



Studies on bird diversity of Overa-Aru Wildlife Sanctuary of Jammu and Kashmir, India

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The Overa-Aru Wildlife Sanctuary (WS) is one of the most important protected areas of the state of Jammu and Kashmir and lies within the distribution range of the endangered Hangul *Cervus elaphus hanglu*. This Sanctuary is the habitat of different species of birds during different seasons. The avian diversity of the state varies seasonally and available data suggests the existence of 358 species of birds belonging to 179 genera, 51 families under 16 orders. Eight species of sympatric warblers, Simla Black Tit *Parus rufonuchalis*, Rufous-bellied Crested Tit *Parus rubidiventris*, Crested Black Tit *Parus melanolophus* were abundant, found close to the tree line, and breed

in the Overa-Aru (Price & Jamdar 1989, 1990, 1991). However, Stattersfield et al. (1998) have reported 11 restricted range species, four or more of which have been found in the sanctuary. Birdlife International (2001) reported that the only threatened species in Overa-Aru WS is the Kashmir Flycatcher *Ficedula subrubla*, a restricted range species and it was found wintering in Sri Lanka and in the Western Ghats (Ali & Ripley 1987). The present study is an attempt to list the bird species of Overa-Aru WS, which can be useful as baseline information for future conservation and management of the habitat.

Study Area

This study was carried out in the Overa-Aru Wildlife Sanctuary located in the Himalayan biogeographical zone to the southeast of Srinagar, with the southern boundary at Pahalgam in Anantnag District (Image 1). It is a famous tourist attraction in this region. The Sanctuary lies in Lidder Valley Forest Division surrounded by Sindh Forest Division in the north; Lidder Forest in the south; Pahalgam in the east; and Dachigam National Park in the west. The Sanctuary is located at an altitude of 2100–5425 m between 34°11'18"N & 75°18'40"E (Bhatt & Bhargava 2005).

The Sanctuary is named after two villages, Overa and Aru (Suhail 2000). Overa-Aru is an old sanctuary declared under Dogra rule in 1945. At that time the Sanctuary covered only 32km² which was later extended to 392km² when Aru forest was included in the year 1981. Initially, the same order designated the area as a biosphere reserve of 425km² under the “Man and Biosphere Programme”, but neither the Government of India nor UNESCO accepted the designation and finally the State Government declared the whole area as a wildlife sanctuary (Suhail 2000). The dominant trees species were *Cedrus deodara*, *Pinus griffithii*, *Abies pindrow*, *Aesculus indica* etc. The major shrub species were *Indigofera heterantha*, *Viburnum* sp., *Sorbaria tomentosa* etc. The ground cover was very rich and dicotyledonous herbs dominated, comprising of *Rumex patientia*, *Primula* sp., *Anemone* sp.

Methods

Birds were surveyed for about one week every

Date of publication (online): 26 October 2012
Date of publication (print): 26 October 2012
ISSN 0974-7907 (online) | 0974-7893 (print)

Editor: Rajiv S. Kalsi

Manuscript details:

Ms # o2899

Received 02 August 2011

Final received 16 June 2012

Finally accepted 14 September 2012

Citation: Khah, S.K., R.J. Rao & K.A. Wani (2012). Studies on bird diversity of Overa-Aru Wildlife Sanctuary of Jammu and Kashmir, India. *Journal of Threatened Taxa* 4(13): 3228–3232.

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Acknowledgements: The authors are indebted to Chief Wildlife Warden, Department of Wildlife Protection Jammu and Kashmir, officers and field staff for their cooperation and support. We are highly thankful to Head Department of Zoology, Jiwaji University, Gwalior for providing all the facilities for the present work.

