



The Survey of the Bird Fauna of the Indawghy Lake in February 2016

Christoph Zöckler and Lay Win







Summary

A second thorough survey of the Indawgiy wetland and the adjacent Wild Sanctuary has been undertaken in February 2016 during a different period towards the end of the winter season. The survey has been carried out by boat, motorbike bicycle, elephant and on foot and covering most of the lake and its adjacent wetlands and paddy fields. Two full-day-excursions into the forest areas allowed an insight into the diversity but also vulnerability of the fragile forest ecosystem.

In total 227 species were observed. Of these 42 were entirely recorded in the forested hills, whereas 185 species were recorded within the lake system. Of these species 6 are globally threatened and 7 are near-threatened. A further nine globally threatened species have been either recently or in previous years recorded. A comprehensive list of all recorded species since 2012 is attached in an annex.

Declines of reed birds and also within larger birds like storks and herons have been observed are reason for concern. Management recommendations include a site by site list suggestions, including more general recommendations like reducing motorboat noise and fishing restrictions as well as recommendations towards an effective monitoring of the bird fauna and the effectiveness of the conservations measures.

Introduction

Since 2012 FFI is engaged in a conservation project in close collaboration with the Forestry Department and the reserve management to protect the fragile Lake Indawgyi ecosystem. Until then only a brief wetland survey in 2001 and some scattered bird observations were available. In 2013 a first brief visit enabled a joint waterbird count and training. It provided a first insight that also revealed the potential of the Lake for many more yet undiscovered bird species in the lake area. In December 2014 a comprehensive survey of seven days provided the first basis of a bird based assessment report. In February 2016 the bird survey was repeated at a different time of year and also at different sites. The results of this survey are presented here and together with previous results building the basis for management recommendations. Meanwhile the lake, the adjacent agricultural land and the forest areas are protected as a Wildlife sanctuary and also as Myanmar's second Ramsar site. On the basis of bird records, bird habitats and observations on threats recommendations for conservation and future management are provided.

Survey Methods

From 3-12 February 2016 a comprehensive survey of the bird fauna of the lake and adjacent selected forest areas was undertaken. The survey was carried out by boat, motorbike, bicycle and on foot in the forest areas. In February 2016 we were granted permission to access the Naung Khuin wetland NW of the lake and the wetland was surveyed on the back of elephant on 10 February, organised by U Myint Shwe (FFI). Boats were provided by the Forest Department and conducted by the reserve staff. The survey team consisted of Lay Win from FFI, accompanied by at least one forest reserve officer Ni Lar and Thura. Boat surveys were undertaken mostly one in the morning and afternoon until dusk or whole day tours to remote parts of the lake. On three mornings (5-7 February) mist netting was tried out in the adjacent grassland areas near Lonton village. This proved difficult and also controversial for two reasons. First the nets were becoming very wet in the morning due to extensive fog on each days and a potential health hazard for the birds trapped. Secondly during the course of our boat surveys we noticed considerable d wide-spread bird trapping activities by local people. Although this is illegal we did not want to set doubtful examples of bird catching using mistnets. On February 7 and 9 a whole day tour was organised into the adjacent forest areas and the Community Forest Reserve within the Wildlife Sanctuary in the south of the lake. Observations form this visit are included in this report and species recorded only in these forested areas highlighted in green in the annexed species list.

Table 1: Survey period and methods

date	morning	afternoon			
3-Feb	Arrival in Myitkhyina	Arrival at Lake Guesthouse			
4-Feb	West side by bicycle and by boat	South coast by boat			
5-Feb	Fields on west side by bicycle and motorbike	Reccy trip to Naung Khuin			
6-Feb	Fields at west side, NE side of lake by boat	Indaw Chaung river			
7-Feb	All day forest excursion south-east of the lake				
8-Feb	North side of lake by motor bike and later excursion from north into Indaw Chaung by boat				
9-Feb	Community Forest excursion all day south of lake south part of lake by motorbike				
10-Feb	All day excursion to Naung Khuin wetland to survey on back of elephant				
11-Feb	Overall waterbird count by two teams with two different boats all day				
12-Feb	Southern lake by motor boat lake and duck	Departure			

Figure 1 shows the extent and focus of the survey in February 2016. Areas previously unsurveyed like in the NE of the lake or the Naung Khuin wetland as well as some forest areas in the south and southeast of the lake have been emphasised during this survey.

Binoculars (10x42) and telescopes (15-45 zoom) were used and in addition sound recordings checked for secretive birds calling from hidden vegetation.

