



Studies on density variations of avifauna in three wetlands of north Karnataka, India

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Abstract

The present study is concentrated on density variations of avifauna of three wetlands viz., Bannigola, Ankasamudra and Magadi lake because these three wetlands are attracting the migratory and resident birds every year in considerable number. The density of birds is indicating the potentiality of the habitat. Among these three wetlands, in Bannigola wetland 12 Families emerged as major groups with large number of bird population, each family with more than 1000 in numbers, in Ankasamudra wetland 11 Families were major groups and family Sturnidae occupied first place with 48.58% (especially Rosy starling population was the highest) whereas Magadi lake attracted 10 Families as major groups (dominated by Bar headed geese). Overall species richness is depending upon the spatial scale and the variety of resources available in the wetlands. In contrast to this these three wetlands are having abundant space, food availability and also place for roosting and breeding. Hence these wetlands in North Karnataka emerged as assured habitats for the migratory visitors and resident birds.

Keywords: migratory birds, wetlands, north Karnataka, density, families

Introduction

Wetland is a land area that is saturated with water either permanently or seasonally. It defined as areas of marsh, fen and peat land or water, whether natural or artificial, permanent or temporary with water that is static or slightly flowing fresh, brackish or salt, including areas of marine water, the depth of which does not exceed six meter (Ramsar Convention 1971) (Hosetti, 2002) ^[16]. Wetlands constitute a treasure of living community. Birds inhabiting wetlands for feeding, breeding, nesting or roosting are called as wetland birds (Paramesh Kumar and Gupta, 2013), which comprises bird groups like water fowl and waders. In addition, several other bird groups like king fisher, passerines, raptors are also ecologically dependent on wetlands, hence known as wetland dependent and associated avifauna (Kumar *et al.*, 2005) ^[19]. Now-a-days, these wetlands are subjected to continuous anthropogenic pressures like pollution, encroachment etc., which can greatly influence the structure and distribution of the bird community in wetlands.

India is rich in vivid type of lentic aqua-system located in different geographical regions, ranging from the cold arid zone of Ladakh to wet Impala, the warm arid zone of Rajasthan and the tropical monsoonic central India to the wet and humid zone of the southern peninsula. Such vivid diversity in climatic zones and various types of wetlands supported to rich diversity of flora and fauna in this country. It was decided in the Ramsar convention that these wetlands are important not only as waterfowl habitat but also for their multifaceted ecological functions. Wetland should be considered in term of their sedimentation, storage, ion

exchange, nutrient uptake, absorption, adsorption, bacterial and fungal dissimulation, solubilisation, gasification, transport, immobilization, nitrification, bio-conservation and so on. These are the abodes for a wide variety of plants and animals.

Monitoring the wetland birds provides valuable information on ecological health and status of wetlands and it is a vital tool to develop awareness regarding the conservation value of the wetlands. The importance of local landscapes for conservation of avifauna can only be understood by knowing the structure of the bird community of that region (Kattan and Franco, 2004) ^[18]. As wetlands provide a wintering ground and food for many migratory birds, several wetlands in the country have been identified as being internationally significant under the Ramsar convention.

The wetlands of south Asia are facing tremendous anthropogenic pressure, which can greatly influence the structure of the birds community (Bird Life International, 2003). In spite of all these pressures Ankasamudra Lake, Bannigola wetland, Magadi lake are attracting upto 173 species of both migratory and resident birds in large numbers. Hitherto study focused on the density variations of the bird families because among them few families emerged as major families due to highest population and few families emerged as minor families due to less population.

Study area

Three areas were selected for the present studies and those are shown below (Fig.1).

