



Ecological status of birds in Sunyani using their foraging habits

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Abstract

Birds are important ecologically because they pollinate plants, disperse seeds, scavenge carcasses and recycle nutrients back into the earth. However, land-use changes have driven the current and are pushing future biodiversity composition to change in the tropics. The conversion of native forests to pastures, croplands, botanical gardens and other human dominated habitats are the primary drivers of biodiversity loss. In Sunyani, the current land use in terms of buildings is gradually affecting bird composition and these factors prompted a study into the checklist of birds in Sunyani Metropolis and relate them to their foraging habits in order to establish their ecological importance and status. Using Point-count method, all birds observed at a fixed location were tallied at repeated observation periods. The field work was carried out in the morning between 6:00 am to 9:00 am, for five (5) stations at regular interval of thirty (30) minutes each and five (5) minutes rest to the next station for a total distance of 5 km each. Each count day was for two other week in the months of February/March, May/June and September/October, 2017. The research was conducted in Sunyani the capital of Brong Ahafo Region of Ghana, on the University of Energy and Natural Resources campus and the residency of the Regional Administration. In all, a total of fifty (50) individual bird species were identified, represented by twenty-eight (28) families. Five (5) foraging behaviour made up of twenty five (25) insectivorous birds, eleven (11) seed eaters and eight (8) frugivores were recorded. A test of significance between the months shows no significant differences among the monthly bird compositions, the calculated value was $p < 0.15$. This report is to present a data base for future bird observation in the area based on the current land use changes.

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Introduction

Birds are important because they keep ecosystems in balance: they pollinate plants, disperse seeds, scavenge carcasses and recycle nutrients back into the earth. But they also feed our spirits and our lives on the planet, in parts, depending on the ecological services provided by birds' thus making humanity depend on birds. People, worldwide, are rapidly degrading ecosystems, especially in the tropics, leading to a massive reduction in biodiversity (Laurance and Bierregaard, 1997; Vitousek *et al.*, 1997; and Dirzo and R, 2003).

The decline of bird habitats has been on a large scale for the last 300-400 years especially for mammalian fauna (Decher *et al.*, 2000). Several reasons have been proposed for this decline. Observations at the global level are the most common cause of population decline and species extinction, especially birds (Stewart *et al.*, 2005; Mace *et al.*, 2000). It has been estimated that 36% of global animal extinctions were due to habitat destruction Jenkins, 1992. Another estimate suggests that habitat destruction is responsible for daily extinction of over 100 species Ehrlich *et al.*, 1991. The other related cause of extinction is hunting pressure, due to increasing human populations in local communities around forests and their quest for food for survival. The anthropogenic threats to species is agreed by Stewart and Hutchings, 1996; Ghimire and Pimbert, 1997.

Land-use change is another key driver of current and future biodiversity change in the tropics, the conversion of native forests to pastures, croplands, botanical gardens and other human dominated habitats are the primary drivers of biodiversity loss (Sala *et al.*, 2000; Luck and Daily 2003). According to Şekercioğlu *et al.* (2004, 2006) even though only 1.3% of bird species have gone extinct since 1500 AD, the global rate of extinction is estimated to have experienced a 20–25% reduction during the same period. This has reduced the dependence of ecosystem services by the avian populations faster.

There are over 2,300 bird species in the African Region, a high proportion of which are endemic to the

continent they also present huge opportunities for nature tourism, and also one of the reliable indicators of terrestrial biological richness (Bibby, 2000). As West African forests are rapidly disappearing, the survivals of the birds in the remaining forests are becoming increasingly a matter of concern to bird watchers and ecologists.

Deforestation rate in the country is estimated at 22,000 square kilometers per annum (Hawthorne and Mussah, 1993). Ghana's forest and savanna lands still support an interesting array of plant and animal species, although much of the resource is severely depleted. Data on the status of individual plant species are not readily available, however, it is estimated that over 70% of the original 8.22 million hectares of closed forest in Ghana has been destroyed (IIED, 1992) and only about 10.9% to 11.8% (representing 15,800 to 17,200 square kilometers of forest cover) remains as intact forests. At this rate, without adequate intervention there will be no intact forest left in the country within the next 100 years.

