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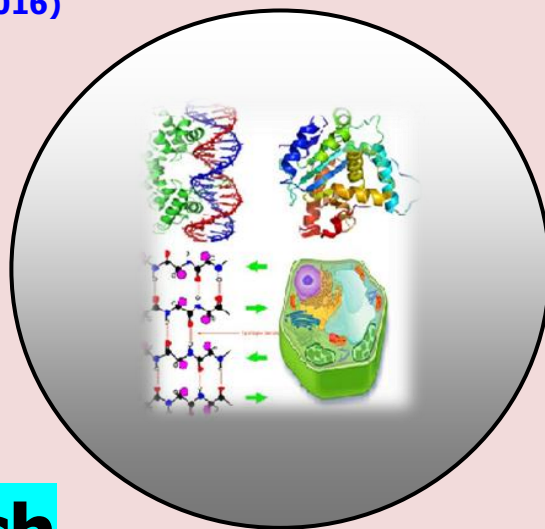
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## **Breeding Biology of Pelicans in Kokkare Bellur, Maddur, Karnataka, India**

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Velipalayam, Nagapattinam, Tamil Nadu, India**ABSTRACT**

*The Kokkare Bellur Bird Sanctuary (12°13'N, 77°0'E) situated in Mandya District of Karnataka provides an important ground for a diverse range of birds. The study was carried out from October 2017 to May, 2018 to document the diversity of various birds. The field observations were carried-out during winter season. Base-line survey was conducted periodically through entire study area. The birds and their behavior were observed during the most active period of the day. Breeding activities and checking of nest contents were observed directly and using a 22 X 50 Nikon binoculars. In order to determine the nest lodging sites, few bird species were visually examined with the help of binoculars. Breeding study is used to access output by bird in a nature and to evaluate nesting habit and habitat. All stages of a breeding cycle of each bird were noted at regular interval. The spotting of Pelicans and Painted storks and other species highlights the importance of Kokkare bellur Sanctuary as a significant region for bird habitat in Karnataka. Besides, appropriate measures have to be taken to avoid the mortality of these birds from the high voltage electric lines which are traversed above this village area. This can definitely facilitate the free movement of these diversified birds particularly at this area. In terms of biodiversity documentation, no studies had been done so far in this peculiar and significant ecosystem. The major aim of this study is to give a baseline data about several local and migratory bird species of the area.*

**Keywords:** Kokkare bellur, Binoculars, Breeding Activities and Baseline Survey.

**INTRODUCTION**

'Kokkare bellur', is a village in Maddur taluk of Mandya district of Karnataka, India. The village is named after the Painted Stork (*Ibis leucocephalus*) called "Kokkare" in Kannada language (Crivelli *et al.*, 2008) It is situated near Maddur between the cities of Mysore and Bangalore. Apart from Painted Storks the Spot billed Pelicans are also found here. The village is one of the 21 breeding sites existing in India.

The uniqueness is the long established bonding between the Spot-billed Pelicans and the villagers who have adopted this bird as their heritage, since they consider the birds as harbingers of good luck and prosperity to the village (Gokula, 2011). The benefits derived by the villagers from these birds are basically in the form of phosphorus and potassium rich manure obtained from the bird droppings (also known as Guano). Further, over the years, the popularity of this uniqueness has also attracted tourists to the village to watch the birds.

The main species that nest in Kokkare bellur – the spot-billed pelican (*Pelecanus phillipensis*) and painted stork (*Ibis leucocephalus*) Gokula (2011). Apart from the pelicans, the other birds found nestling and breeding

in the village trees are the painted stork (*Ibis leucocephalus*), little cormorant (*Phalacrocorax niger*), black ibis (*Pseudibis papillosa*), grey heron (*Ardea cinerea*), black-crowned night heron (*Nycticorax nycticorax*) and Indian pond heron (*Ardeola grayii*).

Kokkre bellur is not a reserved forest sanctuary but is a small village where the storks and pelicans coexist freely, mostly in tamarind trees in the middle of the village, in total harmony with the villagers (Das, 1991). 'Hejjarle Balaga' (meaning "relatives of Pelican") of the Mysore Amateur Naturalists (MAN), an NGO, works in unison with the villagers is providing protection to these birds. The villagers with support from volunteers of the NGOs tend to the injured hatchlings/fledglings that fall from the trees by housing them in exclusively built pens, nurse and feed them with fish caught from nearby water bodies (Gregory and Johnston, 2016). Thus, efforts to conserve these birds have been fruitful and hailed as a "role model" for replication at other places. The Karnataka Forest Department (KFD), the Mandya Zilla Panchayath, the Department of Minor Irrigation and Department of Fisheries and the Karnataka State Tourism Development Corporation (KSTDC) have supported the Local Village Level Committee and NGO organizations to conserve and develop all facilities for the birds (Brown and Urban, 1969).

