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Avian Diversity in and around Sone *Beel*, Assam

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ABSTRACT: 'Sone Beel' is the largest fresh water tectonic lake in the north eastern Indian state of Assam. Systematic list of the birds of this region was lacking. The present study (September 2012 to February 2015) documented the avian fauna in and around Sone Beel. A total of 89 species of birds belonging to 32 families were recorded. Out of these 89 species 39 were water birds, 13 water depended birds while 37 species were terrestrial birds. There were two vulnerable species and two species were listed as near threatened, and 27 were winter visitors. .The conservation threats of the beel have been highlighted.

Keywords: Avian Diversity; IBA; Migratory; Wetland; Waterfowl; Sone Beel; Assam.

INTRODUCTION: Wetlands are important for birds as they use them for feeding, roosting, nesting and rearing their young. Ecologically, Sone Beel is an important wetland providing habitat to migratory and local bird species. This wetland attracts large number of migratory birds during the winter season. Wetlands are crucial to biodiversity conservation in the Asian region, since at least 20% of threatened bird species are found in these habitats. One in eight of all bird species in the Asian region is Globally Threatened (GT)[1].

Water birds can broadly be defined as birds ecologically dependent on wetlands[1]. There are a number of other birds, such as raptors, kingfishers and some passerines, which also depend on wetlands. Many water birds are migratory, undertaking annual movements between their breeding and non-breeding habitats. Water birds refer to any birds that inhabit or depend on the water bodies or wetland areas[2].

Birds are good bio-indicators and useful models for studying a variety of environmental problems[3].Water birds increase the nutrient content and the productivity of aquatic system by their droppings[4]. Migratory waterfowls are one of the most remarkable components of global biodiversity[5]. Water bird abundance depends on their ability to colonise ponds. The primary objective of a wetland bird-monitoring programme is to establish whether aquatic bird population are increasing or declining. It is, therefore, of foremost importance to understand the conservation, distribution and abundance status of the water birds, to evolve appropriate conservation strategies[1]. According to the recommendations of the Convention on Wetlands (Ramsar Convention), one of the criteria for identifying Important Bird Areas (IBAs) is the estimate of water bird populations. Systematic list of the birds of this region is lacking. Hence the present study documented the avian fauna of this wetland and its adjoining areas from direct observation and local informer's interaction.

Although some works have been done on fish diversity[6], physico-chemical parameters[7], and limnology[8], of Sone Beel, hitherto no research has been done about avifauna of the lake. Few records of water birds have been put elsewhere[9], however detail study about the water birds of Sone Beel has not been carried out. Our study is the first of its kind in this wetland, illustrating not only water birds but also terrestrial birds in and around Sone Beel. In this paper we intend to provide a checklist of the birds along with notes on some of them and discussed about the conservation problems. During the lean season a large surrounding area is exposed. It is exceedingly being used by the people living around the Beel for paddy cultivation. This is adding to the input of fertilizers and pesticides into the system.

MATERIAL AND METHODS: Lake Sone, (92°24´50´´- 92°28´ 25´´E and 24°36´ 40´´ - 24° 44´ 30´´ N), Assam, India is locally known as the 'Sone Beel' and is the largest fresh water tectonic lake in the north eastern Indian State of Assam (Figure1). This widespread lake when full runs a length of 13.2 km and a width of 4.2 km, along with a vast shoreline covering 35.4 km. Enclosing a 3458.12 hectare area at

full storage level, it almost shrinks to a mere 409.37 hectare at the dead storage level[6].

