OBSERVATIONS ON NESTING ECOLOGY OF BLACK-HEADED MUNIA (*LONCHURA MALACCA MALACCA*)

L.A.K. Singh, S.S. Srivastava and S.D. Rout

Similipal Tiger Reserve, Bhanjapur, Baripada, Orissa 757002, India.
Email: laksingh33@hotmail.com, simitig@dte.vsnl.net.in

Abstract

The study, undertaken during 1994-97, highlights that the Black-headed Munia (*Lonchura malacca malacca*) could find suitable nesting sites in Ramatirtha due to environmental enrichment in the enclosures for mugger crocodile. The Black-headed Munias used five main species of trees for roosting,viz. *Alstonia scholaris*, *Acacia auriculaeformis*, *Azadiracta indica*, *Polyalthia longifolia* and *Anacardium occidentale* from June to November. The nests were situated at about 83 +/- 14cm (n=54) above the ground and 73 per cent were on tall grasses of *Setaria plicata*, nine per cent on Cycas and 19 per cent on *Crinum asiaticum*. A total of 78% of attempted nests were complete and used for egg-laying. Eggs were laid every week and 73.5 per cent egg-laying was complete during the ten weeks period from the third week of June to the fourth week of August. The nests were at an average 17cm long from outside and 12cm long within and the diameter of the nest mouth was 5cm. Damage of nests were due to rain (16%), depredation by mugger crocodiles (25%), abandoned nests without laying eggs (25%) and five per cent nests had rotten eggs. Although eggs were laid on different days, hatching was within one or two days. Both the phenomenon are believed as strategies for improved survival.

Keywords

Black-headed Munia, Lonchura malacca malacca, *nesting ecology, Ramatirtha, Similipal Tiger Reserve*

Introduction

The Black-headed Munia, *Lonchura malacca malacca* was known to occur up to Raipur in Madhya Pradesh and its distribution towards further north-east was not recorded (Ali & Ripley, 1983). Singh and Rout (1992) stated that the species was a regular (monsoon) visitor to the Crocodile Project area at Ramatirtha which is in the periphery of Similipal Biosphere Reserve in northern Orissa. Accordingly, the species was added to the checklist of birds already prepared for the area by Dev (1986). Within the rearing pens that are maintained for mugger crocodiles (*Crocodylus palustris*) at Ramatirtha, the munias used the available vegetation for nesting.

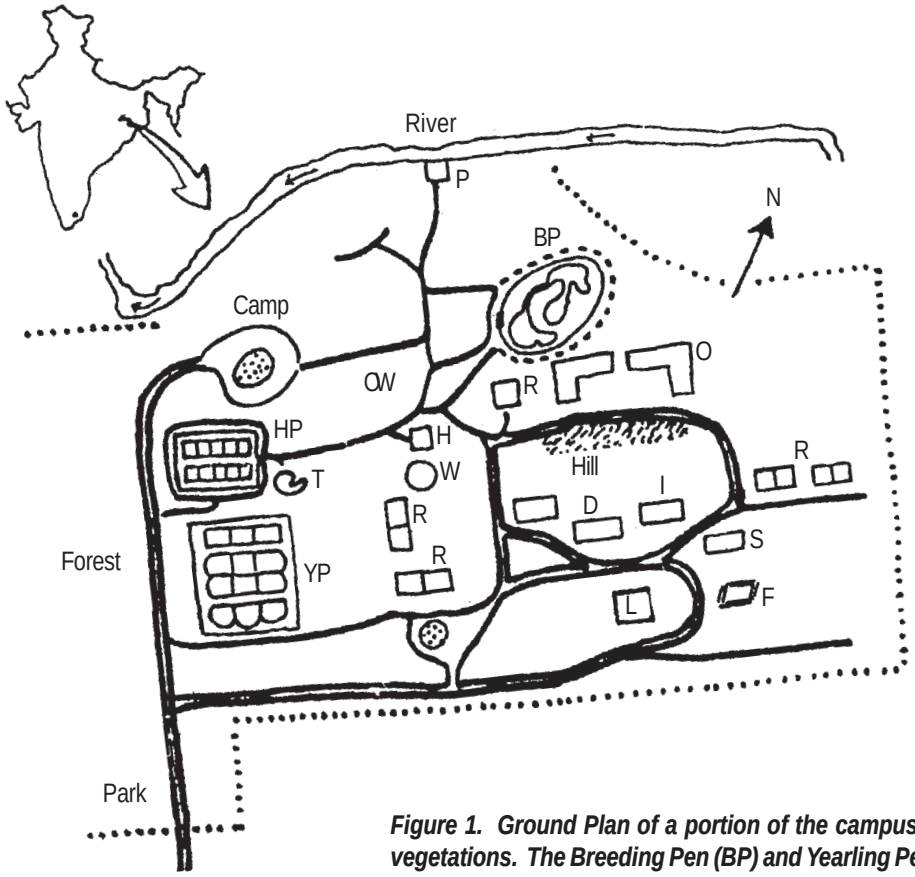
This study presents information on nesting season, nesting sites, clutch size, pattern of egg laying, egg biometrics, incubation period and weight of chicks as recorded at Ramatirtha. The study highlights that the birds could find suitable nesting sites due to environmental enrichment in the enclosures of mugger crocodile. Also, the exercise is an example of developing a 'zoo study project' with very little extension of the daily routine activities of the supervisor.

