



## 8.0 Biogeographical Analysis of Galliformes Distribution in India and Pheasants in the Himalayan Protected Areas

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### Introduction

A biogeographical analysis of distribution patterns of flora and fauna yields a precise picture of faunal similarity of landscape units. They aid inferences about historical dispersal, biogeographical affinities, and biogeographical zonation of a region. We analyze the geographical distribution of Indian Galliformes in this paper in an attempt to study their biogeographical affinities and patterns.

### Methods

The entire country was divided into 35 landscape units on the basis of geomorphology and eco-climate, as follows:

Western Trans-Himalaya: Trans-Himalayan Tibetan facies in the west, including Ladakh, Lahaul & Spiti, and Kinnaur. Also includes the scarce and isolated Trans-Himalayan stretches of Uttarakhand

Eastern Trans-Himalaya: Trans-Himalayan Tibetan facies in the east, including that of Sikkim and Arunachal Pradesh

Kashmir Valley: The oval-shaped upland plain of Kashmir Valley (134 X 40 km) nestled among the Kashmir Himalaya (Pir Panjal)

North-western Himalaya: The Great Himalaya in north-west India (Kashmir & Himachal Pradesh), excluding the Tibetan facies

Western Himalaya: The Himalaya in the west comprising Garhwal & Kumaon in Uttarakhand, excluding the Tibetan facies

Shiwalik Hills: The Shiwalik Range and associated foothills in Kashmir (between Pir Panjal Range and Chenab river) and then disjunctly from Himachal Pradesh (Kangra district), Uttarakhand, east to Nepal

Eastern Himalaya: The Himalaya in the east (Bhutan & Arunachal Pradesh), excluding the Tibetan facies

North-eastern Hills: The hills in north-east India, south of Brahmaputra River

Punjab Plains: The semi-arid plains of Punjab, Haryana, and Delhi

Upper Gangetic Plains: The Upper Gangetic Plains of Uttar Pradesh including terai, bhabar, and floodplains of Ganges and its tributaries

Lower Gangetic Plains: The Lower Gangetic Plains of Bihar and West Bengal including terai and bhabar

Assam Plains: Assam floodplains along the Brahmaputra River

Gujarat-Rajputana: The Gujarat-Rajputana region, including north-western Gujarat, Chambal valley, Malwa and Shivpuri Plateaus in Madhya Pradesh and Aravallis of southern Rajasthan

Kathiawar Peninsula: The Kathiawar peninsula of Gujarat (including Saurashtra)

Thar Desert: The Great Thar Desert of India in Rajasthan

Kutch: The Great and Little Rann of Kutch in Gujarat

Satpura Range: The Satpura Ranges of the Central Indian Highlands, almost entirely south of Narmada River. The range includes (from west to east) Nimar Hills, Gawilgarh Hills, Betul Plateau, Pachmarhi Plateau, Mahadeo Hills, and Maikal Ranges

Vindhya Range: The Vindhya Ranges of the Central Indian Highlands, north of Narmada River. The range includes (from west to east) Jhabua hills, Vindhyan hills south of Malwa Plateau, Sagar-Damoh Plateau, Bhandar Range, and Vindhyan Scarplands

Northern Eastern Ghats: The northern parts of Eastern Ghats, including Chotta-Nagpur Plateau, Eastern Highlands



of Chhattisgarh, and hills of Orissa and north Andhra Pradesh (south to Krishna River)

Southern Eastern Ghats: The southern parts of Eastern Ghats, including the hills of southern Karnataka, southern Andhra Pradesh, and hills of north and western Tamil Nadu

Deccan Plateau: The 'cotton country' of the Deccan Plateau which includes the semi-arid plains and scrublands in Maharashtra (central and western including Vidarbha), Madhya Pradesh (lowlands surrounding the Satpuras and Vindhyas), Chhattisgarh (Mahanadi Basin), northern Karnataka, and north-western Andhra Pradesh

Eastern Plains: The plains of Eastern India lying between the Eastern Ghats and East Coast in Orissa (esp. Mahanadi Basin) and north-eastern Andhra Pradesh south to Godavari delta

Coromandel Plains: The Coromandel Plains of Tamil Nadu and southern Andhra Pradesh (south of Godavari river)

Malabar Plains: The narrow linear stretch of plains sandwiched between the Malabar and Konkan parts of the West Coast and the Western Ghats (Maharashtra, Goa, Karnataka, and Kerala)

Southern Western Ghats: The southern stretches of Western Ghats (south of Palghat Gap)

Central Western Ghats: The central part of Western Ghats [north of Palghat Gap -from Nilgiris north to Uttar Kannada (Dharwar dt in Karnataka)]

Northern Western Ghats: The northern stretches of Western Ghats (Maharashtra and Gujarat).

