

STATUS AND DIVERSITY OF BIRDS OF RAMNA PARK, DHAKA, BANGLADESH

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Abstract: A study on status and diversity of birds of Ramna Park, Dhaka, Bangladesh was conducted from July 2013 to March 2014. Data were collected through direct field observations where 6 days had been spent in every month in the field. A total of 50 species of birds belonging to 11 orders and 28 families were observed. Of the 50 species, 84% were residents and 16% migrants, 50% were passerines, 50% non-passerines. Passeriformes presented the highest number (25 species) of observed birds. Only *Clamator jacobinus* was recorded as summer migrant among the migratory birds. We found *Psittacula eupatria* considered as Near Threatened globally according to IUCN. *Corvus splendens* was the most common with the highest number of individuals in comparison to other bird species. We observed single individual of *Clamator jacobinus* followed by *Psittacula eupatria* and *Apus pacificus* throughout the study. Regarding the relative abundance, 18% species were very common, 30% common, 16% fairly common and 36% few. Calculating the Shannon-Wiener and Simpson's indices of diversity and species evenness, we found maximum number of species and individuals in the month of December while minimum in the month of July. Anthropogenic activities such as festivals, random assemblies and gatherings, dumping of plastics, polythene and papers, noise from the vehicles were common inside and around the park, which may be threats to birds.

Key words: Birds, Bangladesh, Dhaka, Ramna Park

INTRODUCTION

Bangladesh has been endowed with a rich plant and animal diversity because of its fertile alluvial land and moderate climatic condition. The climate of Bangladesh is the subtropical monsoon climate; its natural forests are classified on the basis of three major vegetation composition: evergreen to semi-evergreen hill forests, deciduous Sal forests and mangrove forests (Mukul 2008). Depending upon such habitat composition, Bangladesh offers shelter to a total of 690 bird species of which 380 are residents, 209 winter visitors, 11 summer visitors and 90 vagrants (Khan 2008). The total number of bird species in Bangladesh is nearly the same as all of Europe (Khan 2008). It has been

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reported that a great diversity of avifauna is found in the Indian subcontinent (Ali 1972, Ali and Ripley 1989).

Avifaunal diversity plays a vital role to figure out the quality and condition of environment (Bilgrami 1995). In ecological monitoring and assessments they are frequently used as indicator variables as they constitute a well defined taxon (Lin *et al.* 2008). Some important activities like pest control (Jaman *et al.* 1999), pollination, seed dispersal and sound environment are performed by birds. The values of avifauna are immense for nature as well as for human being (Jaman *et al.* 1999). But now-a-days, this avifaunal diversity is threatened due to anthropogenic activities. Habitat loss is the most commonly cited human threat to birds (Norris and Pain 2002). Pollution, indiscriminate cutting down of trees, climate change, unplanned infrastructure are the main causes to confine the foraging, feeding and resting sites of birds. Thus, birds are compelled to change their habitats either from urban to rural or vice-versa. Comprehensive studies are therefore, needed to protect them from their critical positions.

Ramna Park is a large park that lies in the heart of Dhaka metropolis as a green oasis in the concrete jungle featuring a beautiful and modern venue for relaxation as well as a rich place for birds. Last study on avian diversity of Ramna Park was dated back to 39 years ago (Das 1975). The present work is not only focused on bird's list but also to find out their diversity as well as their status. In addition, the study also aims at providing updated information and compilation of information on birds of the study area.

MATERIAL AND METHODS

Study area: The study was carried out in the Ramna Park (23°44'14.70" N, 90°24'03.4" E) which is situated in central Dhaka, Bangladesh (Fig.1). Maximum temperature was recorded 36.2°C in April and May and minimum 15.1°C in December. Ramna Park now protects an area of 68.50 acres. There is a water tank, a lake, restaurant and an office in the park of which the lake covers 8.76 acres (35,500 m²). The study area is mainly plain land with a moderate number of flora and fauna. The Park grows 71 species of flowering trees shrubs, perennials, and annuals, 36 species of fruit bearing plant, 33 species medicinal plant and 41 species of forestry and 11 other species Walkways inside park have been widened and five new gates built for entry from different sides. The Park features many beautiful and modern venues for relaxation which is maintained by the Public Works Department (Murshed 2012).

