

Bihar. However, the largest congregation of Greater Adjutant-Storks, containing 53 individuals, was recorded on the banks of River Ganga, within Vikramshila Gangetic Dolphin Sanctuary in May 2006, along with 57 Painted Storks, and other water birds (Choudhary & Mishra 2006). The sighting of such a large numbers of Greater Adjutant-Storks and Painted Storks catalysed us to be more vigilant.

In the last week of January 2009 two Greater Adjutant-Storks were recorded roosting, with seven Lesser Adjutant-Storks, on a large banyan tree in Koabari village (Kishanganj district, northern Bihar). Villagers report that their number could be more than five. But their sudden appearance here reveals that in future this could become a preferred site for roosting or breeding and that their numbers may ultimately increased. This is certainly a good sign for us.

Conclusion

The above facts make it quite clear that both the threatened storks are breeding successfully in Bihar. Tolerance of villagers towards the birds, and awareness created by members of Mandar Nature Club, Bhagalpur help in their successful breeding. Traditional beliefs of farmers combined with relatively simple awareness programmes to ensure villagers retain pride can aid to improve numbers of species that are of global conservation concern.

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References

- Ali, S., & Ripley, S. D., 1987. *Compact handbook of the birds of India and Pakistan together with those of Bangladesh, Nepal, Bhutan and Sri Lanka*. 2nd ed. Delhi: Oxford University Press.
- BirdLife International. 2007. List of threatened birds downloaded from <<http://www.birdlife.org/>>
- Choudhary, D. N., Mandal, J. N., Mishra, A., & Ghosh, T. K., 2010. First ever breeding record of Black-necked Stork *Ephippiorhynchus asiaticus* from Bihar. *Indian BIRDS* 6 (3): 80–82.
- Choudhary, D. N., & Mishra, A., 2006. Sighting of some threatened bird species in Vikramshila Gangetic Dolphin Sanctuary (VGDS) Bhagalpur, Bihar. *Newsletter for Birdwatchers* 46 (5): 68–70.
- Choudhary, D. N., Dutta, G. R., & Pan, T. K., 2007. Lesser Adjutant breeds in parts of north Bihar - a recent finding. *Newsletter for Birdwatchers* 46 (6): 86–88 (2006).
- Choudhary, A., 2007. The status of endangered species in northeast India. *J. Bombay Nat. Hist. Soc.* 103 (2&3): 157–167 (2006).
- Choudhary, A., 2009. Counting large gatherings of globally threatened Greater Adjutant *Leptoptilos dubius*. *Indian Birds* 4 (4): 133–135 (2008).
- Choudhary, D. N., & Ghosh, T. K., 2004. Sighting of Greater Adjutant Storks in the wetlands of north Bihar. *Newsletter for Birdwatchers* 44 (4): 62–63.
- Choudhary, S. K., Dey, S., Dey, S., & Mitra, A., 2004. Sighting of the Greater Adjutant-Stork *Leptoptilos dubius* in Vikramshila Gangetic Dolphin Sanctuary, Bihar, India. *J. Bombay Nat. Hist. Soc.* 101 (2): 313–314.
- Choudhary, D. N., 2008. Danapur military cantonment (IBA): the largest breeding site of Asian Openbill in Bihar. *Mistnet* 9 (2): 6–8.
- Islam, M. Z.-u., & Rahmani, A. R., 2002. Threatened birds of India. *Buceros* 7 (1&2): 6 pr.II, iii–x, 1–102.
- Istiaq, F., 2001. Summaries of the PhD thesis on birds. *Buceros* 6 (3): 45.
- IUCN. 2007. IUCN Red list of Threatened animals, Gland, Switzerland, IUCN.
- Mishra, A., Mandal, J. N., & Ghosh, T. K., 2005. Breeding of Lesser Adjutant from an unexplored area of Kosi region of N. Bihar. *Newsletter for Birdwatchers* 44 (6): 84. (2004).
- Mishra, A., Ghosh, T. K., Mandal, J. N., Agrawal, S., Choudhary, D. N., Kumar, A., 2010. Protection of Greater Adjutant in Bihar. *Mistnet* 11 (3): 10–12.
- Rahmani, A. R., Narayan, G., & Rosalind, L., 1990. Status of Greater Adjutant Stork (*Leptoptilos dubius*) in the Indian subcontinent. *Colonial Waterbirds* 13 (2): 139–142.
- Singha, H., 2001. Summaries of PhD thesis on birds. *Buceros* 6 (3): 49–50.
- Subramanya, S., 1996. Distribution, status and conservation of Indian heronries. *J. Bombay Nat. Hist. Soc.* 93 (3): 459–486.

