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RESEARCH ARTICLE

NEST SITE SELECTION AND BREEDING PARAMETERS OF BLACK - CROWNED NIGHT HERON *Nycticorax nycticorax* IN HOKERSAR WETLAND KASHMIR

Mustahson F. Fazili and *Raheela Mir

Department of Zoology, University of Kashmir, Hazratbal, Srinagar, Jammu and Kashmir 190006, India

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ABSTRACT

The study of Nest site selection and breeding parameters of Black - Crowned Night Heron *Nycticorax nycticorax* was carried out during breeding season of 2012 in Hokersar wetland, North- Kashmir. Nest site characteristics and breeding parameters namely egg laying date, clutch and brood size, egg biometry and breeding success were examined. Breeding was initiated with selection of nesting sites. Nests were bowl shaped of dried willow twigs. Mean egg dimensions were 55.01 ± 0.77 mm × 35.41 ± 0.97 mm. Mean egg weight was 4.45 ± 0.83 g and average clutch size 4.00 ± 0.57. Both sexes incubated the eggs with major role of females and incubation period averaged 24.97± 0.80 days. Hatching was asynchronous and hatchlings were nidifugous. Hatching, fledging and nesting success calculated were 40.7%, 34.6% and 51.1% respectively. Main causes of low nesting success were predation, flooding and faulty incubation.

INTRODUCTION

Nest site selection influences the reproductive success of wild birds (Buckley and Buckley 1980, Burger and Gochfeld 1988). Interaction of colonial birds at their nest sites are well documented for species nesting in trees. The size, structure, shape and orientation of the nest are important in providing shelter against adverse weather, particularly high winds, gales and storms (Kim *et al.*, 1998). Proper nesting habitat provides protection against predators (mammals, humans, birds of prey, etc.), offers adequate stability and materials to construct the nest, and is accessible to abundant feeding areas within the foraging range (Fasola and Alieri 1992, Hafner 1997, Lamseri and Gale 2008). Further, the nest site also promotes hatching (Ludwig *et al.*, 1994) and successful rearing of young individuals, which is important for the survival of the species (Buckley and Buckley, 1980). Birds probably nest in colonies to decrease the probability of nest depredation (Brown and Brown 1996). Wading birds including Night Heron *Nycticorax nycticorax* are useful indicators of wetland productivity, trophic structure, human disturbance and contamination of wetlands, so their reproductive study is of considerable interest to wildlife and land ecologists. Also their reproductive parameters are considered as bio-indicators of the population, community and ecosystem because they reveal primary response to environmental changes (Temple and Wiens 1989). Little work has been done from South - Asian subcontinent on this bird species.So the main aim of present paper is to determine nest site characteristics, clutch size, egg morphometry and breeding success of Night Heron, a wading bird of family Ardeidae from data collected during breeding season of 2012 at Hokersar wetland Kashmir.

MATERIAL AND METHODS

Study Area

The study was carried out in Hokersar wetland one of the major wetland of Kashmir valley between 34°06 'N lat., 74°05' long, located to the north- west of srinager city. This wetland is mostly fed by Doodhganga and Sukhnag stream in the west. This wetland is traversed by narrow boat channels about 4m to 10m wide. Vegetation is dominated by *Typha angustata, Typha laximanii, Eleocharis palustris, phragmites communis, Scripus sps and Botumus umbellatus*. This wetland provides excellent feeding and breeding grounds to a large number of migratory waterfowls in Summer (Fig. 1)

