

Amphibian Diversity of Wetlands of Bongaigaon District of Assam with a Note on the Morphometric Characters of *Duttaphrynus Melanostictus*

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Abstract: Situated in the northwestern part of Assam Bongaigaon district is gifted with lot of wetlands significantly Tamranga, Konara and Dalani wetland is home of 12 amphibian species under 5 family. Of which 1 species belonged to family Bufonidae, 2 species to family microhylidae, 1 species to family Rhacophoridae, 6 species to family Dicroglossidae and 2 species to Ranidae. Morphometric study was carried out for *Duttaphrynus melanostictus*. Significant variation was observed in the morphometric characteristics of *D. melanostictus* with its Lectotype. Supratympanic fold was found to be present and parietal ridge is absent in case of specimens of Bongaigaon, while vice versa in Lectotype. Webbing formula found to be $I_{0-1}II_{0-1\frac{1}{2}}III_{1-3\frac{1}{2}}IV_{3\frac{1}{2}-1\frac{1}{2}}$ in case of lectotype, where as in the specimens from Bongaigaon it is $I_{1-1\frac{1}{2}}II_{1\frac{1}{2}-2\frac{1}{2}}III_{1\frac{1}{2}-3\frac{1}{2}}IV_{3\frac{1}{2}-1\frac{1}{2}}$.

Keywords: Amphibia, Wetland, *Duttaphrynus melanostictus*

1. INTRODUCTION

Wetlands are one of the world's most productive and important ecosystems. The word 'wet-land' tell us that they are lands that are wet. These ecosystems fall somewhere between terrestrial and aquatic categories. They are more shallow and characterized by the presence of vegetation rather than open water. These water bodies are suitable natural habitat and breeding ground for variety of amphibian fauna. Amphibians play a pivotal role in wetland ecosystem as secondary consumers in many food chains. Because of their importance in ecosystem, decline or extinction of their population has significant impact on other organisms along with them. 26% of the world's fresh water amphibian species are considered threatened. Approximately over a 4550 species of amphibians are recorded in the world, including 165 species of caecilians, 390 species of caudata and 3995 species of anura. About 220 species of amphibians belonging to eleven families are recorded from India. Studies on Anurans of North East India were first published by Chanda [1] and reported 54 species of toads and frogs. Dutta [2] reported 69 species of amphibian (67 anurans, 1 gymnophionia, 1 caudata) from North East region of India. Sen [3] has published 83 amphibian species from the region. Firoz *et al.* [4] first recorded *Polypedates taenimulus* from Assam. Choudhury *et al.* [5] has reported 20 species from Kamrup district of Assam. Borthakur *et al.* [6]. Has reported four *Fejervarya* species from Assam. The present paper deals with the amphibian diversity of wetlands of Bongaigaon district of Assam with special emphasis on the morphometric characteristics of *Duttaphrynus melanostictus*.



Duttaphrynus melanostictus

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Hoplobatrachus tigerinus



Uperodon globulosus

2. STUDY AREA

The district is situated in the northwestern part of Assam between $26^{\circ} 10'N$ and $26^{\circ} 45'N$ latitudes and $90^{\circ} 50'E$ and $91^{\circ} 00'E$ longitudes (Fig.1).