Gujarat Coast: The coastline of Gujarat State (including Kutch and Kathiawar coasts south to Surat)

Konkan Coast: The Konkan Coast of Maharashtra and Goa, south to Karwar in Karnataka

Malabar Coast: The Malabar Coast from Karwar in Karnataka through Kerala, south to Kanyakumari in Tamil Nadu

Coromandel Coast: The southern stretch of East Coast from Visakhapatnam south to Kanyakumari in Tamil Nadu

Sundarban and Orissa Coast: The northern stretch of East Coast from Bengal (Sundarbans) and Orissa down to Visakhapatnam in Andhra Pradesh

Andamans: Andaman islands

Nicobars: Nicobar islands

Lakshadweeps: Lakshadweep islands

Information on presence/absence of Galliformes species in each of these landscape units were collated from various published sources mainly Ali and Ripley (1983), Grimmett *et al.* (1998), Kazmierczak and van Perlo (2000), and Rasmussen and Anderton (2005). Apart from these general references, a large number of regional works have also been consulted. although 45 species of Galliformes are recorded in India, we have considered 43 species for the analysis (Table 1). As the Nicobar Megapode is a distant relative of Galliformes, we have not included in the analysis as it has independent biogeographical history. Similarly, the Japanese Quail which is a winter visitor in small numbers in some parts of northeast India has not been included in the analysis. As very few galliformes species occur in Andaman or Lakshadweep islands, these two landscape units have been removed from final analysis.

The distribution matrix of 43 species of Galliformes and 33 landscape units was developed and subjected to hierarchical cluster analysis to derive similarity matrices of land units in terms of their bird species composition. As the data was binary in nature (i.e., presence / absence of species), Sørensen's distance measure was used in conjunction with flexible beta linkage ( $\alpha = -0.25$ ) to extract the clusters. This combinatorial strategy is often recommended as it turns out to be the most space-conserving clustering algorithm for binary data (McCune & Bruce, 2002). All the analyses were done using the statistical program PC-ORD Version 4.0 (McCune & Mefford, 1999).

### Biogeographic classification of Galliformes in India

Out of the 43 species of Galliformes in India, 13 species (c. 30 %) are endemic to the Indian Subcontinent, with four genera *Perdicula*, *Galloperdix*, *Catreus*, and *Ophryisia* being confined to the Subcontinent. The highest diversity of Galliformes is to be seen in the Himalayas, while the Andaman & Nicobar islands have only one resident species (Blue-breasted Quail in Nicobars). Biogeographically, a large number of Galliformes genera found in India are Oriental in affinities, with some showing Indo-Chinese links and others Indo-Malayan origins. However, species exclusive to the Trans-Himalaya are distinctly Palearctic in nature. One genus (*Francolinus*) is of African origin. There are seven endemic and eight restricted-range species within Indian limits. See Table 2 for a list of endemic and restricted range species of Galliformes in India.



Table 1 : List of Galliformes species found in India and their biogeographic affinities