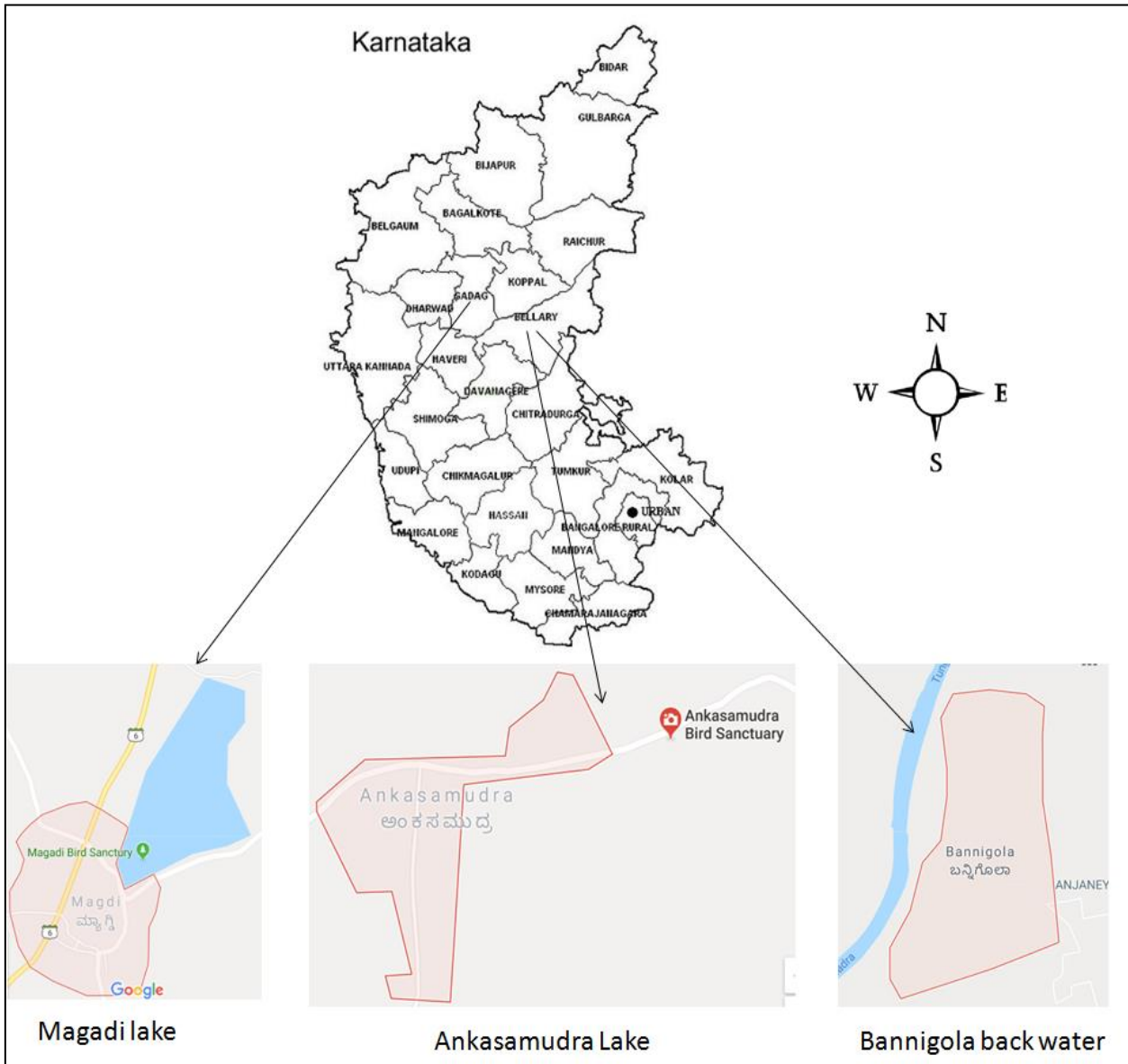


Fig 1: The three study areas viz, Magadi lake, Ankasamudra lake and Bannigola backwater.

