

Observations of the breeding of the Endangered Masked Finfoot *Heliopais personatus* in the Bangladesh Sundarbans

SAYAM U. CHOWDHURY, MD. MONIRUZZAMAN, GERTRUD NEUMANN-DENZAU & MD. JAHIDUL KABIR

The Masked Finfoot *Heliopais personatus* is a rare and threatened riverine species, with a global population of probably only 1,000 individuals. We studied its breeding biology in the Bangladesh Sundarbans. Accessible waterways at least 5 m wide were checked for nests between June and August (breeding season) in the years 2011, 2013 and 2014. Five active nests were found containing eggs. Nests were located on Gewa *Excoecaria agallocha*, Sundari *Heritiera fomes* and Dhundul *Xylocarpus granatum* trees. One breeding pair was studied in detail in August 2011 by observations from a hide and a camera trap covering the hours of darkness. The female and male both incubated the eggs although the female always covered the hours of darkness whilst the male worked for shorter periods during daylight and ceased after 10 days, after which it took no further part. The adults fed mainly on small crabs and a few shrimps; their foraging trips took them up to about 500 m from the nest. During the study, predation by Changeable Hawk Eagle *Nisaetus cirrhatus* and Shikra *Accipiter badius* was observed. Breeding success, habitat selection and the roles of the sexes over the nesting cycle require further study. Maintaining/increasing numbers and monitoring trends are key requirements for Masked Finfoot conservation in the Sundarbans.

INTRODUCTION

The Masked Finfoot *Heliopais personatus* is suffering a widespread decline in its small numbers (fewer than 1,000 mature individuals) arising from various anthropogenic threats, including habitat destruction and increasing disturbance along rivers in lowland forests, hunting and the collection of eggs and chicks for food; it is classified as Endangered (BirdLife International 2018). The species is thinly distributed from Myanmar, Cambodia, Laos and Vietnam to Peninsular Malaysia, Sumatra and Java, Indonesia, but the mangroves of the Sundarbans in Bangladesh are a stronghold; however, little is known about its breeding biology, population trend and potential threats in the Sundarbans (Neumann-Denzau *et al.* 2008, BirdLife International 2016, Chowdhury *et al.* 2017).

The first observations of nesting of this species in the Sundarbans were made in 2004 (Neumann-Denzau *et al.* 2008). During a week-long survey, the team covered 60 km² (1% of the total area of the Bangladesh Sundarbans) and found three active nests, with one nest being observed from a hide for 47 hours in order to collect data on incubation, the roles of the sexes and diet. This paper seeks to build on that study by presenting further notes on the eggs, incubation, hatchlings, foraging and nest predation, using data gathered through camera-traps and direct observations.

METHODS

The Sundarbans is the largest area of mangrove forest in the world; it lies between the Hoogly river in Bengal, India, and the Brahmaputra in Bangladesh, covering an area of about 10,000 km², 4,000 km² in India and 6,000 km² in Bangladesh (Sarker *et al.* 2016). The study took place primarily in Sarankhola and partly in Khulna and Chandpai ranges of the Bangladesh Sundarbans. Both banks of accessible waterways with a minimum width of 5 m were checked for Masked Finfoot nests during June–August in 2011, 2013 and 2014. A wooden boat paddled manually was generally used to navigate the creeks quietly (also see Chowdhury *et al.* 2017).

Between 15 and 25 August 2011, the nesting activity of a breeding pair was observed from a hide on a wooden boat moored 20 m away. Notes were taken on the behaviour of the pair at the nest, behaviour during incubation periods, vocalisations and foraging behaviour around the nest site, using 10×42 binoculars, a 25–50× telescope and a DSLR camera.

In August 2011 and June 2014, Bushnell 8 MP Trophy Cam Trail camera-traps were installed to record incubation, predation and behaviour at Nests 1 and 5 (see Table 1). We recorded activities at Nest 1 from 5 to 23 August 2011 and at Nest 5 from 22 to 29 June 2014. Both camera-traps were attached 1 m above the nests to record activities every 5 minutes for 24 hours a day.

RESULTS

Eggs and hatchlings

A total of five active nests were found in 2011, 2013 and 2014 (Table 1). The clutch size ranged from 1 to 6. Out of the five nests, two eggs successfully hatched at Nest 1, all the eggs were predated at Nest 5, and the fate of the eggs in the three other nests could not be determined. Intra-clutch egg-size variation was observed in one clutch (Nest 1), where the smallest egg did not hatch.

