Volume : 4 | Issue : 2 | February 2015 • ISSN No 2277 - 8179

Research Paper

Environmental Science

KEYWORDS : Avifauna, Abundance, Occurrence, diversity.

Identification and Characterization of Avifauna in Acharya Nagarjuna University – A Report

Suneel Gudla — Department of Environmental Science, Acharya Nagarjuna University, Guntur, Andhra Pradesh, India

P.Brahmaji Rao — Department of Environmental Science, Acharya Nagarjuna University, Guntur, Andhra Pradesh, Indi

ABSTRACT

Avifauna plays significant role in ecological balance of an ecosystem. The presence of birds leads to sustainability and their presence indicates the landmark for diversity of flora and other living organisms. The present investigation was carried out to document observations made on diversity of avifauna in Acharya Nagarjuna University, Nambur located in the Guntur district of Andhra Pradesh State. Diversified ecosystem of the University revealed abundance of forty seven species of birds recorded of during the study. The study showed that, the varied composition of birds associated with ecosystem sharing common habitat for different purposes. The native flora such as scattered horticulture gardens, bushy scrubs, trees, swamps, small water bodies and undisturbed wilderness in the area might have extended comfortable shelters and foraging ground for avifauna. It is hoped that this study would provide a preliminary database for the avifauna of this area for the further research.

Introduction

Birds are found throughout the world, at approximately all altitudes and in nearly every climate. They are a natural way to control pests in gardens, on farms, and other places. They aid in the pollination of plants. By landing on a plant or sucking the nectar from a flower, and then moving on to the next, a bird does the job usually associated with bees. Birds also have a good system for spreading seeds. They eat berries and then when they "dispose of" their waste, the berry seeds are disposed along with it. Bird feces provide good fertilization for the seeds with which they are dropped, giving seeds very good conditions to grow. Birds serve as one of the best environmental indicators. Their presence anywhere speaks volumes of the environment as to whether all is well or there is something amiss. The presence of birds also shows the biological importance or going technical, the biodiversity significance of an area. (Harney and Bhute, 2014)

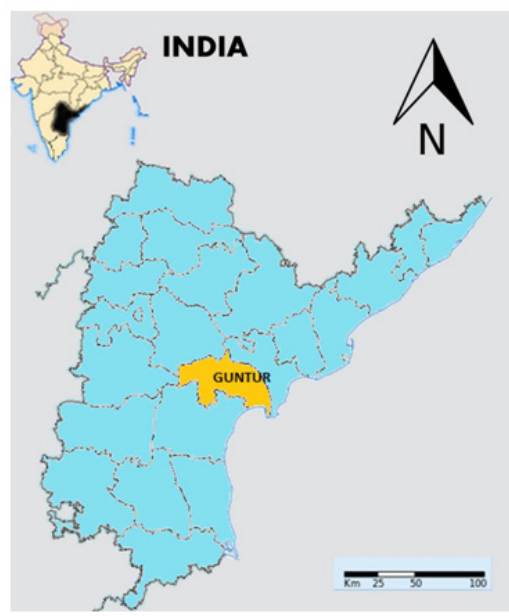
Urban biodiversity has received very little attention from conservation biologists as compared to natural and protected ecosystems (Jules, 1997; Vandermeer, 1997). Patvarthan*et al.* (2000) have identified educational and defense premises as hotspots for urban biodiversity. Although educational premises occupy less than 5% of the total urban area, such areas may harbour up to half the biodiversity of the urban biota (Patvarthan*et al.*, 2000).

