Communal roosting of Black-winged Kites *Elanus caeruleus* and possible influence of rainfall and wheat cultivation

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Suryawanshi, K. R., & Ingle, B., 2020. Communal roosting of Black-winged Kites *Elanus caeruleus* and possible influence of rainfall and wheat cultivation. *Indian BIRDS* 16 (5): 143–145.

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Manuscript received on 21 June 2020.

Introduction

The Black-winged Kite *Elanus caeruleus* is widespread across the Indian Subcontinent, South-East Asia, Sub-Saharan Africa, parts of northern Africa, and Iberia. It is relatively common across large parts of its distribution range. Its population is increasing in the Iberian peninsula and northern Africa, and its distribution is expanding to other parts of Europe (Ławicki & Perlman 2017; Llorente-Llurba et al. 2019). In India, however, the recent State of India's Birds Report 2020 estimated a 34.6% (CI ±10.1) decline in its population over the past 25 years, and a 5.7% (CI ±2.3) decline over the past five years (SoIB 2020). Local population sizes of this species are known to fluctuate as it moves large distances in search of sporadically abundant prey. Such movements are expected to be linked to rainfall, and booms in rodent populations (Naoroji 2006; Llorente-Llurba et al. 2019; Kemp et al. 2020). Despite the charisma of this species, as a raptor, and it widespread occurrence, it remains poorly studied outside Europe (Naoroji 2006).

The Black-winged Kite prefers open habitats, such as savannah grassland and agricultural fields, which have widespread grassy or herbaceous vegetation with scattered trees (Kemp et al. 2020). It is commonly found in agricultural areas of seasonal crops interspersed with trees. It predominantly feeds on rodents, but also eats insects and small birds (Naoroji 2006). It is a solitary forager, but known to roost communally (Parejo & Aviles 2001). Communal roosting behaviour of raptors is of much interest to ornithologists and conservationists, but there are few first-hand reports of communal roosting in Black-winged Kites (Table 1).

In this note we describe one of the largest communal roosts of the Black-winged Kite. We present data on rainfall and agricultural cultivation for the landscape surrounding the roost. We present perceptions of local farmers about the correlation between rainfall, wheat cultivation, and rodent abundance, and put forth a hypothesis about the conditions that may have led to such a large aggregation of the Black-winged Kite.

Study site

The roost covered an area of four hectares of the north-eastern slope of Deodongri Hill, Aurangabad District, Maharashtra (20.51°N, 75.72°E), which is part of an isolated forest patch of about 20 ha **[140]**. The habitat type of the roost patch is mainly dry-scrub and savannah with grass being the main understory, and some bushes interspersed with trees. The predominant tree species in this patch include Teak *Tectona grandis*, Flame-of-the-forest *Butea monosperma*, Karanda *Carissa carandas*, Neem *Azadirachta indica*. The primary crops in the surrounding agricultural fields are Cotton *Gossypium hirsutum*, Maize *Zea mays*, Wheat *Triticum aestivum*, Bengal gram *Cicer arietinum*, Jowar *Sorghum bicolor*, Soyabean *Glycine max*, and small amounts of pulses and vegetables.

Table 1. Reported sizes and year of sighting of communal roosts of Black-winged Kite in published works

Location	Number of birds	Year of sighting	Reference
Senegal	500-600	April 1976	Morel & Poulet (1976)
South Africa	5-9	1977-1978	Mendelsohn (1988)
Badajoz, Spain	60	1999-2000	Parejo & Aviles (2001)
Arusha, Tanzania	80	Mar-Apr 1964	Morgan-Davies (1965)
Salisbury, Rhodesia	5-30	Feb-Nov 1964	Brooke (1965)
Ranthambore NP, India	>15	May 1984	Naoroji (1987)
Ranthambore NP, India	>50	May 1999	Srinivas (2002)
Raipur, Madhya Pradesh, India	35	August 1995	Bharos (1997)

Note: Meghwal & Soni (2017) studied the tree species at 29 roosts of Black-winged Kites in Churu District, Rajasthan, but did not report the number of kites at any of the roosts.

140. The north-east facing slope of the Deodongri hill as seen from the road connecting Ajanta and Mukhpat village. The patch of forest on the slope which is visible in this picture was the main roosting site for the Black-winged Kites.

