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## SHORT COMMUNICATION

### AVIAN CONGREGATION SITES IN THE GULF OF KACHCHH, GUJARAT, INDIA

Jigar D. Joshi, Sandeep B. Munjpara, Kinjal Joshi, Harshad Salvi & R.D. Kamboj

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## Avian congregation sites in the Gulf of Kachchh, Gujarat, India.

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**Abstract:** The present study deals with the congregation of avifauna at various locations in Gulf of Kachchh (GoK), Gujarat, India. The study was conducted between 2011 and 2014. A total of 14 sites were identified in Gulf of Kachchh which had regular and remarkable congregation of mono-species or multi-species of waterbirds. The observations were made through line transects and point count sampling methods. The largest congregation sites were Bhaidar and Pirotan Islands with more than 5,000 individuals of waterbirds. Khijadiya wetland was also recorded with a remarkable number of birds in the congregation, i.e., more than 4,000 individuals. The identified congregation sites were found to be distributed throughout the southern part of GoK. Such sites were intertidal areas, freshwater bodies, salt pans etc. The bird congregations comprised resident and migratory waterbirds and coastal birds.

**Keywords:** Bhaidar, congregation, Khijadiya, migratory, Pirotan, resident, sampling, waterbirds.

Many families of birds congregate either to breed or to feed during non-breeding period and sometimes, congregation protects them from natural predators as

well. If degradation persists at the breeding colony for a long time, it may affect the population of those breeding birds and if similar site related threats perseveres at the non-breeding or wintering sites, the birds might have to look for other similar sites to sustain themselves (BirdLife International 2008). A majority of congregations are observed in families such as Pelecanidae, Ardeidae, Anatidae, Ciconiidae, Scolopacidae, and other shorebirds. Usually, congregation of birds comprise single or more than one species. And usually, waterbirds are congregational compared to terrestrial birds (Pandey & Teli 2005).

Gujarat is a maritime state in India having the longest coastline and rich in coastal biodiversity (Sengupta & Deshmukhe 2000). Out of the three gulfs in India, two gulfs, i.e., Gulf of Kachchh (GoK) and Gulf of Khambhat (GoKh) are in Gujarat State. GoK is one of the four major reefs of the country (Venkataraman et al. 2003;

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Parasharya & Padate 2014). Geographically, the GoK is endowed with islands, intertidal areas, offshore areas, and terrestrial habitats in shorelines that results in the existence of various habitats such as mangrove forests, coral reefs, Inter-tidal mudflats, reef vegetation, salt affected areas, and marine & terrestrial biodiversity (Sengupta & Deshmukhe 2000). Furthermore, from an avifaunal point of view, GoK is an ecologically significant place as two International flyways of migratory birds pass through GoK (MoEF 2005; Newton 2007; Kirby 2010; BirdLife International 2010) and some internationally known congregation sites have been identified as Important Bird Areas and potential Ramsar sites (Islam & Rahmani 2004). The large continental shelf of the southern part of the gulf harbors vast areas of mangrove and coral reefs that provide shelter to other benthos such as fishes, crabs and small invertebrates. Birds utilize these vast habitats as a wintering ground and attract enormous migratory birds in the state. Several studies have been carried out to make an inventory of avifauna of GoK such as Ali (1945); Ali (1962); Parasharya (1984); Naik et al. (1991); Bhuva & Soni (1998); Urfi (2002); Singh (2001); Singh et al. (2004); Panday & Teli (2005); Jani & Mishra (2007). Some of the observations with scattered information on congregation are also available, however, detailed information of the congregation sites is not available. The present study deals with the congregation sites of avifauna in GoK, Gujarat, India.