The gradual deforestation is seen by the gradual turning of some forests in the middle belts in Ghana into savannah lands. This has reduced the productive systems as well as the livelihood and the very survival of the average Ghanaian threatened by the severe environmental degradation associated with deforestation (e.g. soil erosion, local climate changes, instability of hydrological regimes all leading to loss of biological diversity). Though most of these are accelerated by anthropogenic activities; their contribution to the decline of bird population in certain areas in the middle transition zone of Ghana cannot be over emphasized, where Sunyani environment is a case study.

Currently there are eight (8) threatened bird and fourteen (14) near-threatened bird species in Ghana i.e. species at risk and requiring monitoring (Collar and Stuart, 1985; Collar and Andrew, 1988). Bird species are important mobile links Lundberg and Moberg 2003, top consumers, and keystone species in some habitats Raffaelli, 2004; their value in the ecosystems cannot be over emphasized, and

because birds are so common in most habitats, we often overlook their ecological significance. However, their ecological roles are incredibly important and humans can benefit monetarily through the many actions of birds Dirzo and Raven 2003.

Birds are important to some animals for biological control, for example Rodentia, and are important to continue ecological cycle, especially in food chain. Birds are important pollinators; the honeyeater family performs the majority of pollination by all birds in our native bush. However, the degrading ecosystems, especially in the tropics, are accelerating the massive reduction in biodiversity (Laurance & Bierregaard 1997; Vitousek *et al.*, 1997; Dirzo and Raven 2003). Important ecosystem processes, particularly decomposition, pollination, and seed dispersal, is likely to decline as a result of bird population decline due to the contributing functions of birds in diverse natural and human-dominated ecosystems.

In Ghana, there are about 760 species of birds Brown and Borrow, 2010, and they contribute to the biodiversity in the country Bird Life International, 2005. Generally, there has not been any documented evidence of the status of birds in Sunyani, this project seek to contribute to this scientific information gap and identify bird species in the Sunyani Metropolis and classify them into their foraging habits in order to relate them to their ecological importance. This can also provide an ecological road map to biodiversity discussions in the face of current developmental activities such as housing, road construction and urban farming of fallow lands in the metropolis.

The objective of this project was to survey and do a checklist of birds in Sunyani Metropolis and relate them to their foraging habits in order to establish their ecological importance and status.

The specific objectives are:

1. To identify bird species in Sunyani metropolis.
2. To relate birds to their foraging habits and determine their ecological importance.

Materials and methods

The Sunyani Municipality is located in the heart of Brong Ahafo Region, Sunyani also currently served as

the Regional Capital. It lies between Latitudes 70° 55'N and 70° 35'N and Longitudes 20° W and 20° 30'W. It shares boundaries with the Wenchi Municipal to the north, Berekum Municipal and Dormaa East Districts to the west and Asutifi District to the south and Tano South District to the east.

Experimental procedure

The research was conducted in Sunyani the capital of Brong Ahafo Region of Ghana, on the University of Energy and Natural Resources campus and the residency of the Regional Administration, between February/March, May/June and September/October, 2017 using Point count method (Hamel *et al.*, 1996; Ralph *et al.*, 1993, 1995a, 1995b). The area was divided into four quadrats and assigned to a group of students with laid down bird identification protocol and a leader.

Using Point-count method, (Ralph, Droege and Sawyer 1995a and 1995b) to monitor bird populations, all birds observed at a fixed location were tallied at repeated observation periods and identified (Borrow and Demey 2001). The field work was carried out in the morning between 6:00 am to 9:00 am, for five (5) stations at regular interval of thirty (30) minutes each and five (5) minutes rest to a different station for a total distance of 5 km each, in a compass direction determined on each count day for each week in a month.

