Research Article

BIO DIVERSITY INDICES AND THE MEASURES TO CONSERVATION OF AVIFAUNAL DIVERSITY OF BHAVANAPADU WETLANDS, BHAVANAPADU, SANTABOMMALI MANDAL, SRIKAKAULAM DISTRICT, ANDRAPRADESH, INDIA

Mukunda Rao S*

Department of Zoology, Andra University, Vishakapatnam, Andrapradesh, India- 530003

ARTICLE INFO	ABSTRACT
	Birds occupy almost all habitat types and diversity of birds often serves as a good indication of overall diversity of a given area .India is a signatory to Ramsar convention and plays an important role in conservation and wise use of wetlands. During my investigation period 42 bird species were recorded. Its indicate good diversity of birds in the study area. The study was carried out in 12 months from 2013 to 2014 in pre-monsoon, monsoon, post monsoon the data was analyzed by Shannon – Weinner index. It showed significant diversity of avian fauna. In post monsoon season the diversity indices (Po-Mon H value is 3.94) was more than the other seasons. The maximum avian species were recorded during the post monsoon and the minimum in monsoon. The study also recorded four vulnerable species. The avian diversity of the study area is under great threat due to various anthropogenic and environmental problems. So proper conservation measures should be followed for sustainable development.

INTRODUCTION

Wetlands support rich biodiversity of flora and fauna, provide many services that contribute to human wellbeing and poverty alleviation. The plethora of environmental problems contributing to the decline in habitat and species populations and diversity has been growing in the past two decades. Hence efforts have to be made to conserve the biodiversity and to minimize its loss through sustainable ways and conservation practices. The state of Andhra Pradesh is bestowed with thousands of wetlands which fall under different categories. The Indian subcontinent, a part of the vast Oriental biogeographic regions, is very rich in biodiversity. Out of the more than 9,000birds of the world, the Indian subcontinent contains about 1,300 species, or over 13% of the world's birds (Grimmett *et al*. 1998).This subcontinent, rich in avifauna also boasts of 48 bird families out of the total 75 families in the world. Natural wetlands are among the most threatened ecosystems in the world. Their high productivity and the morphologic characteristics make wetlands excellent areas for many human activities. Often the damage caused by land reclamation for agriculture or unsustainable practices leads to the disappearance of wetlands and corresponding biodiversity. Suitable management is therefore a critical priority to save these fragile ecosystems.The diversity indices was calculated based on univariate methods.

Bhavanapadu wetland (Fig:1 A,B) is Located in Bavanapadu village of santabommali mandal in Srikakulam district. It is situated on $18^0.5554617$ N latitude and $84^0.34079647$ E longitudes. The Bhavanapadu Creek is natural; mouth is an ecosystem harboring rich and vulnerable species. The bird biodiversity is quite rich. It is 1 m from sea level.

MATERIALS AND METHODS

Avifaunal surveys were carried out at regular intervals during Pre-monsoon, monsoon and Post-monsoon periods of the year, in order to cover migratory and resident species. Observations were made over a period of one year from January 2013 to February 2014 with an aid of field binoculars (7x35m and 10x50 m). Identification was based on standard scientific procedures, field identification by direct sightings; photographs were taken whenever feasible and possible by using Nikon 35 mm digital camera with appropriate zoom lens. Bird survey was conducted, when the birds are most active during day from 06:00 to 9.30 hrs and from 16:00 to 19:00 hrs. Identification manuals and field guides by Ali & Ripley (1989), Kazmierczak (2000) and Grimmett *et al*., (2001) were used during survey.

*Corresponding author: **Mukunda Rao S**
Department of Zoology, Andra University, Vishakapatnam, Andrapradesh, India- 530003

A . Field photograph

B .Google satellite map

Fig 1 Study Area (A,B)

Abundance of the recorded species are documented based on the total sightings during the study period as common (more than 10 sightings), uncommon (3-5 sightings), and rare (1-2 sightings). The checklist of species with their status was given. The Avifaunal diversity of wetlands was calculated based on univariate methods {diversity indices *d, H'* and *J*; multivariate analysis through hierarchical clustering (Bray-Curtis similarities) and ordination by Multi Dimensional Scaling (MDS) as recommended by Clarke and Warwick (1994). A number of software exists to carry out hierarchical clustering and MDS ordination. However, PRIMER v6 (Plymouth Routines In Multivariate Ecological Research).

RESULT AND DISCUSSION

Birds are also known to be responsive to any kind of changes to their ambient conditions hence can be used as bio-indicator. During the study period 42 bird species, 856 individuals were recorded. Amongst the 42 species,(Table:3)

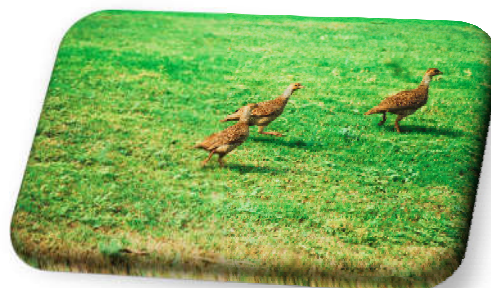**Table 1** Diversity indices of Avifauna from study area

