Original Research Paper

Volume : 5 | Issue : 12 | December-2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 78.46

COMPARATIVE STUDY OF SELECTED WET-LAND BIRDS POPULATION IN VISNAGAR AREA, GUJARAT

Biology

KEYWORDS:

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ABSTRACT

Polyspecific (mixed) bird population of 29 species at semi-arid condition was investigated at six sites for 48 months. All 29 species are belonging to 7 orders and 12 families. Out of which 1/3 population is Resident where as 2/3 population is Local Migrant. The highest percentage of population is observed in family anatidae (Ducks) and lowest in ciconiidae (Storks). The population of Cattle Egret as a resident species is highest due to availability of food (insects) in croplands, better nesting sites and shelter. Shoveller as a migratory species observed high in numbers, where as Darter as a migratory speices was very less in number. Species wise as well as total population of birds is recorded maximum at such sites where human interference is very less. Anthopogenic pressure threats the birds from their favorable habitat. Water table is also the second important factor. Rainfall is not directly involved but high or moderate rainfall of the previous year affect to the next year for migratory species. Yearly average record shows that the range of these birds has remained between 239 and 375 per visit. Breeding behavior also regulates the population especially in Herons and Egrets.

INTRODUCTION

A population is generally individuals of a particular species occupying a particular area at a specific time, in which the individuals interact interbreed and exchange genetic information. Our investigation provides a background of the evaluation of population census of available wetland birds and the status of individual species. It may be to determine the importance of a site, the population size of a species, the habitat requirement for a species for which their population is going to be decline. Their findings are correlated with ecological factors as they might govern the distribution of waterfowl in a semi-arid zone; therefore we have selected this topic for study.

The size of the population is always under constant state of change. These fluctuations in population may be due to change in the physical environment, or due to interaction within the population or due to interaction between closely interrelated populations or by nature. There occur two types of fluctuations in population: (1) seasonal fluctuation and (2) annual fluctuation. Dispersal of birds occur for various reasons such as food, protection, action of climate (temperature, humidity, rainfall, photo-periodism), breeding behavior that regulates the population in a particular site and prevents overexploitation. Migration in birds is also a way in a population dispersal of avifauna.

Population censusing is a methodological problem in ecology particularly for mobile animals (here some birds like Waterhen Moorhen) which are distributed over a large area or at different area. Most ecological studies of birds use abundance or number of birds per unit area as the basic information on their population.

METHODOLOGY

We selected this topic and area to census of wetland waterfowl population because such kind of work has not been made here in past. Firstly we surveyed six sites of this area which were different from each other on different angles, such as location, water table, water quality, surrounding area vegetation, human interference etc. To get the satisfactory data six sites of this area and 4 year time span (from March- 2011 to February- 2015) was decided, so that the figures for the population census such as means, standard deviation (±S.D.) range, density, percentage, climate effect and relation etc. can be acquired properly. Every site was being visited weekly. Count was carried out from 6.30 a.m. to 11.00 a.m. 20 x 30 binocular was used. In the present study, population of wetland birds was estimated by direct count method employed by the Bombay Natural History Society (BNHS) since 1993, for estimating the population of aquatic birds at Keoladeo National Park (KNP) Bharatpur. Several other workers have also used this method for various birds (Prakash, 1988; Sridharan, 1989; Bhupathy, 1991 and Siva Subramanian, 1992). Different types of calculation and statistical analysis required for population dynamic are done according to popular techniques and formulae.

