

## MICROHABITAT UTILIZATION OF SOME ANURAN SPECIES IN MINBU ENVIRONS

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### Abstract

Microhabitat utilization of some anurans were investigated during June 2018 to May 2019 in Minbu environs. Weekly data collection was carried out in the late evening. A total of 22 species inhabited in ten microhabitats were recorded. Out of the recorded species, the highest numbers of species (15 species) were from paddy field while the lowest numbers of species (three species) were observed in temporary pool microhabitat. The anuran species were distributed in the study area and well-occupied in the different microhabitats located in different areas.

**Keywords:** anuran, microhabitat utilization, Minbu

### Introduction

Most anuran lives in the tropical parts of the world than in the northern temperate climate. Most Asian tree frogs occur in south, southeast and east Asia from eastern India, Sri Lanka and Nepal through Myanmar, Thailand, Laos, Cambodia, and Vietnam, southeast along the Malay Peninsula onto the islands of Sumatra, Java, Borneo and Sulawasi, and throughout the Philippines. Many species of *Chiromantis*, *Polypedates*, and *Rhacophorous* also inhabit flooded rice fields and grasses or low shrubs between agricultural lands and forests (Duellman and Schlager, 2003).

Microhabitat loss is a significant cause of frog population decline, as are pollutants, climate change, the introduction of non-indigenous predators/competitors etc. A Canadian study conducted in 2006 suggested heavy traffic near frog microhabitats as a large threat to frog population. Natural fluctuations, in amphibian populations, from changing weather conditions and other natural environmental changes can be relatively large, potentially marking changes due to other factors (Mossman, *et al.*, 1998).

Minbu environs is one of the townships of Myanmar with suitable environment and microhabitats for existence of amphibian population. Its lies to the west of the Ayeyawady River. Environmental conditions are favourable for the occurrence of frogs and toads. However, due to changes of weather and human impacts such as over exploitation, indiscriminate uses of pesticides for agricultural purposes, over extraction of timber from forests, and extension of agricultural land and human settlements, the microhabitats for anurans become degraded and deteriorated. The information about anuran in Myanmar is scarce and the works related to frogs and toads were very limited. With this background, present research was conducted to document the microhabitats of anurans in Minbu environs.

The main objectives of the study are to investigate the occurrence of the anuran species in different microhabitats of study area and to determine the microhabitats of anurans species in Minbu environs

### Material and Methods

#### Study area

Minbu environs is existed between 19°52'16" to 20°18'54" N and 94°28'17" to 95° E. In the area, irrigated paddy lands substitute some dry farming land.

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### Study sites

Three study sites were allocated Maungmakan village, Sabowit Chaung and Man Chaung in Minbu environs.

### Study period

Field trips were made in Minbu environs during June 2018 to May 2019.

### Study design and specimen collection

Specimen collections were made at the designated sampling sites and collected from the late evening till mid night. The data collection was made monthly in each study area based on visual encountered survey method. They were collected using hand net and by hand. Specimens were kept in plastic bags and the species, number of individual, collection sites, dates, microhabitat types and weather conditions were noted. Photographic records were taken instantly in fresh state in wild condition and were noted down. The specimens were preserved in 10% formalin for 24 hours and then transferred to 70 % ethanol for future use. The collected specimens were brought to the Department of Zoology, Magway University for species identification and measurements.

### Identification and classification of species

The species identification and classification were made based on key characters and taxonomic descriptions given by Duellman and schlarger (2003), Zug (2010) and Frost (2015 and 2018).

### Assigning status based on relative abundance

The status of anurans was assigned based on the value of relative abundance according to Bisht *et al.*(2004).

$$\text{Relative abundance} = \frac{\text{No.of individual of a species}}{\text{Total no.of individual of all species}}$$

uC = (uncommon) having relative abundance less than 0.0100

C = (common) having relative abundance of 0.0100 and above but less than 0.0500

vC = (very common) having relative abundance of 0.0500 and above



**Plate 1** Map of study areas of Minbu environs (Source: from Google earth soft ware)

### Results

A total of 22 species of anuran belonging to five families confined to single order were recorded. Among the recorded species, four species of *Duttaphrynus melanostictus*, *Ingerophrynus macrotis*, *I. parvus* and *Phrynodis aspera* are the representative of the family Bufonidae, 10 species

