
ROOSTING HABIT OF BLACK-CROWNED NIGHT HERON (NYCTICORAX NYCTICORAX)

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Abstract: The Black-crowned Night Heron is a species of wading bird found across the world except cold region and Australia. There are very few studies taken place about the roosting habit of these birds and its adaptation to urban area. These birds are found roosting in temporary and permanent habitats. It is a general observation that the number of birds roosting in an area vary on the basis of breeding and seasonal variation as well as availability of forage. The observation of the roosting habit of Black- Crowned night heron in an urban area like Ahmedabad, lies at 23^o.03' N and 72^o.58' E in western India, shows some specific features of roosting and adaptation towards urban life. Throughout the period of study, April 2013 to March 2014, there are ample evidences that these birds have developed a specific pattern of roosting cycle. This pattern is specific to the gathering of almost 300 Black- Crowned night heron during the breeding season to the breeding haven of municipal Zoo at Kankaria and 80 percentage of this birds leave the study area after the breeding season. Among the 4 major study areas of the city only one place we could find these birds that too during breeding season and only a few adapted the same location as permanent habitat.

Key words: adaptation, Black crowned night heron, breeding season, roosting, urbanization, Ahmedabad, India

Introduction: The word "Roost" derived from German, it mean; 'a sleeping house for fowels'. In general birds settle for taking rest and night but some of them nocturnal birds may however rest during the day time. Gathering before roosting is common in mammals and birds, some mammals like primates (Anderson, 1984); bats (Lewis, 1995) and birds (Eiserer, 1984). Communal roosts of single species assemblages in case Pariah Kite *Milvus* migrants or mixed types of roosts in which individuals of more than one species with diverse habitats or same to roost together are found in mammals and birds. However some birds are solitary in nature and they stroll singularly for finding food and roost. Communal roosting is comparatively more advantageous than solitary roosting as it provides protection against predation, maintaining thermo-regulation and population regulation in birds (Gadgil, 1972). There is a great variation in the number of individuals roosting together depends on season (breeding or non-breeding), food scarcity or abundance, behaviour (whether aggressive or not; territorial or not), climatic change (winter, summer and monsoon) and available number of roosting trees (especially in urban area).

According to Beauchamp (1999), there are three main benefits to participating in roosting: a reduction in thermo-regulative demands on the individual, a decrease in predation risk for the individual, and an increase in foraging efficiency for certain members of the population. Roosting has been explained in the past by the "information center" hypothesis (Ward and Zahavi, 1973). Typically, this explanation has been contingent upon two parameters: foraging success and social rank. For example, not all

members of the flock are equally successful at foraging. Less successful conspecifics can recognize successful foragers, and will inadvertently follow them from food patches to roosting sites. In this way, the incoming waves of egrets may represent miniature dominance hierarchies that readjust themselves as new birds integrate themselves into the system.

There is a significant change in the roosting behaviour among birds during breeding and non breeding season and this was very clearly observed among the select wading birds of an urban city like Ahmedabad. How birds roost in a tree, its duration, numbers in the community and other basic behaviour are closely related to the global process and its impact on the local region. Modeling the roosting surface during the non-breeding season is typically different from breeding season. The arrival-departure rhythm, site and tree choice, allocation, pre-roosting gathering and post roosting habitat are very different during the breeding and non-breeding roosting. There is a complex behavioral pattern involved during the non-breeding roosting where multiple flocks of birds picking a single tree or tree limb to rest for the night. In this process the first incoming waves are initially placed and followed by an interaction with the roosted group of birds as well as the subsequent wave of immigrants. There is a displacement resulted by these interactions and such displacement continue till the last immigrants group have been assimilated, the particular branch is fully occupied or the roosting period ends. The entire processes of placement, displacement and final settlement is a time consuming activity unfolds over a

45 minute interval that roughly corresponds with twilight.

The roosting time settlement pattern from waves of incoming migration during the non-breeding season is well defined through a common mathematical model called parking lot model (Kolan et al, 1999). This model represents random absorption that is continuous in time on an n-dimensional lattice (Jin et al, 1994). In the case of the roosting problem, a set of identical particles (birds) can adsorb onto a surface (branch tips with discrete distributions in space) at a specific rate (m) per unit of surface area. Birds can also leave the surface at a rate of n , but the size of this parameter is usually infinitesimal (Evans, 1993).

