

**A BIODIVERSITY HUB: SANDI BIRD SANCTUARY, HARDOI, UTTAR PRADESH, INDIA**

Adesh Kumar, Amita Kanaujia, Sonika Kushwaha and Akhilesh Kumar

Biodiversity & Wildlife Conservation Lab, Department of Zoology, University of Lucknow, Lucknow,  
Uttar Pradesh, India

Email: adesh.science@gmail.com

**ABSTRACT:** Diversity refers variety in nature i.e. the variety of life on Earth and its biological diversity is commonly referred to as biodiversity. Sandi Bird sanctuary was developed and conserved in the year 1990 as natural biodiversity hub for aquatic vegetation as well as local residents and migratory birds. This Sanctuary has an area of 309 hectares. A study of faunal diversity in Sandi Bird Sanctuary was done during January 2013 to March 2014. Sandi Bird Sanctuary is well known as popular tourist destination because of the diverse assemblage of avifauna especially migratory water birds that congregate at the Sandi Bird Sanctuary in winter. The result includes 3 species of annelids belonging to 3 orders, 10 orders of insects with 61 species, 4 species of mollusks belonging to 3 orders, 11 species of fishes belonging to 5 families, 3 species of amphibians and 15 species of reptiles belonging to 13 families, 157 species of birds, and 12 species of mammals belonging to 09 families from Sandi Bird Sanctuary. The sanctuary is an envoy area of the Indo-gangetic eco-system. Wetland vegetation is also found in the sanctuary.

**Key words:** Sandi Bird Sanctuary, Water birds, Biodiversity Hub, Hardoi, Invertebrates, Vertebrates.

**INTRODUCTION**

Diversity refers variety in nature i.e. the variety of life on Earth and its biological diversity is commonly referred to as Biodiversity. Sandi Bird sanctuary (SBS) was developed and conserved in the year 1990 as natural biodiversity hub for aquatic vegetation as well as local residents and migratory birds. Sandi Bird Sanctuary is well known popular tourist destination because of the diverse assemblage of avifauna especially migratory water birds that congregate at the Sandi Bird Sanctuary in winter. The sanctuary is an envoy area of the Indo-gangetic eco-system. It is heavily infested with wetland vegetation. The sanctuary abodes a natural freshwater lake (Deher Jheel). It has a vibrant environment with salinity and depth varying depending on precipitation. It is a home to approximately 160 species of birds, with an average 57,000 individual recorded during the winter and 23,000 in summer.

Sandi is a renowned as bird-heaven and the status of "Bird Sanctuary" mainly due to high bird diversity and abundance that it supports, especially in winter season. It is an important stopover site with globally endangered species of Egyptian Vulture (*Neophron percnopterus*), Vulnerable Sarus Crane (*Grus antigone*) and many other migratory birds. This wetland is also a lifeline for satellite population of many flora and fauna. Kumar *et al.*, (2013) studied the migratory pattern of winter visitor birds and their biodiversity at Sandi Bird Sanctuary. Faunal diversity including both invertebrates and vertebrates are considered as bio- indicators of well flourished and stable wetland ecosystems. They also form a strong link in many aquatic food chains that affect a wetland ecosystem directly or indirectly. The present study was carried out to document the total biodiversity (flora and fauna) of Sandi Bird Sanctuary present in Hardoi district, Uttar Pradesh.

**Study Area**

Sandi Bird Sanctuary (SBS) has been identified under National Wetland Conservation Programme in India (MoEF, 2007). Sandi Bird Sanctuary is located at 26° 53' N and 80° 46' E in Bilgram Tehsil of Hardoi district of Uttar Pradesh (Fig 1). This Sanctuary has an area of 309 hectares. The average rainfall is about < 1,000 mm per annum and the temperature ranges from 1<sup>o</sup> C to 48<sup>o</sup> C, humidity is about 94%.



Fig: 1 Map of Study Area (Source: mapsofindia.com)

The River “Garra” flows in close vicinity to the Sandi Bird Sanctuary. It said that this river is the halting place for coming migratory birds before visiting the sanctuary.

## MATERIALS AND METHODS

Ecological survey of annelids, insects, mollusks, fishes, amphibians, reptiles, birds and mammals were carried out twice in a month at a fixed time- interval from January 2013 until March 2014. Faunal population was observed and monitored twice in a day in the morning and evening hours. Observations were made and monitoring was done with the aid of a Nikon 10x50 binocular and observations were further supported by photography was done with 70 D SLR Cannon camera.

**Identification of Invertebrates:** The invertebrates include annelids, arthropods mainly butterflies, dragonflies, spiders and mollusks that have been identified up to species and order level. The line transects and quadrat- grid methods were used for studying invertebrates. Insects were collected by insect traps. Sample thus collected were identified by various identifying keys such as Sebastian, P. A. and Peter, K. V. (2009), Singh, A. P. (2010), Balmer, E (2007), Kehimkar, I. (2008), Subramanian, K. A. (2009), Apte, D. (1998), Oliver, A. P. H. (2004), Subba Rao N. V. (1993).

**Identification of Vertebrates:** Phylum specific methodology was used for study of vertebrates of different groups. Observations made on vertebrates were further identified and confirmed with respective identifying keys such as:

**Fishes:** Net was used for survey of fishes. Transect of 1 to 100 meter was taken for fishes study. The species were identified using Heda, N. (2009), Daniels Ranjit, R. J. (2002), Fishes of U.P. and Bihar by Gopalji Srivastava (2007).

**Amphibians and Reptiles:** Amphibians and Reptiles were observed by visual encounter or sighting. The species were identified using Daniel, J. C. (2002), Gururaja, K. V. (2010), Daniels Ranjit, R. J. (2005), Whitaker, R. and Captain, A. (2008).

**Birds:** Birds were monitored using “Line Transect” and “Point Count Methods” in a pre-defined area. A line transect of 1-100 meter was prepared and the birds were monitored on both the sides of transect by close end transect up to 2 Km. without stopping. The birds were identified using standard field guide books of Ali & Ripley, 1983, Grimmett *et al.*, 2011, Salim Ali, 2002.

**Mammals:** observation and identification of mammals was done by visual encounter and vocal identification. The species were identified using Menon, V. (2003), Roberts, T. J. (1997).

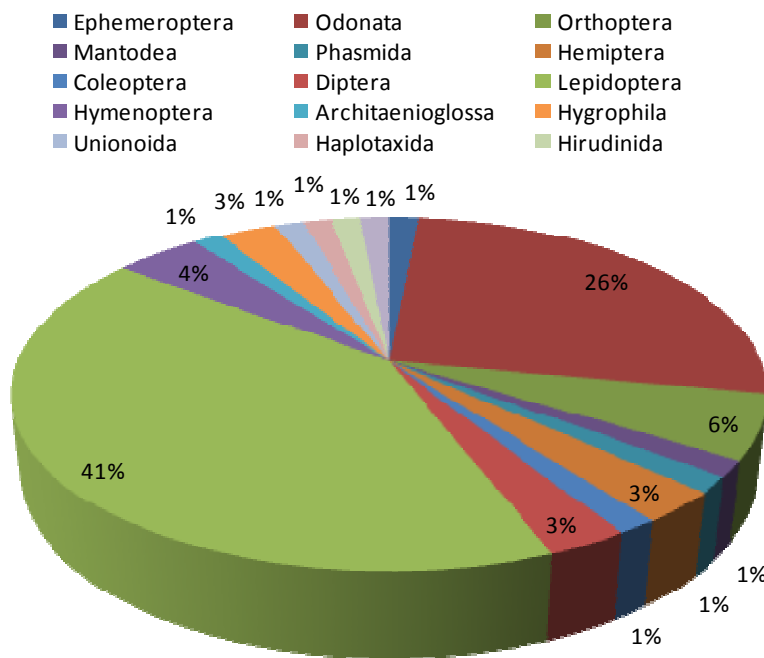
**Plants:** Plants were observed by visual encounter or sighting. The species were identified using Saini, D.C. Singh, S.K. and Rai, K. (2010) and Mukherjee, P. (2008).

