STUDIES ON THE POPULATION AND MICROHABITAT UTILIZATION OF ANURAN IN AGRO ECOSYSTEMS DURING SEASONAL VARIATION AT TRANQUEBAR TALUK, NAGAPATTINAM DISTRICT, TAMILNADU, INDIA.

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ABSTRACT

Habitat loss and fragmentation are among the largest threats to amphibian populations. In the present study, we intended to explore the amphibian population density (diversity) in three different seasons (Thaladi, Kuruvai and Samba) at five different habitats (Cultivable, Non-cultivable, Pond, Dry pond, and Grass land) in Cauvery delta region during the period 2016 to 2017. The Visual Encounter Survey Method (VES) was adopted in this study and amphibians were recorded in all possible 5 habitats. 9 species of amphibians were recorded belonging to 6 families of 9 genera in different habitats. Maximum of species were recorded during samba season in Pond followed by cultivable, non-cultivable, grass land during thaladi and kuruvai. There is no species recorded in dry pond during these three seasons (Thaladi, Kuruvai and Samba). Further studies are needed on the population structure; microhabitats and habitats used by amphibians for better understanding and impose several conservation strategies.

Key words: Amphibians; Population density; Tranquebar; Anuran diversity; Agro ecosystems

1. INTRODUCTION

Amphibians are habitat specific and highly sensitive animals. So, they are called indicator species of environment and also, they play an important role in ecological cycle of the agricultural fields [1, 2]. Among amphibians, the order Anuran constitute the vast majority (88%) of living specie and the bulk of their genetic, physiological, ecological, and morphological diversity. Amphibians currently comprise more than 7301 recognized species in the world and 342 species in India [3]. Out of 342 species of known Amphibians from India, 75 species are yet to be evaluated and 81 species are still under the data deficient category [4]. In India 342 species of amphibians which includes 306 species of anurans, 35 species of Gymnophionas and 1 species of salamander [4]. The amphibians are diverse and unique, with more than 80% of the 77 amphibian species being endemic from the state of Tamil Nadu, India [5]. Also, many new species have been recently discovered from India, especially in Western Ghats [6-10]. Amphibians are more threatened and declining in population next to birds and mammals [11].

Existing agricultural field and village ponds are not suitable habitats for amphibian population in current trends. Various factors are driving population fluctuation in amphibian species [4]. Because these microscopic organisms depend on light and nutrients, they populate the euphotic zone or the upper strata of freshwater lakes, reservoirs, ponds, and rivers. Many micro- organisms feed on diatoms and in this way they are integrated into aquatic food webs [25]. These factors may influence the decline of amphibian population in local areas of our study. Land alterations like converting agriculture land to human habitation, uses of pesticides in agriculture field, water contamination in village ponds by using pesticide and chemical fertilizers around the water bodies are some of the causes for decline of amphibian population [10, 11]. Exotic species (water hyacinth) that invade systems represent a threat to that ecosystem and could directly modify an ecosystem, causing a cascading effect for resident biota e.g. space [12].

Amphibians are of interest because their special physiological (skin permeability) and ecological (compound two phases of life cycle) characteristics happen to be potentially excellent bio -indicators, which in turn makes it very common for amphibian populations to be severely affected when there are serious disturbances to their natural habitats [13, 14]. Disease, pollution, invasive species, over collecting, global changes and other causes have been documented or proposed to be responsible for particular or widespread amphibian declines [14, 15-18]. Throughout the history of civilization, human activities have been detrimental to the natural biota, which is particularly evident in the clearing of the forest that houses the greatest diversity of anurans [19]. For nine out of every 10 amphibian species that are classified as threatened, [20].

Agricultural intensification has led to a drastic transformation of the landscape, soil depletion and the acceleration of irreversible erosion processes [21]. Agriculture can alter natural systems basically in 2 ways: a). Through direct effects on biological diversity in general [22, 23] and amphibian diversity in particular [24,38], such as habitat loss and creation of isolated fragments by conversion of natural habitats to arable land [26,27], b). Through indirect effects, particularly the deleterious impact of the use

of agrochemicals on wildlife [28,29]. For this purpose none of the study explained about the diversity population of Anuran in Tranquebar region of Tamilnadu. This is the first field study about diversity population of amphibian in and around Tranqubar taluk, during three seasons (thaladi, kuruvai and samba) with five different ecosystems (Cultivable land, non-cultivable, pond, dry pond, and grass land).

