

A Study on Indian Painted Frog with Particular Reference to its Declination in Pachikapallam, Andhra Pradesh, India

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Abstract

Amphibians are the most interesting creatures which link aquatic and terrestrial ecosystems by connecting their life cycle. These amphibian populations are declining at fast rate, which may affect the ecosystems in long run, hence studying them is important. This study is aimed to observe the Indian painted frog, *Kaloula taprobanica* Parker Synonym of *Uperodon taprobanicus* (Parker, 1934) which is listed as "Least concern" by IUCN. In this scenario, we had analyzed its threats for its declination in its habitat area. We had studied frequency of these frogs by field survey method for about four years in Pachikapallam area, Chittoor district, Andhra Pradesh, India. We had carefully observed the morphological characters and took measurements of all these encountered frogs we came across. The results are indicates that they are declining at a steady rate, it may be attributed to climate change, habitat loss and encroaching of human settlements.



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Introduction

Amphibians are the first tetrapods emerged between 340-370 million years ago, which connects between land ecosystem and water ecosystem. these amphibians are the main link between fishes and the reptiles playing an important role as both prey and predator in food chain. The amphibians are serving us by reducing pests in the crop fields or by checking the population of insects which act as vector for many diseases. Amphibians, a unique group of vertebrates containing over 7,000 known


species, are the bridges between land and water ecosystem which are now threatened worldwide due to various reasons.

Amphibian population declination was first recognized as a global phenomenon in the early 1990s.¹ A 2004 global assessment² found that nearly one-third (32%), of the world's amphibians population are threatened. In another study, the estimation indicates that 43% of all amphibian species have experienced population decline, 33% are globally

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threatened, and over a hundred's may be extinct.³ The extinction rates for amphibian population may be as much as 200 times higher than background according to another researcher.⁴ The amphibians are facing declines and threats among different regions in worldwide at alarming rates.⁵ There are many factors such as diseases, pollution, usage of indiscriminate pesticides, reducing wetlands and increasing cultivated fields are important role in their habitat destruction.^{6,7} When forests are cleared, the intricate relation of that total ecosystem will also disappear. These amphibians declination are also adding some support to the Earth's sixth mass extinction.⁸ Each amphibian species had been survived by owning its protective compounds like antimicrobial peptides have been isolated from amphibian species, yet so many antimicrobial peptides to be screened from them.⁹ Peptides may be active against a broad spectrum of pathogens and have significant potential application for our health.

As per concern of Amphibian declination, in this paper we have chosen to observe and study Indian

painted frog, which is rated "Least Concern" by the IUCN. Indian painted frog, *Kaloula taprobanica* Parker Synonym of *Uperodon taprobanicus* (Parker, 1934) is a species of narrow-mouthed microhylid frog. These frogs are fossorial as well as good tree climbers and lives in bushy areas of moist places and trees. We have recorded the sightings and observation of this frog for 4 years and assessed potential threats for their declination

Materials and Methods

Study Area And Period

The observations took place in Pachikapallam (13°24'23.4"N, 79°22'18.0"E), Vedurukuppam Mandal of Chittoor district, Andhra Pradesh, India. Pachikapallam area has an average elevation of 875 feet from sea level with good flora and fauna. This area is tropical dry evergreen scrub forest type growing on alluvial soil. These observations were conducted during the transition in October to December, from 2018 -2021

