

## AVIFAUNA OF BHITARKANIKA MANGROVES, INDIA

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*plus web supplement of 2 pages*

### ABSTRACT

This paper presents a comprehensive list of the birds of Bhitarkanika with special reference to globally threatened species occurring here. It is based, in large measure, on our observations throughout the protected area during August 2004 - December 2006 together with unpublished records contributed by other observers. A total of 263 bird species belonging to 63 families have been recorded. A total of 79 birds are added to the existing checklist published in 1997. An account about one of India's largest breeding colony of water birds, and conservation importance of lesser known Sathbahaya wetland which serves as an important stopover for birds migrating to Chilka has also been mentioned.

### KEYWORDS

Aquaculture, avifauna, Bhitarkanika mangroves, checklist, Chilka lake, heronry, Sathbahaya wetland

Assessment of the current status of bird species and habitat would benefit from the past bird surveys, natural history observations, community studies and abundance estimates. Ripley (1978) describes about the "relative scarcity" of avifauna when he visited the Simlipal hills after 28 years. It is believed that an annotated list of the Bhitarkanika birds complete so far as present knowledge permits will be of much value to future workers interested in this particular region. Much new matter in the form of hitherto unpublished field notes is included in this manuscript. A total of 263 birds belonging to 63 families were recorded of which 147 were resident, 99 were winter migrants, 15 were considered vagrants, 16 local migrants were summer migrants and the status of a few birds like Peregrine Falcon, Indian Skimmer, Booted Hawk Eagle, Black Eagle are yet to be ascertained.

### Ornithological history in Indian mangroves and Bhitarkanika mangroves in particular

Very few studies have been so far carried out on the birds of Indian mangroves and Bhitarkanika in particular. Mukerjee (1969) studied the feeding habits of a few selected water birds in the mangrove forests of the Sunderbans. Prasad (1992) reports about a large inaccessible heronry in the Krishna mangroves in Andhra Pradesh where flamingoes, Spot-billed Pelicans, Spoonbills and Painted Storks nest together. Subramanya (1996) updated the existing information on the status, distribution and conservation of Indian heronries and listed Bhitarkanika as one of the oldest and largest heronry in the country. Chaudhari & Chakrabarti (1973) studied the breeding biology of Openbill Stork, Little Cormorant and Large Egret. Several notes on species diversity and checklist of birds in different Indian mangroves like Thane Creek near Rutuchakra Nature Park (Nitsure, 2002), Mahul Creek, Mumbai (Verma, 2002), Gulf of Kutch mangroves (Stanley, 2002), Pitchavaram mangroves (Sethuraman, 1997) were all published in different sources including symposia proceedings and newsletters. Samant (1985) recorded 121 species of birds in Ratnagiri mangroves in Maharashtra. Notes on the avifauna of Bhitarkanika mangroves occur at random, but an initial checklist of the birds of Bhitarkanika was attempted in the early 1990s by

Dani & Kar (1992), and Pandav (1996). Pandav (1996) listed a total of 169 bird species from Bhitarkanika. Nayak (2003, 2005) studied the ecology of resident birds of the Bhitarkanika heronry and also the seasonality and occurrence of the kingfishers in the mangrove. Kalpana (2005) recently reported about the occurrence of Red-winged Crested Cuckoo in Bhitarkanika. Detailed ecological studies pertaining to breeding patterns, resource partitioning in terms of space and food and conservation assessment have been carried out recently in the Bhitarkanika heronry (Gopi, 2007; Gopi *et al.*, 2007).

### STUDY AREA

Geographically, Bhitarkanika is located between 20°30'-20°48'N & 86°45'-87°03'E. It is the second largest existing mangrove ecosystem of India, which has much significance with regard to ecological, geomorphological and biological background that includes mangrove forests, rivers, creeks, estuaries, backwaters, accreted land and mud flats. Table 1 shows the areas of various wetland classes in Bhitarkanika. Bhitarkanika mangrove ecosystem flourishes in the deltaic region, formed by the rich alluvial deposits of Brahmani, Baitarani, Maipura and Dhamra rivers (Image 1<sup>w</sup>).

Faunal significance includes the occurrence of a sizeable population of Estuarine Crocodile (*Crocodylus porosus*). Besides this, the Sanctuary is rich in other reptiles, birds and mammalian population. These mangrove forests are good habitat for King Cobra, Indian Python and Water Monitor Lizard. The annual rainfall ranges from 920-3000mm. Bhitarkanika represents one of the richest and most diversified mangrove floras in the country. About 62 species of mangrove and its associates are found in Bhitarkanika Sanctuary. Existence of three species of *Rhizophora*, *Heritiera* and *Avicennia* each and four species of *Bruguiera* are some of the interesting features of the flora of Bhitarkanika. The dominant genera of mangroves and its associates include *Acanthus*, *Achrostichum*, *Aegialitis*, *Aglaiia*, *Avicennia*, *Excoecaria*, *Brownlowia*,

<sup>w</sup> See Images in the web supplement at [www.zoosprint.org](http://www.zoosprint.org)

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**Table 1. Various wetland classes and their area in Bhitarkanika**

Mangrove in km <sup>2</sup>	Mud flat in km <sup>2</sup>	Sandy area in km <sup>2</sup>	Coastal Plantation in km <sup>2</sup>
267.14	57.87	23.25	9.43

*Bruguiera, Ceriops, Rhizophora, Heritiera, Hibiscus, Kandelia, Lumnitzera, Phoenix, Sonneratia, Suaeda* etc.

## METHODS

The checklist is based primarily on field work conducted in Bhitarkanika mangroves (Image 1<sup>st</sup>) from August 2004– December 2006. A total of 452 days were spent in the field observing bird diversity. Birds were observed from 0500– 1600hr with the help of a spotting scope and 8x40 Bushnell binoculars. During winters, all the major habitats were visited twice a week for monitoring wintering waterfowls. Surveys were conducted on foot in mangrove forests and agricultural fields, while in the rivers and small creeks birds were observed using mechanised motor boats and non-mechanised country boats, respectively.

In the heronry, total counts were carried out during the last week of August to enumerate the number of bird species nesting and number of nests of each species. Every tree was marked and bird species nesting and number of nests in each tree were recorded. Nests were identified with aid of parent bird or chicks. In absence of both, nest material and nest design were used to identify the species nesting. We have also included information from published literature, as cited in the text. Nomenclature follows Manakadan and Pittie (2002), except as noted.

The status (movement and seasonality of occurrence) and frequency of bird sightings in various habitats have been worked out basing on different parameters listed below.

