

Range Extension and Ecological Insights into *Kani maranjandu* Kumar, Raj & Ng, 2017 (Decapoda: Brachyura: Gecarcinucidae) Based on an Opportunistic Observation from Pushpagiri Wildlife Sanctuary, Western Ghats, India

Ananya Kumar J.¹, Naveen Rowth² & Nemi Raj³

¹Assistant conservator of forest , karnataka forest department.

²Deputy Range Forest Officer, Karnataka Forest Department.

³Forest watcher , Karnataka Forest Department.

Note: * Indicates corresponding author

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*Corresponding Author

Email:

ABSTRACT

Kani maranjandu Kumar, Raj & Ng, 2017 is the only freshwater crab currently recognized as an obligately arboreal species from India and is endemic to the Western Ghats biodiversity hotspot. To date, its distribution has been restricted to Agasthyamala Biological Park in Kerala and Agumbe in Karnataka, suggesting a fragmented and poorly understood distribution. Here, we report a new locality record of *K. maranjandu* from Pushpagiri Wildlife Sanctuary, Karnataka, representing a significant extension of its known geographical range within the Western Ghats. The individual was opportunistically encountered on the forest floor beneath a *Holigarna grahamii* tree in an evergreen forest, approximately 500 m from the nearest perennial stream. Morphological examination confirmed the identity of the specimen as an adult female exhibiting the diagnostic characteristics previously described for the species. The terrestrial location of the encounter, despite the absence of visible phytotelmata in the immediate vicinity, suggests that *K. maranjandu* may periodically utilize the forest floor for activities such as foraging, dispersal, reproduction, or movement between arboreal microhabitats. Although based on a single opportunistic observation, the present record substantially broadens the known distribution of the species and highlights the need for systematic ecological investigations to better understand its habitat use, behavioural ecology, distributional limits, and conservation status throughout the Western Ghats.

1. Introduction

Freshwater crabs belonging to the family Gecarcinucidae constitute an important component of tropical freshwater ecosystems, where they contribute to nutrient cycling, decomposition processes, and food-web dynamics. The Western Ghats of India represent one of the global centres of freshwater crab diversity and endemism, harbouring numerous species with highly restricted distributions and specialized ecological adaptations. Despite considerable advances in the taxonomy of Indian freshwater crabs during the past two decades, the ecology, behaviour, and distribution of many endemic taxa remain poorly understood.

Among these, *Kani maranjandu* Kumar, Raj & Ng, 2017 is particularly remarkable because it is the only freshwater crab in India known to exhibit a fully arboreal lifestyle. The species was originally described from Agasthyamala Biological Park in the southern Western Ghats, Kerala, where individuals were observed inhabiting water-filled tree cavities (phytotelmata) at elevations ranging from approximately 160 to 1100 m above mean sea level. Subsequent ecological investigations further demonstrated its close association with arboreal phytotelmata, suggesting a high degree of habitat specialization. More recently, the species was reported from Agumbe in the central Western Ghats of Karnataka, extending its known range considerably northwards and indicating that its distribution may be broader than initially recognised.

Existing records consistently describe *K. maranjandu* as a predominantly arboreal species occupying evergreen and semi-evergreen forests, where both adults and juveniles exploit phytotelmata as important microhabitats. Nevertheless, information regarding its movement patterns, habitat connectivity, dispersal behaviour, and terrestrial activity remains extremely limited. Consequently, additional locality records accompanied by ecological observations are essential for improving our understanding of the species' natural history and informing future conservation assessments.

The documentation of new distribution records is particularly valuable for narrowly known freshwater crabs because such observations refine estimates of species distributions, identify previously unknown populations, and provide opportunities to document behavioural traits that may not be evident during targeted surveys. Opportunistic observations, although limited in scope, frequently contribute valuable ecological information for elusive or poorly studied taxa.