**RESULTS**

The study reveals the presence of 10 orders of insects with 60 species, 4 species of mollusks belonging to 3 orders, 3 species of annelids belonging to 3 orders, 13 species of fishes belonging to 5 families, 3 species of amphibians and 15 species of reptiles belonging to 13 families, 157 species of birds, and 10 species of mammals belonging to 09 families from Sandi Bird Sanctuary.

The SBS inhabits large variety of flora which includes Babul (*Acacia nilotica*), Safeda (*Eucalyptus*), Arjun tree (*Terminalia arjuna*), khair (*Acacia catechu*), Kadamba (*Anthocephalus cadamba*), Gurhal (*Hibiscus rosa-sinensis*), Neem (*Azardiachta indica*), Jungle Jalebi (*Pithecello biumdulce*), *Baugainvella*, and Bamboo. It is also infested with vegetation like Jal khumbhi (*Eichornia crassppes*), Water chest nut (*Trapa natans*), *Jussiaea repens*, Water meal (*Wolfia globosa*), Sacred lotus (*Nelumbo nucifera*), Water lily (*N. pubescens*), Coon tail (*Ceratophyllum demersum*), *Hydrilla verticillata*, *Cyprus alopecuroides*, Pond weed (*Potamogeton nodasus*), *Patera cuttail (Typha lotifolia)*, Big duck weed (*Spirodela polyrhiza*), Gerga grass (*Zizania acuatica*), Water spinach (*Ipomea aquatic*) and Smart weed (*Polygonum limbatum*) are common water weeds species in Sandi Bird Sanctuary (Table 1). Total 44 floral species belong to 29 families were recorded. Out of 29 families, Fabaceae was most dominant family represented by 7 species followed by Potamogetonaceae, Hydrocharitaceae, Nymphaceae, Lemnaceae and Euphorbiaceae with 3 species, Apiaceae, Poaceae, Cyperaceae, and Convolvulaceae with 2 species.

**Invertebrates:** The invertebrate identified during study belong to the Order Epheneroptera (1 species), Odonata (18 species), Orthoptera (4 species), Mantodea (1 species), Phasmida (1 species), Hemiptera (2 species), Coleoptera (1 species), Diptera (2 species), Lepidoptera (28 species) and Hymenoptera (3 species) of Phylum Arthropoda. The class insect demonstrate the presence of butterflies, dragonflies and other insect’s species, mollusks (4 species) and annelids (3 species) identified at Sandi Bird Sanctuary are shown in Table 2. Order Lepidoptera was found to be most dominant order represented by 28 species followed by order Odonata with 18 species, Orthoptera with 4 species, Hymenoptera with 3 species, Hemiptera, Diptera, Hygrophila with 2 species respectively minimum species of orders Ephemeroptera, Mantodea, Phasmida, Coleoptera, Architaenioglossa, Unionoida, Haplotaxida and Arhynchobdellida with 1 species (Fig. 2).



**Fig:-2 Order wise percentage composition of invertebrates in SBS**

Table 1: Some common Flora of Sandi Bird Sanctuary

S.No.	Family	Common Names	Botanical Names
1	Fabaceae	Babul	<i>Acacia nilotica</i>
2		Jungle Jalebi	<i>Pithecello biundulce</i>
3		khair	<i>Acacia catechu</i>
4		Tamarind	<i>Tamarindus indica</i>
5		Palash	<i>Butea monosperma</i>
6		Gulmohar	<i>Delonix regia</i>
7		Lajalu	<i>Neptunic oleraeaca</i>
8	Combretaceae	Arjun tree	<i>Terminalia arjuna</i>
9	Malvaceae	Gurhal	<i>Hibiscus rosa-sinensis</i>
10	Meliaceae	Neem	<i>Azardiachta indica</i>
11	Myrtaceae	Jaamun	<i>Syzygium cumini</i>
12	Anacardiaceae	Mango	<i>Mangifera indica</i>
13	Moraceae	Peepal	<i>Fiscus religiosa</i>
14	Moraceae	Common Fig	<i>Ficus carica</i>
15	Potamogetonaceae	Pond Weed	<i>Potamogaton natus</i>
16		Pond Weed	<i>Potamogaton Nodosus</i>
17		Pond Weed	<i>Potamogaton pectinatus</i>
18	Najadaceae	Bushy Pond Weed	<i>Najas minor</i>
19	Hydrocharitaceae	Tape Grass	<i>Vallisneria spiralis</i>
20		Wild Celery	<i>Vallisneria americana</i>
21		Hydrilla	<i>Hydrilla verticillata</i>
22	Pontederiaceae	Jalkumbhi	<i>Eichornia sp.</i>
23	Nymphaeaceae	Water Lily	<i>Nymphaea</i>
24		Kamalgata	<i>Nymphaeaceae</i>
25		Sacred Lotus	<i>Nelumbo nucifera</i>
26	Salviniaceae	Water Fern	<i>Azolla punnata</i>
27	Apiaceae	Dhatura	<i>Datura innoxia</i>
28		Common Nightshade	<i>Solanum nigrum</i>
29	Gentianaceae	Jalrani	<i>Nymphoides indica</i>
30	Lemnaceae	Big Duck Weed	<i>Spirodela polyrhiza</i>
31		Duck Weed	<i>Lemna minor</i>
32		Water Meal	<i>Wolffia globosa</i>
33	Poaceae	Wild Rice	<i>Orya rufipogon</i>
34		Couch Grass	<i>Cynodon dactylon</i>
35	Polygonaceae	Sment Weed	<i>Polygonum limbatum</i>
36	Cyperaceae	Pola	<i>Eleocharis dulcis</i>
37		Motha patera / Cyperus	<i>Cyperus alutatus</i>
38	Convolvulaceae	Kamli Shak	<i>Ipomea aquatica</i>
39		Vilayati aak	<i>Ipomea cornea</i>
40	Amranthaceae	Onga	<i>Achyranthus aspera</i>
41		Kanta Chaulai	<i>Amaranthus spinosus</i>
42	Euphorbiaceae	Van laung	<i>Jussiaeaa repens</i>
43		Dudhy	<i>E. parviflora</i>
44		Swallow Wort	<i>Calotropis gigantica</i>

### Vertebrates

Fishes: Total 11 types of fishes were recorded from SBS belonging to Cyprinidae, Chandidae, Bagridae, Clariidae and Heteropneustidae families. Maximum number of species 6 was of family Cyprinidae followed by family Chandidae with 2 species and families Bagridae, Clariidae, Heteropneustidae with 1 species.

**Amphibians and Reptiles:** Overall 3 species of amphibians were recorded from SBS; belong to Bufonidae and Dicroglossidae families.

**Mammals:** Only 12 species of mammals were reported belonging to 09 families.

The vertebrate (excluding birds) species of Fishes, Reptiles and Amphibians and Mammals reported and recorded from SBS (Table.3). Maximum 6 species of family Cyprinidae and minimum 1 species reported from families Bagridae, Clariidae, Heteropneustidae, Trionychidae, Geogmydidae, Cryptodira, Gekkonidae, Agamidae, Varanidae, Pythonidae, Bufonidae, Herpestidae, Leporidae, Cercopithecidae, Bovidae, Sciuridae, Canidae and Hystricidae (Fig.3). Family Cyprinidae was the most dominant family having 6 species followed by Elapidae, Muridae with 3 species, Chandidae, Scincidae, Boidae, Dicroglossidae, Viverridae, with 2 species and minimum of families Bagridae, Clariidae, Heteropneustidae, Trionychidae, Geogmydidae, Cryptodira, Gekkonidae, Agamidae, Varanidae, Pythonidae, Bufonidae, Herpestidae, Leporidae, Cercopithecidae, Bovidae, Sciuridae, Canidae and Hystricidae (Fig. 4).