Checklists of avifauna of the educational premises, cities, states and protected areas of state and country (Rathinasabapathy&Kalairasan, 1992; Kasinathan*et al.*, 1995; Inskipp*et al.*, 1996; Padate&Sapana 1996; Thirumurthi, 1997; Goswami, 1999; Oswin, 1999; Mohan, 2000; Mahabal, 2000;Michael *et al.*, 2000; Palot&Pramod, 2000; Rathore& Sharma, 2000; Sivaperuman& Jayson, 2000; Ramitha&Vijayalaxmi, 2001) have been compiled. The present study is aimed at providing a checklist of the avifauna, which is one of the first studies in the area. It also includes the classification of each species thus providing a record of the species for further studies related to campus biodiversity and to create awareness for their conservation.

Materials and methods:

Study Area

Acharya Nagarjuna University is situated between the cities of Vijayawada and Guntur in Andhra Pradesh at 16022'31.16" N 800 31'42.9"E. Its campus is spread over an area of 293 acres.The climate is tropical in Guntur. In winter there is much more rainfall in Guntur than in summer. The average annual temperature in Guntur is 28.5 °C. About 905 mm of precipitation falls annually.



Study Area

The distribution and occurrence of avifauna correlate well with the vegetation patterns of the area, which is of great significance. The vegetation found in this area mainly consists of naturally grown trees and shrubs. The study area supports a number of native as well as exotic floral species. A large number of tall trees and indigenous fruiting trees occur in this area, which attract many birds (Wadatkar, 2000). Almost all these plants provide some cover and food for the birds throughout the year.

The birds were observed during the most active period in the day, mornings (06.00 to 10.00 hours) and late afternoons (16.30 to 19.00 hours). Sightings were carried out for two days a week during all seasons of the year to encounter maximum birds in an area. Moreover, superficial sighting was carried out every day at the main spots during the morning and evening hours every day. The identification of birds and their occurrence were noted using a 7×35 binocular. Bird identification followed Ali and Rip-

Volume : 4 | Issue : 2 | February 2015 • ISSN No 2277 - 8179

ley (1983), Coomber (1991), Ali and Ripley (1996), Ali (1996), and Grimmettet al. (1999).

We used field binocular to observe and identify bird species. We used some taxonomic books (Baker 1920-30, Ali and Ripley 1983a,b, Lodge 1991, Kotpal 1992 and Ali 1996) to identify birds upto species level. Observations were made by standing and sitting from a hiding place. Photographs were taken where ever necessary to identify birds accurately to the generic and species level. In addition, breeding birds were recorded and vegetation sampling was done during the study period.

The checklists have been prepared based on the following parameters: Common Name, Scientific Name, Local Name, and Field characters, Habit &Habitat, Distribution, Food andNesting.

Results:

Acharya Nagarjuna Universitysupports a good number of avifauna as it has a rich and varied vegetation pattern and possesses small water bodies. The university comprises of different vegetation patterns that include scrubland, dense shrub vegetation with scattered trees, open garden vegetation with sparse trees, and open degraded grounds and buildings.

Diversity of avifauna is one of the most important ecological indicators to evaluate the quality of habitats. Now-a-days, avifaunal diversity has been decreasing due to the destruction of natural habitats and human disturbances. Random destruction of natural habitats by cutting nesting trees and foraging plants for commercial use of woods and lands are the main factor responsible for narrow down in avian foraging habitat and their nesting sites. Thus, many species of birds may be forced to inhabit in the urban areas and constrain them to breed there. Birds are essential animal group of an ecosystem and maintain a trophic level. Therefore, detail study on avifauna and their ecology is important to protect them.

Forty seven species of birds were observed, which is comparable to any small reserve forest. However, the low diversity may be due to constant human activities within and around the study area.The most common birds are crow, pigeon, common myna, jungle babbler etc;Birds like common quail , grey wagtail are observed in the bushes, birds like golden oriole, pied crested cuckoo, grey wagtail , large cuckoo shrike are spotted rarely. Birds like jungle babblers, woodpeckers, mynas are spotted sharing common niche on the ground withsquirrels.

