ECOPRINT **20:** 27-36, 2013 ISSN 1024-8668
Ecological Society (ECOS), Nepal
www.nepjol.info/index.php/eco; www.ecosnepal.com

ECOLOGY AND DIVERSITY OF WILDLIFE IN THE ECO-PARK OF THE JAMUNA BRIDGE AND ITS ADJACENT AREA, SIRAJGONJ, BANGLADESH

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ABSTRACT

Animal diversity of an area is a good indicator for understanding a healthy habitat. We conducted a detail study on ecology and the wildlife diversity in the Eco-park of Jamuna bridge and its adjacent area of Sirajgonj district from April 2010 to March 2011. We employed transect line method and interviewed local people to reveal the status and distribution of wild animal and identify their microhabitats. A total of 89 species of wild animals was recorded, of which, 6 (6.74%) species were amphibians, 11 (12.36%) reptiles, 56 (62.93%) birds and 16 (17.94%) mammals. Regarding relative abundance, 18 (20.22%) species of wildlife were very common, 35 (39.33%) common, 28 (31.46%) fairly common, 7 (7.87%) few and only one (1.12%) was occasionally found. In total 25 species of wildlife were identified as threatened category. In amphibians, 3 species were vulnerable nationally. In reptiles, 4 species were vulnerable and one endangered. In birds, 4 species were vulnerable, 6 endangered and one critically endangered (*Gallicrex cinerea*). In mammals, 3 vulnerable and 3 endangered nationally. Among the amphibians, skipper frog (*Euplyctis cyanophlyctis*) and toad (*Bufo melanostictus*) frequently occurred. Among the reptiles, common garden lizard (*Calotis versicolor*), common skink (*Mabuya carinata*) and cheekered keel back water snake (*Xenochorphis piscator*) were frequently occurred. Among the birds, common myna (*Acrodotheres tristis*), pied myna (*A. fuscus*), black drongo (*Dicrurus macrocercus*) and house crow (*Corvus splendens*) occurred frequently. Among the mammals, shrew (*Suncus murinus*), flying fox (*Pteropus giganteus*) and black rat (*Rattus rattus*) frequently occurred. Our study shows that illegal exploitation of trees, overgrazing of domestic animals, shooting and collection of young animals are the mentionable causes for declining wild animals. We suggest that awareness creation and preparation of proper management action plan in cooperation with related national and international organizations are necessary in order to protect the wildlife resources in the study area.

Key words: Wildlife diversity, habitat.

INTRODUCTION

Diversity of wildlife may increase by the conservation and protection of habitat and declaration of eco-park or protected areas with the help of the government and non-government organizations. However, environmental degradation has been occurring in a faster rate due to the rapid increase of human activities,

interference to the wilderness areas, over-exploitation, deforestation and natural calamities like soil erosion, tornados, etc. The study area contains a variety of unique habitats of wild animals. Every day many visitors come to the place for recreation and enjoy themselves observing the natural beauty. In this regard, wildlife diversity may increase the natural beauty as well as help to keep natural balance as they are important biotic component of the ecosystem. Many species of wild animals act as an important biological pest control agent e.g., insectivore and rodentivore.

Little work was done on the ecology, population status and habitats of some wildlife at Sirajgonj and adjacent areas by Sarker and Sarkar (1985) and Husain and Sarker (1971, 1979). Although, some works on the similar topic were done elsewhere (Haque 1975, Akter 1977, Banerjee 1978, Penafiel 1995, Rosario and Hai 1996, Jasmin 1996, Hossain and Sarker 1997, Sarker *et al.* 2001, Jaman *et al.* 2004). Detail collection of data on wildlife in the Eco-park at Jamuna Bridge and near the study site was not done in the past. It is necessary to have the baseline data of all information of wildlife of a habitat in order to make any management plan for their conservation. For this reason, authors were interested to conduct a detail study on wildlife diversity, status and their ecology in the Eco-park at Jamuna Bridge.