The fluffy one-day old hatchlings were dark-grey above, with light grey underparts and a white throat, face and forehead. The chicks had a stout black bill with a prominent white spot at the tip (probably the egg-tooth), black lores and eye-ring with a thin black eye-stripe. On 30 July 2011, two chicks were observed with an adult female. At an estimated two weeks old the chicks had a stouter, more pointed bill with no white spot at the tip, light brown upperparts and back, dark grey neck and head with a black eye-stripe, and light grey underparts, throat, face and forehead.

Length of breeding cycle

The first active nest (Nest 1) was found on 14 July 2011. Chicks hatched at this nest on 23 August. In 2013 active nests were found

Table 1. Details of active Masked Finfoot nests found during the study period.

Nest No.	Year	No. of eggs	
1	2011	3	Nest found 14 July and observed from hide 15–25 August. Camera trap used 5–23 August. Two eggs hatched successfully on 23 August.
2	2011	1	Nest found 14 July. Possibly an incomplete clutch; fate of egg not determined.
3	2013	4	Active nest found 10 July; fate of eggs not determined.
4	2013	5	Active nest found 11 July; fate of eggs not determined.
5	2014	6	Nest found 22 June. Camera trap used 22–29 June. All eggs predated 29 June.

on 10 and 11 July and in 2014 on 22 June. On another occasion, fledglings were seen foraging with their mother at low tide on 30 July 2011, meaning that the eggs at been laid at least in early July. These observations indicate that the breeding season starts at least in mid-June and continues until at least mid-September, as previously indicated by Neumann-Denzau *et al.* (2008).

Incubation

During our 19 days of observation at Nest 1 (indicating a minimum incubation period which probably extends well beyond three weeks), both sexes shared incubation during the initial stages, but the male left the nest site nine days before the chicks hatched on 23 August 2011. For the first ten days, when both adults participated in incubation, the female and male incubated for a mean of 17.3 and 6.4 hours/day respectively, and both were away from the nest simultaneously for 0.3 hours/day. During the final nine days, however, the pattern changed abruptly and only the female incubated, for a mean of 21.7 hours/day (Figure 1).

Changeovers in incubation never occurred at night. The female always incubated throughout the night, only changing over with the male in the morning between 06h00 and 09h00 during low tide, with 3–5 changes during the day.

Nest 5 was constructed over a 2013 nest, a behaviour not previously reported for the species. A camera-trap was installed at this nest at dawn on 22 June 2014. Throughout the six full days and two part-days of observation (before the nest was predated), only the female incubated. She left the nest to forage every alternate day for only 10–36 minutes during low tide, incubating for a total of 161 hours and 36 minutes.

Breeding appearance and behaviour of adults

The female at Nest 1 had a yellow fleshy knob above the base of the upper mandible, a character previously undescribed in female Masked Finfoot. The literature indicates that the yellow knob is only present on the male during the breeding season.

During incubation changeovers the departing individual usually jumped down to the water from a branch beside the nest. On two occasions the male came underneath the nest, the female jumped close to him and he greeted her with a bubbling call. Both individuals often gave this bubbling call for 5–10 seconds before incubation changeovers.

When flushed from the nest, both sexes tended to land adjacent to the bank for a quick escape. When returning to the nest both sexes often perched on the base of the tree and carefully removed water from their breast, breast-sides and vent by pecking with their large bills and shaking the whole body, including the tail. Then they climbed straight up the tilted trunk, sometimes flapping their wings for balance.

On most occasions during rainy periods both members of the pair would return to the nest; on one occasion they swam off together to forage in light rain, but the female returned after only 12 minutes. Camera-trap observations showed that the female never moved from the nest at night, but changed position every 2–4 hours and less frequently during rain. She took small naps by tucking her head under a wing for up to 15 minutes at a time each night.

Foraging

During incubation, the Nest 1 Masked Finfoot pair made foraging trips both further up the creek and towards its mouth, covering approximately 500 m. When the male ceased incubation and left the vicinity of the nest it was seen foraging about 700 m away. The birds were observed foraging around the nest at low water, especially at the turn of the tide. A foraging bird gathered food by walking up and down along the muddy creek banks, starting on one side of the creek and returning along the other, although on one occasion the female snatched a floating dead shrimp from the water. Overall, the birds fed mainly on small crabs (about 81%) and shrimps (about 19%).