Diversity indices	Pre-mon	Mon	Post- mon
Individuals	376	294	186
Species	23	16	31
Shannon_H	3.12	2.87	3.94

Table 2 vulnerable bird species recorded from study area

Sl. No.	Order	Family	Common Name	Scientific Name
1	Ciconiformes	Ciconiidae	Lesser Adjatant Stork	Leptoptilos javanicus
2	Charadiiformes	Charadriinae	Spoon-billed Sandpiper	Eurynorhynchus pygmeus

Table 3 Checklist of the birds recorded from the study area

S. No	Common Name	Scientific Name	Abundance	Habitat
1	Little Cormorant	*Phalacrocorax niger*	C	W F
2	Darter	*Anhinga melanogaster*	C	W
3	Little Egret	*Egretta garzetta*	C	WD F
4	Large Egret	*Casmerodius albus*	UC	W
5	Cattle Egret	*Bubulcus ibis*	C	T F
6	Indian Pond-Heron	*Ardeola grayii*	C	W F
7	Night – Heron	*Nycticorax nycticorax*	C	W F
8	Yellow Bittern	*Ixobrychus sinensis*	UC	W
9	Painted Stork	*Mycteria leucocephala*	C	W F
10	Lesser Adjutant Stork	*Leptoptilos duius*	R	W
11	Black Ibis	*Pseudibis papillosa*	C	W
12	Mallard	*Anas platyrhnches*	UC	W F
13	Black Kite	*Milvus migrans*	C	T
14	Brahminy Kite	*Haliastur indus*	UC	WD
15	Pale Harrier	*Circus macrourus*	UC	T
16	Grey Patridge	*Franolinus pondicerianus*	UC	T
17	Water Cock	*Gallicrex cinerea*	SC	W
18	Purple Moorhen	*Pulphyrio porphyria*	C	W
19	Common Moorhen	*Gallinula chloropus*	C	W
20	Pheasant-Tailed Jacana	*Hydrophasianus chirurgus*	UC	W
21	Bronze-Winged Jacana	*Metopidius indicus*	C	W
22	Red-Wattled Lapwing	*Vanellus indicus*	C	WD
23	Sand Plover	*Charadrius leschenaultii*	UC	W F
24	Spoonbill Sandpiper	*Eurynorhynchus pygmeus*	R	W
25	Little Stint	*Galidris minuta*	UC	W F
26	Brown Headed Gull	*Larus brunicephalus*	C	W F
27	Blue Rock Pigeon	*Columba livia*	C	T F
28	Ring dove	*Streptopelia decaocto*	UC	T
29	Indian Cuckoo	*Cuculus micropterus*	C	T
30	Asian Koel	*Eudynamys scolopacea*	C	T
31	Brown Fish-Owl	*Ketupa zeylonensis*	UC	WD SP
32	Barn Owl	*Tyto alba*	C	T
33	House Swift	*Apus affinis*	C	WD F
34	Small Blue Kingfisher	*Alcedo atthis*	C	WD
35	Small Bee-eater	*Merops orientalis*	C	WD
36	Blue-tailed Bee-eater	*Merops philippinus*	UC SV	WD SP
37	Indian Roller	*Coracias benghalensis*	C	T
38	Black Headed Myna	*Sturnus pagoderm*	UC	T SP
39	Common Myna	*Acridotherus tristia*	C	T F
40	House Crow	*Corvus splendens*	C	T F
41	Yellow Headed Wagtail	*Motacilla citreola*	UC	WD
42	House Sparrow	*Passer domesticus*	C	T F

Images: A) Small blue kingfisher

B) Grey patridge

Two species were vulnerable categories (Table:2) under wildlife protection act 1972, Leptoptilos javanicus, Eurynorhynchus pygmeus. Analysis of Shannon –Weinner (SI), index of diversity showed that the species diversity of avian fauna in different seasons significantly varies. The individuals were recorded highly in post monsoon season (376) followed by pre monsoon (294) and monsoon (186). Shannon –Weinner diversity index among the study seasons showed that post monsoon season (3.94) was more diverse than the other seasons (Table:1). The highest number of species was recorded (31) during post monsoon season followed by pre monsoon (23) and monsoon (16).

The present study revealed that the Bhavanapadu wetland area is very rich in bird diversity, but this diversity is under threat due to different environmental pollutions and human activity problems. During post monsoon the study area attracts number of peoples for picnic and other recreation purposes which cause air, soil, water and noise pollution. Various anthropogenic problems such as agricultural activities, non-implementation of fishery acts and legislation, fishing of fries, fingerlings and gravid fishes etc. decrease the food resources of avifauna thereby affecting their diversity. Wetlands are life support systems for people living around and are effective in flood control and a suitable habitat for fish and other flora and fauna .Therefore proper conservation measures such as development of eco-tourism by involving local people of the area, strong implementation of conservation laws and acts should be taken immediately to conserve the rich bird diversity of the wetland.

The present study revealed that the rich avifaunal diversity of the wetland is under tremendous pressure due to various problems. Therefore by taking immediate conservation measures we can maintain not only the rich avian diversity but also the overall diversity of the bhavanapadu wetland.

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