### Study area

Kokkre Bellur: Popularly known as the "stork village," Kokkre Bellur village (12°13'N, 77°0'E) is situated about 80 km from the city of Bangalore, in Mandya district of the south Indian state of Karnataka. The area is a typical dry land village in southern India with its cultivated and fallow fields, cactus hedges, and trees in the fields and villages. Kokkre Bellur is bounded on the south side by the Shimsha River although it is some distance away. Within a 100 km radius of the village lie numerous irrigation tanks – principally Sule Kere, Malavalli Kere, Koppe Kere, Marehalli Kere, Shetty Kere, and Karanji Kere which are important feeding grounds for the birds nesting at Kokkre Bellur (See Satellite Image Figure 1).

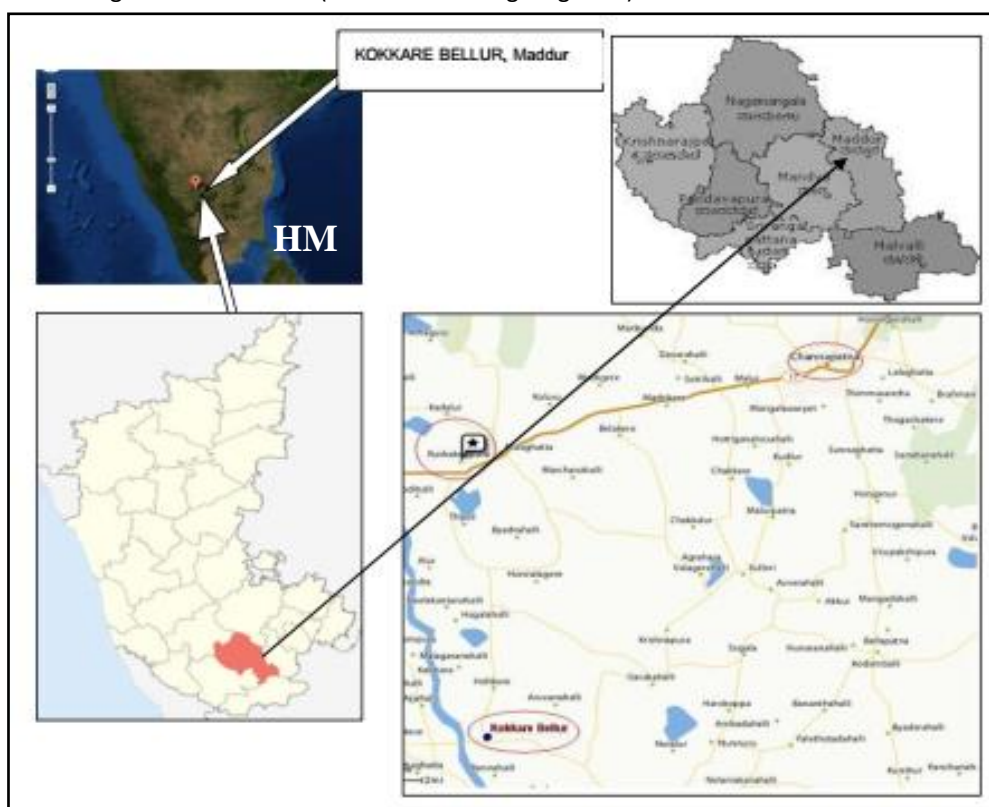


Figure 1. Map of study area (Kokkre Bellur).

### Geography

The village is located 800 metres (2,600 ft) to the west of the Shimsha River. The area in the vicinity of the village offers large water bodies in the form of several large tanks such as the Tailur Kere ('Kere' means "tank"), the Maddur Kere and the Sole Kere that sustain food needs (particularly, fishes and shell fishes) of the pelicans and other birds.