High density nesting of White-Bellied Sea-Eagles *Haliaeetus Leucogaster* on Netrani Island, Karnataka: a possible IBA site

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Introduction

Netrani Island (14°59'N 74°19'E) is a heart-shaped, steep-sloped offshore island jutting out of the Arabian Sea off Uttara Kannada district. It is about 19.6 km from the coastal town of Murudeshwar, and 24 km from coastal town of Bhatkal, in Karnataka, India (Figs 1 & 2). It is 4.2 km² in area, and ranges in altitude from 0 m to 77 m above mean sea level. It is covered with dense evergreen vegetation, with *Ficus* sp., dominating, along with lianas, climbers, shrubs, and grasses. A small un-named rocky islet is located to the south-west of Netrani (Fig. 2), and is devoid of trees, but some grass was seen.

White-bellied Sea-Eagle *Haliaeetus leucogaster* is widely distributed along the Indian seaboard and offshore islands south of the latitude of Mumbai (c. 19°N), and affects the seacoast, tidal creeks, and estuaries (Ali & Ripley 1968). Extraliminally, it is recorded on the coasts of Myanmar, the Malay Peninsula, and archipelagos east to Australia, Tasmania, and W. Polynesia (Ali & Ripley 1968). It breeds in India from October to January (Ali & Ripley 1968).

Pande (2005) had recorded pre-breeding activity of about 60 White-bellied Sea-Eagles flying over Netrani Island during October 2005, when Pande, and others (NS, SP) had observed

these eagles and some of their nests from an Indian Coast Guard ship, from a distance, but had not set foot on the island. We therefore visited the island again in November 2008, for a preliminary avifaunal survey, and also to evaluate the breeding activity of this eagle during its breeding season.

Methodology

We reached Netrani Island (Fig. 3) in motorised boats hired at Murudeshwar, and conducted the avifaunal survey during 22 and 23 November 2008. A 90-minute boat ride later we landed on the island on 22 November in the evening and returned to the mainland at night. In the morning of 23 November we re-visited Netrani for a full day's survey, returning at night.

We walked and conducted a visual survey for birds, and nests, exploring the entire island, and mapping our route and marking the location of White-bellied Sea-Eagle nests on it (Fig. 4). We also recorded details like height of the nest from the ground, the dimensions of the nest, the distance between adjacent nests, nest material, status of occupancy of each nest, parental and chick activity, presence of prey remains under the nests, on the branches, or on the ground, etc. We circumnavigated the island by boat, searching for nests on the tall trees growing on the steep slopes where we could not have otherwise reached on foot. We were especially on the lookout for any aerial activity of birds around the island. From the boat we also, visually, surveyed the un-named adjacent rocky islet for any nesting activity. We photographed birds seen on both, the island, and the islet.

Observations & results

1. *Netrani Island*: 25 nests were located, of which 18 were active, and the remaining seven, unoccupied (Table 1). All nests were on

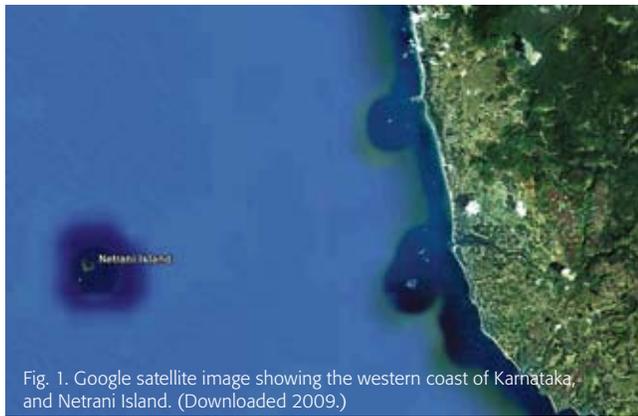


Fig. 1. Google satellite image showing the western coast of Karnataka, and Netrani Island. (Downloaded 2009.)



Fig. 2. Google satellite image of the heart-shaped Netrani Island, and the un-named adjacent rocky islet. (Downloaded 2009.)

Ficus spp. The minimum height of the nest from the ground was 5 m, and the maximum height was 20 m (Table 1)—their average height being 12.7 m. The average diameter of nests was 2 m, and the average thickness was 1.2 m. Adjacent nests were, on an average, 35 m apart (range 25–50 m). Nesting trees held only one nest per tree, except for two, where two nests each were present; but of these only one was active, and the other either old, broken, and not in use. No nests were seen on cliffs.