S.No.	Common name	Scientific name	Biogeographic affinity*
1	Snow Partridge	<i>Lerwa lerwa</i>	Palaearctic
2	Tibetan Snowcock	<i>Tetraogallus tibetanus</i>	Palaearctic (Indo-Tibetan)
3	Himalayan Snowcock	<i>Tetraogallus himalayensis</i>	Palaearctic (Indo-Chinese)
4	Buff-throated Partridge	<i>Tetraophasis szechenyii</i>	Palaearctic (Indo-Chinese)
5	Chukar	<i>Alectoris chukar</i>	Palaearctic
6	Black Francolin	<i>Francolinus francolinus</i>	Ethiopian (Afro-tropical)
7	Painted Francolin	<i>Francolinus pictus</i>	Ethiopian (Afro-tropical)
8	Chinese Francolin	<i>Francolinus pintadeanus</i>	Ethiopian (Afro-tropical)
9	Grey Francolin	<i>Francolinus pondicerianus</i>	Ethiopian (Afro-tropical)
10	Swamp Francolin	<i>Francolinus gularis</i>	Ethiopian (Afro-tropical)
11	Tibetan Partridge	<i>Perdix hodgsoniae</i>	Palaearctic
12	Common Quail	<i>Coturnix coturnix</i>	Uncertain (Palaearctic?)
13	Rain Quail	<i>Coturnix coromandelica</i>	Uncertain (Palaearctic?)
14	Blue-breasted Quail	<i>Coturnix chinensis</i>	Uncertain (Palaearctic?)
15	Jungle Bush Quail	<i>Perdica asiatica</i>	Oriental (Indian)
16	Rock Bush Quail	<i>Perdica argoondah</i>	Oriental (Indian)
17	Painted Bush Quail	<i>Perdica erythrorhyncha</i>	Oriental (Indian)
18	Manipur Bush Quail	<i>Perdica manipurensis</i>	Oriental (Indian)
19	Hill Partridge	<i>Arborophila torqueola</i>	Oriental (Indo-Malayan)
20	Rufous-throated Partridge	<i>Arborophila rufogularis</i>	Oriental (Indo-Malayan)
21	White-cheeked Partridge	<i>Arborophila atrogularis</i>	Oriental (Indo-Malayan)
22	Chestnut-breasted Partridge	<i>Arborophila mandellii</i>	Oriental (Indo-Malayan)
23	Mountain Bamboo Partridge	<i>Bambusicola fytchii</i>	Oriental (Indo-Chinese)
24	Red Spurfowl	<i>Galloperdix spadicea</i>	Oriental (Indian)
25	Painted Spurfowl	<i>Galloperdix lunulata</i>	Oriental (Indian)
26	Himalayan Quail	<i>Ophrysia superciliosa</i>	Oriental (Himalayan)
27	Blood Pheasant	<i>Ithaginis cruentus</i>	Oriental (Indo-Chinese)
28	Western Tragopan	<i>Tragopan melanocephalus</i>	Oriental (Indo-Chinese)
29	Satyr Tragopan	<i>Tragopan satyra</i>	Oriental (Indo-Chinese)
30	Blyth's Tragopan	<i>Tragopan blythii</i>	Oriental (Indo-Chinese)
31	Temminck's Tragopan	<i>Tragopan temminckii</i>	Oriental (Indo-Chinese)
32	Koklass Pheasant	<i>Pucrasia macrolopha</i>	Palaearctic (Indo-Chinese)
33	Himalayan Monal	<i>Lophophorus impejanus</i>	Oriental (Indo-Chinese)
34	Sclater's Monal	<i>Lophophorus sclateri</i>	Oriental (Indo-Chinese)
35	Red Junglefowl	<i>Gallus gallus</i>	Oriental (Indo-Malayan)
36	Grey Junglefowl	<i>Gallus sonneratii</i>	Oriental (Indo-Malayan)
37	Kalij Pheasant	<i>Lophura leucomelanos</i>	Oriental (Indo-Malayan)
38	Tibetan Eared Pheasant	<i>Crossoptilon harmani</i>	Palaearctic (Indo-Chinese)
39	Cheer Pheasant	<i>Catreus wallichii</i>	Oriental (Himalayan)
40	Mrs Hume's Pheasant	<i>Syrmaticus humiae</i>	Palaearctic (Indo-Chinese)
41	Grey Peacock Pheasant	<i>Polyplectron bicalcaratum</i>	Oriental (Indo-Malayan)
42	Indian Peafowl	<i>Pavo cristatus</i>	Oriental (Indo-Malayan)
43	Green Peafowl	<i>Pavo muticus</i>	Oriental (Indo-Malayan)

\* Biogeographic affinity is given here at the level of genera and is inferred on the basis of degree of speciation, radiation, and endemism within the genus

