

Batrachofaunal Diversity in Selected Habitats of Sirsi Taluk, Karnataka, India

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ABSTRACT

Over the last two decades, the amphibians are exhibiting decline in their population throughout the world as an indication of increased degradation, deterioration and alteration of habitat or microhabitat and changes in global climate due to anthropogenic activities. Anurans' are sensitive to environmental changes such as habitat degradation, pollution, climate change, and developing infectious illnesses hence are considered good indicators of habitat quality. A study was conducted to record the distribution and monthly occurrence of anurans in damp, semiforest and Semi Urban habitats in selected regions of Sirsi taluk, Uttara Kannada district, Karnataka. The study area resides amidst Western Ghats, being one of the global biodiversity hotspots, reeling under tremendous pressure due to deforestation, habitat destruction and unprecedented anthropological activities. In the present study total of 229 individuals of anurans belonging to 4 families, 7 genera and 10 species were recorded during a brief study period (October-2019 to January-2020). Dicroglossidae was the most abundant family (89.4%) from the recorded anurans, followed by Bufonidae (6.3%) and Rachophoridae (3.38%), while Microhylidae was the least abundant (1.27%). Most species were found in the wetland habitat (42.7% of Dicroglossidae, 1.27% of Microhylidae) followed by semiforest (11.2% of Dicroglossidae, 5.50% of Bufonidae, 2.96% of Rachophoridae) while semiurban habitats had the least with Dicroglossidae alone (33.8%). This study throws light on dwindling population of anurans in the region because of rapid urbanization and fragmentation of habitats which needs urgent conservation strategies to protect anurans in their native habitat. We recommend that non-governmental organizations, district administration, regional officials, and local people in and around Sirsi taluk, to actively engage in wetland and forest conservation and protection.

KEYWORDS: Diversity; Habitat; Anurans; Biodiversity; Sirsi; Uttara Kannada

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INTRODUCTION

Major threats for the decline in amphibian diversity in Western Ghats- one of the global biodiversity hotspots may be due to contiguous forest habitats being fragmented into patches, which leads to the shrinkage of original habitat, change in hydrological regime, decreased inflow in streams, human-animal conflicts etc. Studies on anuran species richness and diversity has become a concern to gather information on their microhabitat, as they are good indicators of ecosystem health (Kiesecker, and Joseph, 2010 & Aravind and Gururaja, 2011). Rapid industrialization, encroachment of wetlands for urban development, air and water pollution are the major causes for decline in diversity of anurans. Indian continent has had a rich diversity of amphibians (Caecilians, Salamanders and Anurans). Anurans play an important role in regulating the populations of insect pest of economically important crops such as cereals, vegetables and fruits (Frost, 2013). A total of 384 amphibian species have been recorded in the Indian subcontinent in which, Western ghats have been recognized as a biodiversity hot spot and houses 157 species of amphibians which includes 134 anurans and 112 endemic species (Dinesh *et. al.*, 2017).

A census on amphibians of India as a whole and western ghats in particular has revealed that 47 species in India and 28 species in western ghats are permanently lost, on the other hand, another study in a recent expedition has rediscovered 4 species out of 28 lost in western ghats. Numerous studies to document anuran diversity have been carried out in Western Ghats of Karnataka. The IUCN (2020) status report classified 157 species of amphibians of Western Ghats into Critically Endangered (CE)- 8; Endangered (EN)- 28; Near Threatened (NT)- 6; Vulnerable (VU)-16; Data Deficient (DD)- 69

and Least Concern (LC)-30 species (Dinesh and Radhakrishnan., 2011).

This represents a piece of study carried out at damp, semiforest and Semi Urban habitats of Sirsi taluk, Uttara Kannada district. Present study was carried out to provide baseline information of anuran species distribution, richness and their habitat preference. Such studies are scanty in the present study area which is a part of mid Western Ghats.