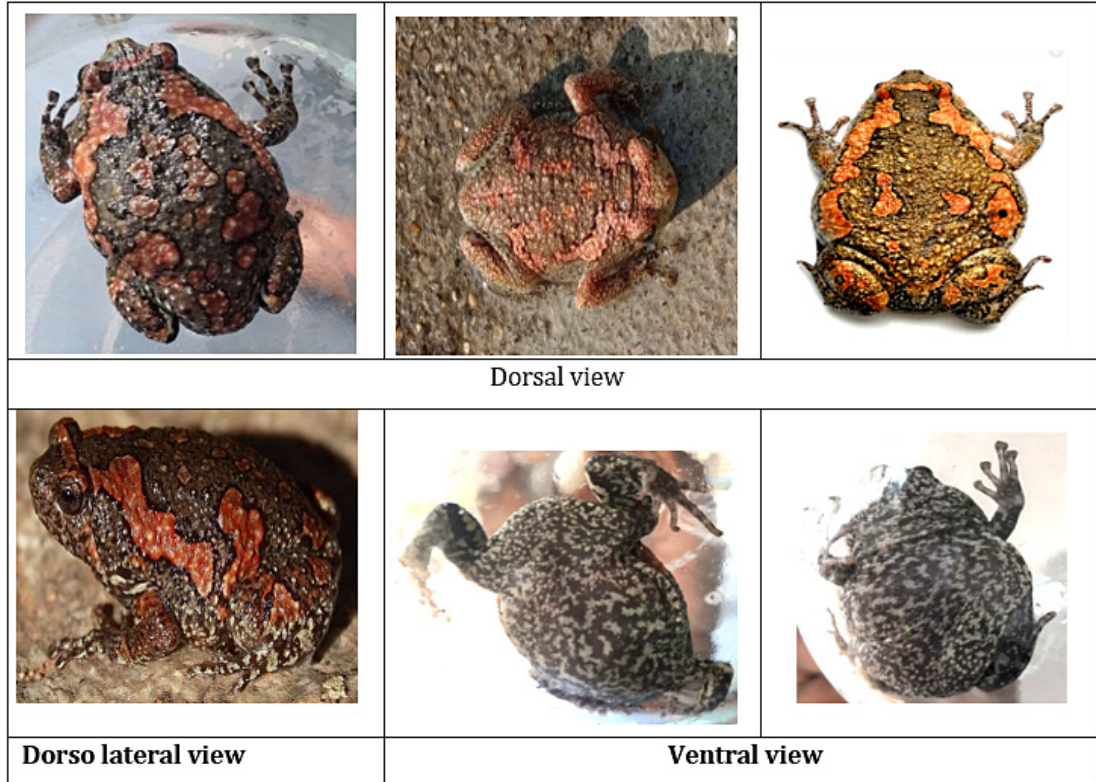


Fig. 1: Indian painted frog photos

During this period, a total of four hours, two hours (6-8 am) in morning and two hours (6-8 pm) at night were spent surveying their habitat in a day. Moderate to heavy rains were experienced in some days during this study. We followed field survey method in the area where we scanned for Indian painted frog and followed it in its habitat. We confirmed our search in the forest edges as where the forest area ends, agricultural sector wherever the cultivation is going on, stagnant water bodies like ponds, gutter etc and in nearby local houses in Pachikapallam.

Methodology

We had opted field survey method by dividing area into different habitat areas of the frog accordingly. We had counted frogs per square kilometer and

then noted down the measurements of each frog. We measured them by measuring scale and vernier calipers. The frogs were handled by wearing hand gloves gently and after analysis we left the sample in its habitat. Macro lens were used in this study to get pictures of these frogs. No frogs were harmed during this study. They were left in their native habitat. The frogs frequency were calculated from October to December.

Results

Based on the morphological characters, of each frog we identified the frog as Indian painted frog.

The above photos are taken during the field study.

Table 1: Morphological characters observations and its remarks

Morphological characters	Observations	Remarks
Tympanum	√	Hidden
Shape the snout	√	Rounded
Tongue	√	Elliptical
Dorsal skin texture	√	Smooth with slightly granules
Dorsal skin colour	√	Greyish-brown in colour with uneven orange bands
Ventral skin texture	√	smooth
Ventral skin colour	√	White dots with black background
Finger shape	√	Spoon shaped slightly swollen
Webbed toes fore limb	x	Not present
Webbed toes hind limb	x	Less webbed