### Study Area

The present study is confined to the GoK, the western-most part of the country that encompasses an area of around 7,350km<sup>2</sup> (ICMAM 2002). A cluster of nearly 42 islands exist in the southern part of the gulf. GoK is a shallow water body and the average depth is 30m ranging from 20m at the head to 60m at the mouth. In the southern part of the gulf, most of the intertidal areas have been notified as marine national park and sanctuary, which is also one of the IBA sites (Islam & Rahmani 2004). An area of 162.89km<sup>2</sup> and 457.92km<sup>2</sup> have been declared as marine national park and marine sanctuary, respectively (Singh 1994; Jani & Mishra 2007). The study was conducted on islands, intertidal and coastal areas of the GoK. The area under the observation was mainly 500m landwards side and 200m seaward side from HTL. Along with this, 14 islands were also considered for making observations. Administratively, the southern part of GoK comprise seven talukas viz., Okhamandal, Kalyanpur, Khambhalia, Lalpur, Jamnagar, Jodiya, and Maliya. Likewise, the northern part of the GoK comprises six talukas, viz.: Bhachau, Gandhidham,

Anjar, Mundra, Mandvi, and Abdasa.

### METHODS

The observations for congregation sites in the GoK were made through whole area search with opportunistic observation as well as through point sample observations from October 2011 to December 2014. Coastal areas of a total of 13 talukas and 14 islands of the GoK were surveyed thoroughly to search and identify bird congregations based on the number of waterbirds (as per Delaney & Scott 2006). In addition to the whole area search method, a total of 34 locations, mainly wetlands near the coastline, were also selected for point sampling observations for occurrence of bird congregations. The observations were made with a pair of binoculars (10X50), spotting scopes (16-48 X/ 20-60 X), GPS instrument and predesigned datasheet.

In order to recognise waterbird congregation sites worldwide, IBA has identified four main criteria (Islam & Rahmani 2004). Any large geographical area that justifies at least one of the four criteria can be considered as a congregation site. It is worth mentioning that islands and coastal areas of the GoK are too small to apply these criteria, however, to identify relatively important areas of the GoK from a congregation point of view, A4 (i) criterion (i.e., site known or thought to hold, on a regular basis, >1% of a biogeographic population of a congregational water-bird species) has been used as a reference. The count of water-birds throughout the GoK is known to be about 66,855 birds by Singh et al. (2004). Therefore, in the present study, the site has an occurrence of more than 600 water-birds (i.e., about 1% of 66,855 water-birds) those mentioned by Delaney & Scott (2006) were considered as congregation site of the Gulf of Kachchh. Each site, identified based on the criterion, might not fulfil the criteria for global recognition, but these can be considered as important congregation sites in GoK.

### RESULTS AND DISCUSSION

From the stretch of the GoK a total of 250 species of birds were recorded during the study. Of the total recorded species, a total of 145 (58%) were primarily terrestrial and 105 (42%) were primarily aquatic. Though primarily aquatic bird species were less than primarily terrestrial, the abundance of aquatic species was always higher. Moreover, many aquatic species have a tendency to congregate at a site for various purposes such as foraging, sheltering, roosting and protection.

Many places in GoK were observed with a congregation of water-birds (Images 1–3), however, a total of 14 locations were identified which had regular,

