Species Composition and Monthly Occurrence of Bird Species in Pyu-Kan Lake and its Environs, Tada-U Township, Mandalay Region, Myanmar

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Abstract

A total of 70 bird species belonging to 40 families and 14 orders were recorded from Pyu-Kan Lake and its environs during the study period from September 2017 to April 2018. Among them, 46 species were terrestrial birds and 24 species were waterbirds. Among 14 orders, Passeriformes was the largest order containing 30 species (42.86%) and next to this was order Pelecaniformes containing nine species (12.86%), Coraciiformes six species (8.57%), Gruiformes five species (7.14%), Anseriformes and Charadriiformes four species (5.71%) in each, Accipitriformes and Columbiformes three species (4.28%) in each and Podicipediformes, Ciconiiformes, Falconiformes, Psittaciformes, Cuculiformes, Strigiformes one species (1.43%) in each respectively. Myanmar's endemic species: *Pericrocotus albifrons* (Jerdon's Minivet), *Mirafra microptera* (Burmese Bushlark), *Pycnonotus blanfordi* (Irrawaddy Bulbul), and *Turdoides gularis* (White- throated Babbler) were also recorded in the Pyu-Kan Lake and its environs. Four Near Threatened species of *Threskiornis melanocephalus* (Black-headed Ibis), *Vanellus vanellus* (Northern Lapwing), *P. albifrons* (Jerdon's Minivet) and *Ploceus hypoxanthus* (Asian Gloden Weaver) and one Vulnerable species of *Aythya ferina* (Common Pochard) were recorded at Pyu-Kan Lake and its environs during the study period. Therefore, this wetland area is very important for bird conservation because a great number of waterbirds species, Near Threatened and Vulnerable species still exist in this area. It is therefore necessary to maintain the environment friendly for the birds to thrive.

Key words: Terrestrial birds, waterbirds, near threatened, vulnerable and Pyu-Kan Lake

Introduction

Birds are good indicators and can be used to identify the most biologically rich areas, as well as environmental changes and problems. In general, places that are rich in bird species are also rich for other forms of biodiversity. Thus, birds can be used as indicators to locate the important areas. Studying birds can tell about the habitats on which people all depend, and loss of Asia's threatened birds from many part of the region is a measure of a more general deterioration in other biodiversity and natural environment (Gill, 1990).

In Southeast Asia, including Myanmar, Thailand, Peninsular Malaysia, Singapore, Cambodia, Laos and Vietnam, a total of 1327 species are known to occur (Robson, 2011). Myanmar revealed a rich and diverse avifauna, amounting to more than 1027 species (Smythies, 2001). Myanmar has 1086 recorded bird species, five of which are endemic bird to Myanmar, 57 bird species are globally threatened and two have been introduced by humans (Avibase, 2017).

Myanmar is home to an impressive number of species of birds that vary from residents, that stay all year around, to breeding birds, that spend a good part of the growing season in Myanmar to raise their young, migrants who pass through Myanmar with the seasons, to wintering birds who like to spend a good part of the winter in Myanmar to escape colder

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conditions up north. While many species of birds are relatively common as they are part of the ecosystems of the state, it is always a thrill to stumble upon a rare bird or vagrant that does not really form part of any the Myanmar ecosystems. Maybe it got lost during its travels between its summer and winter residence or it got displaced by bad weather (Smythies, 2001).

Bird community evaluation has become an important tool in biodiversity conservation and for identifying conservation actions in areas of high human pressure (Sethy *et al*., 2015). Increasingly, human population growth coupled with the rise in demand for settlements, agricultural land and wood products is altering important wildlife habitats, bird diversity patterns and overall biodiversity around the world (Wilbard *et al*., 2013).

Study of the avifauna in the educational premises of the country has been completed. The main aim of this research is to make comprehensive based line information of the bird species for the future as well as to create awareness for their conservation (Sethy *et al.*, 2015).

Pyu-Kan Lake is located in the South East from Tada – U Township, and it has many different habitat types for birds including both terrestrial and waterbirds. Moreover, Pyu-Kan Lake and its environs have paddy fields, various plantations, aquatic plants, big trees, shrubs, bushes, tall grasses, Monastery and Pagoda were good habitats for terrestrial birds. Pyu-Kan Lake has food sources such as fish, crustaceans, and aquatic organisms in abundant for the waterbirds. For these reasons, Pyu-Kan Lake and its environs was chosen as the study area. The present study aimed to identify and record the avifauna and to assess the monthly occurrence and species composition in different study sites of the Pyu-Kan Lake and its environs.