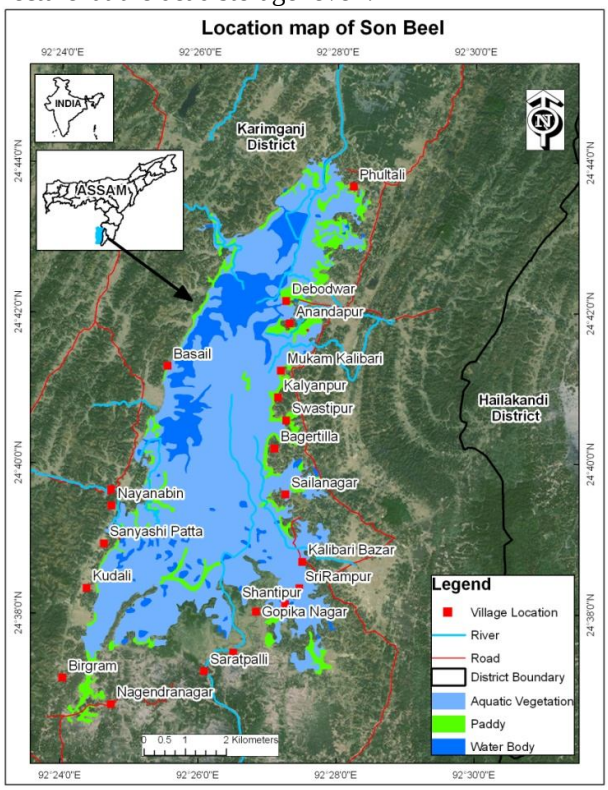

Figure 1: Location map of Son Beel.

Lake Sone is continuously fed by a major inlet called Singla, which originates as Thing Tlawng Lui within the Mizo Hills; from an altitude of 365 meters above sea level, this inlet traverses a torturous course of 62 km to finally empty itself in the Lake Sone. Moreover, a major outlet called River Kachua traversing a distance of 19 km from the northernmost end of the lake, eventually drains this lake water into a bigger river called 'Kushiara' within Karimganj district of Assam.

Data Collection: Bird recording has been carried out from September 2012 to February 2015. Observations were made with the aid of binocular Super Zenith 10X50 Field 5˚. Identification was done with the help of field guides by[10 11 & 12].

The study was carried out in regular intervals covering all parts of the study area. Regular surveys were done fortnightly by walking along the shore of the beel. Further, marked water ways were selected for venturing inside the beel by country boat for recording birds amidst aquatic vegetation. Birds were observed during their most active period of the day, i.e., from 6:00 to 9:00 hr and from 16:00 to 18:00 hr. However, observations were also made during other timings according to convenience. Photographs were taken with the aid of Canon camera with high zoom (48X).

Data Analyses: The birds were listed following the nomenclature of Rasmussen & Anderson (2012). Their Migratory or Resident status was categorized as R = Resident, W = Winter visitor, L = Local and altitudinal migrant, Bm = Breeding migrant (summer), P = Passage migrant birds according to[9] in the context of Assam. Their IUCN status is also confirmed from the IUCN Red Data list for birds[13].

RESULTS AND DISCUSSION: A total of 89 species of birds belonged to 32 families were observed during the study period. Of these 39 were water birds,13 water depended birds while 37 species were terrestrial birds (Table 1).All the species were least concerned except for two vulnerable species, viz., Lesser Adjutant and Pallas's Fish Eagle, while two species, Black headed Ibis and Red-breasted Parakeet were listed as near threatened. There were 60 resident species, 27 winter visitors, one species, i.e., Black-headed Ibis was local migrant and one species i.e., Indian Plaintive Cuckoo was summer migrant. Highest numbers of birds were observed during mid-month of November to Post January and lowest in Post February to upcoming summer.

Notes on Some Bird Species:

Lesser Whistling-duck *(Dendrocygna javanica):* The Indian Whistling-duck or Lesser Whistling Teal[14] is the dominant Anatidae species in Sone Beel. Large congregations have been observed during the months of December to mid-March. Being nocturnal by habit, they were observed to rest in large flocks in day time at different secluded locations of the beel. They were found to prefer open areas in the water front or shallow mud islands amidst aquatic macrophytes in the beel. As day temperature increased in the early noon, few birds get into the water and often get engaged in playful chase and dives in the water. The congregations being of non-breeding population, young ones and sub adults were not noted. In their breeding season from mid-May to July pairs were observed at random places in the beel. The highest bird count (1153) was done in the months of January and February.