Observations and sampling protocol: The study was conducted from July 2013 to March 2014. Data were collected through direct field observations. Assessment of the environmental condition was conducted before collecting data. The study used to start early in the morning and continued till sunset when animals were most active. Observations were made equally across the months. Six days were spent per month in the field to observe the wild birds. Line sampling method was conducted regarding the observations of different

species of birds. In total, 15 line samples were made and recorded at least for three times of observations. Size of the line samples varied from 500 m to 700 m in length and 30 m in both sides. When any species was observed, population was counted along with habitat type and food habit.



Fig. 1. Study area (Source: Dhaka South City Corporation).

Color, size and shape were the parameters that had been used to identify different species. Songs and calls had also been applied as identification criterion. During the study a pair of binoculars (Bushnell Powerview 10x42) was used. For identification of birds, Grimmett *et al.* (1999) and Halder (2010) were followed. In many cases, birds were photographed by D80 SLR camera in order to confirm the identification. Only the species with confirmed identification were listed. Khan (1982) was followed to estimate the relative abundance as very common (VC) 80-100%, common (C) 50 - 79%, fairly common (FC) 20 - 49% and few (F) 10 - 19% which was calculated based on total sighting.

Shannon-Wiener Index (1949), Simpson's index (1949) of diversity and evenness (quantifies how numerically equal the community is) of species in the study area were also calculated using following formulas:

$$\text{Simpson's index of diversity, } D = 1 - \sum (P_i^2)$$

$$\text{Shannon-Wiener Index, } H' = - \sum (P_i \ln P_i) \text{ (natural log)}$$

$$\text{Evenness, } E = H' / \ln(S) \text{ (natural log)}$$

(Where, P_i = number of individuals of a species/ total number of individuals of all species from a month and S = number of species observed).

Data analysis: Data were organized and tabulated in excel spreadsheet. The analysis of data were carried out using Microsoft excel. Shannon-Wiener Index, Simpson's index of diversity and evenness were calculated according to the month.

RESULT AND DISCUSSION

Faunal composition of avifauna: A total of 50 species of birds were found belonging to 11 orders and 28 families. Passeriformes had the maximum number (25 species) of birds followed by Piciformes (4 species), Coraciiformes (3 species), Strigiformes (3 species), Pelecaniformes (2 species), Columbiformes (2 species), Cuculiformes (3 species), Psittaciformes (2 species), Apodiformes (3 species), Acciptriformes (2 species) and Suliformes (1 species) (Table 1). Das (1975) recorded 37 species of birds in Ramna Park. Sarker *et al.* (2007) observed a total of 27 species of birds from two different sites in Dhaka, Bangladesh. A total of 50 species of avifauna were found from the Curzon hall premises, Dhaka University (Akash *et al.* 2013). Chowdhury *et al.* (2014) recorded 78 species of birds from the Dhaka university campus. The present study observed 50 species of birds that depict, the study area could be a better home to birds as it supports many flowering plants, fruiting trees, shrubs, large trees and lake inside the park.

Status and relative abundance of avifauna: Overall relative abundance showed that 18% birds were very common, 30% common, 16% fairly common and 36% few. (Fig. 2). Highest number of individuals were found in the month of December (534 individuals) followed by January (481 individuals) and February (409 individuals) and lowest numbers were in the month of July (189 individuals) followed by August (305 individuals) and September (350 individuals) (Fig. 3). *Corvus splendens* was the dominating species followed by *Passer domesticus* and *Acridotheres tristis* among the observed avifauna in the Ramna Park. Only *Clamator jacobinus*, *Psittacula eupatria* and *Apus pacificus* were observed in the month of September, August and January respectively. *Corvus splendens* is the scavenger bird which mainly feeds on waste products. So the highest population of this species indicates that the environment of Ramna Park is not clean in comparison to the other parts of Dhaka. We observed insectivorous birds such as *Dicrurus macrocercus* which acts as pest controlling agent especially insect pests. Jaman *et al.* (1999) studied that birds are considered as friends of human as they demolish a lot of harmful insects and mosquitoes from the environment.

