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RESEARCH ARTICLE

Nesting substrates of Red-Naped Ibis *Pseudibis papillosa* in human dominated landscapes of Telangana, India

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Abstract Artificial structures such as power lines and communication towers have negative impacts on birds, posing risks of collisions and electrocutions, but also provide substrates for perching, roosting and nesting. In this note I present incidental sightings of Red-naped Ibis *Pseudibis papillosa* using transmission pylons and communication towers for roosting and nesting in rural Telangana, India. Between 1 November 2020 and 27 November 2022, 512 surveys were carried out in 56 locations covering a total of 2,870 Km. A total of 129 observations of Red-naped Ibis were recorded during the study period. The highest count ($N = 33$) recorded on a single survey was along the rural road (60 km); majority ($N = 29$) were roosting on transmission pylons and very few ($N = 4$) on communication towers, with flock size ranging from three to ten birds. Ten active nests were recorded - six on communication towers, one on a pylon, one on a *Borassus flabellifer* Palm and two on a cliff. On one of the communication towers, active nests of a pair of ibis and a pair of Red-necked Falcons *Falco chicquera* that were using an older ibis nest were recorded. The surveyed part of rural Telangana had very few trees. Here, transmission pylons and communication towers appear to be providing nesting substrates to the Red-naped Ibis whose nests, in turn, appear to be supporting raptors like the Red-necked Falcon that do not build nests. These novel observations show Red-naped Ibis to be very adaptable to human presence and actively breeding even on landscapes with few trees.

Keywords Artificial structures, modified landscapes, nests, raptors, Red-naped Ibis, road, roosting.

Introduction

Despite rapid land-use changes, South Asian agricultural landscapes have retained considerable bird diversity (Sundar and Kittur 2012; Katuwal *et al*. 2022), with conducive conditions for foraging and breeding (Sundar *et al*. 2016; Ghimire *et al*. 2021). However, contemporary intensified agricultural practices, rapid land use changes, extensive use of agrochemicals, illegal hunting, and reduction of nesting trees could be placing farmland birds in jeopardy (Mitra *et al*. 2011; Stanton *et al*. 2018; Katuwal *et al*. 2021). Birds nesting on man-made utility structures has been well documented all over the world; in some parts of the world the availability of utility structures has resulted in some species flourishing due to an unlimited potential for nesting (Harness 2008). Birds that build stick nests may find areas on electricity transmission and distribution structures suitable for nesting sites (APLIC 2006). In Europe, the White Stork *Ciconia ciconia* commonly nests on transmission and distribution towers (Janss 1998). Double-crested Cormorants *Phalacrocorax auritus* and Great Blue Herons *Ardea herodias* have been recorded nesting on steel-lattice

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transmission towers along the Great Salt Lake in Utah, USA (APLIC 2006). In Telangana Woolly-necked Storks *C. episcopus* have been seen using communication towers for nesting in busy towns (pers. obs.). In a north Indian agricultural landscape with traditional agroforestry, the Woolly-necked Stork rarely used artificial structures with most nests located on trees (Kittur and Sundar 2021). Large nests of birds on such landscapes are reused by birds such as some raptor species that do not build nests of their own. Prairie Falcons *Falco mexicanus* have been documented using Common Raven *Corvus corax* nests (DeLong and Steenhof 2004). Woolly-necked Stork nests have become the most common nesting substrate for Dusky Eagle-owls *Bubo coromandus* in north India (Sundar *et al*. 2021). Bhatt (2023) has recorded Red-necked Falcons *Falco chicquera* nesting on empty nests of House Crows *Corvus splendens* and Red-naped Ibis *Pseudibis papillosa* in Gujarat, India. While a few studies are emerging on waterbird use of artificial structures in south Asia and reuse of waterbird nests by raptors, studies so far have covered very few areas, and several resident waterbird species remain unstudied.

