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BIRD COMMUNITY STRUCTURE ALONG AN ALTITUDINAL GRADIENT IN POLLACHI DIVISION, ANAIMALAI TIGER RESERVE (ATR), TAMILNADU, SOUTH INDIA.

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1. Introduction

The stress limiting the survival of a bird species but it can vary from the outright over harvesting, competition with other species and habitat loss. Among that habitat loss is the one of the major reason identified for loss of 1025 species of birds currently threatened in the world (Collar and Andrew 1988; Robinet *et al.* 2003). This alone affects a species in many ways from eliminating appropriate breeding and feeding ground to restricting range, which can affect dispersal pattern (Bridgman 2002). Habitat destruction and habitat fragmentation has been described as "the single greatest threat to biological diversity" (Stockwell et al. 2003; Reed 2004; Ezhilarasi and Vijayan 2009). Thus habitat loss and fragmentation have long-term effect causing extinction of population, generations after the destruction occurred and even after the deforestation practices were stopped, in many species extinctions continued with small population size living in the forest (Kattan et al. 1994).

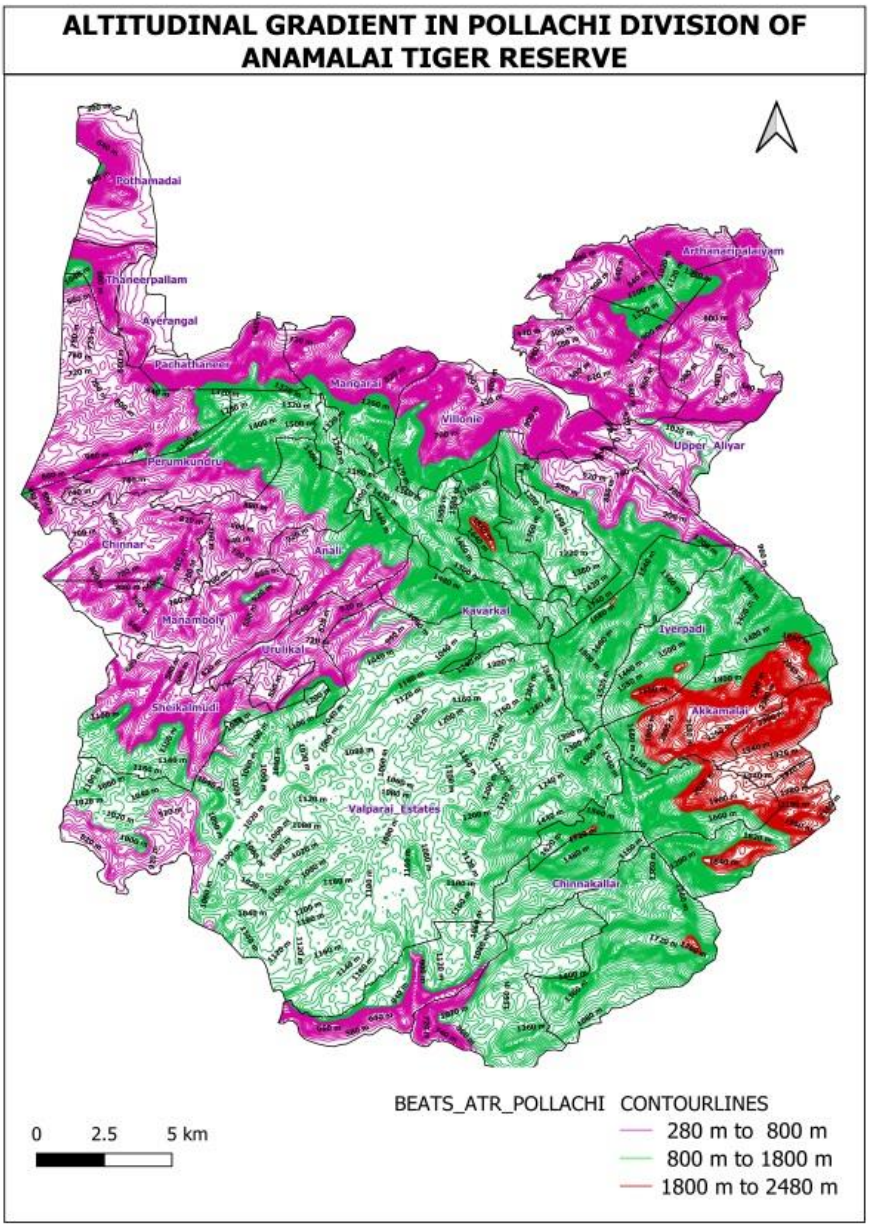
The distribution of bird species and other organisms in mountainous regions usually vary according to different altitudinal ranges. Changes in the composition of bird species in an altitudinal gradient have been explained by various factors such as physical and biological conditions varying along altitudinal gradients (Noon 1981, Loiselle & Blake 1991, Navarro 1992, Lomolino 2001).

