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SUMMER BIRD ABUNDANCE PATTERNS IN THE FORESTS UNDER BODOLAND TERRITORIAL COUNCIL, NORTHEAST INDIA

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ABSTRACT

The forests under Bodoland Territorial Council (BTC) are a northern extension of the plains of Assam, which is classified as an 'Important Bird Area'. Unlike other plains of North-eastern India, most of the ornithological surveys in this landscape have produced only limited bird inventories. During present studies two hundred sixty open width transects were used to survey eight major habitat types in the central and western part of BTC forests. The 270 species of birds were recorded from the study area which include 24 species from outside transects. The maximum bird species were recorded from Dry Deciduous Miscellaneous Forest followed by Moist Deciduous Miscellaneous Forest, Sal Forests and Scrub Forests. Some species were also recorded from reverine habitat and Evergreen Forests. The bird species richness was least in encroached forestland under agriculture fallow and monoculture plantations. The results show that the forests of BTC are important parts of the Northeast Biodiversity Hotspot and deserve inclusion in protected area network.

Key words: Biodiversity Hotspot, Bodoland Territorial Council, Avifauna, Density, Diversity and richness

Introduction

There are 25 biodiversity hotspots world wide (Myers *et al.*, 2000) which have at least 1500 species of vascular plants as endemic. Asia has 13 Hotspots of which two are clustered in the Western Ghats and Northeast India. There are 465 Important Bird Areas (IBAs) in India including 198 as legally unprotected (Islam and Rahmani, 2004). These areas are characterized by higher globally threatened avifauna, restricted range bird species and biome restricted range assemblages of significant congregations. The Northeast India forests in general and BTC forests in particular are important because they retain large chunks of rainforests but such pristine forests are under severe threat in the form of illegal felling (Hilaluddin *et al.*, 2010), jhumming (Ramkrishna *et al.*, 2005; FSI, 2011) and wild animal hunting (Hilaluddin *et al.*, 2005; 2006). The forests of Bodoland are north-western extension of Assam plains and are under severe anthropogenic disturbances mainly in the form of illegal felling and hunting (Hilaluddin and Sarma, 2008; Sarma *et al.*, 2008). The forest types available in BTC area ranges from semi deciduous forest in the west with sal as dominant tree species to broad leave wet evergreen forest in the east and riverain fringing forests. Within the region, the designated protected area is Manas National Park. There are large tract of dense forests with perennial streams/ rivers flowing through and scattered patches of grasslands outside Manas.

Anecdotal surveys conducted by amateur wildlife lovers have recorded over 200 species of birds from Bodoland Territorial Council Area (BTC) area. Most of the research till date is confined to Manas National Park in the BTC area. Although a checklist of birds has been documented by Hilaluddin and Sarma (2008) from forests outside-protected area network but avifauna of BTC forests is highly rich in terms of communities and their populations that are yet to be generated. Thus, there is a pressing need for quantitative baseline data so that populations of bird communities could be monitored for identification of conservation threats for proper management. Therefore, the proposed study was designed to document patterns of bird abundance in the forest outside the protected areas in BTC area. The aim was to quantify baseline data on abundance, species richness and diversity of the avifauna in Chirnag, Manas and Ripu Reserve Forests under Haltugaon, Kachugaon, Gossaigaon and Aie Valley Forest Divisions.

Study area

Bodoland Territorial Council is an autonomous council constituted under the Sixth Schedule of the Constitution of India during 2003. The BTC has legislative, administrative and financial powers over 40 subjects including forests and wildlife. There are four districts namely Kokrajhar, Chirang, Baksa and Udalguri under BTC. Recently Bongai Gaon has been separated from Chirang to form a new district called Bongai Gaon. The

Two hundred seventy (270) species of birds were recorded from the forests of Bodoland Territorial council, Northeast India.

council is spread on the north bank of Brahmaputra along the foothills of Bhutan and Arunachal Pradesh.

Champion and Seth (1968) have classified forests under BTC control into 13 broad categories. Predominately, Deciduous Sal, Miscellaneous Forests and Evergreen Forests are the characteristic vegetation in the BTC. Most of the tract is dominated with *Shorea robusta, Terminalia* sp. and *Pterospermum* sp. with scattered low bushes of *Dodonaea viscosa*, *Adhatoda vasica, Jasminum pubesens, Mimosa hamata*, *Eupatorum odoratum* and *Lantana camara*. The recorded forest area under BTC is 2591 km^2 including 670 km^2 declared as protected area. Around 35% land use of BTC is under forest cover and another 24% under grasslands. The forests of BTC area are home to several globally threatened species including asiatic elephant (*Elephas maximus*), Indian bison (*Bos gaurus*), assamese macaque (*Macaca assamensis*), golden langur (*Trachypithecus geei*), Indian tiger (*Panthera tigris*) and Indian leopard (*Panthera pardus*). Amongst the avifauna, significant species are critically endangered white-backed vulture (*Gyps bengalensis*), vulnerable Greater adjutant (*Leptoptilos dubius*) and genetically threatened red jungle fowl (*Gallus gallus*) and several species of woodpeckers and hornbills – the indicators of forest age.

