

Activity patterns and time budgets of the Andaman Crake, *Rallina canningi*

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Abstract

The Andaman Crake is an endemic and data deficient species. Activity pattern and budget were studied by following Focal Animal Sampling method. Total of 288 hours of observations were made. The activity pattern showed bimodal pattern with high in the morning and evening hours. The activity budget results showed that Crake spent maximum time for foraging and calling than other activities. No significant difference was recorded in activity budget between breeding and non-breeding season but significant difference was recorded among seasons.

Keywords : activity pattern, activity budget, seasons

INTRODUCTION

The genus *Rallina* (family Rallidae) comprises eight species of distinctively plumaged rails which inhabit forest or marshland in forest and are confined to Asia and Australia (Taylor and van Perlo, 1998). Most rails are known for their shyness, and are studied with great difficulty. Hence, little is known about the activity budget and pattern of many rails (Taylor 1994; del Hoyo *et al.*, 1996). In India, although, the activity pattern of Purple Moorhen (Bhupathy, 1985) and the daily activity pattern of Coot (Jayaraman, 1985) were studied, the time activity budget has not been studied in any forest rails so far. The Andaman Crake (*Rallina canningi*) is an endemic and data deficient species lives in Andaman Islands. It is a Grey partridge sized (length 34 cm), medium to large rail, and the largest *Rallina* species found in the Andaman Islands (Ali and Ripley, 1987). The present article deals with the activity patterns and time budget of the Andaman Crake.

STUDY AREA

Andaman and Nicobar Islands form a major group of oceanic islands in the Bay of Bengal, India, located between 6° 5' to 14° 45'N and 92° to 94°E. The entire Andaman and Nicobar Island groups cover 8,249 km². The Andaman and Nicobar Islands receive both the southwest and the northeast monsoon and hence average rainfall in the Andaman is high at 3,200 mm. Mean rainfall is 86-450 mm per month, the number of rainy days per month ranges from 1-21 days and the mean maximum and minimum temperature in 2006 were 34°C and 22°C (DES, 2005). The study was carried out in Chidiyatapu Biological Park (11° 30' 35.6E, 092° 42' 33.1N) at the southern most tip of South Andaman Island. The area of this park is about 40 ha. Park is composed of moist deciduous, semi-evergreen and littoral forest.

MATERIALS AND METHODS

The activity budget and pattern were studied by following the focal animal sampling method (Altman 1974) during 2004-2006. Crakes were observed from dawn to dusk. The day light hour was divided into three equal parts, and one day light period was covered over three consecutive days. Observations were made for six such daylight periods in a month. The bird was observed as long as possible, whenever it was spotted. All occurrences of specific activities of individuals were recorded during each sampling period. The activities such as feeding, calling, bathing, preening, roosting and agnostic behavior were noted on the data sheets. The duration of each observation was noted with an electronic stopwatch. Temperature was recorded every hour.

Observations were grouped into four seasons: winter (January-February), summer (March-May), south-west monsoon (June-August) and north-east monsoon (October -December). Man-Whitney U test and Kruskal-Wallis H test were performed to explain the variation in activities between breeding and non-breeding and among various seasons. Statistical tests were evaluated at the $p < 0.05$ level of significance and analyses were performed by using SPSS software student version 16.0.

RESULTS

Activities of Andaman Crake

About 2714 observations were made on the activities against a total of about 5000 field hours with the contact hours 382. Different activities of the Andaman Crake were recorded and classified as foraging, calling, maintenance, agonistic and resting.

Activity Pattern

Overall

The result of activity pattern of Andaman Crake showed bimodal pattern with the more time spent during

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morning 04.00 to 12.00 hrs and evening 14.00 to 17 hrs. The overall pattern showed that for most of the time the foraging and calling activity were inversely proportional to each other. Maintenance activity especially bathing recorded mainly in the afternoon.

Activity pattern among different season

Winter showed that the foraging activity was high in the morning hour from four to nine and decreased around ten o'clock then again increased moderately and constant up to evening. Maintenance activity was observed mainly during the afternoon hours (Figure 1). Summer season foraging and calling activity were recorded more throughout the day than other activities, while high fluctuation was found in calling activity (Figure 2).