Cotton teal (*Nettapus coromandelianus*): This species was one of the small waterfowl, as little as 160 g and 250-260 mm in size[14]. The green wings with a white band, in flight, making the male distinct even amongst the huge flocks of lesser whistling duck, which share the same micro habitat in Sone beel. The Cotton teal was observed in Sone beel especially from the months of November to March. They were observed to be feeding on aquatic vegetation during the day time, primarily from early morning till pre noon. However, few birds remained active even in mid-day.

Few flocks were observed amidst reed grass and aquatic macrophytes in the afternoon. They showed propensity to fly around the habitat during the evening hours making their characteristic nasal call[14].

Table 1: Checklist of birds recorded in and around Sone Beel, Assam during 2012 to 2015.

Family	Sl. No.	Common Name[1]	Scientific Name[2]	Con-serv-ation status[3]	Habitat	Migratory or Resident[4]
ANATIDAE	1	Lesser Whistling-duck	*Dendrocygna javanica*	LC	WT	R
	2	Cotton teal	*Nettapus coromande-lianus*	LC	WT	R,L
SCOLOPACI-DAE	3	Black-winged Stilt	*Himantopus himantopus*	LC	WT	R
	4	CommonRedshank	*Tringa totanus*	LC	WT	W
	5	Marsh Sandpiper	*Tringa stagnatilis*	LC	WT	W
	6	Ruff	*Philomachus pugnax*	LC	WT	W
	7	Wood Sandpiper	*Tringa glareola*	LC	WT	W
	8	Common Sandpi-per	*Actitis hypoleucos*	LC	WT	W
	9	Little Stint	*Ereunetes minutus*	LC	WT	W,P
	10	Curlew Sandpiper	*Erolia ferruginea*	LC	WT	W,P
	11	Common Green-shank	*Tringa nebularia*	LC	WT	W
	12	Green Sandpiper	*Tringa ochropus*	LC	WT	W
	13	Common Snipe	*Gallinago gallinago*	LC	WT	W
	14	Pintail Snipe	*Gallinago stenura*	LC	WT	W
JACANIDAE	15	Bronze-winged Jacana	*Metopidius indicus*	LC	WT	R
CHARADRI-DAE	16	Grey-headed Lap-wing	*Vanellus cinereus*	LC	WT	W
	17	Red-wattled Lap-wing	*Vanellus indicus*	LC	WT	R
	18	Little Ringed Plov-er	*Charadrius dubius jerdoni*	LC	WT	R
	19	Pacific Golden Plover	*Pluvialis fulva*	LC	WT	W
	20	Long-billed Plover	*Charadriu splacidus*	LC	WT	W
ACCIPITRI-DAE	21	Eastern Marsh Har-rier	*Circus spilonotus*	LC	WD	W
	22	Brahminy Kite	*Haliaster indus*	LC	WD	R
	23	Crested Serpent Eagle	*Spilornis cheela*	LC	T	R
	24	Pallas's Fish Eagle	*Haliaeetus leucory-phus*	VU	WD	W,R,L
	25	Oriental Honey-buzzard	*Pernis ptilorhynchus*	LC	T	R,L
	26	Black Kite	*Milvus migrans*	LC	T	R
PANDIONI-DAE	27	Western Osprey	*Pandion haliaetus*	LC	WD	R,W
PODICIPEDI-DAE	28	Little Grebe	*Tachybaptus ruficollis*	LC	WT	R
PHALACRO-	29	Little Cormorant	*Microcarbo niger*	LC	WT	R