STUDY AREA AND VEGETATION

Sirajgonj district belongs to Rajshahi division with an area of about 2497.92 km^2. The main rivers are Jamuna, Baral, Ichamati, Karatoya and Phuljuri. The district is bounded by Bogra district on the north, Pabna district on the south, Tangail and Jamalpur districts on the east, Pabna, Natore and Bogra districts on the west. The Eco-Park is a part of the North Bangel and located in the Jamuna Bridge of Saydabad Upazila in the Sirajgonj Sadar district. The park is controlled by Pabna Forest Range. It covers currently an area of 600 ha (coordinates). The park was established through a gazette notification in 1998-1999.

The park is transected by a highway, a railway, a bridge and a power transmission corridor, the rest house; the forest beat office and the other institute in the middle of the park. In the Eco-Park trees were planted which are now thriving and growing into a forest. The annual average temperature reaches a maximum of 34.6°C and a minimum of 11.90°C. The annual rainfall is 1610 mm. The dominant plants are: Shisu (*Dalbergia sissoo*), jam (*Eugenia jambolana*), mehoginy (*Switenia mahogoni*), babla (*Acacia arabica*), debdaru (*Polyalthia longifolia*), bandarlathy (*Cassia fistula*), kadam (*Anthocephalus chinensis*), wood-apple (*Aegle marmelos*), coconut (*Cocos nucifera*), tetul (*Tamarindus indica*), betelnut (*Areca catechu*), amloki (*Emblica officinalis*), tulsi (*Ocimum sanctum*), margosa tree (*Azadirachata indica*), muktajuhri (*Acalypha indica*), arohor (*Cajanus cajan*), horitoki (*Terminalia chebula*), krishnachura (*Delonix regia*), nalkhagra (*Phragmites karka*).

MATERIALS AND METHODS

The study was conducted from April, 2010 to March, 2011 at Jamuna Eco-park and its adjacent area. Different species of wild fauna was recorded during the study period. Data collection was done once in a month (6-7 days) and continued from early morning to evening during the whole study period. We employed transact line method, plotting method, direct observation for data collection and information collected through the interview with local people.

Transact line: In this method wildlife were observed and counted on each side of the transact line (size: 1000 m long × 100 m width) using tape recorder. A total of 60 transect lines were made across the study site.

Plot counting: A total of sixty plots (size: 500 m × 100 m) were selected to study the wildlife, particularly amphibians and mammals within the study site. A total of 75 days were spent in the field. Observation was started early in the morning and ended at late afternoon in each day. During observation, movement of observer was kept at a uniform speed and while walking along a route, attempts were made to note the animals when they were whiting, singing or flying over the study area or foraging and feeding either on the ground or on the trees. Climber, bamboo ladder and portable hide were used for closer observation. During observation and data collection field notes, two pairs of binoculars (Prism a 10×50), digital camera (Cannon auto focus 35 mm and 16 mm), National Video Camera, GPS, distance measuring plastic tape, surgical gloves, preservative and chemicals, plastic and metal tapes, map, paper box and rubber tapes, etc. were used. We also used field guide on birds (Ali and Ripley 1968-74, 1983), amphibians and reptiles (Daniel 1983, Smith 1931, 1943) and mammals (Prater 1993) in order to identify species during observation and also in the laboratory for identifying collected specimens and pictures. Museum species of wild animals of the Department of Zoology, University of Dhaka was also used to identify collected specimens and pictures of wild animals taken from the field. Data collected in each trip imputed in the computer to make the systematic data base for each species and categorized according to the taxonomic position. Habitat types, food habits, etc were also recorded.

RESULTS AND DISCUSSION

In the present study a total of 89 species of wild animals were recorded. Of these, 6 species were amphibians, 11 reptiles, 56 birds and 16 mammals (Table 1).