The village setting at Kokkare bellur has nesting trees in the form of *Ficus* (*F religiosa*, *F bengalensis*) and *Tamarind* (*Tamarindus indica*) trees. The Mandya district, where the village is located, has extensive agricultural fields with sugarcane as a major crop. During the season of migration of birds, large colonies of Spot-billed Pelicans and Painted Storks are seen nesting, mostly in tamarind trees.

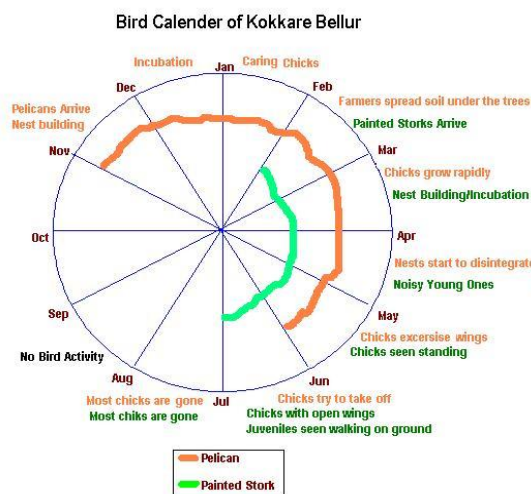


Figure 2. Bird Calendar of Kokkare Bellur

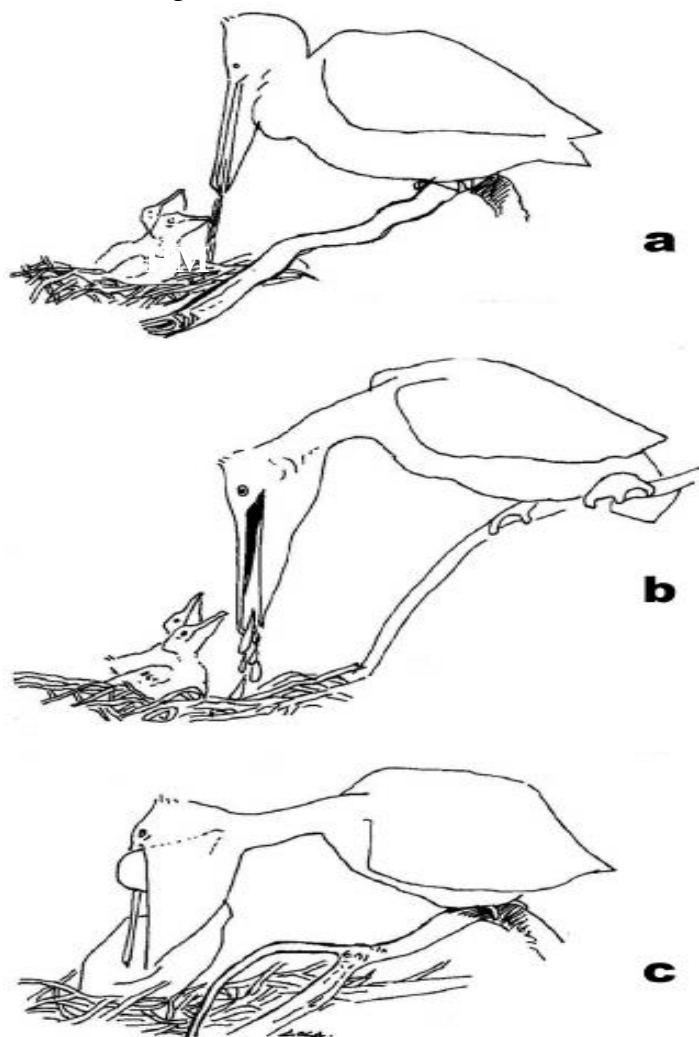


Figure 3. Chicks of Pelican.

## Fauna

A part from the Pelicans, the other birds found nestling and breeding in the village trees are the Painted Stork (*Ibis leucocephalus*), Little Cormorant (*Phalacrocorax niger*), Black Ibis (*Pseudibis papillosa*), Grey Heron (*Ardea cinerea*), Black-crowned Night Heron (*Nycticorax nycticorax*) and Indian Pond Heron (*Ardeola grayii*).

