Off Print

ISSN: 2319-3174

Himalayan Journal of Contemporary Research

Vol. IV No. 1 JANUARY-JULY 2015

What is the Potential for Citizen Science to Inform Avian Conservation in the Western Himalayas, India

Virat Jolli
Mathew J Grainger

HIMACHAL PRADESH UNIVERSITY
SHIMLA-171 005

What is the Potential for Citizen Science to Inform Avian Conservation in the Western Himalayas, India

Virat Jolli
Mathew J Grainger

The construction of hydro-electric projects in Sainj Valley has negatively affected critical habitat for montane bird communities. These habitats can be restored but only if local communities are willing to participate. However, there is lack of knowledge among local people regarding the rich biodiversity of this region, especially avian-fauna. Inform local people about the importance of biodiversity we initiated a citizen science program to target local school children and educate them regarding the importance of conservation of avian habitats in this region. The study showed promising future for citizen science projects in Western Himalayas. It will ensure long term benefits for the region.

Keywords: Citizen science, Western Himalayas, Birds, Community participation

CITIZEN science or community science is a process in which the general public are involved in science as researchers [1, 2]. Citizen science can also include concerned citizens, government agencies, industry, academia, community groups, and local institutions coming "...together to monitor, track and respond to issues of common environmental concern" [3]. Citizen science has been a popular tool to collect data regarding distribution and abundance of birds in European and North American countries [4, 5]. However, it is in its infancy in India.

Community involvement in the conservation of protected areas can yield excellent results [6]. It is of general opinion that protected areas will not be fully protected unless local people are willing to participate [7]. Here we wished to explore the extent that citizen science can contribute to monitoring of the biodiversity of the Himalayan mountain ecosystems.

The Himalayan mountain ecosystem is one of the most important ecosystems in India. It is the source of many perennial river water systems and hence popularly known as the "water-tower" of South Asia [8, 9]. It harbours a large variety of plants and animal species including several endemics [10]. These restricted range species include cheer pheasant *Catreus wallichii* and western tragopan *Tragopan melanocephalus*.

The Western Himalayas provides critical habitats for montane birds, which are facing threat due to the proliferation of hydro-electric project (HEP) development [11]. Parvati Hydro-electric Project is one such project which in under construction in and around the Great Himalayan National Park Conservation Area (GHNPCA). The region is known to harbour a sizable population of endemic bird species such as cheer pheasant and western tragopan (12, 13). Further, more than 209 bird species have been recorded from this region [14]. This region is characterised by a large

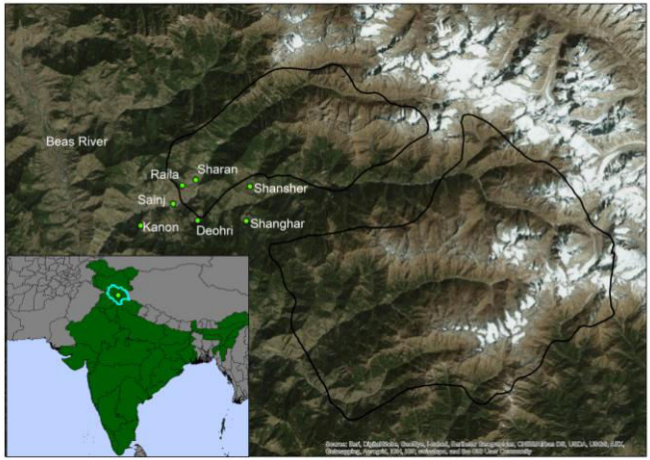


Figure 1. The location of the study region within India (inset; Himachal Pradesh is highlighted in blue and the Sainj Valley is marked with a green dot) and the location of the main towns in the Sainji Valley (shown in the main panel; towns are marked with a green dot and the Great Himalayan National Park Conservation Area is outlined in black).

number of upland villages where native people practice traditional farming systems which comprise of agriculture fields in the matrix of forest. These mosaic habitats provide habitats to forest as well as agricultural bird and thus higher species diversity of montane birds [15]. Thus the region is important from a conservation point of view. The activities associated with HEP construction degrade the surrounding habitats through blasting and dumping of excavated material along the slopes of mountains. Road cutting followed by increasing influx of heavy vehicles and people put pressure on the local environment and cause habitat loss [11]. It is reasonable to expect that these changes in land use will cause changes in bird species diversity and communities [16]. Thus, there is need for effective conservation strategies to prevent further critical habitat loss and monitoring of biodiversity.