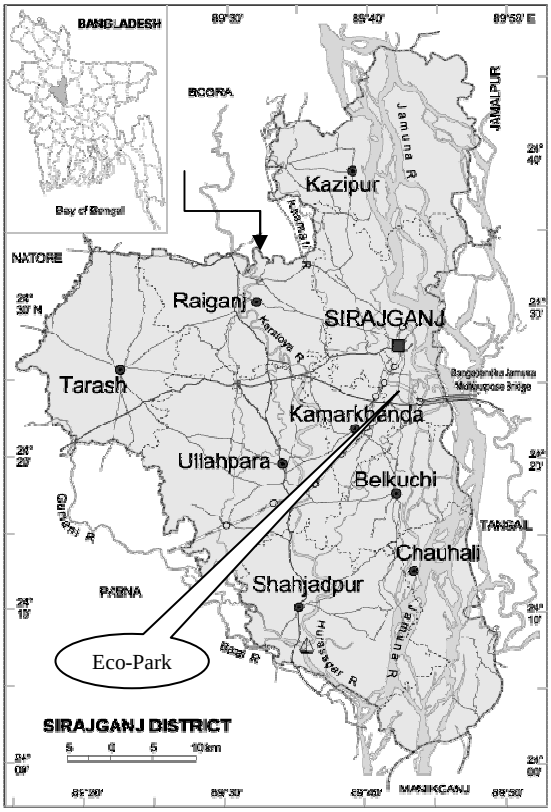

Fig. 1. Map of Sirajgonj district indicating the study site.

Amphibians

A total of 6 species of amphibians under 3 families and one order were observed in the Eco-park and its adjacent area. Among the wildlife, amphibians represented 6.74% species (Fig. 2). Relative abundance showed that two species were very common, 1 common and 3 were few in number (Fig. 3). The population of *Bufo melanostictus* showed the highest density (17.33 indiv./ha) and *Rana cyanophlyctis* showed the lowest density (4.0 indiv./ha) (Table 1). According to IUCN (2000) category, 3 species of amphibians were vulnerable at national level. Of the amphibians, three species occurred on aquatic and terrestrial habitats, 1 species on aquatic and semi-aquatic habitats like river, pond, ditches, wetland, water edge, etc. and 2 species on the terrestrial habitats like, bush, open place, human habitation,

cultivated land, tall tree, hole, etc. for foraging, nesting and roosting activities (Table 1, Figs. 4 and 5).

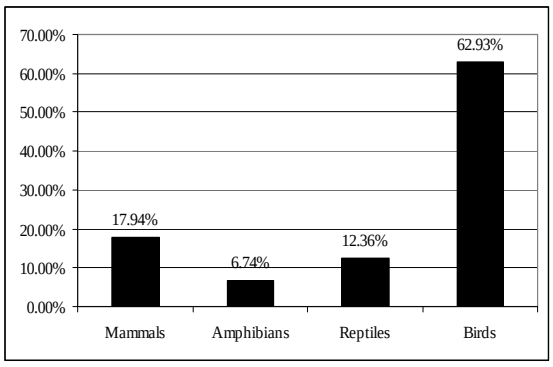

Fig. 2. Species diversity of wildlife in the Eco park.

Reptiles

A total of 11 species of reptiles were recorded. Of the reptilian species, 9 were lizards and 2 species of snakes (Table 1). Of the wild fauna, reptiles constituted 12.36% species (Fig. 1). Among the reptiles, 7 were common, 1 fairly common, 1 few and 2 very common (Fig. 3). The population of *Hemidactylus brookii* showed the highest density (20.5 indiv/ha) and *Varanus flavescens* showed the lowest density (1.0 indiv./ha) (Table 1). In the present study, 5 (45.45%) species of reptiles were included in the threatened category, of which 1 (9.09%) endangered and 4 (36.36%) vulnerable at national level. Sarker and Sarker (1983) and IUCN (2000) reported that 22 species of reptiles are threatened in Bangladesh. Only one species of reptile used aquatic and terrestrial habitats, 1 species aquatic and semi-aquatic habitats like river, pond, ditches, wetland, water edge, etc. and 9 species used terrestrial habitats like bush open place, human habitation, cultivated land, tall tree, hole, etc. were used as feeding, nesting and roosting sites (Table 1, Figs. 4 and 5).

