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# Status, distribution, habitat type of threatened bird diversity, potential eco-tourism site and conservation strategy for wetland in Tamapara Lake Southern Odisha, India

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**Article History**

Received: 23 October 2017  
Accepted: 02 December 2017  
Published: 05 December 2017

**Citation**

Rajkishore Mohanta, Subrata Kumar Behera, Mishra SS, Sethy J, Swain KK, Sahu AK. Status, distribution, habitat type of threatened bird diversity, potential eco-tourism site and conservation strategy for wetland in Tamapara Lake Southern Odisha, India. *Spring*, 2017, 6(7), 14-21

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**ABSTRACT**

Tampara Lake is situated in district of Ganjam towards the Southern part of Odisha provides an important diverse range of winter migration and resident birds. It is a fresh water lake and which also acts as a shelter for the both migratory and residential birds in the wintry weather season. This is small but extremely picturesque Tampara Lake holds a prominent position in the tourist map of Odisha for its beauty and proximity. This eye-catching tourist attraction is about 130 km from Bhubaneswar. This survey was carried out from October 2012 to March 2016 to document the diversity of birds. For protection and conservation of biological diversity, alternate livelihood support and socio economic developments are the most important role of local community. So that ecotourism can be enforces for change which revolutionised in the local and globally. Diversity of birds was indicating the tourism area which was healthy environment and valuable of wetland. This paper assesses the occurrence of 61 avian species, of 52 genus and 26 families were recorded during survey period. Of these 46 species were resident, 12 species were winter migrant and 3 were local migrant. It is expected that this study would provide a preliminary database for further research, conservation and better management of the lake. It has not only good population of bird diversity and this site could be protected for the other wildlife also.

**Key words:** Conservation, human, wetland, threatened species

**1. INTRODUCTION**

Water and Wetland play a vital role for the rural people. Fresh water bodies perform many vital functions such as provide food, fodder, fuel and water for domestic, irrigation, and industrial purpose etc. In our surroundings lakes are the most important ecosystems, which are valuable as resources and transformers of a multitude of both chemical and biological materials. The relations of man with lakes are the first humanizing system initiated in the process of evolution and development of many civilizations. Societies have enjoyed an ancient association with wetlands and have learned to obtain multiple benefits of natural resources, facilities and environmental services. Wetlands are important for habitat, environment, biodiversity, livelihood for the local community and other flora and fauna species. Resident and migratory of birds are depend for its natural habitats and use them for feeding, roosting, nesting and rearing their young. Also birds are excellent indicators of water quality and measures of biodiversity (Vishwakarma *et al*, 2014). Wetland birds play a significant role in wetland ecosystem and one of the best indicators of environmental changes. The population of birds in any kind of ecosystem shows the environmental quality of the area, pollution level, security and availability of food and habitat.

Birds are very important component of most of the wetland ecosystem as they occupy several trophic levels in the food web of wetland nutrient cycles. Activities of water birds are considered as indicator of quality of the reflect changes originating in several different ecosystem components (Custyer and Osborne 1977). The various lakes and wetlands in any city serve as a balancing reservoir for sustaining native flora and fauna (Girmmet and Inskipp, 2007; Surana *et al*, 2007). The aquatic birds of the Ganjam area are important bio indicators of wetland ecosystem which should be protected to conserve the biodiversity and environment.

Monitoring of wetland birds provides valuable information on the ecological health and status of wetlands and can be a vital tool for developing awareness regarding the conservation value of the wetlands. The importance of local landscapes for conservation of avifauna can only be understood by knowing the structure of the bird community of that region (Kattan & Franco 2004).

**Study Area**

Fresh Water Tampara Lake is situated in the district of Ganjam, Southern Odisha. This lake is 5.8 km long and 670 meters wide and it runs up to Rushikulya River. The study area location where promotion of tourism has been proposed is Tampara Lake, near

Chatrapur (Figure 1). The district is characterised by an equable temperature all through the year, particularly in the coastal regions and by high humidity. The cold season from December to February is followed by hot season from March to May. The period from June to September marks the South West Monsoon and 70% of annual precipitation is received during this period. The normal rain fall of this district is 1444 mms. May is the hottest month. With the arrival of the monsoon by about the second week of June the day temperature decreases slightly while the night temperature continue as it was in the summer. Towards the end of September, after the withdrawal of south west monsoon, temperature decreases progressively. December is the coldest month. As of 2011 India census, Ganjam had a population of 3,520,151. Males constitute 50.49% of the population and females 49.51%. Ganjam has an average literacy rate of 71.88% male literacy is 81.85%, and female literacy is 61.84%. Total child population age between 0–6 years is 11.30% of the total Ganjam population. Sex ratio is 981 and density of population (persons per km<sup>2</sup>) is 429 (Annonymus, 2011).