**Status:** A taxon was accorded any one of the following: R - Resident throughout the year; LM - Resident with some local movements; SM - Summer Migrant, MM - Monsoon Migrant; WM - Winter Migrant; V - Vagrant with only a single or couple of records, depending on its movement and seasonality of occurrence.

**Frequency:** A taxon was accorded any one of the following: A - Abundant, sighted on 9 to 10 out of 10 visits; C - Common, sighted on 6 to 8 out of 10 visits; O - Occasional, sighted on 3 to 5 out of 10 visits; R - Rare, sighted on less than 2 out of 10 visits, depending on the probability of sighting in the suitable habitat at the any given time.

**Major Habitats:** Different habitats where observations were carried out include; MF - Mangrove Forests; NMF - NonMangrove Forest; OW - Open Wetlands; IZ - Intertidal Zones; TM - Tidal Mudflats; SB - Sand Bars; PF - Paddy Fields; AF - Aquaculture Farms.

## RESULTS

**Globally threatened species in Bhitarkanika:** Seventeen species of globally threatened species are found in Bhitarkanika mangroves and adjacent non mangrove wetlands (Table 2).

**Spot-billed Pelican:** This is a local migrant. About 15 birds were sighted in the heronry during July-August of 2005 and 2006. Highest number of 25 birds were recorded during 2002 (Nayak, 2003).

**Table 2. List of globally threatened bird species in Bhitarkanika and their status according to IUCN/Birdlife International Red Data List 2006**

Species	Category
Spot-billed Pelican <i>Pelecanus philippensis</i>	VU
Lesser Adjutant <i>Leptoptilos javanicus</i>	VU
Painted Stork <i>Mycteria leucocephala</i>	NT
Black-necked Stork <i>Ephippiorhynchus asiaticus</i>	NT
Baer's Pochard <i>Aythya baeri</i>	VU
Pallas's Fish-eagle <i>Haliaeetus leucoryphus</i>	VU
White-rumped Vulture <i>Gyps bengalensis</i>	VR
Greater Spotted Eagle <i>Aquila clanga</i>	VU
Spotted Greenshank <i>Tringa guttifer</i>	EN
Brown-winged Kingfisher <i>Halcyon amauroptera</i>	NT
Indian Skimmer <i>Rynchops albicollis</i>	VU
Black-headed Ibis <i>Threskiornis melanocephalus</i>	NT
Darter <i>Anhinga melanogaster</i>	NT
Pallid Harrier <i>Circus macrourus</i>	NT
Pale-capped Pigeon <i>Columba punicea</i>	VU
Black-tailed Godwit <i>Limosa limosa</i>	NT
Black-bellied Tern <i>Sterna acuticauda</i>	NT

**Black-necked Stork:** A solitary bird is frequently spotted in the open meadows of Bhitarkanika forest block. During September 2005 a juvenile was spotted in the open meadows of Bhitarkanika forest block.

**Baer's Pochard:** Sighted twice; two birds were first sighted near Dobanthi (Barunei) in November 2005 and five birds were sighted in the Satabhaya intertidal wetlands on 8 November 2006.

**White-backed Vulture:** Approximate population of 10 individuals are present near Ragadapatia and Barapita forest block. Two old nests were located on *Sonneratia apetala* trees with three adults and two juveniles on 17 March 2005.

**Spotted Greenshank:** Two birds were sighted on 23 January 2003 in Udabali islands adjoining the sea and two birds were sighted on 10 December 2005 near Barunei river mouth.

**Brown-winged Kingfisher:** This species was sighted all over the National Park in the mangrove areas. An approximate population of 100 individuals are found here. It nests in the tree holes during July to September.

**Black-headed Ibis:** Breeds in the *Bagagahan* heronry. 136 nests were counted during the annual heronry census in August 2006. They built closely placed platform nests away from most of the species within the heronry forming subcolonies. Black-headed Ibis had the mean largest clutch size of six per nest in the heronry.

**Darter:** (Image 2<sup>nd</sup>) Breeds in the *Bagagahan* heronry. Over the years there is a marginal decline in the number of darters nesting in the heronry. Eighty-eight nests were counted during the annual heronry census in August 2006. They exhibited longer incubation duration (of more than 28 days) compared to other species in the heronry.

**Indian Skimmer:** (Image 3<sup>rd</sup>) Bhitarkanika is a major key congregation area for Indian skimmers in the country (Gopi *et al.*, 2006) with more than 100 birds that frequent the Praharajpur and the Barunei estuary during the ebb tide for foraging. The seasonal movements of this species are not known. Though it is said to be a winter visitor to the Orissa coast, the fact that few individuals are sighted all through the year indicates that this species possibly breeds in Orissa.

**Pallid Harrier:** This is a winter migrant and rare to

Bhitarkanika. This bird has been sighted thrice on 16<sup>th</sup> December 2005 and during last week of November 2006. On both occasions it was seen perched on *Sonneratia apetala* trees on the mud banks of the creeks.

**Pale-capped Pigeon:** Sighted twice during June - July 2003 feeding on *Syzygium cumini* fruits.

**Black-tailed Godwit:** Local migrant, has been sighted almost throughout the year except during rainy season. Prefers paddy field, shallow water and sand bars during high tide. A total of 23,203 birds were counted during the Annual Mid-Winter Waterfowl Count conducted on 10 & 11 January 2005.

**Black-bellied Tern:** Winter migrant. Birds have been observed near Dhamra estuary and on the sand bars of Coconut Wheeler Islands.

### Breeding notes

One-hundred-and-four species of birds were observed to breed or showed evidence of breeding in Bhitarkanika. The mangrove forests of Bhitarkanika harbours one of the largest congregation of breeding water birds in the country and it is one of the top five largest heronries in India which hosts approximately 30,000 birds every year (Gopi & Pandav, 2005; Subramanya, 1996; Chadha & Kar, 1999). Eleven species of resident water birds, namely, Asian Openbill (*Anastomus oscitans*), Large Egret (*Casmerodius albus*), Intermediate Egret (*Mesophoyx intermedia*), Little Egret (*Egretta garzetta*), Cattle Egret (*Bubulcus ibis*), Grey Heron (*Ardea cinerea*), Purple Heron (*Ardea purpurea*) (Image 4<sup>w</sup>), Black-crowned Night Heron (*Nycticorax nycticorax*), Little Cormorant (*Phalacrocorax niger*), Darter (*Anhinga melanogaster*), and Black-headed Ibis (*Threskiornis melanocephalus*), breed in this heronry during the wet season (June-December) (Table 3).

