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Anuran diversity in and around historic Joysagar Tank of Sivasagar district, Assam

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Abstract

The present study is on the anuran diversity in and around the Ahom kings' historic Joysagar tank of Sivasagar District, Assam. 12 species of anurans were enlisted belonging to 5 families and 10 genera. The most dominant family is Dicroglossidae and the most common and abundant species was *Duttaphrynus melanostictus*. Species diversity index, richness and evenness were also estimated for the study area.

Keywords: Anura, diversity, Joysagar Tank, Assam

1. Introduction

Amphibians, a unique group of vertebrates containing over 6,664 known species, are threatened worldwide. A recent assessment found that nearly one-third (32%) of the world's amphibian species are threatened, representing 1,856 species. Amphibians have existed on earth for over 300 million years, yet in just the last two decades there have been an alarming number of extinctions, nearly 168 species are believed to have gone extinct and at least 2,469 (43%) more have populations that are declining. This indicates that the number of extinct and threatened species will probably continue to rise [1]. As per researchers [1] the "rapidly declining" species belong to the 4 families namely Bufonidae, Leptodactylidae, Hylidae (tree frogs) and Ranidae (true frogs). Anurans are included in the order Salientia or Anura of class Amphibia. Anurans include the Frogs and Toads.

Studies on anuran of North-East India were first published by Chanda (1994) [2] and reported 54 species of toads and frogs. [3] Recorded *Polypedates taeniatus* for the first time from Assam. [4] Have reported 20 species from Kamrup district of Assam. [5] Reported one new species from Arunachal Pradesh. [6] Reported 64 species of Amphibia from North-East India in 2002. [7] Reported 5 new species from Nagaland. [8] Have reported 83 numbers of total amphibians from North-East India in 2004. Four *Fejervarya* species were first reported from Assam in 2007[9]. The amphibians of India show a high level of endemism.

For global Climate Change, Amphibians are regarded as indicator species [1]. High diversity of Amphibia in a particular water body indicates the low level of pollution. Amphibian decline has been recorded world over. Various factors like fungus, pollution, habitat destruction have been attributed to amphibian decline. Detailed survey and distribution pattern has become very essential for conservation of the amphibian fauna in a particular area. Hence the present investigation was carried out to find out the biodiversity of amphibian fauna (Anurans) in and around the historical Joysagar Tank of Sivasagar district, Assam.

2. Materials and Methods

2.1 Study Area

The study was carried out from May 2015 to June 2016, around the historic Joysagar tank. Joysagar Tank is one of the largest men made tank in Asia, built by Ahom Kings Rudra Singha (1696-1714 AD) in Sivasagar District of Assam. It is situated just at the 5 km distance from Sivasagar town and adjacent to Joy Dole, between 26°56'97"N & 26°57'32"N and 94°37'38" E & 94°37'54" E. It comprises an area of 318 acres including four banks. Its water level stays at 14 feet higher than ground level. This tank supports diverse flora and fauna. Another characteristic feature of this tank is that the water level of the tank does not fall much even during the dry season. This is justified by the fact that the tank is fed by underground water source [10, 11].

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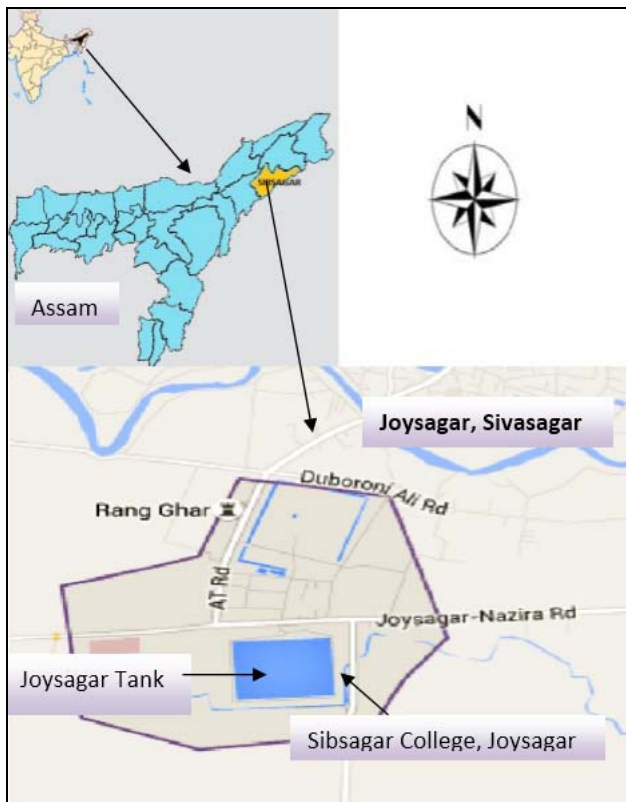