MATERIALS AND METHODS

(i) Study area

The present study was carried out in Sirsi Taluk located in Uttara Kannada district of Karnataka state (14°37'02.4"N, 74°50'09.4"E). The study sites comprise forest of hilly terrain. It has highland and lowland tropical evergreen forest, grassland and mosaics of mixed semi-evergreen forest and plantation in the peripheral area. Seasonality is marked as pre-monsoon (March-June), monsoon (July-October) and post-monsoon (November-February) periods respectively. South-West monsoon brings heavy rainfall in Sirsi Taluk with an average of 2500mm. Temperature varies from 13°C to 37°C, January and February months being coldest and April and May being the hottest months.

Following study sites were identified to record anuran diversity and distribution.

Site-1: Targodu (14°36'18.7"N 74°50'13.4"E) with isolated natural habitat covered by moist deciduous and tropical evergreen forest.

Site-2: Adarshanagara (14°37'40.2"N 74°50'58.2"E) Urban area

Site-3: Onikere (14°33'24.1"N 74°58'36.0"E) which comprises of agricultural fields with anthropogenic activities.

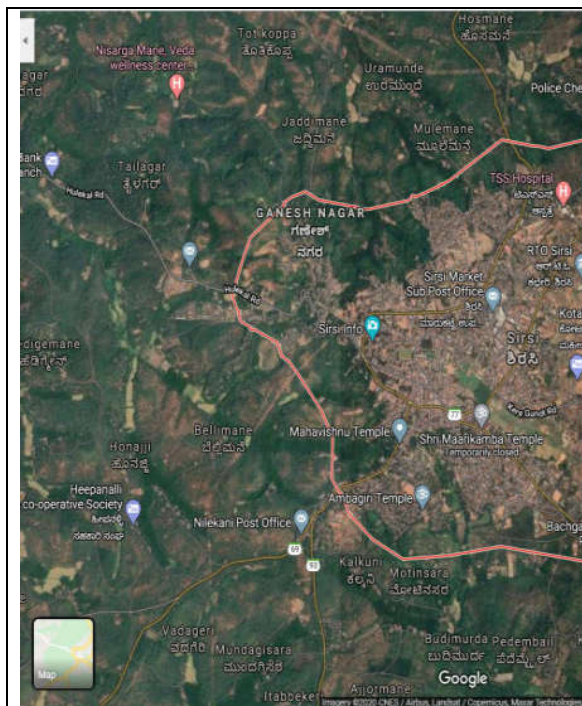


Figure 1: Map showing study area at Sirsi, Uttara Kannada ($14^{\circ}36'43.8''\text{N } 74^{\circ}49'03.6''\text{E}$)

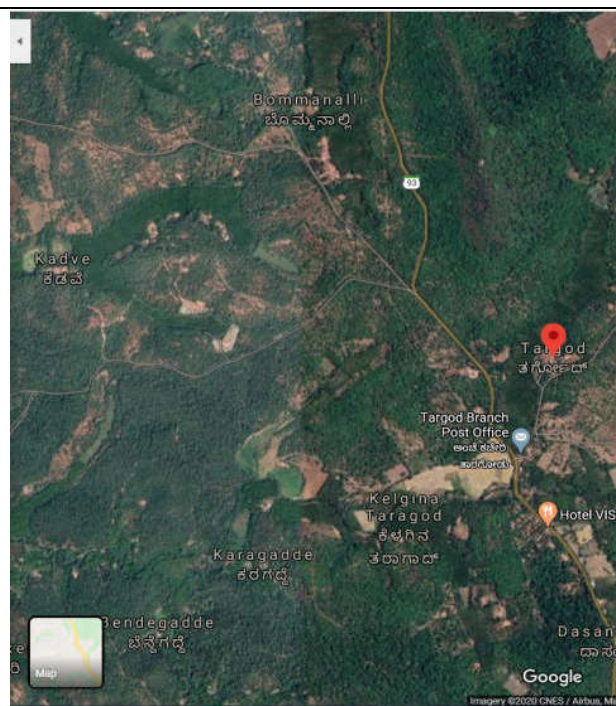


Figure 2: Map showing study area at Targodu, Sirsi (Site-1) ($14^{\circ}39'59.0''\text{N } 74^{\circ}50'06.5''\text{E}$)