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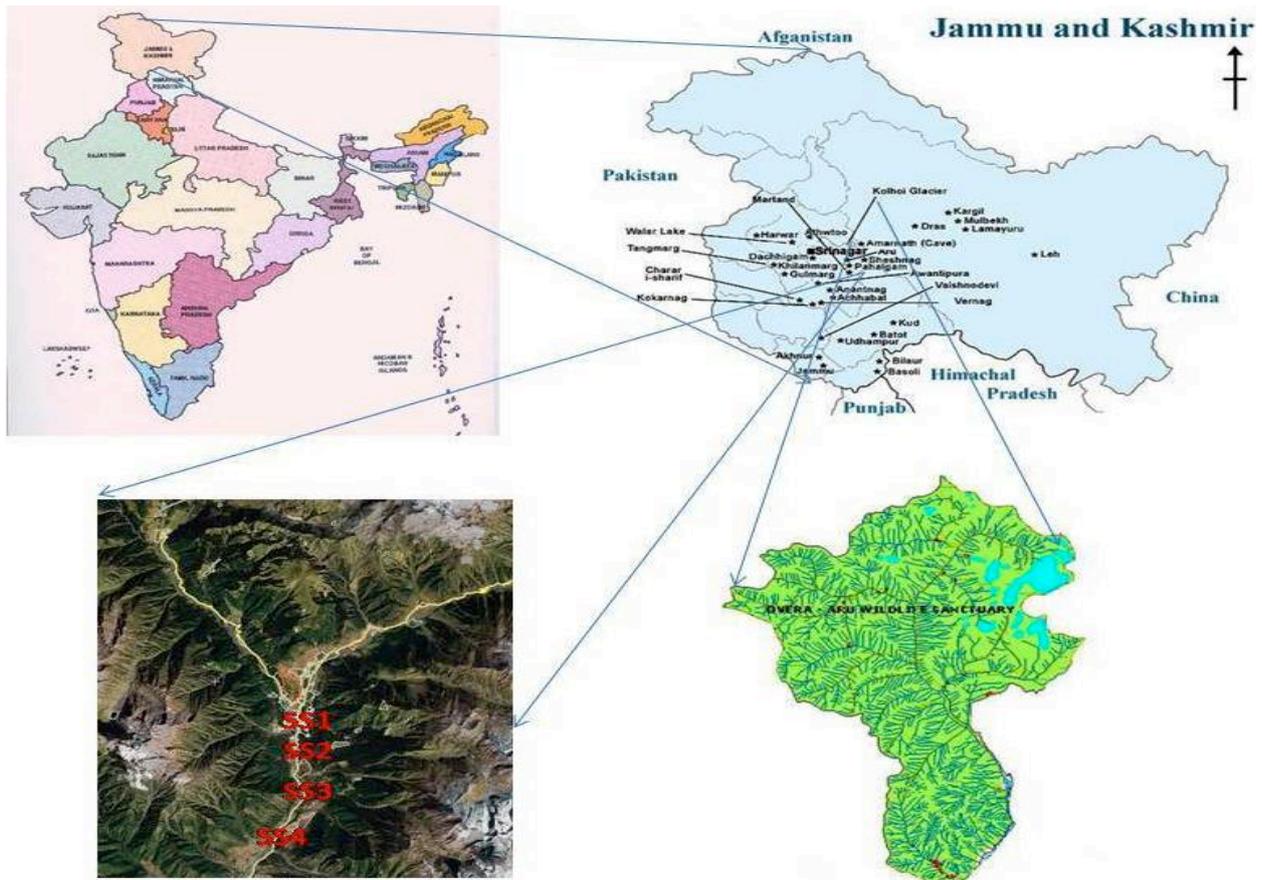


Figure 1. Study area

month from October 2010 to June 2011. The surveys were conducted on foot and observations were made with 7–21x40 binoculars, mainly in the morning and evening. Grimmett et al. (1998) and Ali & Ripley (1987) were used for identification, and in many cases photographs were taken in order to confirm the identification.

For the present study, eight study sites were selected, four of which were in the Overa part and the other four from the Aru part of the sanctuary. The study sites were selected and surveyed on the basis of harbouring varied biodiversity. Frequent occurrence of different bird species in these areas during spring and summer seasons was another reason for the selection of these areas. The birds were categorised into abundant or very common, common and fairly common based on their abundance and their feeding habits as in Ali & Ripley (1987). Various research advisors, local communities, field staff of Overa-Aru WS and other key organizations were consulted during the study period for data collection.

Bird species diversity and evenness

Species diversity was calculated using the Shannon-Weiner Diversity Index (Shannon & Weaver 1949).

$$H = - \sum_{i=1}^s p_i \log p_i$$

Where $i = 1$

H - Symbol for the diversity in a sample of S species

S - The number of species in the sample

P_i - relative abundance of i th species measured, = n_i/N

N - Total number of individuals of all species

n_i - number of individuals of i th species

log - natural log

Results and Discussion

The avifauna of the Overa-Aru WS includes a large number of birds both resident and migratory. Resident as well as migratory birds were found in the lower areas from March–September. A total of 702 individual birds representing 29 species, 22 families

and five orders, were observed from the sanctuary during the study (Table 1). Family Motacillidae had the highest number of species (six) followed by Sturnidae, Muscicapidae, Passeridae, Columbidae with two species each. Fifteen families were represented by single species each (Appendix 1).

Price et al. (2003) reported a list of 70 species of birds in the Overa-Aru WS in contrast to 117 bird species recorded in or around the sanctuary. Eighty nine species breed within its boundaries as listed by Price & Jamdar (1990).

More than 70% of the birds were breeding residents in the Overa-Aru WS. Species such as Rock Bunting *E. cia*, Jungle Crow *C. macrorhynchos*, Common Stonechat *Saxicola torquatus*, Oriental Turtle Dove *Streptopelia orientalis*, Russet Sparrow *Passer rutilans* and various species of warblers were found breeding in the lower areas of the sanctuary. Price & Jamdar (1989, 1991) reported eight species of sympatric warblers breeding in Overa-Aru.