Endemic special attention as they are worst affected by habitat destruction. Their restriction to one or more small discrete sites makes them inherently vulnerable to catastrophic and stochastic events that can eliminate population (Atkinson 1989; whittaker 1998;Castellatta et al. 2000, Riley et al. 2002). Any species that is highly

restricted range is at great risk of extinction from spatially localised foreces" (Simberlorr 1994). The small and limited population resulting from restrictions in habitat often exhibit low level of genetic diversity, further affecting the ability to of a species to survive (Berger 1990; Roelke et al. 1993) Anaimalai Tiger Reserve of Western Ghats shows a very high level of endemism. There are 22 endemics of total of 320 species. This paper is designed to assess the population of Anaimalai Tiger Reserve birds at depended birds based on altitudinal differences. The main objective of this study is to find the bird community distribution in different altitudinal ranges and also to find whether the species occurrence within specific altitudinal ranges.

2. Methods

The study area . Bird species were counted using the point counts after every 2 kilometers of walk and also in identified bird watching locations. Road transect sampling were done in all the three altitudes. Fixed line transects laid inside the forest areas for population estimation. The 2 km fixed-length line transects were used. Birds were sighted and identified using an Olympus 10 x 50 Binoculars and calls were also noted in a datasheet. Field guides by Grimmett *et al*. 2011 were used to identify the birds and their calls. Data collection was done from the first 30 minutes after sunrise and lasted for about three hours. All the birds during the point count were observed and noted for fifteen minutes (Bibby et al., 1998).



The altitudinal gradients of all the 32 beats were analysed and marked in the maps. The bird communities observed in the beats were plotted and analysed.

3. Data Analysis

Individual species altitudinal ranges were extracted from the result of each study. In several cases, those treated as intermediate, there were not enough data for a species to be confident that it occurred only at a particular altitude. In order to confirm the tentative conclusions about these species altitudinal ranges, patchy distributions within uniform habitat may confound the interpretation of data. in most of the cases, species were recorded much more infrequently at one altitude than another.

4. Result

During studies descried herein no proof or evidence of seasonal altitudinal movements has been recorded. Thus conclusion reached in this paper relate to apparently resident birds. This study reveals that there is a clear change

in the bird community in ATR. The distribution of birds have been analysed using the altitudinal distribution, the low altitude birds, mid altitude birds and high altitude birds. Total of 27068 number of individuals belonging to the 221 species were recorded. More number of individuals were recorded in mid altitude with 15272 followed by low altitude with 9549 individuals and less number was recorded in high altitude with 2247 individuals. More number of species was recorded in mid altitude with 183 species (82.8%%), followed by low altitude 173 (78.3%) and high altitude 38 (17.2%). Individual bird number comparison also shows that mid elevation has higher bird count followed by low elevation and high elevation (Table 1, Figure 1). Above about 1200m, overall species-richness declines with increasing altitude. species-richness appears to be at a maximum at about 800-1800 m; it may be lower at lower altitudes but the pattern is unclear. It appears that the putative mid-altitude specialists, but rather that there is an overlap in the distribution of lowland and montane specialist at this altitude. 57% of birds recorded from mid altitude 35% of birds recorded from low altitude and 8% birds recorded from high altitude (Figure 2).

Table 1: Overall bird species composition recorded in different altitudes of Pollachi division, ATR.

Altitude	Species	% (Total) (221)	Families	% (Total 66)	Individuals	% (Total 27068)
Low Altitude	171	78.3	58	87.8	9549	35.3
Mid Altitude	183	82.8	62	93.9	15272	56.4
High Altitude	38	17.1	18	57.6	2247	8.3
					27068	