All counts were done on every Wednesday and Thursday on the first and third week of the counting months. In all 24 count days were spent covering one hundred and twenty kilometers (120km).

An Opticron Polarex 8×40 field binocular was used to assist in the observation and identification of the bird species. The Gamin GPS device was used to take the coordinate and location of the stations. Nomenclatures of birds were referenced in field book of birds; 'Birds of Ghana' by Borrow *et al.*, (2010) and vocal replay of birds were used where necessary in the laboratory.

Analysis of Results/Data

All records were documented in a tabular form in an excel data sheet and the data were analyzed using histogram and statistical methods to determine

diversity of families. We also entered the available data on the conservation, distribution, ecology, and life history of all bird species of the world from 248 sources into a database with >600,000 entries. This provided us with guidance into classifying the foraging behaviour of birds and identifying their families and determining their conservation status.

Results

A total of fifty (50) individual bird species were identified in the study representing twenty-eight (28) families in five (5) foraging behaviour. Insectivorous birds (25) were abundant followed by seed eater (11) and frugivores (8) fig. 1 and 2.

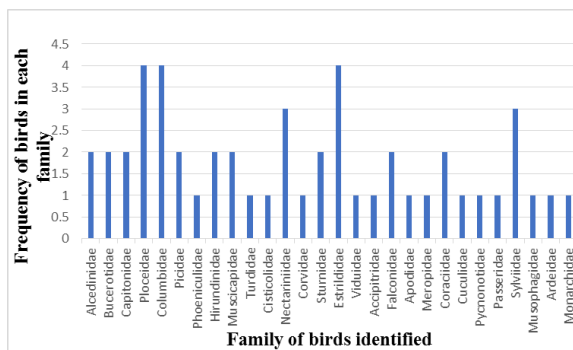


Fig. 1. Families of birds in the study area.

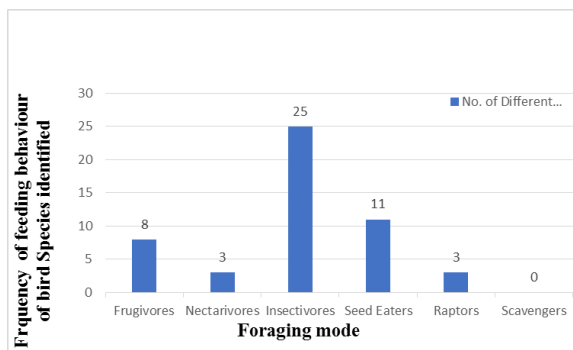


Fig. 2. Foraging Behavior of Different Bird Species in the study area.

Discussions

Birds occupy many levels of trophic webs, from mid-level consumers to top predators. As with other native organisms, birds help maintain sustainable population levels of their prey and predator species and, after death, provide food for scavengers and decomposers. A total of fifty (50) individual bird species were identified in the study representing twenty-eight (28) families in

five (5) foraging behaviour. Insectivorous birds (25) were abundant followed by seed eater (11) and frugivores (8); fig. 1 and 2.

Many birds are important in plant reproduction through their services as pollinators or seed dispersers. Birds also provide critical resources for their many host-specific parasites, including lice that eat only feathers, flies adapted for living on birds, and mites that hitchhike on birds from plant to plant. Birds can help in these services by nutrient cycling, which has been documented in many habitats, through their foraging behaviour. Spreading activities through different habitats, birds can move nutrients from one place to another, through their foraging activities which is particularly relevant in places where plant growth is limited by nutrient availability as exhibited by seed eaters and frugivory. The quality of these plants impacts the number of consumers and the structure of the food web, these birds exerted a bottom-up effect on the food web by regulating primary productivity.

