

Original Research Article

Avian Diversity in Talle Valley: An endemic Bird area of eastern Himalayan Biodiversity Hot Spot in Lower Subansiri, Arunachal Pradesh, India

Neelam Yania^{1*}, Purba Jyoti Saikia², Daniel Mize¹ and Hirendra Nath Sarma¹

¹Department of Zoology (Center with Potential for Excellence in Biodiversity), Rajiv Gandhi University, Itanagar, Arunachal Pradesh, INDIA

²Department of Zoology, Dhemaji College, Assam, INDIA

*Corresponding author: neelamyania18@gmail.com

Received: July 25, 2020; revised: March 10, 2021; accepted: April 17, 2021

<https://doi.org/10.17605/OSF.IO/5U3RH>

Abstract: The rich species diversity of flora and fauna of Northeast India including Arunachal Pradesh is largely attributable to the diverse geographical area, varied topography, climate and soil variability. Immigration of plant and animals has been observed owing to the fact that the state Arunachal Pradesh falls in transitional zone of the three biogeographic realms. The present study on status assessment of avian vertebrates has been conducted at Tale Valley and Tale Wildlife Sanctuary of Lower Subansiri district of Arunachal Pradesh, India. The Avian fauna of Talle Valley Wildlife Sanctuary (TVWLS) was studied monthly (January-December) during study periods from 2013 to 2016. The study was carried out in three different altitudinal areas (i) Pange (ii) Talle and (iii) Labya Penggo. Status assessment was done following standard methodology of line transect, visual encounter and interview with the people of fringe villages. The present study at Talle Valley was an endeavour to document the status of birds in various altitudinal range during the year. Total counts of 308 species of birds were recorded from the three different study areas of the valley. No intensive survey on wildlife of Lower Subansiri district had been done so far. A scanty available report on wildlife of TVWLS indicates that proper survey and documentation of wildlife still remain awaited. During the present study, it is found that 35% of the total 879 avian species of Arunachal Pradesh has been present in TVWLS which indicate that the habitat is conducive for avian species.

Key words: Faunal diversity; Kurung Kumey; Lower Subansiri; Talle Valley; Wildlife

Introduction

Arunachal Pradesh being a part of Himalaya-East Biogeographic Zone (Rodgers *et al.*, 2000) stands at the junction of three biogeographic realms, the Afro-tropical, Indo-Malayan and Indo-Chinese (Takhtajan, 1969). The rich species diversity of flora and fauna of Northeast India including Arunachal Pradesh is largely attributable to the diverse geographical area, varied topography, climate and soil variability. Immigration of plant and animals has been observed owing to the fact that the state Arunachal Pradesh falls in transitional zone of these

three biogeographic realms (Rao, 1994). Biological elements from all the above regions find representation in the flora and fauna of the state.

The present study on status assessment of avian vertebrates has been conducted at Tale Valley and Tale Wildlife Sanctuary of Lower Subansiri district of Arunachal Pradesh (Fig. 1). It lies between 92°40' and 94°21' East Longitude and 26°55' and 28°21' North Latitude. It is bounded in the north by Kurung Kumey, Kra Daadi and Upper Subansiri districts,

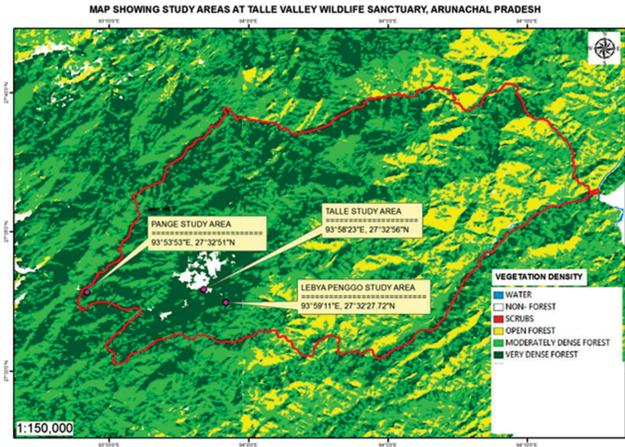


Fig. 1. Map showing Talle Valley Wildlife Sanctuary with its vegetation density and selected study areas. Pink dot indicates the study areas from where primary data on higher vertebrates were collected and red star marks indicates the areas from where secondary data were collected.

on the east by West Siang and some parts of Upper Subansiri, on the west by Papum Pare and some parts of Kurung Kumey districts, on the south by Papum Pare district and neighboring state of Assam. Its elevation gradients vary from 1500m to 3000m of msl. The climatic condition is largely influenced by the nature of altitudinal gradients. The foothills of the Lower Subansiri district have moderate climatic condition whereas in the high belt areas, winter season is chilling cold with pleasant summer. The month of December-January is the coolest month and July to August are warmest month (Ronald *et al.*, 2016).

The Talle valley Reserved Forests (vide Notification No. FOR. 101/71 dt. 15.5.76) lies between $93^{\circ}57' - 94^{\circ}12'E$, $27^{\circ}30' - 27^{\circ}40'N$ and covers an area approximately 51587.5 hectare in Lower Subansiri district of Arunachal Pradesh. The Talle valley wildlife sanctuary was constituted on 14th July, 1995 by carving out an area of 337 sq. km from erstwhile Talle valley reserve forests. The Talle valley proper lies about 35 Kms. from Hapoli, the district Head Quarter of Lower Subansiri. Roughly it lies between the Subansiri, Supu and Pange rivers. It is one of the very few examples of undisturbed pristine climax vegetation. The absence of any road(s) and human settlement inside or at the immediate periphery of the sanctuary has till date maintained the virginity and pristine atmosphere of the

forests. Talle plateau comprises of plains, valleys and hillocks. The plains near Siiro Manipoliang are used as wetlands for cultivation of paddy, which are followed by two main valleys, (I) The Pange valley (II) The Talle valley. Small rivers flow through these valleys forming gorges and rapids, the water collected through rains in the valleys are drained to the Subansiri river which ultimately discharges to the mighty Brahmaputra. In general, the hillocks are with gentle slopes but very high and steep slopes covered with dense vegetation are also common.

The climate of Talle Valley is temperate cool with copious rainfall making it more moist and wet type. In general there is no dry month although the winters are comparatively drier. During winter, there is heavy snowfall in the higher reaches. The maximum humidity is during May, average 81.65% and minimum during December 68%. The maximum rainfall is during June, average 419.5 mm and minimum during December, average 5 mm. The maximum temperature is during July, average $31.6^{\circ}C$ and minimum during January, average $1.1^{\circ}C$. The high precipitation, fertile soil conditions and lack of disturbances have helped in the growth of luxuriant vegetation.

Talle Valley Wildlife Sanctuary is one of the Important Bird Areas (IBAs) in the world (www.birdlife.org) however in context of zoological findings a robust data from this part of the state is yet to be collected due to its remoteness, hilly terrain, and inaccessibility. Talle Valley is away from road head, making work tougher and tiresome. Perfect vegetative habitat indicates that there are many unknown wildlife which are to be found out in this cool climate. Due to the cause mentioned, Talle Valley wildlife sanctuary has been remaining virgin waiting for extensive research to document hidden treasures especially on higher vertebrates and thus, many things to be explored. Therefore, attempt to explore for the avian vertebrates in Talle Valley is utmost essential to find out other relevant information and resources. The collection of information based on distribution of higher vertebrates in Talle Valley will bring new light to the medicine, preservation, eco-development and eco-tourism point of view. The world is

yet to know the varieties and the unknown species available in Talle Valley of eastern Himalayan Biodiversity Hot Spot.

Materials and methods

Study area

As a whole, Talle Valley consists of slope areas, hilly terrain, dense and open forest. Therefore, for assessment of avifauna as carried out by primary and secondary data through filling up of structured questionnaire by interviewing the villagers inhabiting the fringe areas of TVWLS and Forest staff who have serving in TVWLS for more than decades. For collection of primary data, the part of the TVWLS which has high forest cover and are also accessible have been selected. The areas have been divided into three study areas based on the elevation gradient; (i) Pange study area at <1800 to 2100 m above msl , (ii) Talle study area at <2200 to 2500 m above msl and (iii)

Lebya Penggo study area at <2600 to 2900 m above msl (Fig. 2 A & B).

Status assessment approaches

The assessment of avian vertebrates at TVWLS has been carried out by applying methodologies of direct and indirect evidences. For the study of Avifauna line and point transect with Timed Species Count, Opportunistic and pre-loaded sound recording and tape-play method has been exercised.

The various methods used for the study on the status assessment of the avian vertebrates in Talle Valley were : (i) Survey stratification and site selection of dense forest cover using global information system (ii) Random sampling based on species, habitat and terrain type (iii) Line transect (Burnham *et al.*,1980; Daniels,1989 and Javed, 1996) and point centered plots with timed species count (iv) Visual encounter study (Wemmer *et al.*,1996) (vii) Interview with Structured questionnaire about

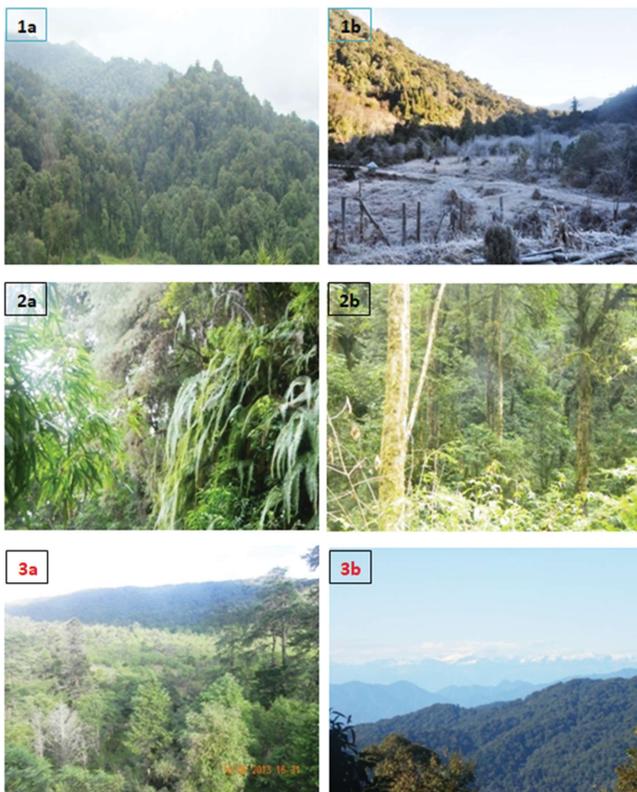


Fig. 2 A. Ecology and vegetation cover at Talle Valley Wildlife Sanctuary, 1. Pange study area vegetation (a) during summer season, (b) during winter season, 2.(a) Mixed vegetation of Bamboo, ferns, Rhododendron and pine on the way to Lebya Penggo study area, (b) Mosses covered forest at Lebya Penggo study area, 3. (a) Talle study area , (b) View of Himalayan landscape from Talle study area.