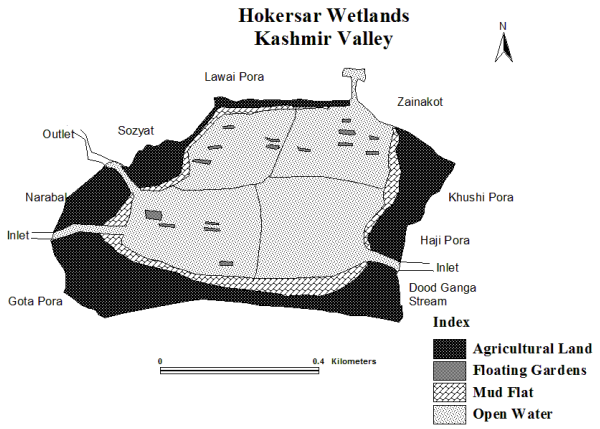

Fig. 1. Hokersar Wetlands Kashmir Valley

Field procedures

For present study wetland was divided into four sites but site 1 and 3 were taken for study because of dense vegetation, more availability of nests, less human disturbance and increased water level. All nests were searched with the help of boat and use of 23 × 50 X binoculars. A ladder was used to climb the trees to view and observe the nests. All newly constructed nests were individually marked with small wooden labels placed below the nest. During first visit, nest dimensions including outer greater diameter, inner lesser diameter, as well as nest height and nest cup were recorded by measuring tape.

Corresponding author: Raheela mir
Department of Zoology, University of Kashmir, Hazratbal, Srinagar, Jammu and Kashmir 190006, India

Nest was considered active if it contained at least an egg or a nestling and successful if it contained a nestling or an egg with the presence of pipping hole. Egg mass was taken with the help of digital balance and egg morphometry with vernier callipers to the nearest 0.1 mm. Eggs were marked with indelible marker pen in the order of their laying and placed back carefully without disturbing their arrangement to calculate incubation period and weight loss if any.The volume and shape indices were calculated by using the formulae: V (cc) = K × L (cm) × B² (cm), where L is length, B is breadth and K is constant (0.51) and SI= B/L × 100 respectively (Hoyt, 1979). To determine variation if any in egg dimensions the clutches were divided into three groups, the first 25% of the total clutches were considered as early clutches, the second 50% were considered as intermediate clutches and the last 25% were considered as late clutches. Incubation period was defined as the period since the laying of last egg of clutch until the hatching of first egg (Gill, 1994). Freshly hatched chicks were weighed to the nearest gram and their beaks and tarsi were measured with the help of vernier callipers. Nesting, Hatching and Fledging success were calculated in accordance to Mayfield (1961,1975).

RESULTS

Breeding season and Nest site Characteristics

Black crowned Night Heron started arriving in the breeding area from 3rd April and were found in abundance till last week of April when their population was estimated 216 through out the wetland (Fig.2).

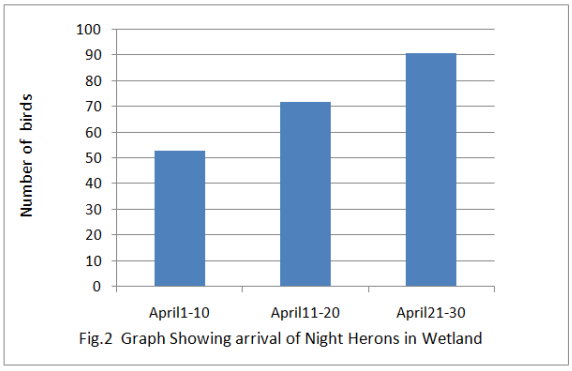

Fig.2 Graph Showing arrival of Night Herons in Wetland

They had single breeding season extending from April to August till they raised their generation and dispersed in different wetlands of the valley. Nesting site was so chosen that it provided sufficient cover to the birds, their eggs and nestlings, with little exposure to direct sunlight and avian predators. Dense willows were selected for nesting. Their density at the nesting site was 21/100 m^2. Nests construction initiated from 19th April was finished almost by 29th April and both the members of the pair took active role in this activity. In most of the cases older nests were reconstructed. It took 5-9 days for a pair to either construct or repair the nest. Nests were bowl shaped made of dried willow twigs that look neither good nor strong. Average nest diameter was 29.09 ± 2.05 cm. Mean height of the nest above water level was 2.92 ± 0.44m (Range 2.4-3.7m, N = 29).Nest cup averaged 7.21 ± 0.75 cm (Range 6.5-8.2 cm, N= 29) (Table 1). Initial nests were placed significantly at higher levels than nests of late breeders (t=2.186, P<0.005).