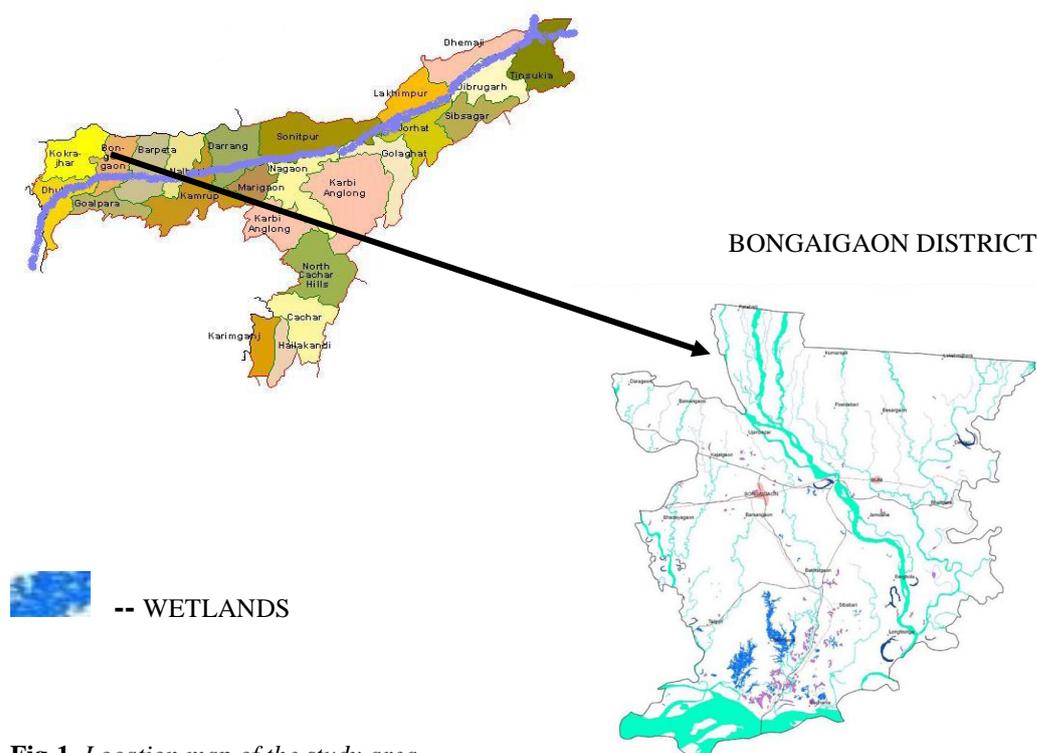


Fig-1. Location map of the study area

It occupies 2, 15,900 hectares of area. It is bounded on the east by Barpeta and on the west by Dhubri district. The topography of the district is almost flat plain except for few hills with elevations ranging from 100 to 500 meters. The Brahmaputra River flows along the southern part of the district. The other two main rivers are Manas and Ai. Both the rivers rise on the hills of Bhutan. A number of wetland locally called beels (natural lakes) exists in the district. Several artificial ponds are also seen in the district. The soils of the district consist of Newer Alluvium on the bank of the Brahmaputra and Older Alluvium near the hillocks and foot hills. The average annual rainfall in the district is 1,614 mm. The maximum temperature rises up to $33^{\circ}C$ during July and August but the minimum temperature falls up to $10^{\circ}C$ in January. The present study was done in Tamranga, Konara and Dalani wetlands of the district.

3. METHODS AND MATERIALS

Survey was done from March-September 2009 in Tamranga, Konara and Dalani wetland. Collections were made randomly and opportunistically and were preserved in 10% formaldehyde for taxonomic study in laboratory. Identification of collected species were done following Boulenger, Chanda, Dutta and Dubois & Ohler [1, 2, 7, 8, 9, 10]. Nomenclature and taxonomic

arrangement in the text follows Frost [11]. For habitat analysis aquatic macrophytes were collected and identified to its nearest taxonomic group. Morphometry of the specimens was done with a Vernier Calliper. Following measurements were taken-

SVL: From tip of snout to the vent distance.

SL: From eye to snout tip distance.

EN: From eye to nostril distance.

NS: From nostril to snout distance.

ET: From eye to tympanum distance.

INS: Distance (Interspace) between nostrils.

IOS: Distance (Interspace) between eyes.

UE: Maximum width of upper eyelids.

ED: Diameter of the eye (horizontal).

HTYD: Horizontal tympanum distance.

VTYD: Vertical tympanum distance.

HL: Head Length- distance from tip of the snout to angle of jaws.

HW: Head Width- width of the head at the angle of the jaws.

HD: Head Depth- depth of the head at the angle of the jaws.

FL: From the insertion of the forelimb to the tip of third finger.

F3D: Greatest diameter of the disc of the tip of the 3rd finger.

IMC: Length of the inner metacarpel tubercles (Palmer tubercles=PT).

OMC: Length of the outer metacarpel tubercles.

