

To study the diversity of Avian fauna found in Kodomoni Beel, Biswanath Chariali, Assam, India

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Abstract : Northeast India is a suitable place of many endemic and endangered avian species. The use of wetland and their resources is widespread among many birds species. A study to find out the avian diversity at the Kodomoni beel, Biswanath, Assam, India was carried out over a period of 3 years from December 2015 to December 2018. Physiologically the area is located at the floodplain area of Brahmaputra river. There are many residential and migratory birds are found in Kodomoni. The main objective of conducting this work is to find out the diversity of avian species and their conservatory steps. The point transect method and active searching method were done during study. Literature and guide books were used to identify the species. A total 106 birds were found during study time. Out of them two species are vulnerable namely Lesser adjutant stork and Woolly necked stork. There are six near threatened species were found in Kodomoni beel. During winter season many migratory birds were found in Kodomoni beel and this indicates the area has a high potential in terms of tourism and research. But due to some anthropogenic activity the beel and avian fauna are facing high risk which need immediate attention.

Keywords: Wetland, Endemic, Kodomoni, Tourism, Anthropogenic activity.

I. INTRODUCTION

Birds or Aves are the only living creature which can only fly. Birds are some of the most prominent species of the Earth's biodiversity and being sensitive to environmental changes they act as key indicators for assessing the status of the ecosystem health (Taper et al. 1995; Olechnowski 2009) and their high and low diversities are directly related with the environmental condition. Migratory birds can gain better understanding of seasonal climate change (Dubey, 2015). By conserving birds and protecting their habitats we can continue to gain insights from our birds friends. Loss of biodiversity is one of the world's most pressing crises. The world's biodiversity is diminishing rapidly (Balmford et al. 2003 and Jenkins et al. 2003). Many of the species are declining to critical population levels due to destruction, fragmentation and degradation of their natural habitat (Shryoran et al., 2013). Birds are sustainers of other forms of life (Anon, 2004). They are also one of the best pollinating agents for various plants. This helps in balancing the life cycle of plant species as well as their evolutionary processes. The Indian subcontinent is very rich in avian diversity. Out of the 10064 bird species, Birdlife International, (2012). India has 1263 species (Praveen et al., 2016) and at stood 9th position for avian diversity, but it has 7th rank for threatened bird species having almost 7% (80 out of 1263) of bird species are categorized to be threatened, Birdlife International, (2013). This subcontinent, rich in avifauna also boasts 48 bird families out of the total 75 families in the world. Ali and Ripley (1987) considered 176 species of birds are endemic (local) to the Indian subcontinent. Out of the 1200 species and subspecies of avian fauna recorded earlier in Indian subcontinent Ali and Ripley, (1987). Out of these North Eastern states, Assam, in particular due to its natural richness holds an important place for harboring a large number of these critically endangered, endangered, vulnerable and threatened species of birds. Assam houses a total of 942 species among 1263 found in India (Praveen et al. 2016). Assam harbors 946 species and sub species (Choudhury, 1990). The Kodomoni harbors a wide and diverse avian population including globally threatened and migratory species. As the kodomoni lies on the bank of river Brahmaputra, it represents a very important area for avian fauna such as Lesser adjutant stork *Leptoptilos javanica*, Pheasant-tailed Jacana *Hydrophasianus chirurgus*, Barheaded Goose *Anser indica*, Fulvous whistling duck *Dendrocyna bicolor*, Red crested pochard *Netta rufina*, Oriental darter *Anhinga melanogaster*, Osprey *Pandion haliaetus*, Grey headed fish eagle *Haliaeetus ichyaetus* Common sandpiper *Actitis hypoleucos*, Common Kingfisher *Acedo atthis*, Brown Shrike *Lanius cristatus* Grey headed Lapwing *Vanellus cinereus*. Most of the birds are disturbed due to some anthropogenic activity such as over fishing, hunting of birds, cutting of trees near the beel, artificial barrier on the stream which is connected to the beel, garbage dump near the beel. The result of all these activities is that the rich avian diversity of the kodomoni beel is decreasing and rare and threatened birds mentioned earlier such as purple swamp hen, Himalayan griffon vulture, etc were not encountered these days. Therefore, the present study was conducted to gather first time information of avian diversity of the Kodomoni beel. The study also aims to preparing the record of local status of bird species in reference to their status according to IUCN and Wildlife Protection Act., their feeding habits and identify major avian groups suffering the most from the recent habitat disturbances, which will help in formulating conservative measures for the important threatened and migratory bird species of the Kodomoni beel.