The Red-naped Ibis, though a widely distributed species across the Indian subcontinent, is poorly studied with the majority of information on its ecology being anecdotal (Ali and Ripley 1992). The species is found both within and outside of protected areas, and is thought to primarily use drier environments such as open fields and dry cultivated land, drier margins of wetlands, grasslands, paddy fields, fallow crop fields, open sewage channels, as well as near urban and village garbage dump sites and sand dunes (Hancock *et al*. 1992; Ali and Ripley 2007; Soni 2008; Soni *et al*. 2010a; Inskipp *et al*. 2016). However, recent studies are recording the positive association of Red-naped Ibis with wetlands especially in semi-arid areas (Ameta *et al*. 2022; Asawra *et al*. 2022). Records of this species using man-made structures are few. Ali *et al*. (2013) documented a nest on a 110 kV transmission pylon in agricultural land along a national highway in Gujarat. Charan *et al*. (2022) observed Red-naped Ibis nesting on tall light poles, and cell phone towers in two cities of Rajasthan. Bhatt (2023) has observed 12 Red-naped Ibis nests on transmission pylons near perennial waterbodies and irrigation canals. The majority of observations of Red-naped Ibis nesting on electricity pylons and communication towers are anecdotal (Sanga 2013), and the frequency to which such structures are used for nesting on landscapes differing in number of trees and human presence is poorly understood. For example, one systematic study in a small city, Churu, Rajasthan, India, recorded Red-naped Ibis using only trees (Soni *et al*. 2010b). In treeless regions, power line structures have increased the availability of nesting sites for many species of raptors (Harness 2008) and large waterbirds (Janss 1998; APLIC 2006). Is the Red-naped Ibis similarly influenced, or does it entirely avoid artificial structures when trees are rare or absent on the landscape? There is no work on this species from Telangana and work on nesting is restricted to one study in Rajasthan (Soni *et al*. 2010b) and a few notes on its use of artificial towers (Ali *et al*. 2013; Charan *et al*. 2022). In this note, I present observations of Red-naped Ibises nesting and roosting along a road close to Hyderabad city in Telangana state, India over a two year period.

Study area

The study focused on two routes, a motorable rural road (60 km) and on walkable paths in Vasalamarri village ending at the surveyed rural road (Figure 1). All observations were made while driving along the rural road and at an open scrub habitat with grassland and paddy fields in Vasaalamarri village. The rural road passed through two districts, Medchal-Malkajgiri and Yadadri Bhuvanagiri District, and the other surveyed location is part of Yadadri Bhuvanagiri District. The survey route passed North East from the city of Hyderabad, between the municipality of Thumkunta (Medchal-Malkajgiri District) and the village Vasalamarri (Yadadri Bhuvanagiri District). The habitat and land use across surveyed locations were a mix of semi-urban areas with small towns, villages, man-made water bodies including village tanks, low hills with dense mixed scrub and rocky outcrops, fallow lands with open scrub, grassland, and meadows. Agricultural fields were common with mostly paddy *Oryza sativa* grown during both the Kharif (June-November) and Rabi (November-March) seasons. The area also has orchards of Mango *Mangifera indica*. Power lines (132 kV, 220 kV, 400 kV and 800 kV) crisscrossed the landscape, while communication towers were limited to small towns, villages and other built-up areas.

Methods

All records of Red-naped Ibis were made during

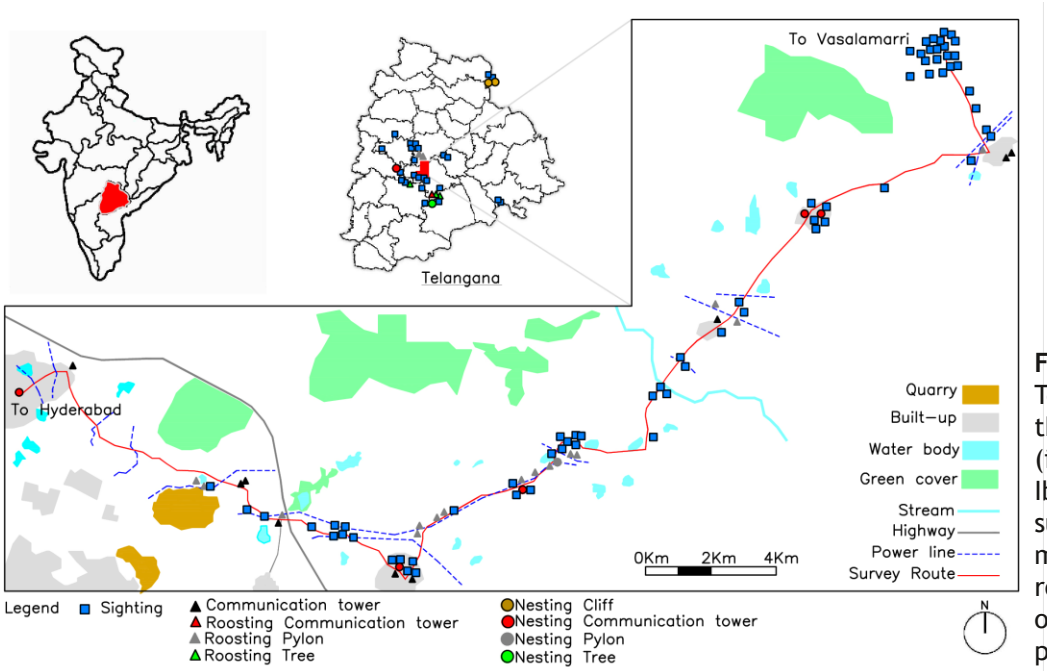

Figure 1. Location of Telangana in India with the map of Telangana (insets) and Red-naped Ibis sightings. The surveyed routes with the major land uses along the routes where Ibis observations are also provided.

