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Gagan Mittal
Department of Zoology, RKSD College, Kaithal, Haryana, India

Corresponding Author:
Gagan Mittal
Department of Zoology, RKSD College, Kaithal, Haryana, India

Nesting of red-naped ibis *Pseudibis papillosa* on power transmission pylons along NH 152, near village Thana, Haryana, India

Gagan Mittal

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Abstract
The nesting behaviour of birds is a critical aspect of their reproductive ecology, influenced by environmental, evolutionary, and behavioral factors. This study documents a notable shift in nesting behavior of the red-naped ibis (*Pseudibis papillosa*), a solitary nesting wader traditionally known to use tall trees, towards the utilization of anthropogenic structures such as power transmission pylons and communication towers. Field surveys conducted between March and April 2023 along National Highway 152, from Pehowa to Kaithal, Haryana, recorded 26 power pylons and 1 mobile tower supporting red-naped ibis nests. The nests, constructed primarily from twigs and leaves, were typically located on the crossarms of pylons at heights of 15-20 meters. Although multiple nests were observed on some pylons, only one pair of birds was seen nesting per pylon, consistent with the species' solitary nesting habits. This behavioural adaptation may reflect a response to habitat modification, urban expansion, and the scarcity of traditional nesting trees. While these artificial structures may offer certain advantages, such as predator avoidance and reduced human interference, this shift raises important conservation concerns regarding the long-term viability of such nesting choices. The findings highlight the need for further research into the ecological drivers and consequences of this nesting shift in red-naped ibises.

Keywords: Red-naped Ibis, *Pseudibis papillosa*, nesting behaviour, power transmission pylons, anthropogenic structures

1. Introduction
Birds are known for their nesting behaviours, which include everything from choosing the right site to building the nest and caring for their young ones. For the survival of the species and for the ability to reproduce, these activities play a vital role (Perez *et al*., 2023) [15]. The process and it of nest building is often long and demanding and it involves a series of stages like selecting a mate, laying eggs, incubating them, and raising chicks. Each step showcases the clever adaptations birds have developed to shield their offspring from predators, harsh weather, and competition (Pablo, 2018; Mainwaring *et al*., 2015; Fontaine & Martin, 2006) [14, 10, 7].

Bird nests come in all shapes and sizes, using a wide variety of materials and construction techniques. This diversity reflects not just the birds' immediate environment but also their evolutionary background and ecological roles (Chia *et al*., 2023) [4]. Several factors influence how and where birds build their nests—ranging from habitat availability and climate to social behaviour and individual preferences. These elements contribute to the wide range of nesting strategies seen across different bird species.

To fully understand how birds' nest, we need to look at both the immediate causes—like hormones and brain activity—and the bigger evolutionary picture, such as how nesting affects survival and reproductive success. Nest site selection can dramatically affect a bird's chances of avoiding predators, withstanding extreme weather, and finding enough food for their young (Wilson *et al*., 2005) [24]. Interestingly, nesting is not purely instinctive. In many social species, young birds learn from watching their parents or other experienced birds, showing that nest-building can also involve learning and cultural transmission (Heinrich, 2011) [9].

The red-naped Ibis, *Pseudibis papillosa*, is a wading bird species native to South Asia, especially the Indian subcontinent, occurring in much of India, Pakistan, Nepal, and Bangladesh (Ali & Ripley, 1983; Rasmussen & Anderton, 2012) [1, 16] recognized for its adaptability to varied habitats, including wetlands, agricultural lands, and urban environments (Tiwary & Gopi, 2022) [23]. Red-naped ibises mostly do not nest in heronries. They are solitary

nesters, usually on the tallest trees available, with the highest relative density canopy cover and diameter at breast height (Soni *et al*., 2010) [20].