In the present study, we report the occurrence of *Kani maranjandu* from Pushpagiri Wildlife Sanctuary in the south-central Western Ghats of Karnataka, India. In addition to representing a noteworthy extension of the currently known distribution of the species, the observation provides preliminary evidence of terrestrial activity away from apparent arboreal breeding microhabitats. The ecological significance of this behaviour is discussed in the context of the species' known natural history and current understanding of arboreal freshwater crabs.

2. Study Area and Observation

2.1 Study Area

Pushpagiri Wildlife Sanctuary is situated in the Kodagu District of Karnataka within the south-central Western Ghats, one of the world's recognized biodiversity hotspots. The sanctuary comprises extensive tracts of tropical evergreen and semi-evergreen forests interspersed with montane shola-grassland mosaics, supporting a rich assemblage of endemic flora and fauna. The region experiences high annual rainfall associated with the southwest monsoon and contains numerous perennial streams that contribute to the diverse freshwater ecosystems characteristic of the Western Ghats.

The present observation was recorded near the Kothnadka Anti-Poaching Camp (12.564093° N, 75.675079° E) at an elevation of approximately 455 m above mean sea level (Fig. 1). The locality lies approximately 442 km north of the type locality in Agasthyamala Biological Park, Kerala, and approximately 122 km south of Agumbe, Karnataka, representing the third confirmed locality for *Kani maranjandu*. The aerial distances were calculated using the published geographical coordinates of previously documented records.

3. Observation

An opportunistic observation of *Kani maranjandu* was made on 05 June 2026 at approximately 08:15 h during routine field activities within Pushpagiri Wildlife Sanctuary. The individual was encountered moving across moist leaf litter at the base of a mature *Holigarna grahamii* tree in an undisturbed evergreen forest (Fig. 2).

The crab was carefully captured by hand for documentation, photographed in situ and under controlled conditions, and subsequently released unharmed at the exact location of capture immediately after examination. Species identification was confirmed through comparison with the original taxonomic description and subsequent literature describing the species. The identification was further corroborated through personal communication with freshwater crab taxonomist Sameer Kumar Pati and from the existing literature [1, 3].

The encounter site was located within a closed-canopy evergreen forest approximately 500 m from the nearest perennial stream. No conspicuous phytotelmata or water-filled tree cavities were observed on trees in the immediate vicinity of the observation site during the encounter.

4. Results

The observed individual was identified as an adult female based on the morphology of the thoracic sternum and abdominal characteristics. The specimen exhibited all diagnostic morphological characters previously reported for *Kani maranjandu*, including:

- relatively elongated ambulatory legs,
- strongly curved dactyli adapted for climbing,
- yellowish chelipeds,
- a transversely ovate carapace,
- predominantly black body coloration with a faint bluish tinge.

These characters correspond closely with the original species description and subsequent records from Agasthyamala Biological Park and Agumbe, thereby confirming the taxonomic identity of the specimen.

The present record represents the first documented occurrence of *Kani maranjandu* from Pushpagiri Wildlife Sanctuary and constitutes an important distributional extension within the Western Ghats. Collectively, the three confirmed localities indicate that the species occupies a broader geographical range than previously recognized, although its actual distribution remains insufficiently documented.

Unlike previous reports that consistently associated the species with arboreal phytotelmata, the present individual was encountered actively moving across the forest floor. Although this observation alone does not demonstrate regular terrestrial activity, it suggests that movement across the ground may occur under certain ecological circumstances.

