



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

International Journal of Recent Scientific Research
Vol. 7, Issue, 7, pp. 12277-12282, July, 2016

**International Journal of
Recent Scientific
Research**

Research Article

AN ASSESSMENT OF THE AMPHIBIAN FAUNA OF SATAKOSIA TIGER SANCTUARY OF CENTRAL ODISHA, INDIA

Bishnu Charan Pradhan

Department of Zoology, Angul Mahila Mahavidyalaya, Angul, Odisha, India 759122

ARTICLE INFO

Article History:

Received 17th April, 2016

Received in revised form 12th May, 2016

Accepted 04th June, 2016

Published online 28th July, 2016

Key Words:

Amphibia, Inventory, Satakosia Tiger Sanctuary (STS), Anthropogenic factors, In situ Conservation

ABSTRACT

In this article, the description is about a survey made to prepare an inventory of Amphibians in the Satakosia tiger sanctuary (STS) of Central part of Odisha which remained uncovered till now. During the last monsoon I tried to assess the Amphibian diversity of this area with the help of local people and fishermen. We prepared a checklist of these animals with their scientific names and in which habitats these are available. The amphibians are only anurans belonging to 16 species, 10 genera and of 4 families. The local residents argued that the number of these animals is decreasing very sharply. So it's our primary duty to give protection to these animals in situ and conserve them for our posterity to cherish.

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INTRODUCTION

Depletion of amphibians throughout the globe and their extinction is causing a conscientious and diligent task to the people of all spheres of the society to conserve them. The amphibians probably originated 300 million years ago during Devonian period and flourished through Carboniferous and Permian periods⁽¹⁾ From that time they became an inseparable part in all the ecosystems of the biosphere. They help to maintain the balance of nature and serve a lot to mankind. But unfortunately due to anthropogenic factors they are depleting very speedily from the earth. In most of the parts of the earth, herpetologists are trying to provide the actual inventory of these animals. In India also the work was done accurately and many new species were discovered by them. Many herpetologists in Orissa and Chhattisgarh also did some inventory and assessment of these animals in an excellent way. Dutta, Dash & Mohanata, Chandra & Gajbe, Sanyal & Dasgupta and Sanyal, Chandra & Ray did some inventory of amphibian fauna in the state of Orissa & Chhattisgarh^(17,13, 27, 53&54).

We found that some areas in the state of Odisha is remaining uncovered in this field and most of these species are becoming extinct before they come to human knowledge. We did some wildlife study during 2013-2015 in the STS (Satakosia Tiger Sanctuary) of Central Odisha. It was a preliminary assessment of the biodiversity of STS. In the last monsoon of 2013, we carried an expedition to assess the amphibian diversity of this

hills range and prepared a checklist of these animals from our direct observation and from some second hand information of the local residents.

Angul is a new district of Orissa. It is a centrally located District in the State of Orissa. Angul came into existence on April 1, 1993. Two rivers Mahanadi & Bramhani rush through the district making it fertile. Angul is well discovered for its hot spring named Athamallik. It is rich with the resources like coal mines, Thermal power Project plant, fertilizer factory and heavy water project. The ranger's training and Police training colleges also exist here. The district covers a geographical area of 6232 square kilometers and supports a population of about 11.40 lakhs. It is although new but strategically most advanced district because it gives highest return of revenue to the Government due to vast coal mines located in its abode. Big industries like National Aluminium Company (NALCO), Mahanadi Coalfields Limited (MCL), National Thermal Power Corporation (NTPC), Heavy Water Plant, Talcher, Indian Aluminium Product Ltd. etc. are situated in the district. The great natural resources and beauties like Satakosia Gorge over river Mahanadi, famous Budhi Thakurani & Lord Jagannath Temple, the unique puppet dance "RavanChhaya" signify the rich culture and tradition of this district.

Satakosia spreads along the magnificent gorge over the mighty river Mahanadi in Odisha. Established in 1976 as a wildlife sanctuary, Satakosia is a paradise of immense scenic charm. It is one of the best ecosystems in the country, representing a diverse floral and faunal extravaganza. The name Satakosia