√: Present; x: Absent

Table 2: morphological characters measurements

Parts	Measurements (Mean value)
Weight	11 ± 1.23 gms
Length (snout to vent)	4.6± 0.53 cm
Distance between eyes	0.8 ±0.47 cm
Eye diameter	0.4 ±0.02 cm
Distance between jaws	2 ±0.03 cm
Distance between Snout and eye	0.5 ±0.06 cm
Fore limb	2 ±0.52 cm
Hind limb	1.4 ± 0.61 cm
Femur length.	1.1 ± 0.66 cm
Tibia length	1± 0.49 cm
Hind leg 2nd digit length	0.7± 0.03 cm
Fore leg 2nd digit length	0.6 ±0. 01 cm

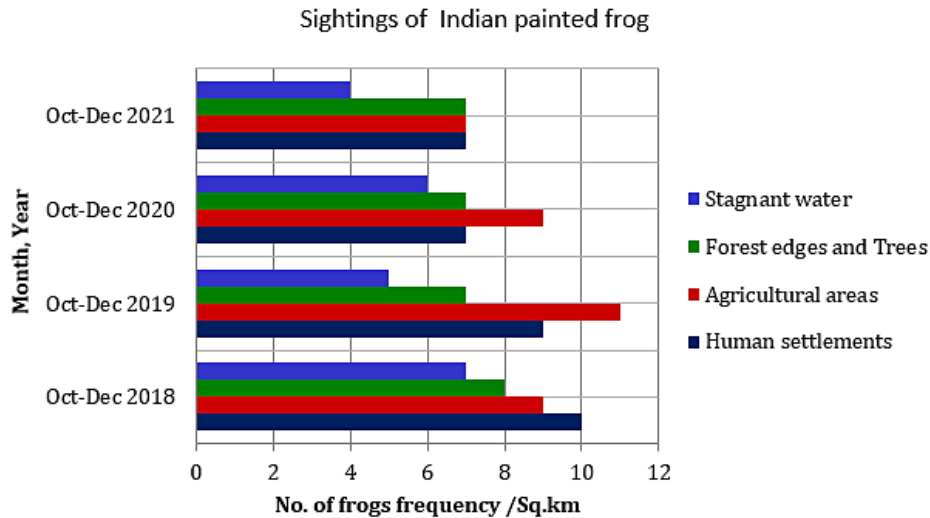


Fig. 2: Observational graph of frogs

The morphological characters in the frog observed as present or absent

In the above table we observed that the frequency of frogs is increasing in human settlements, than agricultural areas. Stagnant water, forest edges and trees habitat was fluctuating. The frequencies of the frogs in October to December 2018 in stagnant water are 7, Forest edges and trees are 8, Agricultural areas are 9, Human settlements are 10. The frequencies of the frogs in October to December 2019 in stagnant water are 5, Forest edges and trees are 7, Agricultural areas are 11, Human settlements are 9. The frequencies of the frogs in October to December 2020 in stagnant water are 6, Forest edges and trees are 7, Agricultural areas are 9, Human settlements are 7. The frequencies of the frogs in October to December 2021 in stagnant water are 5, Forest edges and trees are 7, Agricultural areas are 7, Human settlements are 7.

Discussion

The Indian painted frog adults can be spotted by their appearance, its maximum length is about 5.6cm (Table 1 & 2). This frog has been identified based on the standard procedure using keys. There is a bony ridge on the roof of it's mouth, which is exactly below the internal opening of each nostril. The eardrum is hidden and males have a single vocal sac. We had collected morphological characters observations, measurements and remarks as about the limbs,

limb size, head shape, body shape, the presence of dorsolateral bands, the tympanum, shape of the snout, teeth, dorsal skin texture, dorsal skin colour, ventral skin texture, ventral skin colour, finger shape, the presence of webbed fingers of fore and hind limbs. We studied them while watching them in their natural habitat, and took measurements left them in their same habitat.