Here we aim to explore the potential of local people (citizen science) to inform avian conservation in Sainj Valley.

Material and methods

Study Area

The Sainj Valley (31°45'0" to 31°55'0"N; 77°15'0" to 77°25'0"E) is drained by the Sainj khad River, an important tributary of the Beas River. The Valley is situated in the North-Western Himalayas in Kullu District of Himachal Pradesh, about 45 km to the South-East of Kullu. Sampling was conducted in or near to the towns of Sainj, Raila, Shanghar, Shansher, Deohri, Sharan and Kanon (*Figure 1*). The elevation of sampling sites ranged between 1300 and 2300 m.

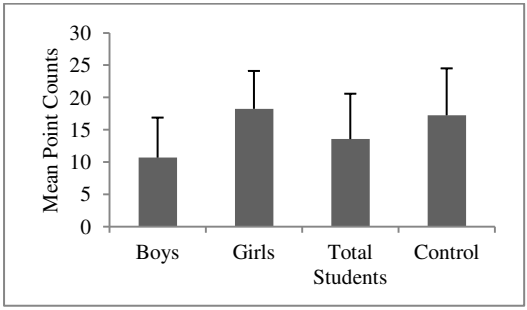
Sainj is a small town situated on the Sainj Khad. Parvati Hydro-electric Power (PHEP) house is under construction in the close vicinity (Suind). As a result of PHEP road connectivity is improved and the town is now considered an important town in the Kullu District. Around 2/3rd area of Sainj Valley comes under Great Himalayan National Park Conservation Area (GHNPCA).

Field work and bird identification

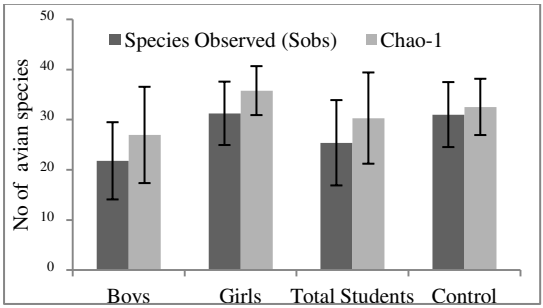
A total of 21 students participated from four different schools in the Sainj Valley. We selected two Government Senior Secondary Schools, Sainj and Shansher and two Government High Schools, Raila and Shanghar, for this project. In each selected school, we delivered lectures on environmental conservation and educated them about the importance of birds of Sainj valley and encouraged students to engage in training in bird identification and monitoring (*Appendix 2*). From each school 4-5 students were selected and given training.

Bird identification: We used the Birds of Indian Subcontinent [17, 18] and Birds of Sainj Valley [19], to identify birds during field work. We asked students to identify birds on the basis of size, shape, colour and calling behaviour. Each student was given a data sheet for counting birds. They independently collected the data and after

a)



b)



c)

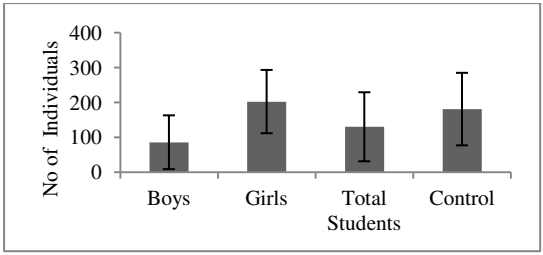


Figure 2. (a) Mean number of points counted (b) Observed and estimated species richness of birds recorded (c) Mean number of bird individuals recorded by each boys, girls, total students and control (myself) in Sainj Valley (Spring 2014). Error bars represent standard deviation (SD).

completing the counting they submitted their sheets.

