



*Research Paper*

**POPULATION FLUCTUATIONS OF AMPHIBIANS IN THE THATTEKKAD BIRD SANCTUARY, ERNAKULAM DISTRICT, KERALA**

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**Abstract**

Thattekkad bird sanctuary is the first bird sanctuary in Kerala, which owe its significance to the world famous ornithologist, Dr.Salim Ali. Amphibians formed one of the major group of vertebrates within the sanctuary, with 17 species reported by previous studies. The present study reported 9 species of Anurans belonging to 3 families, from the Human inhabited areas of the sanctuary. Of which 1 species was Endangered one and two species were found to be Near threatened ones with rest, belong to Least concern category. Anurans provide significant ecosystem services like insect-pest control agents as well as bio-indicators of healthy ecosystem.

Key words: Anurans, Bio-indicators, Near-threatened, Endangered ones.

**INTRODUCTION**

Amphibians are vertebrates that lead lives both on land and water. They are poikilothermic or cold blooded animals, implying that they are affected by the temperature in their immediate surroundings. Amphibians survive best within an ambient or surrounding temperature range of 20-30°C. However, unlike birds and mammals, which are considered warm blooded or homeothermic, amphibians are unable to internally regulate their body temperature. As a result, they spend a lot of time hiding or moving about only during the cooler part of the day or in the nights. Amphibians use their skins to exchange gases (a form of respiration) and thus need to keep their skins moist. For this, all species of amphibians carry skin glands that secrete slimy substances, making them slippery to handle, and seek habitats that are moist. The combination of the amphibian's physiological requirements and environmental factors such as moisture, land and water and tolerable surrounding temperature limits have restricted the distribution of most species of amphibians to the warm and humid tropical parts of the world.

Amphibians are broadly classified into those with limbs and those without. Amongst those with limbs, there are some with tails, while the majority is tail-less. All

living species of amphibians are taxonomically treated under three orders viz., Anura (frogs, toads and treefrogs), Caudata (newts and salamanders) and Gymnophiona (caecilians or limbless amphibians). The three orders of amphibians demonstrate distinct patterns of geographical distribution and species diversity too. Anurans, the most diverse of the three with regard to the number of species and ways of living are found all over the world, caudates are largely restricted to the temperate regions and caecilians are exclusive to the tropics. What is most characteristic of amphibians is that they undergo complete metamorphosis from egg to adult stages. With the exception of caecilians, all amphibians have four distinct stages in their life histories. These include an aquatic or terrestrial egg stage, with a few exceptions, a free-living aquatic tadpole/larval stage, a terrestrial/partially aquatic young frog, toad or salamander stage and finally the adult that can reproduce. Further, all anuran adults can produce sounds, which the males effectively use at the time of courtship and reproduction. In India, there are 216 species of amphibians. This includes one species of salamander which is found only in the Himalayas, 15 species of caecilians, most of which are restricted to the Western Ghats and 200 species of frogs, toads and tree frogs.

Thattekkad bird sanctuary is located at a latitude  $76^{\circ}40' - 76^{\circ}45'N$  and longitude  $10^{\circ}7' - 11^{\circ}E$ . The bird sanctuary is located in Kothamangalam taluk of Ernakulam district on the Northern banks of Periyar river and is a home to some of the rarest and endangered species of birds in India.

Thattekkad bird sanctuary is the first bird sanctuary in Kerala, which covers an area of 25 square kilometers and the name " Thattekkad " literally means flat forest and the region is an evergreen lowland forest located between the branches of Periyar river, the longest river in Kerala. This world famous sanctuary owes much of its fame to the internationally renowned Ornithologist, Dr. Salim Ali.

## STUDY AREA

The study area selected for the present study is inhabited land area within the Salim Ali bird sanctuary cultivated, with diverse kinds of crops, spread in around 9 kms. Six plots of three hectares, lying on the selected transect was selected with different cultivated crops

## METHODOLOGY

Direct observation and line-transect methods were involved and observations were made once in a week in the morning hours (8am -10am) for 3 years (March 2015- April 2018) in six plots. These plots were having different cultivations like nutmeg, cocoa, papaya, guava, mango, jackfruit tree, coconut, pepper, etc.