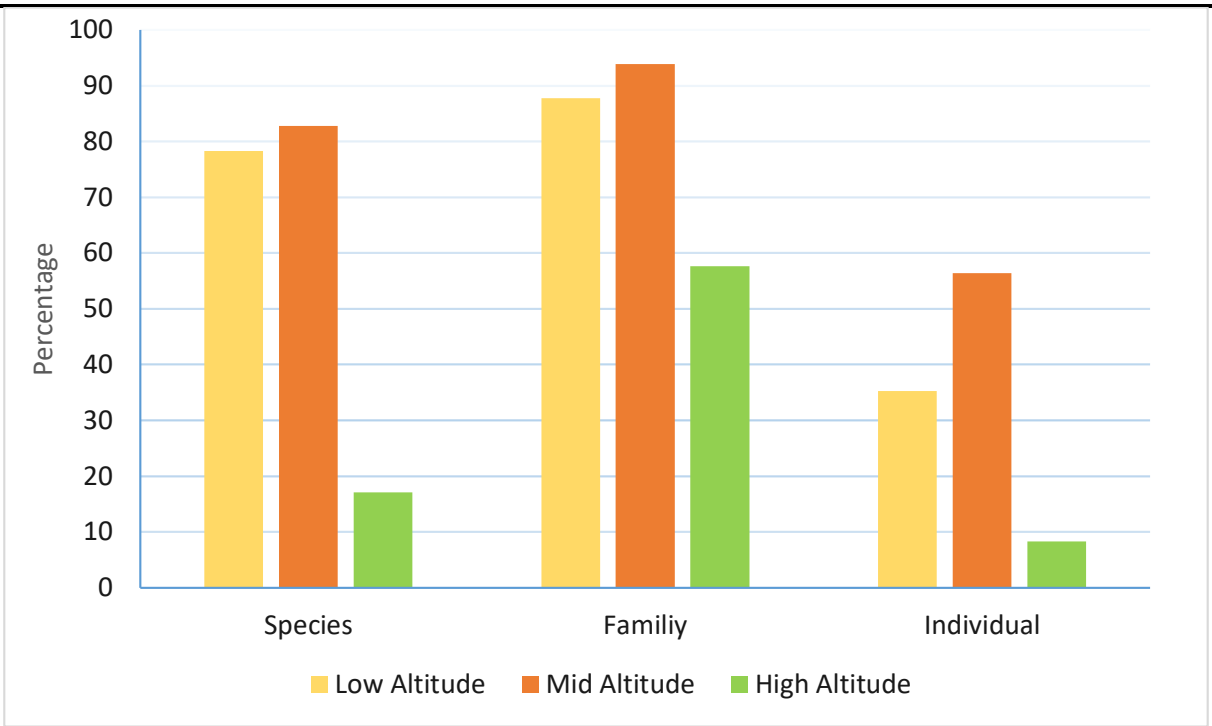


Figure 1. Species wise and family wise distribution of bird community in Pollachi division, ATR

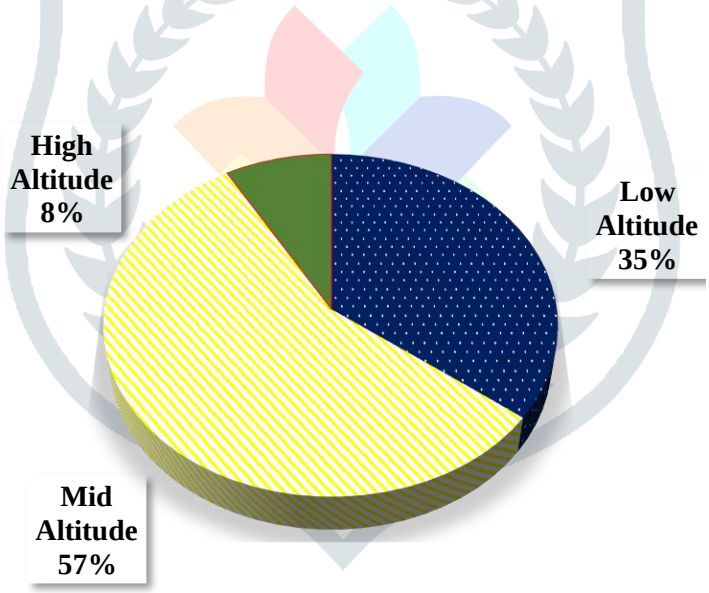


Figure 2: Percentage of individuals recorded in all three altitudes of Pollachi division, ATR

In all altitude total of 32 beats were surveyed. From lower altitude ten beats surveyed, from mid altitude 18 beats surveyed from higher altitude four beats were surveyed. Average was taken. overall distribution of birds with reference to altitude and beat wise is given in table 2 figure 3.

Table 2: Altitudinal distribution of Bird community in Pollachi division, ATR

S.No	Range	Beat	species	Family	Individuals
1	LA	Pothamadai	110	49	901
2		Thaneerpallam	103	45	948
3		Ayerangal	121	47	945
4		Pachathaneer	116	48	902
5		Mangarai	124	48	1200
6		Villonie	139	50	901
7		Aliyar	173	57	885
8		Gopalsamymalai	91	45	947
9		Arthanaripalaiyam	88	43	975
10		Paruthiyur	94	43	945
11	MA	Topslip	157	56	741
12		Varagaliyar	105	47	756
13		Chinnar	84	38	758
14		Perunkundru	87	41	758
15		Attakatti	78	47	845
16		Poonachi	81	38	865
17		Upperaliyar	45	37	874
18		Iyerpadi	68	43	839
19		Kadamparai	73	50	895
20		Kavarkal	45	42	803
21		Manambolly	58	45	865
22		Anali	51	26	842
23		Urulikkal	48	27	898
24		Sheikelmudi	45	28	936
25		Highforest	41	23	985

