13. SUMMARY

There are about 2100 species and sub-species of birds in India. Many of these species are at present threatened due to growing human population necessitating destruction of Wildlife habitats. The piscivorous waterbirds are particularly endangered because of filling up of low-land,ponds and bheries despite laws prohibiting it.The Kulik Bird Sanctuary at Raiganj provides an unique habitat for the colonial Pelicaniformes and Ciconiiformes to nest and increase in number without much disturbance. Six species of colonial birds such as : Open-bill Stork, Little Cormorant, Night Heron, Large Egret, Median Egret and Little Egret nest in this sanctuary for more than three decades. The present study analyses mainly feeding, reproductive and parental care behaviour and ecology ; and a note on interference due to human, cyclonic storms and management etc. on two species i.e. Little Cormorants and Night Herons.

The Kulik Sanctuary is located in the District of Uttar Dinajpur, 2 Km. North-West of the district town Raiganj and is 174 Km. South of North Bengal University. High way NH-34 runs by its southern border. The sanctuary covers an area of only 321.23 acres. It receives an annual average rainfall of about 2081.38 mm. with a maximum recorded temperature of 39°C in May and a minimum temperature of 4.7°C in January during the study period.The maximum and minumum relative humidity were 41.96% in March and 21.40% in September. The nature of soil in the sanctuary is mostly loamy with colour varying from yellowish grey to grey. The present vegetation in the sanctuary is mostly planted and the resulting forest may be described as tropical semi-evergreen type.

Little Cormorant is a diurnal bird and feeds mainly during the day time. Main feeding activity of this bird was found to be in the early morning and late afternoon hours. It mostly depends on Plunging-diving techniques to

capture food. Thus its victims were mostly column and bottom feeding fishes Occasionally it takes crustaceans, frogs and snakes. It usually takes 40 - 50 gm of food per bout with approxmately 5-6 bouts per day. Usually it forages within 2 Km. and 10 Km. radius from the sanctuary in the breeding and non-breeding seasons respectively.

The Night Herons on the other hand are nocturnal and feeds during the night in the non-breeding season. However, during the breeding season it was observed to feed in the early morning and late afternoon hours and even at other times of the day. It captures its victims mostly by stand and wait technique and its victims are mainly surface feeding fishes. It takes about 50 - 60 gms. of food per bout with a maximum of 6-8 bouts per day.

With the onset of the monsoon the birds of both species start flocking in the sanctuary specifically from mid June. Usually experienced males arrive first while the novice first time breeders come late. On arrival the males settle at suitable high up positions to attract members of the opposite sex and in a few days pair formation is achieved. Both Little Cormorants and Night Herons are known to be strictly monogamous although several incidednts of EPC's were observed in both the species. Several specific displays and calls for pair formation, mating and pair maintenance are described. Males of both species possess intromittant organs and copulations take place in the usual bird pattern. Pair dissociation, however, is not infrequent. About 26 - 30% and 21 - 25% pairs dissociated in Little Cormorants and Night Herons respectively during the 4 year study period.

Although the males initiate nest-site selection and nesting ; the females also participate in the whole process. Jarul trees are preferred most by both the species i.e. 85.2% and 84.21% nests of Little Cormorants and Night Herons with a P.V. value of 1.36 and 1.46 respectively. In regard to nest material Jarul tree again contribute approximately 40-42%. It was observed that in both the species intraspecific nest distance was higher than

interspecific nest distance. Most nests of Little Cormorants and Night Herons in the sanctuary are at a height of 7.0-8.5 meters. The birds of both the species tended to keep their nests clean in order to avoid growth of unwanted micro-organisms. The nest sanitation was particularly enhanced by the pehenomenon of defecating liquid wastes and ejecting it outside the nest in a jet.

Usually the first clutch is initiated around the first week of July. Laying occurs on alternate days. The mean clutch size in Little Cormorants was 3.69 with a range of 2 to 6. Mean clutch size of Night Heron on the otherhand was 3.15 with a range of 2 to 5. Clutches of four was maximum i.e. over 36% in Little Cormorants while clutches of three was highest in Night Herons comprising over 54%. A total of 377, 238 and 165 eggs of Little Cormorants were observed in the first, second and third phase respectively. The same for Night Heron was 422, 350 and 177. Hatching and fledging success increased as the laying date progressed. Hatching success was 68.96% in the first phase 74.46% in the second, 79.39% in the third phase. Fledging success for the same phases were 56.49%, 61.15% and 64.24% in case of Little Cormorant. In Night Heron hatching success were 69.90% in the first phase 73.42% in the second and 72.88% in the third phase. Fledging success for the same periods were 54.26%, 56.28% and 53.67% respectively. Predation accounted for a maximum of 10.87% egg loss in the first phase and at 3.03% in third phase in case of Little Cormorant. In Night Heron predation accounted for 9.47% egg loss in the first phase and 3.95% in the third phase. Overall 72.92% eggs hatched into hatchling in Little Cormorants and 71.75% in Night Herons. It was observed that starvation is the main cause of loss of hatchlings amounting to 5.97% in case of Little Cormorants and 9.37% in Night Herons. Average body weight of Little Cormorants hatchling increased from 17.8 gms. on day-1 to 352.0 gm on day-14. While the same for Night Herons was 27.88 gm to 382.0 gms. An increase

in body weight of over 19 times and over 13 times respectively. Incubation was performed by both the partners. However, the females did most of it in both the species.

Feeding of the hatchlings was also done by both the partners. At the early stage the parents insert the feed into the gaping mouth of the chicks. Sibling rivalry was frequently observed. The dominant chick managed more feeds became heavier and stonger than others. Parents were occasionally found to store food materials in the nest for later consumption of the chicks. The diversity of feed items increased progressively with the development of the chicks.

Although the sanctuary was relatively free from human interference. some forms of human interference such as poaching of egg, young and adults for human consumption, disturbance due to breeding plumage collection and firewood collectionwas observed. The last mentioned factor did the most damage. in a number of seasons cyclonic storms rendered havoc in all the years of its occurance causing extensive damage to the nestlings as well as the adult birds.

Employment of adequate security personnel, increase in area of the sanctuary, proper fencing, creation of a buffer zone, public awareness campaign and a research wing are suggested as measures for proper conservation of the birds.