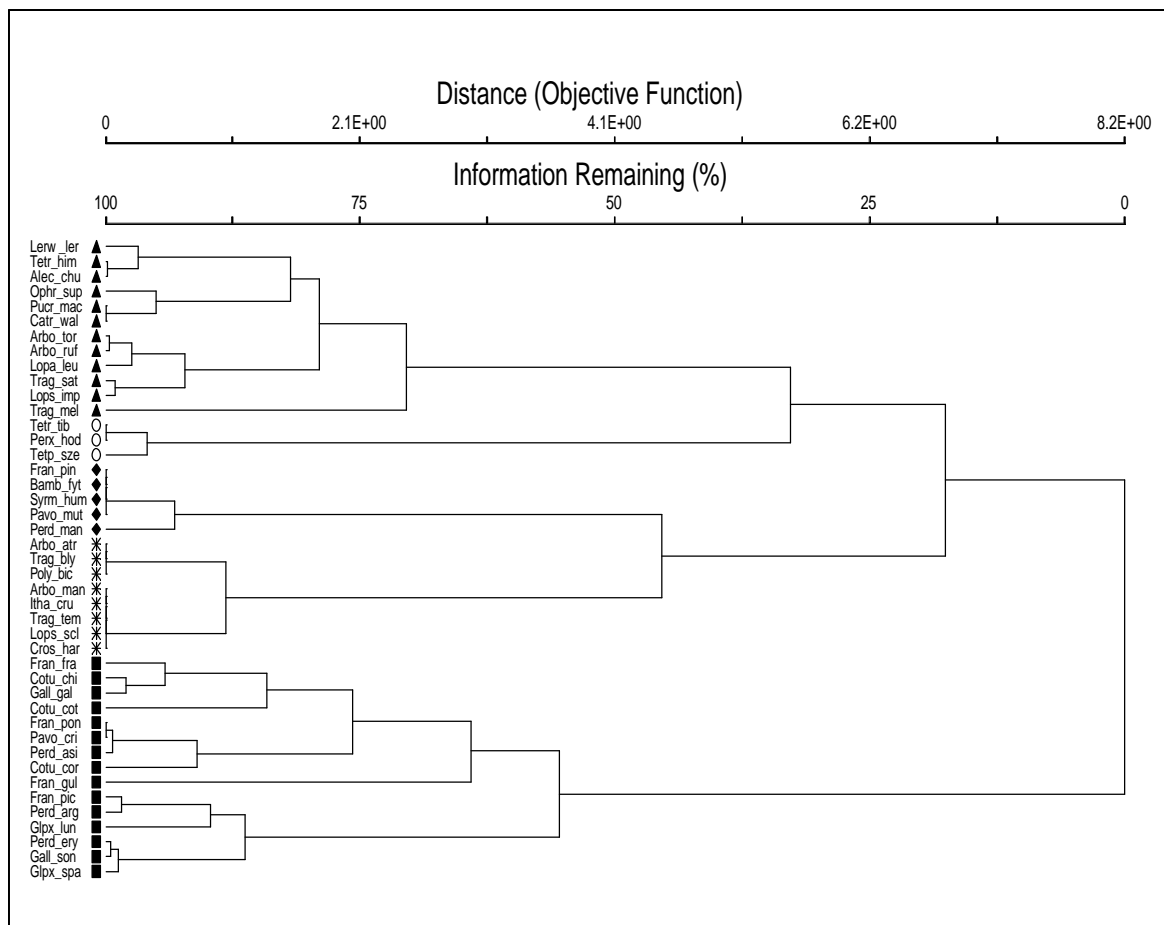


The cluster dendrogram yielded five distinct Galliformes assemblages with respect to their geographical distribution (Figure 1). These assemblages can be

interpreted as 'signature species' of West Himalaya, Eastern Himalaya, North-eastern Hills, Trans-Himalaya, and Peninsular India. See Table 3 for a summary of these assemblages.

**Table 2 :** List of Galliformes species which are endemic to India and species that have very narrow distribution ranges (i.e., < 50,000 km<sup>2</sup>).

Species endemic to India	Restricted-range species
Nicobar Megapode	Nicobar Megapode
Rock Bush Quail	Manipur Bush Quail
Painted Bush Quail	Chestnut-breasted Partridge
Red Spurfowl	Himalayan Quail
Painted Spurfowl	Western Tragopan
Himalayan Quail	Blyth's Tragopan
Grey Junglefowl	Slater's Monal
	Cheer Pheasant



**Figure 1.** Dendrogram showing the five distinct Galliformes assemblages of India.



**Table 3 :** Species composition of Galliformes assemblages of India as identified by the cluster analysis

S. No.	Assemblage	Species Composition
I	Trans-Himalaya	Tibetan Snowcock
		Tibetan Partridge
		Buff-throated Partridge
II	Western Himalaya	Snow Partridge
		Himalayan Snowcock
		Chukar Partridge
		Himalayan Quail
		Koklass Pheasant
		Cheer Pheasant
		Hill Partridge
		Rufous-throated Partridge
		Kalij Pheasant
		Satyr Tragopan
		Himalayan Monal
		Western Tragopan
		III
Blyth's Tragopan		
Grey Peacock Pheasant		
Chestnut-breasted Partridge		
Blood Pheasant		
Temminck's Tragopan		
Sclater's Monal		
Tibetan Eared Pheasant		
IV	North-eastern Hills	Chinese Francolin
		Mountain Bamboo Partridge
		Mrs Hume's Pheasant
		Green Peafowl
		Manipur Bush Quail
V	Peninsular India	Grey Francolin
		Black Francolin
		Painted Francolin
		Swamp Francolin
		Blue-breasted Quail
		Common Quail
		Rain Quail
		Red Junglefowl
		Grey Junglefowl
		Jungle Bush Quail
		Rock Bush Quail
		Painted Bush Quail
		Red Spurfowl
Painted Spurfowl		



### Key Findings with respect to biogeographical analysis of Galliformes in India

The following are some of the key observations made out of biogeographical analysis of distribution of breeding Galliformes in India:

- A majority of Galliformes in India are either Indo-Chinese or Indo-Malayan in their zoogeographical affinity.
- Francolins are probably the only Galliformes taxa that are African in origin, in contrast to the general trend in Indian avifauna.
- Four genera (*Perdica*, *Galloperdix*, *Catreus*, and *Ophrysia*) are exclusive to the Indian Subcontinent, with *Perdica* (Bush Quails) and *Galloperdix* (Spurfowls) showing a moderate degree of speciation and radiation.
- Only one species (*i.e.*, Blue-breasted Quail) of Galliformes is found in Indian islands (confined to Nicobars), giving support to dispersal vis-à-vis vicariance events.
- There are seven species of Galliformes endemic to India and eight restricted-range species.
- The biogeographical analysis yields FIVE major Galliformes assemblages within India, *i.e.*, Western Himalaya, Eastern Himalaya, North-eastern Hills, Trans-Himalaya, and Peninsular India.

