

Avifaunal diversity of mangrove ecosystem, Kundapura, Udupi district, Karnataka, India

K.M. Vijaya Kumar^{1*} and Vijaya Kumara²

¹Department of Zoology, Bhandarkars' Arts and Science College, Kundapura-576 201, India

²Department of Post Graduate Studies and Research in Wildlife and Management, Bioscience Block, Kuvempu University, Shankaraghatta-577 451, India

Abstract

The avifaunal diversity and density of Mangrove Ecosystem, Kundapura, Udupi district, Karnataka, India, was studied for a period of one year from July-2010 to June-2011 based on observational methods. The mangrove ecosystem is inhabited by a variety of smaller birds, resident birds, migratory birds and wading birds. One of the most productive ecosystems of world is mangrove forests, providing shelter and feeding sites for many avifaunas. Mangrove and habitat estuaries are being used for various purposes like prawn culture, collection of shells for lime and harvesting of fish. Fluctuation of salinity of water and variations in food availability in different seasons affected the avifaunal diversity in the study area. This habitat attracted 32 bird species, belonging to the 19 families, which are residential, residential migrants and migratory including aquatic birds, waders and others. Highest number of egrets, common myna, open billed storks, black headed ibis and crows was recorded in three seasons, pre monsoon, monsoon and post monsoon. Other permanent residents were cormorants, pond herons, little herons and night herons.

Keywords: Mangrove, Avifauna, Egrets, Herons, Cormorants, Myna, Open Billed Storks, Black Headed Ibis

INTRODUCTION

Mangroves harbor a greater variety of bird life than areas such as salt marshes, mudflats and beaches (Mac Arthur and Mac Arthur, 1961). Mangroves enable extensive breeding activity by a number of tree nesting birds. Little information is available on the birds associated with mangroves in India, except a few studies like 53 species from Bay Islands (Samanth, 1985), 24 migratory species from Sunderbans (Naskar and Guhabakshi, 1987) and 166 species from Bhitarkanika mangroves (Mohanty, 1992). There is no report on the Avifaunal communities of Kundapura mangroves.

Odum, W.E, et.al (1982) have studied the ecology of the mangroves of south Florida. Samanth, J.S. (1985) has studied avifauna of the mangroves around Rathnagiri Maharashtra. Naskar, K.R. and D.N.Guhabakshi (1987) studied the mangrove swamps of the sunder bans. Pandav, B. (1997) studied the birds of Bhitarkanika Muthupet mangrove forest. Aravind, N.A.D. Rao and P.S. Madhusudan (2001) have studied additions to the birds of Biligiri Rangaswamy Temple wildlife sanctuary, Western Ghats.

The above avifaunal studies impress upon the need for the inventory of avifaunal diversity of other such habitats. The selected area for the study is Kundapura. Kundapura is located 445 kms West of Bangalore and 36 kms North of Udupi (13° 37' 24" N and 74° 41' 30" E and 58 ft. asl) The annual rainfall is 4848 mm and normal rain fall of 4182mm.

MATERIAL AND METHODS

Inventorying bird diversity and density was made. We selected four sites, viz., site-I (Herikudru), site-II (Uppinkudru), site-III (Jalady), site-IV (Hemmadi), for the study purpose. Weekly visit to the sites was made for one year and an average of 4 weeks was accounted for a month. The birds can be recorded by line transect method (Barnham et al., 1980). Binoculars were used for bird watching. Birds are to be identified by referring the key books (Bikram Grewal-1995; Grimmett, Inskipp C, Inskipp T-1988; Ali, Salim – 1996; Salim Ali – 2002).

Bird population was observed and documented every week end in the early morning from 5.00 a.m to 7.30 a.m and evening from 5.00 p.m to 7.30 p.m. The relative abundance of birds was estimated and their monthly fluctuations over the year were recorded. The present study was focused on the ecological status of avifaunal diversity and density in the study area. The birds are classified on the basis of "The Book of Indian birds" (Salim Ali – 2002).

RESULTS AND DISCUSSION

Monthly variation in the avifauna and the relative abundance of these species in the study area was recorded. A check list of bird species cited in the present study is presented in Table-1. Locations of the study area are presented in the Fig-1.

Indian peafowl (*Pavocristatus*) was occasionally cited in the nearby forest and plantations. Usually parties of one cock with 4 or 5 hens were observed. The different species of Kingfishers recorded in the study area include small blue king fisher (*Alcedo atthis*), white breasted Kingfisher (*Halcyon smyrnensis*), pied kingfisher (*Ceryle rudis*) and brown headed stork billed Kingfisher (*Pelargopsis capensis*). Small green eaters (*Merops orientalis*) were the resident species, recorded in the study area from the month of December to July.