STUDY AREA

Population count of wetland birds was conducted at Visnagar (23042' N, 71034' E, about 127 m above m.s.l.) Gujarat state. Visnagar is one of the taluka place of the Mehsana district. It is situated 20 km east of Mehsana and 90 km from Ahmedabad. Kansa, Kada, Saduthala etc. are the villages, surrounding the study of Visnagar taluka. The town has several ponds for water source as well as collection like Delia, Pindaria, Depal, Vatrabh, Malap etc., out of which we have selceted six sites (Fig.-1) for the study which are:

1. Site- I Located near Shiva temple West side of Kansa village
2. Site -II Vaghnara pond - the South side of Kansa village
3. Site- III Vatrabh pond of Kamana road, Visnagar
4. Site - IV Malap pond on Gandhinagar road, Visnagar
5. Site - V Sewage canal on Mehsana road, Visnagar
6. Site - VI Delia pond near Mota Hanuman temple City area of Visnagar

Salient feature of each site is given in a Table -1. Above wetland sites are now prime wintering grounds for migratory birds and local wetland birds. It shows that these sites and their surrounding are become an important area for breeding of some- resident as well as migratory birds especially Egrets, Herons, Cormorant, Ibis etc.

RESULTS AND DISCUSSIONS

India comprise -3558915 sq. km area in which 1200 bird species are recorded. It presents 0.0003 avifaunal species densities/ hector. Whereas Gujarat comprises 2092206 sq. km wetland area in which 154 wetland birds are recorded (Pilo and Pathak, 1996) Thus Gujarat wetland area possesses 0.0007 species density/ hectare. In our selected study area 29 bird species (studied) are sprayed within 46 sq.km area (It might be variable at other places of North Gujarat). It shows 0.63 species density/ hectare. It is enough in comparison to country and state level. During study period (March, 2011- February, 2015) 29 species are recorded, out of which 1/3 population is Resident were as 2/3 population is Local Migrant (Table-2)

Taxonomic status of 29 species shows that they are belonging to seven orders: podicipidiformes, pelecaniformes, ciconiiformes, anseriformes charadriiformes, coraciiformes and graiiformes. The family records of all species indicate that maximum three families are recorded in the oder ciconiiformes and charadriiformes, two families are of pelecaniformes and remaining are single family regarding their orders.

The highest percentage of population is observed in the family anatidae (Ducks) and lowest in ciconiidae (Stork). The family

recurviostridae also shows good number or present population (12.21%). Due to gregarious behavior in Pelicans its family also present high population in some specific months when they migrate to this area. Average population of different bird species are recorded in (Table -2). It ranges from 1 to 63 day. All 29 species are grouped into five categories with respect to their average population (full figures are counted) as under:

Group	Range(per day)	Total Species
A	<1	05
B	1 to 10	10
C	10 to 20	09
D	20 to 30	02
E	30 to 40	03

Five species show very less average population, among them Painted Stork. Darter, Pied Kingfisher, White-breasted Waterhen and Grey Heron are included. More than 20 birds /day are seen in Cattle Egret, Black winged Stilt, Little Grabe, Rosy Pelican and Shoveller species. Average population of other nine species was moderate. Shoveller shows highest 19.81% population, Whereas Darters population is less than 1% only (0.09%) (Table -2).

Percentage of bird species in overall population shows that the members of the family ardeidae, anatidae pelicanidae, recurvirostridae are more abundant in this area. The family ardeidae comprises Cattle Egrets, Little Egrets, Median Egrets, Large Egrets, Pond Heron, Night Heron and Grey Heron. Out of these Egrets groups Cattle Egrets are seen in highest number where as Night Herons and Grey herons are comparatively seen less in number. Generally we observed that Egrets breed locally. Here Cattle Egret population is highest due to the availability of food (insects) in croplands, favorable nesting site and shelter. The Indian Pond Heron or Paddy Bird is one of the commonest bird of India, where there is any water, small or large stagnant or running, village ditches and ponds great swamp and lakes or the flooded Rice fields (Lamba, 1963). In Our observation also it was found in good numbers. Shoveller is a migratory species, throughout it observed within fair number at a time.These species always found in pairs hence it might be possible in the highest number. (Parsons, 1939) Darter is a migrant species and seen very less in number in this area. These birds are used in fishing at North East Assam and it might be one factor for their low count (Stonor, 1948)