namely, *Fejervarya cf. limnocharis*, *F. limnocharis*, *Hoplobatrachus crassus*, *H. tigerinus*, *H. ugulosus*, *Limnonectes grunniens*, *L. modestus*, *Occidozyga lima*, *Sphaerotheca breviceps* and *Zakerana greenii* belonged to the family Dicroglossidae and five species, *Calluella guttulata*, *Glyphoglossus molossus*, *Kaloula pulchra*, *K. p. pulchra* and *Microhyla ornata* represented the family Microhylidae, single species of *Humerana humeralis* is from the family Ranidae and the two species, *Chiromantis punctatus* and *Polypedates leucomystax* belonged to the family Rhacophoridae in Minbu environs. According to IUCN Red List, in the study area one near threatened (*Glyphoglossus molossus*), one endangered species (*Zakerana greenii*), two data deficiency (*Chiromantis punctatus* and *Polypedates leucomystax*) and the rest of 18 species in least concern were collected (Table 1).

### Microhabitats analysis

Different environmental places where frogs and toads inhabited were analyzed and categorized into different microhabitats.

### Distribution of microhabitat in different in Minbu environs

Ten microhabitats found were trees dominated area, grass ground, sandy area near water, swamp, pond, paddy field, ditch, human habitation, temporary pool and sandy field.

### Occurrence of anuran species in different microhabitat types

In Minbu environs, *Duttaphrynus melanostictus*, *Kaloula pulchra* and *K. p. pulchra* was found in all microhabitats. *Fejervarya limnocharis* and *F. cf. limnocharis* were found in all microhabitat types except temporary pool. *Ingrophrynus macrotis* and *I. parvus* was found in pond only. *Chiromantis punctatus* and *Polypedates leucomystax* were found in swamp only. *Calluella guttulata* was found in only sandy field. *Microhyla ornata* was found in three microhabitats. *Occidozyga lima* and *Glyphoglossus molossus* were found in five microhabitats. *Zakerana greenii* was collected in six microhabitats. Three species from temporary pool, five species from in each of human habitation, and trees dominated area, six species from grass ground, eight species from in each of ditch and sandy field, 10 species from pond, 11 species from in each of swamp and sandy area near water, 15 species from paddy field were recorded. The seven species are very common species, the anuran species well distributed in the study area and well-occupied in the different microhabitats located in different areas. Another seven species are uncommon species and eight common species were collected. Six microhabitat types such as sandy area near water, swamp, pond, ditch, paddy field and sandy field in very common species, three microhabitat types such as tree dominated area, grass ground and human habitation in common species and only temporary pool microhabitat type in uncommon species were collected (Table 2 and Fig.2).

A total of 22 species in Minbu environs, the highest species were in family Dicroglossidae (45.45%) followed by family Microhylidae (22.73%), family Bufonidae (18.18%), family Rhacophoridae (9.09%) and the lowest species in family Ranidae (4.55%) (Table 3, Fig 1). In the present study the highest species was found in paddy field microhabitat type (15 species) while the lowest in temporary pool microhabitat type (three species). In Minbu environs, *Duttaphrynus melanostictus*, *Kaloula pulchra* and *K. p. pulchra* was found in all microhabitats in all study sites.