Birds

Fifty six species of birds belonging to 12 orders and 22 families were observed in the Eco-Park and adjacent areas, of which 55 species were resident and only one winter migrant (Table 1). Among these, 36 species were non passerines and 20 passerines. Of the wild animals, birds constituted 62.93% species (Fig. 2). Regarding relative abundance of species, 14 species were very common, 24 common, 16 fairly common and 2 species were few (Fig. 3). The population of *Passer domesticus* showed the highest density (125.17 indiv./ha) and *Sterna aurantia* showed the lowest density (1.83 indiv./ha) (Table 1). Thirty species of birds are threatened nationally (Sarker and Sarker 1988). In the present study, 11 (19.64%) species of birds are included in the threatened categories, of which 1 (1.79%) critically endangered, 6 (10.71%) endangered and 4 (7.14%) vulnerable at national level (Table 1). A total of 2 species of birds used aquatic and terrestrial habitats, 13 used aquatic and semi-aquatic habitats like river, pond, ditches, wetland, water edge, etc. and 41 species used terrestrial habitats like bush, open place, human habitation, cultivated land, tall tree, hole, etc. for feeding, nesting and roosting activities (Table 1, Figs. 4 and 5).

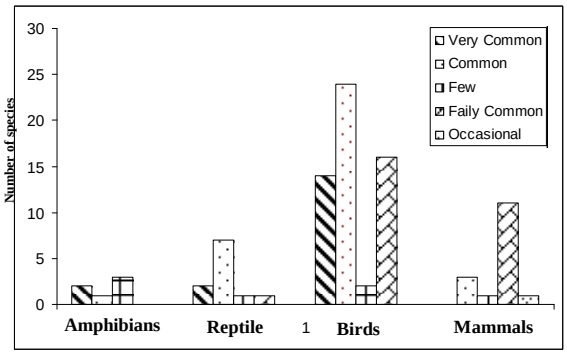

Fig. 3. Relative abundance of wildlife species in the Eco park.

Mammals

A total of 16 species of mammals belonging to 9 families and 6 orders were recorded in the Eco-Park and adjacent area. Mammals constituted 17.94% among the total wildlife (Fig. 2). Regarding relative abundance, 11 species were fairly common, 3 common, only one few and one occasional (Fig. 3). The population of *Rattus rattus* showed the highest density (19 indiv./ha) and *Lepus nigricollis* showed the lowest density (0.83 indiv./ha) (Table 1). Sarker and Sarker (1986) and IUCN (2000) reported that fifteen species of mammals are threatened nationally. In the present study, 6 (37.50%) species of mammals are included in the threatened categories, of which 2 endangered and 4 species are vulnerable at national level. A total of two species of mammals used aquatic and terrestrial habitats and 14 species used terrestrial habitats like bush, open place, human habitation, cultivated land, tall tree, hole, etc. for display of feeding, nesting and roosting activities (Table 1, Figs. 4 and 5).

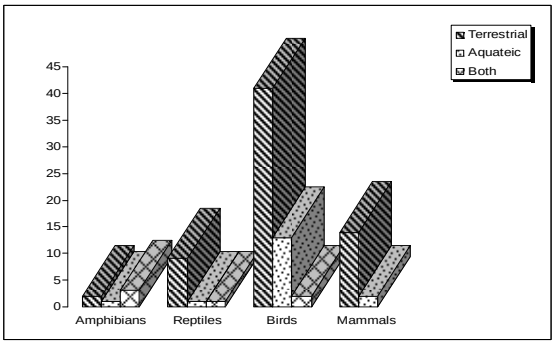

Fig. 4. Macro-habitat utilization by wildlife species in Eco park.

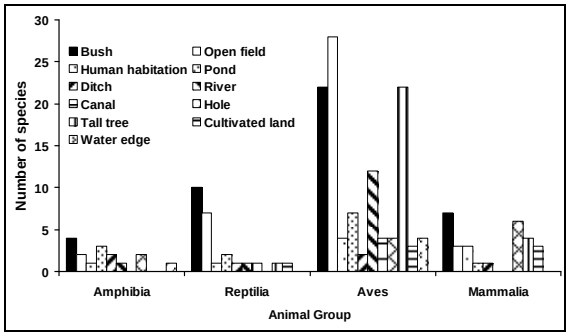

Fig. 5. Microhabitat utilization by wildlife species (Amphibian – Mammalian) in Eco park.

