

ADAPTATION TO URBAN ECOSYSTEMS ?

Morphometric trait variations of *Hemidactylus parvimaculatus* gecko individuals along an urban-rural gradient of Bengaluru, India.

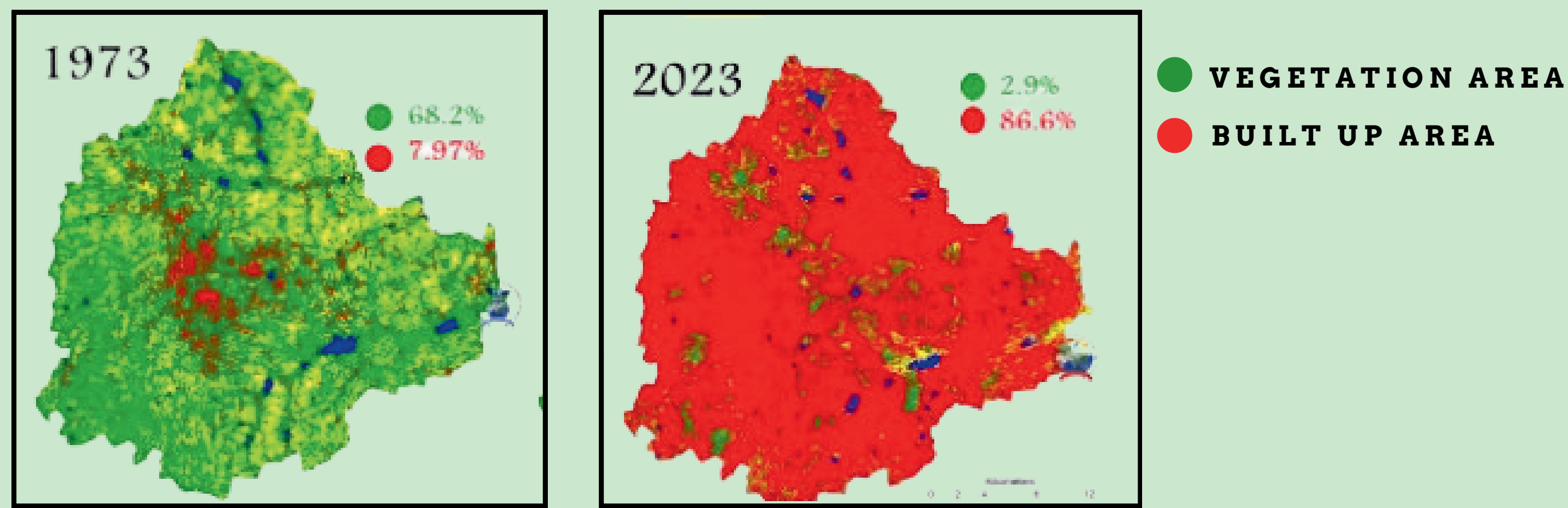


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CONTEXT

- **Urbanisation** is intensifying worldwide and in response to it, some species tolerate and exploit urban environments, while a few others keep out entirely from this new habitat.
- Understanding the factors that underlie tolerance of urbanization like the species' ability to adapt to rapidly changing environments through **morphological variations** is thus vital.
- The study aims to understand the impact of urbanization on geckos and investigated the variations in morphometric traits of *Hemidactylus parvimaculatus* along the urban-rural spatial gradient in **Bengaluru, Karnataka**



Bengaluru's urban growth from 1973 to 2023

METHODOLOGY

- A total of 70 adult *Hemidactylus parvimaculatus* geckos were collected from urban and rural areas of Bengaluru using random opportunistic sampling. An **Urban Heat Island index map** was used as guide to sampling in urban Bengaluru. (Chakraborty, T., & Lee, X. (2018)).
- 26 **morphometric traits** were measured, focusing on head and body dimensions.
- A **Principal Component Analysis (PCA)** was conducted to identify key traits contributing to the observed variation between urban and rural gecko populations.
- A **t-test** was performed to determine significant differences between the two populations.