Table 1 List of collected anuran species in Minbu environs

Sr. No	Family	Genus	Species	Common name	Venacular name	IUCN Status
1.	Bufonidae	<i>Duttaphrynus</i> <i>Ingerophrynus</i> <i>Phrynooidis</i> <i>Fejervarya</i> <i>Hoplobatrachus</i> <i>Limnonectes</i> <i>Occidozyga</i> <i>Sphaerotheca</i> <i>Zakerana</i> <i>Calluella</i>	1. <i>Duttaphrynus melanostictus</i> (Schneider, 1799)	Common toad	Hpar pyoke	LC
			2. <i>Ingerophrynus macrotis</i> Boulenger, 1887	Big-eye toad	Hpar pyoke	LC
			3. <i>Ingerophrynus parvus</i> Boulenger, 1887	Dwarf toad	Hpar pyoke	LC
			4. <i>Phrynooidis aspera</i> (Gravenhorst, 1829)	River toad	Hpar pyoke Chaung	LC
			5. <i>Fejervarya cf. limnocharis</i> (Gravenhorst, 1829)	Paddy frog	Kyaw san kay	LC
			6. <i>Fejervarya limnocharis</i> (Gravenhorst, 1829)	Paddy frog	Kyaw san kay	LC
			7. <i>Hoplobatrachus crassus</i> (Jerdon, 1854)	Brown edible frog	Hpar paung nyo	LC
			8. <i>Hoplobatrachus rugulosus</i> (Wiegmann, 1834)	Chinese Edible frog	Sarr hpar kyie	LC
			9. <i>Hoplobatrachus tigrinus</i> (Daudin, 1803)	Kaing land frog	Kaing hpar	LC
			10. <i>Limnonectes grunniens</i> (Latreille, 1801)	Nil	Sarr hpar	LC
			11. <i>Limnonectes modestus</i> (Boulenger, 1882)	Grass frog	Nil	LC
			12. <i>Occidozyga lima</i> (Gravenhorst, 1829)	Common floating frog	Hpar than lat	LC
			13. <i>Sphaerotheca breviceps</i> (Schneider, 1799)	Terrestrial frog	Kon hpar	LC
			14. <i>Zakerna greenii</i> (Bloulenger, 1905)	Paddy frog	Hpar paung sinn	EN
			15. <i>Calluella guttulata</i> (Blyth, 1855)	Myanmar squat frog	Nil	LC
3.	Microhylidae	<i>Glyphoglossus</i> <i>Kaloula</i>	16. <i>Glyphoglossus molossus</i> Gunther, 1869	Balloon frog	Hpar ayne	NT
			17. <i>Kaloula pulchra</i> Gray, 1831	Bull frog	Hpar kon nyin	LC
			18. <i>Kaloula pulchra pulchra</i> Gray, 1831	Bull frog	Hpar kon nyin	LC
4.	Ranidae	<i>Microhyla</i> <i>Humerana</i>	19. <i>Microhyla ornata</i> (Dumeril and Bibron, 1841)	Sand frog	Thae hpar	LC
			20. <i>Humerana humeralis</i> (Boulenger 1887)	Nil	Hpar paung shay	LC
5.	Rhacophoridae	<i>Chiromantis</i> <i>Polypedates</i>	21. <i>Chiromantis punctatus</i> (Wilkinson, 2003)	Myanmar plant Frog	Hpar pyan thae	DD
			22. <i>Polypedates leucomystax</i> (Gravenhorst, 1829)	Tree Frog	Hpar pyan Kyi	DD

DD-Data Deficiency, NT-Near Threaten, EN-Endanger species, LC- Least Concern

**Table 2 Occurrence and abundance of anuran species in different microhabitat types in Minbu environs**

Sr. No	Species	Trees dominated area	Grass ground	Sandy area near water	Swamp	Pond	Paddy field	Ditch	Human habitation	Temporary pool	Sandy field	Total	Relative abundance	Status
1.	<i>Duttaphrynus melanostictus</i>	5	10	25	30	60	80	40	10	5	20	285	0.15	vC
2.	<i>Ingerophrynus macrotis</i>	-	-	-	-	20	-	-	-	-	-	20	0.01	uC
3.	<i>Ingerophrynus parvus</i>	-	-	-	-	10	-	-	-	-	-	10	0.005	uC
4.	<i>Phrynooidis aspera</i>	-	-	15	-	-	-	-	-	-	10	25	0.013	uC
5.	<i>Fejervarya cf. limnocharis</i>	5	10	20	20	30	30	20	5	-	20	160	0.085	vC
6.	<i>Fejervarya limnocharis</i>	10	20	30	30	30	40	30	10	-	20	220	0.117	vC
7.	<i>Hoplobatrachus crassus</i>	-	-	-	-	-	50	-	-	-	-	50	0.026	C
8.	<i>Hoplobatrachus rugulosus</i>	-	-	-	-	-	50	-	-	-	-	50	0.026	C
9.	<i>Hoplobatrachus tigerinus</i>	-	-	-	-	-	100	-	-	-	-	100	0.053	vC
10.	<i>Limnonectes grunniens</i>	-	-	-	-	-	80	-	-	-	-	80	0.042	C
11.	<i>Limnonectes modestus</i>	-	-	-	-	-	50	-	-	-	-	50	0.026	C
12.	<i>Occidozyga lima</i>	-	-	20	20	30	40	30	-	-	-	140	0.074	vC
13.	<i>Spherotheca breviceps</i>	-	-	20	-	-	-	-	-	-	50	70	0.037	C
14.	<i>Zakerana greenii</i>	-	5	5	5	10	20	5	-	-	-	50	0.026	C
15.	<i>Calluella guttulata</i>	-	-	-	-	-	-	-	-	-	10	10	0.005	uC
16.	<i>Glyphoglossus molossus</i>	-	-	5	5	10	15	5	-	-	-	40	0.021	C
17.	<i>Kaloula pulchra</i>	15	20	30	30	40	60	20	10	5	10	240	0.127	vC
18.	<i>Kaloula pulchra pulchra</i>	5	10	15	10	20	20	10	5	5	10	110	0.058	vC
19.	<i>Microhyla ornata</i>	-	-	5	5	-	10	-	-	-	-	20	0.01	uC
20.	<i>Humerana humeralis</i>	-	-	-	-	-	30	-	-	-	-	30	0.016	C
21.	<i>Chiromantis punctatus</i>	-	-	-	10	-	-	-	-	-	-	10	0.005	uC
22.	<i>Polypedates leucomystax</i>	-	-	-	10	-	-	-	-	-	-	10	0.005	uC
Total number species		5	6	11	11	10	15	8	5	3	8	22		
Total number of individual		40	75	190	175	260	675	160	40	15	150	1880		

