

## Note on the breeding of Shikra *Tachyspiza badius* at Polo Forest, Gujarat, India.

**Devvratsinh Mori:** Ecology, Evolution and Climate Change Research Cluster, School of Arts and Sciences, Ahmedabad University, Ahmedabad 380009. devvratsinhmori@gmail.com

**Raju Vyas:** 1–Sashwat Apartment, BPC–Haveli Road, Nr. Splatter Studio, Alakapuri, Vadodara 390007. razoovyas@hotmail.com (corresponding author)

### Abstract

Here, we present a detailed account of a pair of Shikra *Tachyspiza badius* in the reserved Polo Forest of Gujarat. The nest was monitored by a security surveillance camera for three months during the breeding season from April to June 2025. The nest was found at 21.5 m in the upper middle canopy of a 24.5 m high Mahua tree (*Madhuca longifolia*). The eggs hatched after 26 days of nest discovery, with 100% breeding success, and nestling periods were recorded for 6 weeks. During the nestling period, parents brought 14 prey types in 269 flights over six weeks for the chicks. The nestling diet consisted of amphibians (1.11%), birds (1.85%), mammals (9.66%), reptiles (83.25%), and 4.8% unidentified prey. The most common prey, at 83.27%, was common garden lizards, which were the target prey in nestling diets.

### Introduction

The Shikra (*Tachyspiza badius*) is a widespread member of the family Accipitridae, with a predominantly Asian and African distribution. It occurs in various habitats, from dense woodlands to savannas, and in arid, agricultural, and plantation areas, as well as in rural-to-urban and suburban residential gardens (Kemp & Kirwan 2024). This widespread species is further recognized by several races (Kemp & Kirwan 2024). Four subspecies are recognized from India (Naoroji 2006), *Tachyspiza badius dussumieri* is the most common subspecies in Gujarat (Dharmkumarsinji 1955). The Shikra nests across much of its distribution range, except for small regions in sub-Saharan Africa and parts of the Arabian Peninsula, where it occurs only in the non-breeding season (Kemp & Kirwan 2024). Earlier detailed descriptions of the nesting of this species are available from Sri Lanka (Phillips 1933) and India (Biddulph 1937; Lamba 1964). Published records on observations of nesting Shikra are available from various parts of its distribution range, including Azerbaijan (Heiss & Kai Gauger 2009), Armenia (Ananian et al. 2010), Indonesia (Nurza et al. 2009), Sri Lanka (Phillips 1933), and the United Arab Emirates (Campbell 2018). Despite being one of the most common raptors in India, detailed observations of Shikra nesting are relatively scantily published (Naoroji 1983; Suryawanshi 2021; Khan et al. 2024; Parekh 2025). The breeding biology of the Shikra is well summarized by Naoroji (2006) and Kemp & Kirwan (2024). Shikras usually breed during the dry season,

but this varies geographically, depending on environmental conditions and food availability. Here, we provide new information on the breeding of a Shikra pair, based on close monitoring of a nest for over two months, vigilance through an automated camera, and direct observations from April 10, 2025, to June 12, 2025, within a breeding season in the Polo Reserved Forest, North Gujarat.

### Study Area

The bird's nesting site is located within the reserved Polo Forest in Vijaynagar Taluka, Sabarkantha district, north Gujarat, India. This forest is classified as a southern tropical dry deciduous forest, with a subtype of dry teak forests (5A/C-1b) according to the Champion & Seth (1967) forest classification system. The pristine forest covers 400 square kilometers and lies at the southern end of the Aravalli mountain range. This forest is the catchment area of the perennial Harnav River, a small tributary of the Sabarmati River. The forest patch is home to a diverse array of plants and animals, particularly numerous bird species; the avifaunal surveys remain unexplored, except for Mori et al. (2026).

### Methodology

In the first week of April 2025, we found a Shikra nest on the edge of the road near Village, Polo Forest, Gujarat. The nest was monitored through direct observations and through an automated camera. Direct observations were conducted once a week for the entire day, from sunrise to sunset, by using DSLR cameras (Nikon 10x50 Aculon A211, Nikon Monarch 8x42, including a Nikkor 600mm f/4E FL ED VR telephoto lens), and binoculars (Nature-Trek 12x50), along with a Vortex Viper HD 20–60x85 spotting scope.