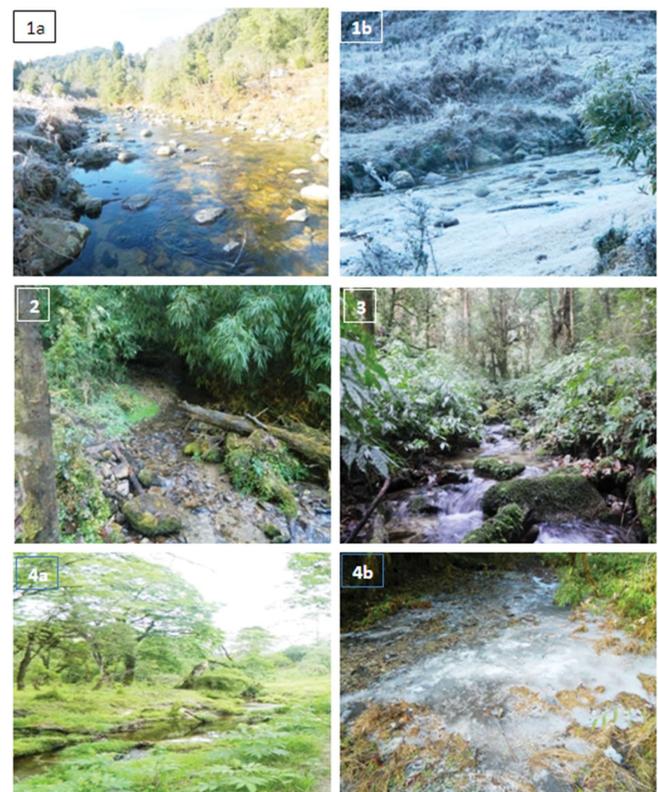


Fig. 2 B. Climatic condition reflected in water bodies at different study areas of TVWLS; 1 Pange river, (a). during summer season, (b). during winter season, 2. Patu nullah, 3. Tasi nullah, 4. Talle stream, (a) Talle stream during summer season, (b). Talle stream frozen during winter season.

existing avian fauna of the areas. Using the above cited methods field survey was done in Talle Valley. Different methodology in different days had been used in the support of the hypothesis that same day surveys yield fewer species and underestimate total species richness (Field *et al.*, 2002).

As the study areas consist of valleys, plateau, hillocks and steep slopes line and point transects techniques, opportunistic and incidental records methods were combined for birds status assessment (Fig. 3). The transects techniques were also mixed with pre-loaded sound recording of the species and tape playback (Gibbons *et al.*, 1996; Whitman *et al.*, 1997, Haselmayer and Quinn, 2000; Newton, 2002; Lor and Malechi, 2002) technique, as combination of techniques are more useful and effective in sampling (Terborgh *et al.*, 1990).



Fig. 3. Placement of transects; (a). Random., (b).Stratified., (c). In linear piecewise manner (Javed & Kaul, 2000)

Species identification

The birds were sighted with the help of binoculars (Nikon:10-22x50 3.8^o 10x) and captured with cameras (Nikon DX : AF-S Nikkor 18-105mm) and Nikon Coolpix : P500. The birds recorded were identified with the help of photographic guides to the birds of India by various authors (Salim Ali, 2002; Grimmet *et al.*, 2011; Grewal *et al.*, 2002).

Two hundred fifty (250) persons above 18 years of age who had knowledge on wildlife and experienced hunting of the fringe villages including frontline forest staff were interviewed with structured questionnaire. They were shown catalogue of photographs of the birds which were available in that region and they identified its names by seeing the photographs and finally confirmed by further field survey. In the present study random, stratified random and linear piecewise sampling were used to evaluate the status of birds at Talle Valley.

In stratified random sampling, the study sites are divided into different strata based on altitude, habitat or vegetation types (Javed and Kaul, 2000, Gopal, 2012). According to the elevation gradients, spatio-temporal use of habitats by wildlife and other natural features TVWLS has been divided into three strata; Pange, Lebya Penggo and Talle to carry out the field survey.

Transects methods

There are two types of transect most commonly used in surveying; line transects and point transects or point counts (Gregory *et al.*, 2003, 2004c)

Line transect method

Line transect method has been used since the early 1930s (Burnham *et al.*, 1980) for estimating the abundance of wildlife population. It is not only practical and efficient, but is relatively inexpensive too. It is also applicable to monitoring round the year. Transects are well suited for open habitats and flat areas, albeit, they have also been successfully tested in hilly areas. As the line transect is based on the strict assumption of a straight line, it is imperative that the marked transect is more or less straight, so that there is no error in estimation of perpendicular distances and sighting of objects (Javed and Kaul, 2000). Once an area has been selected for census, the next step is to lie transects in selected habitats.

Placement of transect

Transects can be placed in random, stratified and in piece wise linear fashion in hilly and more rugged terrain (Javed and Kaul, 2000). Transects during the field work at TVWLS have been placed mainly in the following ways according to habitats and accessibility to the study areas.

Length and width of transect

In most of the community studies, transects of up to 800m have been found to be adequate. The perpendicular observation distance could be open or fixed width. In fixed width, records are done within a specified strip. Strip or belt could be 25-50m in slightly dense habitat and 50-100m in more open habitat. In open width, transect could be monitored as an open width transect where birds are recorded irrespective of their distance from the transect. Using Global Positioning System (GPS) transect lines have been marked temporarily.

GPS is mostly used for navigational purposes in dense and difficult habitats. However during the present field work, transect line of 1 km length and open width methods were used in each selected elevation gradients of 1800-2100m, 2200-2500m and 2600-2900m.

Time of the day for monitoring avian fauna

The monitoring of the transect line in the study areas for birds were done from 6 am to 10 am in morning and from 1 pm to 4 pm in the evening. Census should be conducted at times when there will be little change in the conspicuousness of birds (Dawson, 1981).

Number of monitoring in the transect line

8-12 times monitoring of transect has been done (Conner and Dickson, 1980) every season to determine the status assessment of birds and mammals at selected study area. However, precision and accuracy are functions of the numbers of sightings or detection per transect.

Point transects

The feature common to all point count systems is that an observer remains stationary at one spot for a predetermined period of time, during which birds seen or heard are recorded (Fuller and Langslow, 1984). The count duration of 2 to 20 minutes (Ramsey and Scott, 1981) are usually considered. However, in the British habitats studied, most species and pairs were seen within 10 minutes. Hence longer point counts are a poor investment of time (Fuller and Langslow, 1984). In the present field study the total count was made spending 10 minutes in each predetermined spot with unlimited radii.

Shannon – Wiener diversity index of avian fauna in TVWLS

The Shannon –Wiener diversity index increases as both the richness and the evenness of the community increases. Using formula $H' = -[\sum \rho_i \ln \rho_i]$ where H' is the diversity index, ρ_i is the proportion of each species in the sample and $\ln \rho_i$ is the natural logarithm of this proportion, the data recorded were analyzed in Microsoft office word excel and diversity index has been calculated for three study areas of Pange, Lebya Penggo and Talle.

Results

The Avian fauna of Talle Valley Wildlife Sanctuary was studied monthly (January-December) during study periods (2013 – 2016). Total counts of 308 species of birds were recorded (Table 1) from the three different study areas of the valley. The accessible areas have been divided into three study areas namely (1) Pange, (2) Lebya Penggo and (3) Talle based on elevation gradient, climatic condition and habitat. The total counts of birds obtained by applying various methods have shown that Pange study area has highest numbers of birds species with two hundred ninety nine (299) records. It is followed by Lebya Penggo study area with two hundred twenty two (222) and least number of species recorded at Talle study area with one hundred thirty five species (135) (Fig. 4 and 5). Taxonomically the recorded avifauna are of 15 orders; Passeriformes, Columbiformes, Strigiformes, Cuculiformes, Piciformes, Accipitiriformes, Gruiformes, Pelecaniformes, Galliformes, Bucerotiformes, Falconiformes, Charadriiformes, Caprimulgiformes, Trogoniformes and Coraciiformes. The highest number of 244 species come under Passeriformes order followed by Piciformes (16 species), Columbiformes (9 species), Cuculiformes and Galliformes (6 species each), Accipitiriformes (5 species), Pelecaniformes (4 species), Strigiformes, Charadriiformes and caprimulgiformes (3 species each), Gruiformes, Bucerotiformes, Trogoniformes and Coraciiformes (2 species each) and least is the Falconiformes having only one species (Fig. 6 and categorized into sixty (60) families. Among these, forty three (43) numbers of species were observed in Muscicapidae family, Leiotrichidae has shown 25 numbers of species, Phylloscopidae, 17 species. Picidae, Turdidae and Fringillidae, 12 numbers of species. Scotocercidae and Timallidae showed 10 number of species and rest of the 46 families less than ten numbers of species in each family.

Global Population trend of Birds at Talle Valley

During the present investigation, the population trend and global status of the birds species recorded has also been studied. The avifauna has been categorized as per International Union for Conservation of Nature and Natural Resources (IUCN) Red list of threatened species. Accordingly it has been