Table 1. Species composition, relative abundance, IUCN Red Book category population density and national status of wildlife in the Eco-Park.

Scientific Name	English Name	Local Name	RA	PD/ha	IUCN Local status	HU
Class: Amphibia						
Hoplobatrachus tigerinus	Bull Frog	Shonabang/ Kolabang	VC	5.16	LR	OP, P, Dt
Euplyctis cyanophlyctis	Skipper Frog	Kotkoti Bang	C	4.00	LR	R, P, We
Rana alticola	Boulenger's Frog	Pana Bang	F	8.50	VU	Bh, P
Bufo melanostictus	Common Toad	Kuna Bang	VC	17.33	LR	Bh, Op, Hh, H, Dt
Microhyla ornata	Ornate Microhylid	China Bang	F	8.50	VU	Bh, H
M. rubra	Red Microhylid	Red china Bang	F	6.33	VU	Bh
Class: Reptilia						
Hemidactylus flaviviridis	House Gecko	Tiktiki	C	10.33	LR	Bh, Op, Hh, Tt
H. brookii	Spotted House Lizard	Tiktiki	C	20.50	LR	Bh, Op
H. bowringii	Bowring's House Lizard	Tiktiki	C	8.67	VU	Bh
Gekko gecko	Wall Gecko	Takkhak	C	10.00	VU	Bh, Op

Calotis versicolor	Common Garden Lizard	Rokto-chosa	VC	9.67	LR	Bh, Op
Mabuya carinata	Common Skink	Anjoni	VC	8.67	LR	Bh, Op
M. dissimilis	Stripped Skink	Anjoni	C	5.33	VU	Bh, Op
Varanus bengalensis	Bengal Monitor	Gui Shap	FC	2.33	VU	Bh, P
V. flavescens	Yellow Monitor	Holdy-gui	F	1.00	EN	Bh, Cl
Xenochorphis piscator	Cheekered Keel back snake	Dhora-shap	C	2.67	LR	P, C, Dt
Amphiesma stolatum	Stripped Keel back Snake	Dhora-shap	C	1.50	LR	Bh, Op
Class: Aves						
Ardeola grayii	Pond Heron	Kana Bok	C	8.00	LR	Op, Cl, R, P, Dt, We
Bubulcus ibis	Cattle Egret	Go Bok	FC	4.50	LR	R, P, C
Egretta intermedia	Intermediate Egret	Maijala Bok	FC	6.83	VU	Op, R, P
E. garzetta	Little Egret	Jotti Bok	C	16.33	LR	R, C
Nycticorax nycticorax	Night Heron	Nishi Bok / Ratchora	F	9.17	EN	P, C, We
Milvus migrans	Pariah Kite	Bhuban-cheel	VC	22.50	VU	Op, Hh, Tt
M. lineatus	Large Pariah Kite	Cheel	FC	2.00	LR	Op
Gyps bengalensis	White-backed Vulture	Shakun	FC	3.83	VU	Op, Cl, Tt
Haliastur indus	Brahminy Kite	Lal-cheel	C	2.16	DD	Op, Cl
Gallicrex cinerea	Water-cock	Kora	FC	3.00	CR	R
Amaurornis phoenicurus	White-breasted Water Hen	Dahuk	C	3.00	VU	R
Sterna aurantia	River Tern	Gang-cheet	FC	1.83	LR	R
S. albifrons	Little Tern	Khudey-gangcheel	F	3.33	LR	R
Streptopelia decaocto	Ring Dove	Raj-ghugu	C	17.17	EN	Bh, Tt
S. tranquebarica	Red Turtle Dove	Lal-ghugu	FC	13.50	EN	Tt
S. chinensis	Spotted Dove	Tila-ghugu	VC	13.50	LR	Op, Tt
Columba livia	Rock Pigeon	Jalali Kabutar	C	33.50	LR	Bh, Op, Hh, Cl, Tt
Psittacula krameri	Rose-ringed Parakeet	Tia	VC	6.00	EN	Op
Clamator jacobinus	Pied Crested Cuckoo	Jhuti Kokil	C	12.50	EN	Op
Cuculus varius	Common Hawk-cuckoo	Choggelo	C	9.33	LR	Bh, Tt
Eudynamys scolopaceus	Koel	Kokil	C	9.83	LR	Tt
Centropus sinensis	Crow-pheasant	Kanakuwa	FC	2.50	LR	Op