### Pheasants in Himalayan Protected Areas

There is no detailed information on the distribution of the pheasants in the Protected Areas (PAs) of India. However, we have tried to compile the maximum information regarding pheasants in Indian Himalayas with the help of literature, ornithologists and bird watchers of the region. We believe that the information regarding the distribution of pheasants in the Eastern Himalaya and the northeast India is incomplete in this compilation. Of the 17 species of pheasants that occur in India, 16

species are found in the Himalayan region. Grey Junglefowl is the only one that does not occur in the Himalaya. There are about 99 PAs (which includes five proposed PAs) in the Himalayas covering approximately 41,597 km<sup>2</sup> (approximately 7.9% of the region) in which the pheasants occur in all but Trans-Himalaya. These include; 92 PAs in the Himalayan zone, 4 in the Gangetic Plain, and 13 in northeast India. The Central Himalayan province (2C) has the highest percentage of PA coverage while the province of North-East Hills (9B) has the lowest PA coverage (Table 4).

### Protected Area Coverage for Pheasants in Himalayas

An analysis of area covered under the PA network in each biogeographic zone (*i.e.*, area available for conservation of pheasants) reveals that the pheasants are present almost all over Himalayas except Trans-Himalaya. The area covered under the PA Network for protection of wildlife in the Himalayas is 41,597 km<sup>2</sup> (Table 4). A total of 77 PAs in the Himalayas are believed to have pheasants. The area covered under the PAs network in Trans Himalaya is 14,506.km<sup>2</sup> (7 PAs) while the Himalayas has the highest coverage *i.e.*, 23,941 km<sup>2</sup>. Of the 23,941 km<sup>2</sup> PAs in Himalayas, area of the Western Himalaya under PA network is 4,117 km<sup>2</sup>. the Central Himalaya is 6,072.km<sup>2</sup>. and the Eastern Himalaya is 13,750.km<sup>2</sup>. Apart from this, a total of 11 PAs covering more than 1,350 km<sup>2</sup>. area in the northeast India also protecting minimum of two species of pheasants.

### Pheasants Species Richness in Protected Areas of Himalayas and surrounding areas.

Impeyan Monal, Kalij and Koklass seems to be the most common pheasants in the Himalaya as it is reported from 46, 43 and 36 PAs respectively. All these three pheasants excepting koklass occur in all the Himalayan Biogeographic Provinces except 2D. Distribution of Tibetan Eared Pheasant, Sclater's Monal, Green Peafowl, Grey Peacock Pheasant, Blyth's Tragopan and Temminck's Tragopan are either not covered under the present PAs network or detailed distribution of these species is not available.



Table 4 : Distribution of Pheasants in the Protected Areas of Himalayas and Northeast Biogeographic Zones. (+: presence, -: absence, ? = unknown)

Biogeographic Zone	Biogeographic Province	State	Protected Area	Year of Establishment	Area (km <sup>2</sup> )	Altitudinal Range (m)	Cheer Pheasant	Tibetan Eared-Pheasant	Red Junglefowl	Blood Pheasant	Himalayan Monal	Sclater's Monal	Kailij Pheasant	Indian Peafowl	Green Peafowl	Grey Peacock-Pheasant	Koklass Pheasant	Mrs Hume's Pheasant	Blyth's Tragopan	Western Tragopan	Satyr Tragopan	Temminck's Tragopan	No. of species
2	2A	Jammu & Kashmir	Ballal-Thajwas WS	1987	210	NA	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	2
			Dachigam NP	1981	141	1642-4289	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	2
			Gulmarg WS	1987	180	2400-4300	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	2
			Hirapora WS	1987	114.5	2557-4745	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	2
			Kishtwar NP	1981	400	1700-4800	?	-	-	-	+	-	?	-	-	-	+	-	-	+	-	-	3
			Lachipora WS	1987	93.5	1630-3300	+	-	+	-	+	-	?	-	-	-	+	-	-	+	-	-	5
			Overa WS	1981	32	2100-5425	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	2
			Overa-Aru WS	1987	425	2250-6000	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	2
			Trikuta WS	1981	27.75	450-600	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	2
			City Forest NP	1992	9.07	NA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
			Limber WS	1987	43.75	NA	+	-	+	-	+	-	?	-	-	-	+	-	-	+	-	-	5
			Hokersar WS	1992	13.75	1584	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
		Himachal Pradesh	Bandii WS	1962	41.32	762-2160	+	-	?	-	-	-	+	-	-	-	-	-	-	-	-	-	2
			Gamgul-Siahbehi WS	1962	108.85	1800-3919	?	-	-	-	+	-	+	-	-	-	-	+	-	+	-	-	4
			Great Himalayan NP	1984	754.4	1500-5805	+	-	-	-	+	-	+	-	-	-	+	-	-	+	-	-	5
			Kais WS	1954	14.19	2800-3680	?	-	?	-	+	-	-	-	-	-	+	-	-	+	-	-	3
			Kalatoop-Khajjair WS	1958	61	1185-2768	-	-	-	-	+	-	+	-	-	-	+	-	-	+	-	-	4
			Kanwar WS	1954	54	1800-4833	+	-	-	-	+	-	+	-	-	-	+	-	-	+	-	-	5
			Khokhan WS	1954	14.05	1500-2787	?	-	-	-	-	-	+	-	-	-	+	-	-	+	-	-	3
			Kugti WS	1962	378.86	2250-6044	-	-	-	-	+	-	-	-	-	-	+	-	-	?	-	-	2