Discussion

Studies on behavior and breeding ecology of birds are well done (Baker 1920-30, Wallace 1963, Ali and Ripley 1983b, Lodge 1991, Kotpal 1992, Ali 1996, Khan 1996, Sruti 2008). It is well known that birds are friends of human as they destroy lot of harmful insects and mosquitoes from the environment (Jaman*et al.* 1999).

There are large number of thorny trees and thickets, which support a good number of avifauna. The study site possesses small water bodies in many numbers resulting mainly due to water overflow from the buildings and rain that supports water birds in the site. It was found that the occurrence of avifauna was significantly varied according to the vegetation patterns and anthropogenic pressure. The study site is rich in avifauna but problems have arisen recently as the habitat of these birds are threatened, due to unplanned activities being carried out in favour of human development, for which the thickets of the area have been cleared. Birds are sensitive to the local landscape and change in vegetation patterns can affect the population of birds in the area (Sauvjot*et al.*, 1998; Savard*et al.*, 1999). Such a rare green spot should be managed well to attract more bird species and make the premises favourable for various birds.

This observation is supported by Sinha *et al.* 1978. The mixed forest habitat support a higher number of species of birds than other habitat, mainly because the mixed forest habitat as it was multistoried and average tree height ranging between 4-8 meters with emergent going up to 11 meters and had more plant species in the tree layer and several shrub species. This idea is also supported by Mac Arthur and Mac Arthur, 1961 and Jain, 2011. Most of the observed species are mixed forest residents mainly due to occurrence of various types of microhabitat (Anand et al., 2013).

The major influencing factor on the composition and distribution of bird species is the direct human intervention. The diversity recorded in such a human impacted area must not mislead one to those of large green parks and reserves in these areas, as they support high species diversity because these protected urban areas are the habitat fragments of highly diverse ecosystem (Schaefer, 1994) while most of the urban habitats are unable to sustain their own biota and they often get the diversity from surrounding less impacted areas (Nayan et al., 2005).

Conclusion:

Birds are very useful as destroyer of pests. A big proportion of birds' diet consists of insects (and their larva), including many that are highly injurious to man. A large number of birds feed on rodents and mice, both very destructive for farmers all over the world. Vultures, Crows, Kites and Egrets feed on carrion and waste in garbage dumps. These birds play an invaluable part in keeping our environment clean and disease-free.

In conclusion, the present study emphasizes the need to conduct a detailed study on the status of ecosystem and biology of avifauna to have accurate information on the ecological role of birds associated with agro-ecosystem. The ecosystem of Nagarjuna University is diversified with various aquatic birds. The anthropogenic activities are affecting the occurrence, abundance and richness of avifauna. The birds are the important bio indicators of ecosystems which should be protected to conserve the biodiversity and environment.

47 species of Birds identified in Acharya Nagarjuna University

S.No	Commo	Scientific	Local	Field characters	Habit &	Distribution	Food	Nesting
	n Name	Name	Name		Habitat			
1	Asian Palm swift	Cypsiurusb alasiensis	katthi	A slim, plain sooty-grey bird with narrow deeply forked tail	Open country, tad palm rigid folds and furrows	India, Bangladesh, Srilanka, Myanmar	Insects	Undefined
2	Black drongo	Dicrurusma crocerus	Pasalapoli gadu	Glossy black bird with long, deeply forked tail	Savannas, fields, urban habitats	India, Bangladesh, Pakistan, Srilanka, Myanmar	Insects, flower nectar, also occasionally small birds	April to August
3	Black kite	Milvismigr ans	Mallagadd a	Large brown hawk with forked tail	Towns and villages	India, Bangladesh, Pakistan, Srilanka, Myanmar	Garbage, earth worms and termites, almost everything	Winter and Monsoons
4	Blue tailed bee-eater	Meropsphil ippinus	Komupass eriki	Black stripe through the eyes, deep chestnut throat and breast blue rump and tail	Open country	India, Bangladesh, Pakistan, Srilanka, Myanmar	Bees and dragonflies	March to June
5	Cattle egret	Bubulcus ibis	Samtikong a	Normally white plumage, color of bill is yellow, in breeding period it has orange buff head neck and back	Marshes, rivers, tidal mud flats	India, Bangladesh, Pakistan, Srilanka, Myanmar	Insects, fish, frogs and small reptiles	July to August in North and November to February in South
6	Commo n coot	Fulicaatra	Bollikodi	A slaty black tailless water bird, very duck like	Vegetated lakes, rush bordered irrigation tanks	India, Bangladesh, Pakistan, Srilanka, Myanmar	Grass and paddy shoots, aquatic weeds, mollusks, insects	July to August