Tyto alba	Barn Owl	Laxmi-pencha	FC	5.33	EN	Op
Athene brama	Spotted Owlet	Phuti-pencha	C	7.83	LR	Op, Tt
Apus affinis	House Swift	Ghorani-nakkati	C	69.67	DD	Bh, Op, Tt
Ceryle rudis	Lesser Pied Kingfisher	Pakra Mach rangha	FC	8.33	LR	R, Dt
Alcedo atthis	Common Kingfisher	Choto Machranga	FC	17.33	LR	H, R, P
A. meninting	Blue-eard Kingfisher	Mach-rangha	FC	4.00	LR	P, C
Halcyon smyrnensis	White-breasted Kingfisher	Shet buk Machrangha	C	11.50	LR	R, P
Merops philippnus	Blue-tailed Bee -eater	Nilez suichora	FC	5.16	DD	Bh, Op, Cl
M. orientalis	Green Bee-eater	Suichora	C	30.00	DD	Bh, Cl,
Upupa epops	Hoopoe	Hudhud-pakhi	C	9.33	DD	Op
Megalaima haemacephala	Crimson breasted Barbet	Choto basanta Bauri	C	12	LR	Bh, Op
M. asiatica	Blue-throated Barbet	Nilgri-basanta Bauri	FC	11.50	LR	Op
Dendrocopos macei	Fulvous breasted pied wood pecker	Badami buk kaththokra	C	10.33	LR	Tt
Dinopium benghalense	Lesser-golden back wood pecker	Sonali pit kaththokra	FC	13.00	LR	Bh, Tt, H
Lanius schach	Black-headed Shrike	Kalashir-koshi	C	15.33	LR	Bh
Hirundo rustica	Common Swallow	Ababil Pakhi	C	7.17	LR	We
Oriolus oriolus	Golden Oriole	Sonali-halud Pakhi	C	8.67	DD	Bh, Tt
O. xanthornus	Black headed Oriole	Holdey pakhi	C	15.00	LR	Tt
Dicrurus macrocerus	Black Drongo	Fingey	VC	59.67	DD	Op, Cl
D. leucophaeus	Ashy Drongo	Dhusar-fingey	FC	2.83	LR	Op, Tt
D. aeneus	Bronzed Drongo	Choto-fingey	C	8.50	LR	Bh, Op
Sturnus malabaricus	Grey-headed Myna	Kath-shalik	C	15.83	LR	Bh, Op, Hh, Cl, Tt, H
S. contra	Pied Myna	Gobrey-shalik	VC	68.83	LR	Bh, Op, Hh, Cl, Tt, H
Acridotheres tristis	Common Myna	Bhat-shalik	VC	110.83	LR	Bh, Op, Cl
A. ginginianus	Bank Myna	Gang-shalik	C	18.67	DD	R, We
A. fuscus	Jungle Myna	Jhuti-shalik	C	57.17	LR	Bh, Tt