## RESULTS AND DISCUSSIONS

Thattekkad bird sanctuary is having a well defined natural boundaries with the reserved forest of Kuttampuzha and Neriya Mangalam ranges and the two rivers, Periyar and Edamalayar. The Bhoothathankettu dam constructed in 1964 plays a significant role in the water cycle of the sanctuary and the periodic cycle of flooding of plains and subsequent draining by the opening and closing of shutters of dam lead to ecological

variations in the habitat. The various vegetation types in the sanctuary offer good cover to arboreal animals and small mammals. The topography along with thick forests provide both refuge as well as ambush cover. A total of 34 species of reptiles, 17 species of amphibians and 52 species of fishes were identified from the sanctuary.

The present study conducted within the human inhabited areas of the Thattekkad bird sanctuary reported 9 species of amphibians belonging to 3 different families and single order, Anura were sighted during the study period and the list of them tabulated (Table.1).

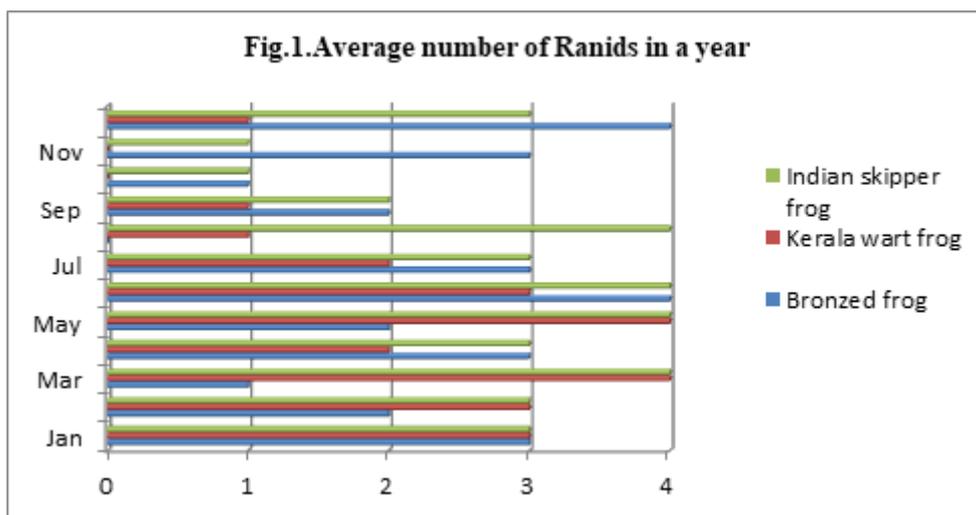
Table.1. Amphibians observed in the study area

Order	Family	Scientific name	Common name	IUCN status
Anura	Ranidae	<i>Rana temporalis</i>	Bronzed frog	NT
		<i>Limnonectes keralensis</i>	Kerala wart frog	LC
		<i>Rana cyanophlyctis</i>	Indian skipper frog	LC
	Bufonidae	<i>Duttaphrynus beddomii</i>	Beddome's toad	EN
		<i>Duttaphrynus melanostictus</i>	Asian common toad	LC
		<i>Duttaphrynus parietalis</i>	Indian toad	NT
	Dicroglossidae	<i>Euphlyctis hexadactylus</i>	Indian green frog	LC
		<i>Haplobatrachus crassus</i>	South Indian bull frog	LC
		<i>Haplobatrachus tigerinus</i>	Indian bull frog	LC
NT-Near Threatened, LC- Least Concern, EN - Endangered				

3 species of amphibians each belong to 3 families like Ranidae, Bufonidae and Dicroglossidae were the organisms sighted, of which two species belong to Near threatened category & 1 species to Endangered category while the rest 3 species to the Least Concern category of IUCN red list of conservation. So Beddome's toad is the one to be given strict conservation measures at present for maintaining in the future.

