

Relative abundance and status of water birds in Taungthaman lake, Mandalay, Myanmar

Abstract

Relative abundance and status of bird species were studied in Taungthaman Lake, during January 2016 to December 2016. Line transect count method was carried out. A total of 27 species, distributed under 20 genera, representing 12 families and 5 orders were observed. The largest number of species was recorded in November and the lowest in August and the largest number of individuals was found in January and the lowest in July. Relative abundance indicated that seven species were found as very common (vC), only one species as common (C) and 18 species as uncommon (uC). According to the International Union for the Conservation of Nature (2015), 26 species were in the Least Concern category, one species *Anhinga melanogaster* was in the Near Threatened. Thus, the Taungthaman Lake supports a sound avifaunal diversity. Its proper management will not only improve the situation for its resident species, but will also attract more migratory and vagrant species in the future.

Keywords: aquatic birds, occurrence, population status, geographic location, Taungthaman lake

Special Issue - 2018

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Received: May 02, 2018 | **Published:** August 01, 2018

Introduction

Birds are sensitive indicators of pollutions in both terrestrial and aquatic ecosystems.¹ They are among the best monitors of environmental changes.² In ecology, they are of tremendous importance because of their key roles as pollinators and agents of seed dispersal.³ Habitats also change seasonally and over a period of years as successional change proceeds in a plant community. The geographic location of different habitats shifts as the climate changes.⁴

Birds form a class of animals that includes over 10000 species worldwide.⁵ Of these, a total of 1327 species are known to occur in South–East Asia.⁶ In Myanmar, a total of 1114 species of which six are endemic, two have been introduced by humans and ten are rare or accidental. One species listed is extirpated. Of these 51 species are globally threatened. Eight of these species are critically endangered, twelve endangered and twenty-six are vulnerable species.⁷

Waterbirds depend on wetlands for a variety of activities which include feeding, breeding, nesting and moulting. The highest number of waterbirds is often found in wetlands which have the greatest diversity of plant species and vegetation types, or where there is permanent water.⁸

The wetlands of Myanmar is directly or indirectly associated with river systems, a total of 99 wetland sites including swamp land were identified. The most of these wetlands are located alongside the Ayeyawady/Chindwin River and 85 sites and a few wetlands are found in the Thanlwin river basin (6 sites) and in the Sittaung river basin (5 sites). The Rakhine coastal region also hosts another 3 wetland sites. These wetlands are not only important for fresh water biodiversity but also the home of globally threatened bird species (National Biodiversity Strategy and Action Plan Myanmar, 2001).⁹

Taungthaman Lake is a natural flood plain with the main inflow of water from the Ayeyarwady River in the rainy season. This natural flood-plain is transformed into a permanent lake by the construction of water control gates for fishery. Nowadays, water is not controlled

and fishery industry is not done in the lake. More people come to the lake than initially and habitat is not good for birds. Bird species have decreased in the lake especially waterbirds. Therefore, the present study aimed to investigate the avifauna in Taungthaman Lake especially on species composition, occurrence and abundance.

Materials and methods

Study area

Taungthaman Lake is situated in Amarapura Township of Mandalay Region on the eastern bank of the Ayeyawady River. It lies between 21° 53' N to 21° 54' N latitude and 96° 03' E to 96° 05' E longitude (Figure 1). It is situated about seven miles (11km) away from the southwest of Mandalay. Its depth is 8-15feet (2.4-4.57meters) with the area of about 1000acres (404.7hectares).

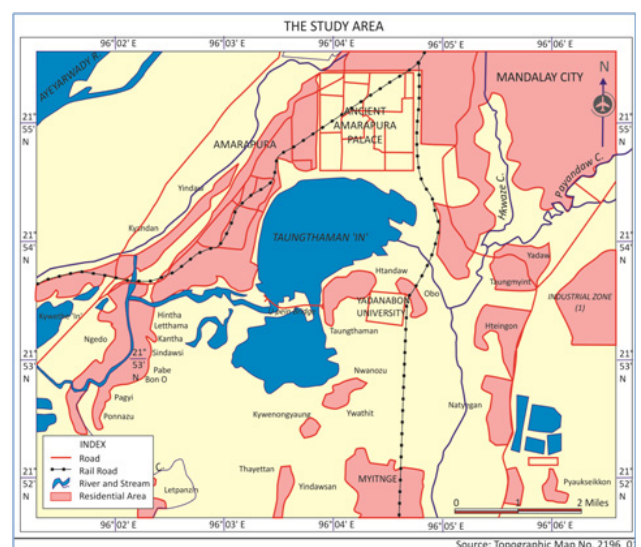


Figure 1 Location map of study area, Taungthaman Lake.