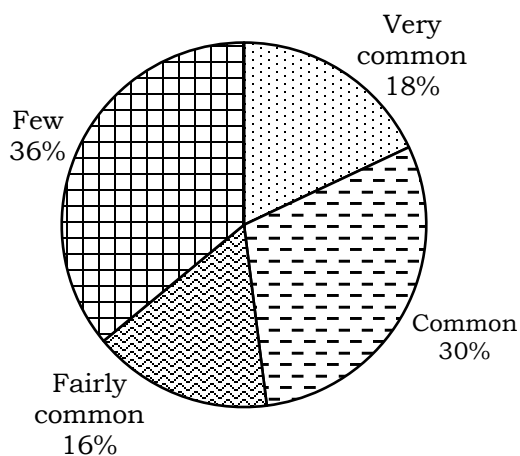


Fig. 2. Relative abundance of recorded avifauna in the study area.

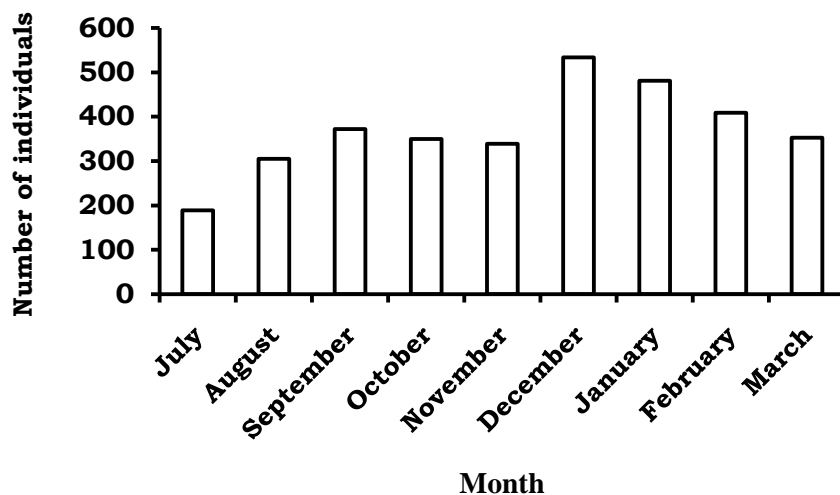


Fig. 3. Monthly variation of observed individuals of birds in the study area.

Resident and migrant status of birds: Among 50 species of birds, 84% were identified as residents and 16% migrants including winter migrant and summer migrant, 50% passerines and 50% non-passerines (Table 1). Among migratory birds, only *Clamator jacobinus* was the summer migrant. We found only one species (*Psittacula eupatria*) which is considered as globally Near Threatened (NT) birds. The resident and migrant status of this suggests that the study area still has a place for roosting, feeding, foraging and breeding sites for birds.

Species diversity indices: The value of Shannon-Weiner index was calculated to be highest ($H' = 3.209$) in the month of December and lowest ($H' = 2.899$) in the

month of July. Similarly, value of Simpson's index of diversity was found to be maximum ($D=0.947$) in the month of December and minimum ($D=0.921$) in the month of July (Table 2). These calculated values indicate that the species diversity was greater (43 species) in December in comparison to July (28 species). We also calculated species evenness where birds species were more evenly distributed ($E=0.820$) in the month of December and less distributed ($E=0.741$) in the month of July (Table 2). December is winter month of when migratory birds visited inside the park and constituted the highest species diversity along with resident birds. In contrast, for being warmer in the month of July there was no migratory birds that results low species diversity. In addition, July was the first month of data collection that might be another reason for the lowest diversity of species. For the avian fauna of Tilyar lake, Rohtak (Haryana, India), Singh and Laura (2013) reported the highest values of diversity indices in the month of December and lowest in the month of July. Another study found that high species diversity in December may be presence of migratory birds for food, proper foraging and breeding sites (Maheswaran and Rahmani 2001, Albores and Siguenza 2011). On the other hand, high temperature, low food availability and local migration of migratory avian fauna to nearby agriculture fields for food may be the reason for low species diversity in the month of July (Maheswaran and Rahmani 2001). Present findings match with those studies.

Problems and threats: We observed some problems and threats inside the Park area. Problems and threats include dumping of wastes materials such as plastics, polythene, chips packets as well as other unused papers. Anthropogenic movements, gatherings, festivals, selling of foods by hawkers, restaurant inside the Park and noise from the outside vehicles were considered as problems. Furthermore, people extensively used and still using this park area as short-cuts for communication to their destinations. These problems and threats might be affecting the bird species in the study area. (Hossain *et al.* 2004) reported that wild animals are losing their habitat due to anthropogenic activities in Hatiya Island, Bangladesh. Chopra and Rani (2015) also studied that anthropogenic activities causes major threats to avifauna in Chilli Lake, Fatehabad, Haryana, India.