**Automated Camera:** To reduce disturbance and ensure a non-invasive approach, we used a fully automated camera to monitor the nesting activities by installing a Godrej ACE Pro 4G Dome Camera system equipped with a 7W solar panel and an integrated 18,000 mAh lithium-ion battery that provides up to 36 hours of autonomous backup under non-solar conditions.

The camera was mounted on April 9, 2025, on the front of the nest, about 3 meters away on a branch of the nesting tree. It was positioned at a slight upward angle to maintain an unobstructed view of the nest platform and nearby perch sites

while minimizing disturbance to the birds. We avoided direct contact with the eggs and chicks, so we do not have their weights or sizes. We ensured that our actions complied with the law and adhered to the principles of bird nesting research (Barve et al., 2020).

## Observation and Results

The mature Shikra shows sexual dimorphism. In this study, we observed plumage features consistent with sexual dimorphism. The female is larger than the male, has yellow eyes, a dark chin line, yellowish nostrils, and a prominent band on the central tail feather. The male, on the other hand, has orange eyes, a lack of a chin line, more whitish nostrils, and a lack of a band on the middle tail feather. The female has a rufous-gray body with a few large white spots on the shoulders, while the male has a gray body without white shoulder spots (**Image 1**).



Image 1: Sexual dimorphism observed in a specific breeding pair: - large female, body colour grey-rufous with white shoulder patches, tail bars, yellow eyes, and light-yellow nostrils (A); male body colour grey with orange eyes and white nostrils (B), both on the nest with four eggs (C). (Photo Credit: Devratsinh Mori).

Nest Tree and Nest: The pair of Shikra nests was located in the upper middle canopy of a Mahua tree, *Madhuca longifolia* (**Image 2**). This nesting site is in an agricultural landscape, adjacent to a dry deciduous reserve forest, with scattered mature trees and proximity to village-edge human activity. Nest dimensions and other details, such as nest height from the ground, tree trunk girth, and overall tree height, are provided in **Table 1**. At the end of the study, after the nestlings had fledged, we collected measurements and examined the nesting materials used to build the nests (**Table 2**). This breeding pair of Shikra used six plant species in their nesting material, all of which were available in the surrounding area.

Eggs and Incubation: When we found the Shikra nest, it contained four white, unmarked eggs. Although we did not measure the eggs, they appear similar in size to a pigeon's

egg. On the morning of May 1, 2025, we observed that a chick hatched at 0602 hours, as indicated by the female removing the eggshell from the nest. The remaining three eggs continued to be incubated for over one or two days, and on May 5, 2025, the fourth chick hatched from the last egg. Thus, all the eggs were incubated for 21 to 26 days after the nest was discovered. While we cannot confirm the exact incubation period, we recorded the pair's activities and behaviors during those three weeks. Most of the time, the female sat on the eggs for incubation, with the male taking over when she left. However, the female incubated the eggs at night, while the male roosted on a higher branch of the tree. The eggs were often left unattended for a few minutes during the morning and evening. Both parents share incubation duties, but not equally; the male spends significantly less time than the female. Additionally, they communicate effectively via specialized calls when switching duties and frequently bring nesting materials and repair the nest.