Data collection

The study was carried out between January 2016 and December 2016. Line transect method was used, as the study area was of open type.¹⁰ Birds were counted by boat and walk in the edge of lake and its environs. The field surveys were conducted in the morning (between 6:30-10:30am) about 3:00hours after sunrise and in the evening (between 3:30 - 5:30) when the activities of birds were prominent. Birds were collected one time in per month and observed using the Seeker Coated Optics binocular (10×50 DPSI), and photographs were taken with a Canon Ultrasonic camera (65 X Optimal Zoom, 16.1 Mega Pixels, Japan) for further identification. The International Union for the Conservation of Nature (IUCN, 2015)⁶ status was also used to compare the local status with the global status. Birds were identified by Symithes¹¹ & Robson.¹² Birds' nomenclature was based on Robson¹² and Avibase - Bird Checklists of the World, Myanmar.¹³

Analysis of data

The recorded data was analyzed as follow after Bisht et al., 2004:

$$\text{Relative abundance} = \frac{\text{No. of individuals of a species}}{\text{Total no. of individuals of all species}}$$

The average relative abundance was categorized adopted by Bisht et al. (2004)

uC= uncommon having relative abundance of less than 0.0100

C = common having relative abundance of 0.0100 and above but less than 0.0500

vC= very common having relative abundance of 0.0500 and above.

Results and discussion

Results

The study revealed that a total of 27 species (25,375 individuals) in 20 genera of birds belonging to 12 families and five orders were present in the study area (Figure 2, Table 1). The analysis of data on residential status revealed that out of 27 species, nine were resident (R) whereas the remaining 18 species showed seasonal only. Among these, one was as resident, other one was local movement (R/LM) as rare (Ra) and passage migration (16 species) were identified as winter visitor (WV) (Table 2). Of these, *Anhinga melanogaster* was placed in the near threatened (NT) and others 26 species were least concern (LC) as in IUCN Red-list 2015 (Table 2).

Table 1 List of recorded bird species in Taungthaman Lake during January 2016 to December 2016

No.	Order	No.	Family	No.	Species	Common name	Local name		
1	Anseriformes	1	Anatidae	1	<i>Tadorna ferruginea</i>	Ruddy Shelduck	hin-tha		
				2	<i>Ana strepera</i>	Gadwall	-		
2	Phoenicopteriformes	2	Podicipedidae	3	<i>Tachybaptus ruficollis</i>	Little Grebe	ta-si-mhoke		
				4	<i>Gallinula chloropus</i>	Common moorhen	ye-kyet-ma		
3	Gruiformes	3	Rallidae	5	<i>Porzana cinerea</i>	White-browed Crake	ye-kyet		
				6	<i>Ardea cinerea</i>	Grey Heron	nga-hit-mwe		
				7	<i>Ardeola bacchus</i>	Chinese Pond Heron	byaing-auk		
				8	<i>Ardeola grayi</i>	Indian Pond Heron	byaing-auk		
				9	<i>Camerodius albus</i>	Great Egret	byaing-ngan		
				10	<i>Mesophoxys intermedia</i>	Intermediate Egret	tharrawaddy-byaing		
		4	Pelecaniformes	4	Ardeidae	11	<i>Egretta garzetta</i>	Little Egret	byaing
						12	<i>Plegadis falcinellus</i>	Glossy Ibis	gaut
						13	<i>Pseudibis papillosa</i>	Red-naped Ibis	kha-yu-soke
						14	<i>Phalacrocorax niger</i>	Little Cormorant	din-gyi
						15	<i>Anhinga melanogaster</i>	Darter	u-pan
						16	<i>Himantopus himantopus</i>	Black-winged Stilt	daung-lan-chi-dauk
4	Pelecaniformes	5	Threskiornithidae	17	<i>Chardrius blaticula</i>	Common-ring Plover	hnet-phyone-tee		
				18	<i>Chardrius dubius</i>	Little-ring Plover	ta laing lay		
				19	<i>Chardrius mongolus</i>	Lesser Sand Plover	-		
				20	<i>Chardrius leschenaultii</i>	Greater Sand Plover	ye-hnyant		
				21	<i>Chardrius veredus</i>	Oriental Plover	-		
				22	<i>Metopidius indicus</i>	Bronze-winged Jacana	kya-bet-nin		
				23	<i>Tringa ochropus</i>	Green Sandpiper	-		
				24	<i>Tringa glareola</i>	Wood Sandpiper	-		
				25	<i>Actitis hypoleucos</i>	Common Sandpiper	-		
				26	<i>Tringa stagnatilis</i>	Marsh Sandpiper	-		
5	Charadriiformes	10	Jacanidae	27	<i>Larus brunnicephalus</i>	Brown-headed Gull	zin-yaw		
				27	<i>Larus brunnicephalus</i>	Brown-headed Gull	zin-yaw		