Point count surveys

For counting birds and quantifying the species richness and abundance of birds a variable radius point count method along transects was used [20]. This method is preferable in steep mountain slopes where visibility is usually low. The point count in general is the preferred method for the study of bird communities in temperate and tropical regions [20, 21, & 22]. Depending upon the habitat accessibility, transects (1000-2000 m length) of variable width were laid in the vicinity of each school. In each transect, (4-8) sampling points were established by maintaining a minimum of 200 m distance between the points to avoid double counting. In total 50 points counts were monitored and started at 7 o'clock to 11 on fair weather days (i.e. absence of heavy rain, fog or strong wind). The point counts were made from May 2014 to June 2014. All birds seen or heard during sampling at each point were recorded for 10 minutes. The location of the birds were noted to avoid double recording. All birds flying over the canopy were excluded and we did not count birds beyond 50 m distance (21). Individuals were counted in the rural landscapes and their surroundings. We avoided other habitat types such as forest, secondary forest, degraded forest etc. as different habitats could have different detection rate and thus influence our results.

Data analysis

Species richness, estimated species richness (Chao-I) and abundance of birds were calculated using PAST version 2.05 [23].

For calculating student's efficiency, the students data was pooled in to three groups; girls, boys and total students. Species richness, diversity and abundance estimates of each of the three groups was compared with the 'control' (a trained ornithologist 'VJ'). The standard deviation was used to determine the efficiency of studied groups.

Results

Student's efficiency

During the two months bird survey, the total students (n=21) counted an average of 13.57 ± 7.02 (SD) number of point counts compared to the control with mean point counts of 17.25 ± 7.27 (U = 147, P = 0.067). Girls (n= 8) completed an average point count of 18.25 ± 5.8 which was significantly higher than the boys 10.69 ± 6.2 (n=13, U = 19, P = 0.02) (*Figure 2a*).

Avian species richness, and bird's individuals as estimated by students

The estimated avian species richness i.e. Chao-1 ($Sp_{control}$) of Sainj Valley was recorded as 32.53 ± 5.6 (SD). Total students recorded a mean avian species richness of 30.3 ± 9.1. The girls recorded a mean species richness of 35.78 ± 4.88 which was higher than that recorded by the boys (26.94 ± 9.6). Girls were more consistent with

less deviation in estimation of species richness compared to boys (*Figure 2b*). Observed mean avian species richness recorded by total students were 25.38 ± 8.5 significantly lower than control 31 ± 6.5 (U = 119, P = 0.01). Similarly, avian species richness (Sp_{obs}) recorded by boys were 21.78 ± 7.7 which was significantly lower than control (U = 26, P = 0.002). However girls recorded a mean avian species (Sp_{obs}) 31.25 ± 6.3 with no significant difference with control (U = 24, P = 0.43) and significantly different from boys (U = 19, P = 0.01).

Mean number of bird individuals ($Ind_{control}$) in Sainj Valley was recorded as 180.5 ± 103.9 significantly higher than total students 129.9 ± 99.9 (U = 128, P = 0.02). The girls recorded a highest number of birds i.e. 202 ± 90.65 with no significant difference with control (U = 24, P = 0.42). While, boys recorded the lowest number of bird individual 85.61 ± 77.1 significantly different from control (P = 0.006) and girl (P = 0.004) in the valley. (*Figure 2c*).

Discussion

In the community based bird count survey, the boys and girls from various Government schools participated. They learnt to identify and count birds. During the survey a total of 21 students (13 boys and 8 girls) participated in the bird survey. Despite boys being more numerous it was the girls who were more efficient and consistent in surveying a greater number of points and estimating higher species richness and diversity. They might have overestimated the avian species richness and diversity by double counting.

It is more convenient to employ males in fieldwork in India as it is socially acceptable for them to travel to far and remote places. In Indian society, men generally work to earn the livelihood whilst women perform most of the household work. However in Himachal Pradesh, women help their family in the cultivation of crops, collection of fire wood and medicinal plants (non forest and timber produce) which adds to family income. Thus they enjoy a much better position in their family than in other Indian States. During the project, girls were found to be good bird surveyors and we would like to employ them in future surveys, this could lead to social change in Sainj Valley.