26		Itliyar	43	18	963
27		Chinnakallar	62	22	781
28		Periyakallar	47	19	868
29	HA	Akkamalai	30	14	689
30		Grasshills	26	15	586
31		Usimalai	23	8	561
32		Thanakkamalai	18	6	411

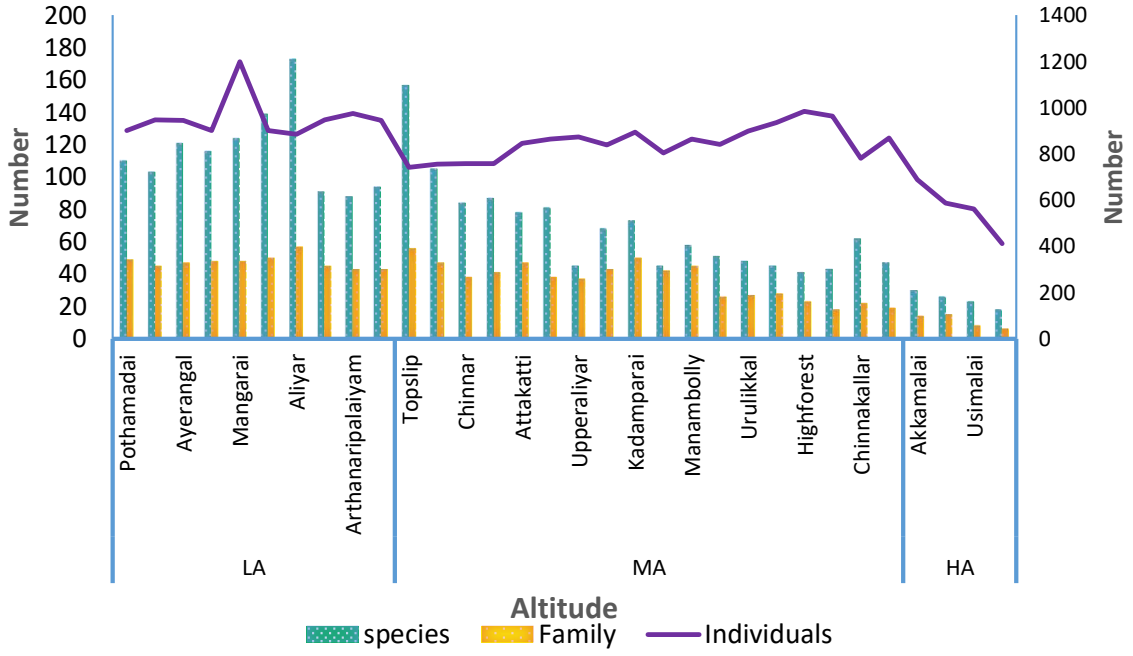


Figure 3: Range, beat and altitudinal distribution of Bird community status in Pollachi division, ATR

Habitat specialist

Out of 221 species 35 species exclusive to lower altitude, 31 species exclusive to mid altitude and three species black-orange flycatcher *Ficedula nigrorufa*, Nilgiri flycatcher *Eumyias albicaudatus*, broad tailed grass bird *Schoenicola platyurus* exclusive to high altitude. Nearly 31 species of birds overlaps with mid and low altitude. Nineteen species found in all the three altitudes (Table 3, figure 4 & 5).

Table 3: Status of bird exclusive and overlapping species in different altitude

Altitude	Species recorded	Exclusive species	Overlapping species
LA MA HA	-	-	19
LA MA	-	-	31
MA	183	31	-
LA	172	35	-
HA	38	3	-