Table 2 Monthly occurrence, abundance and status of waterbirds in Taungthaman Lake during January 2016 to December 2016

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Abundance (%)	Relative abundance	IUCN status	Residential status
<i>Tadorna ferruginea</i>	4	0	0	0	0	0	0	0	22	80	160	295	561	2.211	Uc	LC	WV
<i>Ana strepera</i>	13	0	0	0	0	0	0	0	0	11	12	4	40	0.158	Uc	LC	WV
<i>Tachybaptus ruficollis</i>	16	12	0	0	0	0	0	0	0	8	19	3	58	0.229	Uc	LC	WV
<i>Gallinula chloropus</i>	14	14	22	16	12	4	0	0	0	4	3	8	97	0.382	C	LC	R
<i>Porzana cinerea</i>	0	0	0	0	1	0	0	0	0	0	0	0	1	0.004	Ra	LC	R/LM
<i>Ardea cinerea</i>	200	120	10	0	0	0	0	0	0	33	35	28	426	1.679	Uc	LC	R
<i>Ardeola bacchus</i>	33	68	48	33	22	16	12	18	44	60	78	78	510	2.01	Vc	LC	R
<i>Andeola grayi</i>	22	29	22	16	16	8	6	12	23	4	8	8	174	0.686	Vc	LC	R
<i>Cameroedus albus</i>	500	200	180	82	75	66	18	180	224	212	218	260	2215	8.729	Vc	LC	R
<i>Mesophoyx intermedia</i>	900	824	441	260	98	98	49	120	250	401	429	650	4520	17.81	Vc	LC	R
<i>Egretta garzetta</i>	1300	960	845	330	420	401	168	380	450	914	680	448	7296	28.75	Vc	LC	R
<i>Plegadis falcinellus</i>	240	220	4	0	0	0	0	0	280	304	362	220	1630	6.424	Uc	LC	WV
<i>Pseudibis papillosa</i>	18	10	0	0	0	0	0	0	0	25	24	24	101	0.398	Uc	LC	WV
<i>Phalacrocorax niger</i>	100	50	240	33	16	18	13	0	42	80	68	90	750	2.956	Vc	LC	R
<i>Anhinga melanogaster</i>	88	78	48	18	12	16	8	20	0	28	54	56	426	1.679	Vc	NT	R
<i>Himantopus himantopus</i>	1080	680	22	0	0	0	0	0	0	402	9	724	2917	11.5	Uc	LC	WV
<i>Chardrius blaticula</i>	22	14	8	0	0	0	0	0	0	12	16	18	90	0.355	Uc	LC	WV
<i>Chardrius dubius</i>	80	30	22	0	0	0	0	0	0	8	22	11	173	0.682	Uc	LC	WV
<i>Chardrius mongolus</i>	14	12	0	0	0	0	0	0	0	2	12	10	50	0.197	Uc	LC	WV
<i>Chardrius leschenaultii</i>	11	10	0	0	0	0	0	0	0	1	3	9	34	0.134	Uc	LC	WV
<i>Chardrius veredus</i>	9	6	8	0	0	0	0	0	0	6	8	4	41	0.162	Uc	LC	WV
<i>Metopidius indicus</i>	22	24	38	0	0	0	0	0	0	4	9	13	110	0.433	Uc	LC	WV
<i>Tringa ochropus</i>	7	7	0	0	0	0	0	0	0	3	11	6	34	0.134	Uc	LC	WV
<i>Tringa glareola</i>	4	5	0	0	0	0	0	0	0	8	2	8	27	0.106	Uc	LC	WV
<i>Actitis hypoleucos</i>	3	2	0	0	0	0	0	0	0	8	8	12	33	0.13	Uc	LC	WV
<i>Tringa stagnatilis</i>	5	0	0	0	0	0	0	0	0	6	3	8	22	0.087	Uc	LC	WV
<i>Larus canus</i>	1100	760	0	0	0	0	0	0	0	0	339	840	3039	11.98	Uc	LC	WV
Total no. of individuals	5805	4135	1958	788	672	627	274	730	1335	2624	2592	3835	25375				
Total no. of species	26	23	18	8	12	8	8	7	8	15	26	26	27				

uC= Uncommon, C = Common, vC = Very common, WV = Winter Visitor, R = Resident, R/LM = Resident and local movement, LC= Least Concern, NT= Near Threatened

