' distribution, conservation, Gregory Rift Valley, habitat quality, natural forest, plantation forest.*

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INTRODUCTION

The Mau forest complex is one of the five major water towers for Kenya about 270,300ha of which 224,300ha is gazetted forest and 46,000ha ungazetted (KFWG, 2001). The gazetted forest is in five main Forest Reserves; Eastern Mau (66,000ha), Western Mau (22,700), South-western Mau (84,000ha), Transmara (34,400ha), and Ol Pusimoru (17,200ha). A sixth large block, the Maasai Mau (46,000ha) is as yet ungazetted. The forest covers a substantial area of the south-western highlands of Kenya, and probably represents the largest remaining near-continuous block of montane indigenous forest in East Africa (Bennun and Njoroge, 1999). The forest cloak the western slopes, and part of the crest of the Mau Escarpment, a block of raised land that forms the western wall of the Gregory Rift Valley.

The forest has a rich highland bird community, characteristic of the central Kenya highlands (Bennun & Njoroge, 1999). It is designated as an Important Bird Area since it has global and regional significance in birds conservation. This is proven by the fact that Mau complex is categorized among the richest examples of Central East African montane avifauna (Fishpool, 1996). Further to this, forty-nine of the Kenya's 67 Afrotropical Highland biome species are known to occur in Mau, making 72% of Kenya's Afro-tropical Highland biome species. The forest also harbours 8 species of birds that are Vulnerable and Regionally Threatened (namely: Ayre's Hawk Eagle, African Crowned Eagle, African Grass Owl, Cape Eagle Owl, Red-chested Owlet, Least Honey guide, Grey-winged Robin, and Purple-throated Cuckoo-shrike). The Hartlaub's Turaco is endemic in Mau escarpment while Hunter's Cisticola and Jackson's Francolin are Restricted-range species in the complex forest (Zimmerman, 1996).

Mau forest and its rich biodiversity are, however, threatened by human interference. As reported by Bennun and Njoroge (1999), among the most vulnerable parts of Mau Forest for bird conservation, are the high montane forests on the eastern rim where large areas have been converted to plantation forest. A particular complication in Mau is the presence of the forest-dwelling Ogiek people, an indigenous group whose degree of dependency on forest resource is very high (Muchemi and Ehrensperger, 2012; Ngari, 2009 and Birdlife International, 2007). An excision facilitated by the government in the 1990s with intention to settle landless people accelerated the problem. Immigration of other ethnic groups to the eastern edge of the forest increased pressure on forest resources. Those allocated land quickly removed the forest identity by clear-felling and burning the area in preparation for cultivation.

These processes left the natural forest degraded and fragmented into small blocks with abrupt interruptions by plantation forest in between. This study examined distribution of birds in the Eastern Mau forest considering natural blocks and the adjacent plantation blocks in Sigaon and Logoman.

MATERIALS AND METHODS

Birds were sampled using mist nets. In each of the four sites (Sigaon Plantation, Sigaon Natural, Logoman Plantation and Logoman Natural); mist nets were set in a concealed and accessible position and opened from 6.30am and operated throughout the day up to 4pm in consecutive days. A birding station was set a few meters from the mist net, where the researchers worked from. Sites were studied in turns, the researchers and tools moved from a site once it is exhausted and camps in the next site till it was exhausted. The length of sampling time per station depended on the rate of capture.

The netted birds were extracted from the net every 20 minutes and put in bird bags. One by one the birds were removed from the bird bags and studied carefully at the ringing table held on a birders grip. The first step in the analysis was to identify the bird by common name and age using the size, plumage, shape and other details as guided by the field guide book for Birds of Kenya (Zimmerman, 1999). Once identified, the appropriate ring depending on tarsus size was lounched on the left tarsus of the bird. Each ring has serialized identification which is internationally recognized. The bird rings used range from sizes AA, AB, BB, K, and T, the recorded ring numbers with letter R in front of the number means it is a re-trap. Meaning, the bird has already been ringed in the data collection session but captured again. Ringing was done using ringing tools and all records were written down in a ringing book. Once ringed, bird biometrics including length of wing, length of head, and length of tarsus, weight, primary and secondary feathers moult, body moult and tail moult were measured before releasing or freeing the bird. Body fat was estimated for female adults and bill and tail lengths for sunbirds were measured as additional parameters.

RESULTS AND DISCUSSION

A total of 135 individual birds were captured, 75 in Sigaon and 60 in Logoman from 34 different species. All captures were in natural forest blocks. There was no single bird captured from the plantation forest.

Sigaon at about 2700m asl has a mixed species forest, a bamboo stand and a stream nearby which increases the diversity of resources available for birds. There is sparse settlement in this block and a bit of livestock activities. The large number and abundance of birds could be attributed to the relatively better condition of the habitat and available variety. Logoman is a continuous block of forest with cedar tree species among other natural indigenous vegetation. It has the highest number of species which could be attributed to the variety of habitat resources available for birds. Ngugi, (2006) in a land-use assessment for the area explains that mere existence of a forest does not necessarily mean there will be more bird species but the harmonious integration of land uses might be the underlying secret for high bird diversity.