Methods

Identification of Sites

The major habitat types identified as Evergreen Forest, Dry Deciduous Miscellaneous Forest, Moist Deciduous Miscellaneous Forest, Sal Forest, Scrub Forest, Riverine, Plantation and encroached Agriculture Fallow within the forest boundaries using geo-referenced land use/ land cover maps developed from LISS III satellite images by Sarma *et al.* (2008) were divided into 3 km long and 3 km wide grids. Representative grids within each habitat type were selected randomly for identifying and quantifying avian communities within each major habitat type. In all, 36 grids covering major habitats within the BTC forests were marked for intensive study.

Bird Observations

Open width point transects were used to collect data on avian communities. Open width point counts have been recommended for collection of data on bird communities in areas with homogenous fine grained habitats, where large amount of data has to be collected over a short period of time and where sufficient sample sizes are required for statistical analysis (Bibby *et al.,* 1992). Furthermore, data collected using open-width transects are generally better than those obtained using fixed-width transects. (However, in some places probability of recording a bird, specifically small-bodied birds, declines with distance from the observer in some curves whose shape is unknown). Sampling points for counts were selected at 200 m. regular distance along existing roads and prominent trails. A total of 264 Point Counts (33 in each habitat) were made during the bird survey. At each point, the bird spotted with its distance from the observer was identified (Ali and Ripley, 1995; Grimmett *et al.* (1998) and its numbers were recorded. Calling birds were also recorded. Birds observed to be flying over the area of point transects or soaring overheads were not considered. However, flying birds were recorded if they were flushed out from by the observer or observed to be flying into or out of the transect area during the ten-minute duration of the count. Counts were started 15 minutes after the sunrise and continued for three and half hours after that, in between 4.45 and 8.15 hours everyday during April and May 2007.

Data Analysis

Bird density at a given transect was calculated as a cumulative number of individual birds of each species that were seen at a given site. Bird species richness was calculated as the cumulative number of bird species seen in a point (Ludwig and Reynolds, 1988), whereas general bird diversities and bird equities were calculated in accordance to Shannon-Wiener (1963) and Hill's modified ratio (Hill, 1973), respectively. Diversity indice take into account both number of species present in a given site, as well as their relative proportions in a community. More diverse communities exhibit greater evenness of abundance across species and harbour greater number of species.

Species composition of a community indicates the identity of a species and their relative abundance in the community. In such cases, the identity of individuals becomes important rather than simply number of species. Thus, in order to study the variations in bird species composition across various habitats in BTC area, a series of non-parametric Kruskal-Wallis tests were used to examine quantitative differences of bird densities, diversities, equities and richness among various habitats. The bird species were also classified as per their feeding guild and status following Ali and Ripley (1987), using the guild classification suggested by Karr (1971).

Results

A total of 270 birds have been reliably recorded during the course of present study Hilaluddin and Sarma, 2008 from the forestland under BTC area. Of these, 246 were recorded during point transect counts and 24 were seen only outside the point transects. A total of 136 bird species were recorded from Dry Deciduous

Miscellaneous Forest, 104 from Moist Deciduous Miscellaneous Forest, 67 from Evergreen Forest, 83 from Riverine Habitat, 92 from Sal Forest, 91 from Scrub Forest, 36 from plantation and 27 from encroached agriculture fallow habitat. The contribution of resident birds was maximum (98.7%) in the community and it varied insignificantly across various habitats.

Bird Density

Comprehensive list of birds with their individual densities in various habitats in BTC has been prepared by Hilaluddin and Sarma (2008). Statistically significant variations ($_7$ = 16.86, p = 0.02, Kruskal-Wallis) in bird densities were observed amongst major habitats. Bird densities were significantly higher in Dry Deciduous Miscellaneous Forest (467.45 mean 108.96 SE) as compared to encroached agriculture fallow lands in BTC forests (386.17 mean 93.83 SE), Evergreen Forest (302.13 mean 44.0 SE), Sal Forest (276.01 mean 37.79 SE), scrub land (262.55 mean 32.16 SE) and Riverine habitat (237.58 mean 44.04 SE). Surprisingly, lower bird densities were recorded from Moist Deciduous Miscellaneous Forest (211.9 mean 34.38 SE) than monoculture plantations (233.54 mean 47.98 SE).