## 2. MATERIALS AND METHODS

Exploratory surveys involving field visits and literature review were carried out to find out the present status of wetland birds in Tampara Lake. The avifauna of the study area was surveyed on Tampara Lake in between October 2012 to March 2016. The birds were observed during most active period of the day morning and evening with the help of 8x40 Bushnell binoculars, range finder for distance and photography for confirmation of the species. Survey was conducted through walking in different types of habitats, i.e. casuarinas plantation, human habitation, agricultural land, river mouth, beach, tidal area, wetland, swamp area and nearby vegetations for documentation of different species of birds found in the study area. Birds were identified by using field guide of Grimmett *et al* (1999), Gaston (1975) and Bibby *et al* (2000).

In the study site sampling was made by walking at a slow pace near about 1 to 1.5 km per hour along the area. However, wherever necessary point count of birds was also made within the visible radius by stopping briefly for 2 to 3 minutes as followed by other workers (Froneman *et al*, 2001; Kaul and Howman, 1992; Urfi *et al*, 2005) and with help of binocular. Identification, counting of the birds was made in the morning between 07:30 and 10: 30 hr or in the afternoon between 15:00 and 18:00 hr, depending on the light conditions (Namgail *et al*, 2009).

While surveying from a country boat, we avoided the clusters (bird or bird groups) which were coming from behind. We were careful and seldom caused any disturbance, while rowing the country boat. We carefully observed the clusters while counting the birds and only after confirming their identification we included them in the checklist.

We also observed and maintain the record of birds and there areas i.e. different habitat including inhibited region. Birds observed in these habitats were segregated in to three categories 1. Status/Abundance 2. Habitat 3. Feeding Guilt. The check list of species was prepared following Ali (2002), Manakadan and Pittie (2001) and Grimmett and Inskipp (2007).

## 3. RESULTS AND DISCUSSION

### Bird diversity

Biodiversity and tourism is a principal source of income for many of the area in a country. In Wetland ecosystem and ecotourism sector provides good opportunities for employment generation, livelihood and income of many poor people and local community. As a result lakes play a vital role for the sustain biodiversity and environment in this success.

In Tampara lake we found all sixty one species of birds were observed during the study period in the area, which comes under fifty two genus and twenty six families such as Ardeidae (nine species), Anatidae (eight species), Rallidae and Scolopacidae (5 species), Accipitridae (four species), Sturnidae (three species), Alcedinidae, Aves, Ciconiidae, Cuculidae, Laridae (two species each) and Anhingidae, Bucerotidae, Cerylidae, Charadriidae, Coraciidae, Corvidae, Dicruridae, Halcyonidae, Jacanidae, Megalaimidae, Meropidae, Passeridae, Phalacrocoracidae, Podicipedidae, Sternidae, Threskiornithidae and Upupidae ( one species each).

Whereas the dominated genera were *Trinaga sp.* (4 species) followed by *Anus sp.*, *Ardea sp.* (3 species), *Acridotheres sp.* and *Halcyon sp.* (2 species) likewise, *Accipiter badius*, *Alcedo atthis*, *Amaurornis phoenicurus*, *Anastomus oscitans*, *Anhinga melanogaster*, *Ardeola grayii*, *Aythya farina*, *Bubulcus ibis*, *Casmerodius albus*, *Centropus sinensis*, *Ceryle rudis*, *Chroicocephalus brunnicephalus*, *Columba livia*, *Coracias benghalensis*, *Corvus splendens*, *Dendrocygna javanica*, *Dicrurus macrocerus*, *Egretta garzetta*, *Elanus caeruleus*, *Eudynamis scolopacea*, *Fulica atra*, *Gallinula chloropus*, *Gracupica contra*, *Haliaeetus leucogaster*, *Haliastur indus*, *Larus ridibundus*, *Megalaima zeylanica*, *Merops orientalis*, *Mesophoyx intermedia*, *Metopidius indicus*, *Mycteria leucocephala*, *Netta rufina*, *Nettapus coromandelianus*, *Numenius arquata*, *Nycticorax nycticorax*, *Ocyrceros birostris*, *Passer domesticus*, *Phalacrocorax niger*, *Porphyrio porphyrio*, *Sterna aurantia*, *Streptopelia chinensis*, *Tachybaptus ruficollis*, *Tadorna ferruginea*, *Threskiornis melanocephalus*, *Upupa epops* and *Vanellus indicus* was each one species.