Some birds are considered keystone species as their presence in (or disappearance from) an ecosystem affects other species indirectly. For example, (*Halcyon leuccephala*), woodland kingfisher and Grey Woodpecker, (*Dendropicos goetae*) (Appendix) create cavities on trees that are then used by many other species. Birds, by this way, are also capable of stimulating primary productivity, which supports the functioning of ecosystems. This is also interesting from an ecological standpoint because it exemplifies the intricate ways in which seemingly disparate habitats are connected and can impact one another. Copper-tailed Glossy Starling, (*Hylopsar cupreocauda*) a frugivore, of the family Sturnidae (Appendix) is the only species that is near threatened in the study area (Birdlife Data zone 2018).

Greenberg, 2000, explains that many of the support services provided by birds can also be classified as provisioning services, which encompasses products that we harvest from ecosystems and we can find many examples of activities in this category by examining how birds can positively impact the raising

of crops through their foraging behaviour. Seed eaters like, Black-winged Bishop, (*Euplectes hordeaceus*) Ploceidae, Black-billed Firefinch, (*Lagonosticta rara*), Bronze Mannikin, (*Spermestes cucullatus*) Estrildidae and Northern Grey-headed Sparrow (*Passer griseus*) Passeridae, (Appendix) are common in the study area because of the common traditional practice in the farming of corn around the study area around official government bungalows and other residential areas. By germinating the seeds of trees, birds can contribute to the reforestation of deforested lands, diminishing the costs of restoration, Wunderle Jr, 1997. The fields create habitats that are used for foraging by other birds, as they dive down to where the layer of left over harvested corn rests on the ground, they tear, shred, and churn up the pieces of straw looking for grain, (personal observations).

In agricultural systems, birds can also be beneficial through the regulation of pests Greenberg, 2000. In the study area, the presence of insectivorous birds points to less herbivorous damage to the leaves of crops during the cropping season. African Pied Wagtail (*Motacilla clara*) Columbidae, African Thrush (*Turdus pelios*) Turdidae, Broad-billed Roller (*Eurystomus glaucurus*) Coraciidae, (Appendix) are common birds in the study area feeding on caterpillars that can cause damage to crops, resulting in significantly higher crop yields.

Conclusion

This study has taken an ecological approach by focusing on ways that birds provide services to humans through their interactions with the environment by their foraging habits. However, it should also be noted that birds provide ecological benefits in many cases to the environment through their foraging behaviour.

Because birds are so common in most habitats, we often overlook their ecological significance. However, their ecological roles are incredibly important and humans can benefit monetarily through the many actions of birds. Quantifying the monetary benefit from birds around the study area is nearly impossible. However, the value we gain from birds warrants a

serious investigation into the causes of their decline and provides additional rationale for their continued study and conservation.

Birds are present throughout almost every habitat across the globe; there is always evidence of birds. Things like holes pecked in tree bark by woodpeckers or the remnants of a nest are indicative of the presence of birds around the study area. The marks left behind by birds may seem insignificant, in many cases their activities can have large consequences on the habitats they inhabit, making them important in the overall functioning of the ecology of the area.

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Appendix

Classification of birds and their ecological status in Sunyani

1. Frugivores	Scientific name	Family	Ecological status
African Pied Hornbill	<i>Tockus fasciatus</i>	Bucerotidae	Common
Bearded Barbet	<i>Lybius dubius</i>	Capitonidae	Common
Double-toothed Barbet	<i>Lybius bidentatus</i>	Capitonidae	Common
African Grey Hornbill	<i>Tockus nasutus</i>	Bucerotidae	Common
Copper-tailed Glossy Starling	<i>Hylopsar cupreocauda</i>	Sturnidae	Left
Common Garden Bulbul	<i>Pycnonotus barbatus</i>	Pycnonotidae	Abundant
Western Grey Plantain-eater	<i>Crinifer piscator</i>	Musophagidae	Migrant
Splendid Glossy Starling	<i>Lamprotornis splendidus</i>	Sturnidae	Common

2. Nectarivores	Scientific name	Family	Ecological status
Splendid Sunbird	<i>Cinnyris coccinigastrus</i>	Nectariniidae	Uncommon
Scarlet-chested Sunbird	<i>Chalcomitra senegalensis</i>	Nectariniidae	Common
Copper Sunbird	<i>Cinnyris cupreus</i>	Nectariniidae	Common