**Table 3 Composition of anuran species in different families in Minbu environs**

Sr.No.	Family	Genus	Species	% Composition
1.	Bufonidae	3	4	18.18
2.	Dicroglossidae	6	10	45.45
3.	Microhylidae	4	5	22.73
4.	Ranidae	1	1	4.55
5.	Rhacophoridae	2	2	9.09

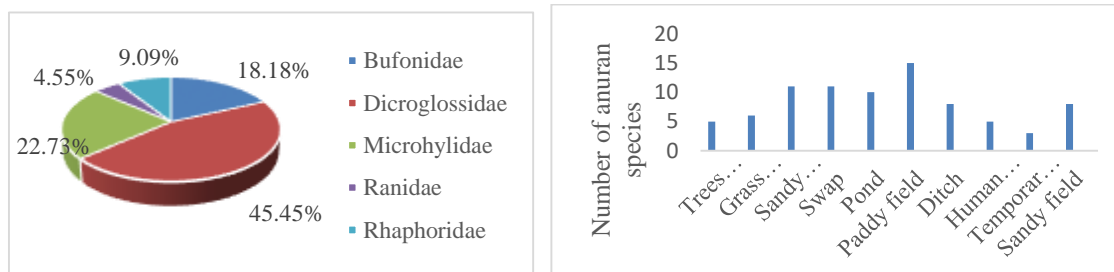
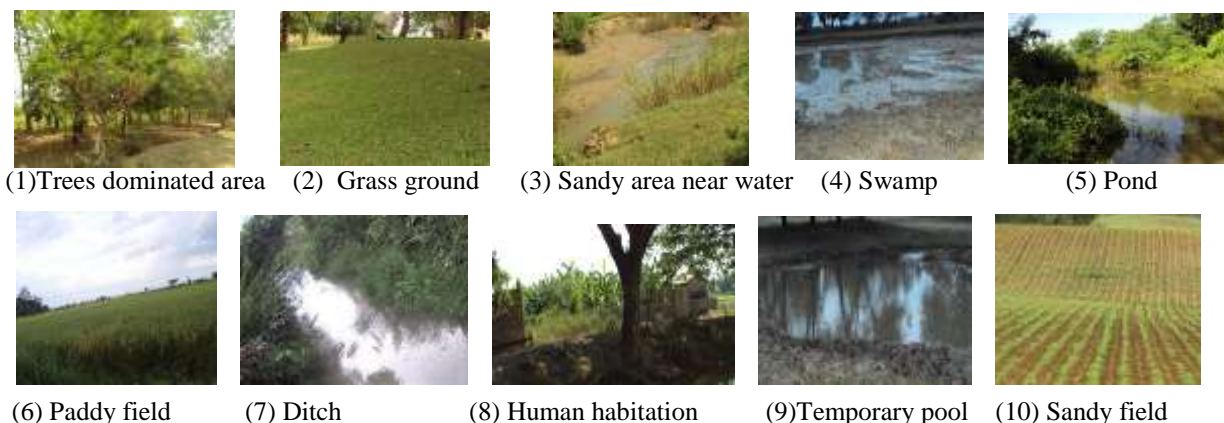


Figure 1 Composition of anuran species

Figure 2 Number of anuran species among different microhabitats



**Plate 2** Recorded species of anuran in Minbu environs



**Plate 3** Microhabitat types of anuran species in Minbu environs

## Discussion

Three species in temporary pool, five species in each of trees dominated area, human habitation, six species in grass ground, eight species in sandy field and ditch, 10 species in pond, 11 species in each of sandy area near water and swamp and 15 species in paddy field were recorded in Minbu environs.