Among foraging groups, the bird community of insectivores dominated, representing more than 72% of the species and 65% of the individuals. Omnivores comprised more than 10% of the species and 22% of the individuals while granivores represented more than 10% of the species and 8% of the individuals. Carnivores and frugivores were least represented in this study of avian community of Overa-Aru WS.

Diversity Indices of both resident and migratory birds of Overa-Aru were calculated by the Shannon-Wiener method (Fig. 1). The species diversity index fluctuated from 0.097 (site-1) to 0.064 (site-5). The highest diversity was shown in site-1, while site-5 had

the lowest diversity. Apart from the diversity, species evenness has shown variation in the first five sites with values of 0.061 (site-2), 0.073 (site-1), 0.067 (site-3), 0.051 (site-4) and 0.044 (site-5) with respect to each other. Site-6, site-7 and site-8 have shown almost the same species evenness to each other. The variation in species diversity and species evenness at various sites may be due to the influx of tourists, vehicles and local people in and near the sanctuary and the availability of food to the birds. The Overa-Aru WS is located at Pahalgam which is a tourist hub in Jammu and Kashmir.

The anthropogenic activities such as parking lots, housing developments and agricultural fields may have changed the diversity in the area which is well reflected by the species composition before human intervention (Sax & Gaines 2003).

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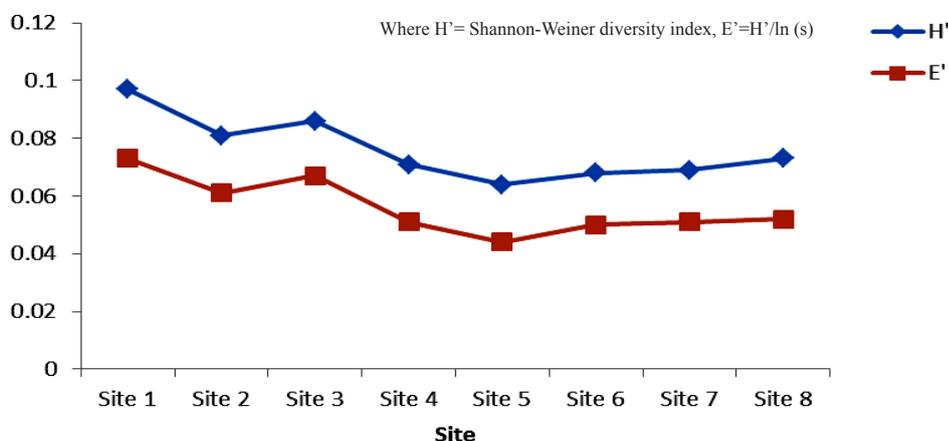


Figure 1. Shannon diversity index and evenness of birds in Overa-Aru Wildlife Sanctuary

Table 1. The migratory status, feeding habits, abundance and status of avifauna of Overa-Aru Wildlife Sanctuary

	Scientific name	Common name	Migratory status	Feeding habit	Status
1	<i>Corvus macrorhynchos</i>	Jungle Crow	R,A	O	2
2	<i>Sturnus vulgaris</i>	Common Starling	W,P,M,R*	F	1
3	<i>Acridotheres tristis</i>	Common Myna	W,A,M	I	2
4	<i>Saxicola torquatus</i>	Common Stone Chat	R,M,P	I	2
5	<i>Rhyacornis fuliginosa</i>	Plumbeous Water-redstart	R	O	1
6	<i>Passer rutilans</i>	Russet Sparrow	A	G	3
7	<i>Motacilla citreola</i>	Citrine Wagtail (Image 2)	M	I	2
8	<i>Streptopelia orientalis</i>	Oriental Turtle Dove	R,M,W	G	3
9	<i>Myophonus caeruleus</i>	Blue Whistling Thrush	A,M	I	1
10	<i>Pycnonotus leucogenys</i>	Himalayan Bulbul	R•	I	2
11	<i>Emberiza cia</i>	Rock Bunting	A,M	I	2
12	<i>Columba livia</i>	Rock Pigeon	R,A	G	1
13	<i>Motacilla alba</i>	White Wagtail (Image 3)	A,M	I	2
14	<i>Motacilla cinerea</i>	Grey Wagtail (Image 4)	A,M,W	I	2
15	<i>Motacilla flava</i>	Yellow Wagtail (Image 5)	B,W,P	I	1
16	<i>Anthus roseatus</i>	Rosy Pipit	A,M,W	I	2
17	<i>Prunella rubeculoides</i>	Robin Accentor	A	I	3
18	<i>Lanius schach</i>	Long Tailed Shrike	R•,M	I	2
19	<i>Phylloscopus occipitalis</i>	Western Crowned Warbler	M	I	1-3
20	<i>Gyps himalayensis</i>	Himalayan Griffon Vulture	A	C	3
21	<i>Phylloscopus affinis</i>	Tickell's Leaf Warbler	M	I	1
22	<i>Carduelis spinoides</i>	Yellow Breasted Green Finch	A	I	2
23	<i>Upupa epops</i>	Common Hoopoe	R,B,W	I	2
24	<i>Parus major</i>	Great Tit	R,A	I	1
25	<i>Dendrocopos himalayensis</i>	Himalayan Woodpecker	N,A	I	2
26	<i>Anthus trivialis</i>	Tree Pipit	M,P,W	I	3
27	<i>Terpsiphone paradisi</i>	Asian Paradise Flycatcher	R•,M,P	I	3
28	<i>Rhyacornis fuliginosa</i>	Plumbeous Water Redstart	A	I	2

