Research Article

AMPHIBIAN DIVERSITY IN DIFFERENT HABITAT OF AGRO ECOSYSTEM IN AURANGABAD DISTRICT (BIHAR)

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ABSTRACT

Amphibians are one of the key components of various ecosystems viz. freshwater, grassland as well as forest ecosystem. Present study for assessment of amphibian diversity was conducted in different agro ecosystem habitat types of Aurangabad district of Bihar province. Different habitat types selected for assessment of amphibian diversity of this area as: - (1) agricultural and non-agricultural land (2) pond (3) grassland. The data was collected by visual encounter survey and call count survey using line transect method. Species identification was confirmed with pictorial guide and various identification keys available. Collected data was analysed descriptively as well as statistically to find out different diversity indices. A total of 13 species of amphibians belonging to 4 families and 9genera were recorded. This study reveals that the Aurangabad district of Bihar province is rich in amphibian fauna. The district lies between 24°45' and 24°75' North Longitude and 84°22' and 84°37' East latitude. Further studies may explore the population structure, microhabitat, habitat, and use by amphibians for better understanding and also impose of several conservation strategies in Bihar state.

Keywords: Amphibian Diversity, Agro ecosystem, Aurangabad (Bihar).

INTRODUCTION

Amphibians are highly sensitive and habitat specific pretty animals. They also act as indicator Species and give information about health of environment. They also play an important role in ecological cycle of the agricultural fields (Blaustein and Wake, 1990; Cushman, 2006). Among amphibians, the order Anuran constitute the vast majority(88%) of living species of amphibians draw much attention due to their genetic, physiological, ecological, and morphological diversity. Amphibians represented by 8428known species in the world out of the 447 species of known Amphibian species from India, 175 species are yet to be evaluated and 86 species are still under the data deficient category (Dinesh *et al.,* 2020). In India 447 species of amphibians which includes 406species of anurans, 39 species of Gymnophiona and 2 species of salamander (Dinesh *et al.* 2020).Amphibians 'population are more threatened and declining than birds and mammals (Stuart *et al.,* 2004).Existing agricultural field and village ponds are not suitable habitats for amphibian population in present scenario due to anthropogenic disturbance. Various factors such as biotic or abiotic interferes the natural habitat

of amphibians leads to declining in their population. 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 major declining factors of amphibian population. Exotic species (water hyacinth) as well the various plant species that invade natural systems represent a threat to that ecosystem and could directly modify an ecosystem, causing adverse effect on local biota (Crooks, 2002).Amphibian draw much attention of workers because of their special physiological (skin permeability) and ecological (two phases of life cycle) characteristics and potentially excellent bio-indicators. Now a day's amphibians facing great threat and their population are severely affected by destruction in their natural habitats (Collins and Storfer, 2003). Various diseases, pollution, invasive species, global climate changes and other anthropogenic and natural causes have been responsible for amphibian decline (Blaustein and Bancroft, 2007). Human activities such as deforestation, use of various chemical fertilizers and pesticides in agro-ecosystems, rapid industrialization have been greatly

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affected the natural biota, that is home of diverse group of anurans(Duellman & Treub, 1986).Amphibian habitat are also affected greatly by drastic transformation of the landscape, soil depletion and the acceleration of irreversible erosion processes (Sans, 2007). Agriculture activity canalter natural systems and directly affects the biological diversity at a great extent (Fahrig, 2003; Firbank *et al.*, 2008). Agricultural activity also alters the habitat of amphibians as habitat loss, creation of isolated fragments by conversion of natural habitats to arable land (e.g., Joly *et al.*, 2001; Grau *et al.*, 2005) and thus causes major loss to amphibian diversity of that area. Use of various agrochemicals, pesticides has deleterious effect of wildlife and local fauna at a great extent (e.g., Smith *et al.,* 2000; Khan and Law, 2005).

MATERIALS AND METHODS

Study area

The present study of assessment of amphibian fauna was carried out at 8 different villages viz (1. Amba (Kutumba) 2. Bansbigha (Rafiganj) 3. Basdiha (Aurangabad) 4. Chandragadh (Nabinagar) 5. Dadar (Goh) 6. Devkund (Haspura) 7. Ketaki (Deo) 8. Shivganj (Madanpur) of Aurangabad district of Bihar province (Figure 1). For assessment of amphibian diversity of this district a study was carried out during the period of 12 month from Oct 20 to Oct 21. Various habitats and micro habitats such as agricultural landscape, dry deciduous forests, grassland, and rocky scrub jungle of the selected study areas were surveyed throughout the year for the assessment of amphibian diversity. Agriculture is the backbone of these villages predominantly with cultivated and non-cultivated agricultural lands, pond. Grasslands etc.