surveys for ongoing studies on birds of the region between 1 November 2020 and 27 November 2022. Ibis were observed and recorded while driving a jeep on the road, or on foot while covering areas without motorable roads. Surveys were conducted in the mornings before 1000 h and evenings (between 1600 h - 1830 h). Road surveys were conducted by driving in a car at 40 Km/ hr, while foot and stationary surveys were carried out on walkable paths in the study area. All ibis seen or heard were recorded and other details like locations, number of birds, nest locations and habitat types were also noted. Two locations, a rural road and a location at the end of this road, together formed the most frequently surveyed areas (see Figure 1). While the road was surveyed by car, the other rural location was surveyed on foot. Survey effort were not similar across months. Nests were considered as active when either adult birds were seen carrying nesting material to the nest or when at least one adult bird was seen sitting in the nest or when mating was observed next to nests. Only locations of nests were recorded and it was not possible to carry out more detailed observations related to breeding biology.

Results

Between 1 November 2020 and 27 November 2022 a total of 512 surveys were carried out in 56 locations, covering a total of 2,870 Km. Red-naped Ibis were encountered on 96 surveys with a total of 129 observations. Of the 2,870 Km surveyed 287 Km were surveyed on foot and 2,583 Km were covered by road surveys.

The rural road was the most frequently surveyed road (N = 55; 1,362 Km; Figure 1). Of 96 encounters of Red-naped Ibis, 36 were along the rural road with a total of 68 observations. More than half (N = 38) of these observations were on power lines and communications towers which included nesting observations (Figure 2). The rural location in Vasaalamarri village was the most surveyed location by foot (N = 144; 78 Km) with 24 encounters; 16 of these observations were of ibises foraging or flying over paddy fields and grassland mosaic. No nests were observed in this location. Roosting was observed on transmission pylons (N = 18 encounters), trees (N = 3 encounters) and communication towers (N = 2 encounters). The highest count recorded on a single survey was 33 birds along the rural road in the month of August. Of these, 29 were seen roosting, spread out in groups ranging from 3 -10 on four different 220 kV pylons on the same line. Two pairs were seen roosting on two communication towers with nests. The highest number (N = 16) of ibises recorded roosting together was on a 400 kV pylon beside a small waterbody in July along the rural road.

All recorded nesting observations were between the months of March and September. Ten active nests were found with most on communication towers (N = 6; Figure 2 and Figure 3), and only one on a 220 kV transmission pylon (N = 1; Figure 2), *Borassus flabellifer* Palm (N =1) and a cliff (N = 2; Figure 1). Five of the six communication tower nests were along the rural road and one was along a national highway. The communication tower nest along the national highway (NH 65) had an active nest of a Red-naped Ibis, with an almost fully-fledged nestling in the nest. On the same tower, below the ibis nest was a pair of Red-necked Falcons *Falco chicquera* with chicks in an old nest of a Red-naped Ibis (Figure 3). Five of the

Figure 2. Photographs showing communication towers and a 220 kV transmission pylon (bottom right) with active Red-naped Ibis nests in Telangana. The photographs are deliberately wide-angle to facilitate a view of the larger countryside. (Photographs by Pranay Juvvadi.)

six nests on communication towers were in small towns and villages. The nest on the transmission pylon was along a small water body and surrounded by paddy fields. All recorded nests except the cliff nests were on private lands. The nest on the palm tree was in a dense area of palms along a small seasonal pond surrounded by paddy fields. Both the cliff nests were recorded on the Palarapugutta. Peddavaagu, a tributary of Pranahita river, flows along the cliff.