We observed White-bellied Sea-Eagles engaged in various activities: noisily chasing each other, soaring, courtship display, cart-wheeling with locked talons (Fig. 5), offering prey to a mate, mating, bringing nesting material, and hunting at sea. Some parents were engaged in feeding their chicks. They were also guarding their nests from approaching raptors such as Common Kestrel *Falco tinnunculus* and Brahminy Kite *Haliastur indus*. When these species came near the nest of the White-bellied Sea-Eagle, the eagle chased them away. We never saw them perching on the tree bearing the nest of the White-bellied Sea-Eagle.

Nests were constructed of twigs, sticks, and branches of trees. The shallow cup in the nest was lined with green leaves. The chicks were noted to be sitting in this small cup (Fig. 6). However, some of the larger chicks were seen at the edge of the nest. Based on their plumage, the age of these chicks was estimated between one to three weeks. We recorded two chicks each in 14 nests, and a single chick each in four nests: totaling 32 chicks. When two chicks were present in one nest they were interacting with each other in the form of pecking or wing flapping. Such activity was followed by periods of sleeping. The chicks also vocalised when they saw their parents approaching.

We saw the White-bellied Sea-Eagles bringing waterfowl (Fig. 7), sea snakes, and fishes for the young. We also found remains of sea snakes (Family: Hydrophiinae) on the branches of the nest trees, and also on the ground below nests. Amongst prey remains those of the fish called *pakit* (local Kannada name) *Balistes stellatus* were most abundant. We were told that this fish is commonly netted by fishermen in the area, and is unfit for human consumption because it has a thick skin. These fish can grow up to 0.3 m in length, have prominent canine teeth, and can gnaw fishing nets thereby causing economic loss to the fishermen. The fishermen are aware that sea-eagles consume this fish, and look upon the sea-eagles as its natural controllers. Other fish remains under the nests were shark *Scoliodon laticaudus*, puffer-fish *Diodon hystrix*, *Clupea* sp., and other fishes known in local language as *tarli*, *surmai*, *shedaka*, *daeen*, and *dayan*. We also saw a partially eaten skink under one nest, along with some crabs, feathers of birds, and mollusc shells. The nest trees were heavily infested with

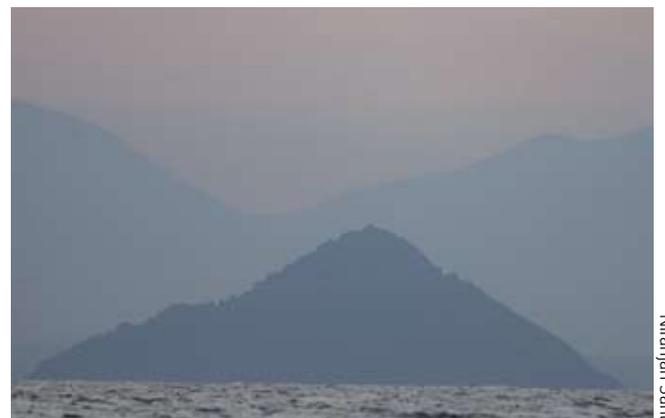


Fig. 3. Netrani Island.

red ants that had been attracted by the prey remains.

We recorded four nests of Brahminy Kites *Haliastur indus*, 25 m high on *Ficus* sp. trees. The kites were bringing nesting material, and displaying.

2. *Un-named rocky islet*: There were at least three nests of the White-bellied Sea-Eagles on the un-named rocky islet, but we could not evaluate their status, as they were located on ledges, high up on the rocks. No nests of Brahminy Kites were observed.

Discussion

The nests of the White-bellied Sea-Eagle are generally widely spaced on the seaboard of the western coast in Maharashtra, with an average of one nest per 2.6 km in Ratnagiri district, and one nest per 3.8 km in Sindhudurga district (Katdare *et al.* 2003, 2004). Pande *et al.* (2007a) recorded nests of White-bellied Sea-eagles on Andaman and Nicobar Islands, where the nests were also widely spaced, not clustered. Pande *et al.* (2007b) did not record White-bellied Sea-Eagles, or their nests, in the Lakshadweep Archipelago.

However, records of White-bellied Sea-Eagles nesting on Netrani Island exist since January 2003, when Madhyastha (2004) reported c. 100 nests on tall trees, such as *Ficus*. Further, he has also stated that there is no other such congregation of these eagles along the Indian coast. Our November survey recorded 18 active, and 7 inactive nests. It is likely that more eagles may arrive on the island subsequently in December–January, later in their breeding season.