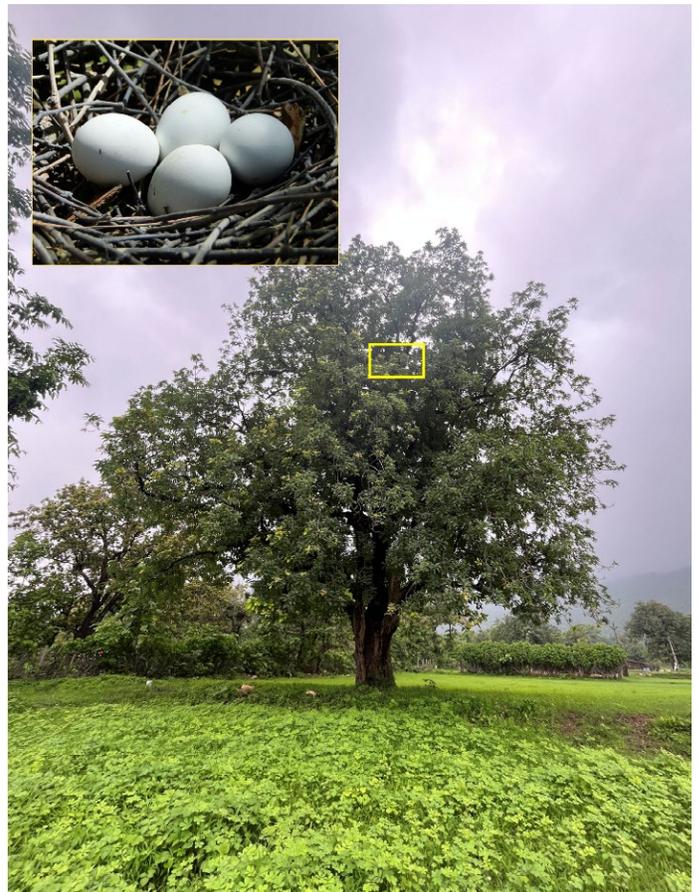


Image 2: The nest tree, Mahua, and the yellow square showing the height of the nest.

Prey, Diets & Nestling: This pair of Shikra delivered a total of 269 kills/prey to the nest over a six-week period, feeding the chicks. These kills were identified and categorized into four vertebrate classes: 3 amphibians, 224 reptiles, 5 birds, 26

mammals, and 11 unidentified prey items (**Table 3; Image 3**). The most abundant prey, 201 (74.72%), are common garden lizards, *Calotes versicolor*, and the second-highest, 11 (4.08%), are northern palm squirrels, *Funambulus pennanti* (**Image 3A**). For the entire six weeks, the female fed all the prey; on two occasions, the male attempted to feed the chicks (**Image 4B**), but the female landed on the nest immediately, and the male flew away. However, we are uncertain whether females hunt all prey; often, males hunt prey and bring it to the nesting tree on an upper or lower branch, from which females collect it. This information was gathered from recorded video clips, images from an auto-camera, and direct observations.



Image 3: Female parent feeding different types of prey to chicks; with Indian myna (A), with prey of a frog (B), the chick holding prey as a gecko (C), and the parent bringing a northern squirrel to feed the chicks (D).

**Feeding frequency:** We continued to monitor the pair and the chick's prey-delivery activities using automated cameras and direct observations. After six weeks, both parents continued to bring prey to feed the chick; data collection was challenging because they were constantly hunting. Since all nestlings are active and can move to higher or lower branches of the tree, most activity occurs outside the cameras' view. Therefore, we only analyzed data from these six weeks. The parents made 269 prey flights, averaging about 6.4 flights per day by the end of the period. Prey was delivered to the chicks each week, as shown in **Fig. 1**. Prey delivery across different time zones is shown in **Fig. 2**. Overall, peak feeding occurred in the morning at 43% (115 flights) and was lowest in the evening at 23% (62 flights). The first recorded feeding flight was at 05:49 h on May 13, 2025, and the last at 18:51 h on May 9, 2025. These times indicate the Shikra's prey and foraging activities within the study area. The highest number of prey deliveries was observed on May 10, 2025. Both parents were active in feeding

and caring for the hatchling, though the female was more dedicated to feeding, caring, and sanitizing the chick.



Image 4: The various stages of both parents: Female incubates, and male brings nesting material (A); male brings prey and attempts to feed the chick in female presence (B), in the absence of female, eggs are guarded by male (C), and incubation duty changes by female and male (D).

**Fledglings' Growth and Behaviours:** The changes in plumage color and chick growth from hatching through the end of the sixth week were observed (**Images 5 & 6**). By the end of this six-week period, the chick was fully developed and roughly the size of an adult, except for its colour plumage.



Image 5: The chick's growth: On May 1, 2025, a chick hatched, and the eggshell was removed by the female (A), on May 7, a one-week-old chick and a female with a prey garden lizard were observed (B), two-week-old chicks engulfed a small lizard (C), and three-week-old chicks (D) were observed.

We documented ontogeny, neonatal development, and other growth stages in the chick. Behaviors such as head-raising, wobbling, food begging, wing-flapping, jumping, hopping, and prey-tearing were recorded during the study. The gradual development of the chick from the first to the sixth week was also tracked. Overall, the nestling period was 37-42 days observed in this study. After six weeks, none of the nestlings

had come to the nest at night. However, they sometimes visited the nest during the day to eat prey; in those cases, the prey was either obtained from the parents or hunted independently.



Image 6: Chick growth. On May 18, 2025, a four-week-old chick (A) appears almost the size of its parents (B); six-week-old chicks are capable of tearing and feeding on prey individually (C); and an eight-week-old chick with a prey garden lizard (D).