7	Common Myna	Aacridothe restristis	Gorinka	dark brownbird with bright yellow bill, legs, bareskin around eyes	follows where man opens new habitations	India, Bangladesh, Pakistan, Srilanka, Myanmar	Fruits, insects, kitchen scraps	April to August
8	Common quail	Coturnixco turnix	Gogarielli chi	A plump, squat, almost tailless francolin like pale brown bread	Standing crops and grassland	India, Pakistan, Myanmar	Grain and seeds, termites etc	Overall February to October
9	Common wood shrike	Tephrodorn ispondicera nius	Ulapitta	A plain grayish bird with a dark stripe below the eye, a distinct white superculum. Hook tipped shrike bill	Light deciduous forests, gardens, babool, neem trees etc	India, Bangladesh, Pakistan, Srilanka, Myanmar	Insects, fruits, berries, banyan and peepul twigs, nectar	February to September
10	Eurasian golden oriole	oriolusoriol us	vangapand u	Bright golden yellow with black in wings and tail, and a black streak throughout the eye	Arboreal, large trees in villages, gardens, noisy towns	India, Bangladesh, Pakistan, Srilanka	Insects, fruits, berries, banyan and peepul twigs, nectar	April to July
11	European starling	Sturnus vulgaris	Not available	Slim, glassy black myna with metallic green and purple reflection finely stippled with whitish, feathers of head, neck and breast	Highly gregarious, damp fields, lawns and pasture	India, Europe, Pakistan, Australia, New Zealand	Mainly fruits, berries and insects	May to June
12	Golden backed wood pecker	Dinopiumj avaense	Kanutolac hhi	Crimoson rump and orange or scarlet mixture on upper back crown and crest crimson in male , black stippled with white in female	Foothill moist deciduous and evergreen forests	India	Insects and insect Larve	January to May
13	Greater coucal	Centropuss inensis	Jamudu kaki	A clumsy glossy black with conspicuous chestnut wings and long , Board, graduated tail	Largely terrestrial, grass land and shrubbery, near to humans	India, Bangladesh, Pakistan, Srilanka, Myanmar	Caterpillars, large insects, snails, lizards, mice and bird eggs	February to September
14	Grey wagtail	Motacillaci nereatunsta ll	Muditippu dujitta	A sprightly, slim long tailed bird chiefly grey and yellow	About singly on ground in wooded country and forest glades	India , Bangladesh, Pakistan , srilanka Myanmar	May flies, beetles, mollusks and crustaceans	May to July
15	House Crow	Corvussple ndensvieill ot	Manchi kaki	Grey neck and smaller size	Towns and villages	India, Bangladesh, Pakistan, Myanmar	It eats almost everything	April to June
16	House Sparrow	Passer Domesticus linnaeus	Pechuka	Grey crown, black lore around eye	Towns and villages	Worldwide	Grains, insects, nectar and kitchen scraps	Round the year
17	House swift	Apus affinis	Not available	A small smoky black bird, short square tail and narrow wings	Ruined buildings, deserted houses	India , Bangladesh, Pakistan , Srilanka, Myanmar	Dipterous insects	February to September
18	Indian chat	Cercomeda fusca	Not available	Plain brown above, rufous brown below with darker wings	Rocky hills , ravines, ruins, bungalows	India, Pakistan	insects	February to August
19	Indian cuckoo	Cuculusmi cropterusgo uld	Not available	Above dark slaty grey, brown tinged , pale ashy and white below	Arboreal, seen flying hawk like above the forest canaopy	Throughout subcontinent except in arid zones	caterpillars, insects	Mid March to August
20	Indian robin	Indian robin	Not available	A sprightly black bird with a white patch on wings		A stony scrub country around towns and villages	Insects, spiders	April to June