Table 1. showing nest parameters

Parameter	Min value	Max value	Mean±SD	N
Nest diameter(cm)	26.2	32	29.09 ±2.05	29
Nest height(m)	2.4	3.7	2.92 ±0.44m	29
Nest cup (cm)	6.5	8.2	7.21 ± 0.75	29

Clutch size and Egg morphometry

Clutch size varied from 3 - 5 eggs with an average of 4.00 ± 0.57 eggs. Clutch size showed positive correlation with the diameter of the nest, as clutch size increased there was also increase in nest diameter (Fig. 3).

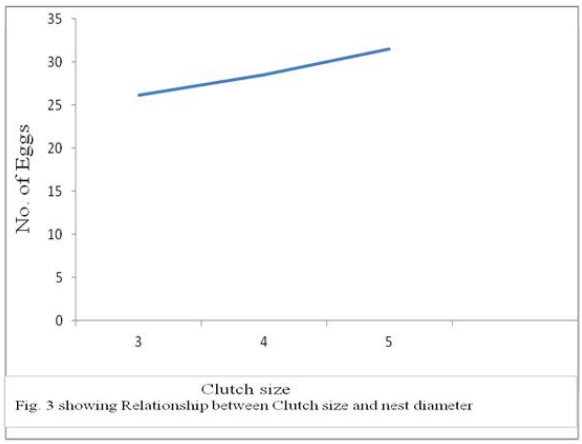

Fig. 3 showing Relationship between Clutch size and nest diameter

Eggs are oval, elongated and greenish – blue in colour and were laid at interval of two days. First egg was laid on 2nd May. Egg laying was brisk in 2nd week of may when about 54% of eggs were laid (Fig 4). Average length and breadth of eggs was 55.01 ± 0.77mm (range 52.3-56.8mm) and 35.41 ± 0.97 (Range 32.4-36.9mm) respectively. Average egg weight was 34.45 ± 0.83g (Range 32.2 - 35.9g). Mean volume and Egg shape index calculated were 34.98 ± 1.67cm^3 and 64.68 ± 1.69 respectively. It was found that eggs of early and intermediate clutches had greater diameter as compared to eggs of late clutches. The average length, Breadth, volume and shape index of eggs for early clutches were 54.98 ± 0.77mm, 35.55 ± 0.93mm, 35.16 ± 1.90 cm^3 and 64.51 ± 1.71; for intermediate clutches it was 54.56 ± 0.96, 35.19 ± 0.79, 34.54 ± 1.66 and 64.45 ± 1.87 respectively. For late clutches average egg dimensions were 53.31 ± 0.80, 33.25 ± 0.76, 31.50 ± 1.21 and 62.34 ± 1.86 respectively (Table 2). The eggs of early and intermediate clutches were significantly longer and broader as compared to final clutches. There was significant variation between the length of eggs of early and late clutches (F=26.01, P < 0.001) and also significant variation was found between breadth of early and late clutches (F= 59.30, P < 0.001).

Table 2. Showing egg parameters of early, intermediate and late clutches

	Length (mm)	Breadth mm)	Vol (cm^3)	Shape index (SI)
Early (n=25)	54.98 ± 0.77	35.55 ± 0.93	35.16 ± 1.90	64.51 ± 1.71
Intermediate (n=50)	54.56 ± 0.96	35.19 ± 0.79	34.54 ± 1.66	64.45 ± 1.87
Late (n =25)	53.31 ± 0.80	33.25 ± 0.76	31.50 ± 1.21	62.34 ± 1.86