Sl.No	Common name	Scientific name	Order	Family	Species authority
1	Ashy drongo	<i>Dicrurus leucophaeus</i>	Passeriformes	Dicruridae	Vieillot, 1817
2	Bronzed drongo	<i>Dicrurus aeneus</i>	Passeriformes	Dicruridae	Vieillot, 1817
3	Lesser racket-tailed drongo	<i>Dicrurus remifer</i>	Passeriformes	Dicruridae	Temminck, 1823
4	Spangled drongo	<i>Dicrurus bracteatus</i>	Passeriformes	Dicruridae	Gould, 1842
5	Ashy-headed green-pigeon	<i>Treron phayrei</i>	Columbiformes	columbidae	Blyth, 1862
6	Ashy wood pigeon	<i>Columba pulchricollis</i>	Columbiformes	columbidae	Blyth, 1846
7	Barred cuckoo-dove	<i>Macropygia unchall</i>	Columbiformes	columbidae	Wagler, 1827
8	Emerald dove	<i>Chalcophaps indica</i>	Columbiformes	Columbidae	Linnaeus, 1758
9	Emerald spotted wood dove	<i>Turtur chalcospilos</i>	Columbiformes	Columbidae	Wagler, 1827
10	Mountain imperial-pigeon	<i>Ducula badia</i>	Columbiformes	Columbidae	Raffles, 1822
11	Oriental turtle dove	<i>Streptopelia orientalis</i>	Columbiformes	Columbidae	Latham, 1790
12	Speckled wood pigeon	<i>Columba hodgsonii</i>	Columbiformes	Columbidae	Vigors, 1832
13	Wedge-tailed green pigeon	<i>Treron sphenurus</i>	Columbiformes	Columbidae	Vigors, 1832
14	Ashy-throated warbler	<i>Phylloscopus maculipennis</i>	Passeriformes	Phylloscopidae	Blyth, 1867
15	Black-faced warbler	<i>Abroscopus schisticeps</i>	Passeriformes	Scotocercidae	Gray, 1846
16	Blyth's leaf warbler	<i>Phylloscopus reguloides</i>	Passeriformes	Phylloscopidae	Blyth, 1842
17	Broad-billed warbler	<i>Tickellia hodgsoni</i>	Passeriformes	Scotocercidae	Moore, 1854
18	Brownish-flanked bush-warbler	<i>Horornis fortipes</i>	Passeriformes	Scotocercidae	Hodgson, 1845
19	Buff-barred warbler	<i>Phylloscopus pulcher</i>	Passeriformes	Phylloscopidae	Blyth, 1845
20	Chestnut-crowned warbler	<i>Phylloscopus castaniceps</i>	Passeriformes	Phylloscopidae	Hodgson, 1845
21	Chestnut-headed tesia	<i>Cettia castaneocoronata</i>	Passeriformes	Scotocercidae	Burton, 1836
22	Common tailorbird	<i>Orthotomus sutorius</i>	Passeriformes	Cisticolidae	Pennant, 1769
23	Dusky warbler	<i>Phylloscopus fuscatus</i>	Passeriformes	phylloscopidae	Blyth, 1842
24	Eastern crowned warbler	<i>Phylloscopus coronatus</i>	Passeriformes	Phylloscopidae	Temminck & Schlegel, 1847
25	Green-crowned warbler	<i>Phylloscopus burkii</i>	Passeriformes	Phylloscopidae	E. Burton, 1836
26	Greenish warbler	<i>Phylloscopus trochiloides</i>	Passeriformes	Phylloscopidae	Sundevall, 1837
27	Grey-cheeked warbler	<i>Phylloscopus poliogenys</i>	Passeriformes	Phylloscopidae	Blyth, 1847
28	Grey-bellied tesia	<i>Tesia cyaniventer</i>	Passeriformes	Scotocercidae	Hodgson, 1837
29	Grey-hooded warbler	<i>Phylloscopus xanthoschistos</i>	Passeriformes	Phylloscopidae	Gray, 1846
30	Grey-sided bush warbler	<i>Cettia brunnifrons</i>	Passeriformes	Scotocercidae	Hodgson, 1845
31	Hume's leaf warbler	<i>Phylloscopus humei</i>	Passeriformes	Phylloscopidae	Brooks, 1878
32	Large-billed leaf warbler	<i>Phylloscopus magnirostris</i>	Passeriformes	Phylloscopidae	Blyth, 1843
33	Lemon-rumped warbler	<i>Phylloscopus chloronotus</i>	Passeriformes	Phylloscopidae	Gray & Gray, 1846
34	Mountain tailorbird	<i>Phyllergates cucullatus</i>	Passeriformes	Scotocercidae	Temminck, 1836
35	Slaty-bellied tesia	<i>Tesia olivea</i>	Passeriformes	Scotocercidae	McClelland, 1840
36	Striated grassbird	<i>Megalurus palustris</i>	Passeriformes	Locustellidae	Horsfield, 1821
37	Tickell's leaf warbler	<i>Phylloscopus affinis</i>	Passeriformes	Phylloscopidae	Tickell, 1833
38	Tytler's leaf warbler	<i>Phylloscopus tyleri</i>	Passeriformes	Phylloscopidae	Brooks, 1872
39	White-spectacled warbler	<i>Phylloscopus intermedius</i>	Passeriformes	Phylloscopidae	La touché, 1898
40	Yellow-bellied warbler	<i>Abroscopus superciliaris</i>	Passeriformes	Scotocercidae	Blyth, 1859
41	Yellowish-bellied bush-warbler	<i>Horornis acanthizoides</i>	Passeriformes	Scotocercidae	Verreaux, 1871
42	Yellow-vented warbler	<i>Phylloscopus cantator</i>	Passeriformes	Phylloscopidae	Tickell, 1833
43	Asian emerald cuckoo	<i>Chrysococcyx maculatus</i>	Cuculiformes	Cuculidae	Gmelin, 1788
44	Common cuckoo	<i>Cuculus canorus</i>	Cuculiformes	Cuculidae	Linnaeus, 1758
45	Indian cuckoo	<i>Cuculus micropterus</i>	Cuculiformes	Cuculidae	Gould, 1837
46	Large hawk-cuckoo	<i>Hierococcyx sparverioides</i>	Cuculiformes	Cuculidae	Vigors, 1831
47	Lesser cuckoo	<i>Cuculus poliocephalus</i>	Cuculiformes	Cuculidae	Latham, 1790
48	Oriental cuckoo	<i>Cuculus saturatus</i>	Cuculiformes	Cuculidae	Blyth, 1843
49	Asian barred owl	<i>Glaucidium cuculoides</i>	Strigiformes	Strigidae	Vigors, 1831

50	Collared owl	<i>Glaucidium brodiei</i>	Strigiformes	Strigidae	Burton, 1836
51	Spotted owl	<i>Athene brama</i>	Strigiformes	Strigidae	Temminck, 1821
52	Asian house martin	<i>Delichon dasypus</i>	Passeriformes	Hirundinidae	Bonaparte, 1850
53	Barn swallow	<i>Hirundo rustica</i>	Passeriformes	Hirundinidae	Linnaeus, 1758
54	Nepal house martin	<i>Delichon nipalense</i>	Passeriformes	Hirundinidae	Horsfield & Moore, 1854
55	Bar-winged wren-babbler	<i>Spelaeornis troglodytoides</i>	Passeriformes	Timaliidae	Verreaux, 1870
56	Beautiful sibia	<i>Heterophasia pulchella</i>	Passeriformes	Leiotrichidae	Godwin-Austen, 1874
57	Black-eared shrike-babbler	<i>Pteruthius melanotis</i>	Passeriformes	Vireonidae	Hodgson, 1847
58	Black-faced babbler	<i>turdoides melanops</i>	Passeriformes	Leiotrichidae	Hartlaub, 1867
59	Black-chinned yuhina	<i>Yuhina nigrimenta</i>	Passeriformes	Zosteropidae	Blyth, 1845
60	Black-headed shrike-babbler	<i>Pteruthius rufiventer</i>	Passeriformes	Vireonidae	Blyth, 1842
61	Blackish-breasted babbler	<i>Stachyris humei</i>	Passeriformes	Timaliidae	Mandelli, 1873
62	Black-throated parrotbill	<i>Suthora nipalensis</i>	Passeriformes	Sylviidae	Hodgson, 1837
63	Blue-winged minla	<i>Siva cyanouroptera</i>	Passeriformes	Leiotrichidae	Hodgson, 1837
64	Brown parrotbill	<i>Cholornis unicolor</i>	Passeriformes	Sylviidae	Hodgson, 1843
65	Brown-throated fulvetta	<i>Fulvetta ludlowi</i>	Passeriformes	Sylviidae	Kinney, 1935
66	Chestnut-tailed minla	<i>Chrysominla strigula</i>	Passeriformes	Leiotrichidae	Hodgson, 1837
67	Coral-billed scimitar-babbler	<i>Pomatorhinus ferruginosus</i>	Passeriformes	Timaliidae	Blyth, 1845
68	Fire-tailed myzornis	<i>Myzornis pyrrhura</i>	Passeriformes	Sylviidae	Blyth, 1843
69	Fulvous parrotbill	<i>Suthora fulvifrons</i>	Passeriformes	Sylviidae	Hodgson, 1845
70	Golden babbler	<i>Cyanoderma chrysaemum</i>	Passeriformes	Timaliidae	Blyth, 1844
71	Golden-breasted fulvetta	<i>Lioparus chrysotis</i>	Passeriformes	Sylviidae	Blyth, 1845
72	Greater rufous-headed parrotbill	<i>Psittiparus ruficeps</i>	Passeriformes	Sylviidae	Blyth, 1842
73	Greater necklaced laughingthrush	<i>Garrulax pectoralis</i>	Passeriformes	Leiotrichidae	Gould, 1836
74	Green shrike-babbler	<i>pteruthius xanthochlorus</i>	Passeriformes	Vireonidae	Gray, 1846
75	Grey-sided laughingthrush	<i>Garrulax caerulatus</i>	Passeriformes	Leiotrichidae	Hodgson, 1836
76	Himalayan cutia	<i>Cutia nepalensis</i>	Passeriformes	Leiotrichidae	Hodgson, 1837
77	Hoary-throated barwing	<i>Sibia nipalensis</i>	Passeriformes	Leiotrichidae	Hodgson, 1836
78	Long-billed wren-babbler	<i>Rimator malacoptilus</i>	Passeriformes	Pellorneidae	Blyth, 1847
79	Nepal fulvetta	<i>Alcippe nipalensis</i>	Passeriformes	Leiotrichidae	Hodgson, 1837
80	Pygmy wren-babbler	<i>Pnoepyga pusilla</i>	Passeriformes	Pnoepygidae	Hodgson, 1845
81	Red-billed scimitar babbler	<i>Pomatorhinus ochraceiceps</i>	Passeriformes	Timaliidae	Walden, 1873
82	Red-billed leiothrix	<i>Leiothrix lutea</i>	Passeriformes	Leiotrichidae	Scopoli, 1786
83	Red-faced liocichla	<i>Liocichla phoenicea</i>	Passeriformes	Leiotrichidae	Gould, 1837
84	Red-tailed minla	<i>Minla ignotincta</i>	Passeriformes	Leiotrichidae	Hodgson, 1837
85	Rufous-backed sibia	<i>Leioptila annectens</i>	Passeriformes	Leiotrichidae	Blyth, 1847
86	Rufous-chinned laughingthrush	<i>Garrulax rufogularis</i>	Passeriformes	Leiotrichidae	Gould, 1835
87	Rufous-capped babbler	<i>Cyanoderma ruficeps</i>	Passeriformes	Timaliidae	Blyth, 1847
88	Rufous-fronted babbler	<i>Cyanoderma rufifrons</i>	Passeriformes	Timaliidae	Hume, 1873
89	Rufous-throated wren-babbler	<i>Spelaeornis caudatus</i>	Passeriformes	Timaliidae	Blyth, 1845
90	Rufous-vented yuhina	<i>Yuhina occipitalis</i>	Passeriformes	Zosteropidae	Hodgson, 1836
91	Rufous-winged fulvetta	<i>Schoeniparus castaneiceps</i>	Passeriformes	Pellorneidae	Hodgson, 1837
92	Rusty-fronted barwing	<i>Actinodura egertoni</i>	Passeriformes	Leiotrichidae	Gould, 1836
93	Scaly laughingthrush	<i>Trochalopteron subunicolor</i>	Passeriformes	Leiotrichidae	Blyth, 1843
94	Scaly-breasted wren-babbler	<i>Pnoepyga albiventer</i>	Passeriformes	Pnoepygidae	Hodgson, 1837
95	Silver-eared mesia	<i>Leiothrix argentauris</i>	Passeriformes	Leiotrichidae	Hodgson, 1837
96	Slender-billed scimitar babbler	<i>Pomatorhinus superciliosus</i>	Passeriformes	Timaliidae	Blyth, 1842
97	Spotted laughingthrush	<i>Garrulax ocellatus</i>	Passeriformes	Leiotrichidae	Vigors, 1831
98	Spotted wren-babbler	<i>Elachura formosa</i>	Passeriformes	Elachuridae	Walden, 1874
99	Streak-breasted scimitar babbler	<i>Poma torhinus ruficollis</i>	Passeriformes	Timaliidae	Hodgson, 1836