2. MATERIALS AND METHODS

2.1. STUDY AREA

The present study (Fig. 1) was carried out at 12 places in Tranquebar taluk Nagapattinam district of Tamil Nadu state. They are 1.Arupathy,2.Eswarankoil,3.Parasalur,4.Madapuram,5.Akkur,6.Thalachankadu,7.Karuvi,8.Thirukadiur,9.Ananthamankalam1,10. Porayar,11.Marudhampallam,12.Ananthamankalam of various micro habitats of Nagapattinam District, Tamil Nadu. The study was carried out only for a growth period of 2 years from Jan 2016 to Dec 2017. The study areas were comprised with dry deciduous, grassland, rocky scrub, jungle and agricultural landscapes. Agriculture is the backbone of these villages predominantly with agricultural cultivated, non-cultivated, pond, dry pond, and grassland.

2.2. GEOGRAPHICAL LANDSCAPE OF TRANQUBAR

The study area is located in the Tranqubar taluk, Nagapattinam district, which lies on the middle of the coramandal coast. The district lies between 10°25' and 11°40' North Longitude and 76°49' and 80°01' East latitude of Tamilnadu, India. The Nagapattinam district lies on the shores of the Bay of Bengal between latitude 10.7906˚N and Longitude 79.8428˚E an area of 2,715 square kilometers (1,048 sq mi). The District capital, Nagapattinam lies on the eastern coast, 350 kilometers down south of the State capital *Chennai*.

2.3. METHODS

The amphibians in all the habitats, such as cultivable, non-cultivable, pond, dry pond and grassland were studied and the data collection was done at morning hours (6.00 am to 12.30 pm). During the survey periods parameters such as population, microhabitat, and water distance from each species sightings, vegetation type and soil types also been recorded. The four habitats were classified in to two categories viz., Agricultural and non agricultural areas. The species were identified by using pictorial guides.

2.4. VISUAL ENCOUNTER SURVEY METHOD (VES)

The selected village ponds were regularly monitored for diversity and density of amphibian population in the study area. All the areas were walked thoroughly for amphibians. Time constrained VES involves systematic search of an area or habitat for a prescribed time [30].VES was used as formalized by [31], the aim of this study was to maximize the species inventory.

2.5. IDENTIFICATION OF AMPHIBIANS

Amphibians were identified with published keys from [32] and [33] also new species descriptions from the recent literatures were used. The fine classification of amphibian families proposed by Frost *et al*. [3] was used in the present work and nomenclature.

Table 1. SHOWING LIST OF AMPHIBIAN SPECIES RECORDED IN TRANQUEBAR REGION

S. N	Family	Name of the species	Common name	IUCN status	IWPA(1972) Status [41]
1	Bufonidae	*Duttaphrynus Melanostictus*	Common Indian Toad	Least Concern	Schedule IV
2	Dicroglossidae	*Euphlyctis Cyanophlyctis*	Skipper frog	Least Concern	Schedule IV
3	Dicroglossidae	*Euphlyctis hexadactylus*	Indian pond frog	Least Concern	Schedule IV
4	Dicroglossidae	*Hoplobatrachustigerinus*	Indian bull frog	Least Concern	Schedule IV
5	Microhylidae	*Microhylaornate*	Ornate narrow mouthed frog	Least Concern	Schedule IV
6	Microhylidae	*Ramanellavariegate*	Narrow mouthed Frog	Least Concern	Schedule IV
7	Ranidae	*Fejervaryalimnocharis*	Indian Cricket Frog	Least Concern	Schedule IV
8	Rhacophoridae	*Polypedatesmaculatus*	Common Tree Frog	Least Concern	Schedule IV
9	Dicroglossidae	*Hoplobatrachus Crassus*	Jerdon's bullfrog	Least Concern	-

Table 2. SHOWING WORKING MONTH 2016 TO 2017 PRESENCE AND ABSENCE OF ANURANS IN THE STUDY AREA

S.No	Species name	Cultivated land	Non cultivated Land	Pond	Dry pond	Grassland
1	LIMLIM	*	*	-	-	-
2	EUPCYN	*	*	*	-	-
3	EUPHEX	*	-	*	-	-
4	BFML	-	-	-	-	*
5	MICORT	-	-	-	-	*
6	RAMVAR	-	-	-	-	*
7	HOP-CRS	*	*	-	-	-
8	HOP-TGR	-	*	*	-	-
9	PLYMAC	*	*	*	-	*