3. Insectivores	Scientific name	Family	Ecological status
Woodland Kingfisher	<i>Halcyon leuccephala</i>	Alcedinidae	Common
Grey Woodpecker	<i>Dendropicops goetae</i>	Picidae	Common
Fine-spotted	<i>Campethera punctuligera</i>	Picidae	Common
Green Wood-hoopoe	<i>Phoeniculus purpureus</i>	Phoeniculidae	Uncommon
Mosque Swallow	<i>Cecropis senegalensis</i>	Hirundinidae	Abundant
Wire-tailed Swallow	<i>Hirundo smithii</i>	Hirundinidae	Abundant
African Pied Wagtail	<i>Motacilla clara</i>	Columbidae	Common
White-crowned Robin Chat	<i>Cossypha albicapilla</i>	Muscicapidae	Migrant
African Thrush	<i>Turdus pelios</i>	Turdidae	Common
Whistling Cisticola	<i>Cisticola lateralis</i>	Cisticolidae	Uncommon
Little Weaver	<i>Ploceus luteolus</i>	Ploceidae	Abundant
Black-necked Weaver	<i>Ploceus nigricollis</i>	Ploceidae	Common

Village Weaver	<i>Ploceus cucullatus</i>	Ploceidae	Abundant
Little Swift	<i>Apus affinis</i>	Apodidae	Uncommon
White-throated Bee-eater	<i>Merops albicollis</i>	Meropidae	Left
Blue-billed Roller	<i>Coracias cyanogaster</i>	Coraciidae	Common
Broad-billed Roller	<i>Eurystomus glaucurus</i>	Coraciidae	Common
Northern Flycatcher	<i>Melaenornis annamarulae</i>	Muscicapidae	Uncommon
African Dwarf Kingfisher	<i>Ceyx lecontei</i>	Alcedinidae	Uncommon
Red-billed Paradise Flycatcher	<i>Terpsiphone rufiventer</i>	Monarchidae	Common
Tawny-flanked Prinia	<i>Prinia subflava</i>	Sylviidae	Common
Red-winged Warbler	<i>Heliolais erythropterus</i>	Sylviidae	Common
Rufous-crowned Eremomela	<i>Eremomela badiceps</i>	Sylviidae	Uncommon
Cattle Egret	<i>Bubulcus ibis</i>	Ardeidae	Migrant
Pied Crow	<i>Corvus albus</i>	Corvidae	Abundant

4. Seed eaters	Scientific name	Family	Ecological status
Black-winged Bishop	<i>Euplectes hordeaceus</i>	Ploceidae	Uncommon
African Morning Dove	<i>Streptopelia decipiens</i>	Columbidae	Common
Vinaceous Dove	<i>Streptopelia vinacea</i>	Columbidae	Migrant
Laughing Dove	<i>Streptopelia senegalensis</i>	Columbidae	Abundant
Black-billed Firefinch	<i>Lagonosticta rara</i>	Estrildidae	Abundant
Bar-breasted Firefinch	<i>Lagonosticta rufopicta</i>	Estrildidae	Abundant
Bronze Mannikin	<i>Spermestes cucullatus</i>	Estrildidae	Abundant
Wilson's Indigobird	<i>Vidua wilsoni</i>	Viduidae	Uncommon
Black and White Mannikin	<i>Spermestes bicolor</i>	Estrildidae	Common
Senegal Coucal	<i>Centropus senegalensis</i>	Cuculidae	Common
Northern Grey-headed Sparrow	<i>Passer griseus</i>	Passeridae	Abundant

5. Raptors	Scientific name	Family	Ecological status
Shikra	<i>Accipiter badius</i>	Accipitridae	Common
Yellow-billed Kite	<i>Milvus migrans parasitus</i>	Falconidae	Common
Common Kestrel	<i>Falco tinnunculus</i>	Falconidae	Common