

Observations of breeding of Greater Painted-snipe *Rostratula benghalensis* in the rice paddies of Wayanad, Kerala

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Introduction

The Greater Painted-snipe *Rostratula benghalensis* is a medium-sized wader (1). It is mostly crepuscular and nocturnal in its habits. It is one of the few species that shows reverse sexual dimorphism (Ali & Ripley 1980). In Kerala it is an uncommon resident and its distribution is poorly known due to its crepuscular nature. "... only 32 birds were counted across all years between 1987 and 2007 during Asian Waterfowl Census," (Sashikumar *et al.* 2011). However, historic records from Travancore state that it was fairly common throughout the low country, "wherever there are rushy marshes" (Fergusson & Bourdillon 1904). They breed throughout the year (Ali & Ripley 1980; Rasmussen & Anderton 2005). There are only a few breeding records of the species from Kerala, seemingly spanning all seasons in a year. However there is not much information available on the breeding behavior of this bird in Kerala (Sashikumar *et al.* 2011). The species was once common in the rice paddies and associated swamps of Wayanad till 1980s. During the mid-eighties, banana, areca nut, and ginger was introduced in Kerala's wetlands, which offered huge profits for farmers and large scale shifting from rice to banana took place in Wayanad during the last two decades. Unlike paddy, banana offers no room for other plants to grow in between, besides using heavy doses of fertilizers and pesticides (Abdusallam 2004). The shift from paddy to other crops has extensive impact on local biodiversity, but very little attention has been accorded to documenting and understanding the effects of such land-use changes on birds in the Indian Subcontinent (Sundar & Subramanya 2010).

Wetland birds, mainly Rallidae, might have lost most of their feeding and breeding habitat due to the expansion of paddy cultivation. However, populations still survive in paddy-growing areas especially where farmers practice agriculture with minimal mechanisation (pers. obs.). A study conducted on the breeding of Sarus Crane *Grus antigone* in the Etawah-Mainpuri districts of Uttar Pradesh (Sundar 2009) shows that landscapes with rice fields, and a favourable attitude of farmers, appear to provide suitable conditions for the cranes' breeding.

In this paper we report on breeding success, interesting behavioural displays of breeding birds and chicks, and observations of predation of Greater Painted-Snipes from a study conducted in 2011 in Wayanad. We provide the first ever report of incubation period, highlight the importance of rice paddies for the breeding of Greater Painted-snipe, and add to the meager literature on this subject from the region.

Study area

Our study was conducted in Thrikkaipatta village, Wayanad district (Kerala, India). Wayanad is a hilly district with elevations from 700 to 2100 m above msl. The region is undulating with hills and wetlands (mainly paddy fields). The area receives an annual rainfall of 2500 mm. The study site was a 25 Ha rice paddy surrounded by small hills. A perennial stream flows at the edge of the paddy field, and 1–1.2 m wide seasonal water channels, of 0.5 m depth cut across it. In Wayanad, paddy is cultivated twice in a year, the crops being called *Nanja* (Monsoon: June–December), and *Punja* (December–May). Though rice is the main crop, the farmers also cultivate banana, and ginger in the rice fields. As a result, now the area under rice cultivation is gradually reducing (Vishnudas 2006).

Methodology

Breeding activities of Greater Painted-snipe were observed in the paddy fields of Thrikkaipatta village from 2008 to 2011. Local people, however, have observed the species in the locality for a long time. We did not use a statistics-based study design since our focus was to provide descriptive information on the breeding of Greater Painted-snipe. During the first three years our observations were limited to identifying nest sites, number of nests, and behavior of birds. An average of six to seven nests were recorded every year. We made detailed observations of breeding behavior, and feeding patterns during the 2011



1. Adult male Greater Painted-snipe *Rostratula benghalensis*.
Photo: C.K. Vishnudas

monsoon (June–August) after erecting a hide in the paddy fields. The camouflage-patterned canvas hide was erected five meters from the nest. Utmost care was taken not to disturb the birds. It was set up while the bird was away feeding in the evening hours. After making the hide, none of the observers approached the nest for two days, so that the bird got used to it. We used 8x40 and 10x50 binoculars for observing the bird in the field, and a Canon EOS50D camera with a 400 mm telephoto lens, with tele-converters for photography. Observers entered the hide when the bird was not present in the nest. During dawn to dusk observation one observer sat in the hide, and came out just once, for a break at noon. We spent a total of c. 186 hrs, spread over two years, observing the nests and behavior of birds, including eight days of dawn to dusk observations at one nest. The other six nests were observed on an *ad hoc* basis.

