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Cover: The breathtakingly beautiful Silver Jubilee cover of JoTT is done in color pencils and ink by the 13-year old darling, Elakshi Mahika Molur.



Breeding of the ‘Critically Endangered’ White-rumped Vulture *Gyps bengalensis* in the Shan Highlands, Myanmar

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Abstract: Recent studies have shown the importance of Myanmar for the conservation of three ‘Critically Endangered’ vulture populations. From November 2022 to March 2023, we carried out rapid surveys on vulture nests and nesting tree characteristics in Ke Hsi Township, Shan Highlands. We recorded 10 nests of White-rumped Vultures, *Gyps bengalensis*, on five nesting trees from four different localities. Six nests were active, and six nestlings were observed; four nests were inactive or abandoned. Most of the nests were recorded on *Ficus* spp. and the mean nest height was 13.6 m (SD ± 4.1) above ground. This represents the first confirmed record of the breeding success of White-rumped Vultures from Shan Highlands and confirms the ongoing presence of the species in Shan States. The population of *G. bengalensis* in Shan Highlands is small, but the confirmed breeding is significant in the wider context for this species.

Keywords: Breeding success, *Ficus* spp., nestlings, Shan states, viable population, vulture nest.

Burmese: မြန်မာနိုင်ငံသည် မျိုးသုဉ်းရန် အလွန်နီးကပ်နေသော လင်းတ မျိုးစိတ်(၃)မျိုး ထိန်းသိမ်းရေး အတွက် အရေးကြီးသော အနားကဏ္ဍ၌ ပါဝင်နေကြောင်း မကြာသေးမီက ပြုလုပ်ခဲ့သော လေ့လာတွေ့ရှိမှုများကဖော်ပြပါသည်။ လင်းတအသိုက်နှင့် အသိုက်ရှိသော သစ်ပင်များ၏ ထူးခြားမှုလက္ခဏာများနှင့် ပတ်သက်၍ လေ့လာမှုများကို နိုဝင်ဘာလ ၂၀၂၂ မှ မတ်လ ၂၀၂၃ အထိ ရှမ်းပြည်တောင်ပိုင်း ကျေးသီး မြို့နယ်တွင် ပြုလုပ်ခဲ့ပါသည်။၎င်းလေ့လာမှုတွင် လင်းတကျောဖြူ *Gyps bengalensis* ၏ အသိုက်(၁၀)သိုက် တွေ့ရှိခဲ့ ရပြီး မတူညီသော နေရာအသီးသီးရှိ သစ်ပင်(၅)ပင်ပေါ်တွင် အသိုက်များ ဆောက်ထား ကြောင်းတွေ့ရှိရသည်။ အသိုက်(၆)သိုက်တွင် လင်းတအကောင်ပေါက်များ တွေ့ရှိခဲ့ရပြီး (၄)ခုတွင် အသိုက်ဟောင်း များ ဖြစ်သဖြင့် မည်သည့်လင်းတမျှ မတွေ့ခဲ့ရပါ။ လင်းတကျောဖြူသည် ညောင်ပင်ပေါ်တွင် အများဆုံး အသိုက်ဆောက်ခဲ့ကြပြီး အသိုက်များ၏ ပျမ်းမျှအမြင့်မှာ ၁၃.၆ မီတာ (SD ± ၄.၁) ဖြစ်ပါသည်။ ယခုလေ့လာတွေ့ရှိမှုသည် ရှမ်းပြည်၌ လင်းတကျောဖြူ၏ ပထမဆုံးသားပေါက် အောင်မြင်မှု မှတ်တမ်းဖြစ်ပြီး ၎င်းမျိုးစိတ် ဆက်လက်ရှင်သန်နေထိုင်နိုင်ကြောင်းကိုလည်း ပိုမိုခိုင်မာလာ စေပါသည်။ ရှမ်းပြည်တွင် လင်းတကျောဖြူ၏ ဦးရေမှာ နည်းပါးသော်လည်း ၎င်း၏ သားပေါက်မှုမှတ်တမ်းသည် ယင်းမျိုးစိတ်အတွက် ပိုမိုကျယ်ပြန့်သော အကြောင်း အရာများကို ဆက်လက် လေ့လာနိုင်ရန်အတွက် အလွန်အရေးကြီးကြောင်း သိသာထင်ရှား စေပါသည်။