II. MATERIALS AND METHODS

Study area

The Kodomoni Beel is located geographically at a distance of about 4-5 kms North-west from the main town of Biswanath Chariali, Assam. The mapping co-ordinates of the beel are 26°42'N latitude and 93°07'E longitude and altitude 64 meters from mean sea level. The Kodomoni Beel is about 790m².



Fig 1: Map of Kodomoni beel

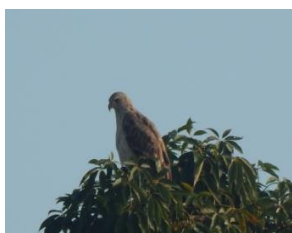
The beel is generally open water but some part of the kodomoni beel is covered with some aquatic plants like *Vallescenarea*, *Hydrilla*, *Water hyacinth*, *azola* etc. Surrounding of the kodomoni beel is covered with paddy field, shrubland. The climate of the area is subtropical with an average annual rainfall of around 2000 mm. The temperature varies from around 8°C in the winter up to 37°C in summer and the relative humidity ranges between 42-91%. The overall climatic condition of the area could be divided into four seasons viz. Pre-Monsoon (March-May), Monsoon (June-September), Pre-retreating monsoon (October-November) and winter (December-February).

METHODS

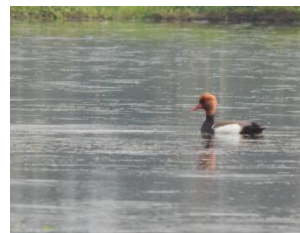
The study was conducted for a period of three years from December 2015 to November 2018 covering all seasons. The study was carried out by Permanent point count method. Each of the point covers 100 meters radius were laid randomly. All the surveys were carried out early morning (5.30am -8.30am) and evening (3pm-6pm). During the study bird sampling was made by walking at a slow pace (about 1-1.5km/h) along the bank of the beel (as the aquatic birds are usually found around or in the wetland area) as followed by (Gaston, 1975 and Bibby *et al.*, 2000). Point count of birds was also made within visible radius (Blondel *et al.*, 1981, Bibby *et al.*, Froneman *et al.*, 2001, Kaul and Howman, 1992, Turner, 2003; Urfi *et al.*, 2005). The field survey was made partly on boat. Birds were counted at their point and ensure that same birds were not counted. The bird species were recorded in a datasheet in each census. Call notes of the bird species were used to locating the birds. Feeding guilds were classified as per direct observations and available literatures (Ali and Ripley, 1987). The common and scientific names of the birds given in the checklist followed the Birds of the World, recommended English Names (Gill *et al.*, 2006, Ali and Ripley, 1987). The threatened status of the birds given in the checklist is per IUCN List of Threatened Taxa (Birdlife International, 2001). The Common-Rare, Resident- Migratory Status of the birds are classified as per available literature (Bikram Grewal and Garima Bhatia, 2014).

III. RESULTS

During the study a total of 5913 individuals from 106 species of birds belonging to 42 families were identified including 2 vulnerable species namely Woolly-necked Stork *Ciconia episcopus*, Lesser Adjutant Stork *Leptoptilos javanicus*, 6 Nearly threatened species namely Black-necked Stork *Ephippiorhynchus asiaticus*, Oriental darter *Anhinga melanogaster*, Grey headed fish eagle *Haliaeetus ichthyetus*, Ferruginous Pochard *Authya nyroca*, River tern *Sterna aurantia*, Red-breasted parakeet *Psittacula alexandri*, 17 winter migrants, 1 summer migrant and 88 Resident species (Appendix I). Some of the notable migratory bird species of the Kodomoni beel include Red crested Pochard *Netta rufina*, Bar-headed Goose *Anser indicus*, Gadwall *Anas strepera*, Fulvous Whistling Duck *Dendrocygna bicolor*, Great Cormorant *Phalacrocorax carbo*, Purple Heron *Ardea purpurea*, Common Sandpiper *Actitis hypoleucos*, Brown Shrike *Lanius cristatus*, Grey-backed Shrike *Lanius tephronotus*, Siberian rubythroat *Calliope calliope*, Siberian stonechat *Saxicola maurus*, White Wagtail *Motacilla alba* and Citrine Wagtail *Motacilla citreola*. Out of the total, 38.85% were Insectivorous (37), 26.67% were Picivorous (28), 20% were Frugivorous (21), 10.48% were Omnivorous (11), 5.72% were Carnivorous (6), 1.90% were Grainivorous (2) and 0.95% herbivorous in their feeding guild. The diversity was different at each sample site in which the highest diversity was found at sample P1 and P6 (Fig. 2).



