



Aquatic fauna of Suleipat reservoir, Mayurbhanj, Odisha, India

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ABSTRACT

This survey was conducted to analyse the diversity of aquatic fauna at Suleipat reservoir. The distribution and diversity of aquatic fauna, and physical, parameters of Suleipat reservoir were studied in the latitude and longitude of 22.122541° N and 86.237750° E. In the study area 4 sites were sampled. Fauna and water variables were randomly collected 8-10 times. This study focused the diverse assemblage of both vertebrate and invertebrate indices. Overall, 87 species were recorded from the study site. Among the aquatic fauna collected from the reservoir, the order Odonata and Agnatha were the most dominant orders varies impressive numbers. The highest Simpson and Shannon index of diversity was 0.64325 and 1.382375, and the evenness index was 0.671875. The high species diversity and evenness in all the sites indicated a good quality of water. There was no back record found about the aquatic diversity of Suleipat reservoir near Bareservoirpahar, Rairangpur forest division in Mayurbhanj district, hence this study was undertaken.

Key words: Aquatic fauna, diversity, invertebrate, Suleipat reservoir

INTRODUCTION

We can classify earth's aquatic ecosystem into fresh water, saline water and brackish water ecosystems. Among them fresh water ecosystem includes lakes and ponds, rivers, streams, springs, and wetlands, which can be broadly classified into lentic and lotic systems, i.e., still and flowing waters, respectively. The estuaries are transitional brackish-water zones between rivers and the sea. A much of focus from the 'Inland waters' is given to fresh waters because of the global requirements. The hydrological cycle plays a vital role in the regulation of fresh waters. Freshwater ecosystems are important for many reasons: they help in regulating hydrological regimes, attenuating floods, recycling of nutrients, purification of water and recharging of aquifers. They support sustaining and maintaining wildlife as well as biodiversity in the form of aquatic life, besides providing congenial riparian habitats for dependent terrestrial

wildlife. To fulfil the human needs, fishes form highest species diversity among all the vertebrate groups besides its economic benefit (Siddiqui and Chouhan, 2014). Sustainable management of fish is important for ecosystem stabilization, maintenance of environmental quality, for understanding inherent value of all species on the earth (Ehrlich and Wilson, 1991). According to Bohnsack (1996), these sites are facing habitat destruction due to some anthropogenic causes by industrial activities, untreated sewage of nearby cities and factories, oil and gas contaminations from refineries, water transport and oil rigs. The significance and the global patterns of freshwater biodiversity is provided by the estimation of diversity and distribution of various taxonomic groups like fishes and amphibians. (Abell and Theime, 2008). The main causes are habitat destruction and defragmentation, water abstraction, industries and private use (Szollosi, 2004; Ricciardi and Rasmussen, 1999; Gibbs, 2000; Dawson and

Berry, 2003) exotic species introduction (Copp and Bianchi, 2005), pollution (Lima-Junior and Cardone, 2006) and global climate change impacts (Leveque et al., 2005). According to Darwall and Vie (2005), freshwater fishes are termed as one of the most threatened taxonomic groups for their high sensitivity to the alteration of quantitative and qualitative aquatic habits (Laffaille and Acou, 2005; Sarkar and Pathak, 2008; Kang et al., 2009). Fishes are used as bioindicator for water quality assessment, maintenance of river network connectivity or flow regime. Now-a-days, the management of fish diversity and associated habitats is a great challenge (Dudgeon and Arthington, 2006). Detailed studies are essential for the conservation and management of the large Indian reservoirs (Sarkar and Pathak, 2008, Sarkar and Gupta, 2010) as these are the major fish habitats.

MATERIALS AND METHODS

Study Area

Suleipat reservoir is a major source of fresh water ecosystem in and around Bareservoirpahar area of latitude and longitude: 22.122541° N and 86.237750° E. It is a reserve water resource in “Khadakhai” river. It is an eco- tourism place, situated in Rairangpur forest division, Mayurbhanj, Odisha. It is also known as the Khadakhai Reservoir. It covers 5 Km area and 350 feet in length. Suleipat reservoir is created for the purpose of water supply and agriculture development in that area. The main purpose is developing the agricultural process. The local people use the water resources for other personal purposes also. It has been constructed on two ends of hills i.e., Bhitarmda Hill and Karanjharan Hill end points. It is situated in the middle of the forest with green vegetations surrounding it. Suleipat reservoir falls under Kusumi block and under Babonghati subdivision, Mayurbhanj. It falls under Bareservoirpahar Forest Range. It is situated in Mayurbhanj District, Odisha between 22.122541°N and 86.237750° E. It is 27 km away from the Forest Range Office, Bareservoirpahar and 36 km from Simlipal Khairi Resort. Brahmanpasi, Kaduani, Pokharia, Raliabindha are the surrounding villages

of Suleipat water reservoir. This reservoir is at an altitude of 1305.77 fts (398 m). The maximum and minimum temperature is 40.05°C and 10°C in summer season and winter season respectively. Suleipat iron ore mines are close up in this reservoir.