Note: - *=Present - =Absent

FIG.1. SHOWING STUDY AREA

FIG.2. SHOWING THE TYPES OF AMPHIBIANS RECORDED

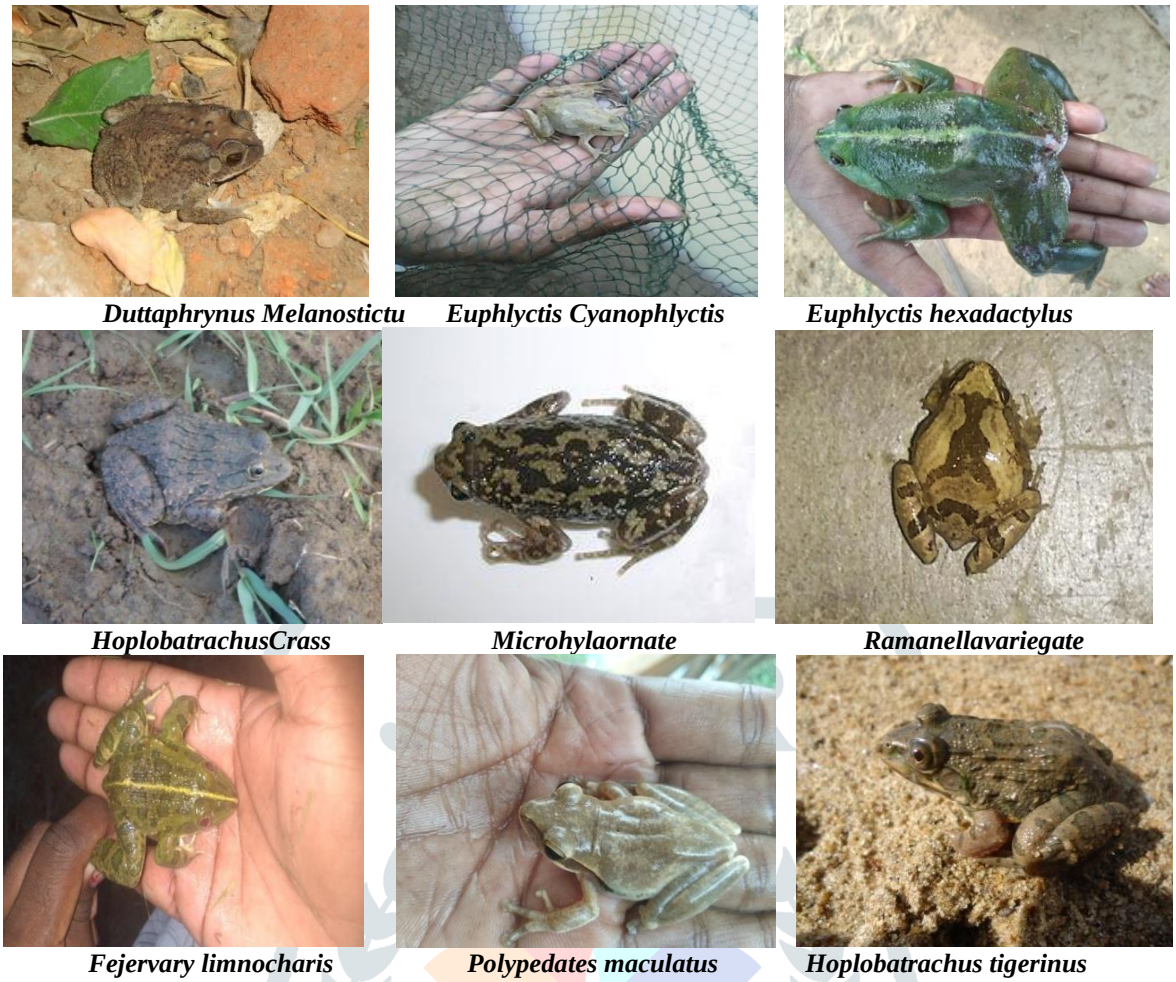


FIG.3 SHOWING AMPHIBIAN POPULATION RECORDED DURING THE STUDY PERIOD 2016 to 2017

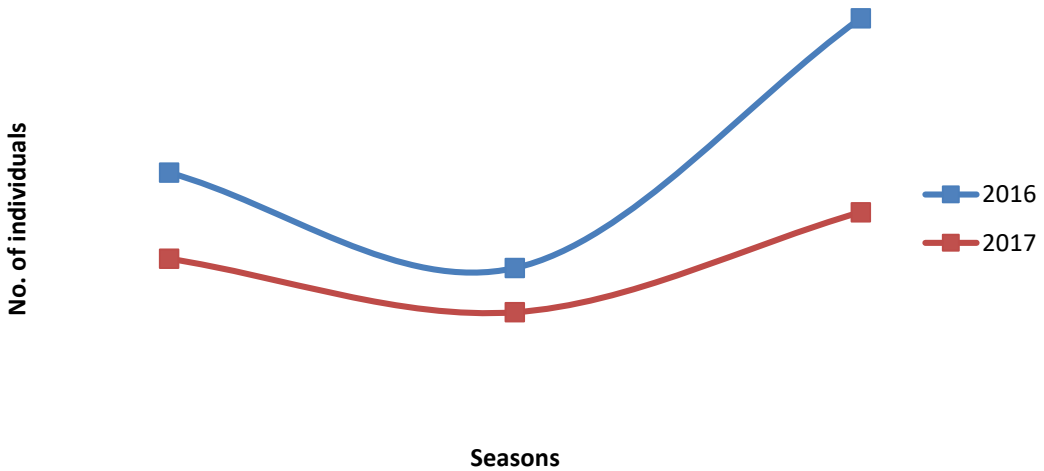
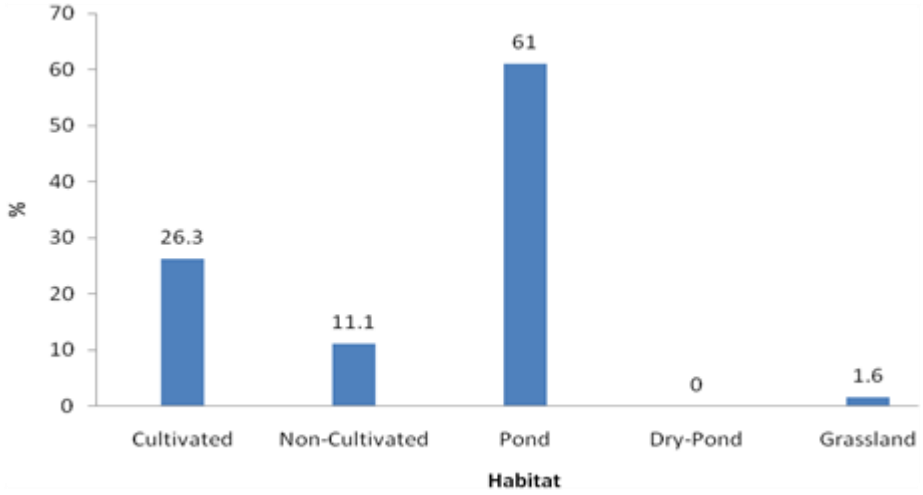


FIG.4 SHOWING PERCENTAGE OF AMPHIBIAN OBSERVED IN DIFFERENT HABITATS



3. RESULT AND DISCUSSION

3.1. SPECIES INVENTORY

A total of 9 species of anurans were recorded (Fig 2) during the present study in Tranqubar taluk, Nagapattinam district: with a majority of 9 species were recorded in 2016 year during samba season (Figure 3) followed by Thaladi and kuruvai. The maximum numbers of 1000 anurans were recorded during the 2016 when compared to 2017. During samba season of 2017 only 600 anurans were recorded when compared to 2016. The Thaladi and kuruvai season also showing the declining population density of amphibian in five different habitats during 2017 when compared to 2016 density population in Tranqubar region of Nagapattinam district.

3.2. OCCURRENCE OF AMPHIBIANS IN DIFFERENT LOCATION

The species of amphibians namely, *Euphlyctis hexadactylus*, *Euphlyctis Cyanophlyctis* and *Hoplobatrachus tigerinu*s were identified in all the habitats (cultivable, non cultivable, pond, and grass land) except dry pond during the three seasons (Samba, Thaladi and kuruvai). Figure 4 depicts the percentage of amphibian in five habitats during the three seasons.

3.3. MICROHABITAT

The microhabitat utilization by anurans in pond (61%) shows highest percentage followed by cultivable land (26.3 %), non-cultivable (11.4%) and grass land (1.6 %). However, the dry pond did not show any species diversity due to loss of water and other feeding sources (0%) (Figure 4). The table 4 clearly denotes the presence and absence of amphibian populations during the study period (2016-2017).