(a)



(b)



(c)



(d)

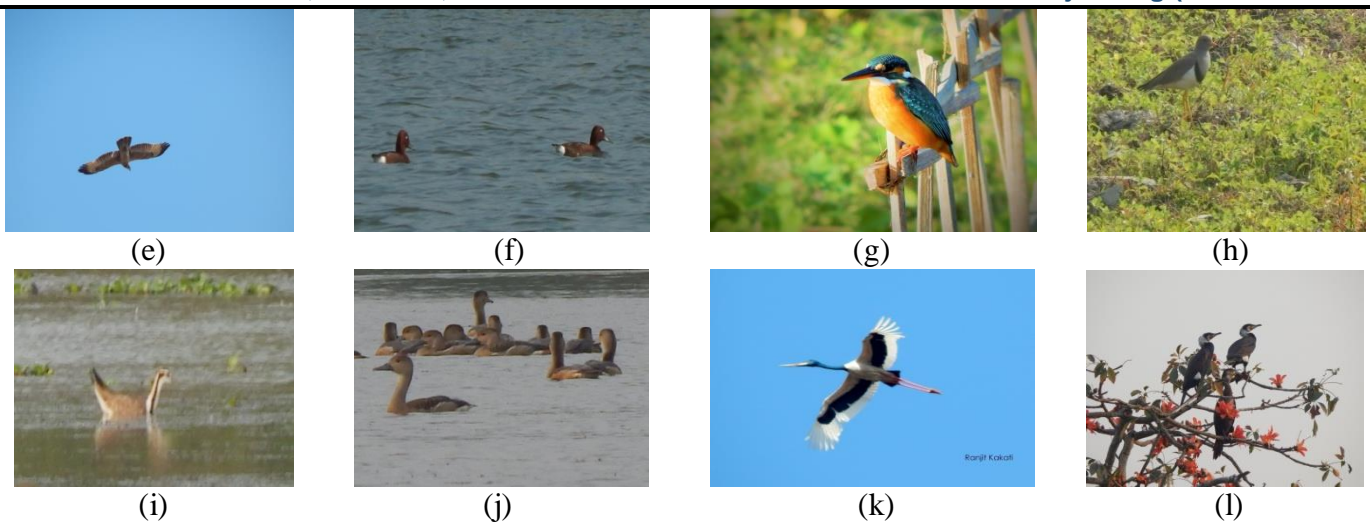


Fig 2 : Photographs of avian fauna found in Kodomoni beel. a. Grey headed fish eagle *Haliaeetus ichhyaetus* Red crested Pochard *Netta rufina*, Lesser Adjutant Stork *Leptoptilos javanicus*, Gadwall *Anas strepera*, Osprey *Pandion haliaetus*, Ferruginous pochard *Aythya nyroca*, Common Kingfisher *Acedo atthis*, Grey headed lapwing *Vanellus cinereus*, Pheasant tailed jacana *Hydrophasianus chirurgus*, Fulvous whistling duck *Dendrocygna bicolor* , Black-necked Stork *Ephippiorhynchus asiaticus*, Great Cormorant *Phalacrocorax carbo*.