Study area and Methods

The study was carried out during 1994 to 1997. Ramatirtha (85^0 55' E, $21^0$35' N approx.) (Fig. 1) experienced an annual rainfall of 160cm, of which about 80 per cent was recorded during July to October. Data on average weekly rainfall for four years are presented in Table 1 and Figure 2. The average minimum temperature ranged between 7-25^0C, with the lowest recorded during the last week of December and first week of January. The average maximum temperature ranged between 12^0 and 42^0C, with the maximum during April-May. The munia birds were seen in Ramatirtha campus during June to December (Table 2, Fig. 2).

The munias used the breeding and yearling pens (Fig. 1) of the campus for nest-building activities. Observations recorded from the yearling pens have been used for the present study. The terrarium includes 12 pens of which the birds used only seven. Each pen is almost square-shaped with a semicircular pool of water, one meter in depth. The terrarium is covered with grass and other vegetation as a practice of management for environmental enrichment.

Received on 6 October 2000 *Accepted on 28 December 2000*



BP - Breeding Pen
YP - Yearling Pen
HP - Hatchling Pen
H - Hatchery
W - Water tanks
P - Pump-house
R - Residential accommodations
D - Students' Dormitories
L - Laboratory
O - Officer
S - Stores
F - Scruby forest

***Figure 1. Ground Plan of a portion of the campus at Ramatirtha Mugger Crocodile Project vegetations. The Breeding Pen (BP) and Yearling Pen (YP) were used for nesting by* Lonchura malacca malacca.**

The procedure for collection of data was simplified into a format and was easily accommodated during one of the several visits to the crocodile rearing pens in a day for attending to chores relating to husbandry of crocodiles.

Results

Arrival and departure

Munias are seasonal visitors to Ramtirtha. Their arrival was noticed when they commenced nesting activities around the first week of June i.e., before the beginning of monsoon. Their departure from the campus was rather gradual, commencing with visits to the crop fields in the periphery of the Ramtirtha campus. Departure was towards the end of winter around the middle of November when harvesting season for paddy commenced (Table 2, Fig. 2).

Roosting trees

Mainly five trees were used by the munias for roosting. The trees were *Alstonia scholaris* (Oriya: *Chhatiana*), *Acacia auriculaeformis* (Oriya: *Sunajhari*), *Azadiracta indica* (Oriya: *Nimba*), *Polyalthia longifolia* (Oriya: *Debadaru*) and *Anacardium occidentale* (Oriya: *Kaju-pesta*)

Nesting trees

Of the 81 nests recorded, 73 per cent were on tall grasses of *Setaria plicata*, nine per cent on Cycas (Oriya: *Arguna*, *Odashamari*) and 19 per cent on *Crinum asiaticam* (Oriya: *Hatikote*). Tall grasses were preferred, perhaps because of the height above the ground, safety from crocodiles and when dense, perch-suitability for the adults (Plate 1).