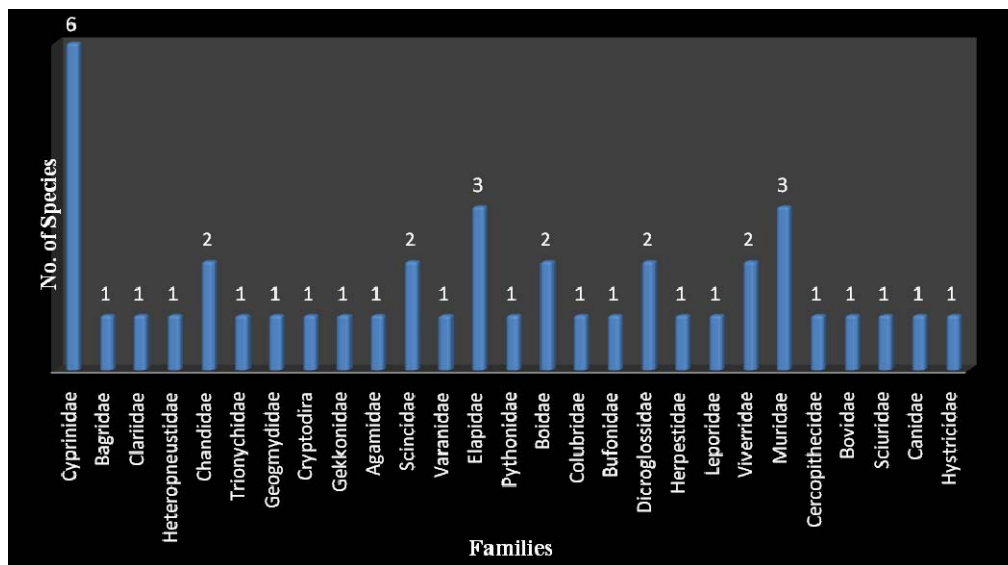


Fig:-3 Family wise species composition of vertebrate in SBS

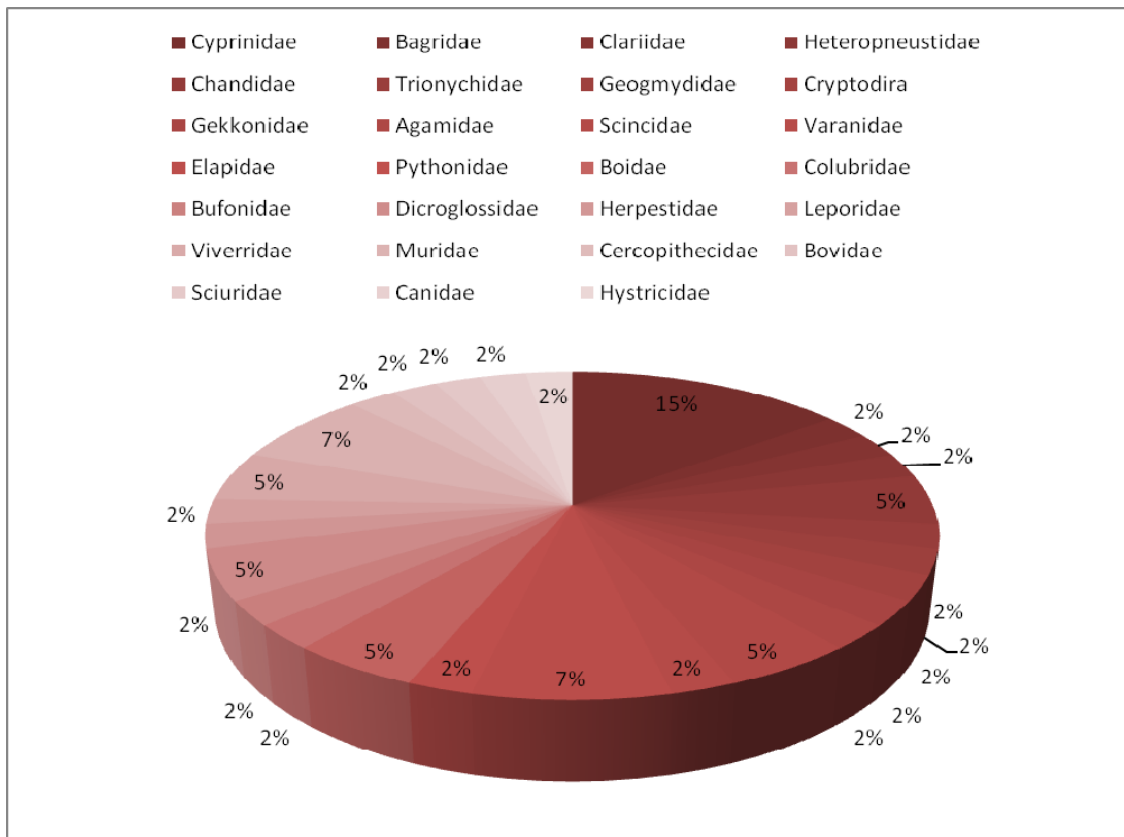


Fig:-4 Family wise percentage composition of vertebrates in SBS

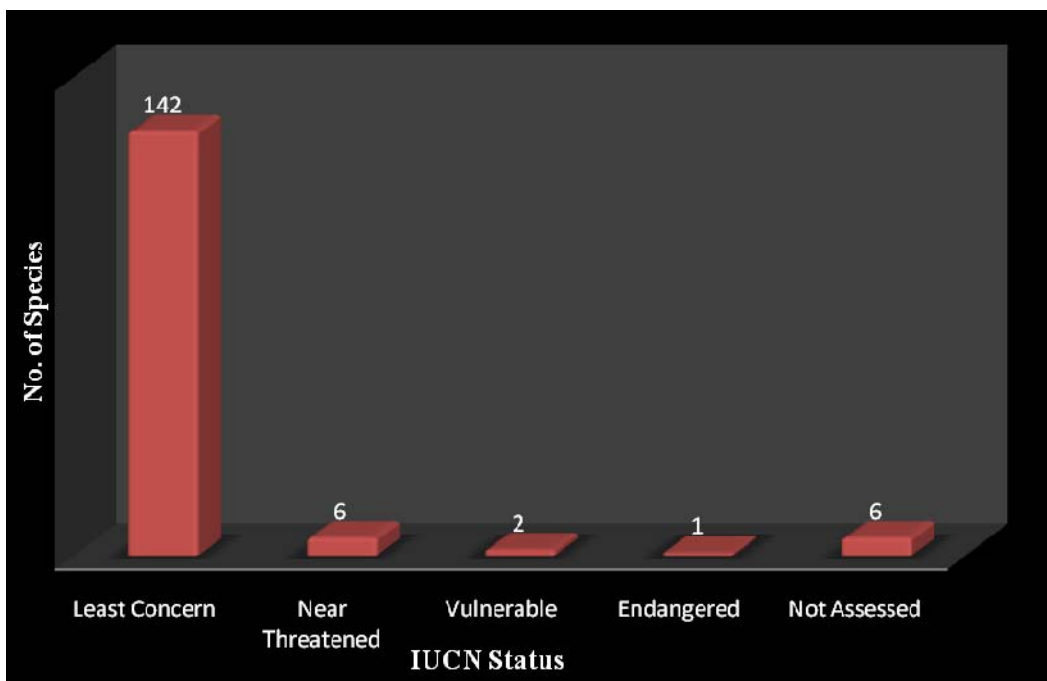


Fig:-5 Species composition of vertebrate in SBS according to IUCN Status

Table 2: Invertebrates (Annelids, Insects, Spiders, Odonata, Lepidoptera and Molluscks) Fauna of Sandi Bird Sanctuary