Materials and Methods

Study Area

Pyu-Kan Lake, wetland area is located the South East from Tada – U Township, Mandalay Region. It is a large lake, situated between 21° 45´ 24.65" N - 95° 52´ 11.18" E and 21° 46´ 45.60" N - 95°54´44.49" E (Plate 1). This lake is irrigated from Kin- tar dam and to seven villages namely Pyu-kan, Myin-tha, Yae-kha-moe, Sin-tae, Ku-toe-sate, Gaung-kwae and Thu-nge-taw villages.

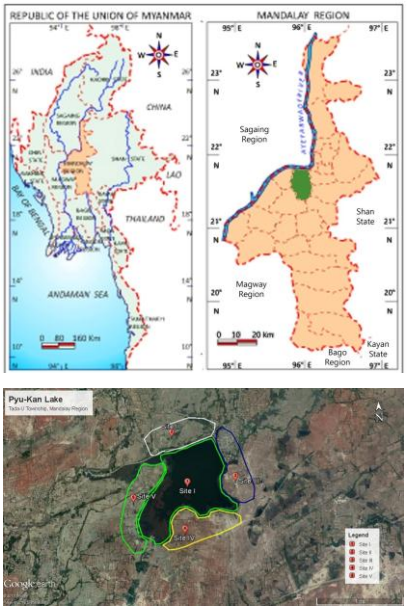

Plate 1 Location map of study area (Source: Google Earth, 2019)

Data Collection and Analysis

Five different study sites were allocated to observe bird species in Pyu-Kan Lake and its environs. Sampling sites were stratified based on the vegetation type and habitat pattern. The study period was lasted from September 2017 to April 2018.

Site I

Site I represented the lake and located between 21° 45´ 39.67" N - 95° 53´ 33.86" E and 21° 46´ 22.85" N - 95°53´27.87" E. The total area of the lake is 1.91 km^2. As all the waterbirds were recorded in the lake, it was allocated as separate site.

Site II

This sampling site is 21° 46´ 27.08" N - 95° 53´ 07.37" E and 21° 46´ 35.16" N - 95°53´43.78" E in the North of the lake. This site includes rice field, bushy areas, tall grasses and toddy trees. The total area is 0.64 km^2.

Site III

The area is between 21° 46´ 32.78" N - 95° 53´ 48.17" E and 21° 45´ 46.27" N - 95°53´58.58" E is the East of the lake. The total area is 0.64 km^2 and well occupied flooded plain with tall grasses, bushy area, toddy trees, rain trees, tamarind trees, Monastery and Pagoda with residential area.

Site IV

This site is situated to the South of the lake and located between 21° 45´ 36.14" N - 95° 53´ 13.98" E and 21° 45´ 34.92" N - 95°53´59.70" E. The habitat types are shrubs, scattered and dense tall trees, grassland, sesame, peanut, sunflower, corns and plantations area. The total area is about 0.64 km^2.

Site V

This site is situated at the West of the lake and located between 21° 45´ 39.71" N - 95° 52´ 59.10" E and 21° 46´ 17.70" N - 95°53´09.75" E. The site is inhabited with grassland, medium-sized plants and bushes, various plantation and Inundated area. Total area is 0.64 km^2.

Collection of data was conducted in five different habitats in study area. Point count method, direct count and estimate count method (Bibby *et al.*, 2000) were used for the individual number of bird species estimations. Birds were viewed with binocular and photos were taken with a Nikon digital camera (Nikon P-900) after sighting the birds. The data collection was made during 7:00 - 10:00 am and evening 3:00 - 6:00 pm at each sampling time. Each sampling site was surveyed twice a month.

Point count involved a standing in one spot and recorded all the bird seen or heard within 10 minutes. In each ten points Study Site, 150 m apart were allocated and the birds observed within the visible distance were recorded.

Direct counting was done as follows-

(i) The individual bird was counted directly. If it was a small size of flock and due to their moving habit, the counting was made immediately.