The survey was conducted from April 15, 2021 to June 30, 2021. The survey was conducted 6 hours a day, (06 AM – 08 AM, 08 AM – 10 AM, 04 PM – 06PM) with a regular visit and random collection of samples. Water samples were collected from the four sampling stations of the Reservoir. The water samples were collected in bottles and sent to laboratories without disturbances. These were collected by weekly intervals from the sampling stations for a period of three months. The samples were collected during morning hours. Water temperature and conductivity were measured by Cyber Scan water proof PC 300 multi parameter. Water velocity was measured by flow meter (JDC electronics SA; Switzerland). Experimental fishing was carried out both by student of the project work as well as by using the expertise of local fisher folk.

Sample collection

Daytime (08:00–17:30) and night (19:30–05:00) sampling was carried out at all the four sites on weekly basis during the study period. Different types of gear including cast nets (90, 100; 90, 1/200), gill nets (7591.3 m, 200; 5091 m, 300; 3091 m, 2.500), drag nets (all with varying mesh sizes) and other local contrivances were used for collecting the aquatic fauna. Fisherman play a very important role in collection and identification of aquatic fauna. All the aquatic fauna was collected in the pictorial form also.

Identification of samples

The data were identified with the help of various literature review and field guide (Bhattacharya, 1998; Abell, 2002; Bauer and Jackman, 2008; Abebe and Decraemer, 2008; Dehorter and Guillemain, 2008). Classifications were carried out by consulting relevant standard literature. Hand book of the fresh water fish of India (Jayaram, 1981), both the books helped a lot to identify the species.

Water sample collection

Water samples were collected from four sample sites of the Suleipat reservoir. Water temperature was measured by a sensitive mercury thermometer, pH was measured by pH meter, dissolve oxygen and salinity were measured in ppm.

Diversity Indices

Species diversity was measured separately by species richness or evenness or diversity as a whole. Species evenness was measured with evenness index (denoted by E). Diversity of the species was calculated directly with a variety of indices, of which two commonly used statistical parameters were Shannon-Weiner Index or simply the Index of diversity or Shannon's index (denoted by H' and Index of dominance or Simpson's index). The diversity index for the surveyed and collected samples was determined by using Shannon and Wiener formula, which is as follows:

$$H = \sum_{i=1}^s p_i \ln(p_i)$$

Evenness of the diversity index was calculated by using the formula: $E = H/H_{\max}$ Where: Shannon-Wiener index of diversity, S- total number of species, $H_{\max} = \ln(S)$, $P_i = (N_i/N)$ proportion of Total sample represented by species I, N= total number of individuals of all species, N_i -total number of specimens of each species. Species diversity was calculated by Simpson's Index of Diversity.

$$D = \sum n(n-1) / N(N-1)$$

Simpson's Index of diversity (1-D)

A total of 87 aquatic fauna were recorded during the field survey. In which 29 were odonates species, 24 were fishes, 16 were snails and 18 were other species. In consideration with dominant fauna, fish has the maximum species found in the whole study area i.e., a total of 24 species belonging to 20 genera and 10 families were recorded from Sulipata reservoir. Cyprinidae was the most dominant family with 50% occurrence, followed by Bagridae 8.33%, Channidae 8.33%, and other families like Ictaluridae, Mastacembelidae shared the same occurrence 4.16%. Among them, two fishes were

found data deficient, and one species was Near threatened, and other were Least concern as per the IUCN Red data of threatened list (2019).

Species Diversity

Fish was the most dominant fauna with Important Value Index (IVI value = 50.01923), followed by odonates (IVI value = 31.80159), Snails (IVI value = 22.46231), Millipeds (IVI value = 21.11303), Mosquito (IVI value = 16.59464), Frog (IVI value = 15.93201), Coleoptera (IVI value = 13.68482), Earthworm (IVI value = 11.06309), Crab (IVI value = 9.377701), and snake (IVI value = 7.879574). The shimpson and shannon diversity index was as followed; 0.64325 and 1.382375 and the evenness index was 0.671875.