Observations

15 April 2020

At 1845 h KS noticed three Black-winged Kites approach and perch in a patch of teak forest on a nearby hill slope close to Mukhpat village. KS quickly counted 30 kites perched across the visible part of this forest patch (Suryawanshi 2020).

22 April 2020

We tried to walk the entire stretch of the roosting patch to do a total count. On that day our maximum count was 62 birds, but we realised that we had missed birds in our attempt to walk the entire area in low light conditions. We realised that we may need to wait at a vantage point and count the birds as they came in to roost to get a better count.

23 April 2020

BI and Ramesh Suryawanshi, positioned themselves on a small knoll on the eastern side, and KS on a rocky outcrop on the western side, at the edges of the roost, which gave a visual coverage of all directions. We attempted a total count and used ridgelines and other prominent features such as water tanks to split the area to be covered, to minimise double counting. We started at 1800 h by counting the seven kites that had already perched inside the roost area. Between 1800 h and 1930 h we recorded 58 and 14 birds respectively, from the eastern and western vantage points. The total count for the day was 79 kites.

2 May 2020

BI and KS decided to position themselves at the eastern lookout as it was found sufficient to obtain a total count and provided a visual coverage of 270 degrees. We arrived at the roost at 1830 h and KS found 17 kites already perched in the roost. Subsequently, we counted an additional 74 new birds that made it 91 kites.

15 May 2020

We counted all the arriving kites between 1800 h and 1930 h from the eastern lookout and also recorded total number of kites for every 15-minute window. This resulted in a total count of 88 kites (Bin count: 6, 4, 10, 13, 45, 10), with most kites arriving post sunset (=1856 h), and the last kite arriving at 1920 h.

20 June 2020

Rains had started in this region since 03 June, when the cyclone '*Nisarga*' hit the western coast of Maharashtra. There was a noticeable decline in the number of kites once the rains started. We started at 1800 h and stayed out till 1930 h when it was almost completely dark. There were no kites inside the roost when we started. The first kite arrived at 1817 h. Total count for the day was 22 birds. The last kite arrived at 1917 h.

During our observations, we saw only one or two kites perched on any one tree (Fig. 2). The birds chose taller trees with bare branches, which is the typical perching behaviour of this species. Birds that arrived before sunset, continued to hunt by hovering over the roosting patch and surrounding forests and agricultural fields.

Environmental factors

Rainfall: We sourced data on monthly rainfall for Aurangabad District from www.worldweatheronline.com on 31 April 2020, and cross-checked it with data from https://aurangabad.gov.in/commissioner-office/daily-rainfall/. The latter is a government website, but it did not have data for all the previous four years. The data showed that during the preceding monsoon June–September 2019, Aurangabad District received 1,779 mm rainfall,

