

## HATCHING SUCCESS OF *Metopidius indicus* (Latham, 1790) AT SUNYE IN (LAKE)

San Yin Win<sup>1</sup>, Khin Mya Mya<sup>2</sup>

### Abstract

Breeding ecology conducted on *Metopidius indicus*, Bronze-winged Jacana during May 2011 to April 2012 at Sunye In, recorded that the nests of bronze winged Jacanas were built on the water surface along the Lake. Nets were large circular cup pads, with, a depression in the center for the eggs. The nest materials were leaves and stems of floating vegetation. A total of 18 nests including 61 eggs were recorded during the study period. The colour of fresh egg was deep rufous (or) olive brown. Clutch size ranged from 2 to 4 eggs and mean clutch size was  $3.39 \pm 0.85$ . The incubation period was last 22 to 25 days. The hatching success of bronze-winged Jacana were observed to be 70.21% hatched.

Keywords: Breeding aspects; *Metopidius indicus*

### Introduction

Waterbirds are found in a variety of habitats, including terrestrial, wetland, grassland and shelter habitats. Waterbirds species depend on wetland for feeding and breeding. Most of the waterbirds require flooding of wetlands for their breeding (Scott, 1997).

Jacanas have characteristics long legs and elongated toes, and claws that spread their weight over a large and allow them to inhabit floating and emergent aquatic vegetation in freshwater wetlands (Jenni, 1996).

The breeding season is the most suitable season, usually with favorable conditions and abundant food and water, for breeding among some wild animals and birds. Different species of wild animals and birds have different breeding seasons according to their particular habitat requirements and food availability (Welty, 1992).

When the breeding birds have selected a nest site, they must build a nest, then lay a clutch of eggs and incubate them (Patterson, 1982).The

---

<sup>1</sup> Associate Professor, Dr., Department of Zoology , Yadanabon University

<sup>2</sup> Professor and Head (Ret.), Dr., Department of Zoology, University of Mandalay

number of eggs a bird lay in one set is called the clutch. Clutch size can also vary within a single species (Gill, 2001).

The average time interval between the laying of the last egg and emergence of the young bird from the shell represents the incubation period (Welty,1992).

At the end of the period of incubation fertile eggs with live embryos hatch, or give birth to young, unhatched eggs may be infertile or contain embryo that died at some stage of development (Wallace, 1963).

Welty (1992) stated that bird hatchlings have two types. They are precocial and altricial. Precocial birds are hatched with a covering of natal down, and is able to feed themselves. The chicks of bronze winged jacana are precocial birds (Butchard, 2000).

The small precocial young birds are very vulnerable to a number of hazards, being at the risk of predation and the danger of chilling when not being brooded by a parent (Patterson, 1982). As a result, mortality in the first weeks out of the nest (or) ten days of life is typically high (Gill, 2007).

Bronze- winged jacanas are the resident birds in Myanmar and also found in Thailand, Cambodia, South West China, Indochina and Malaysia (Robson, 2008).

The bronze – winged jacanas are mainly black birds, although the inner wings are very dark brown and the tail is chestnut red. Adult females are larger than the males. Both male and female showed no plumage dimorphism.

In Myanmar, the information of breeding ecology of *Metopidius indicus*, bronze-winged jacana in Sunye In is still unknown. Therefore, the present work of information may be a key to solve the problems of waterbirds on breeding ecology. For this reason, the observation of *Metopidius indicus*, bronze-winged jacana was carried out with the following objectives.

- to access the breeding season
- to examine the nest building, egg and clutch size and
- to record the hatching success.

## Materials and Methods

### Study Site

The study area was situated in Sunye In (lake), Sintkaing Township, Mandalay Region which lies between North Latitudes 21°41' and East Latitudes 96°13' (Fig-1).

### Study Period

The present study was carried out from May 2011 to April 2012 of Sunye In.



**Fig. 1 Map of Sunye In(Lake)**  
(Source: Google earth)

### Field techniques

Searching of nests was carried out from the first week of May to September 2011 of Sunye In. Nest search was made by boat with the help of two persons among the floating vegetation around the In. Observations were made at least twice per week from the 1st week of May to September (until the hatching period). Nests were marked using wooden sticks (or) bamboo poles label with number, Nests were visited daily during the hatching period to record nest and egg hatching success.

### Nest site and Nest characteristics

Nest site characteristics including dominant vegetation and surrounding water depth (m) near the nest were recorded. Nest diameter, nest depth, nest material and nest characteristics were also recorded. As soon as the nest was observed, it was recorded initiation date, start laying date and incubation date were also recorded.