(ii) Birds flying in separate flocks, the number of birds in a flock was counted and carried on. Eventually, the number in each flock was summed up to obtain the total number. (iii) Birds

flying in large separate flocks, due to the difficulties to count individually, the birds were counted in multiples of even numbers i.e., 2, 4, 6, 8, 10, etc.

Estimated counting was done as follows-

(i) In large flocks, whether flying or perching, the number of birds were estimated in various crowds. It was counted in size of a crowd i.e., 10, 100, 1000, etc.

(ii) In large flock that included more than 1000 in number, the birds were counted by estimation.

(iii) In a flock that included the crowds of birds, estimated counting method such as 5, 10, 20, 50, 100, 150, 200was employed. Bird census was followed after Bibby (2000). Species identification was made according to Smythies (2001), Robson (2015) and Avibase (2017), IUCN Red List 2018.Collected data was analyzed as following

$$\text{Species composition} = \frac{\text{no. of individuals of a species}}{\text{Total no.of individuals of all the species in a particular site}} \times 100$$

Results

A total of 70 species of birds representing 46 species of terrestrial birds and 24 species of waterbirds were recorded (Table 1). Of the recorded bird species, four Myanmar endemics, four near threatened and one vulnerable according by IUCN red list (Table 1) throughout this study period, total number of 15562 birds was found to be distributed in Pyu-Kan Lake and its environs. A total of 15562 individuals were recorded, out of which (10645) individuals were terrestrial and (4917) individuals were waterbirds. Among 14 orders, Passeriformes was the largest order containing 30 species (42.86%) and next to this was order Pelecaniformes containing nine species (12.86%), Coraciiformes six species (8.57%), Gruiformes five species (7.14%), Anseriformes and Charadriiformes (four species each) (5.71%), Accipitriformes and Columbiformes (three species each) (4.28%), and Podicipediformes, Ciconiiformes, Falconiformes, Psittaciformes, Cuculiformes, Strigiformes (one species each) (1.43%) receptively.

In the present study, the highest species numbers 61 species (28%) in Site IV was followed by 56 species (26%) in Site V, 46 species (21%) in Site III, 43 species (20%) in Site II and ten species (5%) in Site I (Fig 1).

During this study, in Site I, the highest bird species (ten) were found in December, January and the lowest bird species (five) was found in September and April. In Site II, the highest bird species (36) were found in January and the lowest bird species (25) were found in April. In Site III, the highest bird species (36) were found in January and the lowest bird species (24) were found in April. In Site IV, the highest bird species (49) were found in December and the lowest bird species (28) were found in April. In Site V, the highest bird species (46) were found in December and the lowest bird species (26) were found in April (Fig 2). The highest numbers of 61 species (28%) was observed in Site IV. Moreover, waterbirds were also highest number. The lowest number of ten species (5%) was observed in Site I.

The highest number of individuals (6810) was found in Site I and the lowest number of individuals (1344) was found in Site II (Fig 3)

Table 1 List of bird species recorded in Pyu-Kan Lake and its environs

Order	Family	Scientific name	Common name	IUCN Status
Anseriformes	Anatidae	*Dendrocygna javanica**	Lesser Whistling -Duck	LC
		*Anas poecilorhyncha**	Indian Spot-billed Duck	LC
		*Aythya ferina**	Common Pochard	VU
		*A. fuligula**	Tufted Duck	LC
Podicipediformes	Podicipedidae	*Tachybaptus ruficollis**	Little Grebe	LC
Ciconiiformes	Ciconiidae	*Anastomus oscitans**	Asian Openbill	LC
Pelecaniformes	Threskiornithidae	*Threskiornis melanocephalus**	Black-headed Ibis	NT
		*Plegadis falcinellus**	Glossy Ibis	LC
	Ardeidae	*Ardeola bacchus**	Chinese Pond Heron	LC
		*Bubulcus coromandus**	Eastern Cattle Egret	LC
		*Ardea cinerea**	Grey Heron	LC
		*A. purpurea**	Purple Heron	LC
		*Mesophoyx intermedia**	Intermediate Egret	LC
		*Egretta garzetta**	Little Egret	LC
	Phalacrocoracidae	*Phalacrocorax niger**	Little Cormorant	LC
Falconiformes	Falconidae	*Falco tinnunculus*	Common Kestrel	LC
Accipitriformes	Pandionidae	*Pandion haliaetus*	Osprey	LC
	Accipitridae	*Milvus migrans*	Black Kite	LC
		Circaetus gallicus	Short-toed Snake-Eagle	LC
Gruiformes	Rallidae	*Amaurornis phoenicurus**	White-breasted Waterhen	LC
		*Porphyrio poliocephalus**	Grey-headed Swamphen	LC
		*Gallinula chloropus**	Common Moorhen	LC

