

Avifaunal Diversity at Kotuattawala Tank and associated Environments, Sri Lanka

Dharshini Diwakara and Sriyani Wickramasinghe

Department of Biological sciences, Faculty of Applied Sciences,
Rajarata University of Sri Lanka, Mihintale

Introduction

Sri Lanka has been identified as an endemic bird area in 1998 by the Birdlife International (Annon, 2008). 482 species of birds have been recorded from the country that includes 233 resident species of which 26 are endemic. Additionally 127 migrants, 24 pelagic and 75 incidental species have been recorded from island (Kotagama *et al.*, 2006).

Wetlands support and maintain a diverse community of birds (Duncan *et al.*, 1999) as these habitats are useful for feeding as well as breeding, nesting, and rearing of young (Acuna *et al.*, 1994). Many wetlands are also important for migratory birds. But due to human pressures these ecosystems are decreasing rapidly. Habitat destruction adversely affect on species diversity, density and distribution in many parts of the world (Watson *et al.*, 2004). Declining number of wetland associated birds is partly attributed to the loss of wetlands (Duncan *et al.*, 1999; Mads *et al.*, 2002).

Although numerous studies have been carried out about the avifauna of Sri Lanka, most of them are confined to the terrestrial ecosystems and information on aquatic avifauna is scarce. Many of the available aquatic avifaunal studies are restricted to coastal belt of Sri Lanka.

Kotuathawala reservoir provides nesting and roosting habitats for large number of residential and migratory birds annually. The major drawback in this habitat is lack of scientific information. This is the first study conducted on avifauna associated with this reservoir and therefore the main aim was to determine diversity, distribution, habitat selection, aspects of ecology and threats of the resident and migratory birds in the reservoir and its immediate environment. Further, to ensure the long-term survival of this unique habitat, appropriate recommendations will be provided

Study area

Kotuattawala reservoir is located in the Kurunegala District of the North-Western Province of Sri Lanka. There are no proper demarcated boundaries for the reservoir and its catchments (Fig. 1). It receives an annual rainfall between 1,000-1,500 mm from the North-east monsoon (November - January) and inter monsoons (March - April and September - October). Temperature ranges between 19° C to 34° C. February to September is the dry season and August is considered as the warmest month of the year.

The study was conducted from August 2009 to May 2010. Observations were done 10 days per each month at during morning from 0600 h to 0800 h and 1600 h to 1830 h in the evening. For the purpose of this study four habitats were selected to investigate the avifaunal diversity and to gather information from villagers. They were named as as Kotuattawala forested (KF), Kotuattawala aquatic (KA), Kotuattawala Edge (KE) and Kotuattawala Disturbed (KD) (Fig 2).

Method

Line transect method (200 m x 50 m) was used for sampling terrestrial habitats while point counts were used for sampling aquatic habitats (Bibby *et al.*, 1993). Four fixed points were selected and 20-30 minutes were spent for both point and transect counts. The opportunistic observation method was used since some bird species in the study site could not be observed along the line transects or points. Species identification, nomenclature, endemic status and local names given in this paper are in accordance with Kotagama *et al.*, 2006.

During the study a structured questionnaire was used to assess the knowledge, attitudes, beliefs and practices of residents living close to reservoir towards birds together with any threats they observed and their suggestions regarding conservation of the animals and the idea of establishment of nature reserve.