Biogeographic Zone	Biogeographic Province	State	Protected Area	Year of Establishment	Area (km <sup>2</sup> )	Altitudinal Range (m)	Cheer Pheasant	Tibetan Eared-Pheasant	Red Junglefowl	Blood Pheasant	Himalayan Monal	Sclater's Monal	Kalij Pheasant	Indian Peafowl	Green Peafowl	Grey Peacock-Pheasant	Koklass Pheasant	Mrs Hume's Pheasant	Blyth's Tragopan	Western Tragopan	Satyr Tragopan	Temminck's Tragopan	No. of species
			Lipka Asrang WS	1962	30.89	4000-5022	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	1
			Manali WS	1954	31.8	2273-5300	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	2
			Nargu WS	1962	278.37	970-4034	?	-	-	-	+	-	+	-	-	-	+	+	-	?	-	-	3
			Rupi Bhaba WS	1982	269	909-5650	+	-	-	-	+	-	+	-	-	-	+	+	-	-	+	-	5
			Sechu Tuan Nata WS	1962	102.95	2550-6072	?	-	-	-	+	-	-	-	-	-	+	+	-	-	+	-	3
			Shikari Devi WS	1962	72	1800-3359	?	-	-	-	-	-	+	-	-	-	+	+	-	-	-	-	2
			Tundah WS	1962	64.22	2074-5532	?	-	-	-	+	-	+	-	-	-	+	+	-	-	+	-	4
			Tirthan WS	1992	61.12	2100-4875	+	-	-	-	+	-	+	-	-	-	+	+	-	-	+	-	6
			Sainj WS	1994	90	NA	+	-	-	-	+	-	+	-	-	-	+	+	-	-	+	-	5
	2B	Himachal Pradesh	Chail WS	1976	108.54	701-2408	+	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	3
			Churdhar WS	1985	56.15	2000-3647	+	-	+	-	+	-	+	-	-	-	+	+	-	-	+	-	6
			Daranghati WS	1962	167	2100-3315	+	-	+	-	+	-	+	-	-	-	+	+	-	-	+	-	6
			Darlaghat WS	1962	140	1075-2069	+	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	3
			Majathal WS	1954	40	900-1966	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	2
			Sangla WS	1989	650	3200-5486	+	-	-	-	+	-	-	-	-	-	+	+	-	-	+	-	4
			Shilli WS	1963	2.13	1230-1845	+	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	3
			Shimla Water Catchment WS	1958	10.25	1900-2620	?	-	-	-	-	-	+	-	-	-	+	+	-	-	-	-	2
			Talra WS	1962	26	1500-3324	?	-	-	-	+	-	+	-	-	-	-	?	-	-	+	-	3
		Uttarakhand	Askot Musk Deer WS	1986	599.93	2400-5000	+	-	-	-	+	-	+	-	-	-	+	+	-	-	-	+	5



