

16. SUMMARY

Behavioural ecology of feeding and reproduction of openbill stork, Anastomus oscitans (Boddaert), was conducted at the Raiganj Wildlife Sanctuary, west Dinajpur, west Bengal (25°37' N; 88°08' E) and its adjoining areas. Average monthly maximum-minimum temperature and relative humidity at the sanctuary ranged from 32.6°C - 10.5°C and 98% - 45.5% respectively. The average annual precipitation was 1841.6mm. The loamy slightly acidic soil of this region in general supports luxuriant growth of tropical semievergreen forest. Openbill storks breed in this sanctuary along with four other Ciconiiformes viz., large egret (Egretta alba), median egret (E. intermedia), little egret (E. garzetta) and night heron (Nycticorax nycticorax), and one Pelecaniformes viz., little cormorant (Phalacrocorax niger) forming one of the world's largest breeding assemblages of these waders.

Openbills are broadly classified into three age classes - adults, yearlings and fledglings. Major portion of adults' body cover is white except scapulars, wings and tail which are glistening purplish or greenish black in breeding plumage. During non-breeding season the luster of the black portion turns to dull black and the white portion become somewhat dusky. Similarly flesh-pink leg of breeding season also become dull in the non-breeding season. Characteristic horny arching bills with 10 - 18mm gap in between. Yearlings resemble the non-breeding adults with prominent smokey-grey head, neck,

breast and upper parts. The gap between mandibles never measures beyond 5mm in the yearlings. In the fledglings the white portion is pale smokey-grey and there is also no gap between mandibles. The gap in the bill usually appeared at an age of around 150 days. The males of a pair appeared to be larger than the females. Tail of the male is more tapering than that of the female.

Foraging was mostly restricted to waterbodies such as swamps, marshes, submerged cultivated lands, ditches and river banks. However, during the dry season birds also collected food from dry cultivated lands. During breeding season they foraged mostly singly or in parties of 2 or 3. At the earlier part of breeding their foraging movements were usually restricted within 2.5km radius of the sanctuary. But as the season progressed they visited far off spots from the sanctuary in search of food. At the last phase of breeding they even visited foraging spots 7km away from the sanctuary. During non-breeding season birds foraged in groups of 16 to 102 individuals. Their movements were restricted within an area of 3.54 - 8.05km² around a perennial waterbody. Usually groups comprised of youngs covered larger area during this time. On their way to the foraging grounds from the breeding colony birds were probably aided by the 'local enhancement' (Hinde, 1961; Mock et al., 1988). Pila globosa and Bellamya bengalensis are major food species. Other mollusc species such as Bellamya dissimilis, Lymnaea acuminata, and Lamellidens sp., and crabs were also taken by the birds.

Most probably they also consumed some ground beetles during periods of food scarcity. Usually they employed three foraging techniques viz., tactile foraging, groping and visual foraging to find a prey from the shallow water or mud. Openbills used only the bill tip to capture, carry and consume the prey. Fila was opened up by removing the operculum with the insertion of the lower mandible under it. The structure of lower mandible seemed to be an aid in opening molluscan shells.

Birds usually start assembling in the sanctuary from the third week of June and remain busy in rearing offsprings upto January. Older birds are first to arrive at the sanctuary. Usually birds start to breed at an age of 3 yrs. However, 2-year-old birds were also seen to breed. A few yearlings with sub-adult plumage were also found to initiate breeding but without success. Males select the nest site and exhibit pair forming displays almost simultaneously. A typical pair forming display involves the up-down display, swaying-twig-grasping and preening. However, at the later part of the breeding season when nest site was scarce 'opportunistic pair formation' occurred following a group attack of unpaired birds resulting dislodgement of an established pair from their nest. Copulation is not usually preceded by any display. Copulatory failure was higher among young individuals.

Birds selected those sites for nesting which are free from human disturbance either physically due to presence of water moates or through administrative means. Birds of an

incoming group usually nested in synchrony. Although both the sexes take part in nesting it is the male who shared bulk of this activity. It takes 5 - 10 days to complete a nest. However, almost upto fledging of youngs nest materials were added to the nest regularly.

Main components of aggressive acts are: threatening, chasing, pecking and fighting. Severe fights involving 6 - 10 birds occurred quite frequently after July when most of the nesting spots were occupied. Aged birds were more successful to win a fight. When both the partners of a pair were present at the nest it was the male who defended the nest more often.

Clutch size ranged from 2 to 7 with an average of 3.67 (\pm 0.83). Clutches initiated at the earlier period were usually of larger sizes. Average size of eggs was 56.10 X 39.03mm. Eggs laid at the middle of the clutches were larger in size. Egg size decreased significantly as the clutch size increased. Older females usually laid larger eggs.

Incubation started with the laying of second egg. Both sexes took part in incubation but females incubated for most (3/4th) of the time. Incubation period varied from 24 to 30 days and is higher in larger clutches. In a 'calm session' incubating birds usually oriented themselves opposite to the sun. But as the wind speed increased they tended to face the wind.

Hatching is highly asynchronous. Although house crow (Corvus splendens) was the most common predator, intraspecific

attack was the main cause of egg loss. Besides a considerable number of eggs remained unhatched particularly in the larger clutches. Hatching success was 61.35%. Fledging period was 42.11 (\pm 0.88) days. Of all the hatchlings 81.04% were successful to fledge. A number of hatchlings died as a consequence of hatching asynchrony which created size hierarchy among the broods. Other than intraspecific attack a number of nestlings died during first flight as they fell down on ground. Early breeders were more successful in reproduction.

Almost all types of parental care was shared by both the sexes. Sprinkling of water on nest, a remarkable parental activity, probably helped in stabilizing the nest. On an average 228.78 (\pm 48.63)gm of food was delivered to each brood per day. Nestlings' food consisted of only soft body of Pila and Bellamya.

For the first time, a group of 3 to 4 birds were found to breed in a single nest. It was probably the case of polygyny. Such polygynous mating system evolved as a consequence of severe group fighting and appeared to be an adjustment against conspecific attack.

Birds in this sanctuary are not actually well protected. From its very inception birds of this sanctuary were subjected to human interference. Some of the nesting zones in particular are heavily disturbed by man which even imposed serious effects on their reproduction. So far birds are successful to combat this disturbances by nesting higher in the disturbed zones

or by migrating to the undisturbed zones. However, this increasing human interference should be prevented through proper conservation measures with immediated effect.