Observations from a previous visit in December 2013 and 2014 were included in the overall assessment and included together with other records into a comprehensive bird list

In order to assess the avifauna the lake has been divided into eight sections (see Figure 2). This describe specific sections of the lake, the Naung Khiun wetland and its avifauna and conservation needs. Recommendations are provided for each of these sections. As the forest regions were only sporadically visited and only little insight given, more general recommendations are provided.









Different survey methods, on motorbike, boat, elephant and on foot

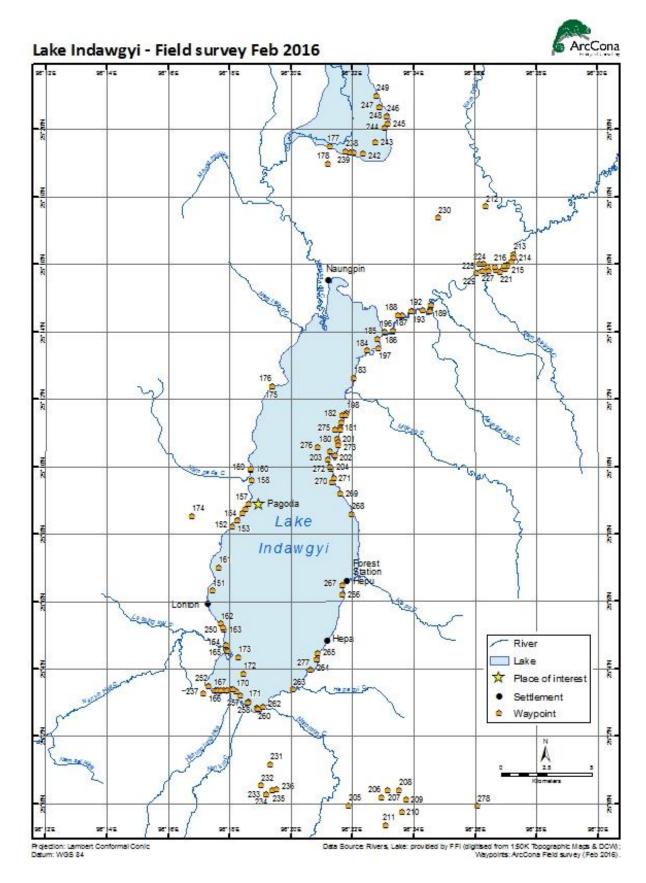


Figure 1: Extent of survey depicted by waypoints from 4-12 February 2016

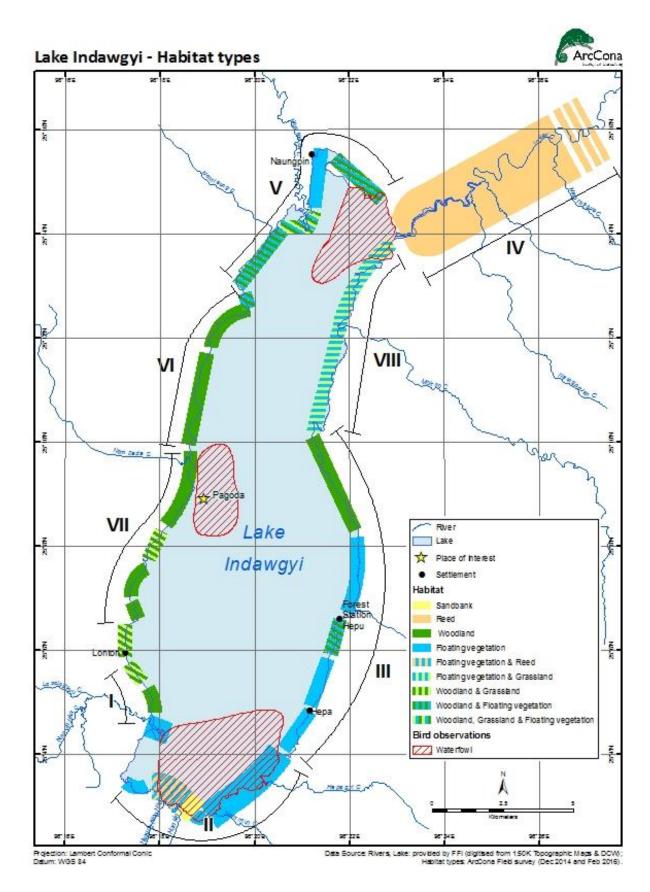


Figure 2: Bird Habitats of Lake Indawgyi and sections describing defined bird habitats and recommendations for their conservation and management.