Out of the sixty one species, forty six (75.41%) species were found to be residents, whilst twelve (19.67%) species were winter migrant and three species (4.92%) were local migrant visitors. Whereas the abundance of thirty seven species (60.66%) was found to be common, fifteen species (24.59 %) were in fairly common and nine species (14.75%) were in rare.

There were highest Feeding guild of birds 16 (26.23%) species in omnivore, followed by 13 (21.31%) species in insectivore, 11 (18.03%) species in carnivore, 10 (16.39%) species in predator, 4 (6.56%) species in granivore and was found lowest food habit birds 3 (4.92%) species each were herbivore. The checklist of avifauna observed during study period is given in table 1 and figure 1.

**Table 1** Status, distribution and habitat type of avifauna of the study area

Family	Common Name	Scientific Name	Status/ Abundance	Habitat	Feeding Guild
Accipitridae	Shikra	<i>Accipiter badius</i>	RS/C	OF	PR
	Black shouldered Kite	<i>Elanus caeruleus</i>	RS/C	CU, OF	PR
	White bellied Sea Eagle	<i>Haliaeetus leucogaster</i>	RS/FC	CU, OF	PR
	Brahminy Kite	<i>Haliastur indus</i>	RS/ FC	CU, OF,W	CV
Alcedinidae	Common king Fisher	<i>Alcedo atthis</i>	RS/C	OF, W	PR
	Black Capped Kingfisher	<i>Halcyon pileata</i>	RS/C	SP,W	CV
Anatidae	Cotton Teal	<i>Anas crecca</i>	M/R	W	O
	Eurasian Wigeon	<i>Anas penelope</i>	M/R	W	H
	Spot billed Duck	<i>Anas poecilorhyncha</i>	M/R	W	H
	Lesser Whistling Duck	<i>Dendrocygna javanica</i>	RS/C	W	O
	Ruddy Shelduck	<i>Tadorna ferruginea</i>	M/R	SP	O
	Red crested Poachard	<i>Netta rufina</i>	M/FC	WT	H
	Common Poachard	<i>Aythya ferina</i>	M/R	WT	O
	Cotton pygmy goose /cotton teal	<i>Nettapus coromandelianus</i>	LM/FC	WT (MR)	O
Anhingidae	Darter	<i>Anhinga melanogaster</i>	RS/C	SP, W	P
Ardeidae	Grey Heron	<i>Ardea cinerea</i>	RS/C	MR,SP & W	CV
	Goliath Heron	<i>Ardea goliath</i>	RS/ FC	MR, W	CV
	Purple Heron	<i>Ardea purpurea</i>	RS/C	MR,W	CV
	Indian Pond Heron	<i>Ardeola grayii</i>	RS/C	MR,W	CV
	Cattle Egret	<i>Bubulcus ibis</i>	RS/C	HH, MR	CV
	Great Egret	<i>Casmerodius albus</i>	RS/C	SP & W	PR
	Little Egret	<i>Egretta garzetta</i>	RS/C	SP,C	PR
	Median Egret	<i>Mesophoyx intermedia</i>	RS/C	SP, W &	P

