

Are the heronry birds adapting to urbanization?

Different reasons are suggested for birds occupying in human-influenced habitats, but, the most widely-accepted hypothesis is the enemy exclusion hypothesis (King, 1983). Urban environment has provided protection against predators for birds (Walasz, 1990; Gliwicz et al. 1994; Shochat et al. 2010). Simultaneously, some studies also have showed that the proximity of humans cause physiological and behavioural stress in the birds by increasing corticosterone and suppressing immunity (Saino et al. 2005; Fletcher & Boonstra, 2006; Ylönen et al. 2006). The characteristics such as behavior, physiology and life history of species that have adapted to urbanization are poorly known (Diamond 1986). Through urbanization humans have been occupying the habitats of the wild species, forcing animals and plants to either adapt to novel conditions or to disappear (Moller, 2008). In India only few attempts have been made to investigate the impacts of urbanization on birds (Urfi, 2006) and many Indian cities offer foraging and nesting habitat for birds, especially colonial waterbirds such as stork, ibis, spoonbill, heron, egret, cormorant, and spoonbill (Urfi, 2010).

Heronry birds are wetland dependent birds, but most of their breeding sites are within highly crowded towns and human settlements in Kerala. Year-round food resources, nesting opportunities, more homogenous and predictable

environmental conditions, along with protection from predators had increased the density and population some avian species (Griffin et al. 2017). More than 45% of all heronries in India are located in parks and gardens in urban areas (Subramanya, 1996) and similarly in North Kerala they are found nesting close to human inhabited areas such as towns, along roads sides, residential areas and non-residential areas (Sashikumar & Jayarajan, 2007). Our observation in Kannur and Kasaragod districts of Kerala state supports this; in 2015



Cattle egrets scavenging in local fish market in Kasaragod district

survey, heronry birds were found to select a total of 172 trees in human habituated areas (road-130, residential area-22, non-residential area- 20; Roshnath & Sinu, 2017). These data indicate that the birds select sites with human presence. As Subramanya (2005) mentioned, “it also, rather probable that in a state like Kerala, there are hardly any area without people inhabiting it” could be the reason of nesting of large waterbirds, within human compounds. This paper summarises a few observations like changes in flight distance, foraging behaviour and diet, nesting proximate to food source etc. which show



Indian Pond Heron fledgling feeding on thrown out fishes in Marachappa heronry in Kannur district

the adaptations of heronry birds to humans and human altered environment.

Little Cormorant and Indian Pond Heron are the common species found nesting in urban areas in Kannur-Kasaragod districts. Little Cormorants were believed to be occupied in the Kannur city by late 1980s (pers. comm. C Sashikumar) and later showed a sudden population increase

(Sashikumar et al. 2011) and began nesting in human habitated area and mangrove as well. Similar reports of increase in existing population of cormorants in human habitations were reported elsewhere (Des-Granges & Reed, 1981; Rodgers & Smith, 1995) but some study showed productivity of cormorant colonies lowers by human disturbances (Henny et al. 1989). Cormorants are found to be highly opportunistic feeders and forage in diverse habitat conditions and have high upper tolerance level to the human disturbances if the benefit of foraging is high (per. observ.). The risk-reward continuum shapes behavioral variation and is associated with the speed-accuracy trade-off that partly explains inter-individual and inter-species differences in cognition (Sih & del Giudice, 2012). We have observed Little Cormorants preying upon shrimps and fishes from aquaculture farms even though many bird deterrents such as distracting with loud sounds, crackers are being used. Similarly in Irrity River in Kannur, we observed Little Cormorants competing for fishes with men after fishing using explosives takes place; the local people said that Little Cormorants and Egrets arrive at the river with the hearing of explosion. These indicate how well these birds are adapting with human activities for their living.

In Kannur district, Indian Pond Herons are the principal nesting species in most of the heronries (Roshnath et al. 2014). Colonial nesting waterbirds are most sensitive to land-related intrusions (Carney & Sydeman, 1999). Human presence had no effect on reproductive success of Tricolored Herons (Frederick & Collopy, 1989). However human disturbances associated with logging operations were found to affect the colony size, nest occupancy rate and fledging rate of Great Blue Herons nests (Werkschul et al. 1976). Herons were found to respond to local disturbance and local shifting of nesting (Kelly et al. 2007), such a case was noted during 2015 survey where construction activity near Koduvally heronry made all the birds to abandon the nesting and re-colonize a month later after the construction

Changes in flight distance

Human visitation in heronries has no ill effect when an appropriate buffer area was set (Burger et al. 1995). A study in a mixed heronry found 30-50m was the average distance taken by birds to flush out when approached (Erwin, 1989).