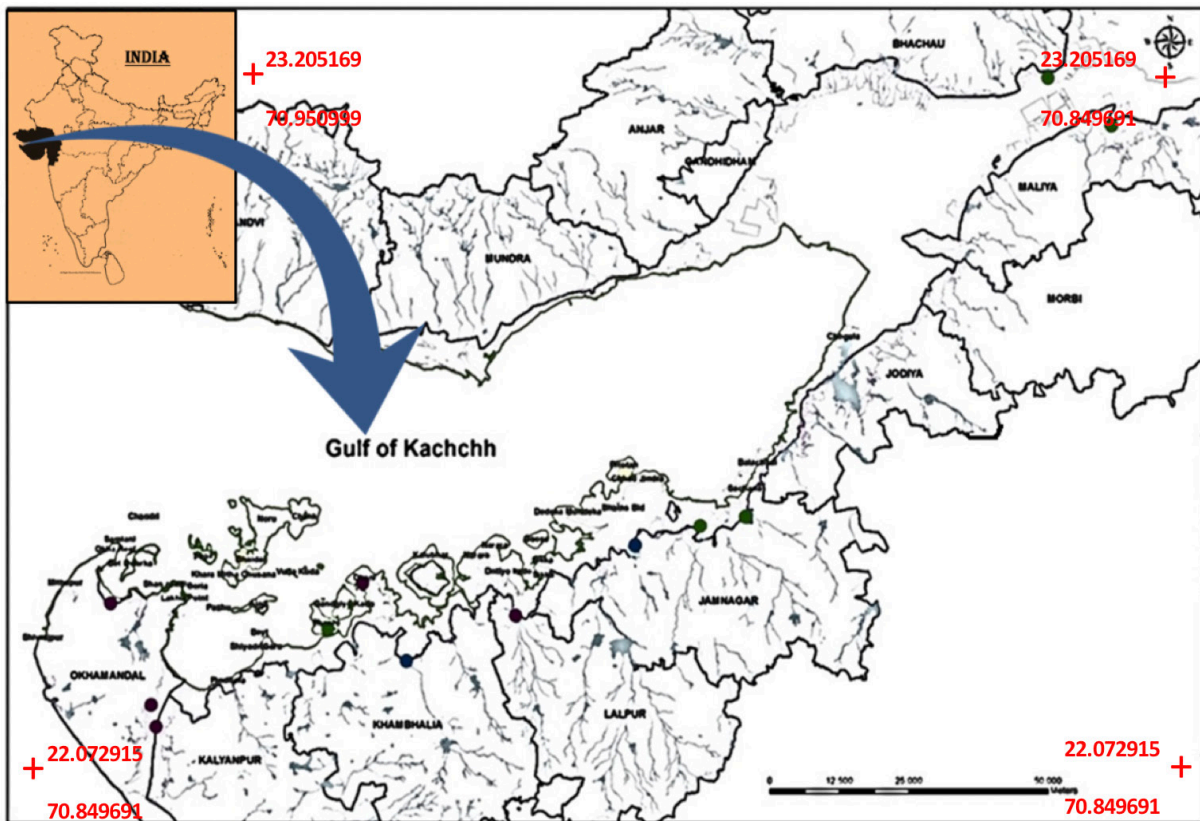


Figure 1. Study area - Gulf of Kachchh.