Bird fauna

In the survey period from 3-12 February 2016 a total of 227 bird species were recorded in the lake area and adjacent forest as it is part of the Wildlife Sanctuary (see annex 1). Including only birds that are associated with lake and lake shore habitats with total is slightly lower. A total of 42 forest species were only recorded in forested areas far from the lake. On the lake and its shores a total of 185 species were recorded. These are the open waters, floating vegetation, reed belts, woodland and grasslands adjacent to the lake and often directly impacted by inundation. Also some of the major streams, such as the Indaw Chaung in the NE with extensive reed beds and small lakes imbedded. These 185 species are part of a total of over 350 species that have been recorded on the lake and its surrounding habitats since systematic observations started in 2001 (see Davies et al (2004) and Tordoff et al. (2007). It is also 25 more species than have been recorded in December 2014 (Zöckler 2014), which is partly seasonally explained but also due to more targeted surveys and a stronger team in February 2016.

Forest areas in adjacent hills are part of the wildlife sanctuary and as such considered for this report separately. Species only observed in forest areas far from the lake but within the Wildlife Sanctuary are listed in annex 1 but marked in green.

Due to its wetland character the lake is supporting a high number of breeding and wintering water birds. Among these, geese and ducks are dominating with a total of 18 species recorded in Feb 2016, adding two new species (Greater White-fronted Goose and Common Shelduck) Together with previously recorded Baer's Pochard in December 2015 the total recorded waterfowl species stands now at 21 species. Three species each of grebes and two cormorants, one darter, five stork and 9 heron and egret species were present at the lake. The lake is not significantly important for shorebirds, gulls and terns but still 18 different waders were recorded of which at least five species are likely breeding in the area. Among the rails and crakes the lake comprises a very high number of species, with nine species recorded in 2013 and 2014. Four species of Kingfisher inhabit the lake and adjacent rivers. A fifth species has been recorded upstream in one of the small tributaries but not recorded during our survey in 2016.

Annex 1 is listing all recorded bird species in February 2016 and refers to those recorded in December 2014 for comparison. Those only in the forest areas far from the lake have been highlighted in green.

Among birds of prey the lake regularly hosts 18-22 species, some of which are dependent on wetlands and globally threatened. There are a few other wetland dependent birds among the other bird groups but mostly these are ubiquitous and settle in many different habitat types. Some of the recorded passerines are dependent on the lake habitats and several have been recorded in 2016 for the first time.

Globally Threatened Birds

Since December 2013 a total of 17 red-listed species have been recorded from the lake area. Table 2 is listing these and previously recorded red-listed species and their status.

Table 2 Red-listed bird species from the Indawghy lake area

		IUCN		Highest	Trend
Red Listed Species		criteria	last rec.	number	
Falcated Duck	Anas falcata	NT	2011		DEC
Ferruginous Pochard	Aythya nyrca	NT	present	>2000	STA
Common Pochard	Aythya ferina	NT	present	<mark>>1000</mark>	<mark>STA</mark>
Baer's Pochard	Aythya baeri	CR	2015	1	
Black-necked Stork	Ephippiorhynchos asiaticus	NT	2013	-	DEC
Wholly-necked Stork	Ciconia episcopus	VU	present	4	DEC
Lesser Adjutant	Leptoptilos javanicus	VU	present	4	DEC
Spot-billed Pelican	Pelecanus philippensis	NT	present	8	STA
Oriental Darter	Anhinga melanogaster	NT	present	40	DEC
White-rumped Vulture	Gyps bengalensis	CR	present	6	INC
Slender-billed Vulture	Gyps tenuirostris	CR	present	8	INC
Himalayan Griffon	Gyps himalayensis	NT	present	22	INC
Cinereous Vulture	Aegypius monachus	NT	present	2-3	?
Greater Spotted Eagle	Aquila clanga	VU	present	3-4	STA
Pallas's Fish-Eagle	Haliaeetus leucoryphus	VU	2014	-	
Lesser Fish Eagle	Icthyophaga humilis	NT	2005	-	
Grey-headed Fish Eagle	Icthyophaga ichthyaetus	NT	2005	-	
Sarus Crane	Grus antigone	VU	present	22	STA
Wood Snipe	Gallinago nemoricola	VU	present	1	?
Eurasian Curlew	Numenius acquata	NT	2015	1	
Black-bellied Tern	Sterna acuticauda	EN	2011	-	?
Red-breasted Parakeet	Psittacula alexandri	NT	present	>	
Rufous-necked Hornbill	Aceros nipalensis	VU	present		?