Hence a buffer zone of 100 m to minimize disturbance in colony were advised (Rodgers & Smith, 1995). In Kannur, there are a group of birds nesting in isolated mangrove habitat surrounded by water and another group



Little egrets scavenging in Ayikkara Harbour, Kannur

nesting in busy town with high human activities. We found that there is difference in behaviour between these two groups. Birds nesting in mangrove patches were found to be less tolerable to human presence as were found to fly way when approached to a distance of 30m, whereas same species of birds nesting in the town heronry near to Stadium Complex in Kannur, were found to tolerate human presence and the nesting birds were not seen to fly away even when approached very close (5m). Such change in behavior of urban adapted species were reported elsewhere (Ditchkoff et al. 2006). Variation in flight initiation distance (VFID) is an important measure for analysing a bird's tolerance to urbanization (Lin et al. 2012). Hence we believe there is a change in behavior among the two groups of birds where one is adapted with urban conditions and tolerate human presence and another is completely isolated with more flight initiation distance.

Difference in flight distance by birds will influence the distribution and abundance of different species (Blumstein & Fernández-Juricic, 2004; Blumstein, 2006) and most adapted species are likely to survive during environmental changes including urbanization and habitat conversion (Moller, 2008). Ducatez et al. 2017, concluded that urban birds are bolder, less neophobic and have shorter flight distances than their less urbanized conspecifics. Although nesting herons and egrets at some sites may tolerate human activities at close range (Nisbet, 2000; Hothem & Hatch, 2004), their tolerance levels are highly variable and sensitive to differences in the timing, type, proximity, or intensity of human activity (Vos et al. 1985, Rodgers & Smith, 1995, Kelly, 2002). More scientific research on such behavioral changes can help to learn and understand the adaptive nature of these birds.

Nesting near food source

During the heronry survey in Kannur and Kasaragod area, it was noted that most of the heronries were located close to fish markets or local fish sellers (unpublished data). While interacting with few fish sellers, significant clues on the behavior of these birds were obtained. Nesting Indian Pond Herons in Marachappa, a rural junction in Kannur were reported to feed on fish waste thrown out from local fish market and that was



Adult Indian Pond Heron feeding a Threadfin Beam (*Nemipterus japonicus*) to chick in Stadium Heronry, Kannur

demonstrated by the fisher seller by throwing a small fish (sardine) which was fed soon by a heron fledgling which came down from the tree. Similar instances were observed in Puthiyatheru fish market (Per. comm. Sethu). There is a heronry site at Ayikkara fishing harbor with 290 nests of Indian Pond Herons in 12 trees and plenty of thrown-out fishes to feed. Egrets and herons feeding on the waste fishes could be seen most of the time. Coping with novel food source

and overcoming fear of humans to access those, the urban animals become more flexible in their foraging strategies than animals living in non-urban habitats (Federspiel et al. 2017).

Changes in foraging behaviour

During the present heronry survey (2016) in Kannur a new site in Thrikkannapuram was

observed with nesting Indian Pond Herons (11 nest) in Jack Fruit trees in a house compound. As it was a new site, we enquired about the colonization history with the house owners. According to them, the herons used to visit her backyard daily from previous year when she cleaned the fish and would also scavenge on discarded fish waste and later on they found that the herons have started nesting in their compound. Observations of Indian Pond Heron feeding on marine fishes like Sardine (Seedikkoya et al. 2012) and Threadfin Beam (*Nemipterus japonicus*) (Roshnath, 2014). These observations indicated shifts in the foraging behavior of these birds from sit and wait strategy to scavenging. Being commensal with humans (Murray, 2005) and with wide niche occupancy (Carrick, 1962; Ross, 2004) which are the general characteristic for an urban adapted species (Ditchkoff et al. 2006) our urban nesting heronry birds could be changing their foraging behavior.

Major foraging grounds of these birds were paddy fields, river banks, ponds, and other water sources, but now these birds are getting adapted to garbage dumps in towns, waste water canals etc. Increase in food source (insects, bugs and worms) may have attracted these birds to garbage. Urban adapted birds are expected to forage at the closest site which provide high quality resources but they also forage at local sites which provide lower quality food if there is minimal energetic expenses from travelling or completion (Baird, 1991; Olsson et al. 2008).

Foraging trips may increase during breeding season, when the growing chicks need more food and greater quality/ quantity of food per trip has to be assured (Johst et al. 2001). This might result in opportunistic feeding or human animal conflicts. The most favored foraging place of Cattle Egrets are the waste bins with abundant dipteran maggots at low energy expenditure (Seedikkoya et al. 2007). Conflict of the Little Cormorants with fisheries for quality prey like shrimps were also reported (Roshnath et al. 2016). Use of urban landscape like parks and landfills by Australian White Ibis rather than foraging in natural habitat has been reported by Martin et al. (2011). Murray (2005) has mentioned that the concept of home range does not provide a complete description of movements and interactions. Similarly our concept of foraging ground of these birds are vague as they are opportunistic feeders, feeding on a wide range of prey species and well adapted to human environments. Species depending upon the ability to colonize would establish permanent populations that may be further more adapted to urban environment (Moller, 2008). With these observations on changes in flight distance, nesting proximal to food source, shift in the foraging behavior and strategy we believe that the heronry birds are getting adapted to urbanization. More research on the ethology of such urban adapted birds is needed.

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