100	Streak-throated barwing	<i>Sibia waldeni</i>	Passeriformes	Leiotrichidae	Godwin-Austen, 1874
101	Streak-throated fulvetta	<i>Fulvetta manipurensis</i>	Passeriformes	Sylviidae	Ogilvie-Grant, 1906
102	Striated laughingthrush	<i>Grammatoptila striata</i>	Passeriformes	Leiotrichidae	Vigors, 1831
103	striated yuhina	<i>yuhina castaniceps</i>	Passeriformes	Zosteropidae	Moore, 1854
104	Stripe-throated yuhina	<i>Yuhina gularis</i>	Passeriformes	Zosteropidae	Hodgson, 1836
105	Whiskered yuhina	<i>Yuhina flavicollis</i>	Passeriformes	Zosteropidae	Hodgson, 1836
106	White-browed shrike-babbler	<i>Pteruthius aeralatus</i>	Passeriformes	Vireonidae	Blyth, 1855
107	White-throated laughingthrush	<i>Garrulax albogularis</i>	Passeriformes	Leiotrichidae	Gould, 1836
108	White-bellied yuhina	<i>Erpornis Zantholeuca</i>	Passeriformes	Vireonidae	Blyth, 1844
109	White-crested laughingthrush	<i>Garrulax leucolophus</i>	Passeriformes	Leiotrichidae	Hardwicke, 1815
110	White-naped yuhina	<i>Yuhina bakeri</i>	Passeriformes	Zosteropidae	Rothschild, 1926
111	Yellow-throated fulvetta	<i>Schoeniparus cinereus</i>	Passeriformes	Pellorneidae	Blyth, 1847
112	Bay woodpecker	<i>Blythipicus pyrrhotis</i>	Piciformes	Picidae	Hodgson, 1837
113	Crimson-breasted woodpecker	<i>Dryobates pernyi</i>	Piciformes	Picidae	Verreaux, 1867
114	Darjeeling woodpecker	<i>Dendrocopos darjellensis</i>	Piciformes	Picidae	Blyth, 1845
115	Greater yellownape	<i>Chrysophlegma flavinucha</i>	Piciformes	Picidae	Gould, 1834
116	Grey-capped pygmy woodpecker	<i>Picoides canicapillus</i>	Piciformes	Picidae	Blyth, 1845
117	Lesser yellownape	<i>Picus chlorolophus</i>	Piciformes	Picidae	Viellot, 1818
118	Rufous woodpecker	<i>Micropternus brachyurus</i>	Piciformes	Picidae	Viellot, 1818
119	Rufous-bellied woodpecker	<i>Dendrocopos hyperythrus</i>	Piciformes	Picidae	Vigors, 1831
120	Speckled piculet	<i>Picumnus innominatus</i>	Piciformes	Picidae	Burton, 1836
121	White-browed piculet	<i>Sasia ochracea</i>	Piciformes	Picidae	Hodgson, 1836
122	Stripe-breasted woodpecker	<i>Dendrocopos atratus</i>	Piciformes	Picidae	Blyth, 1849
123	Fulvous-breasted woodpecker	<i>Dendrocopos macei</i>	Piciformes	Picidae	Viellot, 1818
124	Beautiful rosefinch	<i>Carpodacus pulcherrimus</i>	Passeriformes	Fringillidae	Moore, 1856
125	Brown bullfinch	<i>Pyrrhula nipalensis</i>	Passeriformes	Fringillidae	Hodgson, 1836
126	Collared grosbeak	<i>Mycerobas affinis</i>	Passeriformes	Fringillidae	Blyth, 1855
127	Common rosefinch	<i>Carpodacus erythrinus</i>	Passeriformes	Fringillidae	Pallas, 1770
128	Crested goshawk	<i>Accipiter trivirgatus</i>	Accipitriformes	Accipitridae	Temminck, 1824
129	Dark-breasted rosefinch	<i>Procarduelis nipalensis</i>	Passeriformes	Fringillidae	Hodgson, 1836
130	Grey-headed bullfinch	<i>Pyrrhula erythaca</i>	Passeriformes	Fringillidae	Blyth, 1862
131	Red crossbill	<i>Loxia curvirostra</i>	Passeriformes	Fringillidae	Linnaeus, 1758
132	Scarlet finch	<i>Carpodacus sipahi</i>	Passeriformes	Fringillidae	Hodgson, 1836
133	Spot-winged grosbeak	<i>Mycerobas melanozanthos</i>	Passeriformes	Fringillidae	Hodgson, 1836
134	Yellow-breasted greenfinch	<i>Chloris spinoides</i>	Passeriformes	Fringillidae	Vigors, 1831
135	Tibetan siskin	<i>Spinus thibetanus</i>	Passeriformes	Fringillidae	Hume, 1872
136	Beautiful nuthatch	<i>Sitta formosa</i>	Passeriformes	Sittidae	Blyth, 1843
137	Chestnut-bellied nuthatch	<i>Sitta cinnamoventris</i>	Passeriformes	Sittidae	Blyth, 1842
138	White-tailed nuthatch	<i>Sitta himalayensis</i>	Passeriformes	Sittidae	Jardine & Selby, 1835
139	Black-backed fortail	<i>Enicurus immaculatus</i>	Passeriformes	Muscicapidae	Hodgson, 1836
140	black redstart	<i>phoenicurus ochruros</i>	Passeriformes	Muscicapidae	Gmelin, 1774
141	Blue rock thrush	<i>Monticola solitarius</i>	Passeriformes	Muscicapidae	Linnaeus, 1758
142	Blue-capped rock thrush	<i>Monticola cinclorhyncha</i>	Passeriformes	Muscicapidae	Vigors, 1832
143	Blue-fronted redstart	<i>Phoenicurus frontalis</i>	Passeriformes	Muscicapidae	Vigors, 1832
144	Blue-fronted robin	<i>Cinclidium frontale</i>	Passeriformes	Muscicapidae	Blyth, 1842
145	Chestnut-bellied rock thrush	<i>Monticola rufiventris</i>	Passeriformes	Muscicapidae	Jardine & Selby, 1833
146	Common stonechat	<i>Saxicola torquatus</i>	Passeriformes	Muscicapidae	Linnaeus, 1766
147	Dark-sided flycatcher	<i>Muscicapa sibirica</i>	Passeriformes	Muscicapidae	Gmelin, 1789
148	ferruginous flycatcher	<i>muscicapa ferruginea</i>	Passeriformes	Muscicapidae	Hodgson, 1845
149	Golden bush robin	<i>Tarsiger chrysaeus</i>	Passeriformes	Muscicapidae	Hodgson, 1845

150	Grey bushchat	<i>saxicola ferreus</i>	Passeriformes	Muscicapidae	Gray, 1846
151	Grey-headed canary-flycatcher	<i>Culicicapa ceylonensis</i>	Passeriformes	Stenostiridae	Swainson, 1820
152	Hodgson's Redstart	<i>Phoenicurus hodgsoni</i>	Passeriformes	Muscicapidae	Moore, 1854
153	Indian blue robin	<i>Larvivera brunnea</i>	Passeriformes	Muscicapidae	Hodgson, 1837
154	Large niltava	<i>Niltava grandis</i>	Passeriformes	Muscicapidae	Blyth, 1842
155	Little pied flycatcher	<i>Ficedula westermanni</i>	Passeriformes	Muscicapidae	Sharpe, 1888
156	Orange-flanked bush-robin	<i>Tarsiger cyanurus</i>	Passeriformes	Muscicapidae	Pallas, 1773
157	Oriental magpie-robin	<i>Copsychus saularis</i>	Passeriformes	Muscicapidae	Linnaeus, 1758
158	Pale blue flycatcher	<i>Cyornis unicolor</i>	Passeriformes	Muscicapidae	Blyth, 1843
159	Plumbeous water redstart	<i>Phoenicurus fuliginosus</i>	Passeriformes	Muscicapidae	Vigors, 1831
160	pygmy blue-flycatcher	<i>Ficedula hodgsoni</i>	Passeriformes	Muscicapidae	Moore, 1854
161	Rufous-bellied niltava	<i>Niltava sundara</i>	Passeriformes	Muscicapidae	Hodgson, 1837
162	Rufous-gorgeted flycatcher	<i>Ficedula strophiatea</i>	Passeriformes	Muscicapidae	Hodgson, 1837
163	Sapphire flycatcher	<i>Ficedula sapphira</i>	Passeriformes	Muscicapidae	Blyth, 1843
164	Slaty-blue flycatcher	<i>Ficedula tricolor</i>	Passeriformes	Muscicapidae	Hodgson, 1845
165	Small niltava	<i>Niltava macgrigoriae</i>	Passeriformes	Muscicapidae	Burton, 1836
166	snowy-browed flycatcher	<i>Ficedula hyperythra</i>	Passeriformes	Muscicapidae	Blyth, 1843
167	Spotted fork-tail	<i>Enicurus maculatus</i>	Passeriformes	Muscicapidae	Vigors, 1831
168	Slaty-backed fork-tail	<i>Enicurus schistaceus</i>	Passeriformes	Muscicapidae	Hodgson, 1836
169	Ultramarine flycatcher	<i>Ficedula superciliaris</i>	Passeriformes	Muscicapidae	Jerdon, 1840
170	Verditer flycatcher	<i>Eumyias thalassinus</i>	Passeriformes	Muscicapidae	Swainson, 1838
171	White-browed bush-robin	<i>Tarsiger indicus</i>	Passeriformes	Muscicapidae	Viellot, 1817
172	White-capped water-redstart	<i>Phoenicurus leucocephalus</i>	Passeriformes	Muscicapidae	Vigors, 1831
173	White-crowned fork-tail	<i>enicurus leschenaulti</i>	Passeriformes	Muscicapidae	Viellot, 1818
174	White-gorgeted flycatcher	<i>Anthipes monileger</i>	Passeriformes	Muscicapidae	Hodgson, 1845
175	White-rumped shama	<i>Kittacincla malabarica</i>	Passeriformes	Muscicapidae	Scopoli, 1788
176	White-tailed robin	<i>Cinclidium leucurum</i>	Passeriformes	Muscicapidae	Hodgson, 1845
177	White-tailed stonechat	<i>Saxicola leucurus</i>	Passeriformes	Muscicapidae	Blyth, 1847
178	Asian Black bulbul	<i>Hypsipetes leucocephalus</i>	Passeriformes	Pycnonotidae	Gmelin, 1789
179	Black-crested bulbul	<i>Pycnonotus flaviventris</i>	Passeriformes	Pycnonotidae	Tickell, 1833
180	Mountain bulbul	<i>Ixos mcclllandii</i>	Passeriformes	Pycnonotidae	Horsfield, 1840
181	Red-vented bulbul	<i>Pycnonotus cafer</i>	Passeriformes	Pycnonotidae	Linnaeus, 1766
182	Red-whiskered bulbul	<i>Pycnonotus jocosus</i>	Passeriformes	Pycnonotidae	Linnaeus, 1758
183	Striated bulbul	<i>Pycnonotus striatus</i>	Passeriformes	Pycnonotidae	Blyth, 1842
184	White-throated bulbul	<i>Alophoixus flaveolus</i>	Passeriformes	Pycnonotidae	Gould, 1836
185	Black eagle	<i>Ictinaetus malaiensis</i>	Accipitriformes	Accipitridae	Temminck, 1822
186	Common buzzard	<i>Buteo buteo</i>	Accipitriformes	Accipitridae	Linnaeus, 1758
187	Crimson-browed finch	<i>Carpodacus subhimachalus</i>	Passeriformes	Fringillidae	Hodgson, 1836
188	Mountain hawk-eagle	<i>Nisaetus nipalensis</i>	Accipitriformes	Accipitridae	Hodgson, 1836
189	Long-legged buzzard	<i>Buteo rufinus</i>	Accipitriformes	Accipitridae	Cretzschmar, 1827
190	Black-headed munia	<i>Lonchura malacca</i>	Passeriformes	Estrildidae	Linnaeus, 1766
191	Black-throated munia	<i>Lonchura kelaarti</i>	Passeriformes	Estrildidae	Jerdon, 1863
192	Scaly-breasted munia	<i>Lonchura punctulata</i>	Passeriformes	Estrildidae	Linnaeus, 1758
193	White-rumped munia	<i>Lonchura striata</i>	Passeriformes	Estrildidae	Linnaeus, 1766
194	Black-winged cuckooshrike	<i>Lalage melaschistos</i>	Passeriformes	Campephagidae	Hodgson, 1836
195	Grey-chinned minivet	<i>Pericrocotus solaris</i>	Passeriformes	Campephagidae	Blyth, 1846
196	Large wood-shrike	<i>Tephrodornis virgatus</i>	Passeriformes	Vangidae	Temminck, 1824
197	Long-tailed minivet	<i>Pericrocotus ethologus</i>	Passeriformes	Campephagidae	Bangs & Phillips, 1914
198	Scarlet minivet	<i>Pericrocotus flammeus</i>	Passeriformes	Campephagidae	Forster, 1781
199	Short-billed minivet	<i>Pericrocotus brevirostris</i>	Passeriformes	Campephagidae	Vigors, 1831