*Corresponding author: **Bishnu Charan Pradhan**

Department of Zoology, Angul Mahila Mahavidyalaya, Angul, Odisha, India 759122

originates from two words; sat meaning seven and kos meaning two miles, indicating the length of the gorge as 14 miles or 22 km. The area was declared as Satakosia Tiger Reserve in 2007, comprising two adjoining wildlife sanctuaries; the Satakosia Gorge sanctuary and Baisipalli sanctuary. The Reserve is spread over 4 districts like; Angul, Cuttack, Nayagarh and Boudh. The reserve has an area of 963.87sq km with 523.61sq km as core area. The area is also a part of the Mahanadi elephant reserve. Satakosia is the meeting point of two biogeographic regions of India; the Deccan Peninsula and the Eastern Ghats, contributing immense biodiversity. Satakosia spreads along the magnificent gorge over the mighty river Mahanadi in Odisha. Established in 1976 as a wildlife sanctuary, Satakosia is a paradise of immense scenic charm. It is one of the best ecosystems in the country, representing a diverse floral and faunal extravaganza. The name Satakosia originates from two words; sat meaning seven and kos meaning two miles, indicating the length of the gorge as 14 miles or 22 km. The area was declared as Satakosia Tiger Reserve in 2007, comprising two adjoining wildlife sanctuaries; the Satakosia Gorge sanctuary and Baisipalli sanctuary. The Reserve is spread over 4 districts like; Angul, Cuttack, Nayagarh and Boudh. The reserve has an area of 963.87sq km with 523.61sq km as core area. The area is also a part of the Mahanadi elephant reserve. Satakosia is the meeting point of two biogeographic regions of India; the Deccan Peninsula and the Eastern Ghats, contributing immense biodiversity. Three distinct seasons are experienced in the Tiger reserve.

The winter starts from November and lasts till middle of February followed by summer which continues up to middle of June. This is followed by rainy season spanning till September.

The bulk of precipitation occurs during June to September through the south-west monsoon. Normally the monsoon breaks in the third week of June and continues up to middle or end of September. Pre-monsoon showers are experienced in first or second week of June, but not common. Thunder storm usually occurs during April and May. The average number of rainy days in a year is 100 out of which, 70 are confined between June to September. The annual average rainfall varies from 1250 mm to 1700 mm.

The advent of summer is usually experienced from March when temperature starts rising. Summer months are very hot. Maximum day temperature varies from 45°C to 47°C in month of May and June. It went to a maximum of 49°C during May 2005. With the onset of the monsoon, temperature drops appreciably. When monsoon withdraws in the month of October, the winter sets in. Gradually both day and night temperatures fall. The coolest month is December when temperature during the night varies between 6°C to 11°C. The humidity is generally high in the Tiger Reserve. It generally hovers 80 % in August, September, and October, while in other months the humidity is around 75 %. The Satakosia Gorge is a unique feature in geomorphology of India. Here Mahanadi has cut right across the Eastern Ghats and has formed a magnificent gorge with sylvan beauty and excellent features.