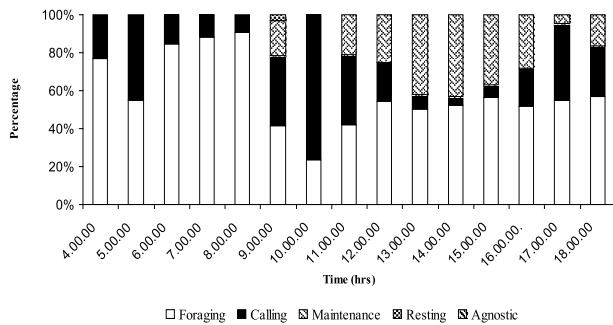


Figure 1. Activity patterns of the Andaman Crane during winter

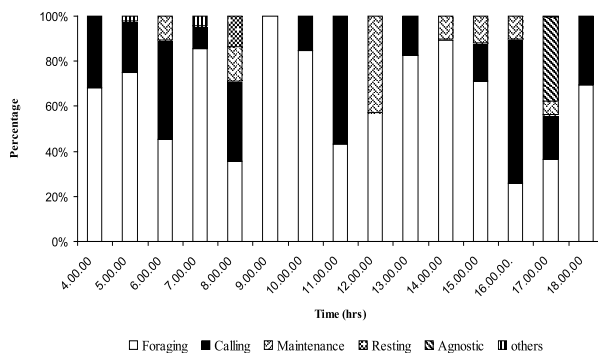


Figure 2. Activity patterns of the Andaman Crane during summer

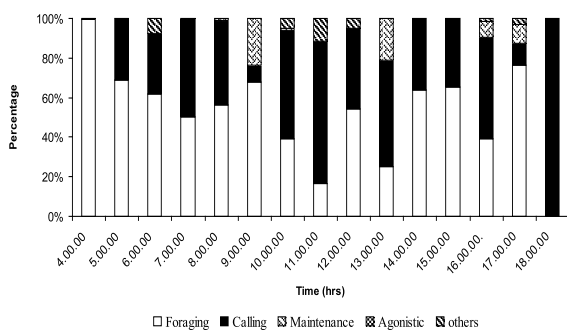


Figure 3. Activity patterns of the Andaman Crane during south-west monsoon

Since south-west monsoon is the breeding season, to compare the activities, the activity of bird outside the nest (non-incubating) was considered. The activity pattern during the south-west monsoon (breeding season) showed typical bimodal pattern with morning and evening more foraging activity, which decreased around 11th to 13th hour (Figure 3).

During north-east monsoon, foraging showed alternative peaks with less in the afternoon around 12th to 13th hour. Though calling activity was recorded throughout the day, the time spent for calling in each hour was less than other activities. Unlike other seasons during this season the maintenance activity occupied more time in most of the hours especially after 8th to 16th hour (Figure 4).

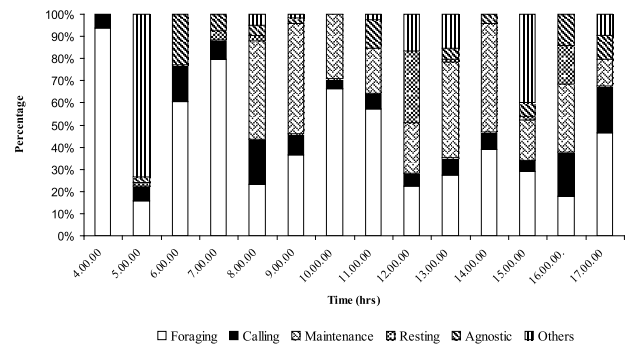


Figure 4. Activity patterns of the Andaman Crane during north-east monsoon

Activity budget

Overall

The total activity budget showed that the Crane spent maximum time for foraging followed by calling, maintenance and breeding, and minimum time for other activities such as resting and agonistic (Figure 5).

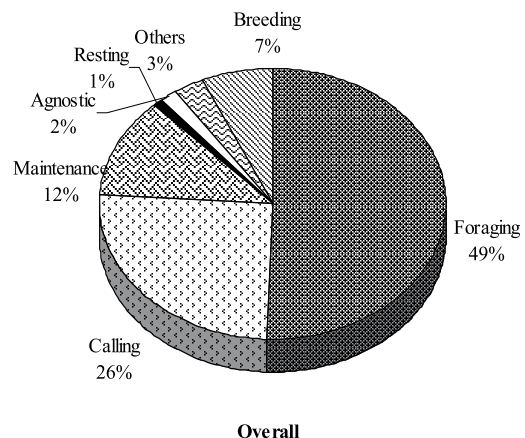


Figure 5. Activity budgets of Andaman Crane (Total)

Activity budget during breeding and non-breeding season

Significant difference in the activities was recorded between breeding and non-breeding season (Mann-Whitney U test; $p < 0.005$; Table 1). Maintenance activity was recorded less during breeding season than non-breeding (Figure 6). The day time activity budget of incubating bird showed 80% of the time for vigilance and another 20% for rolling the egg, responding to its pair and sleeping (Figure 7).