200	Black-faced laughingthrush	<i>Trochalopteron affine</i>	Passeriformes	Leiotrichidae	Blyth, 1843
201	Blue-winged laughingthrush	<i>Trochalopteron squamatum</i>	Passeriformes	Leiotrichidae	Gould, 1835
202	Chestnut-crowned laughingthrush	<i>Trochalopteron erythrocephalum</i>	Passeriformes	Leiotrichidae	Vigors, 1832
203	Black-tailed crane	<i>Zapornia bicolor</i>	Gruiformes	Rallidae	Walden, 1872
204	Common coot	<i>Fulica atra</i>	Gruiformes	Rallidae	Linnaeus, 1758
205	Black-throated sunbird	<i>Aethopyga saturata</i>	Passeriformes	Nectariniidae	Hodgson, 1836
206	Green-tailed sunbird	<i>Aethopyga nipalensis</i>	Passeriformes	Nectariniidae	Hodgson, 1837
207	Mrs gould's sunbird	<i>Aethopyga gouldiae</i>	Passeriformes	Nectariniidae	Vigors, 1831
208	Streaked spiderhunter	<i>Arachnothera magna</i>	Passeriformes	Nectariniidae	Hodgson, 1837
209	Black-throated tit	<i>Aegithalos concinnus</i>	Passeriformes	Aegithalidae	Gould, 1855
210	Rufous-fronted bushtit	<i>Aegithalos iouschistos</i>	Passeriformes	Aegithalidae	Blyth, 1844
211	Blue-throated barbet	<i>Psilopogon asiaticus</i>	Piciformes	megalaimidae	Latham, 1790
212	Great barbet	<i>Psilopogon virens</i>	Piciformes	Megalaimidae	Boddaert, 1783
213	Blue whistling thrush	<i>Myophonus caeruleus</i>	Passeriformes	Muscicapidae	Scopoli, 1786
214	Chestnut thrush	<i>Turdus rubrocanus</i>	Passeriformes	Turdidae	Hodgson, 1846
215	Dark-throated thrush	<i>Turdus ruficollis</i>	Passeriformes	Turdidae	Pallas, 1776
216	Dusky thrush	<i>Turdus eunomus</i>	Passeriformes	Turdidae	Temminck, 1831
217	Green cochoa	<i>Cochoa viridis</i>	Passeriformes	Turdidae	Hodgson, 1836
218	Grey-sided thrush	<i>turdus feae</i>	Passeriformes	Turdidae	Salvadori, 1887
219	Grey-winged blackbird	<i>Turdus boulboul</i>	Passeriformes	Turdidae	Latham, 1790
220	Lesser shortwing	<i>Brachypteryx leucophris</i>	Passeriformes	Muscicapidae	Temminck, 1827
221	Long-tailed thrush	<i>Zoothera dixonii</i>	Passeriformes	Turdidae	Seebohm, 1881
222	Plain-backed thrush	<i>Zoothera mollissima</i>	Passeriformes	Turdidae	Blyth, 1842
223	Purple cochoa	<i>Cochoa purpurea</i>	Passeriformes	Turdidae	Hodgson, 1836
224	Rusty-bellied shortwing	<i>Brachypteryx hyperythra</i>	Passeriformes	Muscicapidae	Jerdon & Blyth, 1861
225	Tickell's thrush	<i>Turdus unicolor</i>	Passeriformes	Turdidae	Tickell, 1833
226	White-browed shortwing	<i>Brachypteryx montana</i>	Passeriformes	Muscicapidae	Horsfield, 1822
227	White-collared black bird	<i>Turdus albocinctus</i>	Passeriformes	Turdidae	Royle, 1840
228	Brown dipper	<i>Cinclus Pallasii</i>	Passeriformes	Cinlidae	Temminck, 1820
229	Brown shrike	<i>Lanius cristatus</i>	Passeriformes	Laniidae	Linnaeus, 1758
230	Long-tailed shrike	<i>Lanius schach</i>	Passeriformes	Laniidae	Linnaeus, 1758
231	Grey-backed shrike	<i>Lanius tephronotus</i>	Passeriformes	Laniidae	Vigors, 1831
232	Brown-throated treecreeper	<i>Certhia discolor</i>	Passeriformes	Certhiidae	Blyth, 1845
233	Rusty-flanked treecreeper	<i>Certhia nipalensis</i>	Passeriformes	Certhiidae	Blyth, 1845
234	Eurasian treecreeper	<i>certhia familiaris</i>	Passeriformes	Certhiidae	Linnaeus, 1758
235	Cattle egret	<i>Bubulcus ibis</i>	Pelecaniformes	Ardeidae	Linnaeus, 1758
236	Cinamon bittern	<i>Ixobrychus cinnamomeus</i>	Pelecaniformes	Ardeidae	Gmelin, 1789
237	Indian pond heron	<i>Ardeola grayii</i>	Pelecaniformes	Ardeidae	Sykes, 1832
238	Little egret	<i>Egretta garzetta</i>	Pelecaniformes	Ardeidae	Linnaeus, 1766
239	Chestnut-breasted partridge	<i>Arborophila mandellii</i>	Galliformes	Phasianidae	Hume, 1874
240	Hill Partridge	<i>Arborophila Torqueola</i>	Galliformes	Phasianidae	Valenciennes, 1826
241	Kalij pheasant	<i>lophura leucomelanos</i>	Galliformes	Phasianidae	Latham, 1790
242	Red junglefowl	<i>Gallus gallus</i>	Galliformes	Phasianidae	Linnaeus, 1758
243	Rufous-throated partridge	<i>Arborophila Rufogularis</i>	Galliformes	Phasianidae	Blyth, 1850
244	White-cheeked partridge	<i>arborophila atrogularis</i>	Galliformes	Phasianidae	Blyth, 1850
245	Coal tit	<i>Periparus ater</i>	Passeriformes	Paridae	Linnaeus, 1758
246	Golden-throated barbet	<i>Psilopogon franklinii</i>	Piciformes	megalaimidae	Blyth, 1842
247	great tit	<i>parus major</i>	Passeriformes	Paridae	Linnaeus, 1758
248	Green-backed tit	<i>Parus monticolus</i>	Passeriformes	Paridae	Vigors, 1831
249	Grey-crested tit	<i>Lophophanes dichrous</i>	Passeriformes	Paridae	Blyth, 1844