21	Indian roller	Coraciasbe nghalensis	Pala pitta	Blue bird with biggish head, heavy black bill, pale blue	Light deciduous forest open country	India, Bangladesh ,Pakistan srilanka, myanmar	Insects, rogs, lizards	March to July
22	Indian treepie	Dendrocitta vagabunda	Kanda katigadu	A long tailed chestnut brown birdwithsoothy head and neck	Wooden country, scrab jungle, gardens, residential compounds	India Bangladesh, Pakistan, Myanmar	Fruits, insects, lizards, frogs, centipedes, rodents	March to may
23	Jungle babbler	Turdoidesst aitus	Vurapichu ka	An earthy brown frowzled and untidy lokking bird with longish Tail which gives the impression of being loosely stuck in to body	Gardens and groves of tress,, villages and towns	India , Bangladesh, pakistan	Spiders, cockroaches and other insects	Througho ut the year
24	koel	Eudanamys scolopacea	Podakovel a	Male glistening black with yellowish green bill	Arboreal , gardens, blood parasitic large leafy tress	India, Bangladesh, Pakistan , srilanka	Fruits and berries , caterpillars and insects	April to august
25	Large cuckoo shrike	Coracinam acei	Paeddaaku rai	Grey bird, whitish from breast down with a board dark eye streak	Arboreal, deciduous forest. evergreen jungle	India , Bangladesh srilanka . Myanmar	Insects, berries and banyan peepul	May to October
26	Lesser golden backed wood pecker	Dinopiumb anghalense	Vadrangi pitta	Upper plumage golden yellow and black, crown and occipital	Open tree and scrub jungle, groves of ancient tress	India, Bangladesh, Pakistan, srilanka	Beetles, insects, black ants	March to august
27	Little cormora nt	Phalacroco raxnaiger	Netti kaki	Black duck like water with a longish stiff tail, compressed bill sharply hooked at the tip	Inland waters, brakish lagoons, and tidal creeks	India, Bangladesh, Pakistan srilanka, Myanmar	Fish	November to februray
28	Pied bush chat	Saxiolacapr ata	kumpanal alchi	Male black with white patches on rump, abdomen and wings	Scrubbed country, villages	India, Bangladesh, Pakistan, srilanka, Myanmar	Flying insects	February to May
29	Night heron	Nycticorax nycticorax	Chintawak ha	ashy grey above with glistening black back	Inland waters, noctumal	Inland, Bangladesh , Pakistan, srilanka, myanmar	Crabs, fish, aquatic, insects, frogs etc	December to February
30	pied crested cuckoo	clamatorjac obinus	Not available	A handsome, crested black and white cuckoo	Well wooden country, chiefly arboriat	India , Bangladesh, Pakistan, srilanka, myanamar	Hairy caterpillars, grass hoppers, berries	June to August
31	Pied king fisher	Cerylerudis	Not available	Black and white kingfisher with typical, stout, dagger shaped bill	Rivers, jheels, irrigation tanks	India, bangladesh , Pakistan, srilanka, myanmar	Fish, tadpoles, frogs, aquatic insects	October to May
32	pond heron	Ardeolagra yii	Guddykon ga	An egret like marsh bird earthy brown when at rest , but with Glistening white wings	water , rivers, roadside, mangroves, almost every where	India, Bangladesh, Pakistan, Myanmar	frogs, fish, crabs, insects	May to September
33	purple rumped sunbird	Nectatiniaz eyolica	Not available	Upper parts and breast glistening metallic crimson, green and puple lower parts yellow	Plants, trees, responsible for cross pollination of flowers	Srilanka and peninsular India	Nectar	Not yet defined
34	Purple sunbird	Nectariania asiatica	thena pitta	Breeding male metallic dark blue	Gardens, grooves, cultivated and scrub country	India, Bangladesh, Pakistan, myanamar	Insects , spiders	March to May