Nesting attempts

A total of 104 nesting attempts were made during the four years. Complete nests which were used for laying eggs numbered 81 (78%). Such nests have been termed as complete or successful nests (Tables 2, 3; Fig. 2). Other nests were abandoned by the birds at various stages of construction, without using for laying of eggs. Egg-laying for the season was complete to the extent of 73 per cent during the ten-week period from the third week of June to the fourth week of August.

The lower number of nests during the year 1996 and 1997 (Table

Table 1. Rainfall at Ramatirtha recorded during 1994-97.

Month	Date	Average rainfall		Average Temperature ^{0}C	
		Days	mm	Max.	Min.
January	1-8	0	0	25	13
	9-16	10	103	24	14
	17-24	3	9	24	12
	25-31	0	0	25	11
February	1-8	5	56	26	14
	9-16	2	4	27	15
	17-24	2	2	29	17
	25-28/29	3	19	27	15
March	1-8	1	6	30	19
	9-16	0	0	33	20
	17-24	1	1	36	22
	25-31	4	65	34	21
April	1-8	8	82	34	22
	9-16	7	45	36	23
	17-24	2	20	37	24
	25-30	8	68	36	22
May	1-8	6	51	36	25
	9-16	14	373	36	25
	17-24	10	61	37	26
	25-31	5	48	39	25
June	1-8	3	24	38	26
	9-16	4.25	80	34	26
	17-24	5.75	186	31	25
	25-30	4	216	30	25
July	1-8	4.25	39	30	26
	9-16	5	94	30	25
	17-24	7.25	118	30	25
	25-31	4	64	30	26
August	1-8	6.5	183	29	24
	9-16	6.5	132	30	24
	17-24	6.75	92	29	25
	25-31	5	51	30	24
September	1-8	5.5	50	30	24
	9-16	5	58	29	24
	17-24	2.75	50	31	24
	25-30	3	53	30	23
October	1-8	2.75	29	30	22
	9-16	2	19	30	21
	17-24	1.25	7	29	21
	25-31	2.25	25	28	19
November	1-8	1	1	25	19
	9-16	1	30	27	19
	17-24	1.5	2	26	18
	25-30	0	0	25	15
December	1-8	4	41	25	14
	9-16	5	40	25	13
	17-24	0	0	25	12
	25-31	1	4	25	13

3) was due to disturbance caused while repairing the rearing pens and clearing grasses. The birds had then moved to nest at the periphery of the yearling and breeding pens.

The nest

The nests were situated at about 83 +/- 14cm (n=54) above the ground. More than one bird, perhaps both the male and female, participated in nest building process. The building material of the nest consisted of various species of grass. It took two to eight days, with an average of four days to complete a nest. The nests were spherical with the entrance situated laterally. The wall of the nests had thin padding. Based on data for 54 nests, the dimensions of an average nest was 17cm long when measured from the outside and 12cm long within. The diameter of the nest mouth was 5cm.

The egg

The completion of nest-construction and starting of egg-laying appeared to be continuous without a day's gap. The average pattern for four seasons of egg-laying showed that the eggs were laid every week from the first week of June to the second week of October. Later, eggs were laid for two alternate weeks and after the second week of November there were no more laying of eggs (Table 2, Fig. 2.) During the 10-week period from the third week of June to the fourth week of August, 73.5 per cent of the eggs were laid.

A complete clutch consisted of 6-7 eggs. The average size of the egg was 16 +/- 0.5 x 11 +/- 0.3mm (maximum length x width). The average weight of an egg was 5 +/- 1.5g for 52 eggs. The eggshell was smooth, glossy and bright-white in colour. There was a faint indication that with increase in egg length there was decrease in egg width and egg weight.

Incubation

During the incubation period when only one bird remained inside the nest, another bird was seen perching outside the nest. Perhaps the male showed interest in incubation too. The incubation period was approximately 14-17 days. The relationship, if any, between incubation period to changes in ambient temperature and rainfall could not be established.