**Parental care:** Both parents are involved in raising the young, but their duties are shared unequally. The male often hunts and brings prey to the nesting tree, rarely directly to the nest, whereas the female assumes the primary role by tearing off small pieces and feeding the chick. In some cases, female also hunt and bring prey to the nest to feed the chicks.



Image 7: Parental care: female with spread wings for protection against sunlight (A), uneaten food thrown from the nest as a form of sanitation by the female (B), aggression against intruders at night (C), and the female protecting chicks during rain (D).

Both parents communicate using distinct, typical calls. At night, the female stays in the nest with the chick, whereas the male roosts on an upper branch of the nest. After four weeks, the chick remains alone in the nest, while both parents roost in the top branch of the tree. We observed that only the

female cleaned by removing prey remains, covering the chicks from direct sunlight, protecting them from rain, and disposing of carcasses (**Image 7**). Additionally, both parents continued to repair the nest during incubation and nestling rearing.

## Discussion

The breeding season for the Shikra was recorded from April to June in the study. This pair of Shikra built a nest on a large Mahuva (=Mahuvdao) tree at a height of 25 meters. The nesting season, height, and nest construction are comparable to those noted in the earlier studies (Dharmakumarsinhji 1955; Suryawanshi 2021; Upadhyay et al. 2023). The nestling period was observed for six weeks in the study, as noted by Suryawanshi (2021). However, the 100% success (four chicks) in breeding and their care, from incubation to feeding, was primarily the female's responsibility, with less involvement by the male Shikra; similar results were reported by Suryawansi (2021).



Image 8A & 8B: Shikra female with a prey garden lizard (Photo Credit: Devvratsinh Mori)

The study's key finding is the diet composition of a specific pair of Shikras. The parents hunted and brought 14 different prey items in 269 flights over a six-week period. This shows prey selection and abundance within the study area and aligns with the hunting abilities of the Shikras. The abundance of Saurian prey (83.27%) in nestling diets (**Fig. 3**), with Calotes as the dominant prey (**Image 8**), indicates that the lizard Agamidae is widely available in the landscape during the study period. The second-highest prey group is mammals (9.66%), with the target being the Northern palm squirrel (*Funambulus pennanti*), another common prey in the area. However, both

target species are arboreal and require skilled hunting tactics, as evidenced by this hawk.

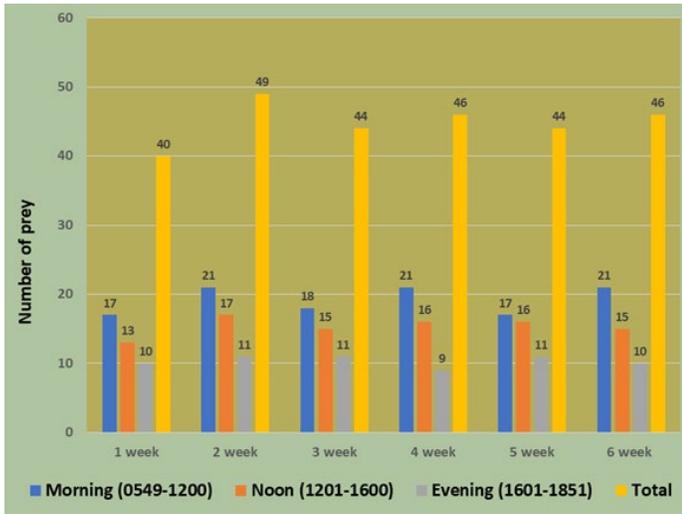


Fig. 1: The weekly fight frequency of prey delivery to chicks by the parents.