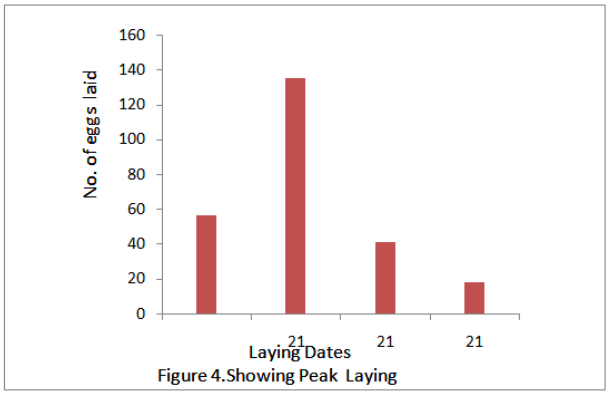

Figure 4.Showing Peak Laying

Incubation and Hatching

Incubation usually started with the laying of first egg. However, the time spent on the nest gradually increased with each additional egg laid. Both mates incubated the eggs, but females incubated for longer time.The species was found to be monogamous. Incubation period varied from 21-23 days with an average of 21.92±0.67. Freshly laid eggs weighed on an average 34.23 g. On incubation there appeared wt. loss of 15.89 % (Fig 5). First egg hatched on 22 May and continued until 12 June showing peak hatching during first week of June (Fig 6). Hatching was asynchronous and hatchlings were nidifugous. Of 256 eggs, 157 hatched resulted in hatching success of 61.32% (Traditional Method of Mayfield 1975) while it was 40.7% (Mayfield Method 1975, on the basis of exposure days). The major causes for unsuccessful hatching were flooding, predation and eggs lost due to faulty incubation.

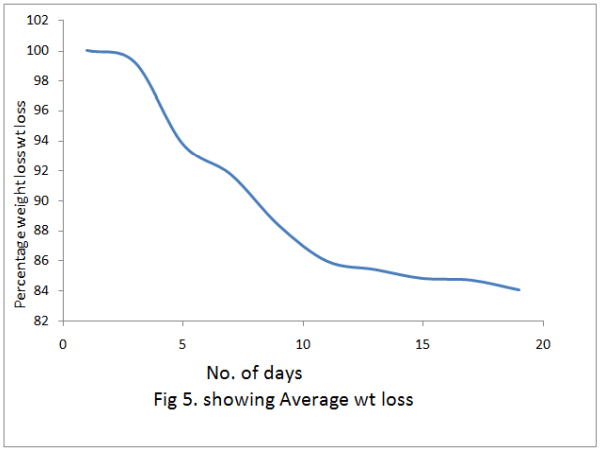

Fig 5. showing Average wt loss

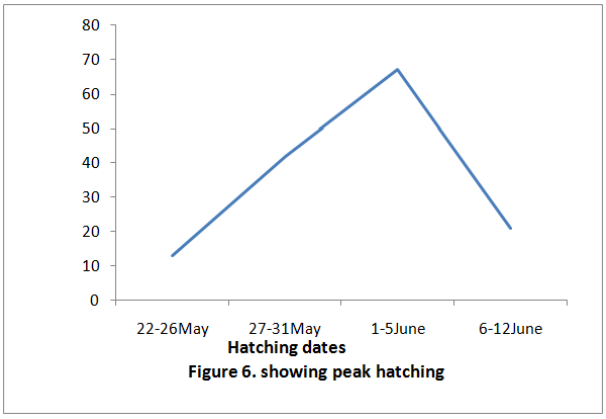

Figure 6. showing peak hatching

Nesting and fledging success

Nesting success was calculated as the number of successful nests divided by total number of nests. Out of 64 nests 23 were destroyed reasons were predation (31.25%, n=20) and abondonment of nests by females (4.68%,n=3) resulting in total nesting success of 64 % and 56.68% of chicks fledged away successfully (Traditional method). Mayfield method on basis of exposure days there was nesting and fledging success of 51.1% and 34.6% (Table 3).