Results & discussion

Nests: The Greater Painted-snipie builds its nest on the ground, in areas within fields where paddy is not being planted, choosing a 20–30 cm tall clump of grass and/or other weeds (2). The thick vegetative growth in places where cattle dung was present, was taller and denser than the surrounding vegetation. Five nests, out of the seven observed, were in such grass thickets; the other two were in normal grasses. The nest is a cavity with a pad of grass on the ground, formed by folding and pressing the grass tussocks to the floor. It has a slight depression in the centre where the eggs are placed. The nests were well covered with grass above. The seven nests were placed 50–100 m apart. The nests closest to each other were 58 m apart, and the most distant ones were 115



Photo: C.K. Vishnudas

2. Adult male Greater Painted-snipie coming out from its nest.

m apart. All nests were constructed in a similar fashion. The nests are indistinguishable at first sight, even if one was familiar with its location, and there were high chances of the destruction of a nest during various agricultural operations (see below), as well as by grazing cattle.

Eggs: The eggs were yellowish in colour, heavily marked with blackish-brown blotches (3). All nests contained four eggs each.

Clutch size, incubation, & hatching success: Breeding activities started in the last weeks of June, with the onset of monsoon, and ended in the last weeks of August. We observed the first nest on 8 June 2011 in an uncultivated paddy field near to a paddy nursery. On 12 June 2011 we saw one egg in the nest; the clutch being completed on 14 June 2011 (Table 1). The eggs hatched on 3 July 2011. On



Photo: C.K. Vishnudas

3. Eggs of Greater Painted-snipie.

2 July 2011 two more nests with eggs were located, and their eggs hatched on 6 July, and 8 July 2011 respectively. Another nest was located on 18 July 2011; its eggs hatching on 23 July 2011. A nest constructed on a bund, and located on 18 July, was accidentally crushed by agricultural workers while ploughing the rice fields. Another nest was discovered on 12 July 2011, its eggs hatching on 3 August 2011. A pair was seen mating on 2 August 2011; their first egg laid on 3 August, and the clutch of four eggs was completed by 5 August 2011. This means that it took 72 hrs to complete the clutch, with an average gap of 18 hrs between consecutive eggs. Wesley (1993) recorded an average interval of 22.33 hrs between the laying of two consecutive eggs. However, we could study egg laying in the case of two pairs only; incubation started after completion of the clutch. The pair was sighted (not always) near the nest site, occasionally entering the nest, till the completion of the clutch.

Incubation was observed at Nest VII (Table 1) from 14 August to 21 August 2011 (8 days). A continuous period of incubation, in a day, varied from 45 min to 1.5 hrs, with a gap of 30 to 45 min. After a stretch of incubation, the male emerged from the nest to preen its feathers, probe the ground (for food?), or fly away to the swamps, probably to feed. On 22 August 2011 the first egg hatched at 0930 hrs, the second at 1130 hrs, the third at 1430 hrs, and the fourth at 1645 hrs. Two of the chicks moved out from the nest, while one remained inside. The fourth, immediately after hatching, walked out about 60 cm from the nest, and then went back in. In the evening this entire family started moving up to about 2 m from the nest and back. The chick that hatched last was very small. In all the nests we observed, after all the eggs hatched, the adult male led the chicks from the nest site to the uncultivated paddy fields, swamps, or to the paddy nurseries within 24 hrs. One or two chicks were carried on the shoulder of the parent while the others followed. On one occasion, we even saw a parent flying away holding the chicks in its toes. Once out of the nest, it was difficult to locate the adult and chicks.

Sl. Nest No.	Date of first sighting	Clutch initiation	No. of eggs	Hatching date	No. of chicks	Status
I	8 June 2011	12 June 2011	4	3 July 2011	4	Successful
II	2 July 2011	NA	4	6 July 2011	4	Successful
III	2 July 2011	NA	4	8 July 2011	4	Successful
IV	18 July 2011	NA	4	23 July 2011	4	Successful
V	17 July 2011	18 July 2011	4	Crushed	Nil	Failed
VI	12 July 2011	13 July 2011	4	3 August 2011	4	Successful
VII	2 August 2011	3 August 2011	4	21 August 2011	4	Successful
VIII	24 June 2009	26 June 2011	4	NA	NA	NA
IX	26 June 2009	28 June 2009	4	Predated	NA	Failed

Abbreviation: NA = Not available

We recorded the average clutch size as four, and the incubation period as 20 days (N=3). This is the first report of incubation period for this species (Ali & Ripley 1980). Studies in Japan (Komeda 1983) also showed a clutch size of four.

Out of the 28 eggs laid in the seven nests, 24 hatched except for those in Nest IV, which was crushed accidentally; thus there was a hatching success of 85.7% (N=7) (Table 1). Wesley (1993) observed only 13.15% hatching success in Tiruchirappally, Tamil Nadu. Even though it took three days to complete a clutch of four eggs, all the eggs hatched on the same day, obviously, since incubation commenced only after the clutch was complete.