The bird survey was efficiently carried out with the help of students in the valley. They were able to count more than 30 bird species and monitored different sites of the Valley.

However, students encountered and identified common birds more often while rare and elusive birds were difficult to locate and identify. Moreover larger bird species like crows, mynas, thrushes, and kingfishers were easy to identify while small birds especially warblers and tits were difficult to identify.

This bird survey was carried out in upland villages which constitutes upland and

farmland birds. In near future, these students can be used to monitor upland villages which are repository of unique birds of Western Himalayas. Long term monitoring of farmland and upland villages will give useful information for management of avian biodiversity of Western Himalayas an Endemic Bird Area (EBA). Bird survey highlighted the potential for common bird monitoring in the Valley in particular and Western Himalayas in general.

Works Cited

Kruger, L. E., & Shannon, M. A. 2000. Getting to know ourselves and our places through participation in civic social assessment. - *Society and Natural Resources, 13*, 461–478.

Carr, A. J. L. 2004. Why do we all need community science. - *Society and Natural Resources, 17*, 841–849.

Whitelaw, G., Vaughan, H., Craig, B., & Atkinson, D. 2003. Establishing the Canadian Community Monitoring Network. - *Environmental Monitoring and Assessment, 88*, 409–418.

Greenwood, J. J. 2007. Citizens, science and bird conservation. - *Journal of Ornithology*, *148*(1), 77-124.

Silvertown, J. 2009. A new dawn for citizen science. - *Trends in ecology & evolution*, *24*(9), 467-471.

Waylen, K. A., Fischer, A. & McGowan, P. J. K. 2010. Effect of local cultural context on the success of community-based conservation interventions. - *Conservation Biology* 24(4), 1119-1129.

Bharucha, E. 2013. Textbook of Environmental Studies. 2nd Edition. Universities Press Private Limited.

Qiu, J. 2008. The third pole. - Nature 454:393–396.

Xu, J. C., Yang, Y., Li, Z. Q., Tashi, N., Sharma, R. and Fang, J. 2008. Understanding land use, livelihoods, and health transitions among Tibetan Nomads: a case from Gangga Township, Dingri County, Tibetan Autonomous Region of China. - EcoHealth 5:104–114

Conservation International. 2014. http://sp10.conservation.org/where/priority_areas/hotspots/asia-pacific/Himalaya/Pages/default.aspx downloaded on 18th Nov 2014.

Jolli, V. 2014a. Impacts of Parvati Hydro-electric project development on the critical habitats of montane birds of Western Himalaya. Unpublished Thesis. University of Delhi, India.

Miller, J. R. B. 2010. Survey of Western Tragopan, Koklass Pheasant, and Himalayan Monal populations in the Great Himalayan National Park, Himachal Pradesh, India. - Indian Birds 6(3):60-65

Jolli, V., Srivastav, A., and Thakur, S. 2011. Patch occupancy for cheer pheasant Catreus wallichii in the Great Himalayan National Park Conservation Area. - International Journal of Galliformes Conservation, 2: 74-81.

GHNP, 2014. http://www.greathimalayannationalpark.com/birds/index.html Downloaded on 05-October-2014.

Jolli, V. 2014c. Upland habitats as micro hotspot of avian biodiversity: a case study of Sainj Valley Western Himalayas. BOU Proceedings– Ecology and conservation of birds in upland and alpine habitats. http://www.bou.org.uk/bouproc-net/uplands/poster-virat.pdf

Waltert, M., Mardiastuti, A., & Mühlenberg, M. 2004. Effects of land use on bird species richness in Sulawesi, Indonesia. - *Conservation Biology*, *18*(5), 1339-1346.

Grimmett, R., Inskipp, C., and Inskipp, T. 2013. Birds of Indian Subcontinent. 2nd Edition. Oxford University Press, India.

Kazmierczak, K. & Perlo V. B, 2009. Om field guide birds of India. Om Books International.