It is possible that reasons such as bombing practices by the navy, (information given to authors SP and NS by local fishermen and coast guard personnel) with Netrani Island as the target, may have caused a drastic reduction in the number of nests of these eagles from 100 to 25 in a short span of 4 to 5 years. We also saw a few empty bomb shells on the island during the survey. Therefore, it will be interesting to visit the island periodically throughout their breeding season to precisely document the current nesting status of the eagles on the island. However, it

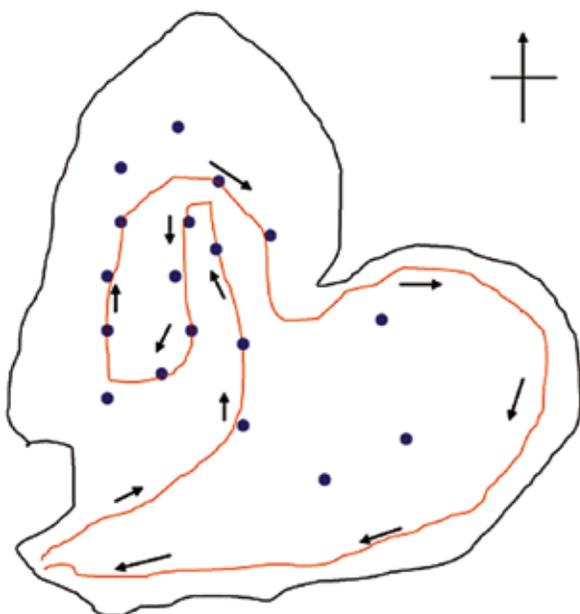


Fig. 4. Sketch map of Netrani Island showing various locations of 18 active nests, and the survey route followed by the study team. Nest sites are shown by solid dots and the route is marked by a line with arrows to indicate the direction of in which the survey was undertaken.

Table 1. Nest data of White-bellied Sea-Eagles recorded on Netrani Island on 22 and 23 November 2008.

Nest Number	Approximate height of the nest from the ground in meters	No. of chicks in the nest
1	18 m	2
2	12 m	2
3	12m	2
4	10 m	2
5	10 m	2
6	15 m	2
7	8 m	1
8	10 m	2
9	12m	2
10	16 m	1
11	5 m	1
12	18 m	2
13	20 m	1
14	18 m	2
15	15 m	2
16	12 m	2
17	12 m	2
18	15 m	2
19	10 m	Inactive
20	13 m	Inactive
21	9 m	Inactive
22	12 m	Inactive
23	12 m	Inactive
24	11 m	Inactive
25	12 m	Inactive

is undeniable that the nesting density of the White-bellied Sea-eagles on Netrani Island is not only high but also unusual and unique.

White-bellied Sea-eagles are known to use the same nest or site traditionally for over 50 years (Ali & Ripley 1968). The height of the tree-nest from the ground level on Netrani Island was quite low (5 to 20 m) as compared to the documented range of 10–50 m (Ali & Ripley 1968); 20–40 m in Ratnagiri district, and 10–30 m in Sindhudurga district, Maharashtra (Katdare *et al.* 2003, 2004). Though nests on Netrani Island are constructed only on *Ficus* sp., on the western coast of Maharashtra nests were recorded on eleven tree species with the commonest being *Mangifera indica* and *Casuarina equisetifolia*, followed by *Ficus* sp. (Katdare *et al.* 2003, 2004).

The absence of nests on the cliffs of Netrani Island indicates that trees play an important role in nesting of these eagles at



Fig. 5. White-bellied Sea-Eagles *Haliaeetus leucogaster* cart wheeling with locked talons.



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Fig. 6. White-bellied Sea-Eagles *Haliaeetus leucogaster* chicks, and a half-eaten fish in the nest.

Netrani. On Burnt Island, Vengurla Rocks, Maharashtra, or on other offshore islands in the Arabian Sea, which are relatively devoid of any tall trees, there is only an occasional incidence of nesting of the White-bellied Sea-eagles (unpublished observation of SP). On the contrary, on such barren offshore islands particularly on the Burnt Island, though there are no trees, the islands alternatively offer nesting opportunities for other pelagic ground nesting birds like various species of terns (Pande 2002a, b).

Local fishermen revealed that the average catch around the island is about 600 quintals on a good day. This indicates the richness of marine life in the waters adjacent to Netrani. This is no doubt important for sustaining such a large breeding population of the White-bellied Sea-eagles on such a small island. At the same time, since the island is quite far away from the nearest coast, there are no regular human visitors on the island except during the annual pilgrimage when fishermen come to the island to the worship the local deities. The landing on the island is also difficult, even on calm days; hence the human interference is almost negligible. All these factors are favourable for the nesting of these eagles.