S.No	Order	Common name of Species	Scientific name of Species		
1	(Annelids )	Common Earthworm	<i>Pheretima posthuma</i>		
	Haplotaxida				
	Hirudinida			Cattle leach	<i>Hirudinaria granulosa</i>
	Arhynchobdellida			Indian leach	<i>Haemadipsa sylvestris</i>
2	Ephemeroptera	May-fly	<i>Caenis sps.</i>		
3	Odonata (Dragonfly)	Asiatic Blood tail	<i>Lathrecista asiatica</i>		
		Ruddy Meadow Skimmer	<i>Neurothemis intermedia</i>		
		Rusty Darner	<i>Anaciaeschna jaspidea</i>		
		Little Blue Marsh Hawk	<i>Orthetrum laucum</i>		
		Common Hooktail	<i>Paragomphus lineatus</i>		
		Ditch Jewel	<i>Brachythemis cotaminata</i>		
		Common Club-Tail	<i>Ictinogomphus rapax</i>		
		Blue Darner	<i>Anaximmaculifrons</i>		
		Fulvous Forests Skimmer	<i>Neurothemis fulvia</i>		
		Pied Paddy Skimmer	<i>Neurothemis tullia</i>		
		Blue –tailed Green Darner	<i>Anax guttatus</i>		
		Trumpet tail	<i>Acisoma panorpoides</i>		
		Coral-tailed Cloud Wings	<i>Tholymis tillarga</i>		
		Granite Ghost	<i>Bradinopyga geminata</i>		
		Coromandel Marsh Dart	<i>Ceriagrana caromandelianum</i>		
(Damsselfly)	Yellow Bush-Dart	<i>Copera marginipes</i>			
	Blue Grass Dartless	<i>Pseudagrion microcephalum</i>			
	Golden Dartless	<i>Ischnura aurora</i>			
4	Orthoptera	Super-throated grasshopper	<i>Cyrtacanthacris tatarica</i>		
		Short-horned grasshopper	<i>Shistocerca sp.</i>		
		Common Indian grasshopper	<i>Acrida exaltata</i>		
		Silent slanted-face grasshopper	<i>Acrida cinerea</i>		
5	Mantodea	Praying Mantis	<i>Sphodromantis viridis</i>		
6	Phasmida	Indian Walking Stick	<i>Carausius morosus</i>		

Table-2 cont.....

7	Hemiptera	Lantern Bug	<i>Zanna affinis</i>
		Water Spider	<i>Gerris sp.</i>
8	Coleoptera	Water Hyacinth Weevil	<i>Neochtina eichhorinae</i>
9	Diptera	Mosquito	<i>Aedes sp. female</i>
		Bee-Fly	<i>Anastoechus barbatus</i>
10	Lepidoptera (Butterfly)	Common Jay	<i>Graphium doson</i>
		Common Mormon	<i>Papilio polytes</i>
		Common Raven	<i>Papilio castor</i>
		Lime Butterfly	<i>Papilio demoleus</i>
		Common Rose	<i>Astrophaneura aristolochiae</i>
		Great Jay	<i>Graphium euryplus</i>
		Small Grass Yellow	<i>Eurema brigitta</i>
		Common Grass Yellow	<i>Eurema hecabe</i>
		Tree Yellow	<i>Gandoca harina</i>
		Common Emigrant	<i>Catapsilia Pomona</i>
		Common Gull	<i>Cepora nerissa</i>
		Painted Sawtooth	<i>Prioneris sita</i>
		Common Jezebel	<i>Delias eucharis</i>
		Tailless Line Blue	<i>Prosotas dubiosa indica</i>
		Dark Grass Blue	<i>Zizeeria karsandra</i>
		Blue Tiger	<i>Tirumala limniace</i>
		Striped Tiger	<i>Danaus genutia</i>
		Plain Tiger	<i>Danaus chrysippus</i>
		Common Evening Brown	<i>Melanities leda</i>
		Common Lasear	<i>Pantoporia hordonia</i>
		Common Castor	<i>Aridine merione</i>
		Blue Pansy	<i>Junonia orithiya</i>
		Grey Pansy	<i>Junonia atlites</i>
		Lemon Pansy	<i>Junonia lemonias</i>
		Peacock Pansy	<i>Junonia almana</i>
		Great Eggfly	<i>Hypolimnas bolina</i>
DanaidEggfly	<i>Hypolimnas misippus</i>		
Pioneer	<i>Belenois aurota</i>		
11	Hymenoptera	Vespid wasp	<i>Polistes hebraeus</i>
		Honey bee	<i>Apis indica</i>
		Weaver ant	<i>Oecophylla smaragdina</i>
12	(Mollusks) Architaenioglossa	Apple snail	<i>Ampullariidae</i>
	Hygrophila	Ram's horn snail	<i>Plonorbis plonorbis</i>
		Great Pond snail	<i>Lymnaea stagnalis</i>
	Unionoida	Unio	<i>Lamellidens marginalis</i>

Table 3: Vertebrates (Pisces, Reptiles &amp; Amphibians and Mammals) Fauna of Sandi Bird Sanctuary except Avifauna

S.No	Family	Common name of Species	Scientific name of Species
<b>Fishes</b>			
1.	Cyprinidae	Catla	<i>Catla- catla</i>
		Naini (Cauvery white carp)	<i>Cirrhinus cirrhosus</i>
		Mrigal	<i>Cirrhinus mrigala</i>
		Rohu	<i>Labeo rohita</i>
		karonch	<i>Labeo calbasu</i>
		Silver Karp	<i>Hypophthalmichthys molitrix</i>
2.	Bagridae	Tengra	<i>Sperata seenghala</i>
3.	Clariidae	Magur	<i>Clarias batrachus</i>
4.	Heteropneustidae	Singhi (Stinging catfish)	<i>Heteropneustes fossilis</i>
5.	Chandidae	Striped or banded snakeheads	<i>Channa striatus</i>
		Saur	<i>Channa puntatus</i>

Reptiles and Amphibians			
1.	Trionychidae	Indian Narrow-Headed Soft Shell Turtle	<i>Chitra indica</i>
2.	Geogmydidae	Indian Tent Turtle	<i>Pangshura tentoria</i>
3.	Cryptodira	Indian Flap Shell Turtle	<i>Lissemys punctata</i>
4.	Gekkonidae	Northern House Gecko	<i>Hemidactylus flaviviridis</i>
5.	Agamidae	Common Garden Lizard	<i>Calotes versicolor</i>
6.	Scincidae	Common Brahminy Skink	<i>Eutropis carinata</i>
		Snake Skink	<i>Lygosoma punctatus</i>
7.	Varanidae	Common Indian Monitor	<i>Varanus bengalensis</i>
8.	Elapidae	Common Krait	<i>Bangarus caeruleus</i>
		Russell,s Viper	<i>Daboi arusseli</i>
		Spectailed Cobra	<i>Naja naja</i>
9.	Pythonidae	Reticulated Python	<i>Python reticulated</i>
10.	Boidae	Red Sand Boa	<i>Eryx johni</i>
		Common Sand Boa	<i>Gongylophis conicus</i>
11.	Colubridae	Common Smooth-Scaled Water Snake	<i>Enhydris enhydris</i>
12.	Bufoinidae	Common Indian Toad	<i>Duttaphrynus melanostictus</i>
13.	Dicroglossidae	Skipper Frog	<i>Euphlyctis cyanophlyctis</i>
		Indian Bullfrog	<i>Haplobatrachus tigerinus</i>
Mammals			
1.	Herpestidae	Indian Grey Mongoose	<i>Herpestes edwardsii</i>
2.	Leporidae	Indian Hare	<i>Lepus nigricollis</i>
3.	Viverridae	Small Indian Civet	<i>Viverricula indica</i>
		Asian Palm Civet	<i>Paradoxurus hermaphroditus</i>
4.	Muridae	Black Rat	<i>Rattus rattus</i>
		Little Indian Field Mouse	<i>Mus booduga</i>
		Greater Bandicoot Rat	<i>Bandicota indica</i>
5.	Cercopithecidae	Rhesus Macaque	<i>Macaca mulatta</i>
6.	Bovidae	Nilgai	<i>Boselaphus tragocamelus</i>
7.	Sciuridae	India Palm Squirrel	<i>Funambulus palmarum</i>
8.	Canidae	Jackal	<i>Canis aureus indicus</i>
9.	Hystricidae	Indian Porcupine (Sahi)	<i>Hystrix indica</i>