Hatchling

Although the eggs were laid once everyday, hatching of chicks was almost simultaneous, within one to two days. Within 24 hours of hatching the young bird weighed 12 +/- 3gm (n = 21). Newly hatched chicks had unopened eyes, the position marked by a grayish-red line about 2cm long. Two birds, apparently both the parents, participated in bringing food for the hatchlings, though only one, perhaps the female was seen more often at the nest.

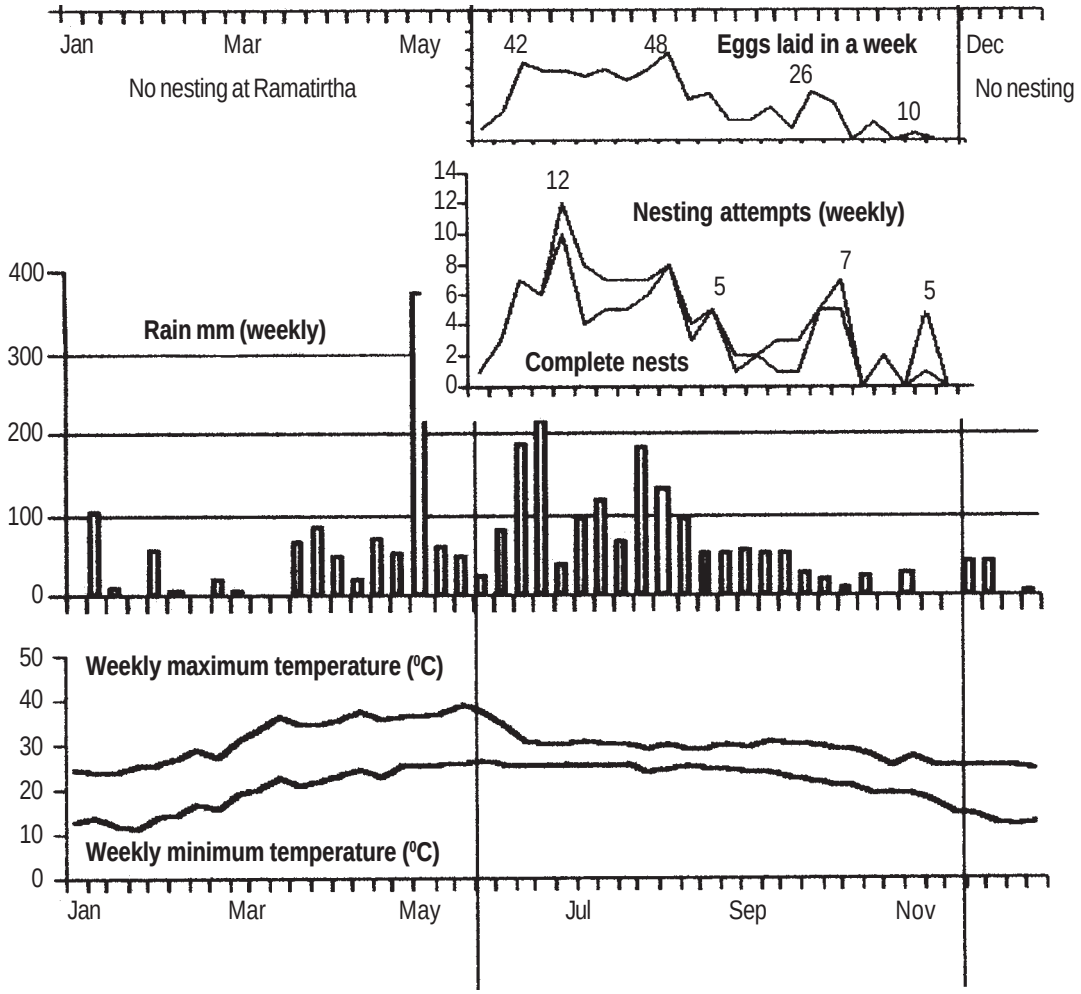


Figure 2. Nesting season of* Lonchura malacca malacca *with activities of nest-construction and egg-laying. The information is superimposed over data on average rainfall and temperature during the years 1994-97.