Bannigola backwater of T.B. Dam

Bannigola is a Village in Hagaribommanahalli Taluk in Bellary District of Karnataka State, India. It is located 101 km towards west from District head quarters Bellary, 17 km from Hagaribammanahalli. 342 km from State capital Bangalore. It is located between 15° 10' 43.02 N latitude and 076 06' 23.3 E longitudes. Tunga Bhadra dam has been constructed across the river of Tungabhadra near Hosapete, Bellary district and its water is spread in an area of 378 sq.km. during monsoon (T.B. Board, 2012). This impounded water formed number of wetlands in different parts. Among them Bannigola backwater region (where river is running) is the one has been selected for the study. This backwater wetland also provides water for fishing activities and irrigation to surrounding agricultural lands of Bannigola village.

Ankasamudra lake

Ankasamudra is a small village located in Hagaribommanahalli taluk, Bellary district, Karnataka, India, between 15° 7' 50.44" N and 76° 13' 52.83" E. Ankasamudra Lake is located outskirts of the village Ankasamudra and spreaded in 244 acres. This lake is located near to backwaters of T.B. dam and filled with both either natural rain water or

by lifting backwater of T.B. dam. Since it is filled with water almost throughout the year and Acacia trees grown in the area attracted bird species during winter season. Hence, it is chosen for the study.

Magadi lake

It is a manmade lake that is built on the outskirts of Magadi village in Shirahatti taluk (8 kms from Shirahatti) of Gadag district (26 kms from Gadag), Karnataka, India between N 15.22 4378, E 75.51 3941. The tank spans about 134 acres of land area with a catchment of 900 hectares. The main water source is rain and surrounded by agricultural crop lands which are the food source for birds. It attracts many migratory birds from Asia and other foreign countries and from within country also. Hence, it is chosen for the study of diversity and abundance of avifauna in this region.

Materials and methods

Observation and photography of the wetland birds at the study area was done by using Olympus binoculars (Olympus 10X15 DPSI, Field 6.50) and (Cannon EoS 6001), DSLR camera. Birds were classified into orders and families by referring to “Birds Of Indian Subcontinent” by R.Grimmett,

Carol Inskipp and Tim Inskipp(2011). In the present study survey of birds conducted from April 2015 to March 2016, April 2016 to March 2017 and April 2017 to March 2018 for three consecutive years (weekly one visit to one study area and from 6AM to 11AM and 4PM to 6PM).

Results and discussion

Major and minor groups of Families of three study areas.

In Bannigola backwater area 12 families emerged as major groups of with large number of bird population (each family with > thousand in numbers). Family Anatidae occupied first place with 19.73 % followed by Phoenicopteridae 18.32 % in second place. The remaining families like Ploceidae (9.67 %), Phalacrocoracidae (7.27 %), Motacilidae (6.88%), Emberizidae (6.63 %), Scolopacidae (5.32 %), Hirundinidae (5.68 %), Glariolidae (4.37 %), Recurvirostridae (2.12 %), Ardeidae (1.28 %) and Threskiornithidae (1.038 %) were occupied the subsequent places respectively. Whereas, remaining 47 families contributed 0.1 % to 1 % each and these groups referred as minor groups (Fig.2).

In Ankasamudra lake eleven families were major groups, among them, family Sturnidae occupied first place with 48.58 % (especially Rosy Starling population was highest) and the family Ciconidae was in second place with 21.27 %. Family Ardeidae 6.22 %, Palacrocoracidae 3.9 %, Ploceidae 3.31 % Anatidae 2.18 %, Threskiornithidae 1.94 %, Passeridae 1.55%, Motacilidae 1.28 % and Emberizidae 1.05 % occupied respective places in series. But the remaining 51 families grouped under minor categories or families and contributed only 0.01 % to 1 % each (Fig.2).

Another study area Magadi lake documented only ten families as major groups. Family Anatidae ranked first place by contributing 74.04 %. High population (especially dominated by Bar headed Geese) followed by Leiothrichidae with 2.73 % placed as second. Family Gruidae 2.29 %, Cisticolidae 2.17%, Ardeidae 1.79 %, Rallidae 1.64 %, Passeridae 1.53%, and Charadriidae with 1.02 % were in the consecutive places. Whereas, remaining 37 families emerged as minor groups which contributed less than one percent each(Fig.2).