				CU	
	black-crowned night heron	<i>Nycticorax nycticorax</i>	LM/R	WT (MR)	CV
Aves	Rock Pigeon	<i>Columba livia</i>	RS/C	Village, CU	G
	Sporttred Dove	<i>Streptopelia chinensis</i>	RS/C	CU, HH	G
Bucerotidae	Indian Grey Hornbil	<i>Oryx capensis</i>	LM/ FC	P	I
Cerylidae	Pied Kingfisher	<i>Ceryle rudis</i>	RS/C	W & P	PR
Charadriidae	Red wattled Lapwing	<i>Vanellus indicus</i>	RS/C	SP, W	I
Ciconiidae	Asian Openbill Stork	<i>Anastomus oscitans</i>	RS/C	MR,SP	PR
	Painted Stork	<i>Mycteria leucocephala</i>	M/R	SP	CV
Coraciidae	Indian Roller	<i>Coracias benghalensis</i>	RS/C	HH, CU	I
Corvidae	House Crow	<i>Corvus splendens</i>	RS/C	HH	O
Cuculidae	Greater Coucal	<i>Centropus sinensis</i>	RS/C	CU	PR
	Asian Koel	<i>Eudynamis scolopacea</i>	RS/C	G, CU	O
Dicruridae	Black Drongo	<i>Dicrurus macrocercus</i>	RS/C	HH, CU	I
Halcyonidae	White throated Kingfisher	<i>Halcyon smyrnensis</i>	RS/C	SP, W	CV
Jacaniidae	Bronze winged Jacana	<i>Metopidius indicus</i>	RS/C	MR, W	I
Laridae	Black headed Gull	<i>Larus ridibundus</i>	M/R	SP, W	O
	Brown headed Gull	<i>Chroicocephalus brunnicephalus</i>	M/R	SP, W	O
Megalaimidae	Brown headed Barbet	<i>Megalaima zeylanica</i>	RS/C	P, G	I
Meropidae	Green bee Eater	<i>Merops orientalis</i>	RS/C	CU, GS, HH	I
Passeridae	House sparrow	<i>Passer domesticus</i>	RS/ FC	HH	G
Phalacrocoracidae	Little Cormorant	<i>Phalacrocorax niger</i>	RS/C	MR, SP & W	P
Podicipedidae	Little Greb	<i>Tachybaptus ruficollis</i>	RS/C	W	I
Rallidae	White breasted Waterhen	<i>Amaurornis phoenicurus</i>	RS/C	W	O
	Common Coot	<i>Fulica atra</i>	RS/ FC	SP, W	O
	Watercock	<i>Gallicrex cinerea</i>	M/FC	MR	G
	Common Moorhen	<i>Gallinula chloropus</i>	RS/FC	SP, W	O
	Purple Swamp hen	<i>Porphyrio porphyrio</i>	RS/ FC	SP, MR	O
Scolopacidae	Eurasian Curlew	<i>Numenius arquata</i>	M/R	W	I
	Spotted	<i>Tringa erythropus</i>	RS/ FC	SP, W	I

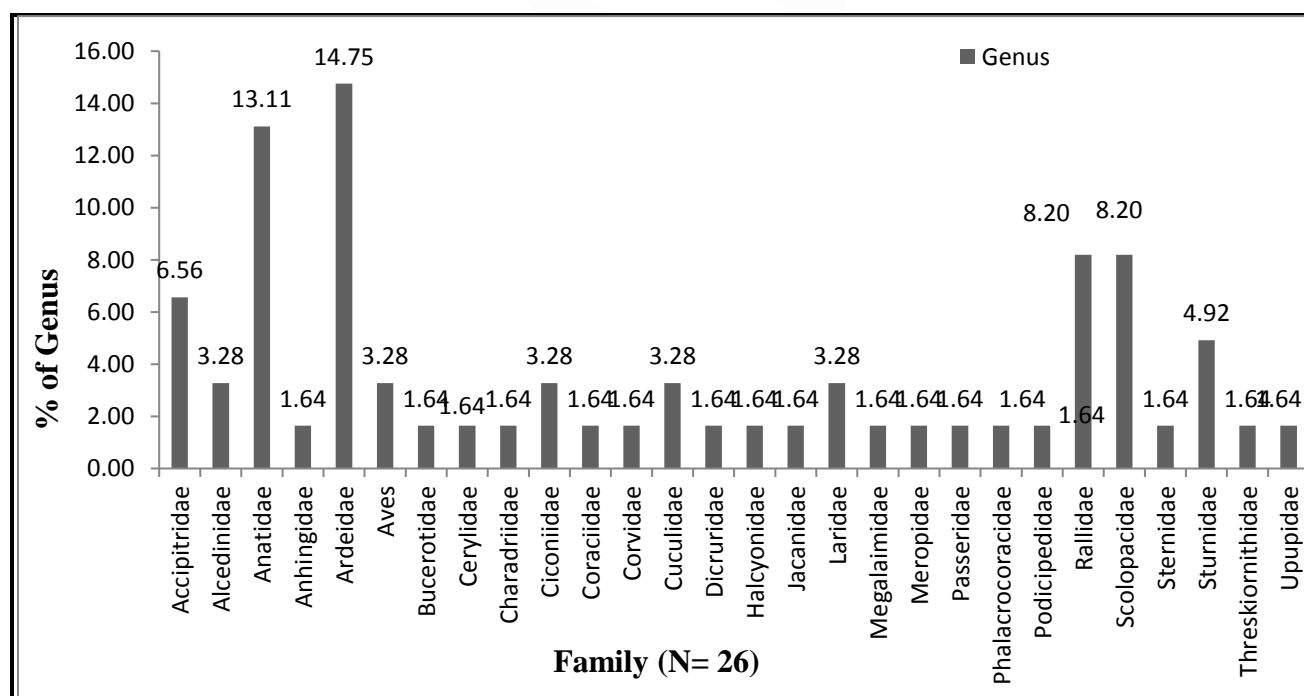
	Redshank				
	Common Greenshank	<i>Tringa nebularia</i>	RS/ FC	OF, W	I
	Common Redshank	<i>Tringa totanus</i>	RS/C	OF, W	I
	Marsh Sandpiper	<i>Tringa stagnatilis</i>	RS/C	MR,W	CV
Sternidae	River Tern	<i>Sterna aurantia</i>	RS/ FC	SP, W	P
Sturnidae	Bank Myna	<i>Acridotheres ginginianus</i>	RS/C	CU, HH	O
	Common Myna	<i>Acridotheres tristis</i>	RS/C	HH	O
	Asian pied Starling	<i>Gracupica contra</i>	RS/C	CU, HH	O
Threskiornithidae	Black headed Ibis	<i>Threskiornis melanocephalus</i>	M/FC	MR,W	PR
Upupidae	Common Hoopoe	<i>Upupa epops</i>	RS/C	CU,HH	I