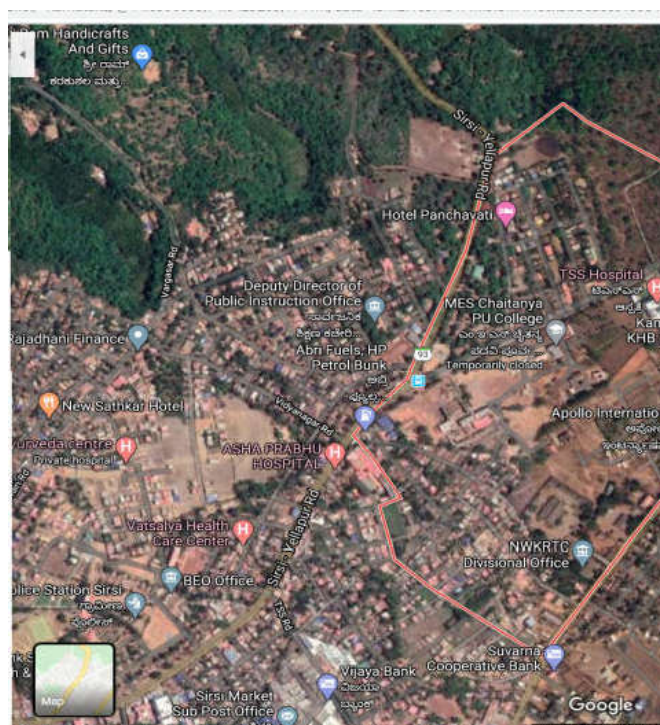


Figure 3: Map showing study area at Adarsha Nagar, Sirsi (Site-2) ($14^{\circ}37'51.8''\text{N } 74^{\circ}50'36.7''\text{E}$)

(ii) Field methods

Anuran species were recorded at the intervals of 15 days between the months of December, 2019 to February, 2020. Stratification is based on land-use categories, namely, Forest, Water-bodies, agricultural fields. Acoustic encounter surveys, visual encounter surveys (Rödel and Ernst 2004), all out search and line transect method was used to record the anurans in the field. Two man hours of searching was made using torch light, headlight etc., between 18:00-20:00 hr, by walking across the streams, forest floors,

gleaning leaf litters, prodding bushes, wood logs, rock crevices, agricultural fields etc; The encountered anurans were photographed and were identified up to species level (if not, up to genus level) using standard keys of Bossuyt and Dubois (2001), Daniels (2005) and Gururaja KV (Pictorial Guide to Frogs and Toads of the Western Ghats) and with the help of websites viz., www.indianamphibians.org, www.inaturalist.org and amphibiansoftheworld.amnh.org.

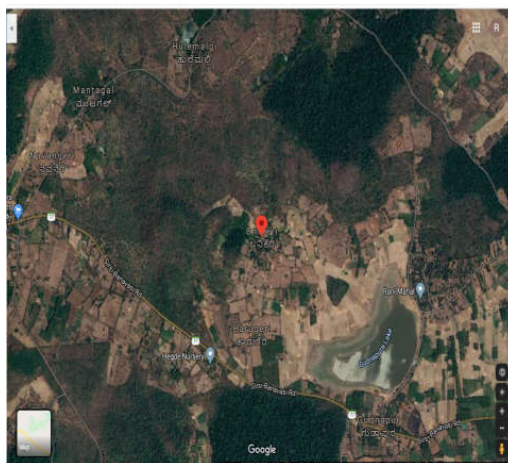


Figure 4: Map showing study area at Onikere, Sirsi (Site-3) (14°33'40.0"N 74°58'09.8"E)