Bird diversity

Mean species richness, equities and diversities in major habitat types are given in Table 1. The important families in terms of species richness were Charadridae, Columbidae, Capitonidae, Picidae, Muscicapidae and Ploceidae. Species richness ($_7$ = 10.91, p = 0.14, Kruskal-Wallis), equities ($_7$ = 7.19, p = 0.41, Kruskal-Wallis) and diversities ($_7$ = 10.37, p = 0.17, Kruskal-Wallis) did not show statistically significant variations across habitats. Data depicted in Table 1 buttressed by field observations revealed that species richness and diversity were higher in encroached agriculture fallows as compared with other habitats. However, more equitable distribution of species was observed in scrub, evergreen and riverine :habitats as compared with dry deciduous and moist deciduous miscellaneous forests, sal forests and plantations.

Feeding guilds

The classification of 270 bird species according to their feeding guilds and their overall and habitat wise proportion in the community is given in Table 2. The highest number of birds belonged to the Omnivorous guild and the lowest number to the Graniivorous guild in the bird community in the BTC forests. At habitat level, the contribution of omnivorous birds varied slightly and was highest in Sal habitat and lowest being in Riverine habitat. Not surprisingly, the surveyor did not record nectivorous birds from encroached agriculture fallows and monoculture plantations.

Discussion

In the present study abundance of birds in landscape of northeast India has been recorded systematically perhaps for the first time. The results of the current study, however, merely represent a snapshot view of bird abundances in relation to habitats in BTC

Table 1 : Bird species diversities in various habitats under BTC forest area

Habitat	Species richness		Species diversity		Species equity	
	Mean	SE	Mean	SE	Mean	SE
Dry Deciduous Miscellaneous	8.96	0.37	0.93	0.02	0.04	0.003
Encroached Agriculture Fallow	10.40	1.60	0.99	0.07	0.05	0.020
Evergreen Forest	7.31	0.51	0.84	0.03	0.06	0.008
Moist Deciduous Miscellaneous	8.76	0.45	0.91	0.02	0.05	0.007
Plantation	9.33	1.47	0.94	0.05	0.04	0.006
Riverine	8.53	0.67	0.89	0.04	0.07	0.020
Sal Forest	8.52	0.41	0.90	0.02	0.05	0.005
Scrub	8.51	0.54	0.89	0.03	0.07	0.010
Overall	8.52	0.19	0.90	0.01	0.06	0.003

Table 2 : Bird guilds (%) in various habitats under BTC forest area

Habitat	Carnivore	Granivore	Insectivore	Frugivore	Omnivore	Nectivore
Dry Deciduous Miscellaneous	6.67	1.48	31.85	5.92	51.85	2.22
Encroached Agriculture Fallow	7.69	11.54	43.61	0.00	46.15	0.00
Evergreen Forest	4.47	0.00	26.86	4.47	59.70	4.47
Moist Deciduous Miscellaneous	3.96	0.00	32.67	7.92	50.49	4.95
Plantation	10.87	8.69	23.91	4.35	52.17	0.00
Riverine	28.91	4.81	22.89	3.61	38.55	1.20
Sal Forest	4.44	1.11	24.44	5.55	60.0	4.44
Scrub	6.52	4.35	36.95	7.61	42.39	2.17
Overall	9.26	1.48	29.25	4.44	51.48	4.07

forests because data on birds during winter could not be collected as a result of the scope and duration of the study. Several species of birds are migratory and does appear only during winter. Therefore, it is likely that bird richness in all habitats is likely to increase with passage and winter migrants, if further observations are made during winter. The trends found in this study should be viewed in the context of importance of the region for inclusion in protected area network. The results of present study may help raising some of the important areas of BTC for bird conservation. The present survey have identified one such area called "Ultapani" to be notify as 'Conservation Reserve' under Wildlife Protection Act 1972 as amended in 2006. The avifauna in encroached agriculture fallow lands and plantations is very low in abundance and richness. A move towards more ecological forestry practices and better provisions and protection of habitats is needed to reverse the present trends and enable populations of birds in general and other important biodiversity groups in particular to overcome the effects of habitat degradation and destruction.