Fig 1: Map showing the study area- Joysagar Tank in Assam and India.

2.2 Methods

All surveys and samplings were carried out thrice a week during dawn and after Dusk. For collection and identification, rapid surveys and careful visual estimations were done for anurans in all possible habitats covering the four banks of the Joysagar tank including the Campus of Sibsagar College and the adjacent water bodies nearby the tank.

Specimens were collected manually and/or with the help of nets using Torch lights during Dusk time. Species were photographed and identified in their natural habitats, but in few cases when assessment was difficult, they were collected for further identification. The species were identified with the help of Standard keys provided by Smith [12], Daniels [13], Chanda [14], & Daniel [15]

2.3 Data Analysis

Community level diversity was calculated using Shannon Weiner Index [16]:

$$H' = \sum p_i \ln p_i \tag{1}$$

Where, $P_i = N_i/N$ or the number of individuals of species 'i' divided by the total number of individuals of all the species, \ln is the natural logarithm and H' is the Shannon-Weiner index.

Richness was calculated using Margalef's Index [17]:

$$R = \frac{(S-1)}{\ln N} \tag{2}$$

Where, S is the total number of species and N is the total number of individuals.

Evenness was calculated using Pielou's Evenness Index [17]:

$$J = \frac{H'}{\ln S} \tag{3}$$

Where, J is the Pielou's Evenness Index, H' is the Shannon Weiner Index and S is the total no of species.

3. Result and Discussion

In the present study 12 species of anurans were found in the study area. The 12 species belongs to 5 families and 10 genera. Of the families, family Dicroglossidae having 5 species was the dominant one, followed by Ranidae with 3 and Rhacophoridae with 2 species each. Family Microhylidae and Bufonidae were represented by onespecies each. *Duttaphrynus melanostictus* (Common Asian Toad) was the most abundant species owing to its wide range of habitats, with a relative abundance of 14.56% of all the species found, and followed by *Hoplobatrachus tigerinus* (Indian Bull Frog) with a relative abundance of 12.51%. The least abundant was the *Polypedates leucomystax* (Common tree frog) with relative abundance less than 1%. Choudhary [16], in 2006, recorded 10 species from Dibru Saikhowa National park. Bortamuli [17] in 2008 recorded 19 species from Charaideo Subdivision (at present Choraideo District) of Sivasagar District whereas Bordoloi and Bortamuli [18] recorded 25 species from various wetlands of Sivasagar District of Assam.

Species diversity index, richness and evenness were calculated, which gives us an idea about the variety and diversity of species in the study site. The Shannon Weiner index was 3.06. The Margalef's Index of richness was observed to be 2.2, whereas Pielou's Evenness Index was 1.23. Typical values of Shannon Weiner index are generally between 1.5 and 3.5 in most ecological studies, and the index is rarely greater than 4 [16]. The Shannon index increases as both the richness and the evenness of the community increase [16, 17].

Of the species found in the study area, 9 species are legally protected under the Wildlife (protection) Act 1972 and are thus listed in the schedule IV of the same [21]. Two species *Hoplobatrachus tigerinus* and *Euphlyctis cyanophlyctis* are listed in Appendix II of CITES [22]. According to IUCN red List [23], all the 12 species are kept in least concern category for conservation. But due to some anthropogenic activities like use of chemical fertilizers and pesticides, may become threats to these species in near future.