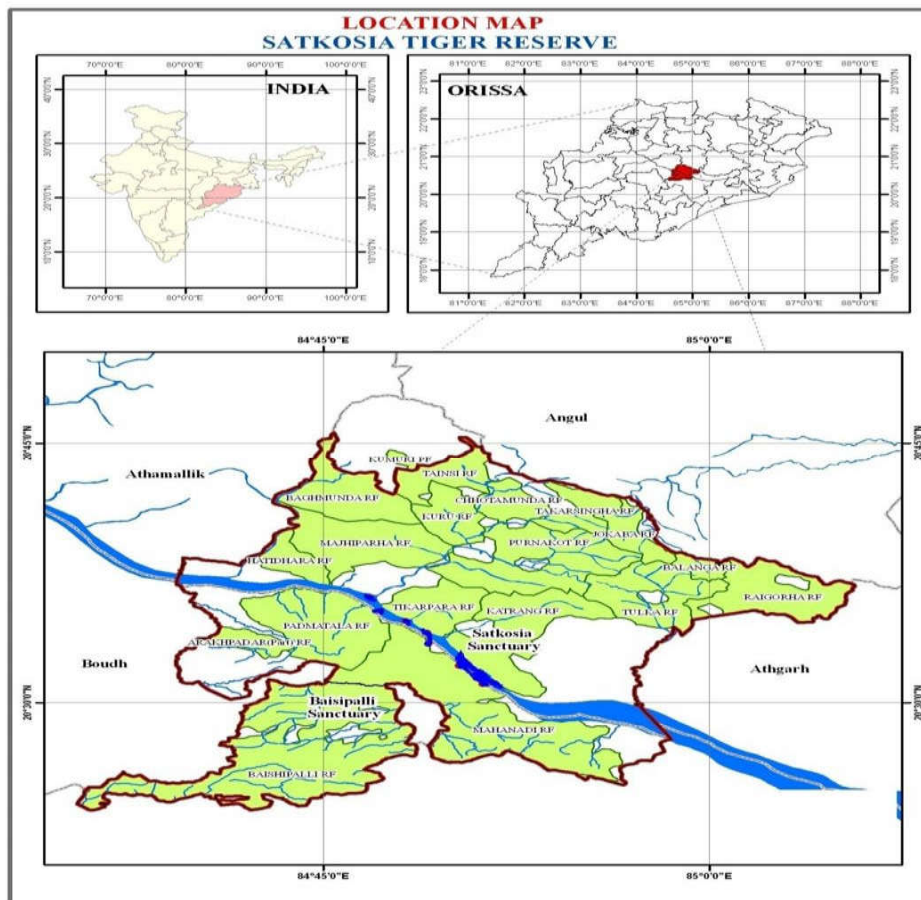


Fig- 1 Map showing Satakosia Tiger Sancuary in Odisha.

The Satkosia Gorge with its magnificent floristic composition and amazing faunal diversity on both of its northern and southern side over an area of 795.52 sq Km. has been notified as Satkosia Gorge Sanctuary in May, 1976. Out of the above area, 530.01 sq Km. is in northern side of the gorge inside Satkosia Wildlife Division within two districts of Angul and Cuttack. The rest area of 265.51 sq Km. is in southern side inside Mahanadi Wildlife Division within two districts of Nayagarh and Boudh. The Baisipalli Sanctuary coterminous with the administrative limits of Baisipalli Reserve Forest in Nayagarh district has been notified in the year 1981 over an area of 168.35 sq Km.

The Satkosia Tiger Reserve comprising Satkosia Gorge Sanctuary (part) on its north and Satkosia Gorge Sanctuary (Part) & Baisipalli Sanctuary on its south has been notified on 31st December, 2007 over an area of 963.87 sq Km. The geographical co-ordinates of the extreme points of the Tiger Reserve boundary lie on 20° 23' 40" N and 20° 45' 36" N Latitudes and 84° 32' 35" E and 85° 05' 24" E Longitudes, The total area is inclusive of the Core area or critical Tiger Habitat of 523.61 sq Km. Out of the total area of 963.87 sq Km., the area to the extent of 530.01 sq km of Satkosia Gorge Sanctuary to the north of Satkosia gorge is in Satkosia Wildlife Division and rest 433.86 sq km is on the southern side of gorge inside Mahanadi Wildlife Division. Out of the area on the southern side of the gorge, 265.51 sq km comes under Satkosia Gorge Sanctuary (part) & 168.35 sq km under Baisipalli sanctuary.

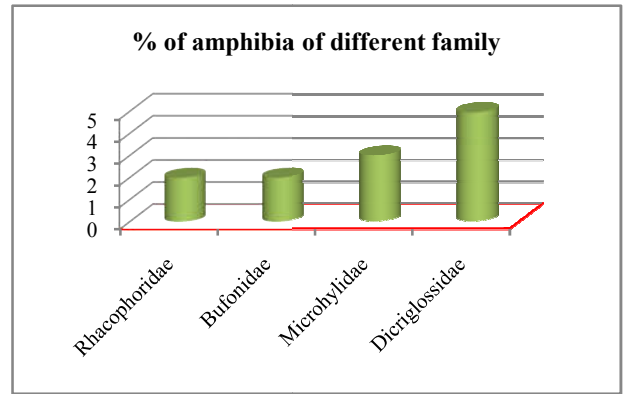


Fig 2 Percentage of different families of Amphibia

The Forest Department of the Government of Orissa with technical support from the UNDP and FAO decided to start a breeding programme of crocodiles during March 1974. As a part of this joint conservation initiative, the Gharial Research and Conservation Unit (GRACU) was started during March 1975. The GRACU had done pioneering work in crocodile conservation in India. The activities include Conservation Breeding; releasing of reared crocodiles into the wild and its rehabilitation had been some of the challenging activities carried out by the centre.

Table-1 Different methods used for identification and documentation of amphibian species (+ indicate the method applied for particular group during present study).

Direct method	Sampling method	Anurans	Urodela	Apoda	Comments
	Hand capturing	+	+	+	Simple and most reliable method and
	Extensive Search in microhabitats	+	+	+	Applied in all habitats
Indirect method	Opportunistic spotting	+	+	+	
	Call Survey	+	+	+	Mostly used at night.
	Acquiring information from local people	+	+	+	Useful for chronological comparison of amphibian diversity.