Biogeographic Zone	Biogeographic Province	State	Protected Area	Year of Establishment	Area (km <sup>2</sup> )	Altitudinal Range (m)	Cheer Pheasant	Tibetan Eared-Pheasant	Red Junglefowl	Blood Pheasant	Himalayan Monal	Sclater's Monal	Kalij Pheasant	Indian Peafowl	Green Peafowl	Grey Peacock-Pheasant	Koklass Pheasant	Mrs Hume's Pheasant	Blyth's Tragopan	Western Tragopan	Satyr Tragopan	Teminck's Tragopan	No. of species
			Binsar WS	1988	45.59	2000-3000	+	-	-	-	+	-	+	-	-	-	+	-	-	-	-	-	4
			Gangotri NP	1989	1552	1800-7083	-	-	-	-	+	-	+	-	-	-	+	-	-	-	-	-	3
			Govind NP	1990	472.08	1400-6323	-	-	-	-	+	-	+	-	-	-	+	-	-	+	-	-	4
			Govind Pashu Vihar WS	1955	481	1400-6323	+	-	-	-	+	-	+	-	-	-	+	-	-	+	-	-	5
			Kedarnath WS	1972	957	1160-7068	+	-	-	-	+	-	+	-	-	-	+	-	-	-	-	-	4
			Nanda Devi NP	1982	624.62	3500-7816	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	2
			Valley of Flowers NP	1982	87.5	3267-6727	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	2
			Mussoorie WS	1993	10.82	?	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	2
	2C	Sikkim	Fambong Lho WS	1984	51.76	1375-2650	-	-	-	-	-	-	+	-	-	-	-	-	-	-	+	-	2
			Maenam WS	1987	35.34	1600-3250	-	-	-	-	+	-	+	-	-	?	-	-	-	-	+	-	3
			Khangchendzonga NP	1977	1784	1829-8585	-	-	-	+	+	-	+	-	-	-	-	-	-	-	+	-	4
			Kitam WLS	2005	6	NA	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	3
			Kyongnosia Alpine WS	1977	31	3292-4116	-	-	-	+	+	-	-	-	-	-	-	-	-	-	+	-	3
			Pangolakha WLS	2002	128	NA	-	?	-	+	+	-	+	-	-	-	-	-	-	-	+	-	4
			Barsey Rhododendron WS	1998	104	1600-3600	-	-	-	+	+	-	+	-	-	?	-	-	-	-	+	-	4
			Shingba Rhododendron WS	1984	43	3048-4575	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	?	2
		West Bengal	Jorepokhri WS	1985	0.04	?-1800	-	-	-	-	-	-	?	-	-	?	-	-	-	-	+	-	1
			Mahananda WLS	1976	158.04	725-1300	-	-	-	-	-	-	?	-	-	?	-	-	-	-	?	-	0
			Neora Valley NP	1986	88	3040-3200	-	-	-	-	+	-	?	-	-	?	-	-	-	-	-	?	1
			Serchal WS	1976	38.88	1500-2600	-	-	-	-	+	-	+	-	-	?	-	-	-	-	-	?	2
			Singalila WS	1986	78.6	2290-3650	-	-	-	-	+	-	-	-	-	?	-	-	-	-	-	?	1



Biogeographic Zone	Biogeographic Province	State	Protected Area	Year of Establishment	Area (km <sup>2</sup> )	Altitudinal Range (m)	Cheer Pheasant	Tibetan Eared-Pheasant	Red Junglefowl	Blood Pheasant	Himalayan Monal	Sclater's Monal	Kailij Pheasant	Indian Peafowl	Green Peafowl	Grey Peacock-Pheasant	Koklass Pheasant	Mrs Hume's Pheasant	Blyth's Tragopan	Western Tragopan	Salyr Tragopan	Temminck's Tragopan	No. of species	
	2D	Arunachal Pradesh	D'Ering WS	1978	190	100-250	-	-	+	?	?	?	?	-	-	-	?	-	-	+	-	-	?	2
			Dibang WS	1991	4149	1500-5000	-	-	?	+	?	?	?	-	-	-	?	-	-	?	-	-	?	1
			Eagle Nest WS	1989	217	1100-2980	-	-	?	+	?	?	?	-	-	-	+	-	-	+	-	+	?	4
			Itanagar WS	1978	140.3	210-1164	-	-	+	+	?	?	?	-	-	-	+	-	-	?	-	-	?	3
			Kamlang WS	1989	783	NA	-	-	?	+	?	?	?	-	-	-	?	-	-	?	-	-	?	1
			Mehao WS	1980	281.5	330-3560	-	-	?	+	?	?	?	-	-	-	?	-	-	+	-	-	?	2
			Lado WS (proposed)	NA	500	2500-5000	-	-	?	+	?	?	?	-	-	-	?	-	-	?	-	-	?	1
			Mouling NP	1986	483	700-3060	-	-	?	+	?	?	?	-	-	-	?	-	-	+	-	-	?	2
			Namdapha NP	1983	1807.82	200-4500	-	-	+	+	?	?	?	-	-	-	+	-	-	+	-	-	?	5
			Pakke WS	1977	861.95	150-1900	-	-	+	+	?	?	?	-	-	-	+	-	-	?	-	-	?	4
			Palin WS (proposed)	NA	250	2000-2800	-	-	?	+	?	?	?	-	-	-	?	-	-	?	-	-	?	1
			Sessa Orchid WS	1989	100	800-3100	-	-	?	+	?	?	?	-	-	-	+	-	-	+	-	+	?	4
			Tale Valley WS	1995	337	1500-2700	-	-	?	+	?	?	?	-	-	-	?	-	-	?	-	-	?	1
			Kane WS	1991	55	NA	-	-	+	+	?	?	?	-	-	-	+	-	-	?	-	-	?	4
			Yardi-Rabe Supse WS		491.62	NA	-	-	?	+	?	?	?	-	-	-	?	-	-	?	-	-	?	1
			Tawang NP/WS (proposed)	NA	300	2000-5000	-	-	?	+	?	?	?	-	-	-	?	-	-	?	-	-	?	1
			Walong WS (proposed)		300	2000-5000	-	-	?	+	?	?	?	-	-	-	?	-	-	?	-	-	?	1