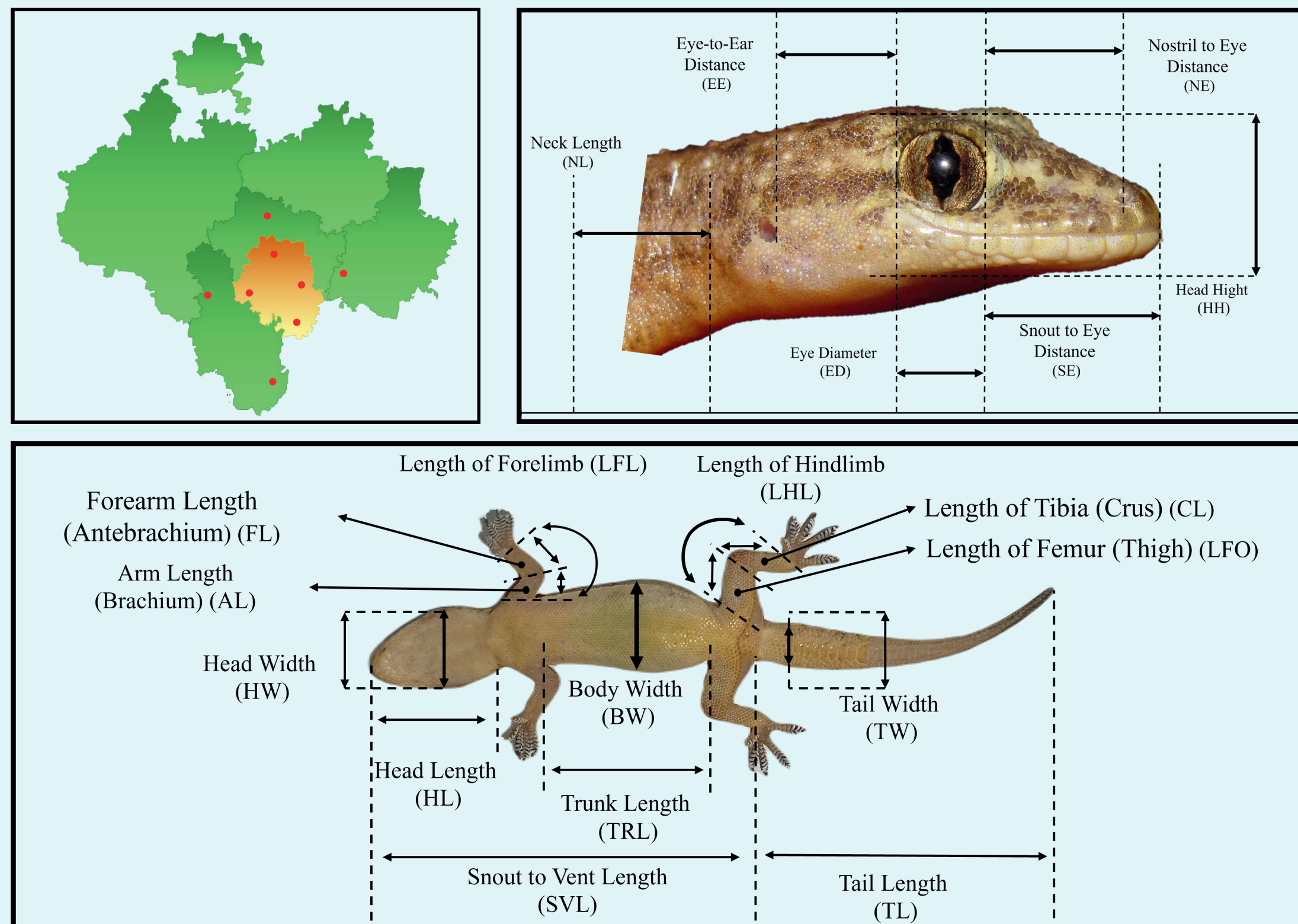


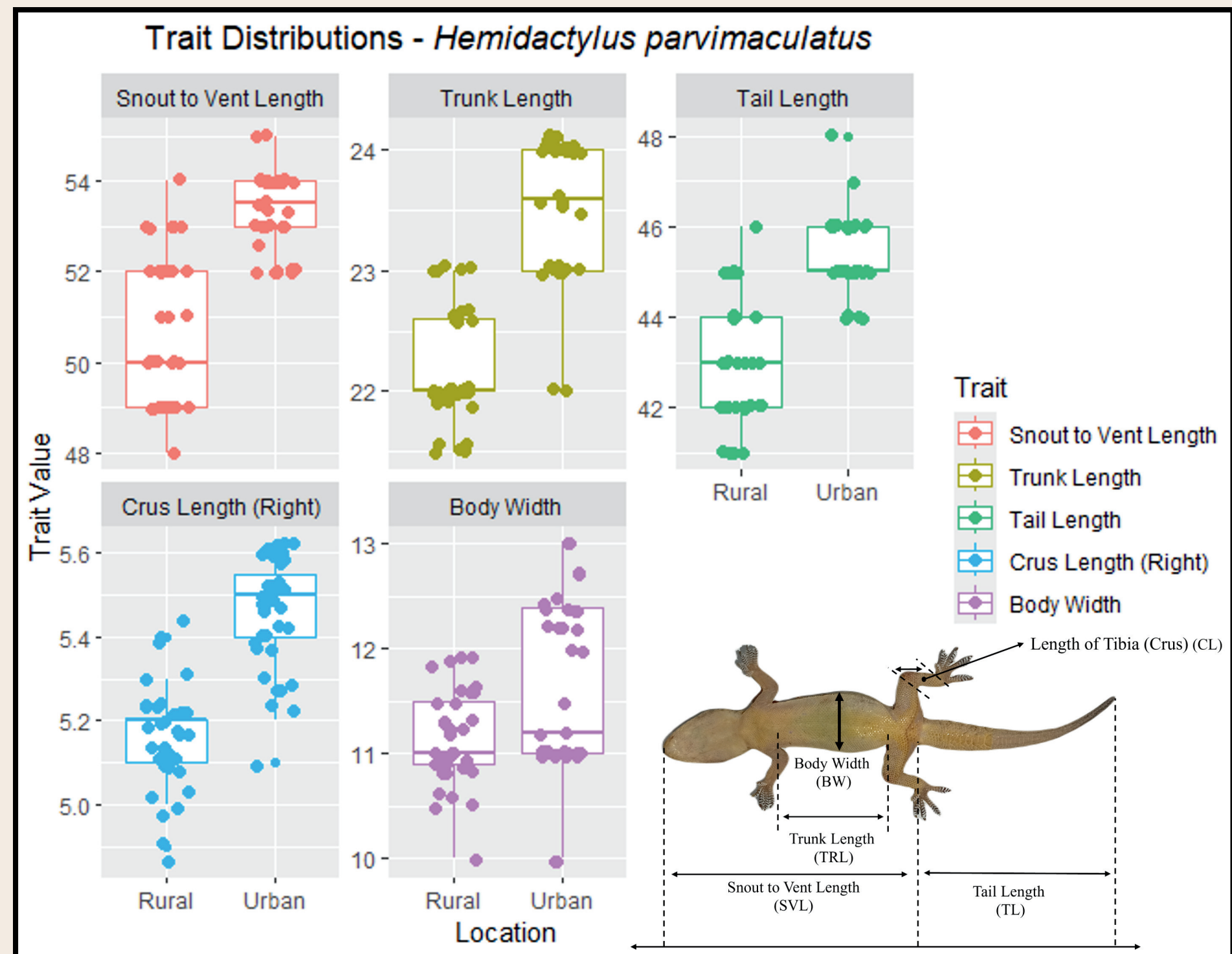
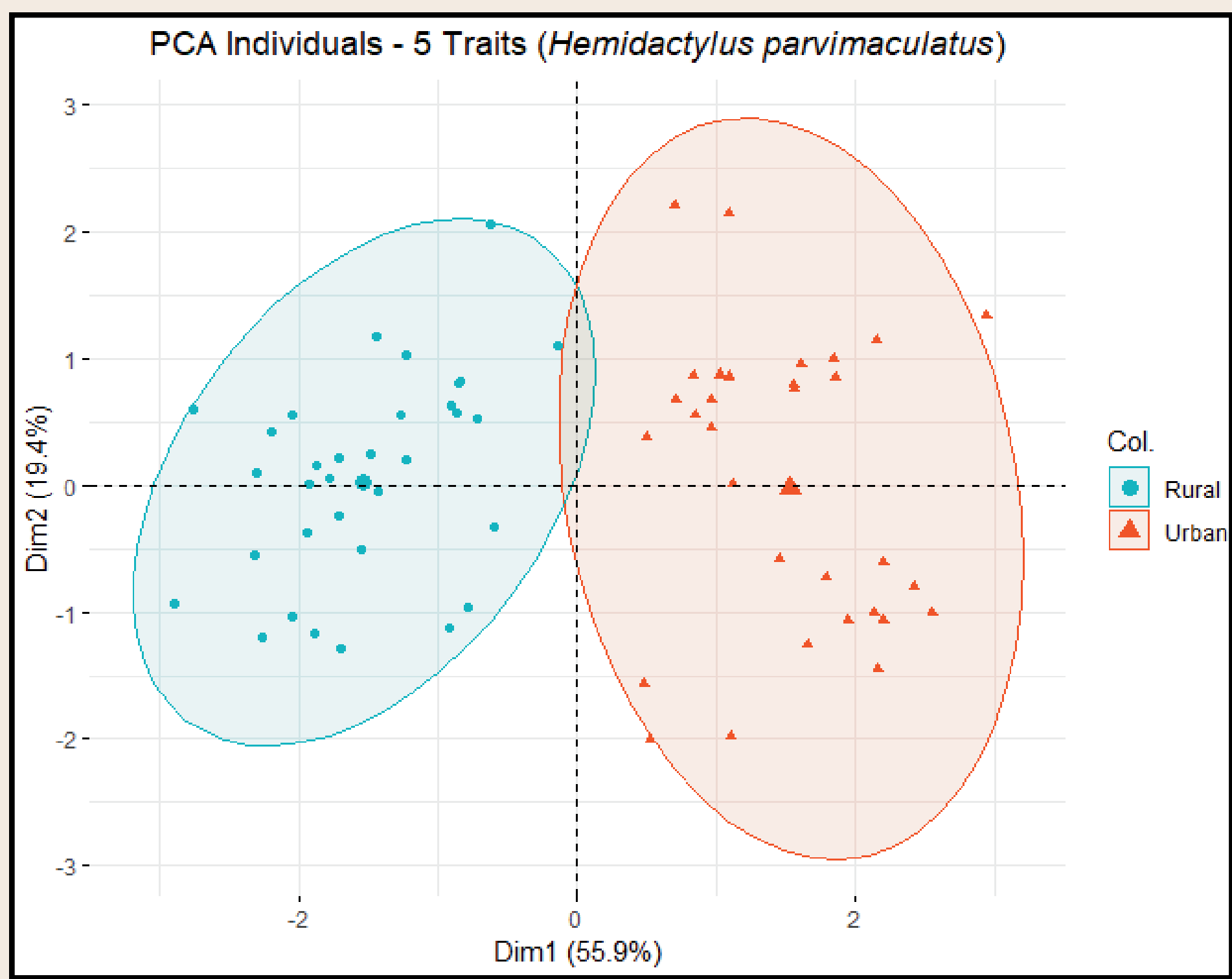
Figure shows the sampled areas in Bengaluru and a guide to the morphometric traits measured in *Hemidactylus parvimaculatus* geckos