Jolli, V. 2014b. Birds of Sainj Valley. 1st Edition. https://www.createspace.com/4662172

Bibby, C.J., Burgess, D. N., Hill, D. A. and Mustoe, S. H. 2000. *Bird Census Techniques*. Academic Press, London.

Raman, T. R. S. 2003. Assessment of census techniques for interspecific comparisons of tropical rainforest bird densities: a field evaluation in the Western Ghats, India. - *Ibis*, 145: 9-21.

Acharya B. K., Sanders, N. J., 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(12): e29097. doi:10.1371/journal.pone.0029097

Hammer, Ø., Harper, D. A. T. and Ryan, P. D. 2001. PAST: Paleontological statistical software package for education and data analysis, - Paleontological Electronica, 4 (1): 9.

Appendix 1. List of bird species recorded in Sainj Valley (Nov 2013- Jun 2014).

		Common Name	Scientific Name	Status	Altitudinal Range
	Phasianidae				
1		Black Partridge	*Francolinus francolinus*	R2	<1200 (2500)
2		Kaleej Pheasant	*Lophura leucomelanos hamiltonii*	A2	600-3700
	Picidae				
3		Scaly-bellied Woodpecker	*Picus squamatus*	R3	1000-3300
4		Himalayan Woodpecker	*Dendrocpos himalayensis*	NA2	1500-Treeline
5		Brown fronted Woodpecker	*Dendrocpos auriceps*	NA2	1000-3100
	Accipitridea				
6		Himalayan griffon	*Gyps himalayensis*	A3	900-4000
	Ramphastidae				
7		Great barbet	*Megalaima virens*	A2	1000-3000
	Upupidae				
8		Common Hoopoe	*Upupa epops*	RBW2	<4600
	Halcyonidae				
9		White Throated Kingfisher	*Halcyon smyrnensis*	R.1	<2300
10		Crested Kingfisher	*Megaceryle lugubris*	R2	< 2800

	Psittacidae				
11		Slaty Headed Parakeet	*Psittacula himalayana*	R.A2	600-2500
12	Tichodromadidae				
		Wallcreeper	*Tichodroma muraria*	AW2-3	1000-3000
	Apodidae				
13		Alpine Swift	*Tachymarptis melba*	B*M.3	<2200
	Strigidae				
14		Asian Barred Owl	*Glaucidium cuculoides*	RA2	<2700
	Columbidae				
15		Blue Rock Pigeon	*Columba liva*	RA1	<3300
16		Oriental turtle dove	*Stretopelia orientalis*	RMW3	<4000
	Falconidae				
17		Common Kesteral	*Falco tinnunculus*	RW2	<3300
	Oriolidae				
18		Indian Gloden Oriole	*Oriolus oriolus*		

	Corvidae			
19	Jungle crow	*Corvus macrorhynchos*	RA2	
20	Yellow billed magpie	*Urocissa flavirostris*	RA2	1600-2700
21	Asian Paradise Flycatcher	*Terpsiphone paradisi*	R.MP3	<1800
22	Ashy drongo	*Dicrurus leucophaeus*	RAM2	<3300
23	Long tailed minivet	*Pericrocotus ethologus*	RAM2	<1000
24	White throated fantail	*Rhipidura albicollis*	R.A2	<1700
25	Grey treepie	*Dendrocitta formosae*	RA2	<2100
	Cinclidae			
26	Brown dipper	*Ciculus pallasii*	A2	450-4000
	Muscicapidae			
27	White tailed stone chat	*Saxicola leucura*	R*.3-4	700+
28	Verditer flycatcher	*Eumyias thalassina*	MA2	1200-2700
29	Blue whistling thrush	*Myophonus caeruleus*	AM1	1500-2400 (treeline)
30	Blue caped rock thrush	*Monticola cinclorhynchus*	M2-3	1200-2200
31	Grey bush chat	*Saxicola ferrea*	AM2	1800-3000
32	Plumbeous water redstart	*Rhyacornis fulginosus*	A2	1200-4400
33	Grey-headed Canary Flycatcher	*Culicicapa ceylonensis*	<2700	RAM1
34	Spotted forktail	*Enicurus maculatus*	AR2	1200-3000
35	River chat	*Phoenicurus erythrogaste*	A2	1800-5300
	Sturnidea			
36	Common Myna	*Acridotheres tristis*	R1	<3050