Dendrocitta vagabunda	Rufous Treepie	Harichacha	VC	8.67	LR	Bh, Tt
Corvus splendens	House Crow	Kak-kowa	VC	71.00	LR	Bh, Tt
C. macrorhynchos	Jungle Crow	Dar-kak	VC	18.00	LR	Bh, Op, Tt
Pycnonotus cafer	Red-vented Bulbul	Kala-bulbul	VC	86.50	LR	Bh, Op
Copsychus saularis	Magpie-robin	Doyel	VC	97.5	LR	Bh
Passer domesticus	House Sparrow	Churoi	VC	125.17	LR	Bh, Op, Cl
P. montanus	Tree Sparrow	Gecho-churoi	VC	9.67	LR	Bh, Op, Tt
Ploceus philippinus	Baya	Babui	VC	28.00	LR	Cl
Class: Mammalia						
Suncus murinus	Whit- tailed Shrew	Chika	C	8.33	LR	Op, Tt, H
Pteropus giganteus	Flying-fox	Badur	C	9.33	LR	Tt
Pipistrellus coromandra	Pipistrelle	Chamchika	FC	5.17	LR	B, Tt
Tylonycteris pachypus	Club-footed Bat	Chamchika	FC	14.16	LR	Bh
Canis aureus	Asiatic Jackal	Shial	FC	1.33	VU	Bh, Op, H
Vulpes bengalensis	Bengal Fox	Khek-shial	FC	1.33	EN	H
Herpestes auropunctatus	Small Mongoose	Choto-beji	F	0.83	EN	Tt
Felis chaus	Jungle Cat	Ban-biral	FC	1.33	VU	Bh, Dt
Lepus nigricollis	Black-naped Here	Khargosh	O	0.83	VU	H
Rattus rattus	Black Rat	Indur	C	19.00	LR	Bh, Cl
R. norvegicus	Brown Rat	Dhamshi Indur	FC	10.50	DD	Bh, Cl
R. fulvescens	Short Tail Rat	Ghashua Indur	FC	4.33	DD	Cl
Mus musculus	House Rat	Nengti indur	FC	2.50	LR	Hh, H
M. booduga	Little Field Mouse	Metho-indur	FC	8.83	LR	Hh, H, p
Bandicota indica	Larges Bandicoot Rat	Indur	FC	5.83	LR	Op, Hh
Calloscirus pygerythrus	Irrawaddy Squirrel	Badami-katbirali	FC	2.33	VU	Bh

Abbreviation: RA = Relative Abundance, PD = Population Density, HU = Habitat Utilization, VC = Very Common, C = Common, F = Few, O = Occasional, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, LR = Lower Risk, DD = Data Deficient, M = Migratory, R = Resident, Bh = Bush, Op = Open place, Hh = Human habitation, Cl = Cultivated land, Tt = Tall tree, H = Hole, R = River, P = Pond, C = Canal, Dt = Ditch, We = Water edge.

CONSERVATION ISSUES

Every year, cyclones destroy the nesting and feeding grounds of wild animals, particularly for birds in the area. The requirement of fire wood and timber for the large number of inhabitants in the study area is a big threat for reducing the park areas. Most of the local people, particularly the poor people depend on the forest resources. As a result, nesting trees are being destroyed day by day. The population of dolphins, migratory birds and other aquatic birds in the Jamuna has been reduced enormously due to oil pollution, movement of people and repairing of fishing nets by the fishermen along the shore that create problem for the movement of birds. Grazing of domestic animals and exploitation of natural

resources along the river shore might have created problem for feeding and roosting of birds and other wildlife.

RECOMMENDATIONS

Regular patrolling by trained persons should control unwise and illegal exploitation of forest resources. Plantation of indigenous fruit-trees with the sharing involvement of local people may increase food availability for wild animal, particularly for frugivores. Trapping and shooting must be prohibited. Oil pollution and movement of fishing boats should be reduced. Use of highly poisonous insecticides in the agricultural fields adjacent to the study area should not be allowed. Establishment of wildlife training centers is necessary where local people would be trained up and can play an effective role to aware people about the value of wild animals and their importance. Wildlife Protection Law 1974 should be strictly implemented through the local enforcement agencies. Shore and new char land areas 'Musa' must be protected for the migratory birds, fishes and other animals.

ACKNOWLEDGEMENT

The authors are grateful to the authority of Jamuna Eco-park, Sirajgonj for their permission and providing facilities during study period.