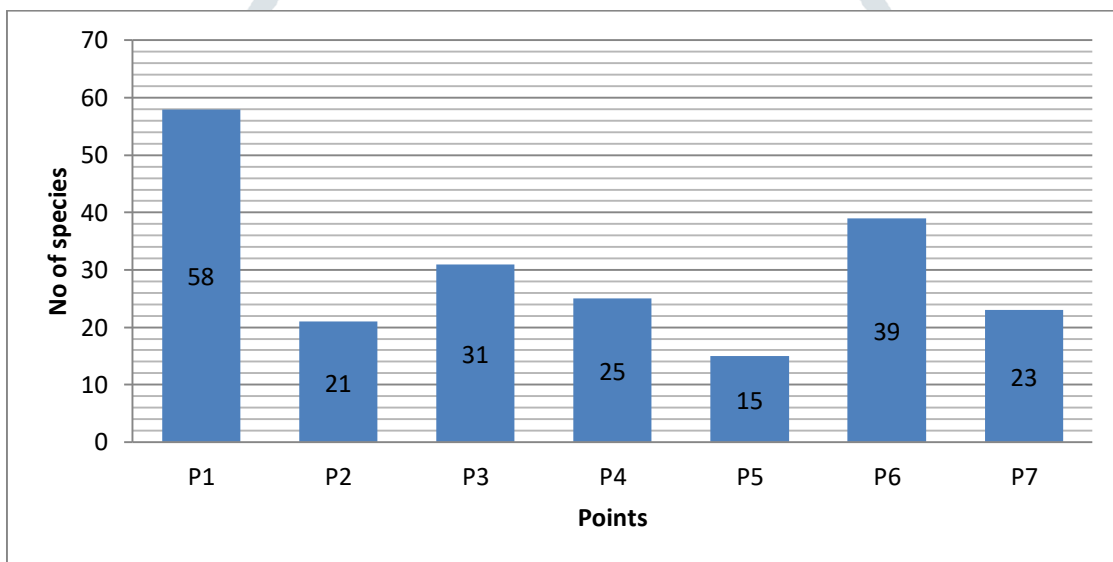


Fig 3: Species diversity in each point count

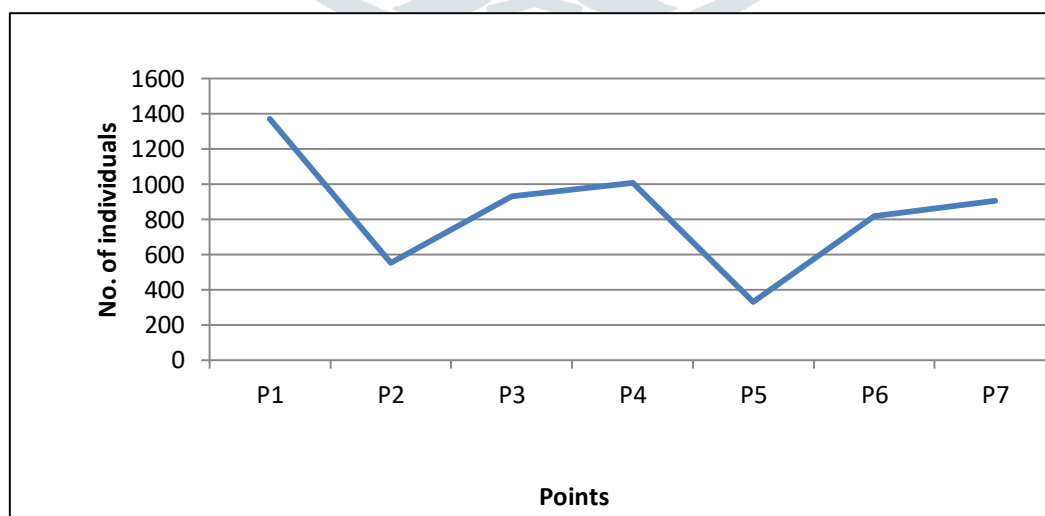


Figure 3: Diversity of total individuals found in each point.