The heronry is located on an island covered with mangrove vegetation. The total area used for nesting is approximately 4ha. Five mangrove trees *Excoecaria agallocha*, *Heritiera fomes*, *Cynometra iripa*, *Hibiscus tiliaceus* and *Tamarix troupia* were used for nesting by the birds. Darters and Grey Herons were the first to arrive in the heronry during late June followed by Large Egrets, Purple Heron and Intermediate Egret (2005 & 2006). Though Asian Openbill Storks arrived early, they delayed nesting till peak monsoons (2005). Night Heron and Black-headed Ibis were the last to arrive but they completed their nesting in a very short time of 3 to 4 days and started laying. The departure patterns of the birds followed the arrival sequence (2005 & 2006). Birds start to

leave the heronry by mid October and the entire heronry is empty by second week of January (2005 & 2006). Major nest materials that were used for nest building were derived from *Excoecaria agallocha*, *Heritiera fomes*, *Hibiscus tiliaceus*, *Tamarix troupia*, *Cynometra iripa*, *Salvadora persica*, *Salacia primoidea*, *Avicennia officianalis* and *Ceriops decandra* and in one instance green leaves of *Phoenix paludosa* were also found in Darter's nest material.

A Lesser Adjutant Stork colony comprising of four nests on two *Xylocarpus mekongensis* trees were located in the Bhitarkanika forest block near Balijori creek. Nest building activity started in early October and the colony was active till mid January (Gopi & Pandav, 2007).

Also a small colony comprising of eight Painted Stork nests were located near Ganjaikhia creek on three *Heritiera fomes* trees. Nest height was about 7.5m. Nest building activity started in early September and the colony was active till the end of December (Gopi & Pandav, 2007).

### Winter migrants

A total of 98 species of winter visitors were recorded during the study in comparison to 57 species recorded earlier (Pandav, 1996). Two Spotted Greenshank (*Tringa guttifer*) were observed in the coastal mudflats near Barunei Chatka during low tide on 10 December 2005. Northern Pintail (*Anas acuta*) and Black-tailed Godwit (*Limosa limosa*) with approximate population of 41,928 and 23,203 recorded during the Annual Mid-Winter Waterfowl Count (2005). Approximately 882 Bar-headed Goose (*Anser indicus*) and 777 Northern Shoveller (*Anas clypeata*) were also recorded during the Annual Mid-Winter Waterfowl Count (2005).

### Sathabaya wetlands

This lesser known wetland is the major bird habitat of Bhitarkanika. This wetland harbours 70,000-80,000 wintering species every year. Bar-headed Goose (*Anser indicus*), Brahminy Shelduck (*Tadorna ferruginea*), Eurasian Wigeon (*Anas penelope*), Gadwall (*A. strepera*), Common Teal (*A. crecca*), Northern Pintail (*A. acuta*), Northern Shoveller (*A. clypeata*), Black-winged Stilt (*Himantopus himantopus*), Pacific Golden Plover (*Pluvialis fulva*), Whimbrel (*Numenius phaeopus*), Eurasian Curlew (*N. arquata*), Spotted Redshank (*Tringa erythropus*), Common Redshank (*T. totanus*), Marsh Sandpiper (*T. stagnatilis*), Common Greenshank (*T. nebularia*), Little Stint (*Calidris minuta*), Temminck's Stint (*C. temminckii*), Curlew Sandpiper (*C. ferruginea*). Vast lands of paddy

**Table 3. Number of nests enumerated year wise in the heronry from 1996-2006**

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Asian Openbill Stork	8524	6843	6187	11349	6901	6906	6839	4986	6956	9061	7568
Large Egret	527	1061	615	1624	231	231	1620	1305	2125	1205	1018
Intermediate Egret	1703	NA	NA	236	146	146	1374	757	509	706	500
Little Egret	478	36	120	276	12	12	313	211	234	61	59
Cattle Egret	47	NA	NA	217	81	81	124	126	148	64	0
Grey Heron	271	568	306	716	182	182	302	265	538	308	298
Purple Heron	473	517	504	676	304	304	459	438	589	501	258
Night Heron	390	399	505	572	96	95	510	353	540	372	363
Little Cormorant	1960	734	1502	848	470	470	1777	1268	1937	1151	913
Darter	225	92	106	200	126	126	234	219	316	123	128
Black-headed Ibis	153	255	226	344	209	209	275	277	295	152	182
<b>Total</b>	<b>14751</b>	<b>10505</b>	<b>10071</b>	<b>17058</b>	<b>8758</b>	<b>8762</b>	<b>13827</b>	<b>10205</b>	<b>14187</b>	<b>13704</b>	<b>11287</b>