CORACIDAE						
ARDEIDAE	30	Chestnut Bittern	*Ixobrychus cinnamomeus*	LC	WT	R
	31	Indian Pond heron	*Ardeola grayii*	LC	WT	R
	32	Cattle Egret	*Bubulcus ibis*	LC	WT	R
	33	Little Egret	*Egretta garzetta*	LC	WT	R
	34	Intermediate Egret	*Egreta intermedia*	LC	WT	R
	35	Great Egret	*Egretta alba*	LC	WT	R
	36	Grey Heron	*Ardea cinerea*	LC	WT	R
	37	Black-crowned Night-heron	*Nycticorax nycticorax*	LC	WT	R
CICONIDAE	38	Asian Openbill	*Anastomus oscitans*	LC	WT	R
	39	Lesser Adjutant	*Leptoptilos javanicus*	VU	WT	R
THRESKIOR-NITHIDAE	40	Black-headed Ibis	*Threskiornis melanocephalus*	NT	WT	L
DICRURIDAE	41	Black Drongo	*Edolius macrocercus*	LC	T	R
HIRUNDINI-DAE	42	Barn Swallow	*Hirundo rustica*	LC	WD	R,W
	43	Red-rumped Swal-low	*Cecropis daurica*	LC	WD	R,W
PASSERIDAE	44	White Wagtail	*Motacilla alba*	LC	WD	W
	45	Citrine Wagtail	*Motacilla citreola*	LC	WD	W
	46	Grey Wagtail	*Motacilla cinerea*	LC	WD	W
	47	Yellow Wagtail	*Motacilla flava*	LC	WD	W
RALLIDAE	48	White-breasted Waterhen	*Amaurornis phoenicu-rus*	LC	WT	R
	49	Common Moorhen	*Gallinula chloropus*	LC	WT	W,R
	50	Watercock	*Gallicrex cinerea*	LC	WT	R
	51	Purple Swamphen	*Porphyrio porphyrio*	LC	WT	R
	52	Eastern Water Rail	*Rallus indicus*	LC	WT	W
	53	Eurasian Coot	*Fulica atra*	LC	WT	W,R
ALCEDINI-DAE	54	Common Kingfish-er	*Alcedo atthis*	LC	WD	R
	55	Lesser Pied King-fisher	*Ceryl rudis*	LC	WD	R
	56	White-throated Kingfisher	*Halcyon smyrnensis*	LC	WD	R
AEGITHALI-DAE	57	Great Tit	*Parus major*	LC	T	R
CISTICOLI-DAE	58	Common Tailorbird	*Orthotomus sutorius*	LC	T	R
ORIOLIDAE	59	Black-hooded Ori-ole	*Oriolus xanthornus*	LC	T	R
CORVIDAE	60	Eastern Jungle Crow	*Corvus macrorhyn-chos*	LC	T	R
	61	House Crow	*Corvus splendens*	LC	T	R
	62	RufousTreepie	*Dendrocitta vaga-bunda*	LC	T	R
MUSCICAPI-DAE	63	Oriental Mag-pie-robin	*Copsychus saularis*	LC	T	R
STURNIDAE	64	Common Myna	*Acridotheres tristis*	LC	T	R

	65	Asian Pied Starling	*Gracupica contra*	LC	T	R
	66	Jungle Myna	*Acridotheres fuscus*	LC	T	R
PYCNONO-TIDAE	67	Red-vented Bulbul	*Pycnonotus cafer*	LC	T	R
	68	House Sparrow	*Passer domesticus*	LC	T	R
	69	Eurasian Tree Sparrow	*Passer montanus*	LC	T	R
COLUM-BIDAE	70	Spotted Dove	*Spilopelia chinensis*	LC	T	R
	71	Rock Pigeon	*Columba livia*	LC	T	R
	72	Red Collard-dove	*Streptopelia tranquebarica*	LC	T	R
MEGALAIMIDAE	73	Blue-throated Barbet	*Megalaima asiatica*	LC	T	R
	74	Coppersmith Barbet	*Xantholaema haemacephalus*	LC	T	R
	75	Blue-eared Barbet	*Megalaima australis*	LC	T	R
UPUPIDAE	76	Common Hoopoe	*Upupa epops*	LC	T	W,R,L
	77	Indian Roller	*Coracias benghalensis*	LC	T	R, L
PICIDAE	78	Stripe-breasted Pied Woodpecker	*Dendrocopos atratus*	LC	T	R
	79	Fulvous-breasted PiedWoodpecker	*Dendrocopos macei*	LC	T	R
	80	Grey-Faced Woodpecker	*Picus canus*	LC	T	R
	81	Crimson-breasted Pied Woodpecker	*Dendrocopos cathpharius*	LC	T	R
NECTARINI-DAE	82	Purple sunbird	*Cinnyris asiaticus*	LC	T	R
STRIGIDAE	83	Spotted Owlet	*Athene brama*	LC	T	R
CUCULIDAE	84	Asian Koel	*Eudynamys scolopaceus*	LC	T	R
	85	IndianPlaintive Cuckoo	*Cacomantis passerinus*	LC	T	Bm
	86	Greater Coucal	*Centropus sinensis*	LC	T	R
TURDIDAE	87	Blue Rock-thrush	*Monticola solitarius*	LC	T	W
PSITTACIDAE	88	Rose-ringed Parakeet	*Psittacula krameri*	LC	T	R
	89	Red-breasted Parakeet	*Psittacula alexandri*	NT	T	R