The most abundant species of the birds trapped was the Streaky Seedeater (*Serinus s. striolatus*) with 26 individuals and only one re-trap. Seed eaters are common in highlands above 1300m asl and are found in gardens and cultivated areas, woodlands edges, heath and shrub. They are usually found in pairs of small family groups. In the world they are found in Burundi, Democratic Republic of Congo, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda and Zambia. Seedeaters are associated with human habitations and open field where there is plenty of grain seeds. It is a colonizer species and a forest generalist that can exist in forest edges or non forest habitat comfortably. It emerges abundant in the study area because of opening of forest land for cultivation in addition to the natural glades found in the forest. It would thrive in fragmentation since it increases edge surface area.

The other abundant birds in this study were Montane White-eye (*Zosterops polioogaster*), Montane Greenbul (*Andropadus nigriceps*), White-starred Robin (*Pogonocichla stellata*) and Eastern Double-collared sunbird (*Nectarinia mediocris*). These are common species with large home range. However, their distribution is affected largely by habitat extent and quality. Like the seedeaters, these species thrive in fragmentation. However, this can only be sustained up to some point since the size of the patch is also significant in terms of other required resources for instance territories and food availability (Lens, 2002a). The captured birds were aged and classified as Adult, Fully Grown, Immature, and Juvenile. Few individuals could not be aged with precision because it was not clear what their age range was. Adult refers to breeding age birds, Fully Grown is almost adult but has not begun breeding, Immature is almost fully grown but still has characteristics from juvenile stage e.g. the gale, Juveniles are birds that have not developed fully and are straight from the brood. Most of them look totally different from the adults in plumage. About 80% of the birds captured were adults.

Given that Eastern Mau Forest is a tropical forest, biodiversity is expected to be high. This however has been interfered with over time by human activities and has altered the habitat conditions and hence the general biodiversity inhabiting this area has also been altered. This is clearly shown by the presence of coloniser bird species that are forest generalists and can exist in forest edges or non forest habitats comfortably.

The recent excision and settlements in Eastern Mau forest block as noted by BirdLife International (2007) and Omweri, (2009) have removed the forest characteristic of the surrounding area. Considering the high mobility capability of birds, most species can now exploit the forest or was forest since they can visit the forest with ease. Food and other resources availability in different habitats at different times has a significant influence in density and diversity of birds as observed in Kibale by Kane, (2007).

Progressive forest fragmentation and abrupt interruptions with plantation monocultures have significant ecological implications for species dependent on high-quality habitats situated in the interior regions of forest patches. The plantation forests adjacent to the natural forest blocks at Logoman and Sigaon recorded zero birds on the mist nets. This sharp contrast clearly shows how quality of the forest habitat affects distribution of birds. The pine plantation at Logoman does not have an under growth and barely had any birds apart from a few warblers flying by. The young Cyprus plantation nearby had more bird life from observation. Most of the birds captured in the natural forest were also observed here. This could be attributed to diverse nature of a regenerating forest. There are weeds and grasses and various plants species growing and it is generally open, hence providing more food including fruits, seeds, leaves as well as insects for hunting species. Mist netting was not done in the regenerating forest since it is low and not concealed.

A modified Qualitative Habitat Suitability Index (QHSI) based on availability of potential bird micro-habitats along the riparian corridors of first order streams in River Njoro Watershed as reported by Ngugi et al., (2006) show that sites with more micro habitat recorded more number of birds and a high diversity. However, the number of forest bird species decreased with the increased varied microhabitat. This is in tandem with ecological theory that states that niche-breadth differences among species are the result of an evolutionary trade-off between the ability of species to exploit a range of resources and their capability to use each one (the _jack-of-all- trades is master of none_ hypothesis; McArthur 1972).

Forest fragmentation in Eastern Mau Forest will affect not only birds but other biodiversity. Fragmentation is an indicator of biodiversity loss (Wilcox & Murphy, 1985; Lauga & Joachim, 1992) through reduction of habitat area and breaking it into isolated pieces (Opdam , 1993). This may reduce biodiversity by making it more difficult for some species to breed or find food (Wade, 2003). In fragmented patches there may be enough places for one or few individuals but not for a population (Burel & Baudry, 2003).

Maintaining large forest blocks is important in Eastern Mau forest in order to preserve forest bird species, which include the endemic species (Bennun and Njoroge 1999). As more forest patches are transformed to younger successional stages mainly of exotic species bird species adapted to the ecological patterns and processes that prevailed previously are at a serious disadvantage and are predisposed to local extinctions. The long-term conservation of bird species depends on the recovery and sustainability of natural conditions in the forest, which implies an improvement of integrity and connectivity of the remaining native forest fragments.

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