4.1 Figure Legends

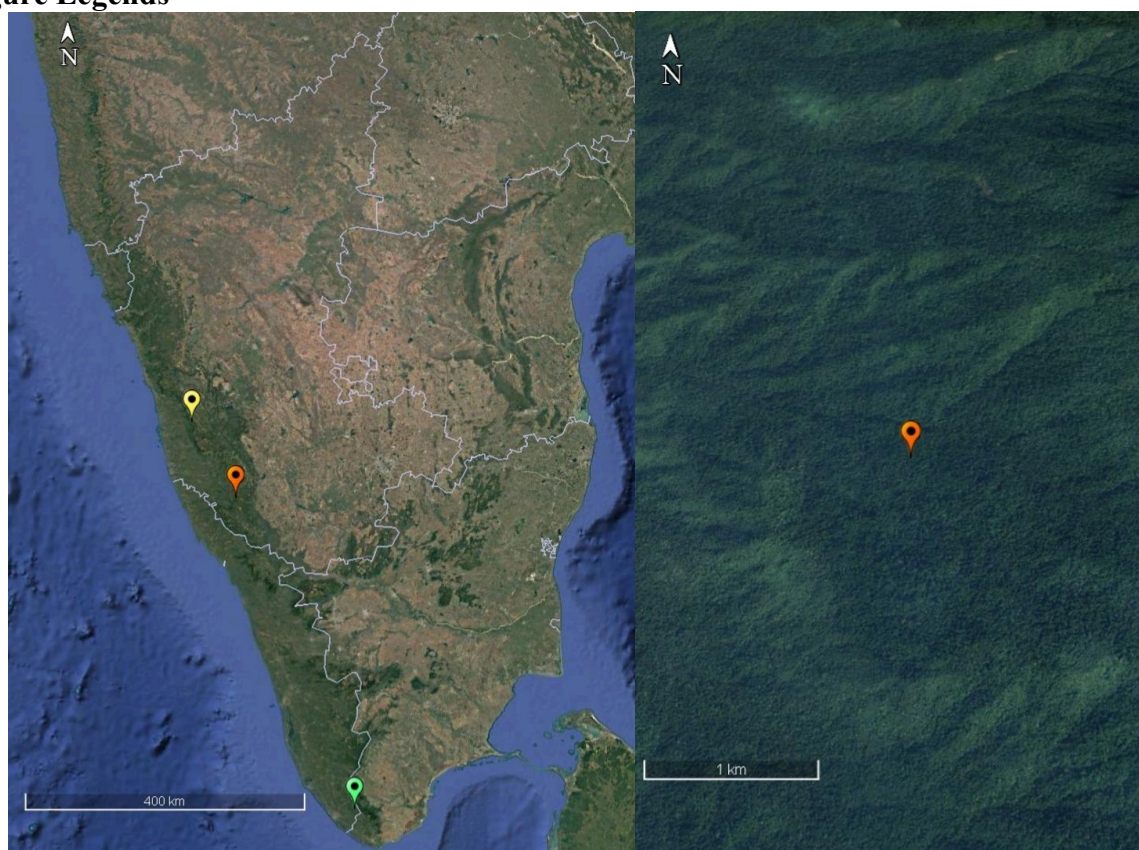


Figure 1. Known distribution of *Kani maranjandu* in the Western Ghats, India. Green marker indicates the type locality at Agasthyamala Biological Park, Kerala; yellow marker represents the previously reported locality at Agumbe, Karnataka; and the red marker denotes the new locality reported from Pushpagiri Wildlife Sanctuary, Karnataka.



Figure 2. Adult female *Kani maranjandu* observed on the forest floor within evergreen forest at Pushpagiri Wildlife Sanctuary, Karnataka.



Figure 3. Diagnostic morphological characteristics of *Kani maranjandu*: (A) frontal defensive posture; (B) thoracic sternum; and (C) transversely ovate carapace.

Discussion

Discussion

The present record represents the third confirmed locality for *Kani maranjandu* Kumar, Raj & Ng, 2017 and substantially expands the documented distribution of this remarkable arboreal freshwater crab

within the Western Ghats [1, 3]. Since its original description from Agasthyamala Biological Park in Kerala [1], the species has remained poorly known, with only a single additional record from Agumbe in Karnataka [3]. The occurrence of *K. maranjandu* in Pushpagiri Wildlife Sanctuary bridges part of the geographical gap between these two previously known populations and suggests that the species may occupy a broader distribution across suitable evergreen and semi-evergreen forests of the Western Ghats than currently documented [3, 4].