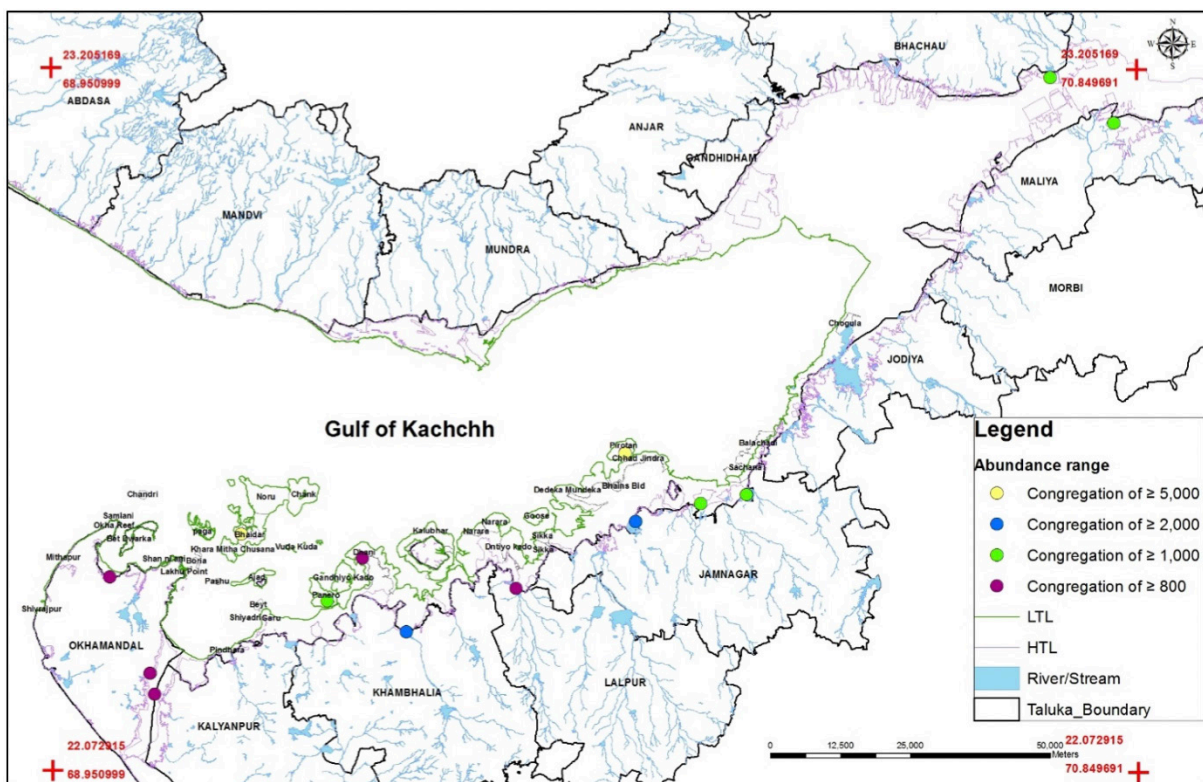


Figure 2. Congregation sites of avifauna in the Gulf of Kachchh.

**Table 1. Congregation sites recorded from the Gulf of Kachchh (GoK) (2011–14).**

Site no.	Site name	Geographical co-ordinates	Habitat types	No. of water-birds	No. of species	Season
1	Bhaidar	22.458°N & 69.292°E	Intertidal area with mudflat	>5000	28	Winter
2	Pirotan	22.597°N & 69.962°E	Intertidal area with mangrove cover and sand patches mangrove cover	>5000	13	Winter
3	Khijadiya	22.534°N 70.171°E	Fresh and saline water wetland	>4000	27	Summer
		22.520°N & 70.133°E	Fresh and saline water wetland	>1000	19	Winter
4	Khara-Beraja	22.472°N & 69.978°E	Freshwater wetland	>2000	16	Winter
		22.483°N & 69.967°E	Freshwater wetland	>2000	17	Summer
5	Salaya	22.303°N & 69.591°E	Wetland with saline mudflat	>2000	35	Winter
6	Panero	22.352°N & 69.458°E	Intertidal area with sand and mudflat	>1000	20	Winter
7	Tupani	22.233°N & 69.238°E	Saline area	>1000	21	Monsoon
		22.238°N & 69.153°E	Saline area	>800	17	Winter
8	Sikarpur	23.211°N & 70.710°E	Saltpan	>1000	16	Monsoon
9	Kajarda	23.114°N & 70.833°E	Creek	>1000	25	Winter
10	Nava nagna	22.532°N & 70.106°E	Saltpan	>1000	16	Winter
11	Charakla	22.199°N & 69.137°E	Saltpan	>800	15	Summer
12	Padli	22.383°N & 69.035°E	Freshwater wetland	>800	36	Winter
13	Parodiya	22.341°N & 69.633°E	Thorny & Scrub	>800	34	Winter
14	Dhani	22.433°N & 69.508°E	Intertidal area with thorny & scrub	>800	10	Winter