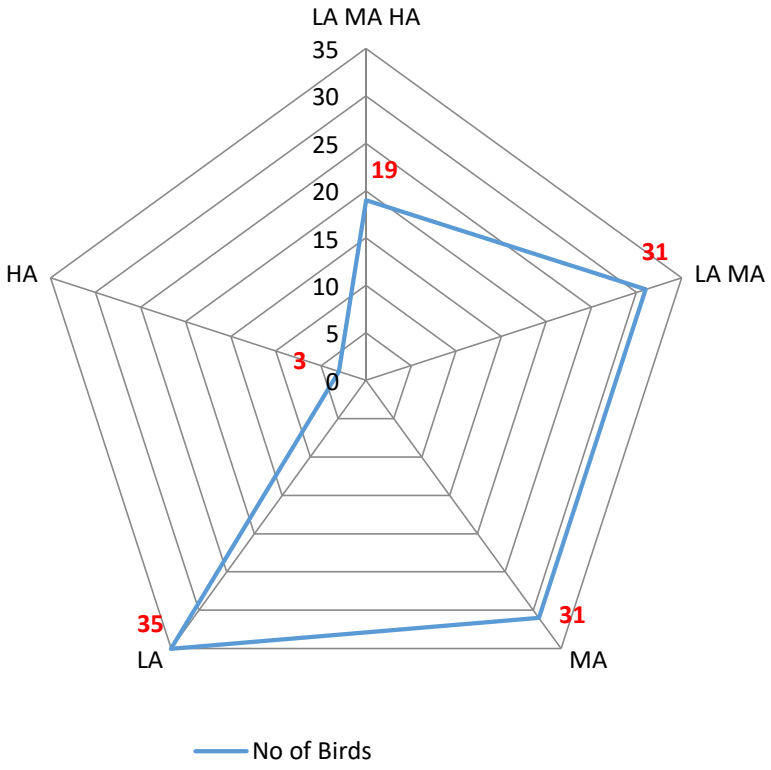


Figure 4: Status of bird exclusive and overlapping species in different altitude

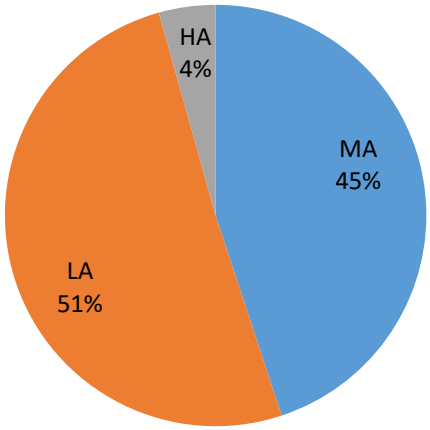


Figure 5: Percentage of species exclusively recorded in different altitude

4.4.2. Family and species wise comparison in different altitude

Total of 221 species of birds from 66 families were recorded. From lower elevation maximum of 173 species recorded from 58 families. Maximum of 17 species recorded from muscicapidae family followed by accipitridae (15). (Figure 6)