Predation

Nests were usually well hidden and camouflaged by surrounding vegetation, and thus almost undetectable by predators unless an

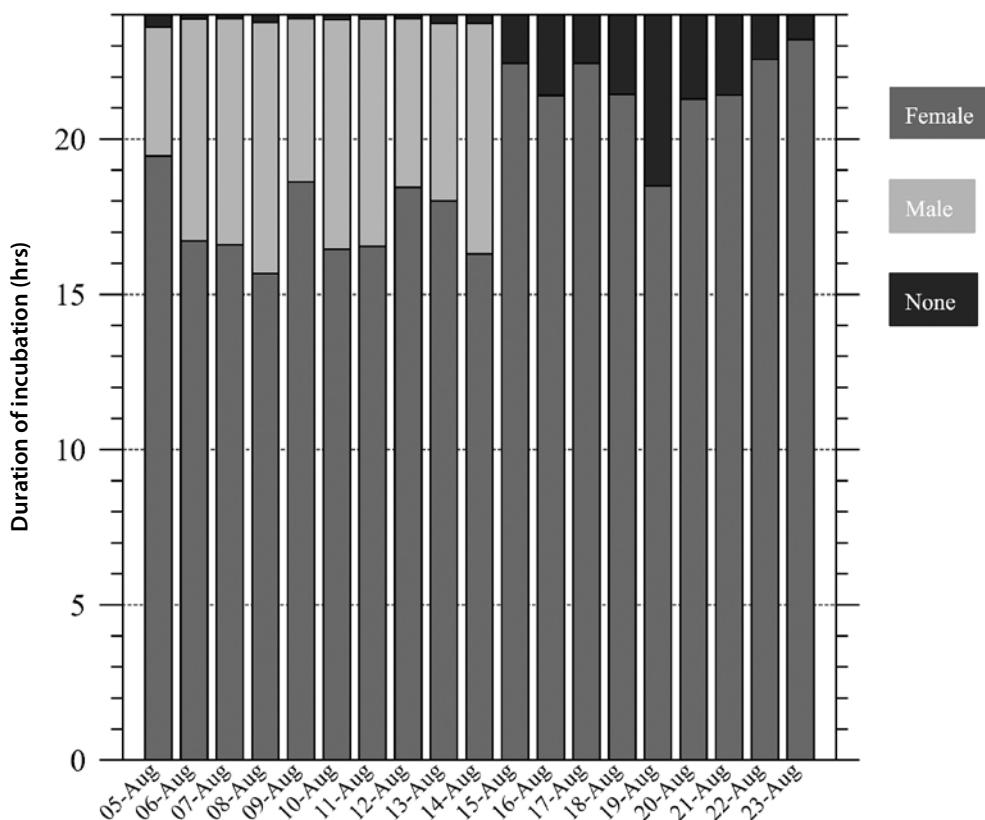


Figure 1. Daily incubation by male and female between 5 and 23 August 2011 at Nest 1.

adult flushed when an intruder approached too near. No predator was observed near Nest 1, even at night (recorded by camera-traps), except for a troupe of Rhesus Macaques *Macaca mulatta* on two occasions. The troupe did not notice the nest as the incubating bird remained silent and immobile on the nest. On 23 August 2011 the first chick hatched. While the incubating female was away foraging, this chick tumbled off the nest into the water. It gave a constant *chi chi chiii chiii* call and swam to the shore, but the call drew the attention of a Shikra *Accipiter badius*, the commonest bird of prey in the Sundarbans. However, as the Shikra tried to grasp the chick, the mother finfoot appeared from the bush and successfully defended the hatchling by attacking the Shikra.

Nest 5 was observed through camera-traps for eight days. The nest was destroyed at 09h36 on 29 June 2014 when all the eggs were predated by a Changeable Hawk Eagle *Nisaetus cirrhatus*. Nest predation has rarely been reported and the scale to which it occurs in the Sundarbans is unclear.