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INTRODUCTION

In Myanmar, each year new records of birds and range extensions are published (Zöckler et al. 2010, 2020; Oo et al. 2022), or records of species, which have been declared locally extinct, re-emerge (Oo et al. 2019). Myanmar hosts five vulture species: The White-rumped Vulture *Gyps bengalensis*, Red-headed Vulture *Sarcogyps clavus*, Slender-billed Vulture *Gyps tenuirostris*, Cinereous Vulture *Aegypius monachus*, and Himalayan Vulture *Gyps himalayensis* (Robson 2008; Hla et al. 2011), and three of these are classified as 'Critically Endangered' by the IUCN Red List of Threatened Species. Among these, the White-rumped Vulture has a widespread distribution across Bangladesh, Bhutan, Cambodia, India, Myanmar, Nepal, and Pakistan (BirdLife International 2021a,b,c) but has also suffered the most drastic declines of over 99.9% across India (Prakash et al. 2012). Literature records suggest that vultures were once widely distributed throughout Myanmar, mainly the northern half of the country with records from Kachin State, Shan State, Chin State, and Sagaing Region (Hla et al. 2011). Also *Gyps bengalensis* was recorded 78 times from Myanmar, most of these records are sightings of non-breeding birds in Kachin (68), while only nine records are from the two Shan states (GBIF 2023). The Shan records are all from 2009 to 2023, which indicates a rare visitor to the Shan Highlands (Image 1).

All but the Himalayan Vulture have been considered relatively common throughout these areas in the past (Tordorf et al. 2007; Hla et al. 2011; Shwe & Aung 2016; Oo et al. 2019). The earliest record of the White-rumped Vulture dates back to the late 19th Century for Southern Shan State, where it was once a common species (Rippon 1901). The Shan states remained relatively unexplored by ornithologists due to political instability, security issues, and inaccessibility of the region (Smythies 2001).

In the early 20th Century, White-rumped Vultures were abundant and considered the most common vulture throughout Myanmar's central plains (Smythies 2001; Naing et al. 2012). However, their population has declined across their historical range because of food shortages, breeding-habitat loss, chemical poisoning, habitat loss, and anthropogenic impacts (Bildstein 2017). This decline was so severe in the region that the White-rumped Vulture population crashed by almost 95% between the 1990s and 2000s (Bildstein 2017).

Hla et al. (2011) estimated a population of 62 White-rumped Vultures based on observations at vulture feeding sites in all of Myanmar for 2006 and 2007. The first White-rumped Vulture survey in northern Shan State

documented 31 individuals, including juveniles (Oo et al. 2019). While the two studies had different temporal and spatial scales as well as methods, we assume that the stronghold of the White-rumped Vulture population of Myanmar is likely located in Shan today, while another hotspot for the species within Myanmar is found in the Hukaung Valley, Kachin State (Thet Zaw Naing pers. comm. 2023).

White-rumped Vultures typically build their nests in tall trees (Khan 2013; Ghimire et al. 2019; Samson & Ramakrishnan 2020; Jha et al. 2021), as these trees reduce predators' access and support mobility for the vultures.

METHODS AND SURVEY SITES

Fieldwork was conducted in Ke Hsi Township (alternatively spelled Kehsi), located in the southern region of Shan State, with specific localities and coordinates detailed in Table 1 and Image 1. Our team undertook surveys of vulture nests, leveraging local knowledge to identify these sites. Nesting trees were identified using GPS coordinates, and these sites were subsequently revisited on a bi-weekly basis. Ke Hsi Township is situated on the elevated plains of southern Shan State, at an approximate altitude of 1,000 m.

The vulture survey covered 35 days, from 15 November 2022 to 31 March 2023. During this period, we collected data on the characteristics of nesting trees, adopting the nest categorization framework established by Jha et al. (2020), which delineates nests as active (housing adults along with juveniles, chicks, or eggs), inactive (only occupied or frequented by adults), or abandoned (without any occupants).