### Egg and clutch size characteristics

The clutch size was recorded as the number of eggs per nest after laying was completed. Egg shape and colour were noted. Length and Width of the egg were measured to the nearest 0.5 mm with calipers and then

weighed to the nearest g with spring balance. Range of clutch size and average clutch size were also recorded.

### **Hatching Metrics**

Total length, wing, tarsus and culmen of the hatchling were measured with caliper. Hatchlings were weighed to the nearest gramme on a 60 (or) 100 g Pesola spring balance.

### **Analysis of Data**

The incubation or hatching success was calculated following Mayfield (1975).

$$\text{Hatching success} = \frac{\text{No. of egg hatched}}{\text{Total no. of egg}} \times 100$$

## **Results**

### **Breeding season**

The size of female Bronze-winged Jacana is greater than that of the male (Plate 1). The breeding season of *Metopidius indicus* started from May to September 2011.

### **Nest Site and Nest Characteristics**

Nests were built on the water surface along the edge of the Sunye In (lake) usually a well shelter spot thickly growing aquatic plants. The nest was generally rather large, composed of floating vegetation. The decaying vegetations were also used for the nest.

### **Nature of Egg and Clutch Size**

A total of 18 nests, 61 eggs were recorded during the study period. Eleven nests contained four eggs each and other seven with three and two eggs each were recorded. The eggs were oval pyriform shape. The colour of fresh egg was deep rufous (or) olive brown. When hatching approach shell colour turned to deep stone brown. Eggs were laid on successive days. Clutch size ranged from 2 to 4 eggs and mean clutch size was  $3.39 \pm 0.85$  (Table 1) (Plate 1).

Measurement of egg weight, length and width were also recorded. Mean weight, length, width of 61 eggs was ( $22.75 \pm 1.90$  g), ( $3.5 \pm 0.13$  cm) and ( $2.49 \pm 0.21$  cm) (Table 2).

### **Incubation**

The eggs were incubated by male alone during the breeding season. The incubation period last 22 to 25 days.

### **Hatching Success and Causes of Egg Loss**

The hatching chick was first observed a puncture the rounded end of the egg. The hatching interval was two to four hours between the eggs. The young hatching, has a brownish yellow stripe along each side of back and a blackish stripe along the dorsal part of head to the back.

Measurement of total length, wing length, tarsus, culmen length and weight of hatchling were recorded. Mean weight total length, wing length, tarsus and culmen of hatchling were  $20.42 \pm 0.77$  g,  $7.59 \pm 0.15$  cm,  $2.59 \pm 0.11$  cm,  $1.65 \pm 0.06$  cm and  $0.94 \pm 0.03$  cm respectively (Table 3, Plate 1).

Among them 14 nests 70.21% survived until hatching and 29.78% of the eggs were lost due to fishermen (two nests), one nest was lost as the vegetation dried up when the water level dropped and one nest was lost for unknown reason (Table 4).

### **Discussion**

Smythies (1986) reported that the breeding season of Jacana began when the southwest monsoon arrived (June) in India, Srilanka and Myanmar.

In the present study, breeding season of bronze-winged jacana *Metopidius indicus* is started from May to September. The nest of bronze-winged jcanana bred once per year and clutches were bred in mid May until early September. Most eggs were abundantly found in July.

Smythies (2001) stated that the clutch size of bronze-winged jacana was four.

Butchart (2000) reported that in the bronze-winged jacana, the mean clutch size was  $3.8 \pm 0.1$  eggs in Southern India and the incubation period

was 29 days. He also noted that male guarded chicks very closely during the first seven weeks.

In present study, out of 18 nests, 11 nests were found to contain four eggs per nest, 3 nests with three eggs, 4 nests with two eggs. Clutch size therefore ranged from 2-4 eggs or mean clutch size was  $3.39 \pm 0.85$ . The male of bronze winged jacana took incubation shortly after the female had laid the first egg. He incubated their eggs for 22 to 25 days.

Dewar (2010) stated that the nests of jacana are truly wonderful structures. They are just floating pads of rushes and leaves of aquatic plants. Moreover, the nest of bronze-winged jacana species is usually larger and more massive than that of other jacanas in Southern India.

In this study, the surfaces of the nests were rather large and formed a circular cup pad with a depression in the centre for the eggs. Most of the nests were constructed by using the stem of live vegetation and few used the decayed vegetations. Most of the nests floated on the surface of the water and the eggs are not found half immersed in the water.