## METHODOLOGY

The field observations were systematically carried-out during winter season (October to May) of the years 2017 and 2018 (Refer Bird Calendar Figure 2). Base-line survey was conducted periodically by walking on the fixed routes through entire study area. The birds and their behavior were mostly observed during the most active period of the day *i.e.*, from 6: 30 am- 10:30 am and from 4: 30 pm to 7: 30pm. Breeding activities and checking of nest contents were observed directly and using a 22 X 50 Nikon binoculars. Weekly 12 or 15 hours were spent for study purpose. In order to determine the nest lodging sites, few bird species were visually examined with the help of binoculars (Nagulu, 1983). Breeding study is used to access output by bird in a nature and to evaluate nesting habit and habitat. All stages of a breeding cycle of each bird where noted at regular interval (Figure 3).

## RESULTS AND DISCUSSION

The pelicans have grey and grayish white plumage, short stout legs, large webbed feet, flat and enormous bill with an elastic bag of purple skin hanging below the throat (that facilitates to collect fish from water surfaces), with length or height in the range of 127–140 centimetres (50–55 in) with tufted crown at the back of the head and lay a maximum of three chalk white eggs at a time. Birds are seen nesting in clusters of 15 to 20 pairs per tree and are thought to use the same tree each year, they arrive after monsoon rains ends in September when the birds create their nests, lay eggs from October to November, thereafter fledge around for three months after laying of eggs, till March and tirelessly feed their hatchlings through the summer season (Ganguli, 1964). As summer peaks in May, they re-migrate, year after year, except when they sense drought conditions in their colonial habitat.

### Breeding behavior in Pelicans

The process of breeding in Pelicans starts from October for the period of 6 months where they migrate to Kokkare bellur, breeding site (Figure 4, 5 and 6) and begins searching for bigger tree like *Ficus bengalensis* or Tamarind tree to build the nest (Gee, 1960). Later it begins to collect the nesting materials like sticks, grasses which are found in lakes, river or other fresh water habitat. It completes building its nest between 20 – 25 days. It nest weighs about 2 kg 100 grams and the dimension is about 2 feet 10 inches in length & breadth as well as 8 feet in roundness. When the process of building nest is completed (Figure 7), it begins to lay eggs. It lays about 2 to 3 eggs in a nest. The dimension of eggs was also recorded. The color of egg is usually whitish. It weighs about 0.65 grams and has 3 inches in length and 2 inches in breadth (Figure 8).

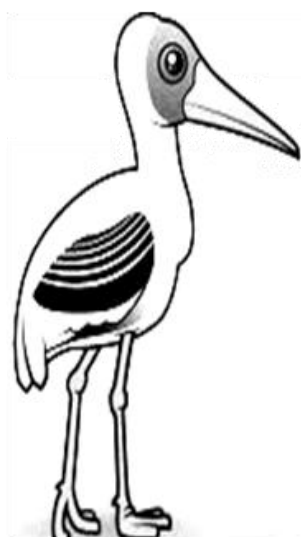


Figure 4. Painted Stork.



Figure 5. During Mating Sequence.



Figure 6. Pelican.



**Figure 7. Nest of Pelicans.****Figure 8. Pelican Egg.****Figure 9. Developmental Stages of Pelican.**

After hatching it takes about 40-45 days for the young ones to come out of the egg. Later the development takes i.e., parental care takes place (Figure 9). It starts feeding the young ones from mouth to mouth till it attains the stage of maturity. As soon as the young ones develop into adults the parental pelicans migrate to the other place for its survival as the breeding season is over.

Later the young pelicans prefer to stay in the breeding site until the feathers are developed and they too migrate to other place during the month of July and arrive in the breeding season during October and stay till July. The life span of pelican is usually 15 to 20 years.

## CONCLUSION

The interaction of man with Bird sanctuary during the last few decades has been of concern largely due to the rapid population growth accompanied by intensified industrial, commercial and residential development further leading to pollution of Birds and nature by domestic, industrial sewage, and agricultural run-offs as fertilizers, insecticides and feedlot wastes (Paulraj and Gunasekaran, 1988). The fact that wetland values are overlooked has resulted in threat to the source of these benefits. Since sanctuaries are a common property resource, it is an uphill task to protect or conserve the ecosystems unless; the principal stakeholders are involved in the process (Morris and Chardine, 2016)

In India, sanctuaries are distributed in all the specific bio-geographic regions and exhibit significant ecological diversity, primarily because of the variability of climate conditions and the changing topography (Rhenius, 1907). The identification of these important sanctuary areas is alone not sufficient to conserve India's biodiversity. Even many protected areas face serious conservation problems, despite their status. Also, very few of India's protected areas were chosen to specifically conserve birds (Vestjens, 1997).

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