\* NA - Not available

**Table 4. Annotated checklist of birds of Bhitarkanika mangroves, Orissa**

Common Name	Scientific Name	Status	Frequency	Breeding	Habitat	Observers
<b>Family: Podicipedidae</b>						
Little Grebe	<i>Tachybaptus ruficollis</i>	LM	Rare		OW	GGV
<b>Family: Pelicanidae</b>						
Spot-billed Pelican	<i>Pelicanus phillippensis</i>	LM	Rare		MF	BP/AKN/GGV
<b>Family: Phalacrocoracidae</b>						
Little Cormorant	<i>Phalacrocorax niger</i>	R	Common	B	MF	BP/AKN/GGV
Great Cormorant	<i>Phalacrocorax carbo</i>	WM	Common		OW	AKN/GGV
<b>Family: Anhingidae</b>						
Darter	<i>Anhinga melanogaster</i>	R	Common	B	MF	BP/AKN/GGV
<b>Family: Ardeidae</b>						
Little Egret	<i>Egretta garzetta</i>	R	Common	B	MF	BP/AKN/GGV
Western Reef Egret	<i>Egretta gularis</i>	WM	Vagrant		OW	AKN
Grey Heron	<i>Ardea cinerea</i>	R	Common	B	MF	BP/AKN/GGV
Goliath Heron	<i>Ardea goliath</i>	R	Vagrant		MF	BP/AKN
Purple Heron	<i>Ardea purpurea</i>	R	Common	B	MF	BP/AKN/GGV
Large Egret	<i>Casmerodius albus</i>	R	Common	B	MF	BP/AKN/GGV
Median Egret	<i>Mesophoyx intermedia</i>	R	Common	B	MF	BP/AKN/GGV
Cattle Egret	<i>Bubulcus ibis</i>	R	Common	B	MF	BP/AKN/GGV
Indian Pond Heron	<i>Ardeola bacchus</i>	R	Common		MF	BP/AKN/GGV
Little Green Heron	<i>Butorides striatus</i>	R	Fairly common	B	MF	BP/AKN/GGV
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	R	Common		MF	BP/AKN/GGV
Yellow Bittern	<i>Ixobrychus sinensis</i>	R	Uncommon	B	MF	AKN
Chestnut Bittern	<i>Ixobrychus cinnamomeus</i>	R	Uncommon	B	MF	GGV
Black Bittern	<i>Ixobrychus flavicollis</i>	R	Uncommon	B	MF	AKN
<b>Family: Ciconiidae</b>						
Painted Stork	<i>Mycteria leucocephala</i>	R	Fairly common	B	MF	BP/AKN/GGV
Asian Openbill Stork	<i>Anasomus oscitans</i>	R	Common	B	MF	BP/AKN/GGV
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	WM	Rare		MF	BP/AKN/GGV
Lesser Adjutant Stork	<i>Leptoptilos javanicus</i>	R	Rare	B	MF	BP/AKN/GGV
<b>Family: Threskiornithidae</b>						
Oriental White Ibis	<i>Threskiornis melanocephalus</i>	R	Common	B	MF	BP/AKN/GGV
Eurasian Spoonbill	<i>Platalea leucorodia</i>	WM	Rare		OW	BP/AKN
<b>Family: Anatidae</b>						
Large Whistling-duck	<i>Dendrocygna bicolor</i>	WM	Uncommon		OW	GGV
Lesser Whistling-duck	<i>Dendrocygna javanica</i>	LM	Fairly common	B	OW	BP/AKN/GGV
Bar-headed Goose	<i>Anser indicus</i>	WM	Fairly common		OW	BP/AKN/GGV
Brahminy Shelduck	<i>Tadorna ferruginea</i>	WM	Uncommon		OW	BP/AKN/GGV
Cotton Teal	<i>Nettapus coromandelianus</i>	R	Fairly common	B	OW	BP/AKN/GGV
Gadwall	<i>Anas strepera</i>	WM	Common		OW	BP/AKN/GGV
Eurasian Wigeon	<i>Anas penelope</i>	WM	Common		OW	BP/AKN/GGV
Northern Shoveller	<i>Anas clypeata</i>	WM	Common		OW	BP/AKN/GGV
Northern Pintail	<i>Anas acuta</i>	WM	Common		OW	BP/AKN/GGV
Garganey	<i>Anas querquedula</i>	WM	Uncommon		OW	BP/AKN/GGV
Common Teal	<i>Anas crecca</i>	WM	Uncommon		OW	BP/AKN/GGV
Common Pochard	<i>Aythya farina</i>	WM	Fairly common		OW	BP/AKN/GGV
Baer's Pochard	<i>Aythya baeri</i>	WM	Rare		OW	GGV
Tufted Pochard	<i>Aythya marila</i>	WM	Rare		OW	AKN/GGV
<b>Family: Accipitridae</b>						
Oriental Honey-buzzard	<i>Pernis ptilorhynchus</i>	R	Rare		MF	BP/AKN
Black-shouldered Kite	<i>Elanus caeruleus</i>	R	Fairly common	B	MF	AKN/GGV
Black Kite	<i>Milvus migrans</i>	R	Common	B	MF	BP/AKN/GGV
Brahminy Kite	<i>Haliastur indus</i>	LM	Rare	PB	MF	BP
White-bellied Sea-eagle (Image 5")	<i>Haliaeetus leucogaster</i>	R	Rare	B	MF	BP/AKN/GGV
Pallas's Fish-eagle	<i>Haliaeetus leucoryphus</i>	WM	Rare		MF	AKN/GGV
Indian White-backed Vulture	<i>Gyps bengalensis</i>	R	Rare	B	MF	BP/AKN/GGV
Short-toed Snake-eagle	<i>Circaetus gallicus</i>	R	Common	B	MF	BP/AKN/GGV
Crested Serpent-eagle	<i>Spilornis cheela</i>	R	Uncommon	PB	MF	BP/AKN/GGV
Western Marsh-harrier	<i>Circus aeruginosus</i>	R	Rare		MF	BP/AKN/GV
Pallid Harrier	<i>Circus macrourus</i>	WM	Rare		MF	AKN
Pied Harrier	<i>Circus melanoleucos</i>	WM	Rare		MF	AKN
Shikra	<i>Accipiter badius</i>	R	Fairly common	B	MF	GGV
Eurasian Sparrow Hawk	<i>Accipiter nisus</i>	WM	Uncommon		MF	AKN
Black Eagle	<i>Ictinaetus malayensis</i>	R/LM	Uncommon		MF	AKN
Lesser Spotted Eagle	<i>Aquila pomarina</i>	R	Uncommon		MF	AKN/GGV
Greater Spotted Eagle	<i>Aquila clanga</i>	R	Uncommon		MF	AKN/GGV
Tawny Eagle	<i>Aquila rapax</i>	R	Vagrant		MF	BP
Booted Eagle	<i>Hieraetus pennatus</i>	R/LM	Rare		MF	GGV
Changeable Hawk Eagle	<i>Spizaetus cirrhatus</i>	WM	Rare		MF	BP/AKN/GGV