Loss of nests and eggs

Of the 98 nesting attempts in four years, 53 per cent of the nests were damaged or were left unused. Rain accounted for 16 per cent damages, depredation by mugger crocodiles to feed on eggs caused 25 per cent of nest-loss, 7 per cent nests were abandoned without laying eggs and 5 per cent had rotten eggs. Occasionally, there was a nest which contained eggs but was abndoned by the birds. An abandoned nest was not reused.

Discussion

In captive management, environmental enrichment is always stressed for the welfare of a species. Because of the enriched environment in the crocodile rearing pens at Ramatirtha (Singh & Rout, 1998), the place has been used for seasonal visit and nesting by *Lonchura malacca malacca*.

The birds used the campus of Ramatirtha for at least six months commencing in June. Nesting activities showed a declining trend towards the latter part of the season. There were intermittent peaks and furrows in activities relating to nest construction and egg-laying. The maximum activity appeared to have occurred during the period when the diurnal fluctuations in the minimum and maximum temperature were the least (Fig. 2). Nesting activities may have some relation to rainfall, which however, could not be established.

It is not known how many clutches of eggs a bird laid during a season. There was no clear evidence if a bird reused a nest. Some of the nests were recorded as abandoned at various stages of construction. Since there was no apparent man-made reason for abandoning a nest half-way during its construction, it could

Table 2. Nesting activities by* Lonchura malacca malacca *studied at Ramatirtha. Consolidated data from 1994 to 1997.

Month	Date/Month	Total nests started	Total nests completed	Total eggs laid
January	1-8	0	0	
	9-16	0	0	
	17-24	0	0	
	25-31	0	0	
February	1-8	0	0	
	9-16	0	0	
	17-24	0	0	
	25-28/29	0	0	
March	1-8	0	0	
	9-16	0	0	
	17-24	0	0	
	25-31	0	0	
April	1-8	0	0	
	9-16	0	0	
	17-24	0	0	
	25-30	0	0	
May	1-8	0	0	
	9-16	0	0	
	17-24	0	0	
	25-31	0	0	
June	1-8	1	1	6
	9-16	3	3	16
	17-24	7	7	42
	25-30	6	6	38
July	1-8	12	10	38
	9-16	8	4	35
	17-24	7	5	39
	25-31	7	5	32
August	1-8	7	6	38
	9-16	8	8	48
	17-24	4	3	23
	25-31	5	5	25
September	1-8	2	1	11
	9-16	2	2	11
	17-24	3	1	18
	25-30	3	1	6
October	1-8	5	5	26
	9-16	7	5	21
	17-24	0	0	0
	25-31	2	2	10
November	1-8	0	0	0
	9-16	5	1	4
	17-24	0	0	0
	25-30	0	0	0
December	1-8	0	0	
	9-16	0	0	
	17-24	0	0	
	25-31	0	0	

***Table 3. Success rates of nesting by* Lonchura malacca malacca.**

Year	Nesting attempts	Successful nests	% of success
1994	29	22	85
1995	57	43	80
1996	14	13	93
1997	4	3	75
Total	104	81	83

be a natural strategy and bears survival value for actual and completed nests. However, an occasional abandoning of a nest halfway during egg-laying or incubation could have been due to the study itself, which formed a lesson for future.

Laying of eggs on different days may be a physiological adjustment. However, this could also be a strategy for survival. Within the same strategy simultaneous hatching of all eggs in a clutch can also be covered.

Acknowledgement

The authors express their gratitude to the State Government of Orissa, Forest Department for scope of the study. Dr. U.N. Dev and Sri B.C. Prusty, former field director encouraged the study. Sri Govind Tudu, mugger watcher helped in the collection of data.

Reference

Ali, S. and S.D. Ripley (1983). *Handbook of the Birds of India and Pakistan*. Compact Edition. Oxford University Press, Bombay.

Dev, U.N. (1986). Checklist of the birds of Similipal. *NWCSO* 4(1&2): 1-57.

Singh, L.A.K. and S.D. Rout (1992). Range extension of southern Black-headed Munia (*Lonchura malacca*). *Bihang* 1(1): 20.

Singh, L.A.K. and S.D. Rout (1998). Environmental enrichment conditions and their preference by hatchling mugger. *Zoos' Print* 13(1): 6-8.