STUDY SPECIES

- *Hemidactylus parvimaculatus*, or the spotted/Sri Lankan house gecko, is native to South Asia and the Indian Ocean region.
- They grow up to 13 cm (5 inches) with a **light grey to tan body featuring dark blotches in three rows**, thriving in habitats like rocky outcrops, gardens, and buildings.
- This species was chosen for the study because they are **ectothermic** (body temperature is regulated by the environment) and they show observable responses to environmental changes, making them ideal for research on urban and rural ecological variations.

RESULTS

- *Hemidactylus parvimaculatus* individuals were sampled from all cardinal directions.
- 17 out of 26 traits (65%) showed significant variation ($p < 0.05$) between geckos.
- 5 of these 17 traits contributed most to the variability between urban and rural gecko populations.



DISCUSSION

Possible reasons for these morphometric differences:

- SVL: Variations in mobility and habitat use.
- TL: Increased agility and different modes of locomotion (especially for tail length).
- CL: Differences in feeding strategies and prey availability.
- TL/BW: Larger body size might help with temperature regulation in urban heat islands.

CONCLUSION

- Preliminary results could represent adaptations to urban ecosystems and the findings from the study will advance future functional morphological research.
- The future research will investigate the **relationships between trait variations and microhabitat usage**, offering insights into gecko responses to changing urban environments.

CITATIONS

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- Balakrishna, S., Amdekar, M. S., & Thaker, M. (2021). Morphological divergence, tail loss, and predation risk in urban lizards. Urban Ecosystems, 24(6), 1391-1398. <https://doi.org/10.1007/s11252-021-01122-6>
- T V Ramachandra, Bharath H Aithal, Vinay S, Bharath Setturu, Tulika Mondal, Abhishek Baghel, Bhuwan C Arya [2024], Bangalore Urban information System [BUiS] <https://wgbis.ces.iisc.ac.in/sdss/BUiS/>
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