DISCUSSION

The discovery of an active nest with six eggs on 22 June 2014 indicates that the breeding season can start at least in mid-June, with earlier work (Neumann-Denzau *et al.* 2008) establishing that the breeding season continues until mid- to late September. Thus it appears that the breeding season in the Sundarbans starts with the monsoon, as it does elsewhere (BirdLife International 2001), usually in June, and continues into September. There is little seasonal variation in water levels in the Sundarbans, unlike in many areas in the south-east of the species's range (BirdLife International 2001), so the population there is presumably sedentary.

Only the female incubated during the final nine days at Nest 1, and similarly at Nest 5 only the female incubated, rarely leaving to forage over the eight days of observation. This matches earlier findings in 2004, when only the female incubated during the period of observation, the four days before the chicks hatched; the male was never seen (Neumann-Denzau *et al.* 2008).

It is interesting to note that neither Gewa nor Sundari—trees found to be used for nests in the Sundarbans (see above)—bear edible fruit that could attract predators such as Rhesus Macaque. By contrast, Passur *Xylocarpus mekongensis* appears to be a structurally suitable nesting tree and is widely distributed throughout the Masked Finfoot range, but it offers edible fruits for Rhesus Macaque and is often used by reptiles for roosting, which may explain why it has not been found to host finfoot nests.

Further study is needed to determine breeding success, breeding habitat selection and the role of the sexes from nest-building to chick rearing. Work with tagged birds would help determine densities, home range, within-mangrove distributions and hence population sizes. In order to predict potential breeding sites in unsurveyed areas,

a detailed GIS analysis is recommended to model potential breeding sites, building on existing habitat information on nest locations.

A clear management objective for the Masked Finfoot population in the Sundarbans should be to maintain and indeed increase its numbers and to set up an effective monitoring scheme to clarify and document anthropogenic threats, including the impact of tourism, poaching of chicks and eggs, habitat degradation and climate change. Such information will form the basis of a comprehensive management plan for the long-term conservation of this species.

ACKNOWLEDGEMENTS

We are extremely grateful to the Rufford Small Grant Foundation, Oriental Bird Club, Birdfair/RSPB Research Fund for Endangered Birds and Yann Muzika for funding this project; Samsul Azam, Tapan Kuman Dey and Akbar Ali of the Forest Department for permission to work in the Sundarbans and their support in various steps of this project, especially during fieldwork; Sabir Bin Muzaffar, Philip D. Round, Md. Anwarul Islam, M. Abdullah Abu Diyan, Rubaiyat Mansur, Elisabeth Fahrni Mansur and Zahangir Alom for their comments and suggestion on the study methods; Abida Rahman, Md. Foysal, Nazim Uddin Prince, Omar Shahadat, Sakib Ahmed, Shibli Sadik and Tareq Onu for volunteering during fieldwork and help throughout the study period; and Shimona Quazi for her comments on an earlier draft of this paper.

REFERENCES

- BirdLife International (2001) *Threatened birds of Asia: the BirdLife International Red Data Book*. Cambridge, UK: BirdLife International.
- BirdLife International (2018) Species factsheet: *Heliopais personatus*. Downloaded from <http://www.birdlife.org> on 01/02/2017.
- Chowdhury, S. U., Neumann-Denzau, G. & Muzaffar, S. B. (2017) Nesting ecology and habitat preference of the Masked Finfoot (*Heliopais personatus*) in Sundarbans, Bangladesh. *Waterbirds* 40: 410–416.
- Neumann-Denzau, G., Fahrni Mansur, E. & Mansur, R. (2008) Nests, eggs, hatchlings and behaviour of the Masked Finfoot *Heliopais personatus* from the Sundarbans in Bangladesh, with first nest observations. *Forktail* 24: 95–99.
- Sarker, S. K., Reeve, R., Thompson, J., Paul, N. K. & Matthiopoulos, J. (2016) Are we failing to protect threatened mangroves in the Sundarbans world heritage ecosystem? *Scientific Reports* 6: 212–234.

Sayam U. CHOWDHURY, Md. MONIRUZZAMAN & Gertrud NEUMANN-DENZAU, House 16/C, Flat 501, Tallabag, Sobhanbag, Dhaka-1207, Bangladesh. Email: sayam_uc@yahoo.com

Md. Jahidul KABIR, Bon Bhaban, Plot - E8B2, Agargaon Dhaka - 1207, Bangladesh.