According to the IUCN Red list of threatened species, the global status of Indian amphibians is 47%, out of which 30% least concern; 9% endangered; 6% is threatened; and 5 % critically endangered; 2 % is near threatened and 1 % threatened [4]. Out of 342 species of amphibians known from India, 161 are still under the data deficient category [34].

A casual conversation with local people has revealed that it is commonly caught for food by few local people. Also, many wet lands in this district were converted for real estate business. About 35% of amphibians were eliminated from the city [35]. Seshadri et al., [36] discussed the problems of urbanization to amphibians in puducherry. The present study area in has also been undergone urbanization in recent years. Seshadri *et al.,* [36] reported 14 species of amphibians from the wetland of puducherry, India. Grazy kutty [37] recorded 12 species of amphibians form agricultural areas form periyakulam taluk. Similarly, Thenmozhi and Thangapandian [39] recorded 12 species of amphibian in and around Agarakeerangudi village, Mayiladuthurai taluk of Nagapattinam district were reported. However, in the present study, only 9 species of amphibians were reported. Seven species were common and widely distributed in India.

4. CONCLUSION:

In conclusion, from the present study, we observed 9 species of amphibians recorded 6 families of 9 genera in different habitats. Maximum of species were recorded during samba season in Pond followed by cultivable, non-cultivable, grass land during thaladi and kuruvai. There is no species recorded in dry pond during these three seasons (Thaladi, Kuruvai and Samba). Further future studies are warranted on the population structure; microhabitats and habitats used by amphibians for better understanding several ecosystem conservation strategies in Nagapattinam district of Tranqubar regions.

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