Nuptial pad: Pad formation on the base of the forelimbs of male during breeding season.

LL: Length of hind limb, from its insertion to the tip of the longest toe.

TBL: Distance between surface of knee to the surface of heel with both tibia and tarsus flexed.

TBW: Tibia width- maximum width of the tibia.

T4D: Greatest diameter of the disc of the 4th toe.

IMT: Length of the Inner Metatarsal Tubercles.

OMT: Length of the Outer Metatarsal Tubercles.

SAT: Subarticular tubercles, present/absent.

SNT: Super numenary tubercles, present/absent.

TTA: Tibiotarsal articulation points reach when the leg is adpressed to the body.

VR: Vomerine teeth- present/absent.

IVR: Inter Vomerine Ridge.

Pupils: Round/Oval/Elongated.

Nostril: Dorsal/Dorsolateral/Lateral.

Tounge Papilla: Yes/NO.

Toung: Entire/Bifid.

Tarsal fold ridge: Yes/No.

Finger tip: Pointed/Blunt/Dilated.

Pre orbital ridge: Yes/No

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Post orbital ridge: Yes/No

Tympanic ridge: Yes/No

Parietal ridge: Yes/No

Frontal ridge: Yes/No

Distance between parotid gland and eye:

Length of parotid gland:

Distance between parotid gland:

Breadth of the parotid gland:

Shape of parotid gland:

Colour of the skin on dorsal and lateral part of the head and body.

4. RESULTS AND DISCUSSION

From the study twelve amphibian species under 5 families are recorded. Of which 1 species belonged to family Bufonidae, 2 species to family microhylidae, 1 species to family Rhacophoridae, 6 species to family Dicroglossidae and 2 species to Ranidae (Table-1).

Table 1. Amphibian species occurring in the wetlands of Bongaigaon district with their common name and conservation status.

Amphibian Sp	Common name (Assamese)	Conservation status
Bufonidae		
1. <i>Duttaphrynus melanostictus</i>	Chuk bhekuli	LC
Microhylidae		
1. <i>Microhyla ornate</i>	Paruwa beng	LC
2. <i>Uperodon globulosus</i>	Belun beng	LC
Rhacophoridae		
1. <i>Polypedates teraiensis</i>	Pat beng	LC
Dicroglossidae		
1. <i>Euphlyctis cyanophlyctis</i>	Pani beng	LC
2. <i>Fejervarya pierrei</i>	Haru Bamun beng	LC
3. <i>Fejervarya limnocharis</i>	Uisiringa beng	LC
4. <i>Fejervarya teraiensis</i>	Do	LC
5. <i>Hoplobatrachus tigerinus</i>	Bamun beng	LC
6. <i>Hoplobatrachus crassus</i>	Chagoli beng	LC
Ranidae		
1. <i>Humerana humeralis</i>	Dangor doloni beng	LC
2. <i>Hylarana taipehensis</i>	Saru doloni beng	LC

Note: LC = Least concerned

Amongst all the species, the abundance of *Haplobatrachus tigerinus*, *Euphyllctis cyanophlyctis*, *Uperodon globulosus*, *Bufo melanostictus*, *Polypedates teraiensis* and *Fejervarya pierrei* were higher in the study area than the other amphibian species. As we lack of previous data comment on the decline of the species from the study area cannot be ascertain.

Macrophytes form an important component of the amphibian breeding ground of wetland. These marshy macrophytes occurring in the wetland can be distinctly categorized into free-floating e.g., *Salvinia oblongifolia*, *Eichhornia crassipes*, *Trapa bispinosa*, *Lemna minor*, *Ceratopsis thallicroides*; free and submerged e.g., *Potamogeton pectinatus*, *Ceratophyllum demersum*,

Limnophila heterophylla; anchored submerged e.g., *Hydrilla verticillata*, *Vallisneria spirales*; anchored and floating e.g., *Marsilea minuta*, *Nymphaea nouchali*, *Nelumbo nucifera*, *Myriophyllum indicum*, emergent amphibious e.g., *Rumex nepalensis*, *Polygonum orientale*, *Alternanthera sessiles*, *Hypericum japonicum*, *Juncus effusus*, *Ranunculus reptans*, *Hydrocotyle javanica*, *Cyperus platystylis*, *Scirpus articulatus*, *Fimbristylis scirpoides*, *Eleusine indica*, *Sagittaria segitifolia*; marshy and amphibious e.g., *Ammania baccifera*, *Commelina benghalensis*, *Ipomoea aquatica*, *Jussiaea repens*, etc. Presence of about twelve species from this wetland shows that these habitats are congenial breeding grounds of toads and frog.