MATERIALS AND MATERIALS

The survey for assessment of amphibian fauna was carried out throughout all possible habitats and microhabitats such as agricultural fields, pond, Grassland etc. Survey and sampling of amphibian fauna was carried out during the morning 5:00 am to 8:00 am and evening 7:00 pm to 11:00 pm. During present study various sampling methods such as visual counter survey, call count survey, opportunistic search was used (Heyer *et al.,* 1994). Specimens were photographed at the site by Nikon D camera for further identification and documentation. Different diversity indices were calculated using the software PAST 4.08.Various parameters such as temperature, microhabitat, and water distance from each species sightings, vegetation type and soil types were also recorded. Different habitats were classified in to two categories viz., Agricultural and non-agricultural areas.

Identification of amphibians

The identification of amphibian specimens was done with various identification keys and publications (Ahmed *et al.,* 2009; Bossuyt & Dubois, 2001; Chanda, 2002; Daniels, 2005; Das, 2008; Dubois, 1975; Dutta & Manamendra Arachchi, 1996; Frost, 2020; Kabir *et al.,* 2009). Nomenclature and classification of Amphibians in this paper followed (Frost, 2020).

RESULT AND DISCUSSION

A total of 13 amphibian species belonging to 4 families and 9 genera were recorded from all the eight study sites. All the species recorded from various study sites are listed in table 1. The amphibian diversity of different study sites of Aurangabad (Bihar) is moderate. Only 13 amphibian species of anuran amphibian belonging to 4 families named Bufonidae, Dicroglossidae, Microhylidae and Rhacophoridae was recorded. The amphibian species represented by *Duttaphrynus melnostictus, Duttaphrynus stomaticus, Hoplobatrachus, Hoplobatrachus crassustigerinus, Sphaerotheca braviceps, Sphaerothe camagadha, Euphlyctis cyanophlyctis, Frejerverya limnocharis, Microhylarubra, Microhyla ornate Uperedonsystoma, Kaloulapulchara, Polypedates maculatus*(Table-1 and Figure2).

Family	Species	Common name	IUCN status	IWPA (1972) Status (41)
Bufonidae	*Duttaphrynus melnostictus*(Schneider,1799)	Common Asian toad	LC	Schedule IV
Bufonidae	*Duttaphrynus stomaticus* (Lutken,1864)	Marbled toad	LC	Schedule IV
Dicroglossidae	*Hoplobatrachus tigerinus*(Daudin,1803)	Indian bullfrog	LC	Schedule IV
Dicroglossidae	*Hoplobatrachus crassus*(Hoffman,1932)	Jerdon's bullfrog	LC	Schedule IV
Dicroglossidae	*Sphaerotheca braviceps* (Schneider,1799)	Indian burrowing frog	LC	Schedule IV
Dicroglossidae	*Sphaerotheca magadha*	IMagadha's burrowing frog	LC	Schedule IV
Dicroglossidae	*Euphlyctis cyanophlyctis*(Schneider, 1799)	Skittering frog	LC	Schedule IV
Dicroglossidae	*Frejerverya limnocharis* (Gravenhorst,1829)	Asian grass frog	LC	Schedule IV
Microhylidae	*Microhyla rubra*(Jerdon, 1853)	Guandong rice frog	LC	Schedule IV
Microhylidae	*Microhyla ornate* (Dumeril&Bibron 1841)	Ornate narrow mouthed frog	LC	Schedule IV
Microhylidae	*Uperedonsystoma*(Schneider,1799)	Marbled balloon frog	LC	Schedule IV
Microhylidae	*Kaloula pulchara* (Gray, 1831)	Banded bullfrog	LC	Schedule IV
Rhacophoridae	*Polypedates maculatus* (J.EGray,1830)	Common tree frog	LC	Schedule IV

Figure 1. Map of Aurangabad (Bihar).