Measurements of tree height and nest elevation were taken using a clinometer, while the diameter at breast height (DBH) was measured with a tape measure, and canopy density was assessed with a densitometer. The relative canopy cover of each nesting tree site was evaluated using the "CanopyApp" (University of New Hampshire), where a photograph taken beneath the tree provided the percentage of canopy coverage as an output.

We also recorded the proximity of nesting trees to the nearest water bodies, which, within the study area, averaged 11.7 hectares in size (N = 4). Observations of nests were conducted from a non-intrusive distance of 100–200 m using Kowa Japan YF30-8 binoculars (8 × 30), to minimize disturbance for the birds. Documentation of birds and their nests was accomplished with a Nikon

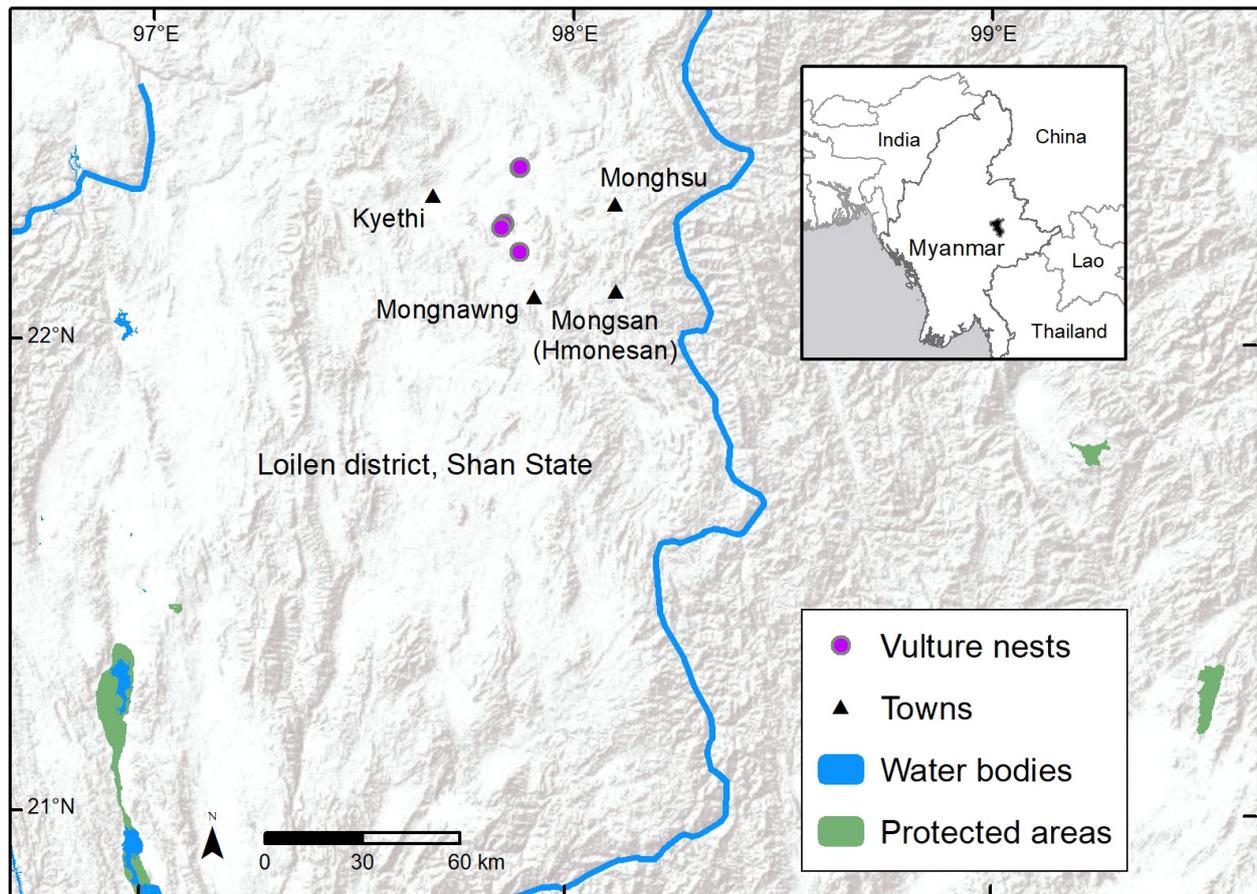


Image 1. Map showing the nesting sites within Loilen District (black area in map inset) of Southern Shan state. Depicted are distances to the nearest protected areas as well as waterbodies mentioned in the text. © Prepared by Marcela Suarez-Rubio.