Common Name	Scientific Name	Status	Frequency	Breeding	Habitat	Observers
<b>Family: Pandionidae</b>						
Osprey	<i>Pandion haliaetus</i>	WM	Rare		MF	
<b>Family: Falconidae</b>						
Common Kestrel	<i>Falco tinnunculus</i>	WM	Rare		MF	AKN
Red-headed Falcon	<i>Falco chicquera</i>	LM	Vagrant		MF	GGV
Peregrine Falcon	<i>Falco peregrinus</i>	LM/WM	Rare		MF	AKN
<b>Family: Phasianidae</b>						
Grey Francolin	<i>Francolinus pondicerianus</i>	R	Vagrant		MF	AKN/GGV
Red JungleFowl	<i>Gallus gallus</i>	R	Common	B	MF	BP/AKN/GGV
<b>Family: Rallidae</b>						
Blue-breasted Rail	<i>Gallinallus striatus</i>	R	Uncommon	PB	MF	BP
White-breasted Waterhen	<i>Amauornis phoenicurus</i>	R	Fairly common	B	MF	BP/AKN/GGV
Watercock	<i>Gallicrex cinerea</i>	R	Common		AF	AKN/GGV
Purple Swampen	<i>Porphyrio porphyrio</i>	R	Uncommon		MF	BP
Common Moorhen	<i>Gallinula chloropus</i>	R	Uncommon		MF	BP/AKN
Common Coot	<i>Fulica atra</i>	WM	Rare		OW	AKN
Ruddy-breasted Crake	<i>Porzana fusca</i>	R	Uncommon		MF	AKN
<b>Family: Jacanidae</b>						
Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	R	Uncommon		MF	AKN/GGV
Bronze-winged Jacana	<i>Metopidius indicus</i>	R	Fairly common	B	MF	BP/AKN/GGV
<b>Family: Rostratulidae</b>						
Greater Painted Snipe	<i>Rostratula benghalensis</i>	R	Uncommon		MF	GGV
<b>Family: Haematopodidae</b>						
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	WM	Common		SB	AKN/GG V
<b>Family: Charadriidae</b>						
Pacific Golden-plover	<i>Pluvialis fulva</i>	WM	Fairly common		TMF	AKN/GGV
Grey Plover	<i>Pluvialis squatarola</i>	WM	Rare		TMF	AKN
Common Ringed Plover	<i>Charadrius hiaticula</i>	WM	Uncommon		TMF	AKN
Little Ringed Lover	<i>Charadrius dubius</i>	WM	Fairly common		TMF	BP/AKN/GGV
Kentish Plover	<i>Charadrius alexandrinus</i>	WM	Uncommon		TMF	BP/AKN/GGV
Lesser Sand Plover	<i>Charadrius mongolus</i>	WM	Common		TMF	BP/AKN/GGV
Greater Sand Plover	<i>Charadrius leschenaultii</i>	WM	Rare		TMF	BP/AKN/GGV
Yellow-wattled Lapwing	<i>Vanellus malarbaricus</i>	R	Uncommon		MF	BP/AKN/GGV
Grey-headed Lapwing	<i>Vanellus cinereus</i>	WM	Fairly common		MF	BP/AKN/GGV
Red-wattled Lapwing	<i>Vanellus indicus</i>	R	Common	B	MF	BP/AKN/GGV
White tailed Lapwing	<i>Vanellus leucurus</i>	WM	Rare		MF	AKN
<b>Family: Scolopacidae</b>						
Pintail Snipe	<i>Gallinago stenura</i>	WM	Fairly Common		OW	BP
Common Snipe	<i>Gallinago gallinago</i>	WM	Rare		OW	AKN
Jack Snipe	<i>Lymnocyptes minimus</i>	WM	Uncommon		OW	AKN
Black-tailed Godwit	<i>Limosa limosa</i>	R	Common		OW	BP/AKN/GGV
Bar-tailed Godwit	<i>Limosa lapponica</i>	WM	Rare		OW	BP/AKN/GGV
Whimbrel	<i>Numenius phaeopus</i>	R	Common		OW	BP/AKN/GGV
Eurasian Curlew	<i>Numenius arquata</i>	WM	Common		OW	BP/AKN/GGV
Spotted Redshank	<i>Tringa erythropus</i>	WM	Rare		OW	AKN
Common Redshank	<i>Tringa tetanus</i>	WM	Fairly Common		OW	BP/AKN/GGV
Marsh Sandpiper	<i>Tringa stagnatilis</i>	WM	Uncommon		OW	AKN
Common Greenshank	<i>Tringa nebularia</i>	WM	Common		OW	BP/AKN/GGV
Spotted Greenshank	<i>Tringa guttifer</i>	WM	Rare			GGV
Green Sandpiper	<i>Tringa ochropus</i>	WM	Rare		OW	BP/AKN/GGV
Wood Sandpiper	<i>Tringa glareola</i>	WM	Fairly Common		OW	BP/AKN/GGV
Terek Sandpiper	<i>Tringa terek</i>	WM	Fairly Common		OW	BP/AKN/GGV
Common Sandpiper	<i>Tringa hypoleucos</i>	WM	Common		OW	BP/AKN/GGV
Ruddy Turnstone	<i>Arenaria interpres</i>	WM	Rare		OW	BP/AKN
Red Knot	<i>Calidris cautus</i>	WM	Rare		TM	AKN
Sanderling	<i>Calidris alba</i>	WM	Rare		OW	AKN/GGV
Little Stint	<i>Calidris minuta</i>	WM	Common		OW	BP
Temminck's Stint	<i>Calidris temminckii</i>	WM	Uncommon		OW	BP
Long toed Stint	<i>Calidris subminuta</i>	WM	Rare		OW	AKN
Dunlin	<i>Calidris alpina</i>	WM	Uncommon		OW	BP/GGV
Curlew Sandpiper	<i>Calidris testacea</i>	WM	Fairly Common		OW	AKN/GGV
Ruff	<i>Philomachus pugnax</i>	WM	Common		OW	BP/GGV
<b>Family: Recurvirostridae</b>						
Blac-winged Stilt	<i>Himantopus himantopus</i>	LM	Common	PB	OW	BP/AKN/GGV
Pied Avocet	<i>Recurvirostra avocetta</i>	WM	Fairly common		SB	BP/AKN/GGV
<b>Family: Dromadidae</b>						
Crab-plover	<i>Dromas ardeola</i>	WM	Rare		TMF	AKN/GGV
<b>Family: Burhinidae</b>						
Stone-curlew	<i>Burhinus oedicnemus</i>	WM	Rare		TMF	GGV
Great Stone-plover	<i>Esacus recurvirostris</i>	WM	Rare		TMF	BP/AKN/ GGV