remarkably during winter, congregation of either mono-species or multi-species (Figure 2). Among selected sites for the observations, Bhaidar Island was identified to be the largest congregation site of water-birds. During each observation, especially in winters a minimum of 5,000 individuals of various species were recorded. Sometimes bird counts exceeded even 10,000 individuals. About 28 species were recorded to be congregating in Bhaidar island. Major congregating species were Little Ringed Plover *Charadrius dubius*, Kentish Plover *Charadrius alexandrinus*, Eurasian Curlew *Numenius arquata orientalis*. The extent of Bhaidar Islands is about 51.57km<sup>2</sup> with sand-dune, intertidal mudflats along with mangroves and shrub vegetation (Singh et al. 2004). Such habitat features attract enormously waders for feeding. The second largest congregation site was recognised to be Pirotan Island, with often more than 5,000 individuals. Similar to Bhaidar, water-birds count on Pirotan sometimes exceeded 7,000 birds. Interestingly, Crab Plover *Dromas ardeola* was a mono-species congregating bird on the Pirotan island and recorded throughout the years whereas the other 13 species of birds were found congregating on Pirotan

island. The Pirotan island is characterized by exposed sand-patches during low tides and it is partially covered with mudflats and mangrove vegetation (Singh et al. 2004; Ramkumaran et al. 2017). Major congregating species at Pirotan Island were the Black-tailed Godwit *Limosa limosa*, Bar-tailed Godwit *Limosa lapponica*, Indian Skimmer *Rynchops albicollis*, Grey Plover *Pluvialis squatarola*, European Golden Plover *Pluvialis apricaria*, and Little stints *Calidris minuta*. Observations were made mostly at 22.597°N & 69.962°E, however, locations of the congregation varied due to various factors such as tidal amplitude, tide timing, and activity of fishermen. Another important congregation site was Khijadiya wetland that makes the site as one of the congregation sites of GoK. Though the number of birds in the entire sanctuary would be in the thousands, some of the places in the Khijadiya wetland and its surroundings had congregations of birds. It is important to mention that one of the congregation place in the Khijadiya was the congregation of migratory cranes (i.e., Common Crane *Grus grus* and Demoiselle Crane *Grus virgo*) which roost in part on wetland covered with shallow water. A congregation of about 27 species were recorded during



**Image 1. Congregation of small waders at Bhaidar island during low-tide.**



**Image 2. Mono-species congregation (Crab Plover) at Pirotan island.**



**Image 3. Congregation of waders (multi-species) at Pirotan island during low-tide.**

the study period. Khijadiya remains always an important area for birds as it has been declared an IBA site (Pandey & Teli 2005; Islam & Rahmani 2004). Congregations were also recorded in a saline area of Tupani Village of Okhamandal Taluka at 22.233°N & 69.238°E and a freshwater wetland of Khara-Beraja Village of Jamnagar Taluka during the study. So far, the sites were not listed as avian congregation sites in any literature. Apart from

mentioned sites, there were many other sites recorded as avian congregation sites during the study (Table 1). Of the recorded sites, 11 sites were intertidal area, saline area, saltpans and creeks, whereas the other three sites were freshwater wetland habitats. The congregation was recorded mainly during the winter and monsoon seasons, however, a congregation was also recorded in summer at Charkala and Khijadiya. The likely reason for congregation in summer is water availability. It is interesting to note that no congregation site was recorded in northern GoK (Figure 1), as the area is devoid of large intertidal area as well as saline or freshwater wetlands. Occurrence of migratory species is more towards the southern coast of the GoK compared to the northern coast due to resource availability (Singh et al. 2004). The extensive mudflat areas (intertidal and high-tidal mudflats), channels, shoals, islands, sand bars, coral reefs and mangroves exist mainly in the southern part. Saltpans are potential habitats for waders and storks, herons and egrets present at the innermost parts of the Gulf, i.e., eastward of Jamnagar which are mainly occupied with saltpans along the coast and mudflats (ICMAM 2002). In addition, the southern part of the GoK comprises islands that provide undisturbed habitats for roosting at night. Sparse mangrove, intertidal mudflats, the coast dominated by sand and silt with narrow beaches at the northern side of the GoK (ICMAM 2002), attracts a number of resident as well as migratory coastal birds, however, this area is not suitable for regular congregation of birds.