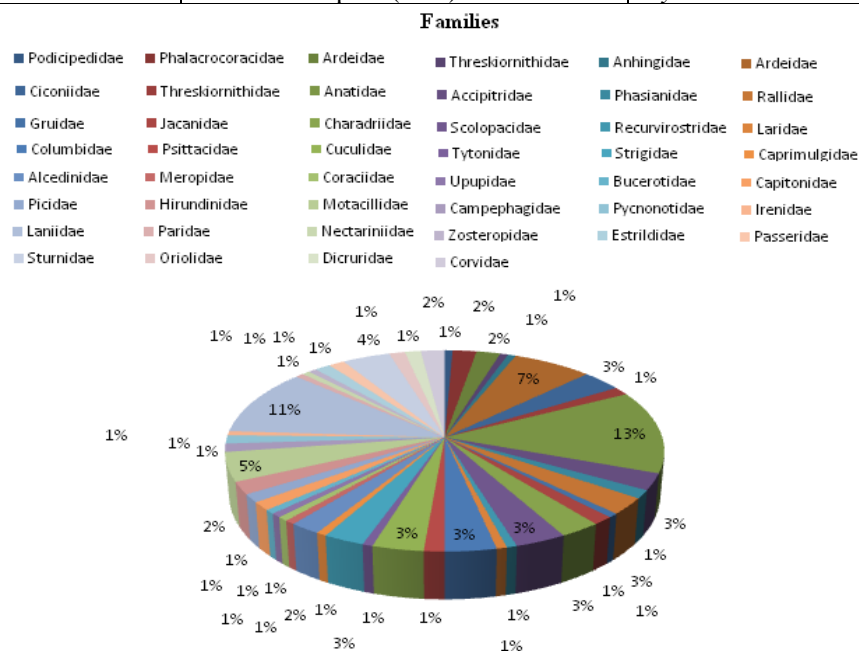


Fig .6:-Family wise percentage composition of birds in SBS



**Birds:-**A total of 157 species of birds, belong to 17 orders and 46 families were recorded from SBS. (Table.4). During study, 142 species of Least Concern, 6 species of Near Threatened, 2 species of Vulnerable, 1 species of Endangered and 6 species of Not Assessed were recorded (Fig.5). Family wise percentage composition of birds of SBS has been calculated (Fig.6).Order Passeriformes is rich with 52 species, Anseriformes and Ciconiiformes with 20 and 17 species respectively (Fig.7).

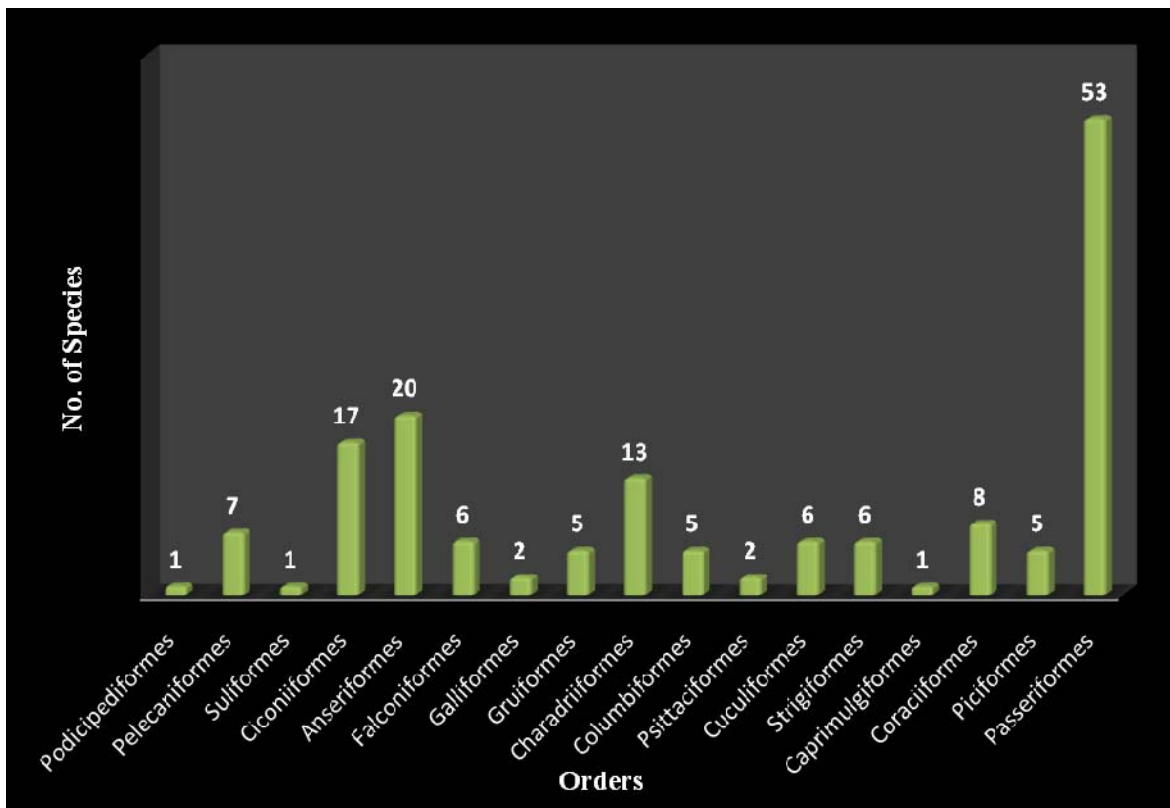


Fig.7:-Order wise species composition of birds in SBS, Sandi

Table 4: Checklist of Birds at Sandi Birds Sanctuary, District Hardoi

S.No	Order	Families	Name of species	Common name	Status	IUCN status
1	Podicipediformes	Podicipedidae	<i>Tachybaptus ruficollis</i>	Little Grebe	R	LC
2	Pelecaniformes	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	Great Cormorant	R/LM	LC
3			<i>Phalacrocorax niger</i>	Little Cormorant	R	LC
4			<i>Phalacrocorax fuscicollis</i>	Indian Cormorant	R	LC
5			Ardeidae	<i>Nycticorax nycticorax</i>	Black Crowned Night Heron	R/LM
6		<i>Ixobrychus flavicollis</i>	Black bittern	LM	LC	
7		<i>Ixobrychus sinensis</i>	Yellow bittern	R/LM	LC	
8		Threskiornithidae	<i>Threskiornis melanocephalus</i>	Black-headed Ibis	WV	LC
9		Suliformes	Anhingidae	<i>Anhinga melanogaster</i>	Darter	R/LM

Table-4 cont.....

10	Ciconiiformes	Ardeidae	<i>Egretta garzetta</i>	Little Egret	R	LC		
11			<i>Casmerodius albus</i>	Large Egret	R	LC		
12			<i>Mesophoyx intermedia</i>	Median Egret	R	LC		
13			<i>Bubulcus ibis</i>	Cattle Egret	R	LC		
14			<i>Ardea cinerea</i>	Grey Heron	R/LM	LC		
15			<i>Ardea purpurea</i>	Purple Heron	R/LM	LC		
16			<i>Ardeola grayii</i>	Indian Pond Heron	R	LC		
17			<i>Butorides striatus</i>	Little Green Heron	LM	LC		
18			<i>Ixobrychus cinnamomeus</i>	Chestnut Bittern	R	LC		
19			<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	R	LC		
20			Ciconiidae	<i>Mycteria leucocephala</i>	Painted Stork	R/LM	NT	
21				<i>Anastomus oscitans</i>	Asian Open bill-Stork	R/LM	LC	
22				<i>Ciconia nigra</i>	Black Stork	WV	LC	
23				<i>Ciconia episcopus</i>	White-necked Stork	WV	LC	
24				<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	WV	NT	
25				Threskiornithidae	<i>Plegadis falcinellus</i>	Glossy Ibis	WV	LC
26					<i>Pseudibis papillosa</i>	Black Ibis	WV	NT
27			Anseriformes	Anatidae	<i>Dendrocygna javanica</i>	Lesser whistling duck	R	LC
28					<i>Anser indicus</i>	Bar headed goose	WV	LC
29	<i>Tadorna ferruginea</i>	Brahminy shelduck			WV	LC		
30	<i>Sarkidiornis melanotos</i>	Comb duck			WV	LC		
31	<i>Nettapus coromandelianus</i>	Cotton teal			WV	LC		
32	<i>Anas platyrhynchos</i>	Mallard			R/LM	LC		
33	<i>Anas poecilorhyncha</i>	Spot-billed duck			R/LM	LC		
34	<i>Anas clypeata</i>	Northern shoveller			WV	LC		
35	<i>Anas acuta</i>	Northern pintail			WV	LC		
36	<i>Anas querquedula</i>	Garganey			WV	LC		
37	<i>Anas crecca</i>	Common Teal			WV	LC		
38	<i>Rhodonessa rufina</i>	Red crested Pochard			WV	LC		
39	<i>Aythya fuligula</i>	Tufted Pochard			WV	LC		

Table-4 cont.....