P1000 digital camera, with results presented in Images 2–6. Each site visit lasted approximately 15 minutes, during which we assessed the breeding status of the nests. Observation periods were conducted from 0800 h to 1600 h.

The climate of Ke Hsi Township is predominantly subtropical, characterized by a mean annual temperature of approximately 23°C and an average annual rainfall of about 1,100 mm (General Administration Department 2020).

RESULTS

During our research period, we identified and monitored 10 nests of White-rumped Vultures, situated within five nesting trees across four distinct locations. Within these locations, three were categorized as loose colonies, notably with one tree hosting four nests. The nesting trees were, on average, 10.4 km apart, with a range from 0.4 to 25.0 km. All nests, discovered in

November 2022 at the onset of our survey, exhibited vulture activity during our initial inspection. Throughout our study, six nests remained active, while the remaining four exhibited signs of inactivity or abandonment. Of the five nesting trees, three were positioned within agricultural fields (specifically, corn and peanut farms), and the other two were adjacent to religious sites (a pagoda and a monastery). *Ficus* trees emerged as the preferred nesting choice, representing four of the five identified nesting trees (Table 1). The average height of these nesting trees was 20.7 m, with nests situated at an average height of 13.6 m (Table 1). The canopy cover of these trees averaged 39.9% (SD ± 10.59, N = 5).

By January 2023, all active nests were home to six vulture chicks, with observations typically noting chick presence alongside at least one adult until late March 2023 (Table 2).

Our observations also included five colonies of White-rumped Vultures, each comprising two to 20 individuals (N = 5), and vulture groups ranging 29–57 individuals, with an average of 41 individuals (N = 4),

Table 1. Locations and records of trees with White-rumped Vulture *Gyps bengalensis* nests in the Shan Highlands. Note: * one out of the four nests was in the crown of the tree and we could not confirm the presence of nestling.

Place	Tree species	Tree height m	# nests	Nest height m	DBH cm	Altitude m	Roosting individuals	Number of nests	Number of chicks	Fledged	North	East
Wan Mut	<i>Ficus tinctoria</i>	23.9	2	19.1; 17.6	980	830	5	2	n/a	n/a	22.0	98.1
Wan Mut	<i>F. tinctoria</i>	20.3	2	11.3; 7.6	1,210	870	7	2	1	1	22.0	98.1
Wan Narr	<i>Schima wallichii</i>	18.3	1	16.5	245	1,000	2	1	1	1	21.7	98.1
Kone Mont	<i>F. tinctoria</i>	21.3	1	19.5	1,100	1,030	2	1	1	1	21.8	98.0
Nam Linn	<i>F. lacor</i>	20.1	4	16.5; 16.5; 12.6; 6.6	750	1,040	14	4*	3	3	21.8	98.0

feeding on carcasses. These groups encompassed three vulture species: White-rumped Vulture, Slender-billed Vulture, and Himalayan Vulture. Throughout the study, we located three cattle and one buffalo carcasses, with three in cropland and one in a paddy field. Near each carcass, two to three stray dogs were observed feeding alongside the vultures. The cause of livestock mortality was undetermined, and no information was collected on the availability of diclofenac, a veterinary drug causing casualties in vultures, in the area. According to the local veterinarian, diclofenac was not utilized for treating cattle within the township. No deceased vultures were discovered during our research period.

Despite observing Slender-billed and potentially Himalayan Vultures feeding on carcasses, nesting sites for the Slender-billed Vulture were not identified. Himalayan Vultures are noted as winter visitors to Myanmar. Moreover, Red-headed Vultures were not observed throughout the duration of this study.