### Population fluctuations of Ranids

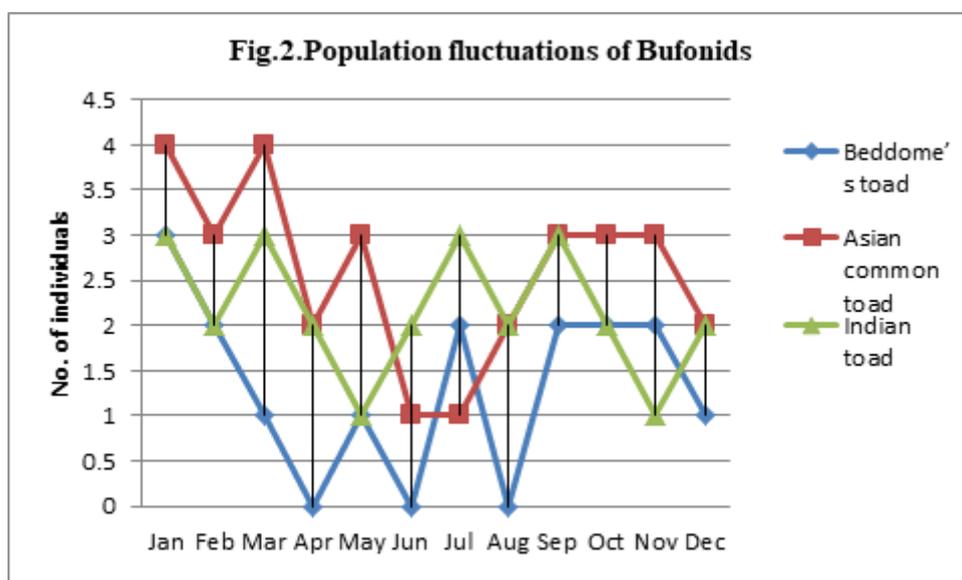
Population distribution of the three families were analysed, studied and evaluated in different months of a year with an average number of individuals. The average number of ranids (Fig.1.) in different months of a year showed the monthly fluctuations of 3 species of family Ranidae like Indian skipper frog (*Rana cyanophlyctis*), Kerala wart frog (*Limnonectes keralensis*) and Bronzed frog (*Rana temporalis*).



Of the three species, Indian skipper frog was sighted every month and in an abundant nature when compared to other two species. Maximum number of the species was for four months – March, May, June and August despite the lowest value in two months – October and November. Kerala wart frog was sighted for 10 months, except in October and November. Wart frog showed maximum number in two months of March and May and least value (1) in August, September and December. Bronzed frogs were present in the study area in a year, except during August and their population showed fluctuations with a maximum value in two months of June and December, followed by a value in 4 months of January, April, July and September and least value in two months of March and October. Thus it can be clear that most of them show abundance during both Monsoon and Pre-monsoon season while less in the Post-Monsoon period of a year.

### Population fluctuations of Bufonids

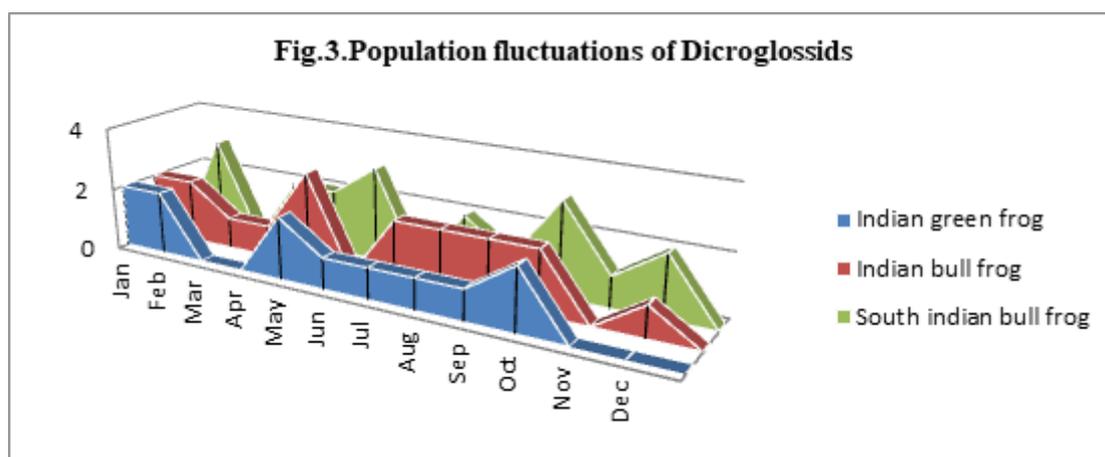
There are 3 species of Bufonids, belonging to the family Bufonidae- Beddome's toad (*Duttaphrynus beddomii*), Asian common toad (*Duttaphrynus melanostictus*) and Indian toad (*Duttaphrynus parietalis*) respectively.