In all three wetland areas family Anatidae emerged as the largest family with more members of aquatic birds. Whereas, the family Phoenicopteridae comes under major groups in Bannigola and as a minor group in Magadi lake and absent in Ankasamudra. Family Phalacrocoracidae registered under major group both in Bannigola and Ankasamudra lake but in Magadi lake it is included under minor group. As far as other families included under major groups are concerned, they were almost recorded in all the three study areas.

Although species richness varied predictably with latitude and other environmental gradients (Hawkins *et al.*, 2003; Hillebrand, 2004) ^[14, 15], the mechanisms responsible for geographic patterns in biodiversity are poorly understood (Mittelbach *et al.*, 2007; Currie *et al.*, 2004) ^[10, 21]. Classic niche-based hypothesis argued that local species richness is related to the variety of available resources including escape space from enemies (Ricklefs 1975; Ricklefs, 2009) ^[31, 32] which were partitioned among species to reduce interspecific competition and thereby allowed co-existence

(MacArthur 1972; Schoener, 1974; Tilman 1982; Chase and Leibold 2003) ^[20, 7, 37, 38, 39].

According to modifications of niche-based theory spatial and temporal variation in the environment (Chesson, 2000) ^[8] related to predation have not been assessed by empirical studies in the past. As per recent consumer resource models conditions for coexistence of similar species (Abrams 2006; Abrams and Rueffler 2009) ^[11, 21] they are represented by small number of species in simplified environment, although they do contain alternatively, diversification- based hypothesis posed that elevated rates of species production compared with extinction within a region to push up steady-state levels of diversity and packed species more tightly into available ecological niche, leading to decouple the relationship between species richness and niche-space (Rosenzweig 1995; Cardillo 1999; Jablonski *et al.*, 2006) ^[33, 6].

Pioneer ecologists have not evaluated these hypothesis adequately, in part because of the difficulty of measuring niche space and its partitioning among species (Pianka 1975; Vitt *et al.*, 2000) ^[25, 1]. Although the idea that diversity generally exist in a long term resource influenced equilibrium (Rabosky 2009) ^[27].

Many families of birds have global geographic distributions and overall species richness does not reflect the number of species that compete locally for potentially shared resources (Ricklefs 2012). Many process influence species richness at each spatial scale and the relationship between species richness and the variety of resources used has been analyzed quantitatively (Pianka, 1975; Cody 1975; Schluter 1988) ^[9, 25]. The tropical species exhibited a variety of adaptations molded by their interactions with resources, competitors, and antagonists. Previous studies on comparisons suggest that such species interactions are stronger in the tropics than at higher latitudes although the data on this point are meager (Schemske *et al.*, 2009) ^[34]. In the case of terrestrial birds and bats, both exhibit strong latitudinal gradients in diversity, tropical environments support many species that use resources such as nectar, fruit, and large insects, not perennially available in temperate latitudes (Orlans, 1969; Findley, 1976; Stevens *et al.*, 2003) ^[22, 11]. However even among ecologically homogeneous phylogenetic groups including many families of passerine birds, tropical regions harbor many species than temperate regions (Ricklefs, 2012). Analysis of reconstructed phylogenetic branching patterns suggest that diversification becomes limited as a clade-the species descending from a single common ancestor-fills ecological niche space (Rabosky, 2009) ^[26]. The number of species in a clade also increases with the size of region within which it occurs (Rosenzweig, 1995) ^[33] but is independent clade age (Rabosky 2009; Rabosky 2009b; Ricklefs 2006; Ricklefs 2009) ^[27, 26, 31, 32] regardless of their age, family level clades in tropical regions tend to be more species-rich than those of similar rank restricted to temperate and boreal zones (Jablonski *et al.*, 2006; Ricklefs, 2006) ^[17, 30]. If the clade size and diversity of species restricted by ecological space, one would expect more species-rich clades, which occupy more ecological space and number within local areas, as well as within regions to be related to the total available ecological space and food (Ricklefs, 2012)

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