Recent research in Avian Nesting behaviour has shown a shift in nesting behaviour, with red-naped Ibis increasingly utilizing anthropogenic structures, especially power transmission pylons and mobile communication towers, as nesting sites. Its ability to adapt to landscapes created by humans offers an ecological advantage to the bird, but it presents conservation difficulties for the already fragile ecosystem. The need of the hour is thorough research into the causes of this behavioural shift and its effects on the long-term survival of the avian fauna in general and red-naped ibis' species in particular. This paper describes the unusual nesting choice of the red-naped Ibis, *Pseudibis papillosa*, on power transmission pylons situated alongside a national highway. Even though they are not natural nesting substrates, power transmission line pylons have specific benefits for nesting birds, such as higher elevations that can improve predator detection and lessen disturbance from the ground.

2. Materials and Methods

2.1 Study Area

The study area selected was on the NH 152. While driving from Chandigarh to Kaithal on NH 152, several nests of red-naped ibises were noticed on 26 electric power transmission line pylons and 1 Mobile tower Communication tower from Village Usmanpur, Pehowa (29°57'28"N 76°35'20"E) about 20-15 km before Kaithal City near the Thana Toll Plaza (29°54'34"N 76°30'2"E). These sites were also located on agricultural land close to a national highway 152. Different surveys at different temporal and spatial scales were performed in the study area for data collection between 1st March and 30th April 2023.

2.2 Methods

During the study, daily surveys were conducted from 1st March and 30th April 2023 by visual encounter surveys. The nests and birds were photographed done during the survey with Compact DSLR camera Nikon P900. For spotting binocular Nikon Aculon 8x42 was used.

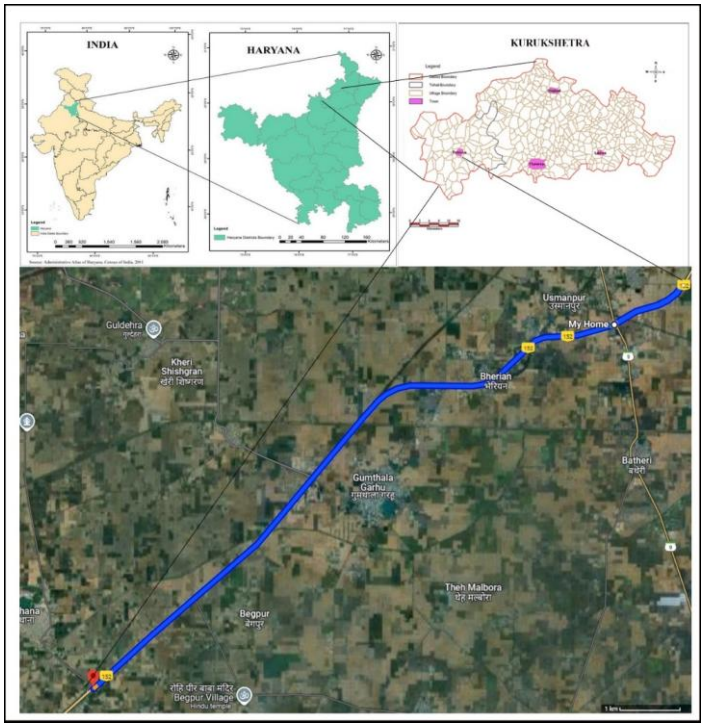

Fig 1: Location map of the study area visited during the study period here the blue lines show the NH 152 along which the electric transmission pylons were situated

3. Results

The nests were observed to be built on the edges of the cross-arms of the pylons at the height of 15m and/or 20m above the ground. In many cases, there were two nests on the same pylon at different heights, but no two pairs of birds were seen together on a single pylon. The red-naped ibises are known to nest individually and not in mixed-species heronries, and the same was observed around the area of study, as there was no observation made where two pairs were nesting simultaneously on a single pylon. During the early daytime, a few birds brought new nesting material and constructed nests on the pylons. The nesting material used for the nests was unknown, but the nests were made mainly of twigs and leaves, which might have been collected from the nearby areas comprising agricultural lands and a few bushy and forest patches. During the study, no nestlings were observed in the nests.