Common Name	Scientific Name	Status	Frequency	Breeding	Habitat	Observers
<b>Family: Glareolidae</b>						
Oriental Pratincole	<i>Glareola maldivarum</i>	WM	Rare		MF	BP/AKN/GGV
Small Pratincole	<i>Glareola lacteal</i>	WM	Rare		MF	AKN/GGV
<b>Family: Laridae</b>						
Heuglin's Gull	<i>Larus beuglini</i>	WM	Common		SB	BP/AKN/GGV
Pallas's Gull	<i>Larus ichthyaetus</i>	WM	Common		SB	BP/AKN/GGV
Brow-headed Gull	<i>(Larus brunnicephalus)</i>	WM	Common		SB	BP/AKN/GGV
Black-headed Gull	<i>Larus ridibundus</i>	WM	Fairly common		SB	BP/AKN/GGV
Gull-billed Tern	<i>Gelochelidon nilotica</i>	WM	Uncommon		SB	BP/AKN/GGV
Caspian Tern	<i>Hydroprogne caspia</i>	WM	Rare		SB	GGV
River Tern	<i>Sterna aurantia</i>	LM	Rare		SB	BP/AKN/GGV
Lesser Crested Tern	<i>Sterna bengalensis</i>	WM	Uncommon		SB	BP/AKN/GGV
Large Crested Tern	<i>Sterna bergii</i>	WM	Rare		SB	GGV
Black-bellied Terns	<i>Sterna acuticauda</i>	WM	Rare	PB	SB	BP/AKN/GGV
Whiskered Tern	<i>Chlidonias hybrida</i>	LM	Fairly common		SB	GGV
<b>Family: Rynchopidae</b>						
Indian Skimmer	<i>Rynchops albicollis</i>	R/WM	Common			GGV/AKN
<b>Family: Columbidae</b>						
Blue Rock Pigeon	<i>Columba livia</i>	R	Common	B	MF	BP/AKN/GGV
Purple Wood Pigeon	<i>Columba punicea</i>	R	Rare		MF	
Oriental Turtle-dove	<i>Streptopelia orientalis</i>	R	Common		MF	BP/AKN/GGV
Spotted Dove	<i>Streptopelia chinensis</i>	R	Common	B	MF	BP/AKN/GGV
Eurasian Collared-dove	<i>Streptopelia decaocto</i>	R	Common	B	MF	BP/AKN/GGV
Emerald Dove	<i>Chalcophaps indica</i>	R	Common	B	MF	BP/AKN/GGV
Orange-breasted Green Pigeon	<i>Treron bicincta</i>	R	Common	B	MF	BP/AKN/GGV
<b>Family: Psittacidae</b>						
Alexandrine Parakeet	<i>Psittacula eupatria</i>	R	Rare		MF	AKN/GGV
Rose-ringed Parakeet	<i>Psittacula krameri</i>	R	Common	B	MF	BP/AKN/GGV
Blossom-headed Parakeet	<i>Psittacula roseate</i>	R	Vagrant		MF	GGV
<b>Family: Cuculidae</b>						
Pied Crested Cuckoo	<i>Clamator jacobinus</i>	MM	Rare		MF	BP/AKN/GGV
Red-winged Cuckoo	<i>Clamator coromandus</i>	PM	Uncommon		MF	BP/KA
Brainfever Bird	<i>Hierococcyx varius</i>	R	Common	B	MF	BP/AKN/GGV
Common Cuckoo	<i>Cuculus canorus</i>	LM	Uncommon		MF	AKN/GGV
Indian Cuckoo	<i>Cuculus micropterus</i>	R	Vagrant		MF	GGV
Indian Plaintive Cuckoo	<i>Cacomantis passerinus</i>	R	Vagrant		MF	GGV
Asian Koel	<i>Eudynamis scolopacea</i>	R	Common	B	MF	BP/AKN/GGV
Large Green-billed Malkoha	<i>Phaenicophaeus viridirostris</i>	R	Fairly common	B	MF	BP/AKN/GGV
Greater Coucal	<i>Centropus sinensis</i>	R	Common	B	MF	BP/AKN/GGV
<b>Family: Tytonidae</b>						
Barn Owl	<i>Tyto alba</i>	R	Rare		MF	AKN
<b>Family: Strigidae</b>						
Oriental Scops-owl	<i>Otus scops</i>	R	Vagrant		MF	GGV
Collared Scops Owl	<i>Otus bakkamoena</i>	R	Common	PB	MF	BP/AKN/GGV
Brown Fish-owl	<i>Ketupa zeylonensis</i>	R	Rare		MF	AKN
Spotted Owlet	<i>Athene brama</i>	R	Common	B	MF	BP
<b>Family: Caprimulgidae</b>						
Indian Jungle Nightjar	<i>Caprimulgus indicus</i>	R	Common	B	MF	BP/AKN/GGV
Large-tailed Nightjar	<i>Caprimulgus macrurus</i>	R	Common	B	MF	BP/AKN/GGV
<b>Family: Apodidae</b>						
Asian Palm-swift	<i>Cypsiurus parvus</i>	R	Common	B	MF	GGV
House Swift	<i>Apus affinis</i>	R	Common	B	MF	GGV
<b>Family: Alcedinidae</b>						
Small Blue Kingfisher	<i>Alcedo atthis</i>	R	Common	B	MF	BP/AKN/GGV
Stork-billed Kingfisher	<i>Halcyon capensis</i>	R	Rare	B	MF	AKN/GGV
Lesser pied Kingfisher	<i>Ceryle rudis</i>	R	Common	B	OMF	BP/AKN/GGV
Brown-winged Kingfisher	<i>Halcyon amauroptera</i>	WM	Common	B	MF	BP/AKN/GGV
Ruddy Kingfisher	<i>Halcyon coromanda</i>	R	Vagrant		MF	AKN
White-breasted Kingfisher	<i>Halcyon smyrnensis</i>	R	Common	B	MF	BP/AKN/GGV
Black-capped Kingfisher	<i>Halcyon pileata</i>	LM	Common		MF	BP/AKN/GGV
Collared Kingfisher (Image 6 <sup>th</sup> )	<i>Todiramphus chloris</i>	R	Common	B	MF	BP/AKN/GGV
<b>Family: Meropidae</b>						
Small Bee-eater	<i>Merops orientalis</i>	R	Common	B	MF	BP/AKN/GGV
Blue Tailed Bee Eater	<i>Merops phillipinus</i>	SM	Fairly Common	B	MF	BP/AKN/GGV
Chestnut-headed Bee Eater	<i>Merops leschenaulti</i>	LM	Vagrant		MF	
<b>Family: Coraciidae</b>						
Indian Roller	<i>Coracias benghalensis</i>	R	Fairly common	B	MF	BP/AKN/GGV
<b>Family: Upupidae</b>						
Common Hoopoe	<i>Upupa epops</i>	R	Fairly Common	B	MF	BP/AKN/GGV