Table 1. Mann-witney U test to analyze Activity budget of Andaman Crake between breeding and non-breeding season.

Activity	U	p - value
Foraging	8	0.00
Calling	52	0.01
Maintenance	37	0.001
Agonistic	36	0.01

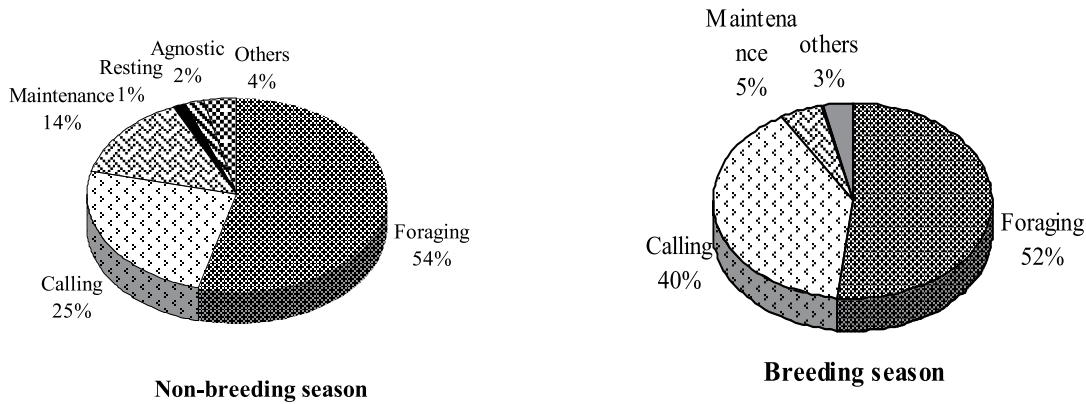


Figure 6. Activity budgets of the Andaman Crake during non-breeding and breeding season (2005-2006).

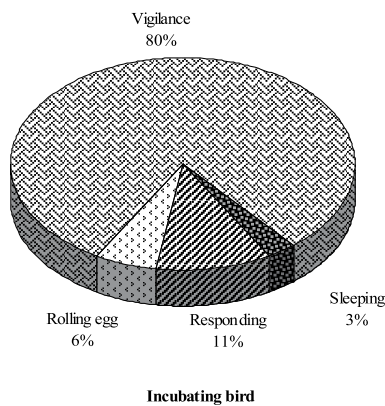


Figure 7. Activity budgets of the incubating bird

Seasonal variation in the activity budget

Time spent on various activities among seasons showed that relatively more time was spent for foraging followed by calling in all the seasons (Table 2) (Figure 8). Calling was recorded more during breeding (south-west moon) than other season and less during north-east monsoon that is after breeding season. Kruskal-Wallis H test was performed to explain the variation in activities among various seasons. Except maintenance activity all the activities showed significant difference (Table 3).

Table 2. Time (minutes) spent on various activities by Andaman Crake during different season

Activities	Winter	Summer	South-west monsoon	North-east monsoon
Foraging	3499	4551	1707	1608
Calling	1203	708	859	686
Maintenance	188	325	59	334
Agonistic	1.6	20	0.3	21
Others	-	4	34	92
Resting	-	9	-	63
Breeding	-	-	133	-

DISCUSSION

Activity Pattern

Foraging was recorded high during early in the morning and again in the late afternoon and early evening as reported by many rails (Taylor and Van Perlo, 1998). The foraging activity was recorded less during afternoon hours may be for the reason of avoidance of high-metabolic activities when the temperature was the highest (Powlesland, 1981; Robinet *et al.*, 2003). It was observed that considerable amount of time spent for feeding followed by calling with the two activities being inversely related. Whereas, it has been reported that feeding and maintenance activities were inversely