35	Raven	Corvuscora xlinnaeus	Not available	A larger and heavier version of jungle crow	Usually seen in pairs, feeds communally with other scavengers	India	Omnivorous	December to March
36	red vented bulbul	Pycnonotus cafer	pigli pitta	A perky smoke brown bird with partially crested black head	Common in gardens, light scrub jungles, near human habitats	India, Bangladesh ,Pakistan, Myanmar	Insects, fruits, and berries vegetables, nectar	February to May
37	Red wattled lapwing	vanellusind icus	Yennapac hitawa	A familiar plover , bronze brown above ,white below with black head and neck and a crimson fleshy wattle in front of each.	ploughed fields , grazing land	India, Bangladesh, Pakistan, srilanka, Myanmar	Insects, grubs, mollusks	March to August
38	Red whisker ed bulbul	pycnnotusj ocosus	Not available	Brown above, wite below with a broken blackish necklace on breat, black upstanding pointed crest , crimson whiskers	Better wooden localities, gardens	India, Bangladesh, Pakistan, Myanmar, srilanka	Insects, fruits, berries	February to august
39	Rock pigeon	Columba liviagmelin	gudipavar ai	Slattygery bird with metallic green, puple on neck and upper breast , two bars on wings, band across end of tail	Open country with cliffs and rocky hills	India, srilanka, Pakistan, Bangladesh, Myanmar	cereals, groundnuts etc	Undefined
40	Rose ringed parakeet	psittaculakr ameri	chiluka	A smaller edition of the alexandrine parakeet, but lacking shouldered patches	villages and towns	India, srilanka, Pakistan, Bangladesh, Myanmar	Fruits, vegetables etc	February to April
41	Shikra	Streptopeli achinesis	Not available	A lightly built hawk, ashy blue grey above, and white below cross barred with rusty brown	Large trees in villages, avoids forests	India, srilanka, Pakistan, Bangladesh, Myanmar	Lizards, mice, squirrels, birds etc	March to June
42	Spotted dove	streptopelia chinesis	podabelag uvva	white spotted pinkish brown and grey upper parts	Varendas, bungalows, gardens, cultivated country	India, srilanka, Pakistan, Bangladesh, Myanmar	Insects, grass, grains, and other vegetation	All the year
43	Spotted owlet	Athenebra ma	Not available	A squat, white spotted grayish brown little owl, with a typical round head and staring yellow eyes	Nocturnal, spend day in ancient trunk	India, Pakistan, Bangladesh, Myanmar	Beetles, insects, lizards, mice	November to April
44	White breasted kingfish er	Halcyon smyrnensis	Buchegad u	Blue kingfisher with deep chocolate brown head and underparts white	Ponds, puddles, rain filled ditches, paddy fields, sea shore	India, Bangladesh, Srilanka, Pakistan, Myanmar	Fish, tadpoles, lizards, grasshoppers, insects	March to July
45	White breasted water hen	Amaurorni sphoenuru s	Buda kodi	Slaty grey tailed long legged marsh bird with prominent white face and breast	Jheels	India, srilanka, Pakistan, Bangladesh, Myanmar, Maldives	Insects, Worms, Mollusks	June to October
46	White wagtail	Motacilla Alba linnaeus	Not available	In non-breeding plumage the black bib is much reduced, chin, throat being white like the under parts	Fallow lawns , golf links, maiden, lawns, leafy trees	India, Bangladesh, Pakistan	Insects, mollusks, fruits	May to July
47	Yellow breasted babbler	Macronous gularis	Not available	Above grayish olive with tiny olive cap and wings, lores pale yellow, below yellow, breast with dark streaks	Light and defense forests	Eastern peninsular region, Bangladesh	Insects	April to July