		*Fulica atra**	Common Coot	LC
	Gruidae	*Grus grus**	Common Crane	LC
Charadriiformes	Vanellidae	*Vanellus vanellus**	Northern Lapwing	NT

Table 1 Continued

Order	Family	Scientific name	Common name	IUCN Status
	Charadriidae	*Charadrius dubius**	Little Ringed Plover	LC
	Jacanidae	*Hydrophasianus chirurgus**	Pheasant-tailed Jacana	LC
	Scolopacidae	*Actitis hypoleucos**	Common Sandpiper	LC
Columbiformes	Columbidae	*Columba livia*	Rock Pigeon	LC
		Streptopelia decaocto	Eurasian collared Dove	LC
		S. chinensis	Spotted Dove	LC
Psittacifromes	Psittacidae	*Psittacula krameri*	Rose-ringed Parakeet	LC
Cuculiformes	Cuculidae	*Centropus sinensis*	Greater Coucal	LC
Strigiformes	Strigidae	*Athene brama*	Spotted owlet	LC
Coraciiformes	Coraciidae	*Coracias benghalensis*	Indian Roller	LC
	Alcedinidae	*Halcyon smyrnensis*	White-throated Kingfisher	LC
		Alcedo atthis	Common Kingfisher	LC
	Meropidae	*Merops orientalis*	Little Green Bee-eater	LC
		M. philippinus	Blue-tailed Bee-eater	LC
	Upupidae	*Upupa epops*	Common Hoopoe	LC
Passeriformes	Campephagidae	*Pericrocotus albifrons*	Jerdon's Minivet	NT
	Aegithinidae	*Aegithina tiphia*	Common Iora	LC
	Dicruridae	*Dicrurus macrocercus*	Black Drongo	LC
	Corvidae	*Corvus splendens*	House Crow	LC
		Dendrocitta vagabunda	Rufous Treepie	LC
	Laniidae	*Lanius cristatus*	Brown Shrike	LC
		L. collurioides	Burmese Shrike	LC
	Nectariniidae	*Cinnyris asiaticus*	Purple Sunbird	LC
	Ploceidae	*Ploceus hypoxanthus*	Asian Gloden Weaver	NT
	Estrildidae	*Lonchura punctulata*	Scaly-breasted Munia	LC

	Passeridae	*Passer domesticus*	House Sparrow	LC
		P. flaveolus	Plain-backed Sparrow	LC

Table 1 Continued

Order	Family	Scientific name	Common name	IUCN Status
		P. montanus	Eurasian Tree-Sparrow	LC
	Motacillidae	*Anthus rufulus*	Oriental Pipit	LC
		Motacilla alba	White Wagtail	LC
		M. citreola	Citrine Wagtail	LC
	Sturnidae	*Acridotheres grandis*	White-Vented Myna	LC
		A. tristis	Common Myna	LC
		Acridotheres burmannicus	Vinous-breasted Myna	LC
		Gracupica nigricollis	Black-Collared Starling	LC
	Muscicapidae	*Luscinia calliope*	Siberian Rubythroat	LC
		Saxicola maurus	Eastern Stonechat	LC
		S. caprata	Pied Bushchat	LC
	Alaudidae	*Copsychus saularis*	Oriental Magpie-Robin	LC
		Mirafra microptera	Burmese Bushlark	LC
	Pycnonotidae	*Pycnonotus blanfordi*	Irrawaddy Bulbul	LC
		P. cafer	Red-vented Bulbul	LC
	Hirundinidae	*Hirundo rustica*	Barn Swallow	LC
	Timaliidae	*Turdoides gularis*	White-throated Babbler	LC
	Cisticolidae	*Prinia inornata*	Plain Prinia	LC