Common Name	Scientific Name	Status	Frequency	Breeding	Habitat	Observers
<b>Family: Bucerotidae</b>						
Indian Grey Hornbill	<i>Ocyrceros birostris</i>	R	Common	B	MF	BP/AKN/GGV
<b>Family: Capitonidae</b>						
Coppersmith Barbet	<i>Megalaima haemacephala</i>	r	Common	B	MF	BP/AKN/GGV
<b>Family: Picidae</b>						
Eurasian Wryneck	<i>Jynx torquilla</i>	WM	Rare		MF	AKN
Speckled Piculet	<i>Picumnus innominatus</i>	R	Rare		MF	AKN
Rufous Woodpecker	<i>Celeus brachyurus</i>	R	Fairly common	B	MF	BP
Brown-capped Pygmy Wood Pecker	<i>Dendrocopos nanus</i>	LM	Rare		MF	GGV
Fulvous Breasted Pied Woodpecker	<i>Dendrocopos macei</i>	R	Uncommon	B	MF	BP
Black-naped Green Woodpecker	<i>Picus canus</i>	R	Fairly common		MF	BP/AKN/GGV
Lesser Golden-backed Woodpecker	<i>Dinopium benghalense</i>	R	Common	B	MF	BP/AKN/GGV
Greater Golden-backed Woodpecker	<i>Chrysocolaptes lucidus</i>	R	Common	B	MF	BP/AKN/GGV
<b>Family: Pittidae</b>						
Indian Pitta	<i>Pitta brachyura</i>	LM	Fairly common			BP
Mangrove Pitta	<i>Pitta megarhyncha</i>	R	Fairly common	B		AKN/GGV
<b>Family: Alaudidae</b>						
Red-winged Bush-lark	<i>Mirafr erythroptera</i>	R	Common		MF	AKN
Bengal Bush Lark	<i>Mirafr assamica</i>	WM	Rare		MF	AKN
Ashy Crowned Sparrow Lark	<i>Eremopterix grisea</i>	R	Fairly common	B	MF	BP/AKN/GGV
Greater Short-toed Lark	<i>Calandrella brachydactyla</i>	R	Vagrant		MF	GGV
Common Crested Lark	<i>Galerida cristata</i>	R	Fairly common		MF	AKN
Eastern Sky Lark	<i>Alauda gulgula</i>	R	Fairly common		MF	AKN
<b>Family: Hirundinidae</b>						
Common Swallow	<i>Hirundo rustica</i>	WM	Common		MF	BP/AKN/GGV
Red-rumped Swallow	<i>Hirundo daurica</i>	WM	Fairly common		MF	BP/AKN/GGV
Asian House-martin	<i>Delichon dasypus</i>	WM	Uncommon		MF	GGV
<b>Family: Motacilidae</b>						
Forest Wagtail	<i>Dendronanthus indicus</i>	WM	Fairly common		MF	BP/AKN/GGV
White Wagtail	<i>Motacilla alba</i>	WM	Uncommon		MF	AKN
Citrine Wagtail	<i>Motacilla cireola</i>	WM	Fairly common		MF	BP/AKN
Yellow Wagtail	<i>Motacilla flava</i>	WM	Fairly common		MF	AKN
Grey Wagtail	<i>Motacilla cinerea</i>	WM	Uncommon		MF	AKN
Richard's Pipit	<i>Anthus richardi</i>	R	Uncommon		MF/PF	GGV
Paddyfield Pipit	<i>Anthus rufulus</i>	R	Common	B	MF/PF	BP/AKN/GGV
Tawny Pipit	<i>Anthus campestris</i>	WM	Uncommon		MF	AKN
Eurasian Tree Pipit	<i>Anthus trivialis</i>	WM	Rare		MF	AKN
Oriental Tree Pipit	<i>Anthus hodgsoni</i>	WM	Uncommon		MF	BP/AKN/GGV
<b>Family: Campephagidae</b>						
Large Cuckooshrike	<i>Coracina macei</i>	R	Vagrant		MF	GGV
Black Winged Cuckoo-shrike	<i>Coracina melaschistos</i>	R	Rare		MF	BP/AKN/GGV
Black-headed Cuckoo-shrike	<i>Coracina melanoptera</i>	R	Fairly common	B	MF	BP/AKN/GGV
Ashy Minivet	<i>Perricocotus divaricatus</i>	WM	Rare		MF	AKN
Small Minivet	<i>Pericocotus cinnamomeus</i>	R	Fairly common	B	MF	BP/AKN/GGV
<b>Family: Pycnonotidae</b>						
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	R	Fairly common	B	MF	BP/AKN/GGV
Red-vented Bulbul	<i>Pycnonotus cafer</i>	R	Fairly common	B	MF	AKN/GGV
<b>Family: Irenidae</b>						
Common Iora	<i>Aegithina tiphia</i>	R	Common	B	MF	AKN/GGV
Jerdon's Chloropsis	<i>Chloropsis cochinchinensis</i>	WM	Vagrant		MF	AKN
<b>Family: Laniidae</b>						
Rufos-backed Shrike	<i>Lanius schach</i>	WM	Vagrant		MF	GGV
Brown Shrike	<i>Lanius cristatus</i>	R	Uncommon		MF	BP
<b>Family: Turdinae</b>						
Orange Headed Ground Thrush	<i>Zoothera citrina</i>	R	Fairly common		MF	BP/AKN/GGV
Ticket's Thrush	<i>Turdus unicolor</i>	WM	Rare		MF	BP/AKN/GGV
Oriental Magpie-robin	<i>Copsychus saularis</i>	R	Common	B	MF	BP/AKN/GGV
Black Redstart	<i>Phoenicurus ochruros</i>	R	Rare		MF	BP/AKN/GGV
<b>Family: Timalinae</b>						
Common Babbler	<i>Turdoides caudatus</i>	R	Common	B	MF	BP/AKN/GGV
Jungle Babbler	<i>Turdoides striatus</i>	R	Common	B	MF	BP/AKN/GGV
Striated Babbler	<i>Turdoides earlei</i>	R	Fairly common		MF	AKN
Yellow Breasted Babbler	<i>Macronous gularis</i>	R	Fairly common		MF	BP/AKN
Red-capped Babbler	<i>Timalia pileata</i>	R	Uncommon	B	MF	BP/AKN
<b>Family: Sylviinae</b>						
Streaked Fantail-warbler	<i>Cisticola juncidis</i>	R	Uncommon		MF	AKN
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	R	Fairly common	B	MF	GGV
Plain Prinia	<i>Prinia inornata</i>	R	Fairly common	B	MF	GGV
Ashy Prinia	<i>Prinia socialis</i>	R	Fairly common	B	MF	GGV

