RESEARCH PAPER

Population density of Blue-tailed Bee-eater (*Merops philippinus*) birds in different zones of Hanumanahalli Village, Gangavathi Taluk, Karnataka, India

Krishna Kumar*, Dr. A. Shwetha

Department of P.G Studies and Research in Applied Zoology, Kuvempu University,
Jnana Sahyadri, Shankaraghatta, Shivamogga District, Karnataka, India

Abstract

This study investigates the population density of Blue-tailed bee-eater birds in different zones of Hanumanahalli village, Gangavathi Taluk. We chose this location due to its diverse ecosystems, making it suitable for both resident and migratory bird activities like breeding and nesting. The Blue-tailed bee-eater, a summer migratory bird, regularly visits the area to construct sand nests along riverbanks, benefiting from the presence of suitable loamy soil. Data collection occurred from January 2020 to December 2022, with weekly surveys conducted. The primary objective was to determine the Percentage of population density of Blue-tailed bee-eater birds in the different zones. The survey revealed distinct population pattern across the zones, with riverine areas, croplands, and urban areas having highest, optimum, and lowest percentages, respectively. The variations in population distribution are attributed to factors such as food availability (insects, especially bee-eaters), suitable loamy soil for nesting, and the need for protection from human-related disturbances in their habitats.

*Corresponding Author: Krishna kumar ✉ kkz.bio@gmail.com

Introduction

Our planet teems with a diverse array of organisms, ranging from tiny microorganisms like viruses and bacteria to magnificent macroorganisms such as plants and animals, forming the tapestry of biodiversity (Dhindsa and Saini, 1994; Hosetti, 2008).

Among these, avifaunal diversity, which encompasses the variety of bird populations, plays a vital role in maintaining ecological equilibrium by enriching flora and fauna. Bird populations and ecosystem pollution share an intriguing relationship, as estimating bird densities offers insights into the abundance of other species within the ecosystem (Wilson and Comet, 1996; Blake, 2007; Hosetti, 2001).

Among the fascinating avian species, *Merops philippinus*, widely known as the Blue-tailed bee-eater, stands out. These captivating birds belong to the Meropidae family and are renowned for their vivid plumage and unique feeding habits. Found across various regions in Asia, the Blue-tailed bee-eater is a migratory wonder, embarking on seasonal journeys in response to changing environmental conditions (Inskipp *et al.*, 1995).

Their diet primarily consists of insects, particularly bees, wasps, and other flying insects. Breeding seasons for these bee-eaters vary across their range, and they exhibit a remarkable nesting behavior. Creating their nests through burrowing into sandy or loamy soil banks, typically in proximity to water sources, these birds exhibit a preference for colonial nesting behavior, assembling into vibrant and interactive breeding colonies.

As they embark on their migratory journeys, these enchanting avian migrants often grace the study area, completing their breeding cycle within this locale.

This inquiry unveils noteworthy insights into the population density trends of Blue-tailed Bee-eater birds across various zones within Hanumanahalli Village, located in Gangavathi Taluk, within the state of Karnataka.

Materials and methods

Study area

Hanumanahalli, a quaint village, stretches over approximately 5 kilometers, encompassing a diverse landscape of mountains, rivers, agricultural lands, and forests. With a human population of 649 residents, it falls under the jurisdiction of Sanapur Gram Panchayath (GP) in Gangavathi Taluk, Koppal District, Karnataka State.

Situated at an average elevation of 472 meters above mean sea level (MSL), the village is located 14 kilometers away from GangavtahiTaluk and 29 kilometers from Hosapete in Vijayanagara District.

One of the prominent features of Hanumanahalli is its proximity to a massive dam built across the Tungabhadra River near Hosapete. As a result, the river backwaters flow into this village, creating an environment rich in high vegetation and favorable conditions for various bird species. The abundance of water and lush greenery provides an ideal habitat for birds, making Hanumanahalli an attractive location for avian activities, including breeding and nesting.
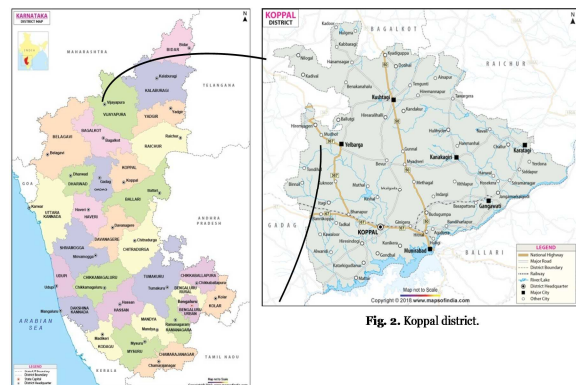
Study area maps

Fig. 1. Karnataka State.
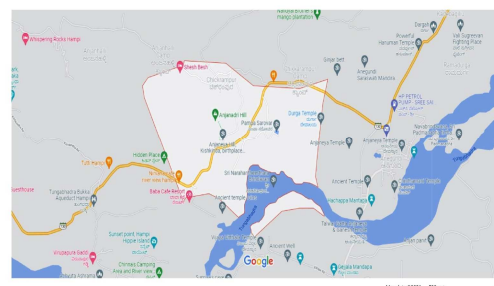

Fig. 2. Koppal district.