Table 1. List of Avifauna in Ramna Park, Dhaka from July 2013- March 2014.

Order	Family Name	Scientific Name	English Name	Individuals observed	Pop ⁿ status, (Local*)	CS (Global*)	R/M	Group
		<i>Sturnus contra</i>	Asian Pied Starling	202	VC	LC	R	Pa
	Sturnidae	<i>Acridotheres tristis</i>	Common Myna	306	VC	LC	R	Pa
		<i>Acridotheres fuscus</i>	Jungle Myna	214	VC	LC	R	Pa
		<i>Sturnus malabaricus</i>	Chestnut-tailed Starling	73	VC	LC	R	Pa
	Pycnonotidae	<i>Pycnonotus cafer</i>	Red-vented Bulbul	273	VC	LC	R	Pa
	Cisticolidae	<i>Orthotomus sutorius</i>	Common Tailorbird	104	C	LC	R	Pa
	Acrocephalidae	<i>Acrocephalus stentoreus</i>	Clamorous Reed Warbler	5	F	LC	M _w	Pa
	Nectarinidae	<i>Nectarinia zeylonica</i>	Purple-rumped Sunbird	26	FC	LC	R	Pa
		<i>Nectarinia asiaticus</i>	Purple Sunbird	26	FC	LC	R	Pa
	Decapidae	<i>Dicaeum erythrorhynchos</i>	Pale-billed Flowerpecker	4	F	LC	R	Pa
	Passeridae	<i>Passer domesticus</i>	House Sparrow	350	VC	LC	R	Pa
Passeriformes	Laniidae	<i>Lanius schach</i>	Long-tail Shrike	17	FC	LC	R	Pa
		<i>Lanius cristatus</i>	Brown Shrike	5	F	LC	M _w	Pa
	Motacillidae	<i>Motacilla alba</i>	White Wagtail	34	C	LC	M _w	Pa
	Estrilidae	<i>Lonchura punctulata</i>	Scaly-breasted Munia	6	F	LC	R	Pa
	Paridae	<i>Parus major</i>	Great Tit	21	FC	LC	R	Pa
		<i>Oriolus xanthornus</i>	Black-hooded Oriole	50	C	LC	R	Pa
	Corvidae	<i>Dendrocitta vagabunda</i>	Rufous Treepie	48	C	LC	R	Pa
		<i>Corvus macrorhynchos</i>	Large-billed Crow	67	C	LC	R	Pa
		<i>Corvus splendens</i>	House Crow	388	VC	LC	R	Pa
	Dicruridae	<i>Dicrurus macrocercus</i>	Black Drongo	163	VC	LC	R	Pa
		<i>Dicrurus leucophaeus</i>	Ashy Drongo	6	F	LC	M _w	Pa
	Muscicapidae	<i>Copsychus saularis</i>	Oriental Magpie Robin	204	VC	LC	R	Pa
		<i>Ficedulla albicilla</i>	Taiga Flycatcher	6	C	LC	M _w	Pa
		Turdoidae	<i>Zoothera citrine</i>	Orange-headed Thrush	7	F	LC	R
	Megalaimidae	<i>Megalaima haemacephala</i>	Coppersmith Barbet	9	F	LC	R	NP
Piciformes	Picidae	<i>Dinopium benghalense</i>	Black-rumped Flameback	64	C	LC	R	NP