Simon (1987) identified microhabitat types with key symbols such as the microhabitat frequented, the life microhabitats, and certain biological characteristics. Different species use different microhabitats and also the same microhabitat. In the present study, when consideration was made on occurrence of each species in different microhabitats, *D. melanostictus*, *K. pulchra* and *K.p pulchra* was recorded in all observed microhabitats. Thus this species may be considered very cosmopolitan in their distribution and tolerable species. *F. limnocharis* and *F.cf limnocharis* are also considered very wide spread species because these two species were recorded in every microhabitat except temporary pool. *Z. greenii* was found distributed in six microhabitat types, whereas *O.lima* and *G.molossus* in five microhabitats. These species are regarded as a fairly distributed species in the study area. *M.ornata* in three microhabitats, and *P. aspera* and *S. breviceps* in two microhabitat types were observed. These species may be regarded as less adjusted species.

Eleven species are considered very specific for inhabitation because they were noted only in one microhabitat type.

Regarding with microhabitats occupied by different species of anuran, microhabitat type of paddy field may be considered very good and suitable microhabitat for anurans. Because 15 species of anurans among 22 species observed in this study were recorded in this microhabitat. Paddy fields are always provided with water during their growing season and hence, moist and damp soil attracts frogs and toads suitable for feeding, sheltering and breeding sites. Other good microhabitats preferred by anurans are sandy area near water, swamp and pond microhabitats. The less preferred microhabitats is temporary pool because each of these microhabitat was occupied with least number of three species. Temporary pool is existed only in limited period especially during rainy time.

Win Mar Khaing (2007) stated that a maximum of 11 species were found at water edge and paddy field and minimum three species were observed at ground. In this work most species (15 species) were found at paddy field microhabitat and less number of species (three species) was recorded temporary pool microhabitat types.

Krebs (2001) described that species may adapt to temperature, moisture, or light levels phenotypically, or genotypically. Therefore, some species are restricted to particular microhabitats type and some are widespread in their distribution. The distribution of many species can be affected by human changes to microhabitats. In the present study, under the family Bufonidae, the species of *D. melanostictus* under Dicroglossidae, the species of *F. limnocharis* under Microhylidae and the species of *K. pulchra* were found in the Minbu environs. They are regarded as the widely distributed and adjustable frog and toad species. Kathy Htun (2012) stated that the lowest of *Occidozyga lima* was found in Patheingyi environs. Her finding is different from present study. *O. lima* was observed in five microhabitat types. Minbu environs is suitable for this species.

Nwe Nwe Win (2012) reported that they were observed in cropland, grassland, shrub, human habitation, aquatic environs and especially in rice field with larger number in Yangon environs. Thus, the present finding was in agreement with those of the above authors. All recorded species except *I. parvus*, *P. aspera*, *F. cf. Limnocharis*, *S. breviceps*, *C. guttulata*, *C. punctatus* and *P.leucomystax* were collected from paddy field microhabitat type.

There is a need to conserve the tropical moist microhabitats including Minbu environ, since local and regional microhabitat loss, degradation and large-scale environmental changes are causal factors associated with decline amphibian population. Thus, microhabitats and communities must be conserved. In addition; since anurans are sensitive to environmental degradation and

pollution are good biological indicators, so that these living assess need to be sustained. Nevertheless, anurans need to be sustained simply because, as living assess they have the inborn right to live and thrive. As a result, Minbu environs is inhabited with more number of anuran species and the microhabitat types of these areas are considered more suitable for existence of anurans. Therefore, it is required to determine the status of current amphibian population and their microhabitats in Minbu environs.

### Conclusion

During the study period, 22 species of frogs and toad belonging to 16 genera under five families were recorded from Minbu environs. *Duttaphrynus melanostictus*, *Kaloula pulchra* and *K.p. pulchra* were observed to be habitat generalist. Among 22 species of anuran recorded from the 15 species were found in paddy field very common species in microhabitat types and three species were found in temporary pool uncommon species in microhabitat types. Therefore the species occurrence in two microhabitats was quite different in the Minbu environs.

### Acknowledgements

I wish to express my thanks to Dr. Khin Maung Oo, Rector, University of Magway, for allowing me to do this research. I am greatly indebted to Dr. Than Than Oo, Pro-rector, University of Magway for her interest and help in various ways. My sincere gratitude goes to Professor Dr Cho Cho Oo (Head), Department of Zoology, University of Magway for her permission to do research and for her suggestions in writing the paper. I am special thanks go to Dr. Thant Zin, Professor Head, Department of Zoology, University of Mandalay for his advice to do research.

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