IV. DISCUSSION

The kodomoni beel is very rich in avian diversity. But, Previously the place was much more enormously enrich with the avian fauna that it is found today. The anthropogenic pressure on the beel has lead to the depletion of the natural healthy environment of the Kodomoni beel. The main problems facing by Kodomoni beel are artificial barrier on stream which are connected to the beel, Overfishing and hunting of the avifauna found in the beel, Chemical fertilizer use in the paddy field present bank of the beel which effect on both fish and birds, cutting of trees in the bank or nearer to the beel. Kodomoni beel harbors different composition of bird groups shows the rich and diversified habitats. High percentage of Piscivorous birds (26.67%) shows that the beel has sufficient fish diversity to support them. Similarly the insectivorous birds composition are also high accounting 38.85 % of the total, though many forest areas along the periphery of the beel have been encroached and cleared up for cultivation and plantation of commercial purpose. Even though the species composition is still high, some notable rare birds such as the Fulvous whistling duck *Dendrocygna bicolor*, Red crested pochard *Netta rufina*, Gadwall /*Anas strepera*, ferruginous pochard *Aythya nyroca*, Woolly-necked Stork *Ciconia episcopus*, Lesser Adjutant Stork *Leptoptilos javanicus*, Great Cormorant *Phalacrocorax carbo*, Pheasant tailed Jacana *Hydrophasianus chirurgus*, etc found during the study. Some important birds like purple swamp hen *Porphyrio porphyrio*, Swamp francolin *francoelinus gularis*, etc was found but due to the some anthropogenic pressure they are locally extinct from the kodomoni beel. Due to the lake of importance to conserve the kodmoni beel, we lost many important species from the beel in a short time, so we need to give immediate importance on the beel and along with the biodiversity to conserve them for our future generation.

Appendix I: Checklist of avian fauna found in Kodomoni beel during the study period.

Sl.NO.	Order	Family	Common Name /Scientific Name	Status	IUCN	Feeding Guilds
1.	Anseriformes	Anatidae	Ruddy Shelduck / <i>Tadorna ferruginea</i>	RW	LC	P
2.			Lesser whistling duck / <i>Dendrocygna javanica</i>	R	LC	P
3.			Ferruginous pochard <i>Aythya nyroca</i>	w	NT	P
4.			Bar-headed Goose / <i>Anser indicus</i>	rw	LC	H
5.			Cotton pygmy-goose/ <i>Nettapus coromandalianus</i>	R	LC	P
6.			Fulvous whistling duck / <i>Dendrocygna bicolor</i>	r	LC	P
7.			Red crested pochard / <i>Netta rufina</i>	W	LC	P
8.			Gadwall / <i>Anas strepera</i>	W	LC	P
9.			Common Teal / <i>Anas crecca</i>	W	LC	P
10.	Podicipediformes	Podicipedidae	Little Grebe / <i>Tachybaptus ruficollis</i>	R	LC	P
11.	Ciconiiformes	Ciconiidae	Asian Openbill Stork / <i>Anastomus oscitans</i>	R	LC	P
12.			Woolly-necked Stork / <i>Ciconia episcopus</i>	R	VU	P