Water parameters

The Suleipat reservoir, housed for variety of fresh water species and holds a great diversity of aquatic fauna. The followings are the parameters of water.

Physical parameters

Colouration

The water colour was found light blue in colour.

Taste

The local inhabitants used Suliepat reservoir's water for drinking and other purpose since long. After tasting the water was found sweet in taste. And it was as drinking water.

Turbidity

The water was found clear and a few no. of sediments were only found. The testing was done with the help of a glass measuring tube. And water was found with minimal turbidity.

Fresh water aquatic faunal diversity is an essential study. It represents the richness of species in that area. Basically, the fish and crabs are catching by the fisheries so the richness become extinction day by day. To conduct such type of study in fresh waterbodies is very important because the efforts on the diversity of such reservoirs will be improve as per the need. Suliepat reservoir supports a variety

of aquatic fauna and specially fishes. This study highlights all the possible fauna housed in Suleipat reservoir. The beetles are most species-rich animal group existing on the earth. The water-beetle fauna of India consists of 776 species belonging to 137 genera, and 17 families in 3 suborders. Out of these only 5 species of 3 family were found in Suleipat

of species was also good and the water quality was also too good.

Table 1. Percentage occurrence of various families at Suleipat reservoir

Family	Percentage occurrence
Anabantidae	4.16
Ambassidae	4.16
Bagridae	8.33
Cyprinidae	50
Channidae	8.33
Ictalurdis	4.16
Mastacembelidae	4.16
Notopteridae	4.16
Schibeidae	4.16
Siluridae	4.16

reservoir. Globally, 6233 species in 685 genera of odonates are known, of which 482 species with about 50 subspecies in 150 genera and 18 families exist in India. In this whole study, 29 species of Odonata belonging to 7 families were collected. Odonates like *Gynacantha bayadera*, *Lathrecista asiatica*, *Copera ciliate*, *Crocothemis servilia*, *Indothemis carnatica*, *Trithemis aurora*, *Pantala flavescens*, *Neurothemis fulvia*, *Rhyothemis variegata*, *Aciagrion approximans*, *Aciagrion approximans etc.* shows good water quality. The freshwater molluscs have an estimated global diversity of 5000 species, of which 217 species comprising 150 species of gastropods and 67 species of bivalves are reported from freshwater ecosystems of India. Here in Table 2; 16 species belonging to 14 family were found like *Pomacea bridgesii*, *Pomacea maculate*, *Biomphalaria straminea*, *Viviparus Georgianus*, *Tarebia granifera etc.* In Suleipat the diversity of fishes also found in good quantity. A total of 24 species belonging to 7 families of fishes were found in the entire study area. Some of them are *Catla catla*, *Cyprinus sophore*, *Channa striata*, *Labeo rohita*, *Amblypharyngodon mola*, *Salmo phasiabacalia etc.* The overall diversity index indicated that there was a good correlation among all species of this reservoir and the rich ness

Table 2. Density, abundance and IVI of various fauna at Suleipat reservoir

Aquatic Fauna	Density	Abundance	IVI
Fish	139	139	50.09123
Snails	43.75	58.33333	22.46231
Snake	0.75	1.5	7.879574
Crab	6.75	13.5	9.377701
Odonates	65.75	65.75	31.80159
Millipeds	53.75	107.5	21.11303
Mosquito	20.25	27	16.59464
Coleoptera	24	48	13.68482
Earthworm	13.5	27	11.06309
Frog	33	66	15.93201