40			<i>Aythya ferina</i>	Common Pochard	WV	LC
41			<i>Anas strepera</i>	Gadwall	WV	LC
42			<i>Nettapus coromendelianus</i>	Cotton Pygmy Goose	LM	LC
43			<i>Anas penelope</i>	Eurasian Wigeon	WV	LC
44			<i>Anser anser</i>	Greyleg Goose	WV	LC
45			<i>Tadorna ferruginea</i>	Ruddy Shelduck	WV	LC
46			<i>Aythya nyroca</i>	Ferruginous Pochard	WV	LC
47	Falconiformes	Accipitridae	<i>Elanus caeruleus</i>	Black - shouldered Kite	R	LC
48			<i>Milvus migrans</i>	Black Kite	R	LC
49			<i>Buteo buteo</i>	Common Buzzard	M	LC
50			<i>Spilornis cheela</i>	Crested Serpent Eagle	R	LC
51			<i>Neophron percnopterus</i>	Egyptian Vulture	R/LM	E
52			<i>Accipiter badius</i>	Shikra	R	LC
53	Galliformes	Phasianidae	<i>Gallus gallus</i>	Red jungle fowl	R	LC
54			<i>Pavo cristatus</i>	Indian peafowl	R	LC
55	Gruiformes	Rallidae	<i>Amaurornis phoenicurus</i>	White-breasted Waterhen	R	LC
56			<i>Porphyrio porphyrio</i>	Purple Moorhen	R	LC
57			<i>Gallinule chloropus</i>	Common Moorhen	R	LC
58			<i>Fulica atra</i>	Common Coot	R/LM	LC
59		Gruidae	<i>Grus antigone</i>	Sarus Crane	R	V
60	Charadriiformes	Jacaniidae	<i>Hydrophasianus chirurgus</i>	Pheasant-tailed Jacana	R	LC
61			<i>Metopidius indicus</i>	Bronzed-winged Jacana	R	LC
62		Charadriidae	<i>Charadrius dubius</i>	Little Ringed Plover	WV	LC
63			<i>Charadrius hiaticula</i>	Ringed Plover	WV	LC
64			<i>Vanellus malabaricus</i>	Yellow-wattled Lapwing	R/LM	NA
65			<i>Vanellus indicus</i>	Red-wattled Lapwing	R	LC
66		Scolopacidae	<i>Tringa glareola</i>	Wood Sandpiper	WV	LC
67			<i>Tringa ochropus</i>	Green Sandpiper	WV	LC
68			<i>Actitis hypoleucos</i>	Common Sandpiper	WV	LC
69			<i>Tringa totanus</i>	Common Redshank	WV	LC
70			<i>Tringa nebularia</i>	Common Greenshank	WV	LC
71		Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt	R/V W	LC
72		Laridae	<i>Sterna aurantia</i>	River Tern	R/LM	NT

73	Columbiformes	Columbidae	<i>Columba livia</i>	Blue Rock Pigeon	R	LC	
74			<i>Streptopelia chinensis</i>	Spotted Dove	R	LC	
75			<i>Streptopelia tranquebarica</i>	Red Collared Dove	R/LM	LC	
76			<i>Streptopelia decaocta</i>	Eurasian Collared- Dove	R	LC	
77			<i>Treron phoenicoptera</i>	Yellow- legged Green- Pigeon	R/LM	LC	
78	Psittaciformes	Psittacidae	<i>Psittacula eupatria</i>	Alexandrine Parakeet	R	NT	
79			<i>Psittacula krameri</i>	Rose-ringed Parakeet	R	LC	
80	Cuculiformes	Cuculidae	<i>Eudynamys scolopacea</i>	Asian Koel	R/LM	LC	
81			<i>Hierococcyx varius</i>	Brain- fever bird	R	LC	
82			<i>Phaenicophaeus leschenaultii</i>	Sirkeer Malkoha	R	LC	
83			<i>Centropus sinensis</i>	Greater Coucal	R	LC	
84			<i>Cuculus micropterus</i>	Indian Cuckoo	R	LC	
85			<i>Cuculus canorus</i>	Common Cuckoo	R	LC	
86	Strigiformes	Tytonidae	<i>Tyto alba</i>	Barn Owl	R	LC	
87		Strigidae	<i>Bubo bubo</i>	Eurasian Eagle-Owl	R	LC	
88			<i>Athenebrama</i>	Spotted Owlet	R	LC	
89			<i>Glaucidium radiatum</i>	Jungle Owlet	R	LC	
90			<i>Ninox Scitulata</i>	Brown Hawk Owl	R	LC	
91			<i>Glaucidium cuculoides</i>	Asian- barred Owllet	R/LM	LC	
92	Caprimulgiformes	Caprimulgidae	<i>Caprimulgus asiaticus</i>	Common Indian Nightjar	R	LC	
93	Coraciiformes	Alcedinidae	<i>Alcedo atthis</i>	Small Blue Kingfisher	R	LC	
94			<i>Halcyon smyrnensis</i>	White breasted Kingfisher	R	LC	
95			<i>Ceryle rudis</i>	Lesser Pied Kingfisher	R/LM	LC	
96		Meropidae	<i>Merops orientalis</i>	Green Bee-eater	R	LC	
97			<i>Merops philippinus</i>	Blue-tailed Bee-eater	R	LC	
98		Coraciidae	<i>Coracias benghalensis</i>	Indian Roller	R	LC	
99		Upupidae	<i>Upupa epops</i>	Common Hoopoe	R	LC	
100		Bucerotidae	<i>Ocyrceros birostris</i>	Indian Grey Hornbill	R	LC	
101		Piciformes	Capitonidae	<i>Megalaima zeylanica</i>	Brown-headed Barbet	R	LC
102				<i>Megalaima haemacephala</i>	Coppersmith Barbet	R	LC
103	Picidae		<i>Dendrocopos nanus</i>	Brown-capped pygmy Woodpecker	R	LC	
104			<i>Dendrocopos mahrattensis</i>	Yellow-crowned Woodpecker	R	NA	
105			<i>Dinopium benghalense</i>	Lesser Golden-backed Woodpecker	R	LC	

Table-4 cont.....