* Waterbirds

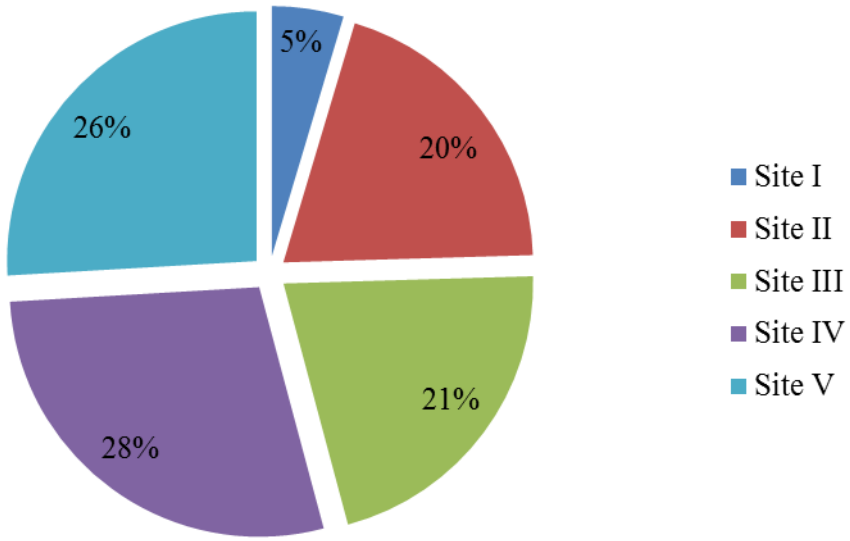

Fig 1 Percentage species composition in different study sites

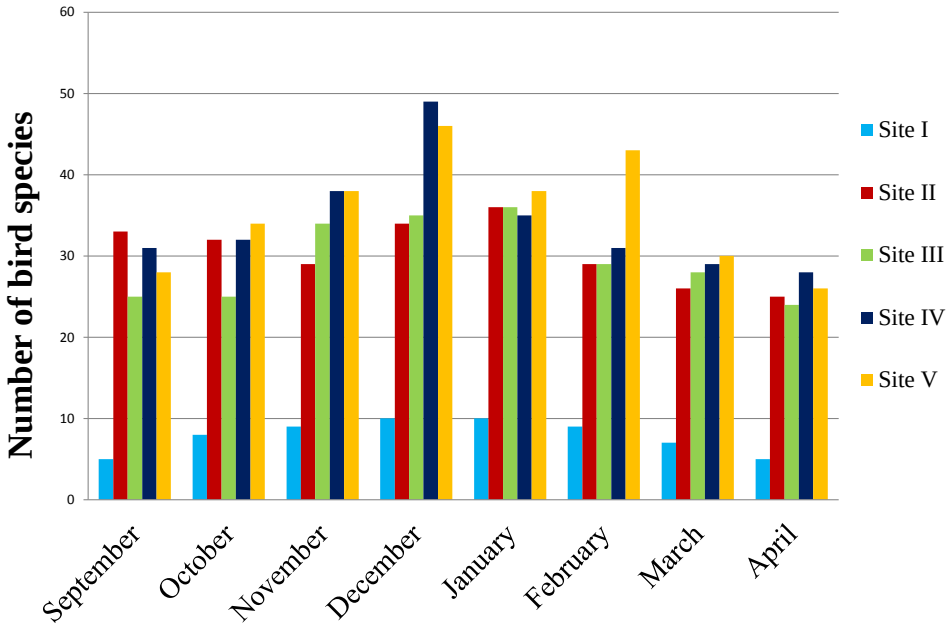

Fig 2 Relative number of bird species recorded in different study sites from September 2017 to April 2018