The behavioral dynamics of birds in roost especially interaction and replacement are depend of scarcity – contention and abundance – harmony. During the non-breeding season the contention is based of the density and breeding season it includes density and other breeding ecology aspects. However on of the fundamental question remains the degree of density (globally) at which the harmony turned to contention and aggression.

The research conducted on selected wading birds in the city of Ahmedabad at selected 4 sites, observed, analyzed and documented the roosting behaviour dynamism along with factors influencing roost site selection, tree preferences for roost in breeding and non-breeding seasons, pre-roosting and immediate post-roosting activities and roosting hours and its variation based on global changes. The data collected and presented here, will lend and important reference of roosting behaviour and habitat selection of wading birds and their conservation in urban area.

Methodology: The study is carried out April 2013 to March 2014. As a sudden expanding city like Ahmedabad, there are only few patches left undisturbed for wading birds to roost. Following the wading birds in the evening as well as visiting the undisturbed patches during twilight helped in tracing the roosting site. There was a requirement to continuously following them at twilight during the non-breeding season as birds kept on changing the roosting site according to the availability of forage site and water availability. However during the breeding time there were only few patches of safe canopy for wading birds to breed, so finding they were easy. A regular weekly visit to pre-roosting area, following birds to roosting site, observing roosting site behaviour, interaction and pre-leaving roosting site in the morning and following birds to first post roosting site helped in collecting data and notes on activities. Special notes were made on immediate habitat of pre-roosting, arrival and departure in corporation with sunset and sunrise, roosting surface

models, waves of immigration, sleeping call, waking calls, pre-departure behaviors, departure rhythms and post departure immediate habitat. For the purpose of collecting detailed data all visits were conducted in the evening (1600hr – 2000hr IST) and morning (500hr- 800hr IST) are conducted as per the available visibility. To observe further data few night visits also were conducted to the roosting sites. Roosting sites are divided into temporary and permanent – breeding roosting ground and non-breeding roosting grounds. The flock size is determined by recording departing and arriving birds at the interval of every 5 minutes.

Roosting trees used by black crowned night heron were counted through direct counts (Khan & Beg, 1998) and also identified with the help of reference book such as Flora of Gujarat state (Shah 1978). Heights of each tree for roosting during breeding and non-breeding season are measured using abney level and measuring tape. Number of roosting trees and birds per trees are also recorded. The frequency of the trees was divided into three categories namely, highly frequent (HF- more than 25 trees), moderately frequent (MF 8-10 trees) and less frequent (LF 1 to 5 trees). The tree height was divided in three groups viz., high (HH, more than 25m), middle high (MH, 15m) and lower high (LH, less than 10). The canopy of the roosting trees was categorized into three categories like, wide canopy (WC, radius 3m), medium canopy (MC, radius 2m) and narrow canopy (NC, radius more than 1.5m)

Result and Discussion

Specific changes in the roosting behavior observed among black crowned night heron in Ahmedabad city.

Roost tree and factors influencing of the selection: Availability of tall tree in Kankaria Lake and zoo at night are giving a right harmony to roost. The Kankaria Lake and zoo are undisturbed after twilight is most favorable for these birds to choose the roosting sites. Kankaria is one of the major breeding roost of many birds like the large cormorant (*Phalacrocorax carbo*), the little cormorant (*Microcarbo niger*), the cattle egret (*Bubulcus ibis*), the great egret (*Ardea alba*), the intermediate egret (*Mesophoyx intermedia*) and (*Mesophoyx intermedia*). The trees around the zoo are heavily crowded during the breeding season (June to October) by the above wading birds. This causes heavy causality of both eggs and chicks and aggressive fight between same breed and birds of other breeds. Black –crowned Night Heron is one of the venerable among these birds and faces serious disturbance form other specious of birds.



Plate Fig 1: Communal roost of Black crowned Night Heron during breeding season.