Table-2 Name of the species and their Microhabitats

Sl. No	Name of the Species	Micro Habitat in Which it is present
01	<i>Duttaphrynus melanostictus</i>	Human habitation (HH)/(T)
02	<i>Duttaphrynus stomasticus</i>	Agricultural fields (AG), (T/F)
03	<i>Euphlyctis cyanophlyctis</i>	Agricultural fields, swamps, ditches and near hill stream(AG/DF); (AQ)
04	<i>E. Hexadactylus</i>	Agricultural fields, swamps, ditches and near hill stream(AG/DF); (AQ)
05	<i>Fejervarya orissaensis</i>	Swamps, agricultural fields near aquatics margins ditches and near hill streams (AG/DF), (AQ/aq)
06	<i>Fejervarya limnocharis</i>	Swamps, agricultural fields near aquatics margins ditches and near hill streams (AG/DF), (AQ/aq)
07	<i>Fejervarya cancrivora</i>	Swamps, agricultural fields near aquatics margins ditches and near hill streams (AG/DF), (AQ/aq)
08	<i>Hoplobatrachus tigerinus</i>	Swamps, agricultural fields near aquatics margins, ditches and near hill streams (AG/DF), (aq)
09	<i>Hoplobatrachus crassus</i>	Agricultural fields, swamps, ditches and near hill streams(AG/DF); (aq)
10	<i>Sperotheca breviceps</i>	Scrub forest, below rock boulders (SC/DF), (F)
11	<i>Sperotheca rolandae</i>	Scrub forest, below rock boulders (SC/DF), (F)
12	<i>Microhyla ornata</i>	Agricultural fields, swamps, ditches and near hill streams, during winter season (AG/DF); (F/aq)
13	<i>Kaloula taprobanica</i>	On tree holes in scrub land, near human habitation (SC, HH), (A)
14	<i>Ramanella veriegata</i>	Agricultural fields (AG), (F/A)
15	<i>Uperodon systoma</i>	Swamps, ditches, agricultural field near human habitation (AG/ HH/DF); (F)
16	<i>Polypedates maculatus</i>	Scrub forest, on trees, near human habitation (HH/ SC/DF), (A)

The area of Satkosia Tiger Reserve supports moist deciduous forest, dry deciduous forest and moist peninsular Sal forest. This area is the home for Tiger, Leopard, Elephant, Gaur, Sambar, Spotted deer, Mouse deer, Nilgai, Chousingha, Sloth bear, Wild dog etc., Varieties of resident and migratory birds, reptilian species (Gharial, Magar, Crocodile, Fresh Water turtle, Poisons & Non poisons snakes etc.)

MATERIALS AND METHODS

The field survey of the amphibians was done in the forest of STS during the post monsoon and monsoon of 2013 and 2014 respectively. This survey was based according the methods of some herpetologists (12, 13, & 14). These animals were studied by visual observations and their calls (15). Traditionally amphibians

are neglected subjects for expedition studies. Our knowledge of the behavioural ecology of most species of tropical amphibians is so slight that a carefully conducted study can make a very significant contribution to the pool of scientific knowledge for most species⁽¹⁶⁾. The local people were taken in the survey work. Some of them were fishermen, they knew about the animals but others were without any knowledge of these animals. They all helped to collect the different species of amphibians. The different parameters were recorded and the animals were left into their habitats insitu. These parameters are the sex, weight and snout-vent length. Both night and day survey was carried out depending on the nocturnal and diurnal nature of amphibia. In this survey we used multiple sampling methods which are broadly divided into two categories. i.e. direct sampling method and indirect sampling method given in Table-1 (1, 2, & 3). The damp skin, larval stage and communal behaviour of amphibians made them different from other herpeto fauna, which was discussed by Heyer and Olson^(22&44). The fishermen used rubber gloves, different nets and hooks to catch the amphibians. These specimens after photographed and studied were released into the forest. The visual encounter method was used to detect the taxa and their identity. All animals after their physical diagnosis and photographed were released insitu).



Photographs of amphibians found in Satakosia Tiger Sanctuary in Central Odisha of India

DATA ANALYSIS AND DISCUSSION

From the survey work in different parts of forest areas of STS, it is evident that in the reserve forest 14 species of amphibians are present in which belong 10 genera and 4 families. All are Anurans (tailless amphibians).