Volume : 4 | Issue : 2 | February 2015 • ISSN No 2277 - 8179

REFERENCE

1. Ali, S. 1996. The Book of Indian Birds (11th Ed). Bombay Natural History Society, Bombay, 197 pp. | 2. Ali, S. 1996.The Book of Indian Birds. 12th Edition. Oxford University Press, Delhi, 140pp. | 3. Ali, S. and Ripley, S.D. 1996.A Pictorial Guide to the Birds of the Indian Subcontinent. 2nd Edition (update). Oxford University Press, Mumbai, 150pp. | 4. Ali, S. and S.D. Ripley. 1983a. A Pictorial Guide to the Birds of the Indian Subcontinent. Bombay Natural Society, Bombay, India. | 5. Ali, S. and S.D. Ripley. 1983b. Hand Book of the Birds of India and Pakistan. Compact Ed. Oxford Univ. Press, Delhi, 737 pp. | 6. Anand M., Pradeepa V., Prabakaran P.and P. Kumarasamy, 2013. Studies on avifauna in and around Melaselvanoor and Keelaselvanoor bird sanctuary Ramanathapuram district, Tamilnadu. Advances in Applied Science Research, 4(5):184-189 | 7. Baker, E.C.S. 1920-30. The Fauna of British India (including Ceylon and Burma) (2nd Ed). Vol. 6. Taylor and Francis, Red lion Court, London. | 8. Coomber, R. 1991.Birds of the World. Colour Library Books Ltd, Italy. | 9. Goswami, S. 1999. Birds in Shivpuri Forest, Madhya Pradesh. Zoos' Print Journal 14(7): 75-76. | 10. Grimmett, R., Inskipp, C. and Inskipp, T. 1999.Birds of the Indian subcontinent. Oxford University press, New Delhi, 344pp. | 11. Harney, N.V. and Bhute, K.B. 2014. Diversity of Avifauna in and around Chalbardi (rai) lake near Bhadrawati, district Chandrapur (m.s.), India. Journal of Global Biosciences. Vol. 3(2), 2014, pp. 399-405 | 12. Inskipp, T., LindsayN. and Duckworth, W. 1996. An Annotated Checklist of Birds of the Oriental Region. Oriental Bird Club. UK. | 13. Jain V. 2011. MP State biodiversity Board, Bhopal. 58-69. | 14. Jaman, M.F., Sarker, S.U. and Sarker, N.J. 1999. Food habits and feeding behavior of black drongo, Dicrurusmacrocercusalbirictus (Hodgson). Bangladesh J. Zool. 26(2):57-66. | 15. Jules, E.S. 1997. Danger in dividing conservation biology and agro ecology. Conservation Biology 11: 1272-1273. | 16. Kasinathan, S., Parthiban, M. and Paulraj, S. 1995. Birds of the Grizzled Giant Squirrel Wildlife Sanctuary, Srivilliputtur, Tamil Nadu. Zoos' Print Journal 10(5): 8-14. | 17. Khan, M.A.R. 1982. On the major wildlife species of St. Martin Island. Paper presented at the 6/7th Annual Bangladesh Science Conference, February, 1982, BARI, Joydebpur, Dhaka. p. 5. | 18. Kotpal, R.L. 1992. A Modern Text Book of Zoology, Vertebrates. Rastogi Publications India. | 19. Lodge, W. 1991. Birds Alternatives Names: A World Checklist. British Library Publications, Sterling Publishing Company Limited, USA. | 20. MacArthur R H, and MacArthur JW. 1961. Ecology, 42, 594–598. | 21. Mahabal, A. 2000. Birds of Talra Wildlife Sanctuary in lower western Himalaya, H.P., with notes on their status and altitudinal movements. Zoos' Print Journal 15(10): 334-338. | 22. Michael