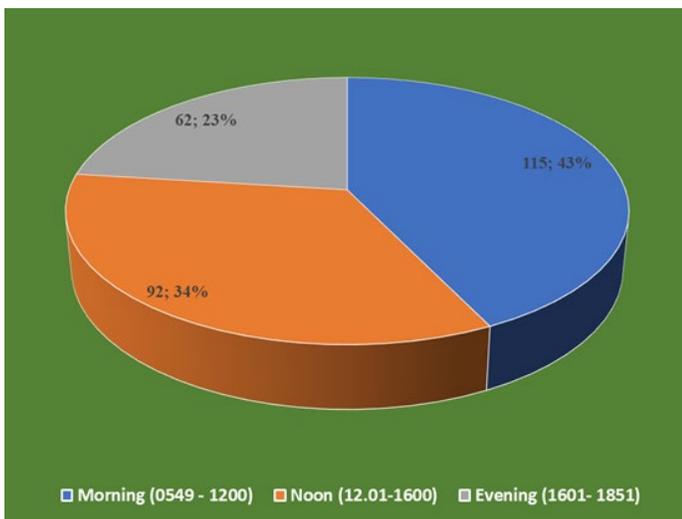


Fig. 2: Fight frequency of prey delivery in different time zones

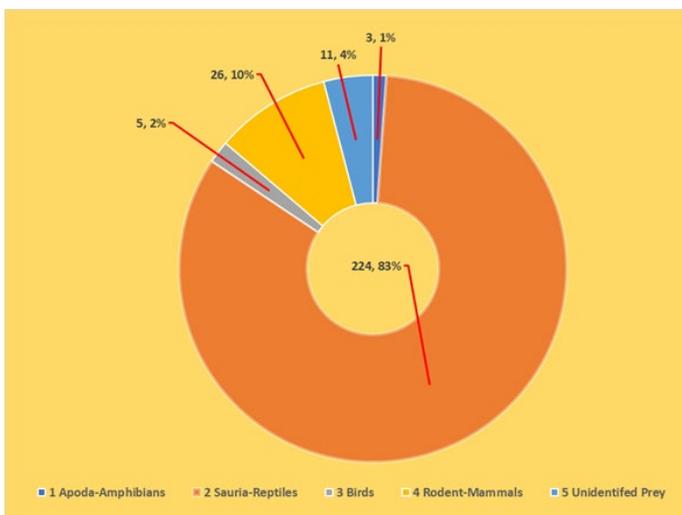


Fig. 3: Composition of foods offered to Shikra's chicks by the parent.

In an earlier study, Suryawanis (2021) reported that 90% of saurian reptiles are in the Shikra diet. Also, similar findings were observed, such as high percentages of saurian diets, among other raptors, including Short-toed Snake Eagle (*Circaetus gallicus*), with 45.83% lizards in its diet (Mori et al. 2017), and Laggar Falcon (*Falco jugger*), with 82% lizards in its diet (Mori et al. 2023). However, all three raptor studies from dry habitat states, Gujarat and Rajasthan in western India, indicate that saurian diversity and abundance play significant roles in the diet composition of these raptors, particularly during breeding seasons. Thus, the prey-predator relationship is a crucial factor in both breeding success and predator survival.

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**Table 1. Morphometrics of Shikra on a nest on a Mahua tree**

Parameter	Details
Tree height	24.5 m
Girth of the tree trunk	436 cm
Height of the nest above the ground	21.5 m
Diameter of the branch supporting the nest	17 –21 cm
Diameter of the nest outer circumference	45–48 cm (circumference)
Height of nest	35–40 cm
Depth of the nest cup	6–9 cm
Nest orientation in relation to the nest-tree-trunk	North-East

**Table 2. List of nesting materials used by Shikra**

Nesting Material	Leaves and stick - Neem <i>Azadirachta indica</i>
	Leaves, stick, seeds: Mahua <i>Madhuca longifolia</i>
	Sticks - Teak <i>Tectona grandis</i>
	Sticks - Khejri <i>Prosopis cineraria</i>
	Unidentified plants stick
	Unidentified tree barks

**Table 3: List of prey species and quantities delivered by Shikra parents to nestlings over six weeks**

No	Species	Total No. of Prey	%
	<b>AMPHIBIA</b>	<b>= 3</b>	<b>1.11</b>
1	Unidentified Frog ( <i>Dicroglossidae</i> )	3	1.11
	<b>REPTILES</b>		
	<b>Family Agamidae</b>	<b>= 224</b>	<b>83.27</b>
2	Co. garden lizard <i>Calotes vultuosus</i>	201	74.72
3	Fan-throated lizard <i>Sitana spinaecephalus</i>	8	2.97
	<b>Family Gekkonidae</b>		
4	Northern house gecko <i>Hemidactylus flaviviridis</i>	5	1.85
	<b>Family Lacertidae</b>		
5	Snake-eye lacerta <i>Ophisops sp.</i>	2	0.74
	<b>Family Scincidae</b>		
6	Skink <i>Eutropis sp.</i>	7	2.60
7	Snake-skink <i>Riopa sp.</i>	1	0.37
	<b>BIRDS</b>	<b>= 5</b>	<b>1.85</b>
8	Indian myna <i>Acridotheres tristis</i>	2	0.74
9	Common Babbler <i>Argya striata</i>	1	0.37
10	Unidentified bird	2	0.74
	<b>MAMMALS</b>	<b>= 26</b>	<b>9.66</b>
	<b>Family Sciuridae</b>		
11	Northern palm squirrel <i>Funambulus pennanti</i>	11	4.08
	<b>Family Muridae</b>		
12	Common house rat <i>Rattus rattus</i>	9	3.34
13	Unidentified mammals	6	2.23
14	Unidentified Prey/Kills	= 11	4.08
	<b>Total Prey =</b>	<b>269</b>	