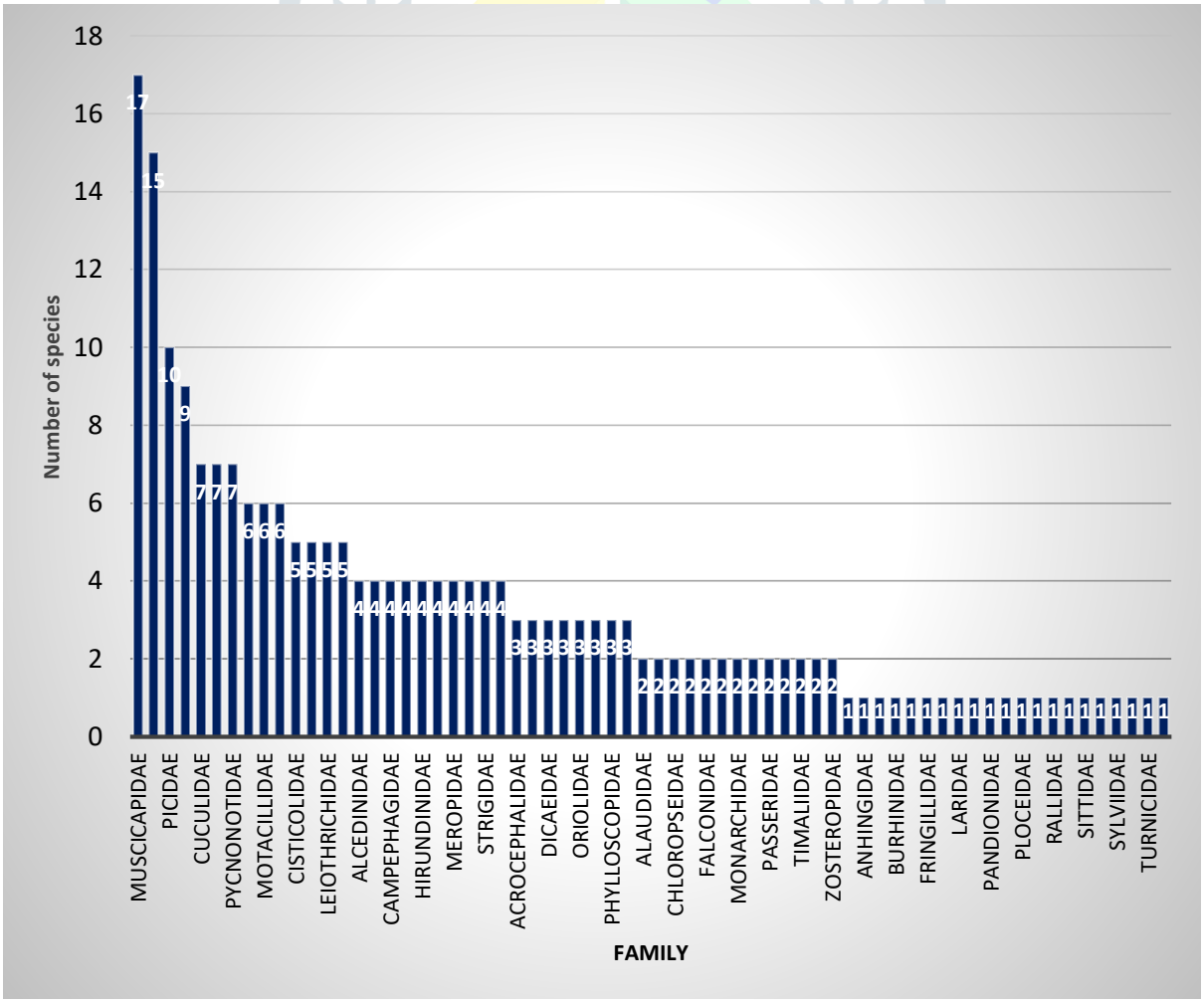


Figure 6: Familys-wise distribution of in all three altitudes, Pollachi division, ATR

Relationships between threat categories and altitudinal distribution

Many birds of ATR considered threatened. one species Southern Hill Myna *Gracula indcia* is considered endangered, which is present only in mid and high altitude, Six near threatened species recorded Oriental darter *Anhinga melanogaster*, Indian swiftlet Aerodramus unicolor, Nilgiri Flycatcher *Eumyias albicaudatus* and Great hornbill Buceros bicornis, Long billed sunbird *Cinnyris lotenius*, Black-and-orange Flycatcher *Ficedula nigrorufa*. out of six near threatened species four recorded in low altitude and four recorded in high altitude and three species recorded in mid altitude. Total of four vulnerable species are recorded namely Yellow-throated bulbul *Pycnonotus xantholemus*, Nilgiri wood-pigeon *Columba elphinstonii*, Nilgiri Pipit *Anthus nilghiriensis* and Broad-tailed grass bird *Scheenicola platyurus*. Out of three one present in low altitude three each present in mid and high altitude. Two hundred and six least concern species recorded of which 165 recorded in low altitude (42%), 172 (47%) in mid altitude and 29 (8%) species from high altitude Table 4, Figure 7 & 8.

Table 4: Record of birds based on IUCN category

Altitude	Near Threatened	Vulnerable	Endangered	Least concern
Low	4	1	0	165
Mid	3	3	1	172
High	4	3	1	29