Received: July 10, 2011; Revised September 21, 2011; Accepted September 21, 2011.

*Corresponding Author

K.M.Vijaya Kumar
Department of Zoology, Bhandarkars' Arts and Science College, Kundapura-576 201, India

Tel: +91-9449266428
Email: vijay15765@gmail.com

Asian Koel (*Eudynamys scolopacea*), Greater coucal (*Centropus sinensis*), Rose ringed parakeet (*Pittaculidae kramerii*) were a resident birds, occasionally cited in the study area. Crested tree swifts (*Hemiprocne coronata*) were recorded in the study area throughout the year.

Spotted dove (*Streptopelia chinensis*), Rock pigeon (*Columba livia*) were observed in the study area. White breasted water hen (*Amaurornis phoenicurus*) was resident bird, found throughout the year. They are more heard than seen, because they disappear quickly on sighting the danger. Similar opinion was expressed by Frederickson and Reid (1986) about Indian moorhen.

Hérons and egrets were found in remarkable number as there was abundant food source and safe habitat. Black headed ibis (*Threskiornis melanocephalus*) was found in the study area from the month of September to June. Herons, egrets, ibises are most conspicuous group of birds that are found in mangroves. Mangrove swamps function as the feeding ground to wading birds, since two third of these species feed almost exclusively on fishes (Odum et al., 1982). White ibises feed predominantly on crabs from mangroves (Kushlan and Kushlan, 1975) has been recorded earlier. Mangrove serves as a breeding ground for large breeding colonies of herons, egrets and ibises. Feeding activity of herons and egrets are observed throughout the year. Successful breeding of all these mangrove nesters is undoubtedly correlated with the abundant supply of fishes associated with mangroves which is also supported by the reports of Odum et al (1982) in Florida mangroves.

Little cormorants (*Phalacrocorax niger*) were found in the study area in all seasons. They were found in remarkable number in the study period as there was abundant food source and safe habitat. Darter (*Anhinga melanogaster*) is a wide spread resident bird seen once in site-IV, during April month.

Birds like red wattled lapwing (*Vanellus indicus*), common sand piper (*Actitis hypoleucos*) occupied the study area throughout the year. Red wattled lapwing occupies open country, ploughed fields, grazing land and margins of dry beds of tanks and puddles. It feeds on insects, molluscs, etc. Sand pipers are opportunistic feeders taking the most abundant, proper sized invertebrates present in whatever habitat the birds happen to occupy (Wolf, 1969; Schneider, 1978). Brahminy kite (*Haliastur indus*) and Black Kite (*Milvus migrans*) were record in the study area throughout the year.

Open billed storks (*Anastomus oscitans*) were recorded in the study area from the month of December to August. They were found in remarkable number in the study period as there was abundant food source and safe habitat. This breeds in colonies amongst mixed heronries of cormorants and egrets. Black Drongo (*Dicrurus macrocercus*), was occasionally cited in the study area. Black Drongo is a familiar bird of open country, usually perched on telephone wires, or attending on grazing cattle. Common myna (*Acridotheres tristis*) is a wide spread resident bird were found in remarkable number during the study period. It occupies bushy mangroves for safe habitat and nesting.

House crows (*Corvus splendens*) were found in remarkable number in the study area as there was abundant food source and safe habit. It has community roosts in selected trees or groves where large numbers collect every night. Magpie robin (*Copsychus*

sularis) was sited throughout the study period, seen in singly or in pairs around mangroves.

Purple rumped sun bird (*Nectarinia zeylonica*), is cited throughout the study period, and is responsible for cross pollinating numerous species of flowers. They were always present in pairs in bushy mangroves.

Monthly variation in the diversity of mangrove birds during the study period is presented in the table -2. It was observed that the avifaunal diversity was more from October to May as there was optimum water, availability of food and increased vegetation and the arrival of migratory birds. The minimum diversity was recorded in June, July, August and September due to heavy rain, increased flow of water, non availability of food and return of migratory birds. Many of the birds were displaced during this season and spread in the neighbouring areas of agricultural activities which form their feeding ground. Some birds find their breeding grounds elsewhere in this season. They start return to the mangrove by October.

Monthly variation in the density of avifauna (number of individuals) in the study period was presented in Table-3. The bird density or the number of individuals was more from October to May and less in June, July, August and September. Similar observations were made by Saxena (1975) on avifauna of Keoladeo National Park, Bharathpur. Since January month is the post breeding season of many of the birds. Chicks of the birds were noticed, where the parents' exhibit marked parental care. Abundant food supply was also caused the increased density of avifauna.