Migratory status: R - residential, W - winter visitor, A - altitudinal migrant, P - passage migrant, M - migrates within the subcontinent, N - near endemic, * - localised or patchily distributed, • - subject to some seasonal movement or wandering.

Feeding habit: P - Piscivores, H - Herbivores, O - Omnivores, C - Carnivores, I - Insectivores, G - Granivores, F - Frugivores

Status: 1 - abundant or very common, 2 - common, 3 - fairly common



Image 2. Citrine Wagtail *Motacilla citreola*



Image 3. White Wagtail *Motacilla alba*



Image 4. Grey Wagtail *Motacilla cinerea*

Appendix 1. Site wise population of birds in Overa-Aru Wildlife Sanctuary

	Scientific name	Family	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Total
1	<i>Corvus macrorhynchos</i>	Corvidae	4	2		7	8	7	6	10	44
2	<i>Sturnus vulgaris</i>	Sturnidae	1	8		2	2	1		3	17
3	<i>Acridotheres tristis</i>	Sturnidae	2	6		4	3	9	4	9	37
4	<i>Saxicola torquatus</i>	Muscicapidae				3	4			2	9
5	<i>Rhyacornis fuliginosa</i>	Muscicapidae	10	8	4	10	4	6	2	6	50
6	<i>Oriolus oriolus</i>	Oriolidae			7	4	9	8	2	8	23
7	<i>Passer rutilans</i>	Passeridae	2		5	3	5	5	3	4	27
8	<i>Passer domesticus</i>	Passeridae				3	2	3	2	2	12
9	<i>Motacilla citreola</i>	Motacillidae			1		3	7	2	4	17
10	<i>Motacilla alba</i>	Motacillidae	8	6	2	9	2	5			32
11	<i>Motacilla cinerea</i>	Motacillidae					4	5	3	2	14
12	<i>Motacilla flava</i>	Motacillidae	2	3	2	4	1	7	3	3	25
13	<i>Anthus roseatus</i>	Motacillidae	5	6	3	4	5	5	1	2	29
14	<i>Anthus trivialis</i>	Motacillidae	3	2	4	2	3	13		3	30
15	<i>Myophonus caeruleus</i>	Turdidae	2	1	2	2	2	4	3	3	19
16	<i>Pycnonotus leucogenys</i>	Pycnonotidae	2	1	2	1	7	7	2	5	27
17	<i>Emberiza cia</i>	Emberizidae	2	2		2	1		2	2	11
18	<i>Prunella rubeculoides</i>	Prunellidae		2	3	2	1	4	2	2	16
19	<i>Terpsiphone paradisi</i>	Monarchidae	2	3	2		3	2	1	3	17
20	<i>Parus major</i>	Paridae	2	1	1	1			2		7
21	<i>Lanius schach</i>	Laniidae	25	13	15	4	3				60
22	<i>Carduelis spinoides</i>	Fringillidae		2			8	3	4	2	19
23	<i>Phylloscopus occipitalis</i>	Phylloscopidae	3	1	2	2	2				10
24	<i>Phylloscopus affinis</i>	Phylloscopidae	1	1	2	1	4	3	2	2	16
25	<i>Streptopelia orientalis</i>	Columbidae	2	2	1	1	1	4	1	1	13
26	<i>Columba livia</i>	Columbidae	1	6	4	2	12		2	6	33
27	<i>Gyps himalayensis</i>	Accipitridae					1	2	1	1	4
28	<i>Upupa epops</i>	Upupidae	2			2	4	2	8	2	20
29	<i>Dendrocopos himalayensis</i>	Picidae	20	10	4	8	3	6	3	10	64
	Total		101	86	66	83	107	117	61	93	702

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Image 5. Yellow Wagtail *Motacilla flava*