Fig. 3. Hanumanahalli, Gangavathi taluk.

Source: Maps of India.

Photographs of different lands

Fig. 4. Riverine area.

Fig. 5. Cropland area.

Fig. 6. Urban area.

Methodology

Data collection for this study involved regular weekly observations of the study area over a period of 36 months, from January 2020 to December 2022. Following the approach used in the study "Avifaunal diversity of Nagpur City, MS, India" by Wanjari (2012), the survey was conducted four times a month.

The observation times were set from 06:30 am to 10:30 am and from 04:00 pm to 07:00 pm. To aid in bird identification, binoculars (Olympus 10x50) were utilized and field guides recommended by Ali (2002) and Grimmett *et al.* (2011) were consulted. For certain bird species, photographs were taken to assist in accurate identification.

Different methods were employed for identifying the birds based on their characteristics. Visual counting surveys were used for identification as suggested by Crump and Scott (1994), Manley *et al.* (2005), and Joshi (2014). Additionally, direct counts of the birds were performed by walking through the study area, following the approach presented by Rajashekara and Venkatesha (2010). These varied techniques contributed to a comprehensive and accurate assessment of the avian diversity in the study region.

Results

Observations

In this study, we observed that the populations of Blue-tailed bee-eater (*Merops philippinus*) birds vary across all different zones.
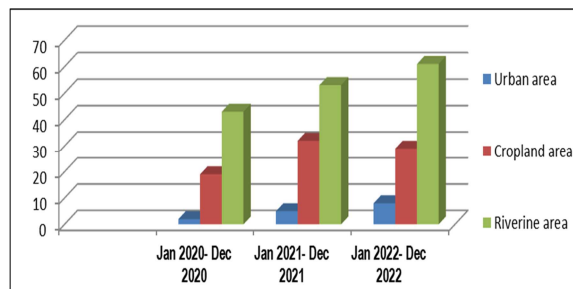

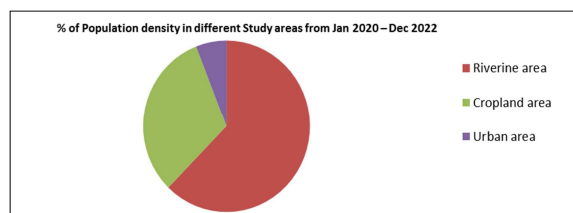**Fig. 7.** *Merops philippinus* birds photographs collected in study area0

Reports

Table 1. Percentage of population density of Blue-tailed bee-eater bird (*Merops philippinus*) in different zones of study area.

SL.	Period of Data collected	Urban area	Cropland area	Riverine area	Total
1	Jan 2020-Dec 2020	2	19	43	64
2	Jan 2021-Dec 2021	5	32	53	90
3	Jan 2022-Dec 2022	8	29	61	98
Total No of Birds		15	80	157	252
% of Population Density		5.95 %	31.75 %	62.3 %	100 %

Fig. 8. Histogram chart showing year wise Percentage of population density of Blue-tailed bee-eater bird (*Merops philippinus*) in different zones of study area.

Fig. 9. Pie chart showing Percentage of population composition of Blue-tailed bee-eater bird (*Merops philippinus)* in study area from Jan 2020-Dec 2022.

Discussion

The survey is based on the population density of Blue-tailed bee-eaters (*Merops philippinus*) in different zones of Hanumanahalli village, Gangavathi Taluku. According to Inskipp *et al.* (1995), Blue-tailed bee-eaters are migratory birds, and they appear only under favorable conditions, such as sufficient food, shelter, and low anthropogenic activities. From this survey, we observed an unequal distribution of bee-eater birds as shown in Table I and in Fig. 8 and 9. The population of these birds is higher in riverine areas, with 157 birds, accounting for 62.3%. They are moderately represented in cropland areas, with 80 birds, constituting 31.75% of the population. The bird population is relatively low in urban areas, with only 15 birds, making up 5.95% of the total during the survey period.

The varying population distribution of *Merops philippinus* birds can be attributed to three main factors:
Availability of food
As insectivorous birds, Blue-tailed bee-eaters primarily feed on bees and other flying insects. The abundance of their preferred food sources in riverine areas makes these zones highly favorable for their population.

Suitable nesting habitat

The availability of loamy soil in the riverine areas provides an ideal environment for the construction of nests. Blue-tailed bee-eaters prefer to dig burrows in sandy or loamy soil along the riverbanks, offering a conducive nesting site.

Protection from anthropogenic activities

Riverine areas are often less disturbed by human-related activities, providing a safer environment for the birds to breed and raise their young. Urban areas, on the other hand, may experience higher levels of human disturbance, leading to a lower population of Blue-tailed bee-eaters in these zones.