Fig. Wetland infested with macrophytes; the amphibian breeding ground.

5. MORPHOMETRY OF *D. MELANOSTICTUS* FROM BONGAIGAON DISTRICT

Medium in size (SVL= 69.94). Head is much wider than length (HL: HW= 0.75). Snout rounded, not protruding, its length shorter than head length (SL: HL= 0.35). Nostril rounded, closer to the snout (EN: NS= 1.46). Vomerine ridge is absent. Parotid glands are present and are kidney shaped. Cranial ridges are present. Fingers are long and rather thin. Relative length of the fingers, shortest to longest: F1<F2<F4<F3. Leg one and half times longer than the tibia (TBL: LEG= 0.31). Relative length of toes shortest to longest: T1<T2<T5<T3<T4. Webbing formula is $I_{1-1/2} II_{1/2-2/2} III_{1/2-3/2} IV_{3/2-1/2}$. Tibio tarsus articulation reaches the parotid gland.

6. COMPARISON BETWEEN *DUTTAPHRYNUS MELANOSTICTUS* SPECIMENS OF BONGAIGAON DISTRICT AND LECTOTYPE

There are lot of morphological differentiation observed between the *D. melanostictus* of study area with the Lectotype (Table-2).

Table2. Comparison between the Lectotype of *D melanostictus* and specimens from Bongaigaon

	Lectotype	Bongaigaon
Supratympanic ridge	Absent	Present
Parietal ridge	Present	Absent
Fingers	II<IV<I<III	I<II<IV<III
SAT	Present	Absent
Webbing formula	$I_{0-1} II_{0-1/2} III_{1-3/2} IV_{3/2-1/2}$	$I_{1-1/2} II_{1/2-2/2} III_{1/2-3/2} IV_{3/2-1/2}$

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Supratympanic fold absent in case of lectotype. On the other hand it is present in case of specimens of Bongaigaon. In case of specimens from Bongaigaon parietal ridge is absent, while it is present in the lectotype of *Duttaphrynus melanostictus*. In the lectotype relative length of fingers, shortest to longest: II<IV<I<III, sub articular tubercles (SAT) prominent. On the other hand it is I<II<IV<III and sub articular tubercles absent in case of specimens from Bongaigaon. Webbing formula $I_{0-1}II_{0-1\frac{1}{2}}III_{1-3\frac{1}{2}}IV_{3\frac{1}{2}-1\frac{1}{2}}$ in case of lectotype, where as in the specimens from Bongaigaon it is $I_{1-1\frac{1}{2}}II_{1\frac{1}{2}-2\frac{1}{2}}III_{1\frac{1}{2}-3\frac{1}{2}}IV_{3\frac{1}{2}-1\frac{1}{2}}$.

These morphometric divergences can be addressed by considering abiotic factors and climatic barriers [12] since the larval development such as body size of ectotherm is significantly affected by water temperature and pH [13, 14, 15]. Morphological differentiation due to warmer water temperature was also noticed in *Rana sylvatica* [16, 17] and *Rana cascadae* [18]. The present variation of *D. melanostictus* with the lectotype are in agree with the above proposition. However genetic analysis of the same can only shed some light on the variation of *D. melanostictus* group in Assam.

7. CONCLUSION

The wetlands of Bongaigaon district support considerable numbers of amphibian populations. The abiotic and biotic condition of the wetlands is suitable breeding ground for amphibian fauna. Extensive and long term field surveys will no doubt significantly add few more to the present list. The morphological differentiations of *D. melanostictus* of the study area with the Lectotype in the present study convey the need of genetic analysis of the species.

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