**Status:** Resident=RS, Migrant= M, Local Migration= LM

**Abundance:** C= Common (Seen frequently >10 sightings), FC=Fairly Common (< 7 sightings), R = Rare (<3 sightings)

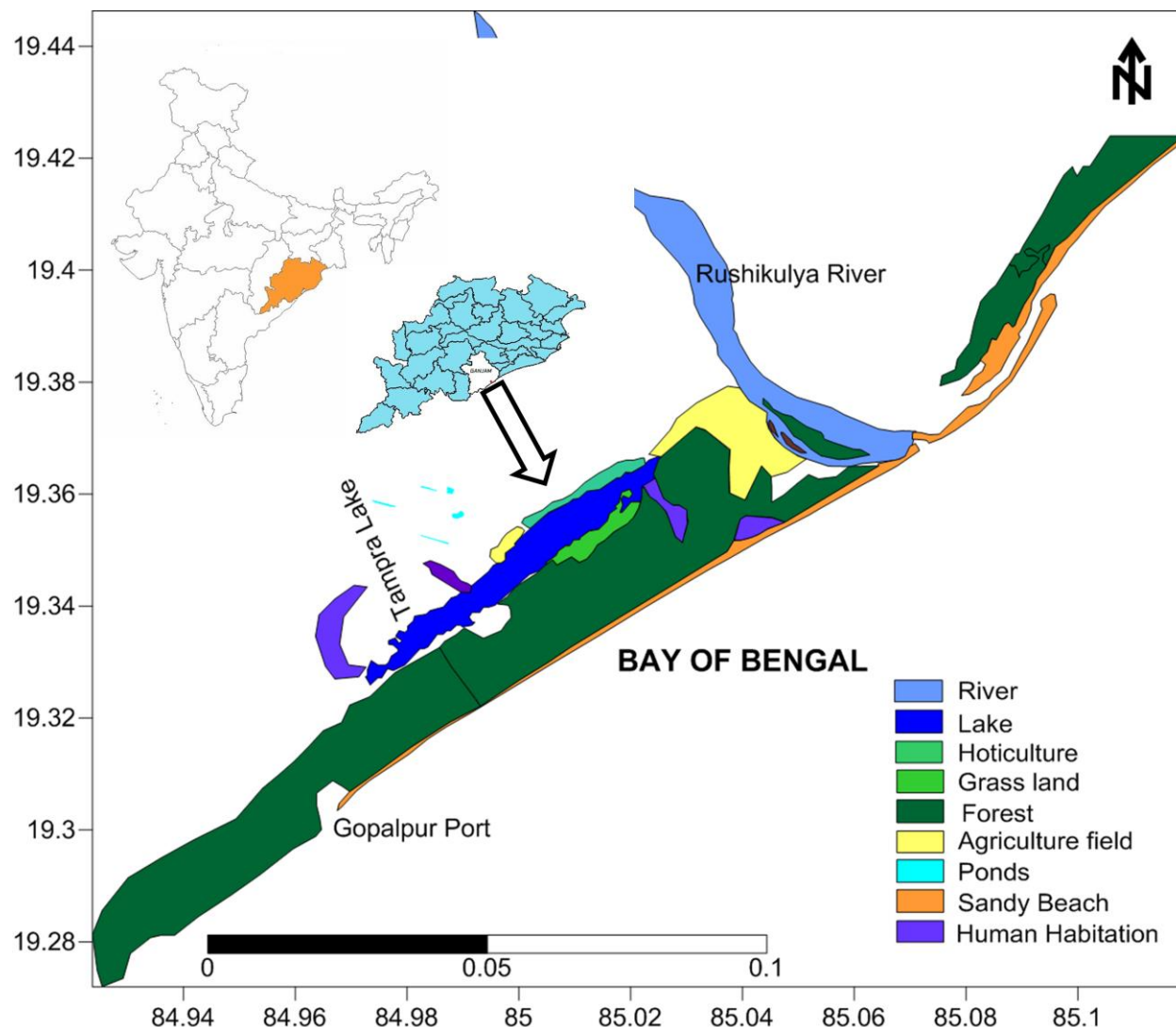
**Habitat:** Open Field = OF, Cultivation= CU, Human Habitation= HH, Salt Pan =SP, Wetland= W, Marsh =MR, Plantation= P, Grassland= GS, Garden=G, Coastal Beach=CB, Village=V