Common Name	Scientific Name	Status	Frequency	Breeding	Habitat	Observers
Paddy Field Warbler	<i>Acrocephalus agricola</i>	WM	Common		MF	AKN
Blyth's Reed-warbler	<i>Acrocephalus dumetorum</i>	WM	Uncommon		MF	AKN
Indian Great Reed-warbler	<i>Acrocephalus stentoreus</i>	WM	Uncommon		MF	GGV
Common Tailor Bird	<i>Orthotomus sutorius</i>	R	Common	B	MF	BP/AKN/GGV
Common Chiffchaff	<i>Phylloscopus collybita</i>	WM	Fairly Common		MF	BP/AKN/GGV
<b>Family: Musicapinae</b>						
Blue-throated Flycatcher	<i>Cyornis rubecoloides</i>	WM	Rare		MF	AKN
Red-throated Flycatcher	<i>Ficedula parva</i>	WM	Uncommon		MF	AKN
Verditer Flycatcher	<i>Eumyias thalassina</i>	WM	Uncommon		MF	BP
<b>Family: Monarchinae</b>						
Asian Paradise-flycatcher	<i>Tarpsiphona paradisi</i>	R	Uncommon	B	MF	BP/AKN/GGV
Black-naped Monarch-flycatcher	<i>Hypothymis azurea</i>	R	Uncommon	PB	MF	BP/AKN/GGV
<b>Family: Rhipidurinae</b>						
White-throated Fantail-flycatcher	<i>Rhipidura albicollis</i>	R	Fairly common	B	MF	BP/AKN/GGV
<b>Family: Pachycephalinae</b>						
Mangrove Whistler	<i>Pachycephala grisola</i>	R	Rare	B	MF	BP/AKN
<b>Family: Paridae</b>						
Great Tit	<i>Parus major</i>	R	Common	B	MF	BP/AKN/GGV
<b>Family: Nectariniidae</b>						
Purple-rumped Sunbird	<i>Nectarina zeylonica</i>	R	Fairly Common	B	MF	BP/AKN/GGV
Olive-backed Sunbird	<i>Nectarina jugularis</i>	WM	Rare		MF	AKN
Purple Sunbird	<i>Nectarina asiatica</i>	R	Fairly Common	B	MF	BP/AKN/GGV
<b>Family: Zosteropidae</b>						
Oriental White-eye	<i>Zosterops palpebrosus</i>	R	Common	B	MF	BP/GGV
<b>Family: Estrildidae</b>						
White-throated Munia	<i>Lonchura malabarica</i>	R	Uncommon	PB	MF/PF	GGV
Black-headed Munia	<i>Lonchura malacca</i>	R	Fairly Common	B	MF	BP/AKN/GGV
Spotted Munia	<i>Lonchura punctulata</i>	R	Uncommon		MF/PF	GGV
<b>Family: Passerinae</b>						
House Sparrow	<i>Passer domesticus</i>	R	Uncommon	B	MF	GGV
<b>Family: Ploceinae</b>						
Baya Weaver	<i>Ploceus philippinus</i>	R	Common	B	MF	BP/AKN/GGV
Black-breasted Weaver	<i>Ploceus benghalensis</i>	R	Vagrant	B	MF	GGV
<b>Family: Sturnidae</b>						
Grey-headed Starling	<i>Sturnus malabaricus</i>	R	Common	B	MF	BP/AKN/GGV
Brahminy Starling	<i>Sturnus Pagodarum</i>	LM	Rare		MF	GGV
Asian Pied Starling	<i>Sturnus contra</i>	R	Common	B	MF	BP/AKN/GGV
Common Myna	<i>Acridotheres tristis</i>	R	Common	B	MF	BP/AKN/GGV
Jungle Myna	<i>Acridotheres fuscus</i>	R	Common	B	MF	BP/AKN/GGV
<b>Family: Oriolidae</b>						
Black-headed Oriole	<i>Oriolus xanthornus</i>	R	Common	B	MF	BP/AKN/GGV
Eurasian Golden Oriole	<i>Oriolus oriolus</i>	R	Uncommon		MF	AKN/GGV
<b>Family: Dicruridae</b>						
Black Drongo	<i>Dicrurus macrocercus</i>	R	Common	B	MF	BP
Ashy Drongo	<i>Dicrurus leucophaeus</i>	R	Common		MF	AKN/GGV
White-bellied Drongo	<i>Dicrurus caerulescens</i>	R	Rare		MF	BP/AKN/GGV
<b>Family: Corvidae</b>						
Indian Treepie	<i>Dendrocitta vagabunda</i>	R	Common	B	MF	BP/AKN/GGV
Jungle Crow	<i>Corvus macrorhynchos</i>	R	Common	B	MF	BP/AKN/GGV
House Crow	<i>Corvus splendens</i>	R	Common	B	MF	BP/AKN/GGV

Abbreviations to observers initials: BP - Bivash Pandav; AKN - Anup Kumar Nayak; KA - Kalpana Ambastha; GGV - Gopi G V  
Nomenclature follows Manakadan and Pittie (2002). The checklist was prepared while carrying out an ecological study on the colonial nesting waterbirds from August 2004 to December 2006.

fields and intertidal zones along the Gahirmatha Marine Sanctuary provide an ample habitat for these wintering species. These waders arrive during late October and depart around mid December with large concentrations of these birds are observed during mid November to second week of December. We speculate that this wetland is being used as a stop over site by the birds wintering in Chilika Lake.

#### Additional data/confirmation required

Certain species listed by Nayak (2003) including Plain Leaf Warbler, Brownish-flanked Bush Warbler, Garden Warbler, Ruddy Kingfisher, Grey-backed Shrike, Singing Bushlark, White-throated Bulbul, Thick-billed Green Pigeon, Saker Falcon, Pallid Scops Owl etc. need further confirmation for site record or require to be removed from the Bhitarkanika checklist.

### Major conservation issues and implications

**Aquaculture farms:** In the past few decades, aquaculture has experienced rapid growth in India and Orissa had been witnessing the same trend. Along the coastal belt of Orissa shrimp farming has been expanding vigorously. The expansion is driven by the high profitability of shrimp farming and attracts a wide range of investors, ranging from individual farmers (converting paddy fields) to multinational companies investing in large-scale semi-intensive and intensive shrimp farming. This fast development of the shrimp sector is at the cost of the conversion of flat, agricultural and coastal lands to shrimp ponds. In December 1996, the Supreme Court responded by placing a number of stringent restrictions on shrimp farming in the coastal zone, including: No shrimp culture ponds were to be constructed within 500m of the high tide mark, applicable for all seas, estuaries, creeks, rivers and backwaters; agricultural lands, salt pan lands, mangroves, wetland, forest lands and land for village common purposes were not to be converted into shrimp ponds.

However, this is being violated in this region and paddy fields are increasingly being converted to aquaculture farms. A total of 674 aquaculture farms (with total area of 793.45 acres) were located along the peripheral region of the National Park alone. This illegal conversion of coastal wetlands will result in loss of foraging grounds and wintering grounds for a variety of bird species.

**Poisoning and trapping of migratory birds:** More than 90 species of birds visit Bhitarkanika with the onset of winter. Some of these birds are either trapped or poisoned by locals for consumption. Poisons are generally mixed in food grains and are kept on broad leaves for the birds to feed.

Conservation of Bhitarkanika birds is not only of local importance but also of global interest. In Bhitarkanika, we consider it important to intensify surveys of birds to obtain complete inventories of the avifauna. Further studies to determine the status and distribution of Indian skimmers, biology of sympatric kingfishers, identification of foraging corridors along with monitoring post dispersal movement patterns of colonial nesting waterbirds, listing of breeding birds and assessing Sathabaya wetland which has received little ornithological attention and no protection, could be taken up in near future to enrich the ornithological knowledge of this region. Finally, we stress the importance of documenting new or rare species records; photographs, video recordings and sound-recordings, as opposed to sight records, which can be objectively reviewed in the future and can therefore be considered as "reliable evidence".

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