Conclusion

Conclusively, the outcomes of this survey have illuminated an uneven distribution of bee-eater birds, vividly depicted in Table I and elucidated further by Fig. 8 and 9. The avian populace exhibits a noticeable preference for riverine areas, composing 62.3% of the total, where they have established their presence. They are moderately represented in cropland areas, accounting for 31.75% of the population that has chosen to inhabit these zones. In contrast, urban areas boast a relatively modest bird count, with a mere 5.95% of the overall population during the survey duration. This distinctive pattern in the population distribution of *Merops philippinus* birds is attributed to favorable conditions such as the availability of food, including flying insects like bees, the presence of loamy soil for nest construction, and reduced human-related disturbances. Riverine areas benefit from good food availability, ample loamy soil, and lower anthropogenic activity. Croplands exhibit an optimal range of food availability, a moderate amount of loamy soil, and intermediate anthropogenic activity. Conversely, urban areas experience scarce food resources, limited loamy soil, and high levels of anthropogenic activity. As a result of these factors, the population of *Merops philippinus* birds thrives more abundantly in the riverine areas of the study locale.

References

Ali S. 2002. The Book of Indian Birds **XIII ed**., Oxford University Press, Mumbai.

Bibby CJ, Jones M, Marden S. 1998. Expedition Field Techniques. Bird Surveys, Royal Geographical Society, London.

Blake JG. 2007. Neotropical Forest Bird Communities: A Comparison of Species Richness and Composition at Local and Regional Scales. Condor **109,** p. 237-255.

Crump ML, Scott NJ. 1994. Visual encounters surveys. In: Measuring and Monitoring Biological Diversity: Standard Methods for Amphibians(eds., Heyer, W. R., Donnelly, M.A., Mc Diarmid, R. W., Hayek, L. C. and M. S. Foster), Washington: Smithsonian Institution Press p. 84-92.

Dhindsa MS, Saini HK. 1994. Agricultural ornithology: An Indian perspective, Journal of Biosciences **19,** p. 391-402.

Gaston AJ. 1975. Methods for estimating bird populations. J. Bombay Nat. Hist. Soc **72,** p. 271-283.

Gibbons DW, Hill DA, Sutherland WJ. 1996. Birds. In: Ecological Census Techniques (Sutherland, W.J. ed.), Cambridge, Cambridge University Press p. 227-259.

Grimmett R, Inskipp C, Inskipp T. 2011. Birds of the Indian Subcontinent. II ed., Oxford University Press, India.

Hosetti BB. 2001. Glimpses of Biodiversity, Daya Publishing House, Delhi. II ed., p. 78-90

Hosetti BB. 2003. Wildlife Management in India, II ed., Pointer Publishers, Jaipur I ed., p. 21-28.

Hosetti BB. 2008. Concepts in Wildlife Managements, III ed., Daya Publishing House, Delhi.

Hughes JB, Daily GC, Ehrlich PR. 1997. Population diversity: its extent and extinction. Science **278**, p. 689-692.

Inskipp C, Inskipp T. 1995. Birds of the Indian Subcontinent: An Overview, Sanctuary Asia **25(5),** p. 16-27.

Joshi PS. 2014. Diversity and Population Dynamics of Ophidian Fauna from Buldhana District, Maharashtra (India). Ph.D., Thesis, SGBAU, Amravati. p. 25-38.

Manley PN, Horne BV, Roth JK, Zielinski WJ, McKenzie MM, Weller TJ, Weckerly FW, Vojta C. 2005. Multiple species inventory and monitoring technical guide. Version 1.0 (Pre-print), USDA Forest Service 1-193.

Rajashekara S, Venkatesha MG. 2010. The diversity and abundance of water birds in lakes of Bangalore city, Karnataka, India. Biosystematica **4(2),** p. 63-73.

Simeone A, Araya MB, Bernal M, Diebold EN, Grzybowski K, Michaels M, Teare JA, Wallace RS, Willis MJ. 2002. Oceanographic and climatic factors influencing breeding and colony attendance patterns of Humboldt Penguins Spheniscushumboldti in central Chile. Marine Ecology **227**, p. 43-50.

Sinha RK, Dubey M, Tripathi RD, Kumar A, Tripathi P, Dwivedi S. 2010. India as a Mega-diversity Nation. Archives of Environ News-Newsletter of ISEB India **16(4),** p. 14-19.

Sutherland WJ. 2001. The Conservation Hand Book: Research, Management and Policy. Blackwell Science Ltd., U.K.

Turner WR. 2003. City-wise biological monitoring as a tool for ecology and conservation in urban landscapes: The Case of the Tucson Bird Count. Landscape and Urban Planning **65,** p. 149-166.

Wanjari PD. 2012. Avifaunal diversity of Nagpur City, MS, India. Bionano Frontier **5(2-I)**, p. 124-126.

Wilson MF, Comet TA. 1996. Bird communities of northern forests: Patterns of diversity and abundance. The Condor **98(2),** p. 337-349.