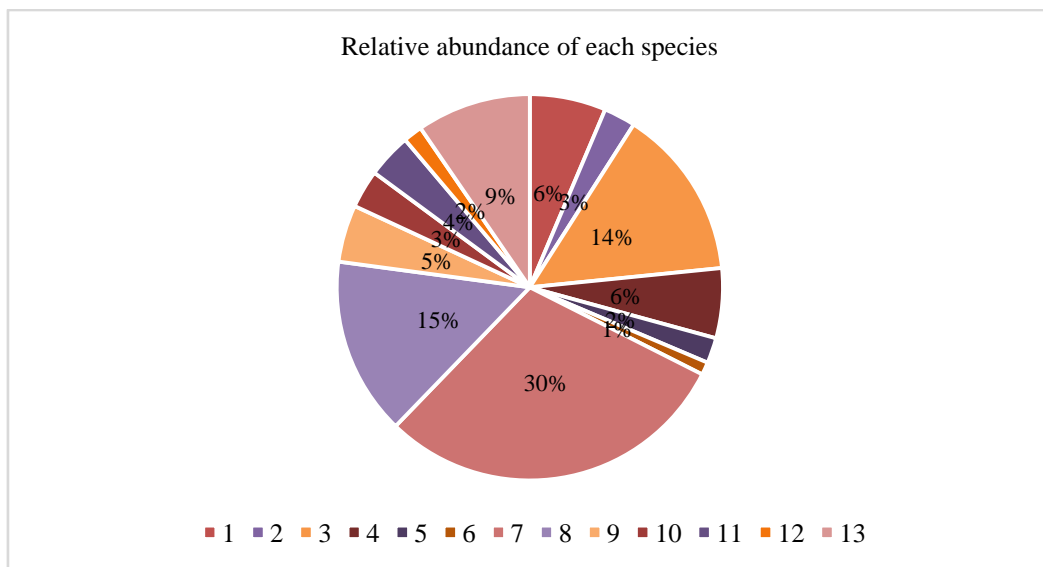**Figure 2.** Some amphibian species recorded from agro-ecosystems of Aurangabad (Bihar).

Figure 3. Relative abundance of each species.

Table 2. Presence and Absence of Amphibian species in different habitat types.

Sl No	Species	Species Agriculture Paddy cultivated	Agricultural Non cultivated	Pond water	Grassland
1.	*Duttaphrynus melnostictus*(Schneider,1799)	-	-	-	+
2.	*Duttaphrynus stomaticus* (Lutken,1864)	-	+	-	+
3.	*Hoplobatrachus tigerinus*(Daudin,1803)	-	+	+	-
4.	*Hoplobatrachus crassus*(Hoffman,1932)	+	+	-	-
5.	*Sphaerotheca braviceps* (Schneider,1799)	-	+	-	+
6.	*Sphaerotheca magadha*	+	+	-	+
7.	*Euphlyctis cyanophlyctis* (Schneider, 1799)	+	-	+	-
8.	*Frejerverya limnocharis* (Gravenhorst,1829)	+	+	-	+
9.	*Microhyla rubra* (Jerdon, 1853)	+	-	+	-
10.	*Microhyla ornate* (Dumeril&Bibron 1841)	+	-	-	-
11.	*Uperedonsystoma*(Schneider,1799)	+	-	-	-
12.	*Kaloula pulchara* (Gray, 1831)	-	-	-	+
13.	*Polypedates maculatus* (J.EGray,1830)	+	-	-	-

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The Anuran population was estimated by habitat wise distribution and enumerates the population. As highest in the Pond habitat and subsequent highest in the cultivated lands suitable for anuran population in this study. These two habitats water availability irregularly or seasonally, generally the amphibians are aquatic and terrestrial inhabitant in which aquatic is more important in their life span for feeding, Breeding and most importantly for metamorphosis tadpoles. Remaining habitats are lack of water source and microhabitat also alteration of habitat or cleaning is the major reason for less population of amphibians in this field. There were changing habitat and climates are regulating the population structure inhabitant location also. This study obtained the anuran population are more preferable in aquatic habitat of pond and cultivated habitat.

CONCLUSION

The observations of this study showed the Anurans diversity and richness in and around the study area. This study may generate the base line data for the anuran's diversity of Aurangbad Bihar India. This study also prevails about the different habitat types suitable of amphibian species. It was the preliminary study on the amphibian faunal diversity of this district of Bihar state but further study is also required for explore the diversity of anurans in the study area by addition of new amphibians' species, habitat study, population estimation, and to find out the severity of the threats to diversity, and also to propose several conservation strategies in the study area.

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