13.			Black-necked Stork / <i>Ephippiorhynchus asiaticus</i>	r	NT	P
14.			Lesser Adjutant Stork / <i>Leptoptilos javanicus</i>	r	VU	O
15.	Pelicaniformes	Ardeidae	Grey Heron / <i>Ardea cinerea</i>	RW	LC	P
16.			Purple Heron / <i>Ardea purpurea</i>	R	LC	P
17.			Intermediate Egret / <i>Mesophox intermedia</i>	R	LC	P
18.			Great Egret / <i>Ardea alba</i>	RW	LC	P
19.			Cinnamon Bittern / <i>Ixobrychus cinnamomeus</i>	r	LC	P
20.			Indian Pond Heron / <i>Ardeola grayii</i>	R	LC	P
21.			Striated Heron / <i>Butorides striatus</i>	r	LC	P
22.			Cattle Egret / <i>Bubulcus ibis</i>	R	LC	I
23.			Little Egret / <i>Egretta garzetta</i>	R	LC	P
24.		Phalacrocoracidae	Little Cormorant / <i>Microcarbo niger</i>	R	LC	P
25.			Great Cormorant / <i>Phalacrocorax carbo</i>	R	LC	P
26.	Suliriformes	Anhingidae	Oriental darter / <i>Anhinga melanogaster</i>	R	NT	P
27.	Accipitriformes	Accipitridae	Black kite / <i>Milvus migrans</i>	RW	LC	C
28.			Grey headed fish eagle / <i>Haliaeetus icthyaetus</i>	r	NT	C
29.		Pandionidae	Osprey / <i>Pandion haliaetus</i>	rw	LC	C
30.	Charadriiformes	Turnicidae	Red wattled lapwing / <i>vanellus indicus</i>	R	LC	I
31.			Grey headed lapwing / <i>Vanellus cinereus</i>	w	LC	I
32.			Little ringed plover / <i>Charadrius dubius</i>	RW	LC	I
33.		Jacanidae	Bronze-winged jacana/ <i>Metopidius indicus</i>	R	LC	O
34.			Pheasant tailed jacana/ <i>Hydrophasianus chirurgus</i>	R	LC	O
35.		Scolopacidae	Green Sandpiper / <i>Tringa ochropus</i>	W	LC	I
36.			Common Sandpiper / <i>Actitis hypoleucos</i>	sW	LC	I
37.		Laridae	River tern / <i>Sterna aurantia</i>	R	NT	P
38.	Gruiformes	Rallidae	White-breasted waterhen / <i>Amauornis phoenicurus</i>	R	LC	O
39.	Columbiformes	Columbidae	Yellow footed green pigeon / <i>Treron phoenicopterus</i>	R	LC	F
40.			Spotted dove / <i>Stigmatopelia chinensis</i>	R	LC	F
41.			Green imperial pigeon / <i>Dacula aenea</i>	r	LC	F
42.	Psittaciformes	Psittacidae	Red-breasted parakeet / <i>Psittacula alexandri</i>	R	NT	F
43.			Rose-riged parakeet / <i>Psittacula krameri</i>	R	LC	F
44.	Cuculiformes	Cuculidae	Common Hawk Cuckoo / <i>Hierococcyx varius</i>	R	LC	I
45.			Asian Koel / <i>Eudynamis scolopaceus</i>	R	LC	O
46.			Greater Coucal / <i>Centropus sinensis</i>	R	LC	I
47.			Indian Cuckoo / <i>Cuculus micrpterus</i>	R	LC	I
48.	Strigiformes	Strigidae	Spotted owl / <i>Athene brama</i>	R	LC	C
49.			Asian barred owl / <i>Glaucidium cuculoides</i>	r	LC	C
50.			Brown fish owl / <i>Ketupa zeylonensis</i>	r	LC	C
51.	Bucerotiformes	Upupidae	Common Hoopoe / <i>Upupa epops</i>	RW	LC	I
52.	Coraciiformes	Coraciidae	Indian Roller / <i>Coracias benghalensis</i>	R	LC	I
53.		Alcedinidae	White-breasted Kingfisher / <i>Halcyon smyrnensis</i>	R	LC	P
54.			Lesser Pied Kingfisher / <i>Ceryle rudis</i>	R	LC	P
55.			Stork-billed Kingfisher / <i>Pelargopsis capensis</i>	R	LC	P
56.			Common Kingfisher / <i>Acedo atthis</i>	R	LC	P