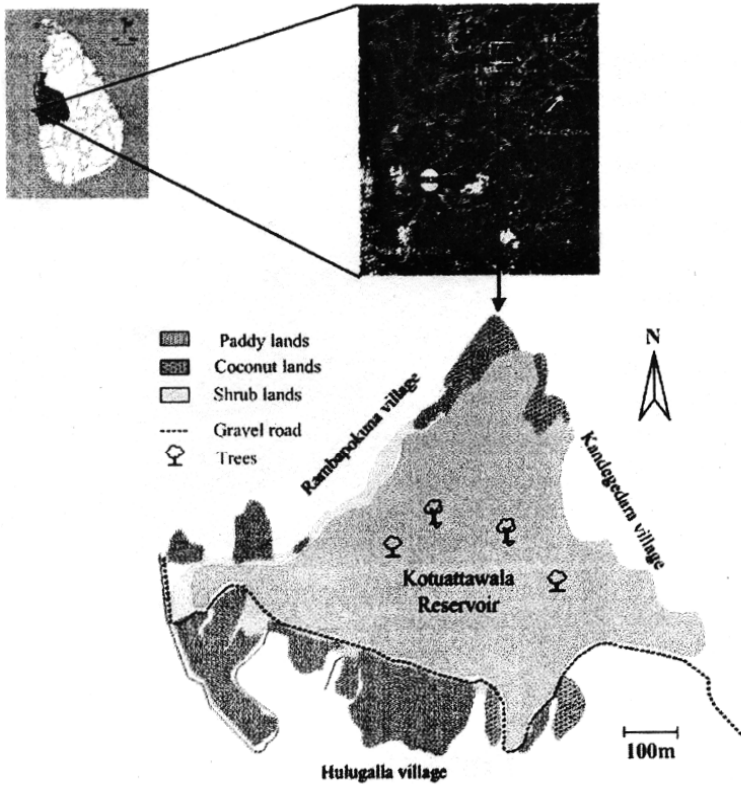


Figure 1: The details of the study site

Results and Discussion

Avifaunal Diversity

A total of 117 bird species belonging to 44 families were observed in the study area. This included 101 breeding residents (including five endemic species), and 16 winter visitors. The highest bird diversity was recorded from forested area (KF; $H'=1.86$), water-edge habitats (KE; $H'=1.70$) and aquatic area (KA; $H'=3.8$). As indicated in Johnsinh and Joshua, 1994 species richness and community structure of birds vary from region to region, as well as within the region, as abiotic and biotic factors vary from habitat to habitat. Further bird species distribution of an area may depend on the insect and biomass of that area. These factors may change due to human influences, climate and the topographic conditions of the area.

The species richness of the whole Kotuattawala area for avifauna was quite high. Out of the breeding resident species found in Sri Lanka, 33.9% were recorded within the Kotuattawala. However, the overall endemism in the area was relatively low (13.04%) compared to protected areas in the dry zone such as Mihintale Sanctuary and the Wilpattu National Park. This may be due to the absence of suitable microclimatic conditions for these endemic birds. There were altogether six species of endemic and proposed endemic birds. Forested area and disturbed area provided habitat for endemic *Gallus lafayetii* (Sri Lanka Junglefowl), *Loriculus beryllinus* (Sri Lanka Hanging Parrot) (Fig 3 and 4) and *Ocyrceros gingalensis* (Sri Lanka Grey Hornbill). About 12% of the winter visitors were recorded during this survey.



Figure 2: Kotuattawala reservoir and its surroundings



Figure 3: *Loriculus beryllinus* (Sri Lanka Hanging Parrot)

Figure 4: *Gallus lafayetii* (Sri Lanka Junglefowl)



Water fowl Abundance

The study area provided nesting and roosting ground for fourteen common roosting water fowls species belonging to 5 families. The dominant nesting species were Black-headed Ibis (*Threskiornis melanocephalus*), Little Cormorant (*Phalacrocorax niger*) (fig 7) Indian Cormorant (*Phalacrocorax fuscicollis*) and Asian Openbill (*Anastomus oscitans*) (figure 6). The number of storks observed peaked during breeding season while the population decreased when juveniles formed and the population decreased and stabilized during non breeding seasons. This site is one of the major roosting sites for the Spot-billed Pelican (*Pelecanus philippensis*) (figure 8) within this region. The average flock size of Spot-billed Pelican varies from 12 to 77 .