**Feeding Guild:** Piscivore=P, Omnivore=O, Insectivore=I, Herbivore=H, Granivore=G, Carnivore=CV, Predator=PR



**Figure 1** shows the family wise percentage of birds in the study area





**Map** Showing the Study area and Habitat Classification of Tampara Lake, Ganjam, Odisha

### Eco-Tourism can sustain of wetland biodiversity and conservation of threatened species

In this ecosystem, nature and climate play a vital role for sustain biodiversity. In relationship between human and lake is however complex and sometimes adversarial. Human can impact lake in a number of ways such as by causing habitat destruction, construction work, pollution, noise or over-consumption of water. But with proper planning it can also be an innovative mechanism for funding nature conservation and opportunity development for local livelihoods and good environment.

- Minimum facilities like sanitation, drinking water, food court, security, different kind of boat, parking area, and tourist guide etc. can be developed and managed proper planning;
- Basic amenities such as signage, brochure, leaflet, tourist information network, museum cum interpretation centre, eco friendly accommodation, etc. can developed;
- If, all liquid and solid wastes are properly treated and disposed of in ways that do not result in damage to biodiversity, and by minimising use of toxic chemicals, pesticides and fertilisers to reduce pressure on wetland biodiversity;
- taken all food stuffs, other biological resources used in tourism activities from sustainably managed sources;
- supporting biodiversity conservation by Government organisation, University, Education department, NGOs through practical actions, including financial contributions through sponsorships and voluntary donations;
- to ensuring that no threatened species (endangered) are put at risk from tourism activities;
- Using the communications and marketing strengths of the tourism sector to raise awareness of tourists and destination authorities of the value of biodiversity and the steps they can take to protect it;
- Negative impacts from existing and future tourism activities can be minimized by appropriate management planning and monitoring;



- Revenue sharing mechanism between local community and department can be developed

## 4. CONCLUSION

Recorded baseline information on the bird diversity at Tampara Lake in this study reveals that the wetland needs to be patrolled and monitored to minimize disturbance, in particular during the breeding season of bird. The only source of water in the lake is rain water and uncertainty in the amount of rainfall coupled with decreased inflow of water from surrounding agricultural fields due to fishing activity during winter and summer a threat to the biodiversity in the wetland. Thus, for sustainable upkeep of the wetland, regular surveys related to biodiversity, bird species diversity and awareness of the local people should be conducted for a detailed assessment of the wetland. Also ecotourism has been support of livelihood for rural and local fishermen dwelling communities. This unique wetland requires planned management of eco-tourism activity and maintenance of the Tampara Lake with an aim of conservation its native flora and fauna. The results of this study will help to conserve bird populations, biodiversity and beauties of the area.

## ACKNOWLEDGMENT

We express our thanks to O/o the Principal CCF (Wildlife Wing), CWLW, Odisha. We are also grateful to the World Bank under Integrated Coastal Zone Management Project and Divisional Forest staff, Berhampur for providing technical and logistical support during the field work.

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