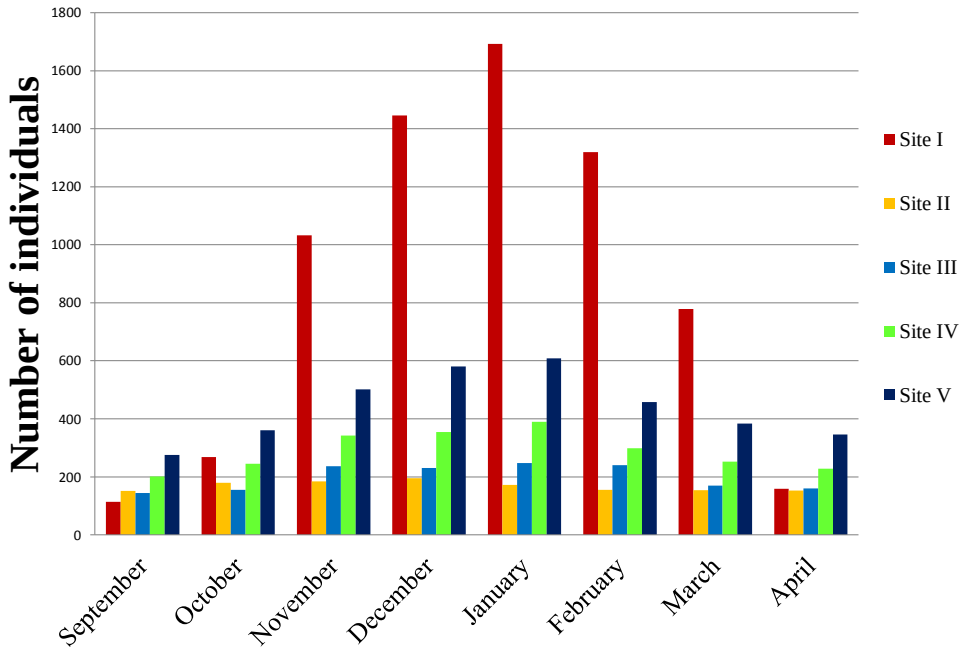

Fig 3 Relative number of individuals recorded in different study sites from September 2017 to April 2018

Discussion

Myanmar revealed a rich and diverse avifauna, amounting to more than (1027) species (Smythies, 2001). Robson (2015) reported the order Passeriformes represent as largest order among all recorded birds in South East Asia. In this study, among 14 orders recorded, Passeriformes was the largest order containing 30 species, followed by order Pelecaniformes containing nine species, order Coraciiformes with six species, Gruiformes five species, Anserifromes and Charadriiformes four species in each, Accipitriformes and Columbiformes with three species each and the lowest order of Podicipediformes, Ciconiiformes, Falconiformes, Psittaciformes, Cuculiformes, Strigiformes were recorded only one species in each respectively.

During this study, in Site I, the highest bird species (ten) were found in December, January and the lowest bird species (five) was found in September and April. In Site II, the highest bird species (36) were found in January and the lowest bird species (25) were found in April. In Site III, the highest bird species (36) were found in January and the lowest bird species (24) were found in April. In Site IV, the highest bird species (49) were found in December and the lowest bird species (28) were found in April. In Site V, the highest bird species (46) were found in December and the lowest bird species (26) were found in April. Most of the highest number of individual was found in December and January and alluded to abundant availability of food sources and suitable weather for both terrestrial birds and waterbirds as well as the winter visitors. In contrast the lowest number of individuals was found in September and April, due to heavy rain in September and increase in average temperature in April, a limiting factor for foraging availability of birds.

Wetland are important ecosystem appreciated for providing quality and abundant habitats for avifauna population throughout the year and thus a considerable number of wetlands are declared as important bird areas (Bird life International 2012).

In the present study, the highest numbers of 61 species (28%) was observed in Site IV. Moreover, waterbirds were also highest number. It may be due to Site IV having dense vegetation and a range of habitats such as wetland area and agricultural area like paddy fields. The lowest number of ten species (5%) was observed in Site I. Although the highest number of individuals (6810) was found in Site I and the lowest number of individuals (1344) was found in Site II (Table 3) and allude to abundant food sources and shelter for waterbirds. In contrast the Site II with paddy fields and cultivated areas appeared a good habitat for terrestrial birds and also suitable habitat for both waterbirds and terrestrial birds.

Many factors have been shown to influence bird populations including geographic locations, habitat condition in nesting, wintering areas and climatic factors (Nilsson, 1978). Climate is an important determinant of geographical range for many bird species. Climate change has been shown to affect the distribution and or abundance of birds (McCarty, 2001).

During this study period, four Near Threatened species of *Vanellus vanellus* (Northern Lapwing), *Threskiornis melanocephalus* (Black-headed Ibis), *Pericrocotus albifron* (Jerdon's Minivet) and *Ploceus hypoxanthus* (Asian Golden Weaver) and one Vulnerable species of *Aythya ferina* (Common Pochard) were recorded at Pyu-Kan Lake and its environs. Therefore, this wetland area is very important for bird conservation because a great number of waterbirds species and Near Threatened and vulnerable species still exist in this area.

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