## References

- Ananian, V., Aghababayan, K., Tumanyan, S., Janoyan, G. & Bildstein, K. 2010. Shikra *Accipiter badius* breeding in Armenia. *Sandgrouse* 32 (1): 151–155.
- Barve, S., Raman, T. S., Datta, A. & Jathar, G. 2020. When and how to study the nesting biology of Indian birds: Research needs, ethical considerations, and best practices. *Indian BIRDS* 16 (1): 1–9.
- Biddulph, C. H. 1937. Number of eggs laid by the Indian Shikra [*Astur badius dussumieri* (Temm. & Lang.)]. *Journal of the Bombay Natural History Society* 39 (2): 406.
- Champion, H. G. & Seth, S. 1967. Revised Survey of the Forest Types of India. – Manager of Publication, Government of India, New Delhi. 404 p.
- Campbell, O. 2018. Recent sudden expansion in the breeding range of Shikra *Accipiter badius* in the UAE. *Tribulus* 26: 65–70.
- Dharmakumarsinhji, R. S. 1955. *Birds of Saurashtra, India: With additional notes on the birds of Kutch and Gujerat*. Published by the author. Pp. 561.
- Heiss, M & Gauger, K. 2009. The rediscovery of breeding Shikras *Accipiter badius* in the Western Palearctic. *Sandgrouse* 31: 134–137.
- Lamba, B. S. 1964. Nidification of some common Indian birds. The Shikra. *Accipiter badius* (Gmelin). *Records of the Zoological Survey of India, Occasional Paper No. 62* (1–2): 11–20.
- Kemp, A. C. & Kirwan, G.M. 2024. Shikra (*Tachypiza badia*), version 1.1. In *Birds of the World* (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.shikra1.01.1>
- Khan, M.R., Sultana, A. & Hussain, M.S. 2024. Feathered success: Shikra breeding in Delhi's Aravalli Biodiversity Park, a restored habitat. *Bird-o-soar* #241, In: *Zoo's Print* 39(7): 20–22.
- Mori, D., Vyas, R. & Upadhyay, K. 2017. Breeding biology of the Short-toed Snake Eagle *Circaetus gallicus*. *Indian BIRDS* 12(6):149–156.
- Mori, D., Vyas, R. & Kini, S. 2023. Monitoring a nest of Laggar Falcons *Falco jugger*. *Indian BIRDS* 19 (1): 1–9.
- Mori D., Vyas, R. & Tere, A. 2026. A study on the Avifaunal diversity at Polo Forest, Northern Gujarat, India. *International Journal of Research and Analytical Reviews* 13 (1): 285-303.
- Naoroji, R. 1983. Shikra: Reflections from a hide. *Sanctuary Asia* III (1): 50–58.
- Naoroji, R. 2006. *Birds of prey of the Indian Subcontinent*. 1st ed. London: Christopher Helm. Pp. 704.
- Nurza, A., Mulyawati, D., Husnurrizal, Jaya, R. L., Sanir, T.M. & Noske, R. 2009. First breeding records of Shikra *Accipiter badius* in Indonesia. *Kukila* 14: 54–58.
- Parekh, J. 2025. Observation notes on the breeding of Shikra *Accipiter badius* in Kachchh. *Flamingo Gujarat* 8 (1-2): 20–24.
- Phillips, W. W. A. 1933. Some observations on the nesting of a pair of Ceylon Shikra Hawks (*Astur badius badius* Gmelin). *Journal of the Bombay Natural History Society* 36 (2): 509–511.
- Suryawanshi, K. 2021. Nesting behaviour and diet of Shikra *Accipiter badius* in Ajanta, Maharashtra. *Indian BIRDS* 17 (2): 50–53.
- Upadhyay, K., Mori, D. & Patel, M. 2023. Observation of a Leucistic female Shikra *Accipiter bandius* at a nest near Pavagadh Hill, Gujarat. *Flamingo Gujarat* 6 (2): 54-60. □