Further, it is observed that black crowned night heron uses only one study site, Kankaria Zoo among 4 major study area of the city at 30 km circumference. This is a permanent and temporary roosting site for this birds. During the breeding season approximately 300 Black-crowned Night Heron arrived at the study site however only 30 to 50 birds remained doing the non-breeding season. The maximum occupations are found on *Azadirachta indica* (48%), *Tamarindus Indica* (20%), *Alianthus excelsa*(14%), *Ficus religiosa*(10%), *Albizia kalkora*(5%), and *Eugenia Jambolana*(3%). One of the specific observations is 70% of the Black crowned night heron choose *Azadirachta indica* for breeding or roosting may be because of the canopy where the nest is totally invisible from outside. It is also observed that none of

the *Azadirachta indica* are used for non-breeding roosting that are used in breeding roost as well as other breeding trees are temporarily emptied after the breeding roosting. They above observation shows that the seasonal abundance of trees are higher immediately after breeding and lowest in the non-breeding season.

The black crowned night heron selected live and unbroken canopies of the trees to roost. Though height was one of the considerations for roosting but only tall trees of Neem, Peepal, and *Tamarindus Indica* with good canopy preferred for roosting. Thus a combination of height, canopy and DBH were found to influence the roosting of the Black crowned night heron on trees.



Plate Fig 2: Kankaria Zoo, the study area

• **Factors influencing of the selection of roosts:** Food availability and aquatic forage are found to be important factor in the roosting site selection. However one of the clear observations of the roosting site is the safe breeding haven. The thick tree cover of the Kankaria Lake is an ideal breeding haven for

many wading birds including black crowned night heron. This is a permanent breeding roosting site for most of the urban black crowned night heron. Night herons hunt in shallow waters using their long necks and thick bills to snatch at prey.

Slow patient stalkers, they may remain motionless for long periods, standing with their neck tucked in, giving their typical hunched posture.

Black Crowned Night Herons may also hunt by vibrating their bills in the water to lure prey into investigating the disturbance. They may walk about or even swim when searching for food.

Although like other heron, they roost and nest together, and may even travel to feeding sites in a flock, they usually hunt alone and fiercely defend a feeding territory from others of their kind.

Although they may fly around during the day, night heron hunt throughout the night and early morning when the other herons are sleeping. But when food is scarce or in high demand (e.g. during the breeding season), they may also hunt during the day.

Night herons are unpopular with other herons, which attack the Night herons on sight. This is because night herons are very aggressive and steal eggs and young of other heron colonies. Perhaps it is the harassment from other birds that force night herons to come out mainly at night.

Tree height was another character of this study. More than (60%) trees were recorded comparatively high, (35%) trees had medium height while only (5%) trees had lower height. Regard to canopy roosting trees were classified as wide canopied (55%), medium canopied (21%) whereas, (24%) trees had narrow canopy within the study area.

It was observed that, *Azadirachta indica* and *Tamarindus Indica* were the favorable roosting trees for large number of black crowned night heron. Both tree species recorded competitively high frequent as well as wide canopied plant within the study area. *Alianthus excels* and *Ficus religiosa* are also found

wide canopied and preferable roosting sites. *Albizia kalkora* and *Eugenia Jambolana* were narrow canopied but tall plants which provided good shelter. Birds particularly select dense vegetation related to frequency as well as, covered with good canopy and tall respect to tree height (Rumble 1992 and Thompson 2003). According to Sharma (1983) birds are choosy about their roosting site both for comfort and safety. Roost selection is vital component of the overall habitat selection process, therefore information on roost selection by a species carries immense importance for assessing its conversation needs. Judicious selection of the roosting site enhances the survival of birds by virtue of reduced heat loss, information sharing accountability of population and better protection from predators (Gadgil 1972, Gadgil and Ali 1975).

Conclusion: Black-Crowned-night-heron-*Nycticorax nycticorax* is a communal rooster within the study area. They mostly used wide canopied and tall trees which conferred safe roosts for them. *Azadirachta indica* followed by *Tamarindus Indica* and *Alianthus excelsa* were found as major roosting trees. The suitable perches and thick green foliage attracted to roosters at the study area. Positive attitude of local people was also most important factor that support to roosting of rooster birds.

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