SITE WISE POPULATION

For the intensive and comparative study of wetland bird census six sites were selected. They are located in urban as well as rural areas and covered with cropland as well as high human population density. Comparatively all sites are not uniform with respect to their area covered, water table, properties of water and soil, food source and human interference. Our interest is whether, heterorganic habitat effect on average population or not? Table -3 shows the comparison of site wise average bird population. All sites show variable numbers of average population per visit during study period, even birds/hectare/ day record was also variable. More than 50 bards / visit are recorded in site- II, III and IV, whereas less than 50 birds are at site - I V and VI. Highest number of birds/ hectare / day is recorded at site -II and V whereas very less number are seen at site - I and VI. Month wise mean of bird in different sites show not of fluctuation (104. 77-743.15) (Table-4)

Anthropogenic pressure is observed as a prime important factor. It is extremely high at site I and VI hence the average population of birds is very less. This result is supported by different authors who worked in wetland ecology (Rao, 2002; Shiva Subramanian, 1992). The size of the water body does not influence on population densities. Water table also plays its role on population. In our case it is clearly seen that the water table remained high at site - I and VI where birds count is very less. Site - II and III show moderate water table where bird population is 84 and 62 respectively. Flat muddy bad remains suitable for feeding. Vegetation does not interfere in increase or decrease number of bird population. We marked a very remarkable finding that birds/ hectare/ day are highest at sewage canal where direct human interference is not involve, but zooplankton and phytoplankton are recorded abundant in a slow running water on mudflat. In site - III water table remained 2 to 3 meter in monsoon whereas 1 to 2 meter in non - monsoon. Sometime in summer it dries up hence population of birds goes down which effect on average number of yearly count; hence it is only 7 birds / hectare/day.

YEAR WISE VARIATION

Fig.:2 represents year wise mean population ow wetland birds in general at all study sites (combine). Its range remains between 239 to 375 birds per visit. Maximum and minimum bird population was recorded during 2013 and 2014 respectively. During 2011 and 2015 it was moderate. Due to highest rainfall during monsoon period of 2014 water table of all water bodies were increased and other small water puddles are formed. Birds visit this newly formed puddle. Thus count towards fixed site goes down.

Breeding behavior also regulates the population Heronry was found maximum in number between March to June during 2011 and 2013 inside the study area. Sure to this behavior over population was seen. It is also a fact that only highest rainfall is not responsible for highest population to all species. Actually if rainfall is highest in a particular year, it affects the next year population of migrant species. Acceleration or reduction in population of birds is totally dependent on migrant species.

Table:1 Highlights of different sites and their comparison

Code No of site	Name of area	Water table Non-monsoon (in meter)	Water table monsoon (in meter)	Distance town (in km)	Cover area (in hector)
I	Located near Shiva temple West side of Kansa village	03 to 04	o4 to 05	3	10
II	Vaghnara pond the south side of Kansa village	01 to 15	02 to 25	4	3.5
II	Vatrabh pond on Kamana road, Visnagar	01 to 02	02 to 03	1.5	9
IV	Malap pond on Gandhinagar road, Visnagar	0.5 to 01	01 to 1.5	1	3.5
V	Sewage canal on Mehsana road, Visnagar	0.5	01 to 02	0	1
VI	Delia pond Nr. Mota Hanuman temple, city area of Visnagar	03 to 4.5	05 to 06	00	19

Continue Table :1)

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Table : 1 Components of different sites based on their ecosystem