Biogeographic Zone	Biogeographic Province	State	Protected Area	Year of Establishment	Area (km <sup>2</sup> )	Altitudinal Range (m)	Cheer Pheasant	Tibetan Eared-Pheasant	Red Junglefowl	Blood Pheasant	Himalayan Monal	Sclater's Monal	Kalij Pheasant	Indian Peafowl	Green Peafowl	Grey Peacock-Pheasant	Koklass Pheasant	Mrs Hume's Pheasant	Blyth's Tragopan	Western Tragopan	Satyr Tragopan	Temminck's Tragopan	No. of species
9	9A	Assam	Dihing-Patkai WLS (proposed)	NA	NA	NA	-	-	+	-	-	-	-	-	-	?	-	-	?	-	-	-	1
	9B	Manipur	Yangoupokpi-Lokchao WS	1989	184.8	1000-2100	-	-	?	-	-	-	-	-	-	?	-	?	?	-	-	-	0
		Meghalaya	Balpakram NP	1985	220	192-1023	-	-	+	-	-	-	-	-	-	?	-	?	?	-	-	-	1
			Nokrek Ridge WS	1986	47.48	600-1412	-	-	+	-	-	-	-	-	-	?	-	?	?	-	-	-	1
		Mizoram	Dampa WS	1985	500	500-1090	-	-	+	-	-	-	-	-	-	?	-	?	?	-	-	-	1
			Murlen NP	1991	200	1000-1500	-	-	+	-	-	-	-	-	-	?	-	?	?	-	-	-	1
			Khawnglung WS	1992	41	400-1300	-	-	?	-	-	-	-	-	-	?	-	?	?	-	-	-	0
			Phawngpui WS	1992	50	NA	-	-	?	-	-	-	-	-	-	?	-	?	?	-	-	-	0
			Pualfeng WLS	2004	50	NA	-	-	?	-	-	-	-	-	-	?	-	?	?	-	-	-	0
			Thorangtiang WLS	2002	50	NA	-	-	?	-	-	-	-	-	-	?	-	+	?	-	-	-	1
		Nagaland	Fakim WS	1980	6.41	2000-2729	-	-	?	-	-	-	-	-	-	?	-	?	?	-	-	-	0
						No. of PAs	21	0	24	21	46	0	43	7	0	6	36	2	6	20	10	0	



### Recommendations

- i. It is important to protect the certain habitats of Tibetan Eared Pheasant, Sclater's Monal, Green Peafowl, Grey Peacock Pheasant, Blyth's Tragopan and Temminck's Tragopan by declaring some of their range as PAs or Conservation/Community Reserves or Biodiversity Heritage Sites. In this connection, a survey on these species aimed to identify their population status, distribution pattern and habitat quality need to be taken immediately
- ii. The biogeographical analysis yields five major Galliformes assemblages within India. Of these, four are from the Himalayan regions. Therefore, it would be better to focus on the Galliformes for conservation of the entire Himalayan ecosystem that is because of the ubiquitous distribution of Galliformes in the Himalayas.
- iii. Among the Himalayas, Western Himalaya, which is home to several endangered species including the Western Tragopan is not adequately covered under the PAs Network compared to other two biogeographic provinces of Himalayas. Hence, it is proposed to identify certain important pheasant habitats in the Western Himalaya and declare the same as either Conservation/Community Reserve or Biodiversity Heritage Sites or PAs.
- iv. Some of the Galliformes species are known to occur around human habitations (outside PAs) and also believed that there is an interface between Galliformes and human with respect to agriculture. It is necessary to assess their status in and outside of

the PAs as well as in human habitations and also to study their impact on agro-ecosystem *vis-versa*.

- iv. Seven Galliformes species that are endemic to India deserve more conservation attention. Though, certain populations of these species protected in at least one PA, more protection is required especially for Himalayan Quail, Megapode, Grey Junglefowl, Red spurfowl and Painted spurfowl.
- vi. Grey Junglefowl, endemic to India especially to southern part of India is believed to be declining especially those populations, that occur outside the PAs. It is important to know their present population status and include some of their distribution range in the PA Network of India.

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