Freshwater crabs exhibiting specialized ecological adaptations frequently appear to possess restricted distributions owing to limited sampling rather than true rarity [5, 6]. The present observation supports the possibility that *K. maranjandu* has been overlooked in other protected forest landscapes where appropriate arboreal microhabitats occur. Nevertheless, additional systematic surveys across the central and southern Western Ghats are required before the full extent of its distribution can be reliably determined [4, 6].

One of the most noteworthy aspects of the present observation is the apparent terrestrial activity of the individual. Previous studies consistently describe *K. maranjandu* as an obligately arboreal freshwater crab inhabiting water-filled tree cavities (phytotelmata), with both adults and juveniles closely associated with these specialised microhabitats [1, 2]. In contrast, the present individual was encountered actively moving across moist leaf litter on the forest floor in a mature evergreen forest, and no conspicuous phytotelmata were observed on nearby trees during the encounter.

Although based on a single observation, this behaviour suggests that the species may occasionally descend from arboreal habitats. Such movements could facilitate foraging, dispersal between suitable trees, mate searching, or relocation when arboreal water reservoirs become unsuitable owing to seasonal fluctuations or local habitat disturbance. Similar behavioural flexibility has been documented in other arboreal gecarcinucid crabs associated with phytotelmata in Southeast Asia [7].

However, these interpretations should be regarded as hypotheses rather than definitive conclusions. Opportunistic observations provide valuable natural-history information but cannot establish behavioural patterns or habitat preferences without repeated observations. Consequently, systematic ecological investigations employing repeated field surveys, behavioural observations, and habitat assessments are required to determine the frequency and ecological significance of terrestrial activity in *K. maranjandu* [2, 3].

The present locality also extends the known ecological context within which the species occurs. Previous records have demonstrated its occurrence across a broad elevational range from approximately 160 to 1100 m above mean sea level in evergreen and semi-evergreen forests [1, 2, 3]. The occurrence of *K. maranjandu* at approximately 455 m above mean sea level within Pushpagiri Wildlife Sanctuary further suggests that the availability of suitable arboreal microhabitats, rather than elevation alone, may be an important determinant of its occurrence. Future studies integrating forest structure, phytotelm availability, and microhabitat characteristics would improve our understanding of the environmental factors influencing its distribution [2, 5].

From a conservation perspective, the discovery of *K. maranjandu* within another protected area reinforces the importance of the Western Ghats protected area network in safeguarding endemic freshwater crab diversity [4, 5, 6]. Although the species is currently known only from protected forests, its apparent dependence on mature evergreen habitats and arboreal phytotelmata suggests that degradation of old-growth forests, removal of large cavity-bearing trees, and alteration of forest hydrology may adversely affect local populations [2]. Improving our understanding of the species' ecology and distribution will therefore be essential for future conservation assessments and management planning [6].

Overall, the present observation contributes important baseline information on the distribution and natural history of one of India's least-studied freshwater crabs. While additional field investigations are clearly required, the record highlights the importance of opportunistic observations in documenting

poorly known taxa and generating new ecological hypotheses that can subsequently be evaluated through systematic research [6].

5. Conclusion

The present study documents the first confirmed occurrence of *Kani maranjandu* from Pushpagiri Wildlife Sanctuary, Karnataka, representing a significant extension of the known distribution of this unique arboreal freshwater crab within the Western Ghats. In addition to expanding its geographical range, the observation of an adult female moving across the forest floor provides preliminary evidence that the species may occasionally utilise terrestrial habitats despite its recognised association with arboreal phytotelmata.

Although the ecological significance of this behaviour remains uncertain, the observation highlights important gaps in our understanding of the species' behavioural ecology, habitat use, and dispersal mechanisms. Comprehensive field investigations across the Western Ghats are required to determine the true distribution of *K. maranjandu*, evaluate its habitat requirements, and assess its conservation status. Such information will be essential for developing effective conservation strategies for this evolutionarily distinctive and ecologically specialised freshwater crab.

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