Percentage composition of birds inhabiting in site-I, site-II, site-III and site-IV in study area during the study period was presented in Fig-2. It was observed that the site-I was occupied by 9.0% of birds, site II was occupied by 8.0% of birds, Site III was occupied by 49.0% of birds and site IV was occupied 34.0% of birds. It clearly indicates that the birds preferred site III in study area. This may be due to fewer disturbances, availability of abundant food and more vegetation.

The site III in the study area was preferred by all bird species. Highest population of egrets, herons, cormorants, house crows, common myna, open billed storks, black headed ibis, was found in the mangroves. Lowest population of white breasted water hen, Asian koel, king fisher's etc. More number of species occurred mostly during October, November, December, January, February, March, April and May months, less in June, July, August and September months in study area. Maximum number of individuals recorded in the month of February and March and minimum was in the month of July and August in the study period.

The study proved that the present ecological characteristics of mangrove made the birds unable to inhabit throughout the year. Extraction of shells, conversion of mangrove habitat into aquaculture ponds, flooding of water during rainy season, harvesting of mangroves for wood are major threats to the avifauna of Kundapura mangroves. Hence, it is required to restore the original ecological features of mangroves by the Government, NGOs and general public to conserve avifauna of mangroves. we request government to declare site-III as Jaladi mangrove bird sanctuary to conserve avifauna.

Table-1: Check list of birds cited in the study area

Common Name	Scientific Name	Habitat
Order: Galliformes		
Family: Phasianidae		
Indian peafowl	<i>Pavo cristatus</i>	-
Order : Coraciiformes		
Family: Alcedinidae		
Small blue Kingfisher	<i>Alcedo atthis</i>	+
White breasted Kingfisher	<i>Halcyon smyrnensis</i>	+
Pied Kingfisher	<i>Ceryle rudis</i>	+
Brown headed stork billed	Kingfisher <i>Pelargopsis capensis</i>	+
Family : Meropidae		
Small green bee eaters	<i>Merops orientalis</i>	-
Order : Cuculiformes		
Family: Cuculidae		
Asian Koel	<i>Eudynamys scolopacea</i>	+
Crow pheasant (coucal)	<i>Centropus sinensis.</i>	+
Order: Psittaciformes		
Family: Psittacidae		
Rose ringed parakeet	<i>Psittacula krameri</i>	-
Order: Apodiformes		
Family: Hemiprocnidae		
Crested Tree-swifts	<i>Hemiproctne coronate</i>	+
Order: Columbiformes		
Family: Columbidae		
Blue rock pigeon	<i>Columba livia</i>	-
Spotted Dove	<i>Streptopelia chinensis</i>	+
Order: Gruiformes		
Family: Rallidae		
White breasted water hen	<i>Amaurornis phoenicurus</i>	+
Order: Ciconiformes		
Family: Ardeidae		
Pond heron	<i>Ardeola grayii</i>	+
Little green heron	<i>Ardeola Striatus</i>	+
Black-crowned night heron	<i>Nycticorax nycticorax</i>	+
Great egret	<i>Casmerodius albus</i>	+
Cattle egret	<i>Bubulcus ibis</i>	+
Little egret	<i>Egretta garzetta</i>	+
Family: Threskiornithidae		
Black headed Ibis	<i>Threskiornis melanocephalus</i>	+
Order: Pelecaniformes		
Family: Phalacrocoracidae		
Little cormorants	<i>Phalacrocorax niger</i>	+
Darters	<i>Anhinga melanogaster</i>	+
Order: Charadriiformes		
Family: Charadriidae		
Red wattled lapwing	<i>Vanellus indicus</i>	-
Common sandpiper	<i>Tringa hypoleucos</i>	+
Order: Falconiformes		
Family: Accipitridae		
Pariah Kite	<i>Milvus migrans</i>	+
Brahminy Kite	<i>Haliastur indus</i>	+
Family: Ciconiidae		
Open bill stork	<i>Anastomus oscitans.</i>	+
Order : Passeriformes		
Family: Dicruridae		
Black drongo (King crow)	<i>Dicrurus adsimilis.</i>	-
Family: Sturnidae		
Indian myna	<i>Acridotheres tristis</i>	+
Family: Corvidae		
House crow	<i>Corvus splendens</i>	+
Family: Muscipidae		
Magpie robin	<i>Copsychus saularis</i>	-
Family: Nectarinidae		
Purple rumped sunbird	<i>Nectarinia zeylonica</i>	+

Table-2: Monthly fluctuation in the diversity of avifauna. 2010-2011

Month	Site-1	Site-2	Site-3	Site-4
July	19	19	22	21
August	17	18	21	20
September	18	17	22	20

October	28	27	28	30
November	30	28	30	28
December	31	28	32	31
January	31	30	31	31
February	31	30	32	31
March	30	30	32	31
April	25	26	25	25
May	19	20	24	22
June	18	17	22	21
Total	309	302	331	323