The four families are Bufonidae, Dicroglossidae, Microhylidae and Rhacophoridae. Their percentage is shown in a histogram chart (Fig-2). The families, Scientific name of the Species, their Vernacular and local names and IUCN status (23) is given in Table-3. All these animals present in different habitats and microhabitats given in Table-2. This is prepared accordingly Mahapatra *et al*⁽⁴³⁾. The habitats of these animals are classified into 4 types such as HH=Human Habitation, AG=Agricultural Fields, SC=Scrub Forest and DF=Deep Forest. The Scrub forest includes the areas where small bushes grow densely. Some are available in the Deep forest near the hill streams. Their adaptive habits is classified into A=Arboreal, T=Terrestrial, AQ=Aquatic, aq= semi aquatic and F=Fossorial

CONCLUSION

Significant attention has been paid to the role of habitat loss and fragmentation in amphibian population decline and additional attention has been paid to land use pattern and subsequent fragmentation. It is necessary to check habitat fragmentation and split and provide sufficient protection for their breeding and survival. Once split and fragmentation occurs only extensive restoration programmes will be able to reverse the negative impacts⁽²²⁾. Hence it is essential to check habitat degradation and loss. An intensive long-term study on amphibian population and ecology of their habitat is necessary in STS. Loss of habitat due to anthropogenic activities must be checked to ensure reproductive and survival success of these neglected animals. Biologists must be pragmatic to assess which causes of population decline can be obviated directly. The impact of habitat degradation, introduced invasive species and unsustainable use can be controlled immediately. Current evidence suggests the amphibian decline, which is exacerbated by burgeoning human population, constitute a worldwide crisis⁽²³⁾.

Table-3 Name of the species, vernacular names, local names and their IUCN Report

Family	Scientific names	Vernacular Names	Local Names	IUCN status(23)
Bufonidae	<i>Duttaphrynus melanostictus</i> (Schneider,1799)	Indian Common Toad	Sinduria Benga	LC
Bufonidae	<i>Duttaphrynus stomasticus</i> (Lutken,1864)	Marbelled Toad	Katha Benga	LC
Dicroglossidae	<i>Euphlyctis cyanophlyctis</i> (Schneider,1799)	Indian Skipper Frog	Pani Benga	LC
Dicroglossidae	<i>Fejervarya orissaensis</i> (Dutta,1997)	Dutta's Cricket Frog	Pani Benga	LC
Dicroglossidae	<i>Fejervarya limnocharis</i> (Gravenhorst,1829)	Paddy field Frog	Kheta Benga	LC
Dicroglossidae	<i>Hoplobatrachus tigerinus</i> (Daudin,1802)	Indian Bullfrog	Brahmani Benga	LC
Dicroglossidae	<i>Hoplobatrachus crassus</i> (Jerdon,1853)	Jerdon's Bull Frog	Cheli Benga	LC
Dicroglossidae	<i>Sperotheca breviceps</i> (Schneider,1799)	Short Headed Burrowing Frog	Matipota Benga	LC
Dicroglossidae	<i>Sperotheca rolandae</i> (Dubois,1983)	Indian Burrowing Frog	Chhota Matipota Benga	LC
Microhylidae	<i>Microhyla ornata</i> (Dumeril & Bibron,1841)	Ornate narrow mouthed Frog	Chuin Benga	LC
Microhylidae	<i>Kaloula taprobanica</i> (Parker,1934)	Painted Balloon Frog	Sinduria Phutka Benga	LC
Microhylidae	<i>Ramanella vertigata</i> (Stoliczka,1872)	Marbelled Narrowmouth Frog	Suneli Benga	LC
Microhylidae	<i>Uperodon systoma</i> (Schneider,1799)	Marbelled Toad	Chitra Benga	LC
Rhacophoridae	<i>Sperotheca rolandae</i> (Dubois,1983)	Common Indian tree Frog	Dian Benga	LC

This case study is a preliminary step in the inventory field to prepare a checklist of amphibian diversity in a particular area. But there are immense possibilities to do such type of works in other areas to give proper protection to the depleting fauna by decreasing the anthropogenic pressure on them.

Amphibians hold vital positions in forest and aquatic food webs; they are also important for the nutrient Portion of the vertebrate biomass (Hutchens and De Perno 2009). Their conspicuous role is noted to be of particular importance in tropical forests, where in acting as both as predator and prey species.

The number of species revealed by this study seems low and there is an urgent need to carry out further studies for confirmation regarding diversity, distribution and status of amphibians, and implementation of effective strategy for their conservation if needed. Additional research is needed worldwide to better understand mangrove-endemic vertebrates, particularly amphibians, for conservation purposes

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How to cite this article:

Bishnu Charan Pradhan.2016, An Assessment of The Amphibian Fauna of Satakosia Tiger Sanctuary of Central Odisha, India. *Int J Recent Sci Res.* 7(7), pp. 12277-12282.