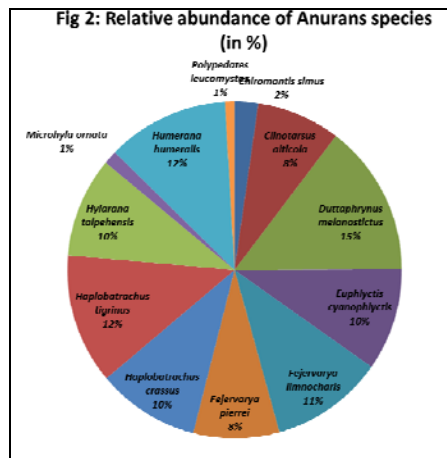


Table 1: List of species found in the study area with their conservation status and relative abundance

SL NO	Scientific Name	Common Name	Family	Iucn Red List Category	Legal Protection	Relative Abundance (In%)
1.	<i>Chiromantis simus</i> (Annandale, 1915)	Annandales' Pigmy Tree Frog	Rhacophoridae	Least Concern	NONE	2.27
2.	<i>Clinotarsus alticola</i> (Boulenger, 1882)	Pointed Nose Frog	Ranidae	Least Concern	WL(P)Act 1972, SCHEDULE IV	8.07
3.	<i>Duttaphrynus melanostictus</i> (Schneider, 1799)	Common Asian Toad	Bufonidae	Least Concern	NONE	14.56
4.	<i>Euphlyctis cyanophlyctis</i> (Schneider, 1799)	Indian Skipping Frog	Dicroglossidae	Least Concern	WL(P)Act 1972, Schedule IV CITES- APPENDIX II	9.84
5.	<i>Fejervarya limnocharis</i> (Gravenhorst, 1829)	Indian Cricket Frog	Dicroglossidae	Least Concern	WL(P)Act 1972, Schedule IV	10.92
6.	<i>Fejervarya pierrei</i> (Dubois, 1975)	Pierrei's Cricket Frog	Dicroglossidae	Least Concern	WL(P)Act 1972, Schedule IV	8.30
7.	<i>Hoplobatrachus crassus</i> (Jerdon, 1854)	Jerdon's Bull Frog	Dicroglossidae	Least Concern	WL(P)Act 1972, Schedule IV	9.89
8.	<i>Hoplobatrachus tigerinus</i> (Dandini, 1802)	Indian Bull Frog	Dicroglossidae	Least Concern	WL(P)Act 1972, Schedule IV; CITES- APPENDIX II	12.51
9.	<i>Hylarana taipehensis</i> (Van Den berg, 1909)	Taipeh Frog	Ranidae	Least Concern	WL(P)Act 1972, Schedule IV	9.61
10.	<i>Microhyla ornata</i> (Dumeril & bibron, 1841)	Ornamented Pigmy Frog	Microhylidae	Least Concern	WL(P)Act 1972, Schedule IV	1.30
11.	<i>Humerana humeralis</i> (Boulenger, 1920)	Bhamo Frog	Ranidae	Least Concern	WL(P)Act 1972, Schedule IV	11.77
12.	<i>Polypedates leucomystax</i> (Gravenhorst, 1841)	Common tree frog	Rhacophoridae	Least Concern	NONE	0.91

**Fig 3.1:** *Clinotarsus alticola***Fig 3.2:** *Duttaphrynus melanostictus***Fig 3.3:** *Euphlyctis cyanophlyctis***Fig 3.4:** *Hoplobatrachus crassus***Fig 3.5:** *Hoplobatrachus tigerinus***Fig 3.6:** *Hylarana taipehensis***Fig 3.7:** *Fejervarya limnocharis***Fig 3.8:** *Humerana humeralis***Fig 3.9:** *Fejervarya pierrei*



Fig 3.10: *Polypedates leucomystax*



Fig 3.11: *Chiromantis simus*



Fig 3.12: *Microhyla ornate*

Fig 3: Photographs of Anuran Species of the Study Area

4. Conclusion

From the present study 12 species of anurans were found, belonging to 5 families. Anurans or as a whole Amphibians are considered as indicator species of global climatic change. High diversity of amphibians in a particular water bodies indicates the low level of pollution in water body. Amphibians in many parts of the world appear to be declining. Various factors have been attributed to amphibian declining. Detailed survey and distribution pattern has become very essential for conservation of the amphibian fauna in a particular area. So far very less work has been done in estimation of the diversity, distribution and conservation of these species. Efforts for study and conservation of these species are to be made to maintain a stable ecosystem.