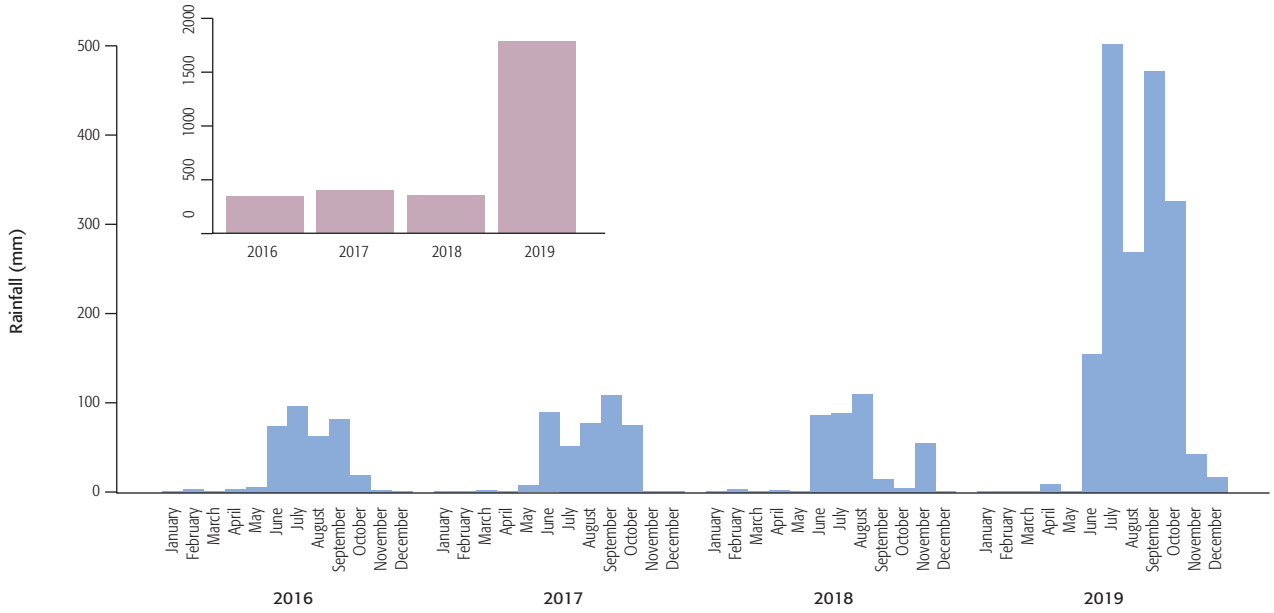

Fig. 3. Monthly rainfall in Aurangabad District from 2016 to 2019. The inset shows the total annual rainfall for the district.

which is 2.4 times the long-term annual average (741 mm; Fig. 3). This is nearly five times higher than the average rainfall (362 mm) of the previous three years (2016–2018) (Fig. 3).

Changes to cropping patterns: We spoke to ten local farmers from the three villages (Mukhpat, Balapur, Ajanta) that surround the roost, to understand changes in cropping patterns because of the heavy rains. The primary difference identified by all the farmers had been the bumper crop of wheat during the Rabi season (October 2019–March 2020). All of them also mentioned that a wheat crop has the highest incidence of rodent pests, compared to all the other crops that they cultivate. This perception of the local farmers is consistent with studies in agricultural sciences (see Sarwar 2015 & Shenkut et al. 2006). All the farmers that we spoke to, also said that they do not use any pesticides on the wheat crop.

Wheat cultivation: The Tehsil records show that 3,080 ha, of a total 16,325 ha (18.8%) was under wheat cultivation in the Rabi season of 2019–2020, in the Ajanta circle. The previous Rabi season (2018–2019) had less than 1% area under wheat, and did not even warrant a column in the tehsil data. This was confirmed during our conversations with the local farmers. The local farmers also said that hardly anyone in the surrounding three villages cultivated any wheat during the previous five years when the rainfall was much lower than average years.

Discussion

This could be the second largest recorded roost of the Black-winged Kite in the world (Table 1). At its peak, we recorded a minimum of 91 kites at a conservative estimate.

We have been birding in this patch the past five years, but we never noticed communal roosting of the Black-winged Kite. None of the ten farmers that we spoke to have ever noticed such a roost. This suggests that the roosting of Black-winged Kites near Mukhpat village is possibly a recent phenomenon.

Black-winged Kites and congeners are known to travel large distances to benefit from seasonal increases in rodent populations (Kemp et al. 2020; Scott 1994), but we did not find any study that proposes a link between aggregation of large number of kites and the cultivation of wheat. Interestingly, wheat is a dominant crop in many of the regions where Black-winged Kite is expanding its distribution range (eg. Iberia, Mañosa et al. 2005; Iran, Vosoghi et al. 2012; southern Europe, Balbontin et al. 2008; Turkey, Karakaş & Biricik 2017). Balbontin et al. (2008) explicitly studied expansion of the Black-winged Kites in southern Europe and concluded that expansion of agriculture was one of its primary reasons. They include cereals such as wheat (along with oat and barley) as one of the main crops in this agricultural mosaic, but do not discuss these crops in particular.

Our report shows, though anecdotally, that a sudden increase in wheat cultivation is followed by an increase in rodent population, which caused the large roost of Black-winged Kites. Future studies should also assess the impact of changes in cropping patterns and agricultural practices (especially use of pesticides, insecticides, and herbicides) on the habitat use of the Black-winged Kite. Such studies would be of value, not only for the conservation of Black-winged Kites, but also for the agricultural sector. Black-winged Kites and other raptors that feed on rodents in agricultural landscapes potentially provide an important ecosystem service to the agricultural sector.

The recent State of India's Birds report estimates a decline in several grassland species, especially birds of prey (SoIB 2020). Many of these species also use agricultural areas to a significant extent. Our observation highlights the need to systematically study changes in cropping patterns and their effects on bird diversity and abundance for effective conservation of birds in India.

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