DISCUSSION

Night Heron is a species that is dependent on water, it builds its nest close to water covered with reeds and trees Durmus & Adizel (2010). During present investigations same types of locations were preferred for nest building. Nests were generally built on willow trees (*salix sp).*The duration of breeding season in Night Heron lasted for nearly 4 months, a single breeding season i,e. from April to July was reported during present study. Uzun and Mehmet (2006) reported that breeding in case of Night heron started in April and lasted upto the end of May. The longer duration of breeding season during the present study may be because of better weather conditions in the wetlands of Kashmir. The first sign of nest building was seen in April. During present study it was observed that nest was build by both partners. Similar observations were reported by Drumus & Adizel (2010). The average length and breadth of eggs during present study was found to be 55.01 × 35.41 mm. Durmus and Adizel (2010) in one of their study area recorded the egg measurements as 50.98 × 31.71 mm. The larger egg dimensions in the present study may be attributed to the better availiblity of food and other resources in the wetlands of Kashmir. The fresh egg weight during present study was found to be 34.23 g. These findings seem to be more or less relevant to the findings of Alfred (1923). Like other herons, both the parents incubate the eggs but majority of the time was spent by female. incubation period of Night heron was reported to be 21- 23 days, these investigations are in relevance to the findings of to Xhu Xi *et. al*. (2005). Turan (1990), Hoyo *et .al.*(1992), however reported incubation period of 23 days .There appeared a gradual weight loss of about 15.89% during incubation, this loss in weight is probably due to evopration rate, which increases with continued incubation and with rising temperature. Fazili (2010) found a weight loss of 18.4% in Little bittern. Ahanger (2009) reported a weight loss of 17.17% in Mallard. Shah (1984) reported a weight loss of 10.5% in Common moorhen. During the course of present studies the clutch size in Night Heron ranged from 3- 5 eggs with mean clutch size of 4.00 ± 0.57 Which is more or less similar to the findings of Uzun and Mehmet (2010). The mean clutch size of Night herons from other locations include: 3.0- 4.0 in Alberta (Wolford and Boag 1971), 3.9-4.2 in the st. Lawrence Estuary Tremblay and Ellison (1980), 3.1 in sandy Neck, Gross (1923), 4.5 in New England (Henny 1972) and 4.1 in New York (Palmer 1962). Clutch size appeared to vary with the progress of breeding season, it was found that the eggs of early and intermediate clutches had greater diameter as compared to eggs of later clutches. This is because of the fact that clutch size in birds is often dependent on the age of parents, younger females lay smaller and fewer eggs (Coulson 1966; Kcomp 1970; Coulson and Porter 1985). Further it was found by Parsons and Burger (1981) that early nesting Black crowned Night Herons were more successful in raising broods as compared to late nesters and Early nests of other colonial species generally have higher reproductive success and are mainly those of older experienced individuals (Coulson and White 1958; Ryder 1975; Blus and Keahey 1978; Lloyd 1979, Manuwal 1979). Hatching was asynchronous and hatchlings were nidifugous. This observation is in confirmation to Alfred (1923) who reported that hatchlings had their eyes open from the beginning and the following day the young bird was active and able to sit in an erect position. Common crow (*Corvus splendens*) and Magpie (*Pica pica*) were the main predators which mostly predated on eggs when the nests were left by incubated individuals. Uzun and Mehmet (2006) and Durmus and Adizel (2010) also found Magpie as one of the common predator of Night Heron eggs and chicks.

Table 3. Mayfield survival probability for different stages of Night heron

	Exposure days	No.ofeggs/nestlings/nests	No.of eggs/nestlings failed	Daily survival	Success rate
Hatching	3072.5	256	99	0.96	40.7%
Nesting success	779	64	23	0.97	51.1%
Fledging success	1457	157	68	0.95	34.6%

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