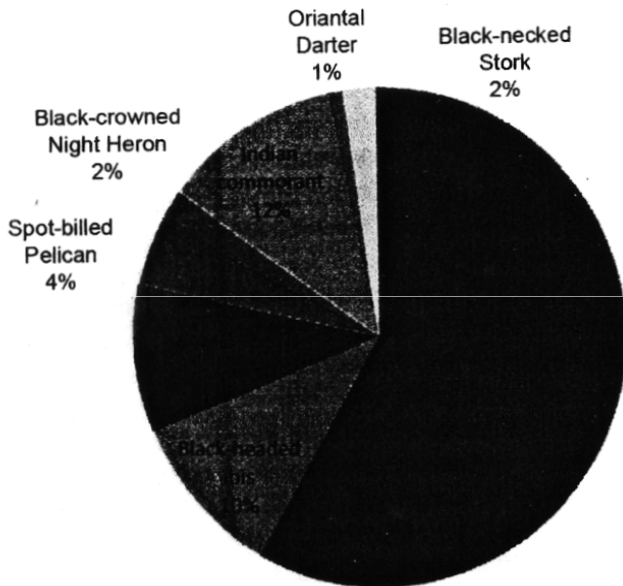


Figure. 6 Abundance of water birds roosting in study area

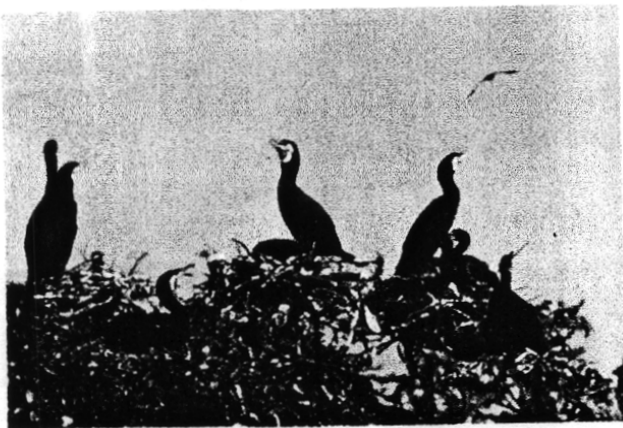


Figure 7 .*Phalacrocorax niger* (Little Cormorant)



Figure. 8 *Pelecanus philippensis* (Spot-billed Pelican)

Threats

Total The human communities living adjacent to the study site population benefited from Kotuattawala reservoir and its surrounding. Around 48% of population living within the Kandegedara Grama Niladari Division. According to questionnaire survey conducted with the participation of villages in Kotuattawala reservoir and based on our observations, five major threats were identified; deforestation; chena cultivation; egg collection; hunting of adult and juveniles for meat; and water quality changes. Out of them egg collections and hunting juveniles for flesh were the highest threats during the roosting nesting period.

People living in the border villages suggested various conservation measures for protecting this valuable site. Thirty eight percentage suggested that giving legal and institutional protection is most important and they believed that recruiting a security officer is vital to prevent illegal activities in and around the reservoir. Launching awareness programs for the community through schools, temples as well as nature societies in order to make people aware about the importance, threats and biodiversity, conservation measures to protect this valuable site for future generations is also vital. Developing the site as a tourist site for local and foreign tourists and facilitate to tourism is also a useful tool (Fig. 9)

Table 2: Total number of water birds recorded during the study period

Species Common Name	Mean total number	Std.Dev
Asian Openbill	595.0	134.9
Black-crowned Night Heron	199.1	21.4
Black-necked Stork	186.1	12.3
Black-headed Ibis	927.0	291.0
Spot-billed Pelican	372.6	157.8
Grey Heron	852.3	314.1
Indian Cormorant	1052.5	267.4
Little Cormorant	4561.6	396.0
Oriental Darter	83.1	0.1
Great Egret	233.7	35.8
Intermediate Egret	502.2	88.8
Little Egret	649.2	27.7
Cattle Egret	309.1	68.0

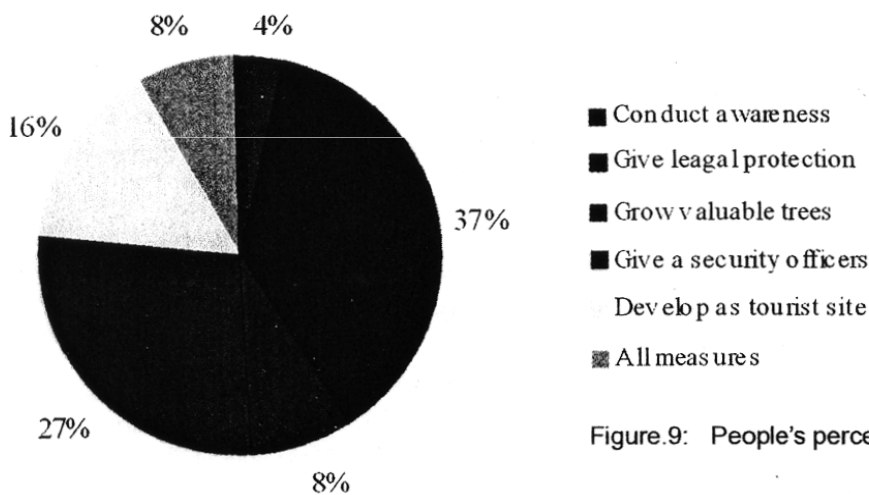


Figure.9: People's perception on conservation measures

Out of fifty interviewers , 17 said that they agree for establishing this valuable biological site as a nature reserve, but it should be done with participation of villagers. In addition, 12 interviewers believed that it is important for giving legal protection to this site. Yet a considerable number of people disagreed to this decision because it may affect negatively on village culture and peaceful livelihood.