	Certhiidae				
37		Bar tailed treecreeper	*Certhia himalayana*	AM2	2000-treeline
	Paridae				
38		Great tit	*Parus major*	RA1	<3600
39		Green backed tit	*Parus monticolus*	RA1	1200-3600
40		Rufous-naped Tit	*Parus rufonuchalis*	RA2	2700-4000
	Aegithalidae				
41		Black throated tit	*Aegithalos concinnus*	R.2	1400-2700
	Hirudinidae				
42		Barn swallow	*Hirundo rustica*	RMW1	<3000
	Pycnonotidae				
43		Black bulbul	*Hypsipetes palpebrosus*	R.A1	<3000
44		Himalayan Bulbul	*Pycnonotus leucogenys*	R.2	300-2400
	Cisticolidae				
45		Striated prinia	*Prinia criniger*	A2	900-2300
	Zosteropidae				
46		Oriental white eye	*Zosterops palpebrosus*	R.1-2	>1800

	Sylviidae			
47	Western crowned warbler	*Phylloscopus occipitalis*	M1-3	1600-2500
48	Rufous sibia	*Heterophasia capistrata*		
49	Rusty cheeked scimater babler	*Pomatorhinus erythrogenys*		
50	Grey hooded warbler	*Seicercus xanthoschistos*	A1	1000-2300
51	Whiskered Yuhinia	*Yuhina flavicollis*	A1	1700-3000
52	Varigated laughing thrush	*Garrulax variegatus*	EA2	2400-treeline
	Nectariniidae			
53	Firebreasted flowerpecker	*Dicaeum ignipectus*	A2	1400-2700
	Passeridae			
54	House sparrow	*Passer domesticus*	M1	<4000
55	Russet sparrow	*Passer rutilans*	A3	1200-2700
56	Grey wagtail	*Motacilla cinerea*	AMW2	1800-3900
	Fringillidae			
57	Rock bunting	*Emberiza cia*		
58	Fire fronted serin	*Serinus pusillus*	A3	1500-3300
59	Yellow breasted green finch	*Carduelis spinoides*	A2	1800-4400
60	Common rose finch	*Carpodacus erythrinus*	AM2-3	2000-3900
61	Pink browed rosefinch	*Carpodacus rodochrous*	A3	2800-4200

Status			
		1	abundant or very common
E	Endemic to Indian subcontinent	2	common
N	near-endemic	3	fairly common
R	resident	4	uncommon
B	breeder	5	Scarce or rare
S	summer visitor		
A	altitudinal migrant		
M	migrates within the subcontinent		
P	passage migrant		
W	winter visitor		

Appendix 2. List of study material used to educate students.

1. Book on Birds of Sainj Valley, 1st Edition 2014.

2. Biodiversity Conservation. NCERT 12TH Class Biology Chapter http://ncert.nic.in/NCERTS/l/lebo115.pdf

3. Birds and vegetation sampling technique. Virat Jolli, Ph.D. Thesis Impacts of Parvati Hydro-electric Project Development on The Critical Habitats of Montane Birds of Western Himalaya.

4. Technique for sampling avian habitats. Barry R Noon http://fishwild.vt.edu/Chihuahua%202005/READINGS/noon.pdf

Appendix 3. Based on the bird survey results following inferences can be drawn

Site	**Bird Survey**	**Inference**
1. Sainj (N=10)	The site had the highest species richness, and diversity of birds in the Valley. Bird community: grey hooded warbler, ashy drongo, Indian golden oriole, great barbet, Asian paradise flycatcher, crested kingfisher, brown dipper, and plumbeous water redstart	Though the site was surrounded by human settlements and market area, it still supported a number of bird species. The primary reason behind high diversity and richness of bird was because the site came under sacred groove i.e. in this site no logging and construction of human settlement was allowed. The site had sufficient canopy and ground cover. The multilayer vegetation provided suitable habitats to number of bird species. The Sainj River flowed on left bank and attracted some large birds like spotted kingfisher, brown dipper, and plumbeous water redstart.
2. Deohri (N=7)	2nd most species rich and diverse site and the most	The upland site was characterised by mosaic of agriculture