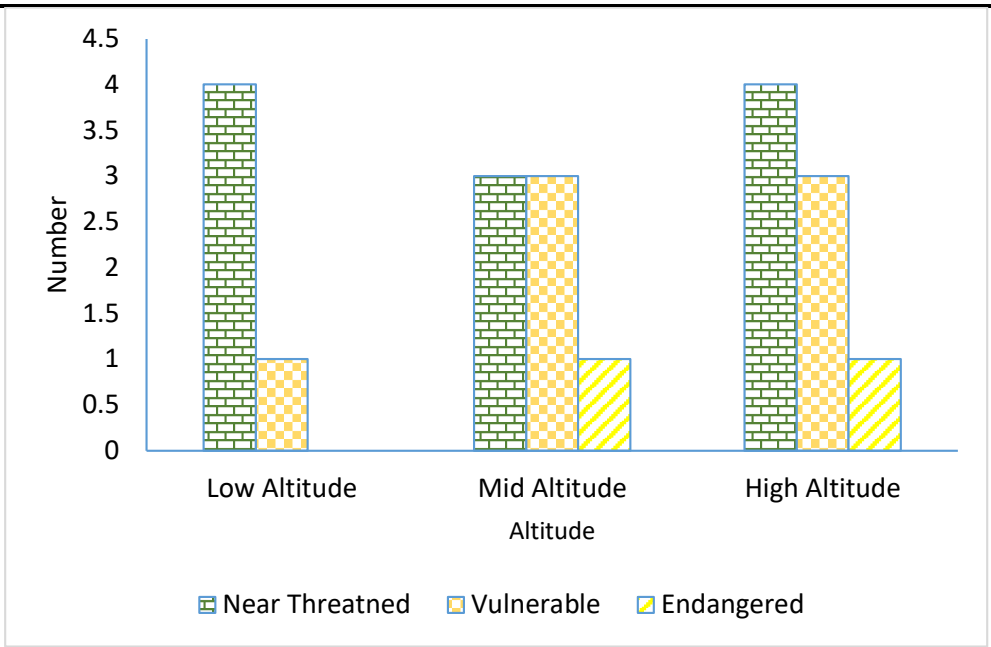


Figure 7: Distribution of birds based on IUCN category

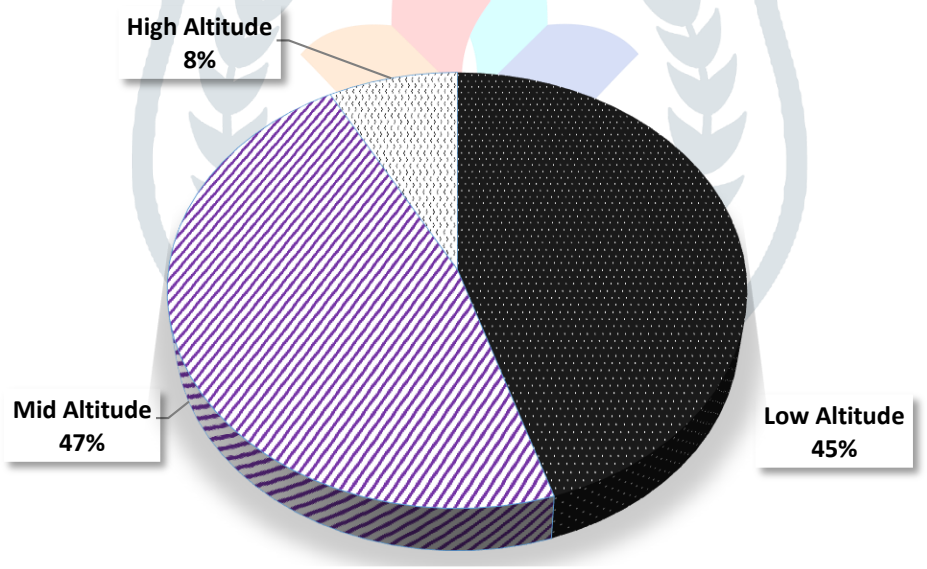


Figure 8: Percentage wise distribution of least concern birds in all three altitudes

Discussion

Status surveys for assessing the population form the top priority for all the species. Basic studies on the ecology are essential for their conservation and management. The finding of this study revealed diverse populations of birds along altitudes gradient and habitat types in the study area. The distribution of bird species and the diversity

indices were observed higher at mid elevation followed by low elevation and high elevation irrespective of habitat types. The pattern of community shows similarities in studies of Peruvian Andes (Rahbek 1995, 2005), Madagascan rain forest (Colwell &Lees 2000), Bolwian Andes South American forest (Kessler et al. 2001). Columbian Andes forest (Kattan & Franco 2004). The pattern of the avian community of the present study varies from that reported by many studies conducted on bird species richness along altitudinal gradients mostly in temperate regions (Naithan & Bhatt 2012) most such studies found the highest species richness at low elevation such as Peru (Terborgh 1971; Terborgh & Weske 1975)

The altitudinal categories into which the forest bird communities have been placed in this analysis conform generally to the forest types defined in the introduction. lowland species tend to drop out at the upper limit or low altitude forest, around 800-1200 m, while low-mid-altitude specialists persist until somewhat below the upper limit of mid-altitude forests at around 1600m. The pattern for high altitude species does not fit so well, as they often occur at 1400 m or slightly lower, well below the lower limit of lower forest. Many individual bird species are truly limited to forest of a particular structure, whether or not it conforms to the phytosociological definitions. Our study has not assessed the influence of certain ecological factors such as competition among species, the structure of vegetation and ecotones. However, the existence of several species restricted to certain altitudinal ranges and the elevation replacement among related bird species found in this study suggest that several factors are acting in different ways on the distribution of the bird species along elevation gradient in the Anaimalai Tiger Reserve.

Threat level of birds in mid altitude forest are very high. of the 21 species of threatened birds, only four are vulnerable and two near threatened species (Collar *et al.,* 1994). This study shows very clearly that lowland and high altitude species are much more likely to be considered threatened than low-mid altitude, mid-altitude or generalist species. The major threat to lowland and mid-altitude forest is encroachment which has had a greater impact on lowland forest than mid-altitude forest as the former is close to centres of population and is usual on shallower slopes. Several of the highly threatened lowland birds appear to be rather rare, occurring at low densities over large areas. High altitude forest is also vulnerable to conversion in Valparai have shown several species treated under high threat categories. Some species locally abundant, and most species in the high altitude specialist category appear to be present at most sites so far surveyed with this forest type present. The threat status of some of these species may thus need to be revised.

REFERENCE

Atkinson I (1989). Introduced animals and extinctions. In Western, D and Pearl, MC (eds.) Conservation for the Twenty-first century. New York: Oxford University Press.

