

# Population status and breeding ecology of critically endangered Long-billed Vulture *Gyps indicus* in Barmer and Jaisalmer, India

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The present study evaluates the status of the Long-billed Vulture (LBV) (*Gyps indicus*) in the arid areas of Barmer and Jaisalmer districts, situated in the Thar Desert region of Rajasthan, India. Field surveys were conducted from 2021–2024. The study elucidates the nesting ecology, breeding outcomes, and population dynamics of the LBV across three consecutive breeding seasons (October 2021–May/June 2022, October 2022–May/June 2023, and October 2023–May/June 2024). The LBV nests were primarily found on hilly or cliff regions. A total of 35 nests were recorded across ten sites. During the first breeding season (October 2021–May/June 2022), the reproductive success was calculated as 100%, while in the second breeding season (October 2022–May/June 2023), it was calculated as 60%, and third breeding season (October 2023–May/June 2024) it was calculated as 62.5% giving an overall reproductive success of 74.17% during the 3 consecutive breeding years. The mean incubation period is  $\pm 54.89$  days, the standard deviation (SD) is  $\pm 3.59$ , the standard error of the mean is  $\pm 1.15$ , and the standard error is  $\pm 1.20$ . The mean nestling period is  $\pm 105.78$  days, the SD is  $\pm 3.27$ , the standard error of the mean is  $\pm 1.01$ , and the standard error is  $\pm 1.09$ . Meanwhile, the hatching time did not differ significantly across the years. During the research period, the mean and SD of population in the Barmer and Jaisalmer districts for the years 2021, 2022, 2023, and 2024 were mean  $\pm$  SD,  $35.17 \pm 9.13$ ,  $40.34 \pm 11.19$ ,  $45.17 \pm 12.59$ , and  $49.92 \pm 12.29$ , respectively. The population trend was calculated from all four years in both districts. The linear population trend in the years 2021, 2022, 2023, and 2024 was, respectively,  $R^2 = 0.0129$ ,  $R^2 = 0.0306$ ,  $R^2 = 0.0107$ , and  $R^2 = 0.0438$ . Key threats contributing to the decline of LBV populations include mining activities, habitat loss, electrocution, anthropogenic disturbances, and food scarcity.

**Keywords:** Barmer, breeding ecology, Jaisalmer, Long-billed Vulture, population.

VULTURES are medium to large birds of prey, renowned for their role as nature's most efficient scavengers. They

primarily feed on carrion from both domesticated livestock and wild animals, making them vital to the health of the ecosystem<sup>1</sup>. They play a crucial role in maintaining environmental cleanliness by consuming animal carcasses. The acidic environment in their stomachs can destroy many harmful microorganisms, thereby reducing the likelihood of disease transmission<sup>2</sup>. Vultures have ecological, socio-cultural, and religious significance due to their essential scavenging roles<sup>3–5</sup>. Their large, wide wings contribute to long-distance soaring efficiency. Due to their long lifespans, need for vast territories, specialised feeding habits, position at the top of the food chain, and low reproduction rate, vultures are especially susceptible to changes in their environment.

Of the nine species of vultures found in various habitats across India<sup>6</sup>, a total of seven species were found in Rajasthan: the Eurasian Griffon Vulture (*Gyps fulvus*), Himalayan Griffon Vulture (*Gyps himalayensis*), and Cinereous Vulture (*Aegypius monachus*), which is a migratory species, along with the Red-headed Vulture (*Sarcogyps calvus*), Egyptian Vulture (*Neophron percnopterus*), White-rumped Vulture (*Gyps bengalensis*), and Long-billed Vulture (LBV) (*Gyps indicus*), all of which are resident species in Rajasthan<sup>7</sup>.

The LBV (*Gyps indicus*) (also known as the Indian vulture) is one of the vulture species currently found in India. It was previously reported in southeast Pakistan, Nepal, Bangladesh, and peninsular India<sup>8–10</sup>. It was once well documented in various parts of India, extending from the Nilgiris in the north to Madhya Pradesh in the east, south of the Gangetic plain, and occasionally even farther south<sup>11</sup>.

The Indian vulture is a medium-sized vulture with a light brown body. Adults have a dark head and neck, with small white spots on the back of the neck, and a white downy ruff. Their bodies are sandy-brown, and their upper wings have whitish feathers. Juveniles have browner overall plumage with light streaks on the breast and belly, a dark bill with more white feathering on the tip and neck, and a fluffy buff neck ruff<sup>12</sup>.

In Rajasthan, they feed, roost, nest, and breed in many districts, viz., Jaisalmer, Barmer, Bikaner, Churu, Udaipur, Jalore, Jodhpur, Pali, and Sikar<sup>7</sup>. They use various types of plant materials in nest construction and collect nesting

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