RESULTS

A checklist of anurans documented in different study sites is shown in Table.1. A total of 229 individuals belonging to 4 families, 7 genera and 10 anuran species were recorded. The data on family wise occurrence of anurans species in different study sites is given in Fig. 1. The members of the family Dicroglossidae were found to be dominant with 88.64% (203 individuals) with 6 species, Bufonidae 6.55% (15 individuals) with 1 species, Rachophoridae

3.49% (8 individuals) with 3 species, Microhylidae 1.31% (3 individuals) with 1 species. Out of the total individuals recorded, members of Dicroglossidae were found to be 14.22%, 47.87% and 37.91% in site 1, site 2 and site 3 respectively. Whereas, Rhacophoridae was found only in site 1 (Targodu), while Bufonidae members were found in site 1 (81.25%) and site 3 (18.75%). Further Microhylidae members were recorded only in site 2 (Fig.2 and 3).

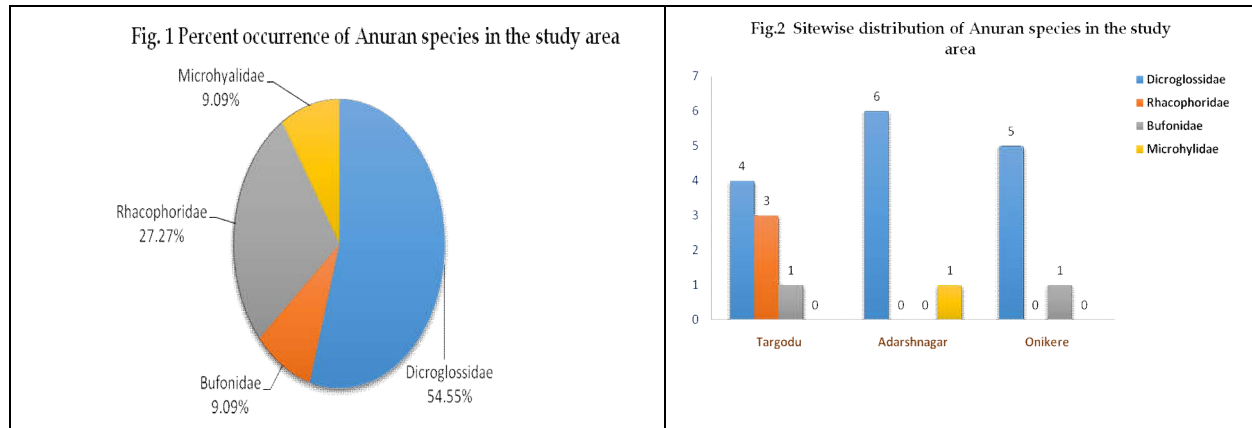


Table 1: Checklist of anuran species recorded in study sites

Sl. No.	Family	Common name	Scientific name	No. of individuals
1.	Dicroglossidae	Skipper frog or Skittering frog	<i>Euphlyctis cyanophlyctics</i>	43
		Asian grass frog or ricefield frog	<i>Frejervarya limnocharis</i>	16
		Indian Bull frog	<i>Hoplobatrachus tigerinus</i>	55
		Indian cricket frog	<i>Minervarya agricola</i>	28
		Common cricket frog	<i>Minervarya syhadris</i>	59
		Jog Krishnan cricket frog	<i>Minervarya krishnan</i>	2
2.	Rhacophoridae	Indian tree frog	<i>Polypedates maculates</i>	5
		Western tree frog	<i>Polypedates occidentalis</i>	3
3.	Bufonidae	Black spectacled toad	<i>Duttaaphrynus melonastictis</i>	15
4.	Microhylidae	Ornate narrow mouthed frog	<i>Microhyla ornata</i>	3

