**TD-000012**

**Acharya, B. K. (2008). Bird communities and their distribution pattern along the elevation gradient of Teesta valley, Sikkim. Sálim Ali Centre for Ornithology and Natural History. Coimbatore, Bharathiar University, Coimbatore.**

3.5 SUMMARY

Woody plant diversity and vegetation structure was studied at different elevation zones along the Teesta valley in Sikkim following quadrat sampling method along predetermined transects. A total of 216 species of woody plants belonging to 64 families were recorded during the study. In total, 3,858 individuals belonging to 170 species were trees and 15,229 individuals representing 135 species were shrubs including saplings of trees. Shannon-Weaver diversity and evenness of trees were 3.9 and 0.77 respectively. These values for shrubs were 3.1 and 0.62. Tree and shrub species richness was the highest in zone II. Species richness and elevation followed hump-shaped relationship with a peak at around 1500 m. Tree diversity was maximum in zone II, evenness and basal area in zone III and density in zone IV. Similarly, shrub diversity was the highest in zone I, shrub density in zone III, whereas evenness was maximum in zone V. Girth class distribution of trees showed L-shaped or left skewed pattern, showing decrease in species richness and density with increasing GBH classes. The number and species of small sized tree (21-60 cm GBH) were more abundant than the large trees indicating healthy regeneration of forests.

4.5 SUMMARY

Studies on ecology of local communities are important for understanding environmental problems and planning area-based conservation management (Simberloff, 2004). Community composition, species richness and diversity of birds in five different elevation zones of Teesta valley, Sikkim were studied from June 2003 to March 2006 using point count sampling method. A total of 329 species of birds (299 during regular quantitative sampling and 30 during opportunistic observations) belonging to 44 families was recorded in the Teesta valley during the study period. The study shows that Teesta valley harbors high diversity and abundance of birds.

Broadleaved vegetation, studied at mid-elevation region, is the most diverse zone as compared to tropical, coniferous or alpine vegetation. Species accumulation curves based on number of point counts indicated that most of the species were detected in all the zones. Species richness (observed and estimated) was the maximum in zone II, whereas density, abundance and diversity were the maximum in zone III. The species-abundance pattern of birds followed truncated log-normal distribution for total bird population as well as for all the zones except zone II which did not fit to any models. Bird data showed the presence of both types of species, exclusive (restricted to one elevation zone) and generalists (present in two or more zones), in the Teesta valley. Out of the total species observed (329), 156 (47.4%) were exclusively recorded in one specific elevation zone. Only three species, namely Blue Whistling Thrush, Greenish Warbler and White-capped Water Redstart occurred in all the five zones.

Each elevation zones harbor unique species composition of birds. Zones II and III shared maximum number of species followed by zones I and II. Similarity indices were generally low, with scores of 0.04 – 0.4 for elevation zone pairs. Overall, species richness as well as density was high during summer and low during winter. Marked seasonal variation in bird species richness and density was observed in different elevation zones. Insectivores dominated the bird community in the Teesta valley comprising 61% species and 55% individuals. Nectarivore and carnivore trophic groups represented lowest species and abundance respectively.

In total, 630 individuals belonging to six TNE (threatened, near threatened and endemic) species were observed from the Teesta valley during the study period. Number of species was the highest (5) in zone III, whereas abundance was highest (357) in zone II. Out of 10 endemic species of Sikkim, only five were recorded during this study. Similarly, among the 17 threatened and two near threatened birds that occur in Sikkim only two species were observed in the Teesta valley. Study in detail on ecology of threatened and endemic species is needed for conservation action.

Breeding observations of birds of the Teesta valley, Sikkim was made during 2004 and 2005. This is the first attempt to study breeding birds in Sikkim after Ali (1962). Altogether, 183 nests of 39 species were recorded in four elevation zones of the study area. Many species had very few nests. Breeding observation of seven species, namely Ashy Wood Pigeon, Black-winged Cuckooshrike, Blood Pheasant, Eurasian Jay, Greenish Warbler, Rufescent Prinia and Tickel’s Thrush were not reported earlier from Sikkim. Breeding bird community differed among zones. Most of the species breeding in zone I were exclusive tot his zone which shows that they have specific habitat for breeding. In total, Grey-backed Shrike had the highest number of nests. As observed in other studies, cup-nesters dominated with 67% species and 69% nests. June was thepeak breeding period with the highest number of breeding species and nests. Breeding period was short (March to August), peak being June. Similar trend was observed in all the zones. The nest and nest-site characteristics of a few select species suggest that nest concealment, immediate microhabitat and environmental variables are potential factors for nest-site selection which differed among the species studied. The result of this study indicates that Teesta valley harbors potential breeding habitats for many bird species and needs conservation attention. Detailed study focusing on habitat requirements of each species, especially the rare and endemic birds, is needed for the implementation of conservation measures.

5.5 SUMMARY

Understanding the distribution of species along the elevation gradient is necessary to understand the factors responsible for patterns and for biodiversity conservation. The patterns of species richness, diversity, abundance and range size distribution of birds were examined along the elevation gradient of the Teesta valley, Sikkim. Species richness as well as abundance, diversity and density of birds showed hump-shaped relationship with elevation showing peak at around 2000 m. This finding is in accordance with many other studies conducted elsewhere. Birds belonging to different diet categories responded in different ways along the elevation gradient. Highest trophic diversity was observed at mid-elevation between 1950 m and 2300 m. It is observed that temperate broad-leaved forest located between 1800 m and 2800 m elevation harbors high avifaunal diversity. Different casual factors such as climate, productivity, area, evolutionary history and geographic hard boundary for distribution pattern of birds in the Teesta valley. The vegetation structure and other habitat features caused major variation in the distribution pattern of birds in the Teesta valley. The role of climatic factors such as rainfall might be important to determine the spatial and temporal distribution of bird species. Birds of the Teesta valley segregated according to the major vegetation types of the study area and distinct community assemblage was formed at each vegetation zones. Although, richness and diversity was relatively low at higher elevation, community composition of birds was different. Most of the bird species had very narrow elevation range. Out of the 297 species, 90 species were restricted exclusively to single elevational transect. Similarity was more along transects located within similar vegetation types, whereas high turnover occurred at habitat transition zones. High diversity and unique community composition of birds at each elevational transect and narrow elevational width of most species suggests that entire gradient has crucial role for the maintenance of bird community composition and diversity, and requires conservation attention.

6.5 SUMMARY

Information on vegetation structure and diversity, and their relationship with birds provides insights on habitat use, which ultimately aids in the conservation of species. Bird community parameters (species richness, abundance and diversity) showed close association with various habitat characteristics. The result suggests that the bird community in the Teesta valley is determined by both floristic diversity and vegetation structure. The findings concur with a number of earlier studies on avian communities.

The number of bird species, abundance and diversity among height categories were different. Overall, maximum species richness (231) was observed in 0 – 5 m height followed by 5 – 10 m, 10 – 15 m and the ground layer. Similar trend was observed in all the elevation zones. Each height category harboured distinct species composition and assemblages of birds. Species similarity among height categories was low which suggests that each strata of vegetation is important for maintaining the diversity and stability of the population of birds.

Maximum foliage was concentrated within 10m height from the ground in all zones. Correlation analysis revealed significant positive relations between foliage abundance and species richness, abundance and diversity of birds. It is obvious that structure and composition of vegetation has a major role in determining bird community structure in all the zones.

Results of this study have brought out the significance of understory or sub-canopy vegetation with least disturbance in maintaining and conserving avifaunal diversity. A detailed study on the resources and other environmental parameters in different zones and vegetation strata could provide better understanding on the distribution of birds.

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