Chicks: The downy chicks were dull grey and buff coloured, with broad blackish-brown coronal-, and eye- streaks (4). The chicks were precocial, and started walking after an hour of hatching, even in the absence of a parent (5). The chicks uttered faint calls while in the nest, which were not audible to a person standing 2 m away from the nest.

Vocalisations: The call of the female was a metallic "hoot... hoot...hoot..." repeated at small intervals around sunset, continuing into the night. But we were not sure if the male also made similar calls. A male did utter a threatening (?) "kek... kek..." call from a frozen posture, when it encountered people at close range.

Polyandry: Greater Painted-snipes are polyandrous and show reverse sexual dimorphism (Ai & Ripley 1980; Komeda 1983; Wesley 1993). During our study we did not observe any participation of the female in incubation and rearing chicks. She left the nest site after laying eggs. Wesley (1993) reported that the female builds the nest. We could not observe the birds' activities during the period prior to nest building, and egg laying. Komeda (1983) observed that the species was "sequentially polyandrous," and that, "she deserts the first mate as soon as possible and gathers energy reserves sufficient to obtain the next mate and to lay his clutch." While other studies seem to suggest that this species is polyandrous, data from both Wesley (1993) and this fieldwork gives no such evidence

Feeding: The birds fed in the evening by probing in squelchy mud of the paddy fields. The fields prepared for paddy transplanting were rich in worms, amphibians, etc. We saw thousands of *Fejervarya* sp., and *Mycrohyala* sp., frogs, and young ones of *Hoplobatrachus tigerinus* in the paddy fields during the birds' breeding period, providing an excellent source of food for the young, as well as, adult Greater Painted-snipes. On 28 August 2011, around 1730 hrs we observed a male feeding the young



Photo: C. K. Vishnudas

5. Chick of Greater Painted-snipe walking out of the nest.

ones by collecting worms and other organisms from the mud and placing them into the beaks of the chicks. A female was also seen near the chicks.

Behaviour: The male was not really disturbed by the presence of humans, even up to 1 m from the nest, during the incubation period. It quietly incubated while women transplanted paddy just 2 m away from its nest. It did not respond when power tillers, used for ploughing, came close to the nest. During incubation, if someone passed too close to the nest, the male sometimes flew away to hide in a nearby grassy patch. Its flight was typically rail-like, with dangling legs for some distance, and then tucked up to the belly. After around 20–30 min it would come back flying to the nest, landing five to seven meters away from the nest, then running quickly along a regular track to the nest, till c. 2 m from the nest. There it paused for a while, proceeding very cautiously till it reached the nest. Against a background of fresh green grass, and tiny golden yellow flowers, the bird was perfectly camouflaged. It used the same passage to enter the nest every time, except on three occasions, during the construction of the hide, when it entered the nest from behind.

The threat display: The incubating male became very alert once the eggs hatched. Whenever someone passed adjacent to the nest, it flew to a distance of c. 2 m into the transplanted paddy, and laid on the ground there, pressing its breast in the mud, in a frozen posture (6), uttering a "kek...kek..." call. Then it spread its wings, one wing at a time (7). This posture often resembled the *theyyam*, a traditional ritual practiced of the Malabar region. The display often lasted for one or two minutes, when the bird moved c. 1 m away, and repeated the display. This was its distraction display, typical of ground nesting Charadriiformes. If we were very close, it came towards us with spread wings. Raza (2005) reported a similar threat display from Rajasthan, by a bird trying to protect its chicks from a feral pig. Because of this threat display, and its propensity of emitting a snake-like hiss, two local names exist for the species in Wayanad, namely, "*Pambu Pakshi*" (=snake bird) and "*Padam Viruthi Pakshi*" (=bird with a raised hood).

Even though intensive agricultural operations such as ploughing, plucking young plants from the nursery, transporting, transplanting, and tilling, covered the entire study area, the Greater Painted-snipe population managed to survive in this changing landscape. Continuous human presence, 50–60 persons working from 0800 hrs to 1800 hrs, does not apparently perturb

4. Chick of Greater Painted-snipe. Photo: C.K. Vishnudas

Photo: C.K. Vishnudas



6. Greater Painted-snipe in Frozen posture.

them. The birds seem to have developed excellent behavioral adaptations so as to breed successfully even in such challenging environs.

The effect of weather: The main nesting season coincides with the south-west monsoon in Wayanad (June–September). It was drizzling almost continuously during the nesting period, interspersed with occasional sunlight. Temperatures ranged from 19°C to 26°C during the day. This encourages luxuriant vegetation growth in the paddy field prior to the *puncha* (June–December) cultivation operations. The fields seldom get flooded, except in case of a very heavy downpour, which might submerge the nest site. The prevalence of erratic, and heavy rains, a phenomenon of recent years, will have a detrimental effect on the breeding success of the species due to the possibility of nest-site flooding.