250	Rufous-vented tit	<i>Periparus rubidiventris</i>	Passeriformes	Paridae	Blyth, 1847
251	Sultan tit	<i>Melanochlora sultanea</i>	Passeriformes	Paridae	Hodgson, 1837
252	Yellow-browed tit	<i>Sylviparus modestus</i>	Passeriformes	Paridae	Burton, 1836
253	Yellow-cheeked tit	<i>Machlolophus spilonotus</i>	Passeriformes	Paridae	Bonaparte, 1850
254	Yellow-billed blue magpie	<i>Urocissa flavirostris</i>	Passeriformes	Corvidae	Blyth, 1846
255	Common green magpie	<i>Cissa chinensis</i>	Passeriformes	Corvidae	Boddaert, 1783
256	Eurasian jay	<i>Garrulus glandarius</i>	Passeriformes	Corvidae	Linnaeus, 1758
257	Grey treepie	<i>Dendrocitta formosae</i>	Passeriformes	Corvidae	Swinhoe, 1863
258	House crow	<i>Corvus splendens</i>	Passeriformes	Corvidae	Vieillot, 1817
259	Large-billed crow	<i>Corvus macrorhynchos</i>	Passeriformes	Corvidae	Wagler, 1827
260	Spotted nutcracker	<i>Nucifraga caryocatactes</i>	Passeriformes	Corvidae	Linnaeus, 1758
261	Common hoopoe	<i>Upupa epops</i>	Bucerotiformes	Upupidae	Linnaeus, 1758
262	Common kestrel	<i>Falco tinnunculus</i>	Falconiformes	Falconidae	Linnaeus, 1758
263	Common kingfisher	<i>Alcedo Atthis</i>	Coraciiformes	Alcedinidae	Linnaeus, 1758
264	Crested kingfisher	<i>Megaceryle lugubris</i>	Coraciiformes	Alcedinidae	Temminck, 1834
265	Common myna	<i>Acridotheres tristis</i>	Passeriformes	Sturnidae	Linnaeus, 1766
266	Common hill myna	<i>Gracula religiosa</i>	Passeriformes	Sturnidae	Linnaeus, 1758
267	Great myna	<i>Acridotheres grandis</i>	Passeriformes	Sturnidae	Moore, 1858
268	Crested bunting	<i>Emberiza lathamii</i>	Passeriformes	Emberizidae	Gray, 1831
269	Little bunting	<i>Emberiza pusilla</i>	Passeriformes	Emberizidae	Pallas, 1776
270	Eurasian tree sparrow	<i>Passer montanus</i>	Passeriformes	Passeridae	Linnaeus, 1758
271	House sparrow	<i>Passer domesticus</i>	Passeriformes	Passeridae	Linnaeus, 1758
272	Russet sparrow	<i>Passer cinnamomeus</i>	Passeriformes	Passeridae	Temminck, 1836
273	Eurasian woodcock	<i>Scolopax Rusticola</i>	Charadriiformes	Scolopacidae	Linnaeus, 1758
274	Fire-capped tit	<i>Cephalopyrus flammiceps</i>	Passeriformes	Paridae	Burton, 1836
275	Fire-breasted flowerpecker	<i>Dicaeum ignipectus</i>	Passeriformes	Dicaeidae	Blyth, 1843
276	Plain flowerpecker	<i>Dicaeum minullum</i>	Passeriformes	Dicaeidae	Swinhoe, 1870
277	Yellow-bellied flowerpecker	<i>Dicaeum melanozanthum</i>	Passeriformes	Dicaeidae	Blyth, 1843
278	Eurasian golden oriole	<i>Oriolus oriolus</i>	Passeriformes	Oriolidae	Linnaeus, 1758
279	Maroon oriole	<i>Oriolus trailii</i>	Passeriformes	Oriolidae	Vigors, 1832
280	Grey nightjar	<i>Caprimulgus jotaka</i>	Caprimulgiformes	Caprimulgidae	Temminck & schlegel, 1847
281	Grey wagtail	<i>Motacilla cinerea</i>	Passeriformes	Motacillidae	Tunstall, 1771
282	Olive-backed pipit	<i>Anthus hodgsoni</i>	Passeriformes	Motacillidae	Richmond, 1907
283	Rosy pipit	<i>Anthus roseatus</i>	Passeriformes	Motacillidae	Blyth, 1847
284	White wagtail	<i>Motacilla alba</i>	Passeriformes	Motacillidae	Linnaeus, 1758
285	Yellow wagtail	<i>Motacilla flava</i>	Passeriformes	Motacillidae	Linnaeus, 1758
286	Hill prinia	<i>Prinia superciliaris</i>	Passeriformes	Cisticolidae	Salvadori, 1874
287	Jungle prinia	<i>Prinia sylvatica</i>	Passeriformes	Cisticolidae	Jerdon, 1840
288	Striated prinia	<i>Prinia crinigera</i>	Passeriformes	Cisticolidae	Hodgson, 1836
289	house swift	<i>apus nipalensis</i>	Caprimulgiformes	Apodidae	Hodgson, 1836
290	White-rumped spintail	<i>Zoonavena sylvatica</i>	Caprimulgiformes	Apodidae	Tickell, 1846
291	Long-tailed broadbill	<i>Psarisomus dalhousiae</i>	Passeriformes	Eurylaimidae	Jameson, 1835
292	Maroon-backed accentor	<i>Prunella immaculata</i>	Passeriformes	Prunellidae	Hodgson, 1845
293	Rufous-breasted accentor	<i>Prunella strophliata</i>	Passeriformes	Prunellidae	Blyth, 1843
294	Orange-bellied leafbird	<i>Chloropsis hardwickii</i>	Passeriformes	Chloropseidae	Jardine & Selby, 1830
295	Oriental white-eye	<i>Zosterops palpebrosus</i>	Passeriformes	Zosteropidae	Temminck, 1824
296	Red-headed trogon	<i>Harpactes erythrocephalus</i>	Trogoniformes	Trogonidae	Gould, 1834
297	Ward's trogon	<i>Harpactes wardi</i>	Trogoniformes	Trogonidae	Kinncar, 1927
298	Red-wattled lapwing	<i>Vanellus indicus</i>	Charadriiformes	Charadriidae	Boddaert, 1783
299	River lapwing	<i>Vanellus duvaucelii</i>	Charadriiformes	Charadriidae	Lesson, 1826

300	Rufous-necked hornbill	<i>Aceros nipalensis</i>	Bucerotiformes	Bucerotidae	Hodgson, 1829
301	White-throated fantail	<i>Rhipidura albicollis</i>	Passeriformes	Rhipiduridae	Vieillot, 1818
302	Yellow-bellied fantail	<i>Chelidorhynch hypoxanthus</i>	Passeriformes	Stenostiridae	Blyth, 1843
303	Winter wren	<i>Troglodytes hiemalis</i>	Passeriformes	Troglodytidae	Vieillot, 1819
304	Yellow-rumped honeyguide	<i>Indicator xanthonotus</i>	Piciformes	Indicatoridae	Blyth, 1842
305	Himalayan bush - robin	<i>Tarsiger rufilatus</i>	Passeriformes	Muscicapidae	Hodgson, 1845
306	Isabelline shrike	<i>Lanius isabellinus</i>	Passeriformes	Laniidae	Ehrenberg, 1833
307	Ashy bulbul	<i>Hemixos flava</i>	Passeriformes	Pycnonotidae	Blyth, 1845
308	Black - throated thrush	<i>Turdus atrogularis</i>	Passeriformes	Turdidae	Jarocki, 1819

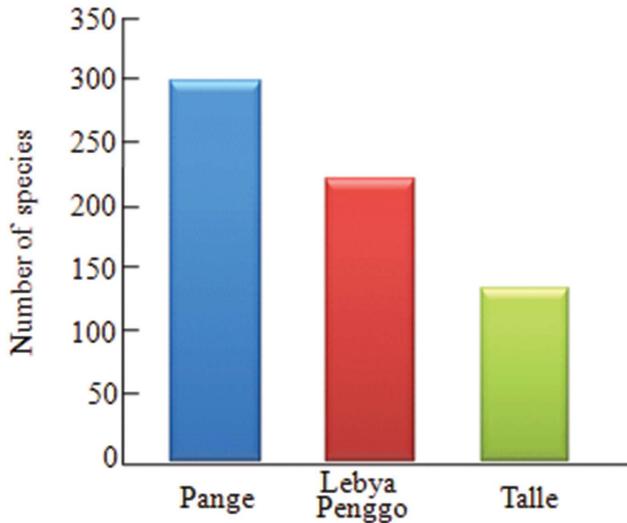


Fig. 4. Total counts of birds at TVWLS. Out of 308 species of birds recorded; Pange study area has the highest record of 299 species of birds followed by Lebya Penggo study area with 222 numbers of species and least records of birds species is at Talle study area with 135 species only.

observed, out of 308 recorded birds species, thirteen (13) species are threatened and rest least concerned. Four species are categorized as vulnerable namely Beautiful nuthatch, Chestnut breasted partridge, Grey sided thrush and Rufous necked hornbill. Nine species are categorized as near threatened namely Ashy headed green pigeon, Blackish breasted babbler, River lapwing, Rufous throated wren babbler, Rusty bellied shortwing, Tyler’s leaf warbler, Ward’s trogon, White cheeked partridge and Yellow rumped honeyguide.

The value of the population trend of the documented avifauna at TVWLS in accordance with IUCN shows stable, decreasing, increasing and unknown categories. One hundred fifty six (156) recorded species are currently stable. One hundred twelve (112) species listed are in decreasing trend.

Twenty seven (27) species documented are in unknown status. Only thirteen (13) species has shown increasing population trend (Fig. 7).

During the entire study, some of the birds like Olive-backed pipit, Black bulbul, Wedge tailed green pigeon, Red crossbill were recorded in group.

The migratory birds, common coot and White collared blackbird were recorded from Pange study area (Fig.8). In Lebya Penggo and Talle study areas, Common coot was not recorded during the study period but White collared blackbird was recorded during the entire dry season. Common coot was seen from April to June, it is an aquatic bird. White collared blackbird was recorded in three (3) study areas from October to February. The endangered species of ward’s trogon; the female and male shows colour variation (Fig. 9). The female is yellowish in looks whereas the male is reddish in colour.

Diversity indices of avian fauna

Among the study areas of Pange, Lebya Penggo and Talle, Pange shows the diversity index value above 4.7 which indicate that the numbers of individuals are evenly distributed between all species. The higher diversity index values of 4.9 have been showed during the dry season (October to February) and lesser diversity index of 4.7 to 4.8 during wet season. The highest diversity index of 4.95 in Pange study area have been recorded in the month of October. It is the time when most of the tree species bears fruits and as such higher activities of avifauna were observed during this period. The least value of 4.73 has been recorded in the month of March. It is the time when most of the avifauna species are in their nesting stage and as such fewer activities of the birds were observed (Fig. 10A).

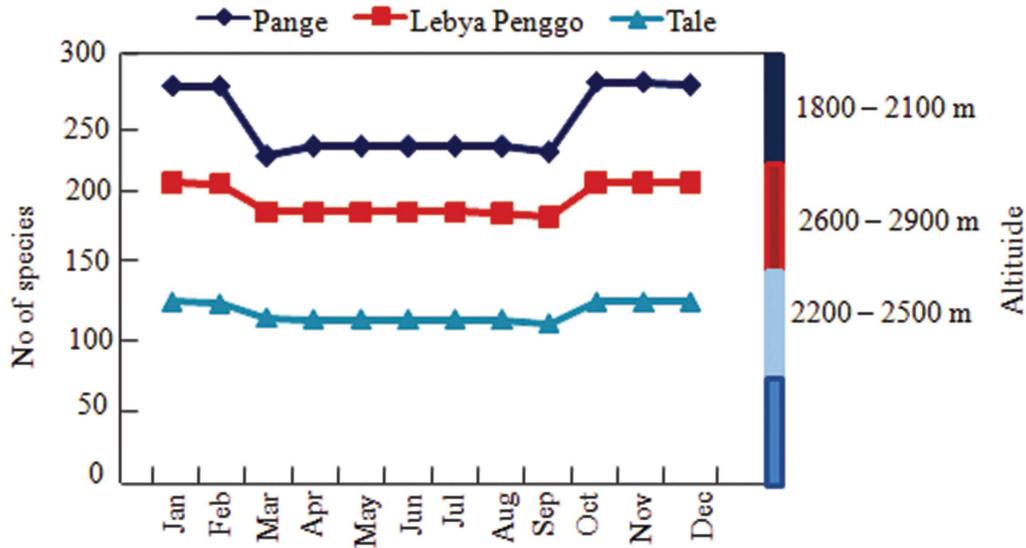


Fig. 5. Pattern of Annual distribution of birds at Talle Valley Wildlife Sanctuary in three different study sites. Lowest altitude is Pange having maximum observation of species round the year than the other two locations. Lebya Penggo is the highest altitude having less number of species than the Pange; the Talle area which is the core area of TVWLS showed constant minimum number of species during winter and summer.