These are mid-sized, stout, short legged with striking colours as combination of bright red to orange with irregular spots. The reddish orange band starting from snout 2-3 centimeter, running through dorso-laterally, 2-square small patches and 2 small oval shape patches were through the body in upper central dorsal body, five anomalous shape in middle three anomalous shaped near posterior dorsal end (Figure 1). As we observed two types of different patches in them, in another type we found just a continuous reddish orange patch in dorso-laterally running to posterior and curved at the end. The ventral side of these frogs doesn't show much difference and was entirely contrast to dorsal side with brown mosaic pattern on grayish colour. The fore digits of these frogs are Bulbous spoon shaped whereas the hind digits were not much spoon shaped and in all of them there are provided with adhesive pads. The second digits were long compared to other digits, this may help them for arboreal behavior or in fast movement.

These frogs are the most spicuous and colourful creature which is laziest and even be inactive for hours. We found almost these frogs as solitary, but if we identified one frog we can easily find other two or three frogs as they will be nearby only. We surveyed for these frogs almost in forest areas, tree trunks near surrounding human settlements and in agricultural areas, where all these habitats were near to small pools and ponds. We found majority of frog's nocturnally fossorial^{10,11,12} and also in diurnal they are arboreal¹¹ in tree trunks especially in holes. When coming back to ground they were using their back legs first. We saw some frogs when in danger, as any predator like birds or snakes approach, they swell up with oozing slimy fluid with head down posture. We can clearly hear them at night or early morning with their unique very low pitched sound. The frogs were totally camouflaged with the surroundings and have great acclimatization capacity with the environment.

These frogs are gradually becoming less in their habitat due to many contributed reasons. The rainy seasons are highly volatile, where the rain was very less to very heavy and in dry periods are too harsh as the water sources in their habitat usually dry up, so they try to venture near human settlements. As if we observe these frogs were directly attracted to human habitats mainly for availability of water. In our observations we noted that there is gradual improvement of the frogs count per year near human settlements which we can predict as water will be available everywhere. We can also see the most attracting factor to them is food which is mainly abundant of insects that are attracted to street lights. The reasons which lure these frogs into the human settlements are availability of continuous water supply and food. They venture mostly at night, while crossing roads they mostly met with accidents, which we observed. These frogs or any frogs when seen by people, they immediately catch and leave them away, as they are afraid of snakes, which they follow them.

These frogs were trying to integrate themselves in the human settlements as human population is increasing there is much encroachment towards forest area. There should be kept limits on agrochemicals like pesticides or herbicides used

by farmers in surrounding forest areas. As these agrochemicals not only affect them directly but also indirectly by consuming insects which are affected by them will be bioaccumulated in them. In some cases we can dig small ditches or artificial ponds in forest areas creating new ecosystems for them to survive. These methods not only save this species but also the depended other species will follow them and may survive. These frogs are the integral part of a large ecosystem, which help to check the population of insects and also some of the predators are depended on them as in food chain if link is gone its broken. If these frogs were taken out of the picture so many species may enter into their extinction phases. The following we considered as threats for declination of these species.

Threats for Declination

The pollution of water bodies with Agrochemicals may influence their breeding rate. Spraying of pesticides and insecticides on crops, may reduce insects for their food or will bio accumulate to frog by consuming them. Majority of authors documented that loss of natural habitat^{6,13,14,15,16,17} or change of their habitat can cause^{18,19} amphibian declination. Their habitat declination was mainly due to conversion of wet lands to agricultural fields. Several environmental factors, infrastructure and developmental activities are also a major threat to their habitat loss. Climate Changes like increasing atmospheric temperature and decreasing or irregular of overall rain fall are also affecting their population enormously.

Conclusion

This study showed how the Indian painted frogs are gradually declining in this long run. This study is a sample for the frogs that had survived millions of years on earth and now facing several problems which are leading them to decline and then go extinct. We have to take desperate conservational measures as to reduce usage of agrochemicals at borders of the forest and also dig small ponds as well. We don't know yet about these species, we may once unlock some antimicrobial components or life saving chemicals which they might have as their adaptation. It's necessary for us to wake and pursue the measures for these frogs to attain in their natural habitat and to retain ecological food chain.

It's need of the hour for us to make amendments to protect and conserve amphibians to stop greater declination of their population.

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Conflict of Interest

The authors do not have any conflict of interest.

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