J.B., Davis,W.F., Mark B.R.and Brian, K.S. 2000.A Field Cchecklist of the Birds of Guyana. Publication 41 of the Biological Diversity of the Guianas program, Smithsonian Institution, Washington, DC, USA. | 23. Nayan K. Jain, Samir N. Patel and Maulik V. Patel, 2005.Birds of Gujarat University Campus, Ahmedabad. Zoos' Print Journal 20(12): 2111-2113 | 24. Oswin, D. 1999. Avifaunal diversity of Muthupet Mangrove Forest. Zoos' Print Journal 14(6): 47-53. | 25. Padate G.S. and Sapana, S. 1996. Checklist of birds in and around Harni Pond, an urban wetland near Baroda. Pavo34: 95-104. | 26. Palot, J.M. and Pramod, P. 2000. A checklist of birds of Calicut University Campus, Kerala. Zoos' Print Journal 15(2): 214-216. | 27. Patvarthan, A., Nalavade,S.,Saharsabuddhe and Utkarsh, G. 2000. Urban wildlife from Nero's fiddle to Noah's arch - A report. Published by RANWA, Pune. | 28. PrasannaSubhash Joshi, 2011. An annotated checklist of aquatic avifauna of agro-ecosystem of Buldhana district of Maharashtra. Golden Research Thoughts. 1 (3), 1 – 4. | 29. Ramitha, M. and Vijayalaxmi, K. 2001. A Checklist of birds in and around Mangalore University Campus, Karnataka. Zoos' Print Journal, 16(5): 489-492. | 30. Rathinasabapathy, B. and Kalairasan, V. 1992. Birds of National Zoological Park. Zoos' Print 7(8): 33. | 31. Rathore, V. and Sharma, R.K. 2000. Avifauna of a lake in district Etawah, Uttar Pradesh, India. Zoos' Print Journal 15(6): 275-278. | 32. Sauvjot, R.M., Buechner,M.,Kamradt, D.A. and Schonerwald, C.M. 1998. Patterns of human disturbances and response by small mammals and birds, in chaparral near urban development. In: Urban Ecosystem 2: 279-297. | 33. Savard, L.J., Clergeau, P. and Mennechez, G. 1998. Biodiversity concept and urban ecosystem. Landscape and Urban Planning 48: (34) pp 131-142. | 34. Schaefer, V. 1994. Urban Biodiversity in Biodiversity, pp. 307-308. In: Harding, L.E. and E.O. Mccullum (Eds.) British Columbia. Environment Canada and Canadian Wildlife service, Vancouver, Canada. | 35. Sinha AK, Adhikari S, and Ganguli BB. 1978 New Central Book Agency, Calcutta. 402. | 36. Sivaperuman, C. and Jayson, E.A. 2000.Birds of Kole wetlands, Thrissur, Kerala.Zoos' Print Journal 15(10): 344-349. | 37. Sruti, N. 2008. Ecological studies on house sparrow, Passer domesticus in the bhadravati town, Karnatka state, India. M. Phil. Dissertation, Kuvempu University, Shankarghatta, Karnatka, India. | 38. Thirumurthi, S. and Balaji, S. 1997. Avifauna of the Forest College and Research Institute Campus, Mettupalayam, Tamil Nadu. Zoos' Print Journal 12: 24-26. | 39. Vandermeer, J. 1997. The Agro Economics System. A need for the conservation-biologist's lens. Conservation Biology 11: 591-592. | 40. Wadatkar, J.S. 2001. Checklist of birds from Amaravati University Campus, Maharashtra. Zoos' Print Journal 16(5): 497-499. | 41. Wallace, G.J. 1963. An Introduction of Ornithology (2nded.). The McMillan Co., New York, USA