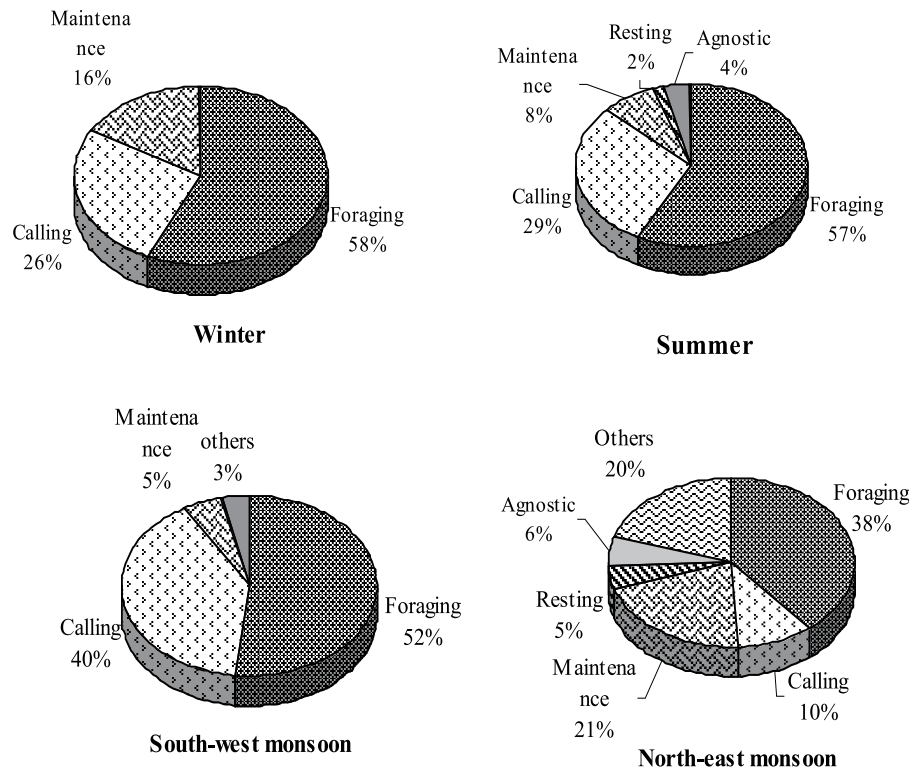


Figure 8. Activity budgets of the Andaman Crake during different seasons

Table 3. Kruskal-Wallis H test to analyze activity budget of Andaman Crake among different seasons.

Activity	χ^2	Df	p - value
Foraging	22.91	3	0.00
Calling	15.27	3	0.00
Maintenance	3.98	3	0.26
Resting	22.34	3	0.00
Agonistic	21.88	3	0.00
Other	17.98	3	0.00

related in Purple Moorhen (*Porphyrio porphyrio*) (Bhupathy, 1985), Coot (*Fulica atra*) (Jayaraman, 1985) and Pheasant tailed (*Hydrophasianus chirurgus*) and Bronzewinged jacans (*Metopidius indicus*) (Ramachandran, 1998). As reported in many rails calling was observed throughout the day, but more in the early morning and evening (del Hoyo *et al.*, 1996; Taylor and Van Perlo, 1998). The maintenance activities were recorded more in the afternoon than in the morning as in Captive yellow rail and Buff-spotted Flufftail (Taylor., 1994) and many other birds.

Activity budget

In Andaman Crake, foraging and calling were the predominant daytime activity during all the seasons except breeding season as reported in many other birds especially in rails (del Hoyo *et al.*, 1996; Ramachandran,

1998;). Birds have extremely high weight-specific metabolic rates among vertebrates, and hence foraging is typically a dominant daytime activity (Fischer, 1981). Crake spent more time for foraging which could be due to relatively large body size of the Crake and smaller size of the insect prey and searching time in the leaf litter. Food density has been known to influence negatively the amount of time spent in foraging by an animal (Pianka, 1974). Foraging was recorded more prior to breeding season and during breeding season than after breeding season. However, during breeding season it was less. The maximum feeding in summer might be because of the favorable conditions with longer daylight and also the need for storing high energy for breeding in the coming season (Lack, 1968; Martin, 1992). To meet energy / nutrient demands of egg laying and incubation, some species store lipid and/or protein before arrival on breeding season (Korschgen, 1977; Ankney and Mac-Innes, 1978; Raveling, 1979; Krapu, 1981) and catabolise these resource during laying and incubation. Similar to other birds (Verbeek, 1972) Andaman Crake exhibited prominent seasonal changes in their activity budgets.

During breeding season, next to breeding activities it spends more time for foraging and calling. Calling is another major activity in Andaman Crake as many other *Rallids* with extensive vocal repertoires, using calls to communicate in a wide variety of situations (Taylor, 1998). Most of the rails are vocal, as expected in birds

which inhabit areas with dense cover where visual contact is often very limited and communication by sound becomes very important (del Hoyo *et al.*, 1996). Calling was the maximum during breeding season as it was meant for guarding territory and the mate. The calls are important in the life of rails in warning other birds of territorial rights or mutual dangers, in locating and recognizing mates and young, and in defending nests or brooding sites (del Hoyo *et al.*, 1996; Taylor and Van Perlo, 1998). Calls seem to be a behavioural response to the productive territory it occupied. Maintenance activities were high during non-breeding season, while it was very less during breeding season. Such variation was noticed in most of the birds (Hutto, 1990). Resting was low as the birds had to spend more time for feeding and other activities as observed in many insectivorous birds, as searching and finding enough food takes more time.

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