Berger J (1990). Persistance of different-sized populations: An Empirical Assessment of Rapid Extinction in Bighorn Sheep. Conservation Biology 4 (1):91-98.

Bibby C, Jones M and Marsden S (1998). Expedition Field Technique: Bird Surveys. Royal Geographical Society. London.

Bridgman C L (2002). Habitat use, distribution and conservation status of the Mikado Pheasant (Syrmaticus mikado) in Taiwan. Ph.d thesis. The University of Tennessee, Knoxville.

Castellatta M, N S Sodhi & R Subraj (2000). Heavy extinction of forest Avifauna in Singapore: Lessons for biodiversity conservation in Southeastern Asia. *Conservation Biology*. 14(6):1870-1880.

Collar NJ and Andrew P (1988). Birds to watch. The ICPN world checklist of threatened birds. International Council for Bird Preservation, Cambridge.

Collar NJ, Crosby MJ and Stattersfield AJ (1994). Birds to watch 2: the world list of threatened birds. Cambridge, UK: International Council for Bird Preservation. BirdLife International, Cambridge.

Colwell R K & D C Lees (2000). The mid-domain effect: geometric constraints on the geography of soecies richness. Trends in Ecology and Evolution 15:70-76.

Ezhilarasi N & Vijayan L (2009). Status and ecology of Andaman Crake. Ph.D. thesis, Bharathiar university, Coimbatore, TamilNadu. pp: 216.

Kattan G H & P Franco (2004). Bird diversity along elevational gradients in the Andes of Colombia: Area and mass effects. Global Ecology and Biogeography 13: 451-458.

Kattan GH, Alvarez-Lopez H, and Giraldo (1994). Forest Fragmentation and Bird Extinctions: San Antonio Eighty Years Later. C*onservation Bioology*, 8 (1):138-146

Kessler M, S K Herzog, Fjelda J & Bach K (2001). Species richness and endemism of plant and bird communities along two gradients of elevation, humidity and land use in the Bolivian Andes. Divers. Distrib. 7 (1-2): 61 -77

Loiselle B A & J G Blake (1991). Temporal variation in birds and fruits along an elevational gradient in Costa Rica. Ecology 72: 180-193.

Lomolino M V (2001). Elevation gradient of species density: Historical and prospective views. global Ecology and Biogeography 10: 3-13.

Naithani A & Bhatt D. 2012. Bird community structure in natural and urbanized habitats along an altitudinal gradient in pauri district (Garhwal Himalaya) of uttarakhand state, India. *Biologia 67/4: 800—808, 2012 Section Zoology DOI: 10.2478/s11756-012-0068-z*

Navarro A G S (1992). Altitudinal distribution of birds in the Sierra Madre del Sur, Guerrero, Mexico. Condor 94: 29-39.

Noon B R (1981). The distribution of an avian guild along a temperate elevational gradient: The importance and expression of competition. Ecology 51: 105-124.

Rahbek C (1995). The elevational gradient of species richness: A uniform pattern Ecography 18: 200-205.

Rahbek C (2005). The role of spatial scale and the perception of large-scale species-richness in Neotropical birds. American Naturalist 149 (5): 875-902. DOI: 10.1086/286028.

Reed DH (2004). Extinction risk in fragmented habitats. *Animal Conservation*. 7:181–191.

Riley SJ, Decker DJ, Carpenter LH, Organ JF, Siemer WF, Mattfeld GF and Parson G (2002). The essence of wildlife management. *Wildlife Society Bulletin*. 30(2):585-593.

Robinet O, Barre N and Salas M (2003). Population estimate for the Ouvea Parakeet *Eunymphicus cornutus uvaeensis*: its present range and implications for conservation. *Emu.* 96:151-157.

Roelke ME, Martenson JS and O'Brien SJ (1993). The consequences of demographic reduction and genetic depletion in the endangered Florida Panther. *Current Biology*. 3:340-349.

Simberloff D (1994). Habitat fragmentation and population extinction in birds. *Ibis.* 137.

Stockwell CA, Hendry AP, and Kinnison MT (2003). Contemporary evolution meets conservation biology. *Trends in Ecology and Evolution* 18:94–101.

Terborgh J & J S Weske (1975). The role of competition in the distribution of Andean birds. Ecology 56 (5): 562-576. DOI: 10.2307/1935491.

Terborgh J (1971). Distribution on environmental gradients: Theory and a preliminary interpretation of distributional patterns in the avifauna of the Cordillera Vilcabamba, Peru. Ecology 52: 23-40.

Whittaker RJ (1998). Island biogeography: ecology, evolution and conservation, p. 285. Oxford University Press, Oxford.