INTRODUCTION

Colonial nesting is an important feature among a majority of the members of Pelicaniformes and Ciconiiformes. The nesting colonies of these birds that represent spatial and temporal clumping of nests are popularly referred to as heronries. One of the largest heronries in India is located in the Bhitarkanika mangroves, along the east coast of India. Over 30,000 birds breed every year in this heronry, a single unbroken patch with an approximate area of less than 5 ha area comprising 3800 – 4200 trees are used for nesting. Birds use five species of mangrove trees for nesting which include *Excoecaria agallocha* (Guan), *Heritiera fomes* (Bada Sundari), *Cynometra iripa* (Singada), *Hibiscus tiliaceus* (Bania), *Tamarix troupii* (Jagula) for nesting in the heronry. The breeding birds in this mixed species colony are Asian Openbill, Great Egret, Intermediate Egret, Little Egret, Cattle Egret, Grey Heron, Purple Heron, Black-crowned Night Heron, Little Cormorant, Darter, and Black-headed Ibis. The Asian Openbill is the most abundant species nesting in the heronry (66%) and the least abundant being the little egret (0.8%). The heronry in Bhitarkanika is located in an island covered with mangrove vegetation. The availability of large number of nest trees in terms of the mangrove forest and foraging areas in terms of the wetlands inside the forest and the paddy fields surrounding the forest are believed to be the factors favouring such large congregation of breeding water birds in the heronry. However, there exists no quantitative information on this massive heronry. Most of the birds from the nesting colony are commonly seen foraging in the paddy fields adjoining the Sanctuary. In recent years paddy fields in this area are rapidly being converted to shrimp ponds, thus reducing the foraging areas available for the breeding birds. It is therefore imperative to understand the biology of these breeding birds in the heronry and understand their resource use pattern in response to concurrent changes in the ecosystem so that proper measures can be taken to avoid any possible threat in future.
BREEDING PATTERNS

There was significant change in the nest profile during various stages. Asian Openbill, Grey heron, White ibis, Large egret, Little cormorant, Intermediate egret, Little egret showed < 50% success rate and Purple heron, Oriental darter showed > 50% success rate. Asian Openbill showed delayed Clutch Initiation Date compared to other species from Nest Initiation Date, probably due to delay in Monsoon in both years. White ibis and Little egret had the least incubation duration, Oriental darter and Asian Openbill had larger incubation duration. Night heron and Large egret had the least clutch and White ibis and Oriental darter had larger clutches. Reproductive success was not random and spatial location at the heronry was a governing factor of reproductive success, proving the well proven hypothesis that breeding success may differ between centre and edge nests in colonial breeders. Success rate is independent of their hierarchical order except Purple heron and Oriental darter which shows significant relation between hierarchical order & hatching success rate. Oriental darter and Purple heron showed negative-significance (More the clutch size, lesser the success rate) & for other species, no significance was obtained between clutch size and hatching success). Marked significance in growth rate difference was observed between Older and younger chicks, with older chicks showing better growth rate than the younger chicks.

RESOURCE PARTITIONING

It was observed that Asian Openbill stork, Large egret, Intermediate egret, little cormorant and little egret were associated more frequently than they would be expected at random. There was a significant avoidance trend between Grey heron and Purple heron, and between Oriental Darter and Asian Openbill stork. Interestingly, White Ibis was observed to nest away from most of the species within the heronry forming sub-colonies on its own. Results of our analysis on vertical alignment of nests did not support the body mass-nest height hypothesis which postulated a direct positive correlation between body weight and nest height among colonial waterbirds. There was a significant radial zonation of species in the heronry with Asian Openbill storks preferring the central portion of the heronry, whereas Oriental Darter and Grey
heron nests were observed more towards the periphery of the heronry. On the other hand, nests of little egret, Purple heron and Night heron were found to have clumped distribution being restricted to select blocks of the heronry. These foretold patterns might have been responsible for reducing the interspecific aggression and thereby enhancing the interspecific resource partitioning.

**FOOD HABITS AND LAND USE CHANGE AROUND HERONRY**

A total of 1422 regurgitated food boluses were collected and analyzed. Food items were segregated and identified to species level. Morphometry of the food items were also recorded to determine as how birds avoid competition by choosing same prey species but in different sizes. Food preference for different species would also be determined. All birds showed major preference to fish except, Asian Openbill which fed 99.7% exclusively on apple snails (*Pila globosa*). Crabs were majorly preferred by White ibis, little cormorant. White ibis had significant proportion of prawns and shrimps in the diet. Night heron showed evidence on predating / scavenging on birds (Little egrets were found on 17 regurgitated samples). Water snakes (*Enhydris enhydris* and dog faced water snake) were preferred by purple heron followed by Night heron, grey heron and little cormoran t. Insects (Mostly water beetle larvae) were largely preferred by White ibis, Little cormorant, Intermediate egret and little egret. Aquaculture farms are on a raise for the past one decade after the blue revolution all along the Indian coastal belts. Bhitarkanika is no exception and our surveys around the Bhitarkanika National Park and inside Bhitarkanika wildlife sanctuary revealed more than 672 farms dotting the periphery of the park. Direct evidence of intake and release of saline water from and to the river systems could have an impact on the fish population which is the major prey base for the nesting birds in the heronry. Food abundance was low adjoining the aquaculture farms thereby affecting the abundance of the forage base for Asian Openbill storks.