[1 & 2].Based on Rasmussen, P.C. & Anderson, J.C. (2012).
[3.]IUCN Red List Legend: LC = Least Concerned; VU = Vulnerable; NT = Near Threatened.
Habitat: WT = Water Bird; WD = Water Dependent Bird; T = Terrestrial Bird.
[4]Migratory or Resident status: R = Resident, W = Winter visitor, L = Local and altitudinal migrant, Bm = Breeding migrant (summer), P = Passage migrant.

Grey-headed Lapwing *(Vanellus cinereus):* Amongst the Charadridae, the Grey-headed Lapwing forms a significant species in the Sone Beel in the winter months. Being a migratory bird breeding in northeast China and Japan, its occurrence in Sone Beel during the entire winter, beginning late October till mid - March, is significant. The Grey-headed Lapwings were gregarious and were found in groups of 30 to 50 in different parts of the Beel. They have been observed feeding on insects, worms and molluscs.

Brahminy Kite (*Haliaster Indus*): Locally known as the '*sankha cheel'*, the Brahminy Kite, belonging to the Family Accipitridae, is distinctive and contrastingly coloured, with chestnut plumage except for the white head and breast and black wing tips. The breeding season is from early winter to late spring (Rasmussen & Anderson et al. 2012). It is primarily a

fishing bird of prey but it is not averse to scavenging, especially in wetlands and marshland. They are also opportunists indulging in kleptoparasitism thereby stealing/ snatching prey from other birds.

There is a sparse but persistent population of Brahminy Kite around Sone Beel and they were observed almost all parts of the year. However, during high floods in the Sone Beel wetlands, the Brahminy Kite is conspicuously absent from that area primarily owing to the increased water depth and its inability to capture fish in the turbulent flood water. The Brahminy Kite was observed to land in the water to catch its prey but managed to take off without much trouble. Although distribution of Brahminy Kite is from the Indus Valley to the Assam Valley in India and down south upto Sri Lanka[14], in Assam, its occurrence is sparse in Brahmaputra Valley (pers.obs.)[9]. However, it is frequently sighted at Sone Beel.

Pallas's Fish Eagle (*Haliaeetus leucoryphus*): Pallas's Fish-eagle (*Haliaeetus leucoryphus*), also known as Pallas's sea eagle or band-tailed fish eagle, is a large, brownish sea-eagle[15]. It was observed on two occasions in the month of December 2014. On both occasions it was in flight and it could be identified from its white and dark two line tail band, which is distinct in flight.

It breeds in Central Asia, between the Caspian Sea and the Yellow Sea, from Kazakhstan and Mongolia to the Himalayas, Bangladesh and northern India. It is partially migratory, with central Asian birds wintering among the southern Asian birds in northern India, and also further west to the Persian Gulf. As such, its occurrence in Sone Beel signifies the extent of its migration. Its diet consists primarily of large freshwater fish. They also regularly predate water birds, by assaulting them on the surface of the water and then flying off with the kill.

Western Osprey (*Pandion haliaetus*): The Western Osprey (*Pandion haliaetus*), sometimes known as the fish eagle, sea hawk, river hawk, or fish hawk, is a diurnal, fish-eating bird of prey. It is a large raptor, reaching more than 60 cm in length and 180 cm across the wings. The osprey's diet consists almost exclusively of fish. It possesses specialised physical characteristics and exhibits unique behaviour to assist in hunting and catching fish prey.