Recommendations

The observation of high density nesting of the White-bellied Sea-Eagles on Netrani Island stresses the need for its protection. Apart



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Fig. 7. White-bellied Sea-Eagles *Haliaeetus leucogaster* with a waterfowl (Aves: Rallidae?).

from the White-bellied Sea-Eagles the avifaunal diversity on the island is substantial, comprising 40 spp., from 32 genera in 27 Families (Pande *et al.*, in press). The Indian Swiftlet *Aerodramus unicolor*, which is a protected species, also nests in the cave on Netrani Island (Mahabal *et al.* 2007). Hence, Netrani Island may be considered as a befitting candidate for declaration as an Important Bird Area (IBA). It may be pointed out here that Burnt Island, which is an important breeding site of pelagic terns, and the Indian Swiftlet, is already notified as an IBA site (code IN-MH-02), meeting IBA criteria as A4iii (Islam & Rahmani 2004).

Islands present fragile, ecologically sensitive, and biogeographically significant ecosystems (Das 2001). The conservation of the flora on the island is of utmost importance for the successful and continued breeding of the White-bellied Sea-Eagles. In the past, the Indian Navy has used Netrani Island for bombing exercises from the ships. If such exercises are continued in the future, the trees on the island could be destroyed, and in turn, the nest sites further reduced, causing an irreversible damage to a very important and unique high-density nesting site of the White-bellied Sea-Eagles in India.

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References

- Ali, S., & Ripley, S. D., 1968. *Handbook of the birds of India and Pakistan together with those of Nepal, Sikkim, Bhutan and Ceylon. Divers to hawks*. Vol 1. 1st ed. Bombay: (Sponsored by the Bombay Natural History Society) Oxford University Press.
- Das, A. K., 2001. Islands. (Pp. 317–347.) In: *Ecosystems of India. ENVIS-Zool. Surv. India*. Pp. 1–410.
- Islam, Z.-u., & Rahmani, A. R., 2004. *Important Bird Areas in India. Priority sites for conservation*. 1st ed. Mumbai: Indian Bird Conservation Network: Bombay Natural History Society and BirdLife International (UK).
- Katdare, V., & Mone, R., 2003. Status of White-bellied Sea-Eagle *Haliaeetus leucogaster* in Ratnagiri District, Maharashtra. *J. Bombay Nat. Hist. Soc.* 100 (1): 113–116.
- Katdare, V., Mone, R., & Joshi, P., 2004. Status of White-bellied Sea-Eagle *Haliaeetus leucogaster* in Sindhudurg District, Maharashtra. *J. Bombay Nat. Hist. Soc.* 101 (2): 314–316.
- Madhyastha, N. A., 2004. A paradise for White-bellied Sea Eagle: Netrani Island. *Newsletter for Birdwatchers* 44 (1): 14.
- Mahabal, A., Pande, S., Sharma, R. M., & Pednekar, S. N., 2007. *Status survey of Indian Edible-nest Swiftlet Collocalia unicolor (Jerdon) in Western Ghats, west coast and Islands in Arabian Sea, India*. 1st ed. Director, Z. S. o. I. (ed.) Kolkata: Zoological Survey of India.
- Pande, S., 2002a. A rocky adventure at Vengurla Islands. *Hornbill* 2002 (April-June): 22–24.
- Pande, S., 2002b. Terns nesting on the Vengurla Rocks Archipelago. *Newsletter for Birdwatchers* 42 (1): 10–12.
- Pande, S., 2005. Report of the First Ocean Bird Survey and Coastal Bird Survey in the Arabian Sea and the West Coast of India from Mumbai to New Mangalore. Jointly Conducted by Ela Foundation and Ecological Society, Pune with Indian Coast Guard. Pp. 1–36. Submitted to Indian Coast Guard, Mumbai and New Delhi. (Unpublished Report).
- Pande, S., Sant, N., Ranade, S., Pednekar, S., Mestry, P., Deshpande, P., Kharat, S., & Deshmukh, V., 2007. Avifaunal survey of Andaman and Nicobar Islands, January 2007. *Indian Birds* 3 (5): 162–180.
- Pande, S., Sant, N. R., Ranade, S. D., Pednekar, S. N., Mestry, P. G., Kharat, S. S., & Deshmukh, V., 2007. An ornithological expedition to the Lakshadweep archipelago: Assessment of threats to pelagic and other birds and recommendations. *Indian Birds* 3 (1): 2–12.
- Pande, S., Sant, N., Pednekar, S., Pawashe, A., Sakhdeo, N., & Mahabal, A., Avifaunal survey of Netrani Island, Karnataka and importance of offshore islands for birdlife. *Indian BIRDS*. (In Press).