Butchart (2000) stated that the chicks of bronze winged jacana are precocial birds. The precocial chicks were mobile within hours of hatching and were actively led away from the nest by the parent. They are soft downy chicks, eyes open and alert, and legs well developed. Shortly after hatching these chicks do not have to be fed by a parent at all (Gill, 2007).

During the study period, it was observed that hatchling were covered with sparsely brown down feathers, legs were develop, eye open and alert. Thus they are regarded as precocial and confirmed the findings of Butchart (2000).

The influence of weather and predators on nest success was variable. However, the male jacana got rid of the empty shell by carrying them in its beak and flying away from the nests (Thong- aree *et al*, 1995)

A nest was recorded as successful, when one (or) more eggs hatched. For unsuccessful nest, they are recorded as either predated, flooded, abandoned or unknown reason (Arnold, 2005). In this study site, hatching success was 70.21% (from a total of 33 eggs from 14 nests) and unsuccessful hatching 29.78% (from a total of 14 eggs from 4 nests) were observed. The hatching success (70.21%) of *Metopidius indicus* at Sunye In (Lake) indicated that the ecological conditions of the In is compatible for the sustainability of the species.

**Table 1 Clutch size of *Metopidius indicus* at Sunye In (May 2011 to April 2012)**

Average clutch size Mean±SD	Range	Total eggs
3.39 ± 0.85	2-4	61

**Table 2 Measurement weight, length and width of the eggs of *Metopidius indicus* at Sunye In (May, 2011 to April, 2011)**

No.	Nest No.	Number of egg	Weight (g) Mean±SD	Length (cm) Mean±SD	Width (cm) Mean±SD
1.	1.	4	23.50±0.58	3.40±0.35	2.13±0.25
2.	2.	4	25.00±2.71	3.48±0.30	2.20±0.23
3.	3.	3	21.33±0.58	3.50±0.17	2.53±0.06
4.	4.	4	21.75±0.50	3.50±0.24	2.43±0.29
5.	5.	4	23.25±1.50	3.70±0.08	2.75±0.13
6.	6.	2	22.25±1.77	3.45±0.35	2.85±0.07
7.	7.	4	24.25±1.50	3.63±0.05	2.78±0.10
8.	8.	4	25.50±1.00	3.55±0.19	2.55±0.06
9.	9.	2	22.50±3.54	3.50±0.14	2.65±0.21
10.	10.	2	26.50±0.71	3.80±0.14	2.30±0.42
11.	11.	3	21.33±0.58	3.57±0.05	2.37±0.35
12.	12.	3	21.33±0.58	3.30±0.10	2.30±0.26
13.	13.	4	22.50±3.00	3.65±0.17	2.65±0.17
14.	14.	4	25.00±3.37	3.48±0.22	2.45±0.33
15.	15.	2	19.50±0.71	3.55±0.21	2.55±0.07
16.	16.	4	20.00±1.41	3.43±0.21	2.38±0.26
17.	17.	4	22.00±2.16	3.40±0.22	2.65±0.13
18.	18.	4	22.00±1.14	3.33±0.19	2.25±0.29
Mean±SD			22.75±1.90	3.51±0.13	2.49±0.21

**Table 3 Measurement of body weight, total length, tarsus and culmen length of hatchling of *Metopidius indicus* at Sunye In (May, 2011 to April, 2012)**

No.	Nest No.	Body weight (g)	Total length	Wing length	Tarsus length	Culmen length
1	1	19.43±0.40	7.30±0.33	2.42±0.10	1.7±0.05	0.98±0.03
2	2	19.86±0.31	7.59±0.12	2.59±0.12	1.59±0.09	0.91±0.04
3	3	21.00±0.71	7.83±0.04	2.66±0.01	1.68±0.04	0.92±0.02
4	5	19.83±1.04	7.32±0.35	2.43±0.23	1.74±0.03	0.98±0.02
5	6	20.69±0.44	7.63±0.04	2.72±0.02	1.71±0.01	0.99±0.01
6	7	20.81±0.38	7.71±0.07	2.66±0.04	1.73±0.20	0.95±0.02
7	8	20.78±1.18	7.60±0.10	2.67±0.06	1.69±0.03	0.89±0.04
8	10	20.83±0.71	7.67±0.05	2.61±0.08	1.60±0.07	0.94±0.01
9	11	20.99±1.21	7.65±0.18	2.62±0.10	1.62±0.10	0.92±0.06
10	12	19.25±0.35	7.40±0.07	2.38±0.11	1.53±0.04	0.98±0.04
11	14	22.00±0.00	7.73±0.00	2.73±0.00	1.68±0.00	0.98±0.00
12	15	19.84±0.23	7.63±0.04	2.59±0.02	1.61±0.01	0.96±0.01
13	17	20.17±0.71	7.64±0.05	2.62±0.07	1.64±0.05	0.92±0.02
14	18	19.67±0.00	7.60±0.00	2.57±0.00	1.60±0.00	0.90±0.00
Mean±SD		20.42±0.77	7.59±0.15	2.59±0.11	1.65±0.06	0.94±0.03