The Western Osprey being a migrant to the locality of study and Scheduled 1 species[16], its wintering in this area is quite significant from bird migration data and bird species richness of Sone Beel. However, the Osprey was regularly observed in the winter months of 2014-15, hence after it was not detected in the study area. While around Sone Beel, we could observe its fishing skills and its perching behaviours. For the period we observed it, it had never missed an attempt at capturing a fish prey when it took a dive. A very significant observation was that it did not eat its prey on the stub onto which it perched. It always took its catch to a tree nearby for eating its prey.

Little Cormorant (*Microcarbo niger*)**:** The Little Cormorant belonging to the family Phalacrocoracidae was most abundant in Sone Beel. It was found round the year, however with fluctuating populations. Except for the few months of rains when its number decreased, it was found in large groups in all the possible roosting sites in the beel. Sone Beel being an important fishing area for the local people, the Little Cormorant has adapted itself to be with the fishing activities occupying all the stubs and the bamboo fishing gears set up by the local fishermen. They have been found to forage singly or in small groups. Often Little Cormorants were observed to venture inside set up fish catching gear called '*DORI*' to steal fish from the catch of the fishermen. During early morning, they have been observed to swim and dive underwater for considerable time. At all time of the day Little Cormorants could be observed with spread wings, drying their plumage from their fishing dives.

Lesser Adjutant (*Leptoptilos javanicus*): Among the storks, only two species have been recorded: Asian Openbill (*Anastomus oscitans*) and Lesser adjutant (*Leptoptilos javanicus*) belonging to the family Ciconiidae. In Sone Beel, the Lesser Adjutant is a regular visitor. All the year round few birds have been observed at different parts of the beel. A total of 12 birds were recorded from around the beel in the month of February 2014. However, most of the individuals were foraging alone. Two or three sometimes foraged within furlong distance of each other.

The Lesser Adjutant had been observed going around the wetland feeding mainly on fish, frogs, reptiles and invertebrates. They are solitary except during the breeding season when they form loose colonies. They breed in small colonies by the end of monsoon[14]. Finding them throughout the year, it could be assumed that there might be some nesting colony nearby.

The Lesser Adjutant is a vulnerable species under the IUCN Red List and its population is declining. The presence of the Lesser Adjutant in Sone Beel signifies its importance as an IBA.

Black-headed Ibis (*Threskiornis melanocephalus*): A white ibis with dark head, long heavy decurved black bill, dark legs and grey plumes over tail is a near threatened species (Rasmussen and Anderson 2012). It was seen during winter months of January- February of both 2013-14 and 2014-15. According to[9], this bird is local migrant; however, we have seen this probing mud flat of Sone beel during winter. They

were found to forage in small flocks of 3-7 individuals.

Red-breasted Parakeet (*Psittacula alexandri*): Distinctly identifiable because of its red breast and a very broad black moustache, this bird was recorded at the periphery of Sone beel in Debodwar and Anandapur village (Fig. 1). This near threatened species was seen four times during the study in small flock of 3-5 birds in trees.

Threats: Sone Beel is threatened by the increased human interference, direct and indirect, resulting in habitat destruction and fragmentation. Many factors which threatened the Sone Beel wetland ecosystem and the bird population are over exploitation of the Beel resources, extensive fishing, and fragmentation of the Beel area for agriculture and land lease compounded with poaching of birds. There is an ever increasing threat of pollution from agricultural runoff. Further there has been a substantial increase in the numbers of motorised boats using hydrocarbon fuel. This is adding to the peril of the already threatened bird of Sone Beel.

CONCLUSION: This study reveals that Sone beel is habitat of good number of avian species not only in the hydrophase but also in the wooded country in the periphery. However, if the present ecological characteristics of this wetland and its over exploitation continues, the bird population would be unable to inhabit this habitat in the immediate future. Proper awareness regarding the importance of birds and their vital role in ecology should be explained to the local people through different programmes. This area being one of the main wetland habitats for birds in South Assam, it should be declared as a protected area.

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