The pylon was in agricultural land about 5-20 m from a busy Highway 152. The adjacent vegetation was sparse and consisted mainly of *Azadirachta indica*, *Neltuma juliflora*, *Polyalthia longifolia*, *Dalbergia sissoo*, *Syzygium cumini*, *Mangifera indica*, *Moringa oleifera*, *Phyllanthus emblica*, *Cassia fistula*, *Delonix regia*, *Zizyphus mauritiana*, *Ficus religiosa*, *Acacia catechu*, *Eucalyptus umbellata*, *Aegle marmelos*, *Calotropis gigantea*.

Several inactive nests were also observed on the power transmission pylons, which may be abandoned nests of ibises or even raptors. These nests were also present on the same pylons at about the same height on the crossarms.

Table 1: Observations of Red naped Ibis perched on communication towers and power transmission line pylons

Site	Number	Location	Number of sites with at least one nest	Location	Number of sites with at more than one nest	Location	Number of sites with pair of Red-naped ibis present in the nest	Location
Power Transmission Pylons	26	29° 54 ' 40" N 76° 30 ' 25" E 29° 54 ' 46" N 76° 30 ' 33" E 29° 54 ' 53" N 76° 30 ' 42" E 29° 54 ' 56" N 76° 30 ' 48"E 29° 55 ' 5" N 76° 30 ' 58"E 29° 55 ' 12"N 76° 31 ' 6"E 29° 55 ' 18" N 76° 31 ' 15"E 29° 55 ' 24" N 76° 31 ' 23"E 29° 55 ' 31"N 76° 31 ' 32"E 29° 55 ' 37" N 76° 31 ' 41"E 29° 55 ' 43"N 76° 31 ' 50"E 29° 55 ' 49" N 76° 31 ' 58"E 29° 55 ' 56" N 76° 32 ' 6"E 29° 56 ' 3"N 76° 32 ' 13"E 29° 56 ' 11" N 76° 32 ' 21"E 29° 56 ' 18"N 76° 32 ' 28"E 29° 56 ' 25"N 76° 32 ' 36"E 29° 56 ' 33" N 76° 32 ' 43"E 29° 56 ' 39" N 76° 32 ' 49"E 29° 56 ' 47"N 76° 32 ' 56"E 29° 56 ' 54" N 76° 33 ' 1"E 29° 57 ' 1" N 76° 33 ' 11"E 29° 57 ' 1"N 76° 33 ' 34"E 29° 57 ' 1" N 76° 33 ' 45"E 29° 57 ' 1" N 76° 33 ' 57"E 29° 57 ' 0"N 76° 34 ' 4"E	11	29° 54 ' 40" N 76° 30 ' 25" E 29° 54 ' 56" N 76° 30 ' 48"E 29° 55 ' 24" N 76° 31 ' 23"E 29° 55 ' 5" N 76° 30 ' 58"E 29° 55 ' 31"N 76° 31 ' 32"E 29° 55 ' 43"N 76° 31 ' 50"E 29° 56 ' 11" N 76° 32 ' 21"E 29° 56 ' 25"N 76° 32 ' 36"E 29° 56 ' 47"N 76° 32 ' 56"E 29° 57 ' 1"N 76° 33 ' 34"E 29° 57 ' 1" N 76° 33 ' 45"E	3	29° 55 ' 5" N 76° 30 ' 58"E 29° 55 ' 43"N 76° 31 ' 50"E 29° 56 ' 47"N 76° 32 ' 56"E	5	29° 55 ' 5" N 76° 30 ' 58"E 29° 55 ' 31"N 76° 31 ' 32"E 29° 55 ' 43"N 76° 31 ' 50"E 29° 56 ' 47"N 76° 32 ' 56"E 29° 57 ' 1"N 76° 33 ' 34"E
Communication Tower	1	29° 57 ' 2" N 76° 34 ' 5"E	Nil		Nil		Nil	