5. Acknowledgement

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6. References

1. Stuart S, Chanson JS, Cox NA, Young BE, Rodrigues ASL, Fishman DL and Waller RW. Status and trends of amphibian declines and extinctions worldwide. *Science*. 2004; 306:1783-1786.
2. Chanda SK. Anuran (Amphibia) fauna of North Eastern India. *Memoirs of Zoological Survey of India*, Kolkata, 1994; 18:143
3. Firoz M, Dutta SK. First record of *Polypedates taeniatus* (Boulenger, 1906) from Assam, North Eastern India. *Hamadryad*. 2000; 25(1):49-50.
4. Choudhury NK, Hussain B, Baruah M, Saikia S, Sengupta S. Amphibian Fauna of Kamrup District, Assam. *Hamadryad*. 2001; 26(1):276-282.
5. Bordoloi S, Borah MM, Sarma PK, Sarma J. Amphibian and insect fauna of amphibian habitats of Dehang-Debang Biosphere Reserve, Arunachal Pradesh. *Himalayan Biosphere Reserves*. 2002; 4(1-2):33-38.
6. Chanda SK. *Indian Amphibian. Hand book*. Published by Zoological Survey of India (ZSI). 2002, 335.
7. Ao JM., Bordoloi S, Ohler A. Amphibian fauna of Nagaland with 19 new records from the state including five new records for India. *Zoos' Print Journal*. 2003; 18(6):117-125.
8. Sen N. Further notes on state wise distribution of Amphibian fauna of North East India. *Record of Zoological Survey of India*. 2004; 102(3-4):105-112.
9. Bortahkur R, Kalita J, Hussain B, Sengupta S. Study on the *Fejervarya* (Anura: Dicorglossidae) species of Assam *Zoos' Print Journal*. 2007; 22(4):2639-2643.
10. Baruah SL. *A Comprehensive History of Assam*, Munshiram Manuoharlal Publishers Pvt. Ltd., New Delhi, 1985.
11. Borpujari HK. *The Comprehensive History of Assam*, Publication Board Assam, Guwahati, Assam, India. 1992, III.
12. Smith MA. *Fauna of British India including Ceylon and Burma. Reptila and Amphibia, Serpentes*. Today and Tomorrow's Printers & Publishers, New Delhi, Indian Reprint 1981, 1943; III: 583
13. Daniels RJR. *Amphibians of Peninsular India*. Universities Press, Hyderabad, India 2005, 286.
14. Chanda SK. *Handbook: Indian Amphibians*. Zoological Survey of India, Calcutta, 2002.
15. Daniel JC. *The Book of Indian Reptiles and Amphibians*. Bombay Natural History Society. 2002; 8:236.
16. Shannon LE, Wiener W. *The mathematical theory of communication*, University Illinois Press, Urbana 1963, 360.
17. Magurran AE. *Ecology Diversity and Measurement*. Princeton University Press, Princeton, USA 1988, 354.
18. Choudhury NK. Diversity of Amphibian fauna of the Brahmaputra Valley of Assam, Thesis submitted to the University of Gauhati, 2004.
19. Bortamuli T. Diversity and Ecobiology of certain species of Amphibia of Sivasagar district, Assam. Thesis Submitted to University of Gauhati, 2010.
20. Bortamuli T, Bordoloi S. Wetlands of Sivasagar district of Assam as congenial habitat for Amphibia. Sengupta, M. and Dalwani, R. (Editors). *Proceedings of Taal 2007: The 12th World Lake Conference*. 2008, 525-528.
21. *The Indian Wildlife Protection act, 1972*. Act no. 53 of 1972. Parliament of India, Date enacted 9 September, 1972.
22. *Convention on International Endangered Species of Wild Fauna and Flora*. www.cites.org/eng/app/appendices.php.
23. IUCN 2014. *The IUCN Red List of threatened Species*. Version 2014.3. [http:// www.iucnredlist.org](http://www.iucnredlist.org).