**Table 4 Causes of egg loss and hatching success of *Metopidius indicus* at Sunye In (May 2011 to April 2012)**

Causes	No. of nest	No. of egg	Unhatched egg	No. of chick hatched
Nests without any loss	14	47	14	33
Egg loss				
Pick up by fisherman	2	8	0	0
Dead vegetation due to low water level	1	2	0	0
Unknown reason	1	4	0	0
Total	18	61	0	33
Percentage (%)			29.78	70.21



*Metopidius indicus*  
(Female and male)



Newly built nest before the egg laying



Nest with three eggs



Egg punctured at the rounded end



Hatchling chick with unhatched egg



Measuring the length of hatchling

**Plate 1 Process of hatchling**

## Acknowledgements

First of all, we are greatly indebted to Dr. Aye Kyaw, Rector, Dr. Khin Ma Ma Tin and Dr. Mint Zu Min Pro-rectors, Yadanabon University. We would like to express my heartfelt thanks to Professor Dr. Khin May Nyo, Head of Zoology Department, Yadanabon University for her permission to conduct this work with the chosen topic. Last but not the least we are deeply indebted to my parents for their encouragement and financial supports throughout the study.

## References

- Arnold, K.E., 2005. The breeding ecology of Least Bitterns (*Ixobrychus exilis*) at Agassiz and Mingo National Wildlife. *MSc Thesis*, South Dakota State University. 68 pp.
- Butchart, S., 1998. The polyandrous breeding system of Bronze-Winged Jacanas, *Blackduck*, 14(2): 28-44.
- Butchart, S.H.M., 2000. Population structure and Breeding System of Sex-Role Reversed, Polyandrous Bronze-winged Jacana *Metopidius indicus*. *Ibis*, 142: 93-102.
- Deware, D., 2010. *A bird calendar for Northern India*. WM. Brendon and Son Company, Plymouth, England. pp 47-73.
- Gill, F.B., 2001. *Ornithology*. 2nd Edition. W.H. Freeman and Company, New York. 766 pp.
- Gill, F.B., 2007. *Ornithology*. 2nd Edition. W.H. Freeman and Company. New York. 758 pp.
- Hundley, H.G. and Chit Ko Ko, 1987. *List of trees, shrubs, herbs and principle climber etc*. Swe Daw Oo Press, Yangon. 568 pp.
- Jenni, D.A., 1996. Family Jacanidae (jacana). *In: Handbook of the birds of the world*. Vol.3, pp. 276-291. Lynx Edicions, Barcelona.
- Mayfield, H.F., 1975. Suggestions for calculating nest success. *The Wilson Bulletin*, 87: 456-466
- Patterson, I.J., 1982. *The shelduck. A study in behavioural ecology*. Cambridge University Press. 276 pp.
- Robson C., 2011. *Birds of South-East Asia, Thailand, Peninsular, Malaysia, Singapore, Vietnam, Cambodia, Laos and Myanmar*. New Holland Publishers (UK) Ltd., London. 544 pp.
- Scott, A., 1997. *Relationships between waterbirds ecology and river flows in the Murray Darking Basin*. Csiro land and water, Australia.
- Smythies, B.E., 2001. *The Birds of Burma*. Fourth Edition Natural History Publications (Borneo). Kota Kinabalu. 601 pp.
- Thong-aree, S., Khobkhet, O., Lauhachinda V. and Pong-Umpai S., 1995. Breeding Biology of Pheasant-Tailed Jacana. *Hydrophasianus chirurgus* in Central Thailand. *Nat. Hist.Bull. Siam. Soc.*, 43: 289-302.
- Wallace, G.J., 1963. *An introduction to ornithology*. The Macmillian Company, New York, 230 pp.
- Welty, J.C. and Baptista, L., 1992. *The life of birds*. Fourth Edition. W.B Saunder College Publishing. 717 pp.