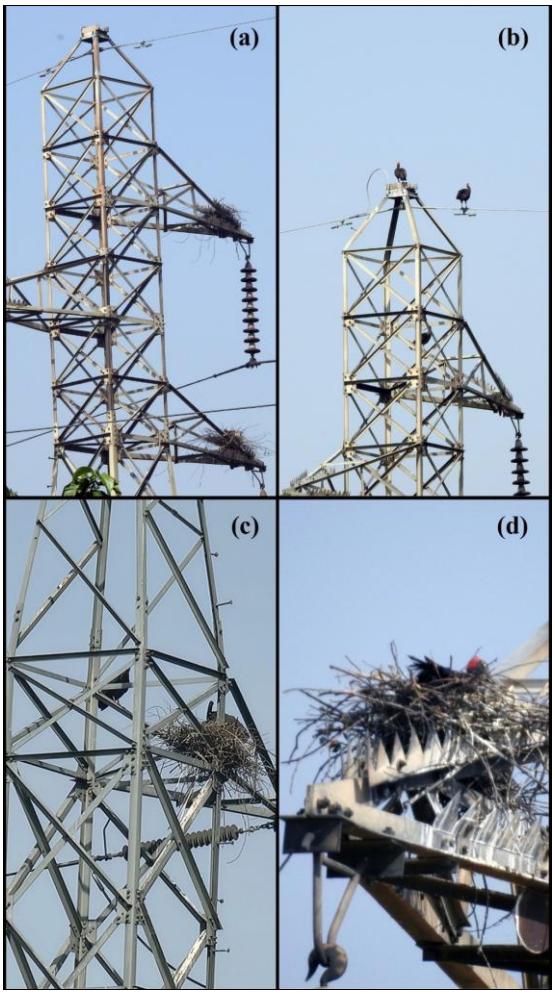

Plate 1: Nest of Black Ibis *Pseudibis papillosa* on power transmission line pylon, NH 152, District Kurukshetra, Haryana, India, April 2022. (a) Nest on power transmission line pylon; (b) red naped Ibis perched on pylon (c) One pair of red-naped Ibis perched on a pylon near the nest. (d) Close view of a nest with one bird.

4. Discussion

Previous observations on nesting Red naped Ibises have recorded nests on tree species such as Peepal *F. religiosa* (Dookie, 2004), Banyan tree *Ficus benghalensis* (Tere, 2022; Nair & Vyas, 2003) [22, 13], Tamarind *Tamarindus indica* (Tere, 2022) [22], Neem *Azadirachta indica* (Soni *et al*., 2010) [21], and other species of trees like Nilgiri *Eucalyptus sp*., Palmyra palm, Sheeshum *Dalbergia sissoo*, and Khejri *Prosopis cineraria*. Morse (1980) [12], Hancock *et al*. (1992) [8] and Sangha (2013) [19] mentioned that taller and bigger trees are preferred for nesting to minimize the risk due to predation and the availability of more shade.

Agricultural fields surround the study area, and it lies near the Golden Jubilee Brahm Sarovar Community Reserve, a big wetland area in Village Thana, Haryana. These sites are considered the chosen foraging habitats of Red naped Ibises (Ameta *et al*., 2022) [2]. Several studies have suggested that colony locations are tied to proximity to foraging sites that enhance foraging efficiency while provisioning chicks (Roshnath & Sinu, 2017a and Roshnath & Sinu, 2017b) [17, 18]. Sangha (2013) [19] reported Red-naped Ibis roosting on electricity pylons in Bikaner, Rajasthan. In contrast, Dodia & Parasharya (1986) [5] and Mohamed S Ali *et al*. (2013) [11] reported Red-naped Ibis nesting on power transmission line pylons in Gujarat, India. However, there seems to be no previous record of Indian Black Ibis nesting on electricity pylons in Haryana, India. The human disturbance due to urbanization and reduced forest cover area in Haryana may be responsible for shifting nesting sites from natural to artificial structures. Nesting on power pylons is a matter of concern if we consider the bird's long-term survival, as survival may be difficult without a safe and preferred nesting location. Despite being exposed to human intervention, highway traffic, and direct sunlight in summer, the nesting pairs near the national highway seem to have considered the high, artificial structures safer than trees, and there was no human interference. Sometimes, it has been observed that the birds

mainly use tall electricity transmission pylons and communication towers for resting during the middle of the day. Focussed research is needed to understand the use of power transmission line pylons by red-naped Ibis and other bird species in this area.

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