57.		Meropidae	Blue-tailed Bee-eater / <i>Merops philippinus</i>	R	LC	I
58.	Piciformes	Megalaimidae	Blue -throated barbet / <i>Megalaima asiaticus</i>	R	LC	F
59.			Lineated barbet / <i>Megalaima lineatus</i>	R	LC	F
60.			Coppersmith barbet / <i>Psilopogon haemacephalus</i>	R	LC	F
61.		Picidae	Lesser flameback / <i>Dinopium benghalense</i>	R	LC	I
62.			Fulvous-breasted woodpecker / <i>Dendrocopos macei</i>	R	LC	I
63.	Passeriformes	Aegithinidae	Common iora / <i>Aegithina tiphia</i>	R	LC	I
64.		Campephagidae	Large Cuckooshrike / <i>Coracina macei</i>	r	LC	I
65.			Scarlet Minivet / <i>Pericrocotus speciosus</i>	R	LC	I
66.		Laniidae	Grey-backed Shrike / <i>Lanius tephronotus</i>	rW	LC	I
67.			Brown shrike / <i>Lanius cristatus</i> .	W	LC	I
68.			Long -tailed Shrike / <i>Lanius schach</i>	R	LC	I
69.		Dicruridae	Spangled drongo / <i>Dicrurus bracteatus</i>	R	LC	I
70.			Black Drongo / <i>Dicrurus macrocercus</i>	R	LC	I
71.			Bronzed drongo / <i>Dicrurus aeneus</i>	r	LC	I
72.		Oriolidae	Black-hooded oriole / <i>Oriolus xanthornus</i>	R	LC	O
73.		Rhipiduridae	White-throated Fantail / <i>Rhipidura albicollis</i>	R	LC	I
74.		Corvidae	Large-billed crow / <i>Corvus macrorhynchos</i>	R	LC	O
75.			Rufous treepie / <i>Dendrocitta vagabunda</i>	R	LC	F
76.			House crow / <i>Corvus splendens</i>	R	LC	O
77.		Paridae	Great tit / <i>parus major</i>	R	LC	F
78.		Hirundinidae	Barn swallow / <i>Hirundo rustica</i>	RW	LC	I
79.			Asian palm swift / <i>Cypsiurus balasiensis</i>	R	LC	I
80.		Pycnonotidae	Red-vented bulbul / <i>Pycnonotus cafar</i>	R	LC	F
81.			Black bulbul / <i>Hypsipetes leucocephalus</i>	R	LC	F
82.		Locustellidae	Striated Grassbird / <i>Megalurus palustris</i>	R	LC	I
83.		Cisticolidae	Common tailorbird / <i>Orthotomus sutorius</i>	R	LC	F
84.		Zosteropidae	Oriental White-eye / <i>Zosterops palpebrosus</i>	R	LC	F
85.		Sturnidae	Common myna / <i>Acridotheres tristis</i>	R	LC	O
86.			Asian pied starling / <i>Gracupica contra</i>	R	LC	O
87.			Chestnut-tailed starling / <i>Sturnia malabarica</i>	R	LC	F
88.			Hill myna / <i>Gracula religiosa</i>	r	LC	F
89.			Jungle myna / <i>Acridotheres fuscus</i>	R	LC	O
90.		Muscicapidae	Verditer Flycatcher / <i>Eumyias thalassinus</i>	R	LC	I
91.			Oriental magpie robin / <i>Copsychus saularis</i>	R	LC	I
92.			Black- backed forktail / <i>Enicurus immaculatus</i>	r	LC	I
93.			Grey-headed canary-flycatcher/ <i>Culicicapa ceylonensis</i>	R	LC	I
94.			Siberian rubythroat / <i>Calliope calliope</i>	w	LC	I
95.			Siberian stonechat / <i>Saxicola maurus</i>	w	LC	I
96.			Red- breasted Flycatcher / <i>Ficedula parva</i>	W	LC	I
97.		Chloropseidae	Golden fronted leafbird / <i>Chloropsis aurifrons</i>	R	LC	F
98.		Dicaeidae	Fire-breasted flowerpecker/ <i>Dicaeum ignipectus</i>	r	LC	F
99.		Nectariniidae	Purple sunbird / <i>Cinnyris asiaticus</i>	R	LC	F
100.			Little Spiderhunter / <i>Arachnothera longirostra</i>	r	LC	F
101.			Crimson Sunbird / <i>Aethopyga siparaja</i>	r	LC	F
102.		Passeridae	Tree sparrow / <i>Passer montanus</i>	R	LC	G
103.		Estrildidae	Scaly-breasted munia/ <i>Lonchura punctulata</i>	R	LC	G
104.		Motacillidae	White wagtail / <i>Motacilla alba</i>	rW	LC	I
105.			Cristine wagtail / <i>Motacilla citreola</i>	rW	LC	I
106.			Paddyfield pipit / <i>Anthus rufulus</i>	R	LC	I

Abbreviations: VU- Vulnerable; NT – Near threatened; LC- Least concern; R- widespread resident; r – very local resident; W – Widespread winter visitor ; w – sparse winter visitor; s – local summer breeder; P- Picivorous; O - Omnivorous; F- Frugivorous; I- Insectivorous; G- Grainivorous.

Table 1: Description of the Point count Location within the Kodomoni beel

Point N	Total species	Total individual	Coordination		Area
			Latitude	Longitude	
Point Count 1(P1)	58	1372	26°42'50''N	93°07'37'' E	East bank of the kodomoni beel
Point Count 2(P2)	21	553	26°42'43''N	93°07'31''E	Southbank of the kodomoni beel
Point Count 3(P3)	31	930	26°42'37''N	93°07'24''E	west bank of the kodomoni beel
Point Count 4(P4)	25	1007	26°42'47''N	93°07'21''E	East bank of the kodomoni beel
Point Count 5(P5)	15	329	26°42'45''N	93°07'28''E	Middle point of the kodomoni beel
Point Count 6(P6)	39	817	26°42'38''N	93°07'26''E	Middle west of the kodomoni beel
Point Count 7(P7)	23	905	26°42'49''N	93°07'35''E	Middle East of the kodomoni beel

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