	rich and diverse amongst upland sites. Bird community: yellow breasted greenfinch, black francolin, great barbet, russet sparrow, oriental turtle dove, house sparrow, Siberian stone chat and great barbet.	field interrupted by tree patches and shrub cover along the hedges. The moderate intensity of agriculture (i.e. no use of mechanised farming) had made it a suitable habitat for a number bird species. The easy availability of food resources (food grains, and fruits) supported number of bird species.
3. Shanghar (N=10)	An important birding site (Jolli, 2014a) recorded moderate species richness and diversity of birds. However the abundance was low compared to other sites. Bird community: rock bunting, western crowned warbler, black throated tit, rufous napped tit and scaly bellied woodpecker.	During the bird count, road construction was underway in Shanghar. The road cutting could have displaced birds which resulted in lower estimation of birds in Shanghar during the bird count.
4. Kanon (N=6)	The site recorded a moderate level of species	We were able to monitor few point counts in this Valley,

	richness and diversity; it was lower compared to other upland villages. Bird community: yellow billed blue magpie, blue capped rock thrush and brown fronted woodpecker.	this could results in moderate level of species richness and diversity. However we expected to have higher number of bird in this site.
Raila (N=12)	This site had lower species richness and diversity compared to other monitored sites. However abundance of birds was very high. The bird community: black throated tit, yellow billed blue magpie, common myna black bulbul and streaked laughing thrush, russet and house sparrow.	The village was previously disturbed by Parvati hydro power development and it had degraded the habitats of montane birds in adjoining areas of Raila site. This site had the presence of large number of generalist species like Jungle crow, house sparrow, common myna, and streaked laughing thrush which caused increase in abundance of birds in this site.
Sharan (N=7)	The bird species richness, diversity and abundance were low. Bird community: yellow billed blue magpie,	The site was affected because of PHEP development and resulted in low species richness and diversity during the bird count. The proximity to Suind power house construction site (part of PHEP) which caused relatively

	Siberian stone chat, common myna, house sparrow and grey bush chat.	higher influx of people and heavy machine vehicles, landslides had disturbed the Sharan. Moreover changing farming practices could have resulted in decline in abundance and diversity of birds.
Shansher (N=7)	It had the lowest number of species richness and diversity amongst all the monitored sites. Bird community: grey bush chat, russet sparrow, pink browed rosefinch and black francolin.	The ongoing construction of road and dam building activity around the village could have resulted in lower number of species diversity in this site. The road cutting together with blasting could have displaced the birds to surrounding areas having lesser human disturbance. There is increased influx of people and mushrooming of labour colony in adjoining area of this site.

Where N = Number of Samples (point count)

Appendix 4: Mean number of bird individuals, observed species richness, and Cho-1 (estimated species richness) of montane birds recorded in 7 different sites of Sainj Valley (Spring 2014) where SE represents standard error and N = number of point counts..

Name of Site	**Mean no. of bird individuals (± SE)**	**Observed Species Richness (± SE)**	**Chao-1 (± SE)**
Sainj (N = 19)	100.43 ± 13.17	25.43 ± 1.23	32.96 ± 1.76
Sharan (N = 7)	38 ± 5.64	17.17 ± 2.13	21.08 ± 2.88
Shansher (N = 7)	46.67 ± 7.12	15 ± 1.52	18.28 ± 1.53
Raila (N = 12)	150 ± 10.36	22.8 ± 0.37	24.01 ± 0.5
Kanon (N = 6)	44.5 ± 4.06	18.33 ± 1.25	21.03 ± 1.67
Deohri (N = 7)	74.8 ± 13.68	21.6 ± 1.96	30.11 ± 2.66
Shanghar (N = 10)	59.67 ± 11.41	19.5 ± 1.18	24.07 ± 1.76