106	Passeriformes	Hirundinidae	<i>Riparia paludicola</i>	Plain Martin	R/LM	LC	
107			<i>Hirundo rustica</i>	Common Swallow	R/WV	LC	
108			<i>Hirundo smithii</i>	Wire-tailed Swallow	WV	LC	
109		Motacillidae	<i>Dendronanthus indicus</i>	Forest Wagtail	WV	LC	
110			<i>Motacilla alba</i>	White Wagtail	R/ LM	NA	
111			<i>Motacilla maderaspatensis</i>	Large PiedWagtail	R	NA	
112			<i>Motacilla flava</i>	Yellow Wagtail	WV	LC	
113			<i>Motacilla cinerea</i>	Grey Wagtail	WV	LC	
114				<i>Anthus rufulus</i>	Paddy-field Pipit	R	LC
115				<i>Anthus trivialis</i>	Eurasian Tree Pipit	R/LM	NA
116			Campephagidae	<i>Coracina macei</i>	Large Cuckoo-Shrike	R	LC
117				<i>Tephrodornis pondicerianus</i>	Common Woodshrike	R	LC
118			Pycnonotidae	<i>Pycnonotus cafer</i>	Red-vented Bulbul	R	LC
119				<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul	R	LC
120	Irenidae		<i>Aegithina tiphia</i>	Common Iora	R	LC	
121	Laniidae		<i>Lanius schach</i>	Rufous -backed Shrike	R	LC	
122	Subfamily: Turdinae		<i>Copsychus saularis</i>	Oriental Magpie-Robin	R	LC	
123			<i>Saxicoloides fulicata</i>	Indian Robin	R	LC	
124			<i>Phoenicurus ochruros</i>	Black Redstart	R/WV	LC	
125			<i>Saxicola torquata</i>	Common Stonechat	LM	LC	
126			<i>Saxicola caprata</i>	Pied Bushchat	R	LC	
127			Subfamily: Sylviinae	<i>Cercomela fusca</i>	Indian Chat	R/LM	LC
128	<i>Chrysomma sinense</i>	Yellow-eyed Babbler		R	LC		
129	<i>Turdoides caudatus</i>	Common Babbler		R	LC		
130	<i>Turdoides striatus</i>	Jungle Babbler		R	LC		
131	<i>Prinia socialis</i>	Ashy Prinia		R	LC		
132	<i>Prinia sylvatica</i>	Jungle Prinia		R	LC		
133	<i>Prinia inornata</i>	Plain Prinia		R	LC		
134	<i>Acrocephalus agricola</i>	Paddyfield Warbler		R/W V	LC		
135	<i>Orthotomus sutorius</i>	Common Tailorbird		R	LC		
136	Subfamily: Muscicapinae	<i>Cyornis tickelliae</i>		Tickell,s Blue Flycatcher	R	LC	
137	Subfamily: Monarchinae	<i>Terpsiphone paradisi</i>	Asian Paradise-Flycatcher	R	LC		
138	Paridae	<i>Parus major</i>	Great Tit	R	LC		
139	Nectariniidae	<i>Nectarinia asiatica</i>	Purple Sunbird	R	LC		
140	Zosteropidae	<i>Zosterops palpebrosos</i>	Oriental White-eye	R	LC		
141	Estrildidae	<i>Lonchura malabarica</i>	White- throated Munia	R	LC		
142		<i>Lonchura punctulata</i>	Spotted Munia	R	LC		

143		<i>Passeridae</i>	<i>Passer domesticus</i>	House Sparrow	R	LC
		<i>Subfamily: Passerinae</i>				
144		<i>Subfamily: Ploceinae</i>	<i>Ploceus philippinus</i>	Baya Weaver	R	V
145		<i>Sturnidae</i>	<i>Sturnus pagodarum</i>	Brahminy Starling	R	LC
146			<i>Sturnus roseus</i>	Rosy Starling	WV	LC
147			<i>Sturnus contra</i>	Asian Pied Starling	R	LC
148			<i>Sturnus malabaricus</i>	Chestnut-tailed Starling	R/LM	LC
149			<i>Acridotheres tristis</i>	Common Myna	R	NA
150			<i>Acridotheres fuscus</i>	Jungle Myna	R	LC
151		<i>Oriolidae</i>	<i>Oriolus oriolus</i>	Eurasian Golden Oriole	R	LC
152			<i>Oriolus xanthornus</i>	Black-headed Oriole	R	LC
153		<i>Dicruridae</i>	<i>Dicrurus macrocercus</i>	Black Drongo	R	LC
154			<i>Dicrurus paradiseus</i>	Greater Racket-tailed Drongo	R	LC
155		<i>Corvidae</i>	<i>Dendrocitta vagabunda</i>	Indian Treepie	R	LC
156			<i>Corvus splendens</i>	House Crow	R	LC
157			<i>Corvus macrorhynchos</i>	Jungle Crow	R	LC

**Legend**-R=Resident, WV=Winter Visitor, LM=Local Movement, M=Migrant, LC= Least Concern, NA= Not Assessed, E= Endangered, NT= Near Threatened, V= Vulnerable

## DISCUSSION

This study reveals presence 10 orders of insects with 60 species, 4 species of mollusks belonging to 3 orders, 3 species of annelids belonging to 3 orders in SBS. Diversity and structure of the arthropods in central Panama exposed arthropods abundance (Stuntz *et al.*, 2002) and Nine species of mollusks in sodic land of Uttar Pradesh suggest that soil arthropods and earthworm improve the restoration and conservation of biodiversity (Singh *et al.*, 2009). There is a favourable environment for the feeding and roosting sites of butterflies and dragonflies in SBS. Pathania and Kumari (2009) studied 28 species of butterflies from district Una in Himachal Pradesh, Sharma and Joshi (2009) recorded a total of 41 butterfly species in district Hoshiarpur, Punjab, Tiple *et al.*, (2009) recorded total 145 species of butterflies in the Nagpur city, A.P. Chandra *et al.*, in 2012 studied a total 28 odonate species assemblages, specific habitats such as bushlands, marshlands, lagoons, flowing water bodies, stagnant water bodies and vegetation type in Bundela National Park, Sri Lanka.

Sanctuary is a hub of biodiversity including 4 species of mollusks, 3 species of annelids, 13 species of fishes, 3 species of amphibians, 15 species of reptiles and 10 species of mammals. A total of 15 species of reptiles were observed from SBS and belong to 11 families. According to the study conducted by Kanaujia A. and Kumar A., in 2013, a total of 25 species of amphibians and 64 species of reptiles have been observed from Uttar Pradesh. Singh *et al.* (2009) recorded 6 species of reptiles and 4 species of amphibians in reclaimed sodic land of Uttar Pradesh, India. Fishes, reptiles and mammals diversity also had reported (Kumar and Srivastava; 2013) from Sandi Bird Sanctuary, Hardoi. Kanaujia *et al.*, (2014) provide a complete list of annelids (3 species), insects (60 species), molluscs (4 species), amphibians (3 species), reptiles (16 species), fishes (12 species) and mammals (12 species) from Nawabganj Bird Sanctuary, Unnao.

A total of 157 species which includes waterbirds, waders, terrestrial, migratory as well as residential, Least Concern, Near Threatened, Vulnerable, Endangered birds from Sandi Bird Sanctuary. Highest number of birds was recorded during the month of January-February and lowest in June and July. Kanaujia *et al.*, (2014) assessed the 150 species of birds (out of which 63 wetlands birds and 38 winter visitor) from Nawabganj Bird Sanctuary, Unnao. A study on Avifaunal diversity of Tikamgarh District done by Kushwaha *et al.*, in 2015. Kanaujia *et al.*, studied the Waterbirds of Lucknow according to their IUCN status in 2015. Similar studies have been done in a number of protected areas. 167 species of birds belonging to 16 orders and 39 families were reported from Kole wetland (C. Sivaperuman and E.A. Jayson; 2010).

Similar observation with 173 species was done by Talmale *et al.*, in 2012. National Chambal Sanctuary in Madhya Pradesh is a good habitat for water birds and other fauna (Meshram *et al*; 2010). Sur Sarovar Bird Sanctuary is also a suitable territory for water birds (Shukla and Lone; 2010). A study on Birds biodiversity with special reference to migratory birds movement (Kumar and Srivastava; 2013) has done in Sandi Bird Sanctuary, Hardoi. A close relation between aquatic food plants and their consumer birds (Jha; 2013) have been explained. A study has done by M. Arya *et al.*, (2014) on avifaunal occurrence and distribution of wetlands birds in Sakhya Sagar and Madhav Lakes in Madhav National Park, Shivpuri and listed 73 wetlands birds.

Total 44 floral species of submerged, floating, free floating, amphibious and terrestrial plants belong to 29 families were recorded. Floristic and Ecological studies of Bakhira wetland performed by Sanjay Mishra and Satya Narain (2010). Mehra *et al.*, (2013) explored the 192 plants species belonging to 46 families of Okhla Bird Sanctuary.