Establishing Community Based Organizations (CBOs) will provide a sound relationship between villagers and government and also facilitates the problem solving process. It is also vital to promote younger generation as nature loving group to mitigate illegal activities and conduct awareness programs.

Acknowledgements

We warmly acknowledge, Biodiversity Unit in Ministry of Environment and Natural Resources for providing a financial support for facilitating to carryout this study. Also gratefully thank to President and staff of Pradeshiya Sabha, Nikaweratiya to give permission and support to conduct this study successfully. We thank to Mr. P.R.K.C.Ranasinghe, Mr. S.M. Wellappuliarachchi, Mr. Ravindra Jayarathne and Mr. Disanayake for the co-operation and assistance given in field work and grateful to all others, who supported during this study.

References

- Acuna, R., Contreras, F., and Kereles, J. (1994). Aquatic bird densities in two coastal lagoon systems in Chiapas state, Mexico, a preliminary assessment. *Hydrobiologia*: 279/280, 101-106
- Anon, 2008: Birds of Sri Lanka. <http://www.ibasrilanka.net/birds.lk/threatened.asp>, 2008.
- Bibby, C.J., Burgess, N.D. and Hill, D.A., 1993: Bird Census Techniques. Academic Press Limited, London. pp. 1-239.
- Duncan, P., Hewison, A.J.M., Houte, S., Rosoux, R., Tournebize, T., Dubs, F., Burel, F. and Bretagnolle, V. (1999). Long-term changes in agricultural practices and wild flowing in an internationally important wetland and their effects on the guide of wintering ducks. *J. of Applied Ecology*: 36(1) 11-23
- continue..... from page 48
- Palestrini, C. & Rolando, A. (1996). Differential calls by Carrion and Hooded crows (*Corvus corone* and *C.c.cornix*) in the Alpine hybrid zone. *Bird Study*, 43, pp. 364-370.
- Podos, J. (1997). A performance constraint on the evolution of trilled vocalizations in a songbird family (Passeriformes: Emberizidae). *Evolution*, 51, pp. 537-551.
- Pohl, N. U., Slabbekoorn, H., Klump, G. M. & Lange-mann U. (2009). Effects of signal features and environmental noise on signal detection in the great tit, *Parus major*. *Anim. Behav*, 78, pp.1293-1300.
- Rasmussen, P. C. & J. C. Anderton (2005). Birds of South Asia-The Reply Guide Washington ,D.C & Barcelona: National Museum of Natural History (Smithsonian Institution) & Lynx Edicions.
- Ratnayake, C. P., Goodale, E. & Kotagama, S. W. (2010). Two sympatric species of passerine birds imitate the same raptor calls in alarm contexts. *Naturwissenschaften*, 97, pp.103-108.
- Redondo, T. (1991). Early stages of vocal ontogeny in the Magpie (*Pica pica*). *J. Ornithol*, 132, pp.145-163.
- Mads, C., Forchhammer, E.P., and Nils, C.H.R.S. (2002). North Atlantic Oscillation timing of long and short distance migration. *J. Animal Ecology*: 71(6), 1002-1014
- Myers, N., Mittermeier, R.A., Mittermeier, et. al.(2000). Biodiversity hotspots for conservation priorities. *Nature*, 203 , 853-858.
- Kotagama, S.W., De Silva, R.I., Wijayasingha, A.S. and Abeygunawardena, V., 2006. Avifaunal list of Sri Lanka. In: Bambaradeniya, C.N.B. (Eds.), *Fauna of Sri Lanka: Status of Taxonomy, Research and Conservation*. The World Conservation Union, Colombo, Sri Lanka and Government of Sri Lanka. pp. 164-203.
- Kotagama, S. and Wijayasingha, A., 1998. *Sirilaka Kurullo*. The Wildlife Heritage Trust of Sri Lanka, Sri Lanka. pp. 1- 394.
- Ryan, M. J. & Brenowitz, E. A. (1985). The role of body size, phylogeny, and ambient noise in the evolution of bird song. *Am.Nat*, 126, pp.87-100.
- Stone, E. & Trost, C. H. (1991). Predators, risks and context for mobbing and alarm calls in Black-billed magpies. *Anim. Behav*, 41, pp.633-638.
- Tobias, J. A. & Seddon, N. (2003). Vocalization and display in the Long-tailed Ground-roller (*Uratelornis chimaera*). *Wilson Bull*, 115, pp.193-196.
- Wiley, R. H. (1991). Associations of song properties with habitat for territorial oscine birds of eastern North America. *Am.Nat*, 138, pp.973-993.