Order	Family Name	Scientific Name	English Name	Individuals observed	Pop ⁿ status, (Local*)	CS (Global*)	R/M	Group
		<i>Dendrocopos macei</i>	Fulvous-breasted Woodpecker	7	F	LC	R	NP
		<i>Celeus brachyurus</i>	Rufous Woodpecker	2	F	LC	R	NP
Coraciiformes	Alcedinidae	<i>Alcedo atthis</i>	Common Kingfisher	43	C	LC	R	NP
	Halcyonidae	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	18	FC	LC	R	NP
	Meropidae	<i>Merops orientalis</i>	Green Bee-eater	27	FC	LC	M _w	NP
Strigiformes		<i>Athene brama</i>	Spotted Owlet	47	C	LC	R	NP
	Strigidae	<i>Tyto alba</i>	Barn Owl	10	F	LC	R	NP
		<i>Ninox scutulata</i>	Brown Hawk Owl	2	F	LC	R	NP
Pelecaniformes	Ardeidae	<i>Egretta garzetta</i>	Little Egret	4	F	LC	R	NP
		<i>Ardeola grayii</i>	Indian Pond Heron	26	FC	LC	R	NP
Columbiformes	Columbidae	<i>Columba livia</i>	Common Pigeon	54	C	LC	R	NP
		<i>Streptopelia chinensis</i>	Spotted Dove	43	C	LC	R	NP
		<i>Hierococcyx varius</i>	Common Hawk Cuckoo	10	F	LC	R	NP
Cuculiformes	Cuculidae	<i>Clamator jacobinus</i>	Pied Cuckoo	1	F	LC	M _s	NP
		<i>Eudynamys scolopaceus</i>	Asian Koel	22	FC	LC	R	NP
Psittaciformes	Psittacidae	<i>Psittacula krameri</i>	Rose-ringed Parakeet	105	C	LC	R	NP
		<i>Psittacula eupatria</i>	Alexandrine Parakeet	1	F	NT	R	NP
		<i>Cypsiurus balasiensis</i>	Asian Palm Swift	49	C	LC	R	NP
Apodiformes	Apodidae	<i>Apus affinis</i>	House Swift	69	C	LC	R	NP
		<i>Apus pacificus</i>	Forked tail swift	1	F	LC	M _w	NP
Accipitriformes	Accipitridae	<i>Milvus migrans</i>	Black Kite	95	C	LC	R	NP
		<i>Haliastur indus</i>	Brahminy Kite	9	F	LC	R	NP
Suliformes	Phalacrocoracidae	<i>Phalacrocorax niger</i>	Little Cormorant	7	F	LC	R	NP

Note: VC-Very common, C-Common, FC-Fairly Common, F-Few, LC-Least Concern, Popⁿ – Population, R/M- Resident and migrant status, R-Resident, M-Migrant, M_s- Summer migrant, M_w- winter migrant, Pa- Passerine, NP- Non-Passerine, CS- Conservation status, Local*-Study site and Global*- Version 2015-3. www.iucnredlist.org

Table 2. Species diversity indices according to month.

Parameter	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Shannon-Wiener index (H')	2.899	2.996	3.039	3.020	3.047	3.209	3.069	3.077	2.925
Simpson's index of diversity (D)	0.921	0.930	0.934	0.935	0.933	0.947	0.935	0.934	0.931
Evenness (E)	0.741	0.766	0.777	0.772	0.779	0.820	0.784	0.787	0.750
Species observed	28	34	36	35	40	43	40	42	34
Individual observed	189	305	372	350	339	534	481	409	353

Note: Aug-August. Sep-September, Oct-October, Nov-November, Dec-December, Jan-January, Feb-February and Mar-March

In conclusion, we observed 50 species of birds belonging to 11 order and 28 families. This figure indicates that the Ramna Park is the potential habitat for the birds. However, some anthropogenic threats had been observed that might be affecting the birds in the study area. So, elaborate study is needed in that area. Massive steps including conservation measures with awareness and punishment must be taken to bring sound environment inside the park.