Table 3. Checklist of fishes

Sl.	Local Name	Family	Scientific name	IUCN STATUS
1	Bhakura	Cyprinidae	<i>Catla catla</i>	LC
2	Rohi	Cyprinidae	<i>Labeo rohita</i>	LC
3	Pita karandi	Cyprinidae	<i>Puntius</i>	LC
4	Mohurali	Cyprinidae	<i>Amblypharyngodon mola</i>	LC
5	Magura	Ictaluridae	<i>Clarias batrachus</i>	LC
6	Chingudi	Palemonidae	<i>M. rosenbergii</i>	LC
7	Bata	Schibeidae	<i>Labeo bata</i>	LC
8	Flai	Notopteridae	<i>Notepterus notepterus</i>	LC
9	Baunspatri	Cyprinidea	<i>Salmophasia bacalia</i>	LC
10	Mira	Cyprinidea	<i>Cirrhinus mrigala</i>	LC
11	Kalibanisi	Cyprinidea	<i>Labeo calbasu</i>	LC
12	Kau	Anabantidae	<i>Anabus cobojius</i>	DD
13	Karandi	Cyprinidae	<i>Puntius amphibious</i>	DD
14	Kantia	Bagridae	<i>Mystus vittatus</i>	LC
15	Gomitudi	Mastacembelidae	<i>Mastacembalus pencahis</i>	LC
16	Seula	Channidae	<i>Channa striata</i>	LC
17	Jahala	Cyprinidea	<i>Chela bacaila</i>	LC
18	Pita karanda	Cyprinidea	<i>Puntius conchoniis</i>	LC
19	Singhi	Bagridae	<i>Sperata seenghala</i>	LC
20	Balia	Siluridae	<i>Wallago attu</i>	NT
21	Gadisa	Channidae	<i>Channa pantatua</i>	LC
22	Chanda	Ambassidae	<i>Channa nama</i>	LC
23	Chainapunti	Cyprinidae	<i>Cyprinus sophore</i>	LC
24	Dandikiri	Cyprinidae	<i>Rabora daniconius</i>	LC

Table 4. Check list of snails

Sl.	Family	Scientific Name	Common Name	IUCN Status
1	Ampullariidae	<i>Pomacea bridgesii</i>	Spile-topped apple snail	LC
2	Planorbidae	<i>Panobarious correnus</i>	The great ramshorn	LC
3	Thiaridae	<i>Melanoides tuberculata</i>	Red rimmed Melania	LC
4	Ampullariidae	<i>Pomacea canaliculata</i>	Channeled apple snail	LC
5	Littorinidae	<i>Littorina littorea</i>	Common periwinkle	
7	Ampullariidae	<i>Pomacea maculate</i>	The apple snail	
8	Lymnaeidae	<i>Galba truncatula</i>	The pond snail	LC
10	Planorbidae	<i>Biomphalaria straminea</i>	The Ram's horn snail	
11	Thiaridae	<i>Tarebia granifera</i>	The quilted melania	LC
12	Lymnaeidae	<i>Radix peregra</i>	The pond snail	
13	Planorbidae	<i>Planorbis planorbis</i>	The Ram's horn snail	LC
14	Viviparidae	<i>Viviparus viviparus</i>	The River snail	LC

15	Viviparidae	<i>Viviparus georgianus</i>	The River snail	
16	Ampullariidae	<i>Pila conica</i>	The freshwater snail	G5

Table 5. Check list of odonates

Sl.	Family	Scientific Name	Common Name	Status	
1	Aeshnidae	<i>Gynacantha bayadera</i>	Parakeet darner	Least Concern	
2	Calopterygidae	<i>Vestalis gtracilis</i>	Forest glory	Least Concern	
3	Coenagrionidae	<i>Aciagrion approximans</i>	Violet striped slender dartlet	Least Concern	
4		<i>Aciagrion occidentale</i>	Green striped slender dartlet	Least Concern	
5		<i>Enallagma cyathigerum</i>	Enallagma cyathigerum		
6		<i>Ischnura aurora</i>	Golden dartlet	Least Concern	
7	Cordulegastridae	<i>Ceriagrion coromandelianum</i>	Yellow waxtail reservoirselfly	Least Concern	
8		<i>Cordulegaster boltonii</i>	Golden ringed dragonfly		
9	Gomphidae	<i>Gomphus vulgatissimus</i>	Common clubtail		
10		<i>Acisoma panorpoides</i>	Trumpet tail	Least Concern	
11		<i>Brachydiplax chalybea</i>	Rufous marsh hawk	Least Concern	
12		<i>Crocothemis servilia</i>	Scarlet skimmer		
13		<i>Diplacodes trivialis</i>	Chalky percher	Least Concern	
14		<i>Erythodiplex umbrata</i>	Band-winged dragonlet	Least Concern	
15		<i>Indothemis carnatica</i>	Black Marsh skimmer	Least Concern	
16		Libellulidae	<i>Lathrecista asiatica</i>	Asiatic blood tail	Least Concern
17			<i>Neurothemis fulvia</i>	Fulvous forest skimmer	Least Concern
18	<i>Orthetrum glaucum</i>		Blue marsh hawk	Least Concern	
19	<i>Orthetrum pruinosum</i>		Crimson tailed marsh hawk	Least Concern	
20	<i>Orthetrum sabina</i>		Slender skimmer	Least Concern	
21	<i>Pachydiplax longipennis</i>		Blue dasher		
22	<i>Pantala flavescens</i>		Wandering glider	Least Concern	
23	<i>Plathemis lydia</i>		Brown skimmer dragonfly		
24	<i>Rhyothemis variegata</i>	Common picture wing	Least Concern		
25	<i>Trithemis aurora</i>	Crimson marsh glider	Least Concern		
26	<i>Trithemis festiva</i>	Black stream glider	Least Concern		
27	<i>Trithemis pallidinervis</i>	Long-legged marsh glider	Least Concern		
28	<i>Urothemis signata</i>	Greater crimson glider	Least Concern		
29	Platycnemididae	<i>Copera ciliata</i>	Pied bush dart	Least Concern	