Table-3: Monthly fluctuations in the density of avifauna. 2010-2011

Month	Site-1	Site-2	Site-3	Site-4
July	100	102	584	564
August	101	100	650	565
September	109	122	651	521
October	177	137	775	575
November	226	167	862	600
December	204	207	941	607
January	210	192	977	619
February	222	165	1227	820
March	212	165	1227	820
April	135	143	1214	689
May	110	140	1200	680
June	102	105	700	570
Total	1908	1745	11008	7630



Fig.1: Chart showing study area

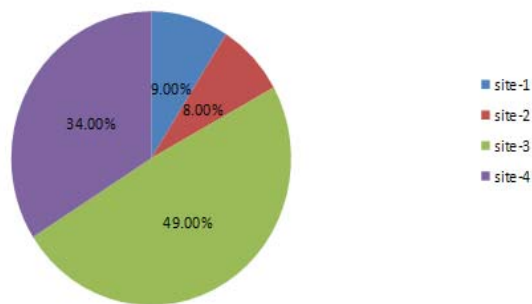


Fig.2: Percentage composition of avifauna in site-1, site-2, site-3 and site-4

REFERENCES

- Aravind, N.A.D. Rao & P.S. Madhusudan (2001). Additions to the birds of Biligiri Rangaswamy temple wild life sanctuary, Western Ghats, India. *Zoos Print Journal* 16970:541-547.
- Ali, Salim (1996). *The book of Indian birds* (Salim Ali centenary edition) Oxford University press, Mumbai, 1-309pp.
- Basha, E.S. (1991). Distribution of mangroves in Kerala. *India Forester* 117:439-448.
- Bikram Grewal-1995. *Birds of the Indian sub continent*. Guide Book Company limited Hongkong.
- Carokell, E.M. (1964). The utilization of mangroves by African bird. *Ibis* 106:251-253.
- Fredrickson, L.H. and F.A. Reid: Wetland and Riparian habitats: Nongame management, over-view. *Proceeding of 47th Midwest fish and wild life conference*, 17 December 1985, Michigan, 60-96 (1996).
- Grimmett, R. Inskipp, C. and Inskipp, T (1998). *Birds of the Indian subcontinent*, Oxford University Press. New Delhi-8-88pp.
- Karup, D.N. (1996). Ecology of the birds of Bharathapuzha estuary and survey of the coastal wetlands of Kerala. Final report submitted to Kerala Forest department, Trivandrum 59pp.
- Kushlan, J.A. and M.S. Kushlan (1975). Food of the white ibis in Southern Florida. *FlaSci.* 42:123-129.
- Mac Arthur and Mac Arthur (1961). On bird species diversity. *Ecology* 42: 594-598.
- Mohanty, N.C. (1992). *Mangroves of Orissa*. Project Swarajya Cuttack.
- Naskar, K.R. and D.N. Guhabakshi (1987). Mangrove swamps of the Sunder bans: An ecological perspective. Naya Prakash, Calcutta.
- Odum, W.E., C.C. Mc Ivor and T.J. Smith III (1982). The ecology of the mangroves of south Florida: a community profile. U.S. Fish and Wild life service, Office of Biological Services, Washington, and D.C.FWS/OBC-81/24:61-73.
- Oswin, D.S. (1999). Avifaunal diversity in Muthupet mangrove forest. *Zoos' Print Journal* 14(6):47-53.
- Pandav, B. (1997). Birds of Bhitarkanika mangroves, eastern India. *Forktail* 12:7-17.
- Ramitha, M. and K.K. Vijayalakhmi (2001). A check list birds in and around Mangalore university campus, Karnataka. *Zoos 'Print Journal* 16(5):489-492.
- Ripley, S.D (1962). Unusual plumage of the Little Cormorant (*Phalacrocorax niger*) (Vieillot). *Journal of the Bombay Natural History Society* 59:285-286.
- Salim Ali. (2002). *The book of Indian birds* (13th Revised edition) Oxford University press, New Delhi, 326pp.
- Samanth, J.S. (1985). Avifauna of the mangroves around Rathnagiri Maharashtra. *Proc, Nat. Symp. Bio. Util. Cons. Mangroves*: 456-466.
- Saxena, V.S. A study of flora and fauna of Bharatpur Bird Sanctuary, Department of Tourism, Jaipur, Rajasthan (1975).
- Schneider, D. (1978). Equalization of prey numbers by migratory shore birds. *Nature* 271:353-354.
- Wolff, W.J. (1969). Distribution of non breeding waders in an estuarine area in relation to the distribution of their food organisms. *Ardea* 37:1-28.