## CONCLUSION

A total of 14 congregation sites were recorded from the GoK, of which the largest site was Bhaidar. Whereas Pirotan Island and Khijadiya wetland were also considerably large sites with a remarkable number of birds in congregation, however, GoK may have more than 14 congregation sites. The recorded congregation sites were found to be distributed throughout the southern part of GoK. The congregation sites are prone to damage by some of the anthropogenic activities such as direct effect of fishing activities and indirect effects of pollutions and alteration of habitats. Hence, the sites should receive serious attention for the conservations because, if the site get damaged, and population survival would be affected.

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## Articles

### Status of Nahan's Partridge *Ptilopachus nahani* (Dubois, 1905) (Aves: Galliformes: Odontophoridae) in Uganda

– Eric Sande, Sisiria Akoth, Ubaldo Rutazaana & William Olupot, Pp. 17063–17076

### Fish diversity in streams/rivers of Kalakad-Mundanthurai Tiger Reserve, Tamil Nadu, India

– K. Kannan & J.A. Johnson, Pp. 17077–17092

### Gastrointestinal helminth and protozoan infections of wild mammals in four major national parks in Sri Lanka

– Chandima Sarani Sepalage & Rupika Subashini Rajakaruna, Pp. 17093–17104

## Review

### Appraising carnivore (Mammalia: Carnivora) studies in Bangladesh from 1971 to 2019 bibliographic retrieves: trends, biases, and opportunities

– Muntasir Akash & Tania Zakir, Pp. 17105–17120

## Communications

### Diversity of scorpions (Arachnida: Scorpiones) in Polonnaruwa Archaeological Reserve, Sri Lanka

– Kumudu B. Wijesooriya, Lakshani S. Weerasekara & Kithsiri B. Ranawana, Pp. 17121–17128

### A faunistic survey of tiger beetles (Coleoptera: Carabidae: Cicindelinae) in Chakrashila Wildlife Sanctuary and adjoining riverine ecosystem in Assam, India

– Kushal Choudhury, Chandan Das & Amar Deep Soren, Pp. 17129–17137

### Occurrence of the *Aporrectodea caliginosa caliginosa* (Savigny, 1826) (Annelida: Clitellata: Haplotaxida) from Kashmir Valley, Jammu & Kashmir, India

– Ishtiyahq Ahmed Najjar, Anisa B. Khan & Abdul Hai, Pp. 17138–17146

## Short Communications

### Avian congregation sites in the Gulf of Kachchh, Gujarat, India

– Jigar D. Joshi, Sandeep B. Munjpara, Kinjal Joshi, Harshad Salvi & R.D. Kamboj, Pp. 17147–17152

### Checklist of brachyuran mangrove crabs of Kerala, India

– Kurian Mathew Abraham & Apreshgi Kolothuthara Prakasan, Pp. 17153–17160

## Notes

### A new country record of Smooth-backed Gliding Gecko *Gekko lionotum* (Annandale, 1905) (Squamata: Gekkonidae) from Bangladesh

– M. Rashedul Kabir Bhuiyan, M. Fazle Rabbe, Mohammad Firoj Jaman, Ananda Kumar Das & Samiul Mohsanin, Pp. 17161–17164

### *Amblyomma gervaisi* (Ixodida: Ixodidae: Amblyomma) infestation in a Rat Snake from northwestern Himalayan region: a case study

– Aman D. Moudgil, Ankur Sharma, Adarsh Kumar, Amit Singla & Surender Bansal, Pp. 17165–17167

### Parasitic enteritis in the free-ranging Common Myna *Acridotheres tristis* (Aves: Passeriformes: Sturnidae)

– Rakesh Kumar, Aman Dev Moudgil, Sameeksha Koundal, Rajendra Damu Patil & Rajesh Kumar Asrani, Pp. 17168–17170

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