Code No of site	Food Source for birds	Properties of Water and soil	Main crops at the surround	Human activities
I	Planktons fishes	High Turbidity Low Dissolved oxygen Bulk Density of soil is high	No Crop land	Cloth, washing, Bathing etc.
II	Planktons Fishes	High Dissolved oxygen & NO2. Low conductivity, Fluorides,Chloride & Total Dissolved Solid Low Chloride in soil	Wheat, Bajari, Cotton, Castrol etc	Less
III	Planktons Fishes	High NO3 Low Calcium, Magnesium & Total hardness and NO2 Bulk Density and pH of soilare more but Moisture Content is less.	Wheat, Bajari, Cotton, Castor etc.	Less but some time fishing take place by people
IV	Planktons Fishes	Most of water property except Dissolved Oxygen NO2 and NO2 are high Turbidity is less Soil pH is less and Conductivity and chloride is high	Bajari, Castor etc.	Fishing Cattle bathing in summer etc.
V	Planktons Fishes	NO2 and NO3 are less but other parameters of water and soil are moderate	No Crop land	It is disturbed by noise and air pollution by traffic and it is also polluted by Cattle and Pigs.
VI	Planktons Fishes	Turbidity and Magnesium are less Bulk density of soil is less but Moisture content and chloride are high	No Crop land	Cloth washing Bathing Fishing etc.

Table :2 Average population of different birds species during study period

Code No.	Species	Average population	Percentage (%)	Status
1	Cattle Egret	25	788	R
2	Little Egret	14	4.55	R.BM
3	Median Egret	10	3.25	R.BM
4	Large Egret	4	1.27	R.BM
5	Pond Heron	11	3.75	R
6	Night Heron	1	0.32	BM
7	Grey Heron	1	0.24	LM
8	White Ibis	12	3.75	R
9	Black Ibis	3	0.89	R
10	Indian Morhen	2	0.72	LM
11	Common Sandpiper	10	3.16	LM
12	White -brested Waterhen	1<	0.07	R
13	Little Cormorant	14	3.35	R
14	Red wattled Lapwing	10	3.21	R
15	Black winged stilt	37	11.76	LM
16	Little Grebe	23	7.19	R
17	Lesser Whistling Tail	12	3.82	LM
18	Pheasant - tailed Jacana	2	0.48	LM
19	Spoon Bill	2	0.52	LM
20	Shoveller	63	19.81	LM
21	Pied Kingfisher	1	0.23	RLM
22	Whitebrested Kingfisher	1	0.4	RLM
23	Rosy Pelican	38	11.83	LM
24	Darter	1<	0.09	LM
25	Painted Stork	1<	0.14	LM
26	Pintail	14	4.28	LM
27	Comb Duck	5	1.42	LM
28	Avocet	1	0.45	LM
29	Coot	4	1.18	LM

Note :R- Resident, LM -Local migrant BM- Breeding migrant

Table -3 Year wise statement of birds at different sites

Year	I	II	III	IV	V	VI
2011	79	55	56	55	41	63
2012	20	93	70	52	41	22
2013	47	156	61	51	30	30
2014	20	49	50	46	34	40
2015	26	1<	138	111	15	43
Mean	42	84	62	53	36	40

Note : Figures shows birds population per visit

Table: 4 Month wise mean of birds in different sites

Month	I	II	III	IV	V	VI	Average
JAN	32	93.15	159.15	113.62	50.39	37.85	486.15
FEB	88.77	346.54	125.69	100.08	40.46	41.62	743.15
MAR	81.53	222.6	109.67	98.33	56.67	59.6	628.4
APR	55.29	45.93	42.57	32.5	41.29	53.79	271.36
MAY	66.13	48.67	73.53	52	47.6	47.6	335.53
JUN	36.53	29.27	31	35.6	32.93	25.73	191.07
JUL	20.23	15.39	17.31	19.92	18.23	13.69	104.77
AUG	21.08	13.69	16.85	19.77	21.15	20.23	112.77
SEP	20.54	19.08	20.69	24.08	24.85	33.54	142.77
OCT	21.92	28.33	26.5	24.67	23	38.42	162.83
NOV	22.83	39.17	33	38.42	24.08	47.08	204.58
DEC	28.31	93.85	83.31	76.23	41.46	55.62	378.77
Annual Mean	42.34	83.92	62.25	53.41	35.75	39.79	317.53
Percentage of birds in sites	13.33%	26.45%	19.60%	16.82%	11.26%	12.53%	100%

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