Predation: We observed Greater Painted-snipe adults being hunted by Bonelli's Eagle *Hieraetus fasciatus*, and Crested Serpent-eagle *Spilornis cheela*. Rat snake *Ptyas mucosa* predares on their eggs. On 31 August 2011, around 1930 hrs we saw an Indian false vampire bat *Megaderma lyra* consuming a Greater Painted-snipe chick. The bat brought the chick, without its head, to its regular roost, under the roof of a cattle shed, near the breeding location. There may be other threats too, which are not

known, as the bird is crepuscular and nocturnal.

Association with the paddy ecosystem: Ali & Ripley (1980) describe the habitat of Greater Painted-snipe as, "marshes interspersed with deepish pools and soft muddy patches and rather thick shrubby vegetation in preference to squelchy paddy fields." All the nests we observed, except for one, were situated near paddy nurseries, which provided them with a quickly accessible hideout from enemies. Even while the rice plants were being transplanted from the nursery to the field, the bird was found hiding among the tied up bunches (8). In Wayanad, paddy is cultivated in two seasons, namely, *puncha* (June–December), and *nancha* (December–May). In years of normal rainfall, the agricultural activities begin by early July. The breeding cycle of Greater Painted-snipes coincides with these activities. Ploughing in the paddy fields exposes large quantities of soil fauna, providing ample food for adult and young birds. At the same time, chances of the accidental destruction of nests are also very high. But the polyandrous, and pugnacious, nature of the bird, and the higher clutch size might contribute to its successful survival.

Farmer as conservationist: The hatching success in Wayanad (85.7%) was significantly higher compared to that in Tiruchirappally (13.15%), where many nests were "deserted owing to pedestrians crossing the field," and, were "trampled by cattle" (Wesley 1993). The higher hatching success in Wayanad is partially due to the protection provided by the rice farmers to the nesting birds. Once they see a nest they mark it with wooden stakes (9) in order to avoid cattle grazing, and stop agricultural operations, in its vicinity until the eggs hatch. While ploughing the fields for rice transplantation, they keep the nest site untouched, activities being resumed only after the successful hatching of eggs. Another benefit of human presence is that it might keep out egg predators such as snakes and dogs.

Declining paddy cultivation, and other threats: Though Greater Painted-snipes are well adapted to the paddy ecosystem, currently it is limited to a few localities in Wayanad. Features of the Wayanad landscape are its vast marshes, and the paddy fields in the valleys, where, in the 1960s nearly 40,000 Ha were under rice cultivation (Vishnudas 2006). But in the 1980s the intensive

7. Threat display of Greater Painted-snipe. Photo: C.K. Vishnudas





8. Greater Painted-snipe hiding among a bunch of young rice plants. Photo: C.K. Vishnudas

cultivation of banana began to replace paddy, and intensive and indiscriminate use of pesticides commenced. Abdusallam (2004) pointed out that nearly 24,80,000 kg of pesticides is used annually in banana cultivation. Banana does not require as much water as rice, so channels are dug to drain out water from the fields. These processes, over the last three decades, have destroyed the entire paddy ecosystem in Wayanad, and today paddy is cultivated annually on just c. 10,000 Ha (11,827 Ha in 2007); that too is not contiguous.

Our study shows that in the absence of natural habitats, rice fields are the only remaining sub-optimal habitat for the survival of the Greater Painted-snipe in the region. A detrimental factor to its breeding in this landscape is the modernisation of agriculture, with high inputs of pesticides and chemical fertilizers, which wipe out entire soil faunas, the main food of the species. Several studies (Pimentel 1992; Deb & Joshi 1994; Kulshreshtha & Singh 1996; Chongwan & Daiji 1988) reported that indiscriminate use of pesticide affects the health of living soil organisms, and it can alter the distribution and balance between species. This may be one of the reasons why Greater Painted-snipes are not seen in some of the chemical intensive agriculture zones within Wayanad. There are no other records of the species from Wayanad in recent years, other than the current location, and two other sites in northern Wayanad. Information on drivers of species persistence in agricultural landscapes are prerequisite for taking proper decisions on the land use pattern focusing maintenance of agricultural fields as multifunctional systems benefiting both food production for humans, and habitat for wildlife. Using agricultural areas as multifunctional systems that produce food for humans, as well as retain wildlife, may be an efficient conservation strategy for many species (Sundar 2011). The future of the species is bleak unless there is a reverse trend in current farming practices. This can be achieved only through proper policies at state and panchayat level, targeting sustainable agriculture, integrating habitat management, and conservation.

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9. Nest site marked with stakes; see the nursery beyond the bund. Photo: C.K. Vishnudas