A pristine habitat rich fauna comprising of 12 species of woodpeckers, 11 species of pigeons 5 species of hornbills and 3 species of pheasants was recorded from the point transects. Other important recorded avifauna included globally critically endangered white-backed vulture (*Gyps bengalensis*) and vulnerable greater adjutant (*Leptoptilos dubius*) (see IUCN, 2004). This gives an indication of precarious status of animals found in the region and the conservation significance of the landscape. This is also significant in view of large-scale indiscriminate felling of climax forest in the BTC as was observed during survey.

The present survey also observed large number of roosting and nesting of great pied hornbill (*Buceros bicornis*), Indian pied hornbill (*Anthracoceros malabaricus*), wreathed hornbill (*Rhyticeros undulatus*) and common grey hornbill (*Tockus birostris*) in and around Ultapani locality. Several raptor species (e.g. Pariah Kite, *Milvus migrans govinda* and Sparrow Hawk *Acipiter nisus* also have been reported breeding in the BTC forests. This indicates that forests of BTC are important breeding refuge for these birds in the region and may also be playing similar role for many other bird species at the landscape level in the region. The presence of open scrub woodlands and patches of tall forests are ideal for nesting for Black-winged Kite (*Elanus caeruleus*), Bonali's eagle (*Hieraaetus fasciatus*), booted hawk eagle (*Hieraaetus pennatus*), han harrier (*Circus cyaneus*), honey buzzard (*Pernis ptilorhyncus*).

Granivorous species were significantly richer in riverine beds. Similarly, nectivorous numbers were higher moist deciduous miscellaneous and evergreen habitats, with none of eight 11 nectivorous was recorded in encroached agriculture fallows scattered inside dense forests and monoculture plantations where grass seed were undoubtedly highly limited. A greater proportion of birds of major all were omnivorous followed by insectivorous. A greater proportion of carnivorous was recorded from riverine habitat.

The forests of BTC have been relatively poorly explored as far as bird communities are concerned. There is only one record of birds list published by Hilaluddin and Sarma (2008) from BTC. Author believe a majority of Aie Valley Forest Division still require sampling of bird communities where extensive and diverse forests and grasslands are habitat for bird species of international interest. Further bird survey is recommended taking it into account. The new study would be valuable to expand on some of the preliminary results compiled here and would also have practical value. Research into the environmental correlates of bird species composition and altitude, as well as season, various land and natural resource issues (e.g. hunting), and comparative analyses of evergreen and grassland bird faunas throughout BTC would also be interesting avenues of inquiry. Thus, the BTC provides a range of interesting research possibilities.

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उत्तर-पूर्वी भारत की बोडोलैन्ड प्रादेशिक परिषद के अन्तर्गत आने वाले वनों में गर्मियों में पक्षियों की प्रचुरता का प्रतिमान

हिलालुद्दीन

सारांश

बोडोलैन्ड प्रदेशीय परिषद के अन्तर्गत आने वाले वन आसाम के उत्तर भाग में फैले हुये हैं। जिन्हें 'मुख्य पक्षी प्रजाति' के रूप में वर्गीकृत किया गया है। उत्तर पूर्वी भारत के अन्य मैदानी भागों के विपरीत इस भू-दृश्य में अधिकांश पक्षी सर्वेक्षणों से पक्षी सम्पदा के बारे में सीमित जानकारी प्राप्त हुई

है। वर्तमान अध्ययन के दौरान इन वनों के केन्द्रीय और पश्चिमी भागों में आठ मुख्य वासस्थलों के सर्वेक्षण के लिए 260 खुले परिच्छेदो का प्रयोग किया गया। अध्ययन क्षेत्र से 270 पक्षि प्रजातियों को रिकार्ड किया गया। जिनमें 24 प्रजातियां बाहय परिच्छेदों से थी। अधिकतम पक्षी प्रजातियां शुष्क पर्णपाती विविध वनों से रिकार्ड की गई। जिसके बाद नम पर्णपाती विविध वनों, साल वनों और झाड़ीनुमा वनों का स्थान रहा। कुछ प्रजातियां नदियों के तटवर्ती वनों तथा सदाहरित वनों से रिकार्ड की गई। कृषि के लिए अतिक्रमित वन भूमियों तथा खाली छोड़े गये खेतों और एक धान्य रोपणियां में पक्षि बाहुल्य बहुत कम था। परिणामों से पता चलता है कि बोडोलैन्ड प्रदेशीय परिषद के वन, उत्तर पूर्वी जैव विविधता की सक्रियता के महत्वपूर्ण अंग हैं और इन्हें रक्षित क्षेत्र नेटवर्क में शामिल करना समय की मांग है।

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