DISCUSSION

With this survey, we documented the breeding success of the ‘Critically Endangered’ White-rumped Vulture in Myanmar’s Shan Highlands, representing the first confirmed breeding record in the eastern part of the country. It also sheds light on their nesting site preferences and food availability. Between November 2022 and March 2023, we observed nestlings in six nests, and all six nestlings successfully fledged. This is a positive sign for vulture conservation in Myanmar (Hla et al. 2011). Our findings suggest that these vultures have sufficient food sources in the study areas, as evidenced by frequent observations of vulture flocks and recorded carcasses. The availability of food is crucial for vulture presence, especially considering their role as obligate scavengers. This is further supported by the presence of



Image 2. A crow on the nest of White-rumped Vulture on 5 February 2023 in Kone Mont Village.

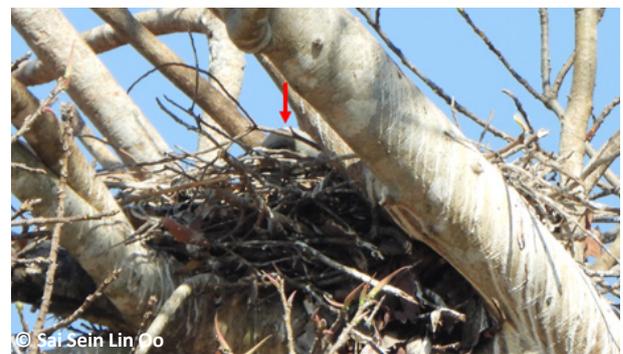


Image 3. A head of nestling visible in the nest in Nam Linn on 5 February 2023.

a substantial cattle population in the region, as has been found in southern India (Manigandan et al. 2023).

Although Slender-billed Vultures were observed feeding on carcasses, we could not locate their nests. Similarly, Red-headed Vultures were not observed during the study, suggesting their rarity compared to the other vulture species.

Table 2. Records of White-rumped Vulture *Gyps bengalensis* nestling found in nests of the study area. 1 observed, 0 not observed.

Date	Kone Mont	Nam Linn	Wan Mut	Wan Narr
8 Jan 2023	0	0	1	1
13 Jan 2023	1	1	1	1
5 Feb 2023	1	1	0	1
11 Mar 2023	1	1	1	1
15 Mar 2023	0	0	1	1

The preference of White-rumped Vultures in our study was for large, tall trees, often *Ficus* spp., while others reported that *Terminalia arjuna*, and *Spondias mangifera* were utilized for nesting by White-rumped Vultures in India (Majgaonkar et al. 2018; Samson & Ramakrishnan 2020). The average nesting tree height in India was 25.4 m (Majgaonkar et al. 2018) and 26.7 m (Samson & Ramakrishnan 2020), respectively.

Since the study areas are located outside of protected areas (compare Image 1), it is needed to introduce conservation awareness and management practices to local communities. In addition, it is required to raise awareness for protecting nesting trees. The vulture colonies we recorded, as well as the flocks attending domestic livestock carcasses, indicate that these birds continue to play an essential role in the ecosystem by cleaning up carrion. Hla et al. (2011) had previously postulated, but not observed, the presence of viable populations of *Gyps bengalensis* and *G. tenuirostris* in Myanmar, and our current findings confirm this claim at least for *G. bengalensis*.

Majgaonkar et al. (2018) emphasized that nesting and reproductive success serve as indicators of specific site-use by the vultures. Therefore, it is demonstrated that habitats and food availability for *Gyps* species still exist in the Shan Highlands of Myanmar. While the population of *G. bengalensis* in Shan State may be relatively small, its breeding success is of significance, indicating that these populations are healthy and successfully reproducing. Based on the study results, Ke Hsi Township emerges as particularly crucial for White-rumped Vulture populations due to its large open habitats, food availability, low disturbance levels, and relatively low human density. Vultures can find and detect carcasses and feed in such open areas, making these habitat characteristics vital for nesting choices. In conclusion, the findings of this study offer promising insights into vulture conservation opportunities in Myanmar.



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Image 4. An adult vulture in the nest with its nestling on 13 January 2023 in Wan Mut Village.



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Image 5. A fledgling White-rumped Vulture in nest on 15 March 2023.



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Image 6. A flock of vultures loitering around the carcass with dog and crows on 27 February 2023.

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