Discussion

Red-naped Ibis has previously been recorded nesting on trees like *Ficus religiosa*, and *Azadirachta indica* (Soni *et al*. 2010a), *Bombax ceiba* and *Shorea robusta* (Katuwal and Quan 2022) and *B. flabellifer* (pers. obs). They have also been recorded nesting of power line structures (Ali *et al*. 2013; Sangha 2013) and in some places nesting entirely on artificial structures despite abundant availability of tall trees (Charan *et al*. 2022). These observations suggest that this species uses a diversity of nesting substrates and may not be limited by trees in contrast to other resident large waterbirds in south Asia that nest entirely or largely on trees (Kittur and Sundar 2021; Katuwal *et al*. 2022). The records presented in this paper indicate that power line and communication structures are frequently used nesting sites of this species in areas like Telangana where large trees are rare on the landscape. It is easy to assume with the present information that a lack of suitable natural nesting substrates in combination with the increased availability of artificial structures is a major reason. But it seems more complicated. Soni *et al*. (2009) have observed all nests on trees in the city in Churu, but recent observations by Charan *et al*. (2022) found all nests on artificial structures in Dhariawad and Sikar cities even though trees were plentiful. These two studies from the semi-arid and arid areas of Rajasthan seem to suggest that use of artificial structures for nesting by Red-naped Ibis may be a recent behaviour, though this is difficult to confirm. Some plausible reasons for use of artificial structures could be the height advantage along with the sturdy lattice-steel of these structures, which probably provide protection against ground-based predators and reduced disturbance by people relative to the shorter trees. The ability to easily sight ibises and their nests on power lines and communication towers along roadsides probably also biases observations toward finding nests on these structures, but these

observations do show that these birds can readily use manmade structures for nesting and roosting (Figure 3). To determine if this behaviour is influenced by the lack of suitable natural substrates alone or if there are other factors involved needs more carefully conducted studies. The results in this study also indicate that Red-naped Ibis preferred communication towers to transmission pylons for nesting, while they preferred transmission pylons for roosting. It was also observed that not all communication towers available were used for nesting and similarily not all transmission towers were preferred for roosting. It can be inferred that there are other factors that determine how and why they choose certain structures and over others in the same landscape. The two active Ibis nests recorded on a cliff were located 20 meters apart; one pair was seen bringing sticks in their beaks and the other pair was on the nest calling. There were at least 4 other birds on the ledges of the same cliff with lots of vocalisations (T. Singh & H. Vardhan pers. comm., 2022).

In human dominated and modified landscapes, with more records of Red-naped Ibis using utility structures, a long-term study on the breeding success and other detailed parameters on nest sites will help to understand whether this species is getting habituated to human structures in these densely populated areas. Studies like this should go in conjunction with the need to sensitise the utility staff of power and communication companies, as the current maintenance practices involves complete removal of nests from these structures. Bhatt (2023) has observed indiscriminate removal of Red-naped Ibis and House Crow nests from transmission pylons by utility companies in Gujarat, India as part of maintenance works. This not only impacts these species, but Bhatt (2023) has observed a dearth of nests for other species like the Red-necked Falcons that depended on empty nests of ibises and crows. Having an avian protection plan integrated into the utility maintenance routine and managing bird nests on these structures will not only solve operational concerns, but will also result in improved breeding of several bird species that may be used to obtain positive publicity for the utility companies.

Bird interactions with utility structures like power lines and communications towers and the impacts they cause on bird populations in human dominated landscapes is relatively poorly studied in India, and observations are steadily increasing covering both additional species and landscapes. While utility infrastructure like power lines can have negative impacts on bird populations from electrocutions and collisions, they also have created novel opportunities for birds to perch, roost and nest. One of the most frequently observed bird species building nests and nesting on power line structures and communication towers in

Figure 3. Red-naped Ibis nest with a fully fledged chick (top left) and a Red-necked Falcon nest on the same com-munication tower (top right) in Sangareddy, Telangana. Adult Red-naped Ibis in nest on a communication tower (bottom left) and Ibis roosting on an 800 kV transmission pylon (bottom right). (Photographs by Pranay Juvvadi.)

rural Telangana is the House Crow and Red-naped Ibis. The association between Red-necked Falcon and Red-naped Ibis recorded in this paper, where the former using disused nests of the latter is probably more common than expected. After crows, the Red-naped Ibis nests are probably the most available nests for the falcon species. This has also been recorded by Bhatt (2023) in Gujarat, India, where empty nests of both House Crow and Red-naped Ibis nests on transmission pylons and trees were the major nest sites for Red-necked Falcons. Such reuse of ibis nests by the Red-necked Falcon was observed once before in Telangana when a pair of falcons successfully used an ibis nest atop a *B. flabellifer Palm* (pers. obs.). The relationship of Red-naped Ibis with built-up areas and artificial structures, and the utility of ibis nests for additional species, seems complex and worthy of future research.

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