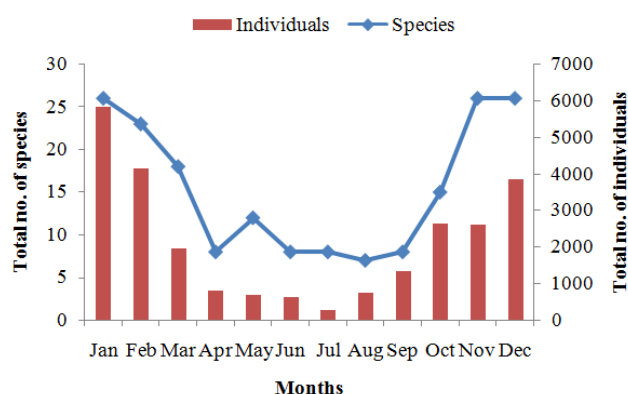


Figure 2 Relative monthly recorded bird species and individuals in Taungthaman Lake.

Discussion

Taungthaman Lake is a natural flood plain flooded by the inflow of Ayeyarwady River in the rainy season. The water from the lake flowed down in the hot season. The vegetation cover and conditions attract the most birds because of their food, shelters and breeding sites. During the study period, 27 species of waterbirds were recorded. Waterbirds species depend on wetlands for feeding and breeding. Most of the waterbirds require flooding of wetlands for breeding (Scott).¹⁴ In the present area, the most coverage is microhabitat was found with bushes and grasses. The dominated abundant of waterbird species were observed in January, November and December 2016 (26 species each), the lowest was found in August 2016 (7 species). The highest individual number (5805) was observed in January, 2016 and the lowest individual number (274) was found in July, 2016. It is assumed that habitat is more suitable for bird species in November because of the cultivated vegetable is growth and the water condition is shallow with water insects, algae and zooplankton and also migrate birds were abundantly found. In August, the water full in the lake and the habitat coverage change and the value of habitat low for the birds. Due to the rainy season, most birds are hidden in suitable habitat their shelter.

On the other hand, the highest number of species in different orders was found in Charadriiformes (10 species). It is due to the most recorded birds were migrate birds (winter visitor). Of these *Himantopus himantopus*, Black-winged Stilt, and *Larus brunnecephalus*, Brown-headed Gull was more abundantly found in this study area. The lowest species was found in order Phoenicopteriformes and Gruiformes (one species each). *Porzana cinerea* was observed only one time in all study times.

Regarding the status, according to IUCN,⁶ in 27 species, *Anhinga melanogaster* is near threaten (NT) and *Porzana cinerea* is rare (Ra) were observed.

In Myanmar, a total number of 1078 bird species include. Five species are endemic, 55 species are globally threatened species and two are introduced species.¹³ In this recorded of 27 species, 9 species are resident whereas the remaining 18 species, of these 17 are winter visitor and one species is seasonal resident/ local movement. According to observed, *Anhinga melanogaster* is near threatened (NT) and others 26 species were least concern (LC).

The formerly widespread White-shouldered Ibis *Pseudibis davisoni* has not been seen in Myanmar since the 1940s.¹⁵ The Pink-

headed Duck *Rhodonessa caryophyllacea* was the focus of several intensive searches in the early 2000s, which did not produce any reliable records despite visiting most of the remaining superficially suitable habitats.¹⁶ Similarly, that the two species White-shouldered Ibis and The Pink-headed Duck were not seen in this study area Taungthaman Lake.

Lebbin¹⁷ stated that the physical environments inhabited by living organisms, are fundamental to their survival.

In the case of birds, habitat provides cover from predators, breeding, wintering and migration stopover sites, and places to forage and roost. All of the habitats used by a bird play role in its survival and the loss or degradation of any one of them can potentially have a population level impact. In that habitat loss is the greatest threat to birds. It is concluded that the abundance of bird species depends on food availability and suitable habitat.

Conclusion

The study area, Taungthaman Lake is mainly microhabitat types with the aquatic insects, algae and others content of water substances. Most villagers are chiefly dependent on agriculture for their livelihood. Therefore, a variety of habitats and environments of this condition attract and support a variety of bird species. Continuous monitoring of avian fauna is an excellent means of monitoring the lake health, and it will also help to this area as a sustainable improvement of the habitat. In the future, with the improvement of the habitat coverage, proper management programs and strategies in the lake and its environs will not only increase the number of resident bird species but will also attract migratory and vagrant species.

Acknowledgements

The authors to express their gratitude to the Department of Higher Education, Minister of Education for financial support in this research project and also thank to Dr Thidar Win, Rector, University of Mandalay for her permission to do this project.

Conflict of interest

The author declares no conflict of interest.

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