Table 6. Other aquatic fauna

Sl.	Order	Family	Scientific name	Common name
Beetles				
1	Coleoptera	Carabidae	<i>Anthia sexguttata</i>	Six spotted ground-beetle
2		Coccinellidae	<i>Coccinella septempunctata</i>	Seven spotted lady-bug
3			<i>Harmonia axyridis</i>	Asian multicolorred lady beetle
4		Scarabaeidae	<i>Oryctes rhinoceros</i>	Coconut rhinoceros bettle
5			<i>Onthophagus cervus</i>	Dung beetle
Mosquito				
6	Diptera	Culicidae	<i>Anopheles culifacies</i>	Mosquito
7			<i>Anopheles jamesii</i>	Mosquito
8			<i>Anopheles karwari</i>	Mosquito
9			<i>Culex bitaeniorhynchus</i>	Mosquito
Earthworm				
11	Haplotaaxida	Glossoscolecidae	<i>Pontoscolex corethrurs</i>	Earthworm
12		Megascolecidae	<i>Amyntas corticis</i>	Earthworm
Millipedes				
13	Polydesmida	Paradoxosomatidae	<i>Chondromorpha xanthotricha</i>	Millipede
14	Spirobolida	Trigoniulidae	<i>Trigoniulus corallines</i>	Common Asian millipede
Snake				
15	Squamata	Colubridae	<i>Xenochrophis piscator</i>	Water snake
16	Squamata	Colubridae	<i>Ptyas mucosa</i>	Dhaman
Frog				
17	Anura	Bufonidae	<i>Duttaphrynus parietalis</i>	Indian toad
18	Anura	Bufonidae	<i>Duttaphrynus melanostictus</i>	Asian common toad

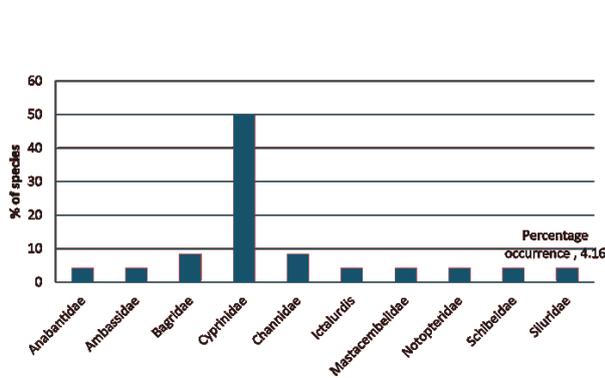


Fig. 1. Percentage occurrence of families

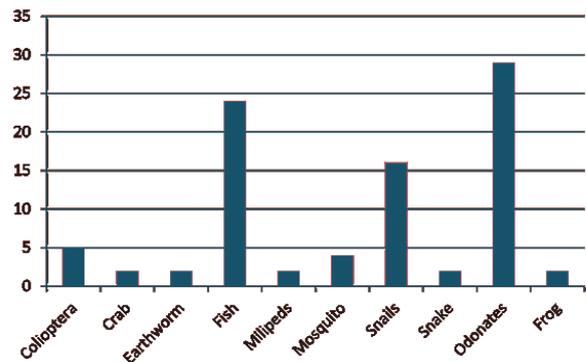


Fig. 2. Number of species of various fauna

CONCLUSION

The Suleipat reservoir is a diverse area having a good qualitative and quantitative species index. Its water quality is good with low turbidity. Fishes, odonates, snails, crabs, beetles, birds etc. are found to be abundant there. The locals use the reservoir mainly for agriculture and fishing which happens to be their main economy and are well concerned about the pollution. So, they keep the reservoir very clean and restrict the use of plastics. The present work gives a substantial data on both quality and quantity to support further research in future.

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