Beddome's toad showed maximum number of individuals (3) in January, which gradually decline to 2(February), 1 (March) and to Zero(April), increased to 1(May), followed by a decrease(0) in June & then increased to 2 in July, then decreased to 0(Aug) ,followed by a constant value of (2) in three months of September October and November and then to lower value (1) in December. Thus a prominent and clear fluctuation can be elicited (Fig.2.)for the three species of family Bufotidae. Asian common toads showed high values during pre-monsoon period especially in January and March(4) and least value(1) in the two months of monsoon period of June and July.Indian toads showed maximum population in the months of Pre-monsoon period of the year- January and March ; Monsoon period- July . Thus Bufotids were dominant during the Pre-monsoon and Post monsoon seasons of a year.

### Population fluctuations of Dicroglossids

The 3 species of Dicroglossids sighted were- Indian green frog (*Euphlyctis hexadactylus*) , Indian bull frog (*Haplobatrachus tigerinus*) and South Indian bull frog (*Haplobatrachus crassus*).Their population fluctuations (fig.3) showed an insight into their dominance and richness in different periods of a year- Pre-monsoon, Monsoon and Post-monsoon period.



Among these dicroglossids, Indian bull frogs and South Indian bull frogs were found dominant than that of Indian green frog. It was observed that Populations of the three species was high both in the Pre-monsoon and Post- monsoon period while less in the Monsoon period. Since cultivation mostly prevails in these seasons, it signifies the importance of these amphibians in controlling and checking insect populations of the habitat as well as the ecosystem, since most of them were insectivores. Thus an increased population of these amphibians in these periods can help farmers a lot in enhancing the insect and pest resistance power of the plants in organic way by the biological controlling mechanisms.

Studies on amphibians in Kerala date back to the descriptions in *Fauna of British India* volumes by Boulenger (1882, 1890, 1892), followed by a list of *Batrachians of Travancore* (Kanyakumari to present Munnar (Devikulam Taluk)) by Ferguson (1904) .

Other significant work on amphibians of Kerala are Pillai & Pattabiraman (1981, 1990), Inger (1984), Biju (2001), Biju & Bossuyt (2003), Easa (2003) and Sivaprasad (2013). Dutta (1997) published the first checklist on Indian amphibians with 212 species. Later Das & Dutta (1998) updated the list with English names. Chanda (2002) was the first to publish a Handbook on Indian Amphibians with brief accounts followed by Daniels (2005) with 238 species of amphibians from Peninsular India in his book *Amphibians of Peninsular India*. Dinesh et al. (2009) published an annotated checklist of amphibians of India as an occasional paper of Zoological Survey of India with a total of 248 species including all new species described till 2009.

Das (2015) listed 151 species of amphibians in 11 families and two orders from various parts of Kerala. Out of which 136 are endemic to Western Ghats. Fifty species of amphibians of Kerala, fall under the various threatened categories of IUCN, and five are Near Threatened. Nineteen species fall under the schedules IV of Indian Wildlife (Protection) Act and two species come under appendix II of CITES.

## CONCLUSIONS

Anurans are very important components of the earth's ecosystems - natural and man-modified, especially agricultural landscapes. They have also been well exploited by humans as food and as laboratory animals, including in medical research. Even conservative estimates made of the number of frogs and toads that are sacrificed in biology laboratories year after year are astounding. Among 9 species of Anurans reported in the human inhabited areas of the Thattekkad bird sanctuary, one species (*Duttaphrynus beddomii*) belong to Endangered category while two species (*Rana temporalis* and *Duttaphrynus parietalis*) belonged to the Near Threatened category of IUCN's list of conservation. Hence proper conservatory measures should be enacted in order to preserve these species in future.

Biologists have recently realised that the amphibian populations, especially anuran, are declining rapidly throughout the world and have sounded an alert through such agencies as the Declining Amphibian Population Task Force (DAPTF). Amphibian's roles in the ecosystem as agents of insect-pest control and as living indicators of ecosystem health have been greatly emphasised.

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