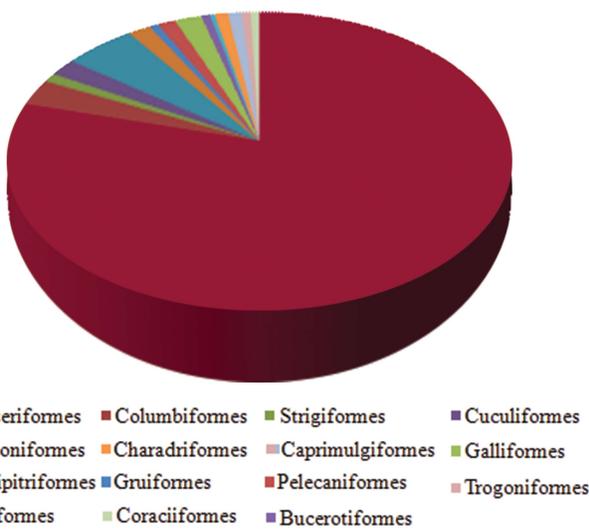


Fig. 6. Number of birds species recorded in TVWLS according to the order. Maximum number of species was recorded under the Order Passeriformes.

Lebya Penggo study area shows diversity index of 4.7 to 4.8. Dry season shows higher diversity index of 4.8 and wet season shows index of 4.6 to 4.7. The overall diversity index of each month of the year is above 4.7 which indicate that the numbers of individuals are evenly distribution between all species in Lebya Penggo study area (Fig. 10B).

Talle study area shows diversity index of 4.0 to 4.2. Similar to Pange and Lebya Penggo study area; the diversity

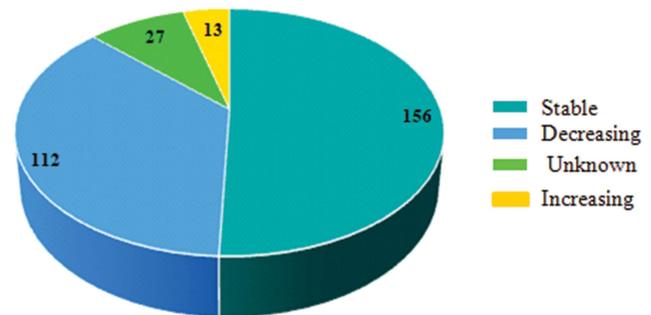


Fig. 7. Population trend of birds at TVWLS. Numbers indicate the species recorded as per IUCN status.

index is higher in the dry month and lesser in wet months. Dry months show diversity index of 4.2 and wet months shows index of 4.0 (Fig. 10C).

The Shannon –Wiener diversity index of Pange and Lebya Penggo study area shows less variation in compare to Talle study area. The individual data analyses of the recorded avifauna shows, the highest diversity index is in Pange study area followed by Lebya Penggo study area and least diversity index at Talle study area.

Discussion

Talle Valley Wildlife Sanctuary is very close to district headquarter, situated at a distance of 35 km north west of the



Fig. 8. (Winter Migratory), A. Common coot , B. White collared blackbird.

Zero town. The pristine and virgin forest in different altitudinal height of Talle Valley is considered as a high priority area for conservation of biological diversity. The vegetation at TVWLS are distinctive from general pattern. In general the conifers are found in high altitude zone and broad leaves forest are characteristics of low altitude areas with higher temperature. However, in Talle Valley areas, the conifers are found at the lowland and broad leaves predominates the higher altitude upland forests.

Wildlife research and exploration in Arunachal Pradesh has so far largely remained restricted to low and mid-elevation habitats with high altitude (>3000 meter) being virtually unexplored and unprotected (Sinha *et al.*, 2005) due to remote location, rugged mountainous terrain, poor road communication and other infrastructure. Talle Valley Wildlife Sanctuary which lies at 1800 to 2900m (above msl) has also been unexplored due to some serious impediments to reach the heart of the valley.

Out of 1263 species of avifauna in India, around 879 species are found in Arunachal Pradesh. According to IUCN

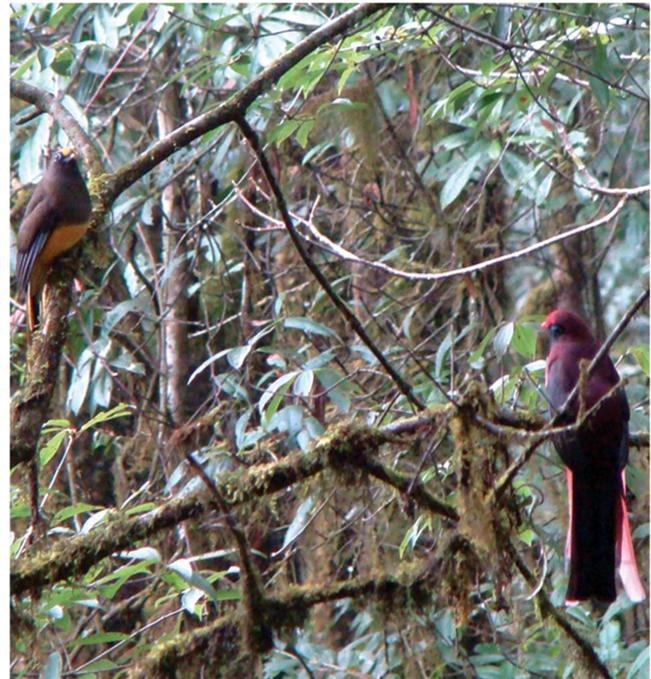


Fig. 9. Ward's trogon (Endangered Species): Male and female.

Red Data list-2015, forty three (43) species are under threatened category. Red headed vulture, White-rumped vulture, long-billed vulture, Slender-billed Vulture, Pink-headed duck, Baer's Pochard, White bellied heron, Bengal Florican and Bugun liocichla are critically endangered at global level. Seven (7) species of recorded birds fall under endangered category, twenty six (26) species are vulnerable and 33 species are near threatened.

Present data shows the maximum record of 299 species at low elevation of 1800-2100m msl. The similar study of spatial variation considering hornbill has been investigated in Namdapha Tiger Reserve, Changlang district at an elevation gradient of 200-4571m msl and Pakke Tiger Reserve, East Kameng district at elevation gradient of 150-2000m msl of Arunachal Pradesh. The result underscored the spatial variation in hornbill distribution with low densities of hornbill in higher elevation of Namdapha National Park and greater densities in Pakke Wildlife Sanctuary due to greater extent of suitable lowland forest habitat (Naniwadekar and Datta, 2013). The identical study of elevational gradients by Acharya *et al.* (2011) along 4500m msl of birds diversity was done in the Eastern Himalaya. Evaluation of distribution patterns and their

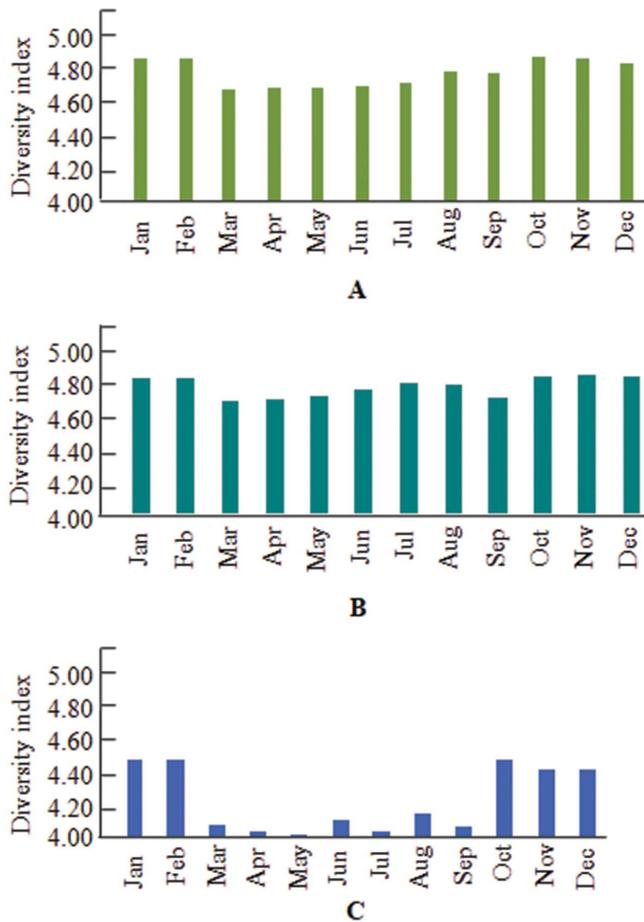


Fig. 10. A. Shannon - Wiener diversity index of avian distribution at Pange study area of TVWLS. B. Shannon - Wiener diversity index of avian distribution at Lebya Penggo study area of TVWLS. C. Shannon - Wiener diversity index of avian distribution at Talle study area study area of TVWLS.

underlying mechanisms showed that species richness increased to approximately 2000m msl and then declined.

In general species diversity measured in several ways show decrease with increasing elevation (Acharya *et al.*, 2011). In present study observation at Pange study area at an altitude of 1800 to 2100m msl 299 avifauna species have been recorded. It has been noticed that at elevation gradients of 2600 to 2900m, the Lebya Penggo study area records the higher number of 222 species. The least number of avian species has been recorded in Talle study area with 135 species which lies at an elevation gradient of 2200 to 2500m msl. It may be noted that Pange and Talle study areas are located in the valley and Lebya Penggo study area at Plateau. The investigation of the higher vertebrates were done by foot-march from Pange valley, the first study area at 1800-2100mtr,

than Lebya Penggo plateau, the second study area at 2600-2900m msl. The third study area, Talle valley's altitudinal gradient is 2200-2400m. msl. Thus, the study area of the wildlife sanctuary covers a landscape of valley-plateau-valley. Elevation gradients provide complex situations displaying various climatic, ecological and physiological factors' effects that impose limitations on species range extensions (Acharya and Chettri, 2012).