Table 2: Monthly occurrence of Anuran species in the study area

SI No.	Species	October	November	December	January	February
1	<i>Euphlyctis cyanophlyctics</i>	+	+	+	+	—
2	<i>Frejervarya limnocharis</i>	+	+	+	—	—
3	<i>Hoplobatrachus tigerinus</i>	+	+	+	—	—
4	<i>Minervarya agricola</i>	—	—	+	+	+
5	<i>Minervarya syhadris</i>	+	+	+	+	+
6	<i>Minervarya krishnan</i>	+	—	—	—	—
7	<i>Polypedates maculates</i>	—	+	+	+	—
8	<i>Polypedates occidentalis</i>	+	+	+	—	—
9	<i>Duttaaphrynus melonastictis</i>	—	—	+	+	+
10	<i>Microhyla ornata</i>	—	—	+	+	—

+ = Present — = Absent

DISCUSSION

Presence or absence of anurans in moist grounds depends on the hydrological cycle of the geographical site in question. The role of anurans in management and maintenance of ecosystem is vital and they are good indicators of ecosystem health (Paromit Chatterjee & Krishnendu Mondal., 2000). The present study provides a wide scope of information on the diversity, distribution, and monthly occurrence of anurans across three distinct habitat types—wetland, semiforest, and semiurban—within Sirsi taluk, situated in the Western Ghats of India. Amphibians are known for their sensitivity to environmental fluctuations (Blaustein *et al.*, 1994; Beebee & Griffiths, 2005), the pattern of diversity observed in this study may serve as key indicator of habitat integrity in the surveyed areas. The Western ghats- referred to as one of the eight hot spots of biodiversity (Myers *et al.*, 2000), are under tremendous pressure of loosing natural habitats due to deforestation, intensified agriculture, expansion of the urban area, infrastructure development by anthropogenic activities. These have direct effects on the decline in the habitat quality with a potential decrease in the anuran population in semiurban landscapes as suggested in the findings.

The higher species richness in wetland habitats (Site 1) suggests that these ecosystems serve as place suitable for anurans, particularly during the breeding season, by providing necessary water requirements and vegetation cover. However, wetlands across the Western Ghats are under considerable threat from encroachment, drainage, and conversion for agriculture or settlement (Pawar & Birand, 2001). The fact that in semiurban areas presence of only Dicroglossidae members (33.8% of the total), with a complete absence of more ecologically sensitive taxa such as Rhacophoridae and Microhylidae, is alarming. The findings highlights the impact of decline in the amphibian species in human altered landscapes (Collins & Storfer, 2003; Stuart *et al.*, 2004). The low diversity of arboreal and forest-dependent species may be due to loss of canopy cover, microclimatic alteration, and pollution, where all factors known to impair amphibian

reproductive success and larval development (Wake & Vredenburg, 2008).

Uttara Kannada district, known for its diverse ecosystems, is a key area for biodiversity conservation in India. The district's varied habitats, including forests, swamps, and coastal areas, contribute to the high diversity of anurans. According to the ENVIS technical report 47 (Sahyadri conservation series 18) 32 anuran species were reported in Aghanashini river basin situated in sirsi talluk of Uttar Kannada district. Present study confirms the presence of few members of anuran families listed in the above said report. Further, Dicroglssidae members such as *Frejervarya limnocharis*, *Minervarya agricola*, *Minervarya krishnan* were also recorded in the present study which are not enlisted in the above report. *Minervarya krishnan* was described by Raj *et.al.*, (2018) from the medium elevated (500 m) forested landscape of Jog, Shimoga in the central Western Ghats, in the present study this species was recorded in the month of October at site 2 (Adarshnagar) which is a semiurban habitat. This finding throws light on the varied habitat preference of *Minervarya krishnan*.

CONCLUSIONS

The present study provides crucial baseline information and reinforces the need for continuous monitoring with respect to conservation priorities for safeguarding anuran populations in one of India's most ecologically significant regions viz., Western Ghats.

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