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LITERATURE CITED

- AKASH, M., HOSSAIN, M. A., CHOWDHURY, G. W., MAHMUD, H. and ISLAM, M. A. 2013. Status of avifauna in Curzon Hall premises University of Dhaka, Bangladesh. *Ecoprint*. **20**: 1-8.
- ALBORES, J. E. R. and SIGÜENZA, A. G. N. 2011. Relationships between bird species richness and natural and modified habitat in Southern Mexico. In: *Changing Diversity in Changing Environment*. (Ed., Grillo, O.). 932 pp. <http://www.intechopen.com/books/changing-diversity-in-changing>
- ALI, S. 1972. *The book of Indian Birds*. 9th ed. Bombay Natural Historical Society, Bombay. India.
- ALI, S. and RIPLEY, S. D. 1989. *Compact Handbook of the Birds of India and Pakistan Together With Those of Bangladesh, Nepal, Bhutan and Sri Lanka*. 2nd ed. Oxford University Press, Delhi, India. 882 pp.
- BILGRAMI, K.S. 1995. *Concept and Conservation of Biodiversity*. CBS Publishers and Distributors, New Delhi.
- CHOPRA, G. and RANI, P. 2015. Species Diversity and Abundance of Birds of Chilli Lake, Fatehabad, Haryana. *Int. J. Inn. Res.Dev.* **5**(4):156-162.
- CHOWDHURY, S., AICH, U. and SHAHADAT, O. 2014. Checklist of avian fauna of Dhaka University Campus, Bangladesh. *Int. J. Fauna. Biol. Stud.* **1** (5): 56-60.
- DAS, A.K. 1975. A study on birds of Curzon Hall and Ramna Park. M.S. thesis (unpubl.), Dept. of Zoology, University of Dhaka.
- GRIMMETT, R., INSKIPP, C. AND INSKIPP, T. 1999. *Pocket Guide to the Birds of the Indian Subcontinent*. Oxford University Press, New Delhi. 384 pp.
- HALDER, R.R. 2010. *A Photographic Guide to Birds of Bangladesh*. Baikal Teal Publication, Dhaka, Bangladesh. 257 pp.
- HOSSAIN, M.K., JAMAN, M.F. and SARKER, S.U. 2004. Diversity of herpeto-mammalian fauna and their conservation issues in Hatiya island, Bangladesh. *Tropi. Biod.* **8**(2):71-78.
- IUCN Red List of Threatened Species. Version 2015-3. (www.iucnredlist.org).

- JAMAN, M.F., SARKER, S.U. and SARKER, N.J. 1999. Food habits and feeding behavior of black drongo, *Dicrurus macrocercus albirictus* (Hodgson). *Bangladesh J. Zool.* **26**(2):57-66.
- KHAN, M. A. R. 1982. *Wildlife of Bangladesh (A checklist)*. University of Dhaka. Dhaka. 173 pp.
- KHAN, M.M.H. 2008. Protected Areas of Bangladesh- A. Guide to Wildlife. Nishorgo Support Program, Bangladesh. Forest Department. 304 pp.
- LIN, Y. P., YEH, M. S., DENG, D. P. and WANG, Y. C. 2008. Geostatistical approaches and optimal additional sampling schemes for spatial patterns and future sampling of bird diversity. *Global Ecol. Biogeogr.* **17**(2): 175–188.
- MAHESWARAN, G. and RAHMANI, A.R. 2001. Effects of water level changes and wading bird abundance on the foraging behavior of black-necked stork, *Ephippiorhynchus asiaticus* in Dudwa National Park, India. *J. Biosci.* **26**: 373-382.
- MANJU, A.H. 2001. Tk. 382 crore projects for conservation of biodiversity in the Sundarbans. In: *State of Sundarbans. Forum of Environmental Journalists of Bangladesh (FEJB)*. (ed., Chowdhury, Q.I.). Dhaka. pp.89-91.
- MUKUL, S.A. 2008. Biodiversity Conservation Strategies in Bangladesh: The State of Protected Areas. *Tiger Paper* **34**(4): 28-32.
- MURSHED, S.M. 2012. In: *Banglapedia: National Encyclopedia of Bangladesh* (Ed., Islam, S. and Jamal, A.A.) Asiatic Society of Bangladesh. 4810 pp.
- NORRIS, K. and PAIN, D. 2002. *Conserving Bird Biodiversity: General Principles and their Application*. Cambridge University Press.
- SARKAR, N.J., Sultana, D., Jaman, M. F. and Rahman, M. K. 2009. Diversity and population of avifauna of two urban sites in Dhaka, Bangladesh. *Ecoprint* **16**: 1-7.
- SHANNON, C.E. and WIENER, W. 1949. *The mathematical theory*. University of Illinois Press, Urbana. 117 pp.
- SIMPSON, E. H. 1949. Measurement of diversity. *Nature*. **163**: 688.
- SINGH, A. and LAURA, J.S. 2013. Avifauna Species Diversity and their Abundance in Tilyar Lake, Rohtak, Haryana (India). *Bulletin of Environment. Pharmacol. Life Sci.* **3** (1): 180-185.

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