REFERENCES

Akter, S. 1977. *The Wildlife Fauna of Baldah Garden, Dhaka* (with notes on ecology habitat and present status) M.Sc. thesis (unpublished), Department of Zoology, University of Dhaka, Bangladesh.

Ali, S. and S.D. Ripley. 1968-1974. *The Books of the Bird of India and Pakistan*. Vols. 1-10. Oxford University Press. Bombay, London, New York.

Ali, S. and S.D. Ripley. 1983. *A Pictorial Guide to the Birds of the Indian Subcontinent*. Bombay Nat. Hist. Soc., Bombay, India.

Banerjee, R.K. 1978. *Status and Composition of Avifauna of the Curzon Hall Campus and Ramna Park, Dhaka*. M.Sc. thesis (unpublished), Department of Zoology, University of Dhaka, Bangladesh.

Daniel, J.C. 1983. *The Book of Indian Reptiles*. Bombay Nat. Hist. Soc., India, pp. 143.

Dunbar, R. and P. Dunbar. 1975. Social dynamics of gelada baboons. *Contrib Primatol*. **6:**1-157.

Haque, M. N. 1975. *The Avifauna of Madhupur Forest* (with notes on ecology, status, distribution and food) M.Sc. thesis (unpublished), Department of Zoology, University of Dhaka, Bangladesh.

Hossain, M.L. and S.U. Sarker. 1997. Birds of Hatiya Islan, Noakhali, Bangladesh. *Dhaka Univ. J. Biol.. Sci.* **6(1)**:39-48.

Husain, K.Z. and S.U. Sarker. 1971. Notes on a collection of birds from Pabna. *J. Asiat. Soc. Bangladesh* **16(2):**259-289.

Husain. K.Z. and S.U. Sarker. 1979. Notes on A collection of birds from Pabna. *J. Asiat. Soc. Bangladesh* **5(1):**15-24.

IUCN. 2000. *Red Data Book of Threatened Birds of Bangladesh*. The World Conservation Union, Dhaka, Bangladesh.

Jaman, M.F., M.S.Z. Haque and S.U. Sarker. 2004. Ecology, conservation problems and status of avifauna of Noakhali Charbata coastal area. *J. NOAMI* **21(1):**1-13.

Jasmin, H. 1996. *The Wildlife Fauna of Bangladesh Rifles Head Quarter, Dhaka*. M.Sc. thesis (unpublished), Department of Zoology, University of Dhaka, Bangladesh.

Penafiel, S.R. 1995. *Wildlife of Sundarbans*. Forest Resources Management Project, Mandala

Agricultural Development Corporation (MADECOR), Dhaka, Bangladesh, pp. 28-41.

Rosario, E.A. and S.K. Hai. 1996. *List of Amphibians, Reptiles, Birds and Mammals in the Sundarbans Natural Mangrove Stand and Adjacent Coastal Areas*. Forest Resources Management Project, Mandala Agricultural Development Corporation (MADECOR), Dhaka, Bangladesh, pp. 126-135.

Sarker, S.U. and N.J. Sarker. 1983. Endangered wildlife of Bangladesh. *Tigerpaper* **10(2):**26-28.

Sarker, S.U. and N.J. Sarker. 1985. Reptiles of Bangladesh. *Tigerpaper* **12(2):**6-12.

Sarker, S.U. and N.J. Sarker. 1988. *Wildlife of Bangladesh* (A systematic list with the status and distribution). The Rico Printers, Nilkhet, Dhaka, 59 pp.

Sarker, S.U., M.F. Jaman, M.L. Hossain and N.J. Sarker. 2001. Wildlife diversity of Maheskhali Island: their ecology and conservation issues. *J. NOAMI* **18(1):**17-31.

Smith, M.A. 1931. *The Fauna of British India including Ceylon and Burma* (Reptilia and Amphibia) Vol. 1, Taylor and Francis, London, 185 pp.

Smith, M.A. 1943. *The Fauna of British India* (Reptiles and Amphibian) Vol. 3, Serpents, Taylor and Francis, London.