Climatically TVWLS is a cool area. Maximum temperatures of 31.6° Celsius are observed in the month of July and August and lower temperature of 1.1° Celsius in January. Talle study area is the coolest among the three study areas experiences freezing temperature as less as minus 4° Celsius in colder months. The present investigations on status assessment of avifauna showed that most of the bird species occur throughout the sanctuary, many species transverse differences in the landscape and forest structure. The occurrence of more species at Lebya Penggo study area at 2600-2900m msl than Talle study area which lies at the lower elevation of 2200-2500m msl is due to very dense vegetation cover and availability of more fruiting trees at Lebya Penggo study area than Talle study area. There are large patches of non-forest land at Talle study area. Moreover, extreme climatic event of cold in winter season and freezing of water bodies at Talle study area, causes the constrain of space use and thus, survival of avifauna.

The investigation on avifauna at TVWLS shows distribution of rare and threatened species. The IUCN Red List of Threatened Species, version 2016-3 (www.iucnredlist.org) has been adopted to categorize the threatened species. 13 species recorded are listed in threatened category. Beautiful nuthatch *Sitta formosa*, Chestnut breasted partridge *Arborophila mandellii*, Grey sided thrush *Turdus feae*, and Rufous necked hornbill *Aceros nipalensis* are in Vulnerable category. Nine (9) species recorded are Near threatened category; Ashy headed green pigeon *Treron phayrei*, Blackish breasted babbler *Stachyris humei*, River Lapwing *Vanellus duvaucelii*, Rufous-throated wren babbler *Spelaeorinis caudatus*, Rusty bellied shortwing *Brachypteryx hyperythra*, Tyler's leaf warbler *Phylloscopus tyleri*, Ward's trogon *Harpactes wardi*, White cheeked partridge

Arborophila atrogularis, and Yellow rumped honeyguide *Indicator xanthonotus*.

During the course of study at different elevation gradient of TVWLS, all threatened species were recorded from Pange Study area (1800-2100m) except Blackish breasted babbler *Stachyris humei*. In lebya Penggo study area (2600-2900m) 11 threatened species were documented and two species, River Lapwing *Vanellus duvaucelii* and Yellow rumped honeyguide *Indicator xanthonotus* were not recorded. 5 threatened species were listed from Talle study area (2200-2500m), Ashy headed green pigeon *Treron phayrei*, Grey sided thrush *Turdus feae*, Rufous-throated wren babbler *Spelaornis caudatus*, Tyler's leaf warbler *Phylloscopus tyleri* and Ward's trogon *Harpactes wardi* and rest of the 8 threatened species were not recorded.

The values of current population trend of recorded species included: stable, decreasing, increasing and unknown. One hundred fifty six (156) birds species recorded at TVWLS are currently in stable point. One hundred twelve (112) species including threatened are in decreasing value. The population trend of 27 recorded species are unknown at global level and only 13 species recorded; Asian barred owlet *Glaucidium cuculoides*, Asian house martin *Delichon dasypus*, black redstart *phoenicurus ochruros*, Cattle egret *Bubulcus ibis*, Chestnut-crowned laughing thrush *Trochalopteron erythrocephalum*, Common myna *Acridothera tristis*, great tit *parus major*, Greenish warbler *Phylloscopus trochiloides*, house swift *apus nipalensis*, Little egret *Egretta garzetta*, Red-vented bulbul *Pycnonotus caper*, Winter wren *Troglodytes troglodytes* and Yellow-cheeked tit *Parus spilonotus* are in increasing trend.

In 21st century, a bird species unknown to science, Bugun Liocichla *liocichla bugunorum* (Athreya, 2006) had been discovered and also after a gap of 60 years, Rusty-throated wren babbler *Spelaornis badeigularis* (King and Donahua, 2006) has been rediscovered from Arunachal Pradesh. However, avifaunas of many areas are poorly surveyed and inadequately documented (Srinivasan et al., 2010). No intensive survey on wildlife of Lower Subansiri district had been done so far. A scanty available reports on wildlife of

TVWLS indicates that proper survey and document of wildlife still remain awaited.

The present study at Talle Valley was an endeavour to document the status of birds. It was observed, a total three hundred eight (308) species of avifauna over the course of study from the year 2013 to 2016. Birds are the indicator of healthy environment (Kaplan et al., 2001), presence of 35% of the total 879 avian species of Arunachal Pradesh indicate that the habitats at TVWLS is conducive for avian species.

Acknowledgements

Authors are thankful to the Department of Forest, Government of Arunachal Pradesh for necessary permission to carry out the research. We are also thankful to the Divisional Forest Officer, other official staff of Talle Valley Wildlife Sanctuary and the local villagers at fringe areas for their help and cooperation during the study.

References

- Ali S. 2002.** The Book of Indian Birds (Thirteenth Edition). Oxford University Press.
- Acharya BK., Sanders, NJ., Vijayan L. and Chettri B. 2011.** Elevational gradients in bird diversity in the eastern Himalaya: an evaluation of distribution patterns and their underlying mechanisms. PLoS ONE 6: e29097.
- Acharya BK. and Chettri B. 2012.** Effect of climate change on birds, herpetofauna and butterflies in sikkim himalaya: A preliminary investigation. Abstract. Sikkim University, Gangtok.
- Athreya R. 2006.** A new species of Liocichla (Aves: Timaliidae) from Eagle nest Wildlife Sanctuary, Arunachal Pradesh, India. Indian Birds 2(4). Pp: 82-94.
- Burnham KP., Anderson DR and Laake JL. 1980.** Estimate of density from line transect sampling of biological populations. Wildlife Monograph 72. Pp: 202.
- Conner RN and Dickson JG. 1980.** Strip Transect Sampling and Analysis for Avian Habitat Use Studies. Wildl. Soc. Bull. 8. Pp: 4-10.
- Daniels RJR. 1989.** A conservation strategy for the birds of Uttara Kannada district. Ph.D Thesis. Indian Institute of Science, Bangalore.

- Dawson DG. 1981.** Experimental design when counting birds. *Studies in Avian Biol* 6. Pp: 392-398.
- Field SA, Tyre AJ and Possingham HP. 2002.** Estimating bird species richness: How should repeat surveys be organized in time? *Austral Ecology. A Journal of ecology in the southern hemisphere* Vol 27, issue 6. Pp: 624-629.
- Fuller RJ and Langslow DR . 1984.** Estimating numbers of birds by point count: how long should count last? *Bird study*. 31:3. Pp: 195-202.
- Gibbons DW, Hill D. and Sutherland WJ. 1996.** Birds. In *ecological census techniques: A handbook*, Ed. Sutherland, W.J. Pp: 227-259.
- Gopal R. 2012.** *Fundamentals of Wildlife Management*. 2nd Ed. Natraj publishers. Dehradun, India.
- Gregory RD, Noble DA and Custance J. 2004c.** The state of play of farmland birds: population trends and conservation status of farmland birds in the United Kingdom. *Ibis* 146 (Suppl.2). Pp: 1-3.
- Gregory RD, Noble DA and Field. 2003.** Using birds as indicators of biodiversity. *Ornis Hungarica* 12-13. Pp: 11-24.
- Grewal B, Harvey B and Pfishern O. 2002.** *Birds of India*.
- Grewal B, Sen S, Singh S, Devasar N and Bhatia G. 2016.** *Birds of India*.
- Grimmett R, Inskipp C and Inskipp T. 2011.** *Birds of the Indian Subcontinent (Second edition)*. Oxford University Press.
- Haselmayer J and Quinn JS. 2000.** A comparison of point counts and sound recording as bird survey methods in Amazonian southeast Peru. *Condor* 102. Pp: 887-893.
- Javed, S. 1996.** Study on bird community structures of Terai Forest in Dudwa National Park. Ph.D Thesis, Aligarh Muslim University, India.
- Javed S, Kaul R and Bombay Natural History Society. 2000.** Field methods for bird surveys. Department of wildlife sciences, Aligarh Muslim University, Aligarh and world Pheasant Association, South Asia Regional Office (SARO), Delhi, Bombay Natural History society, Mumbai, India
- Kaplan G and Rodgers LJ. 2001.** *Birds: Their habitats and skills*. Griffin press. South Australia. Pp: 3.
- King B and Donahue JP. 2006.** The rediscovery and song of Rusty-throated wren-Babbler *Spelaeornis badeigularis*. *Forktail* 22. Pp: 113-115.
- Lor S and Malecki RA. 2002.** Call response surveys to monitor marsh bird population trends. *Wildlife Soc. Bull*, 30. Pp: 1195-1201.
- Naniwadekar R and Datta A. 2013 .** Spatial and temporal variation in hornbill densities in Namdapha Tiger Reserves, Arunachal Pradesh, north-east India. *Tropical conservation science* vol.6 (6). Pp: 734-748.
- Newton PN. 2002.** Bird records from the Siang River valley, Arunachal Pradesh, India. *Forktail* 18. Pp: 156-157.
- Ramsey FI and Scott JM. 1981.** Analysis of bird survey data using a modification of Emlen's method. *Studies in Avian Biol* 6. Pp: 483-487.
- Rao RR. 1994.** *Biodiversity in India*. BSMPS, Dehradun.
- Rodgers WA, Panwar HS and Mathur VB. 2000.** *Biogeographical Classification of Indian in Wildlife Protected Area Network in India: A Review (Executive Summary)*. Wildlife Institute of India, Dehra Dun. Pp: 49.
- Ronald KH, Singh RK, Bamin Y, Gajurel PR, Rethy P and Singh B. 2015-16.** Management of rare and endangered medicinal plant using geoinformatics application in Lower Subansiri district of Arunachal Pradesh, India. *Bulletin of Arunachal Forest Research* Vol. 30 and 31, Nos.1 and 2. Pp: 41-50.
- Srinivasan MT and Borang A. 2013.** A Contribution to the Butterfly Fauna of Mouling national park, Arunachal Pradesh North East India. *Bulletin of Arunachal Forest Research* Vol. 28 and 29 (1 and 2). Pp: 55-61.
- Takhtajan A. 1969.** *Flowering plants, origin and dispersal*. Edinburg: Oliver and Boyd. Pp: 310.
- Terborgh J, Robinson SK, Parker TA, Munn CA and Pierpont N. 1990.** Structure and Organization of an Amazonian forest bird community. *Ecological Monographs* 60(2). Pp: 213- 238.
- Wemmer C, Kunz TH, Lundie- Junkins G and Mcshea W. 1996.** Mammalian sign. In Wilson, D. E., Cole, F.R., Nichols, J.D., Rudran, R. and Foster, M.S Editors.
- Whitman AA, Hagan JM and Brokaw NVL. 1997.** A comparison of two bird survey techniques used in a subtropical forest. *Condor* 99. Pp: 955-965.