## CONCLUSION

The study has revealed that Sandi Bird Sanctuary is vigorous ecosystem. The Biodiversity of the SBS is important as it vital that native and endemic species of flora & fauna are conserved. The Biodiversity of SBS hold a lot potential in terms of conservation. It harbours a huge biodiversity of Invertebrates and vertebrates especially in birds. Unsustainable development hinders the flora & fauna and migration of birds of this biodiversity hub. Since there is very sparse published faunal data prior to this, the present work can form the baseline for further research and comparative studies. This wetland has a number of species of mollusks, amphibians, reptiles, fishes and plants. The study proves that the present ecological status of SBS put together the birds and other faunal population. The present study exhibit the value of SBS as a feeding ground for the Migratory and residential species of birds and other faunal diversity. It is a preliminary data; further survey with aim to study the value of SBS, breeding of migratory as well as residential species, water quality analysis and area in and around SBS with respect to faunal diversity may gain additional knowledge. There is need of further research on the biology of water birds and other faunal species available in the SBS to formulate proper strategies for their conservation.

## ACKNOWLEDGMENT

The Authors are thankful to Head of Department of Zoology for providing necessary facilities to perform this work. Dr. Rupak De, PCCF, Wild Life, Uttar Pradesh, gave ample support, encouragement and valuable suggestions, which is great fully acknowledged. The authors are indebted to Bird Sanctuary staff, DFO, CF, guards etc. and Unnao Forest Department for their helps.

## REFERENCES

- Ali, S. and Ripley, S.D. (1995). A Pictorial Guide to the Birds of the Indian Subcontinent. Bombay Natural history society, Mumbai.
- Apte, D. (1998). The Book of Indian Shells. Bombay Natural History Society and Oxford University Press, Mumbai.
- Ali, S. (2002). The Book of Indian Birds. 13th Eds. Bombay Natural History Society and Oxford University Press, Mumbai.
- Arya, M., Rao R.J., and Kumar, A. (2014). Avifaunal occurrence and distribution of wetland birds in Sakhya Sagar and Madhav Lakes in Madhav National Park, Shivpuri, India. *Journal of Environmental Biology*: Vol. 35, 703-708.
- Balmer, E. (2007). A Pictorial Guide to Butterflies and Moth. Paragon Books Ltd. New York.
- Chandana. (2012). A survey of odonate assemblages associated with selected wetland localities in southern Sri Lanka. *Asian Journal of Conservation Biology*: 1 (2), 67-73.
- Daniel, J. C. (2002). The Book of Indian Reptiles and Amphibians. Oxford University Press Walton Street, Oxford.
- Daniels Ranjit, R. J. (2002). Freshwater Fishes of Peninsular India. University Press (India) Private Limited, Hyderabad.
- Daniels Ranjit, R. J. (2005). Amphibian of Peninsular India. University Press (India) Private Limited, Hyderabad.
- Gururaja, K. V. (2010). Pictorial Guide to Frogs and Toads of Western Ghats. Gubbi Labs LLP.
- Grimmett, R., Inskipp, C., and Inskipp, T. (2011). Birds of the Indian Subcontinent. London: Oxford University Press.
- Heda, N.K. (2009). Freshwater Fishes of Central India- A Field Guide. Vigyan Prasar, Department of Science and Technology, Government of India, Noida.
- Jha, K.K. (2013). Aquatic Food Plants and their Consumer Birds at Sandi Bird Sanctuary, Hardoi, Northern India. *Asian Journal of Conservation Biology*: 2 (1), 30-43.

- Kehimkar, I. (2008). The Book of Indian Butterflies. BNHS & Oxford University Press.
- Kanaujia, A. and Kumar, A. (2013). Amphibians of Uttar Pradesh and Their Ecological Importance. (Paper presented in National Conference on Water and Biodiversity on occasion of International Day for Biological diversity: 148-157).
- Kumar, A. and Srivastava, M. (2013). The Biodiversity at Sandi Bird Sanctuary, Hardoi with special reference to Migratory Birds. Oct. Jour. Env. Res: 1(3), 187-196.
- Kanaujia, A., Kumar, A., Kushwaha, S., Kumar, A. and Kumar, A. (2014). Blooming Faunal Diversity of Nawabganj Bird Sanctuary, Unnao, Uttar Pradesh, India. G- Journal of Environmental Science and Technology: 2(2), 14-24.
- Kushwaha, S., Kanaujia, A., Kumar, A., Kumar, A. and Maheshwari, S. (2015). Avifaunal Diversity of Tikamgarh District, Madhya Pradesh, India. Discovery Nature: 9(20), 20-32.
- Menon, V. (2003). A Field Guide to Indian Mammals. Penguin India, New Delhi. Ministry of Environment and Forest, 2007
- Mukherjee, P. (2008). Trees of India. 1<sup>st</sup> Eds. Oxford University Press.
- Meshram, P.K. (2010). Diversity of some fauna in National Chambal Sanctuary in Madhya Pradesh, India. Biodiversitas: 11(4), 211-215.
- Mishra, S. and Narain, S. (2010). Floristic and Ecological Studies of Bakhira Wetland, Uttar Pradesh, India. Indian Forester: 136 (3), 375-381.
- Mehra. (2013). Plant species of Okhla Bird Sanctuary: A wetland of Upper Gangetic Plains, India. Check List: 9(2), 263-274.
- Oliver, A. P. H. (2004). Guide to Seashells of the World. Firefly Books, Limited.
- Pathania, P.C. & Kumari, Anita (2009). A primary report on Rhopalocera diversity (Lepidoptera) from district Una of Himachal Pradesh, India. Biological Forum -An International Journal: 1(2), 80-88.
- Roberts, T. J. (1997). The Mammals of Pakistan. Oxford University Press, Karachi.
- Subba Rao, N.V. (1993). A hand book on freshwater molluscs of India. John Wailey publn. New York.
- Stuntz, S., Christian, Z., Ulrich, S. and Gerhard, Z. (2002). Diversity and structure of the arthropod fauna within three canopy epiphyte species in central Panama. Journal of Tropical Ecology: 18,161-176.
- Srivastava, G. (2007). Fishes of U.P. and Bihar. Vishwavidyalaya Prakashan.
- Subramanian, K.A. (2009). Dragonflies of India-A field guide. Vigyan Prasar, Department of Science and Technology, Govt. of India.
- Sebastian, P. A. and Peter, K. V. (2009). Spider of India. University Press.
- Sharma, Gaurav & Joshi, P.C. (2009). Diversity of Butterflies (Lepidoptera: Insecta) from Dholbaha dam (Distt. Hoshiarpur) in Punjab Shivalik, India. Biological Forum -An International Journal: 1(2), 11-14.
- Singh, S.K., Srivastava, S.P., Tandon, P. and Azad, B.S. (2009). Faunal diversity during rainy season in reclaimed sodic land of Uttar Pradesh, India. Journal of Environmental Biology: 30(4), 551-556.
- Sivaperuman, C. and Jayson, E.A. (2010). Community Ecology of Tropical Birds. New-India Publishing House, New Delhi.
- Saini D.C. Singh, S.K. and Rai, K. (2010). Biodiversity of Aquatic and Semi-aquatic Plants of Uttar Pradesh. 1<sup>st</sup> Eds. Uttar Pradesh State Biodiversity Board, Lucknow.
- Shukla, U.N. and Lone, A.A. (2010). Water Birds of Sur Sarovar Bird Sanctuary Agra, Uttar Pradesh. Research Journal of Agricultural Sciences: 1(2), 135-139.
- Singh, A.P. (2010). Butterflies of India. Om Books International.
- Tiple, A.D. and Khurad, A.M. (2009). Butterfly species diversity, habitats and seasonal distribution in and around Nagpur city, Central India. World Journal of Zoology: 4 (3), 153-162.
- Talmale, S.S., Limje, M.E. and Sambath, S. (2012). Avian diversity of Singhori Wildlife Sanctuary, Raisen District, Madhya Pradesh. Biological Forum – An International Journal: 4(2), 52-61.
- Whitaker, R., Captain, A. (2008). Snakes of India, The Field Guide. Chengalpattu, Draco Books.
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