Among the total of 23 red-listed species the waterfowl species are dominating with twelve species. But a surprisingly high number of eight raptor species as top predators and scavengers among the globally threatened species depicting a high degree of ecosystem integrity of the lake and its adjacent habitats. It is however worrying that two of these species have not been recorded in recent years (see table 1). Figure 3 displays the distribution of the red-listed species around the lake. Almost all red-listed species appear to be restricted in the northern part of the lake. This is true for all higher categories as VU, EN and CR apart of the Sarus Crane near Lonton, one of the three Greater Spotted Eagles and Woolly-necked Storks (see figure 3). The near-threatened Darter and the Ferruginous Duck are more widely distributed but both not abundant.



Adult Slender-billed Vulture – critically endangered (CR) near fresh carcass Naung Khuin all photos C. Zöckler



Lesser Adjutant Stork – gloablly threatened (VU)

Naung Khuin wetland

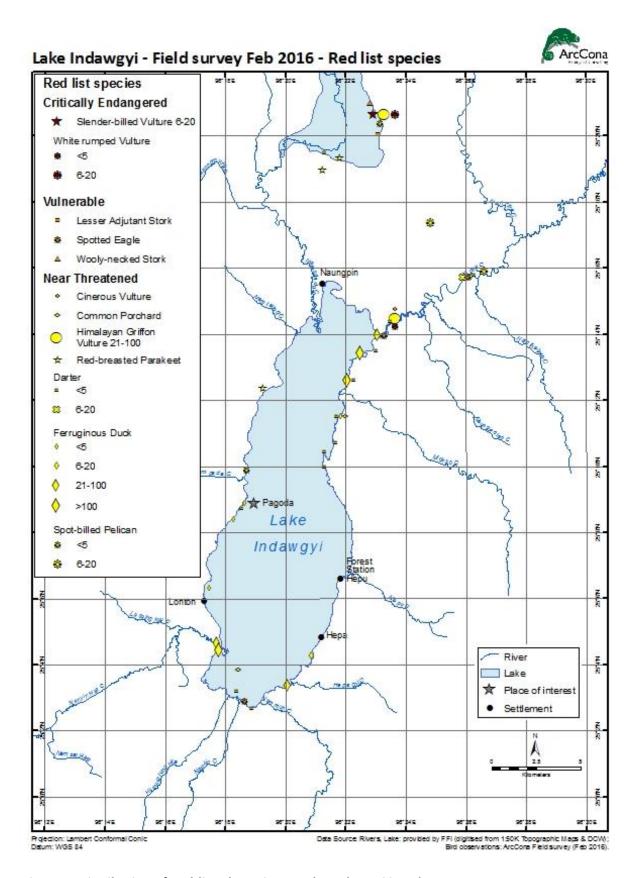


Figure 3: Distribution of Red-listed Species at Lake Indawgyi in Feb 2016

Birds taxa in detail

Among the total of 185 species recorded in February 2016 in the lake wetland area, waterbirds are naturally dominating, followed by a high number of birds of prey and a smaller number of woodland bird species. Some of the less common or rare though not threatened species that represent different lake habitats and migrant status are illustrated in their distribution in Figure 4.

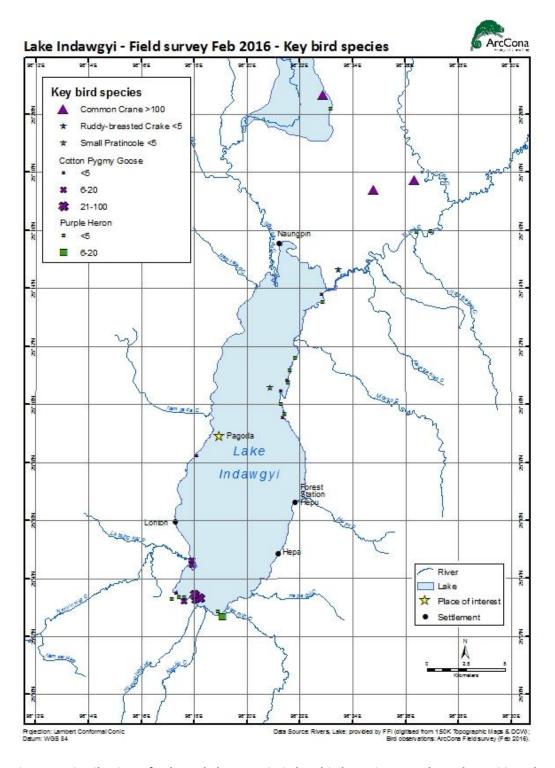


Figure 4 Distribution of selected characteristic key bird species on Lake Indawgyi in Feb 2016

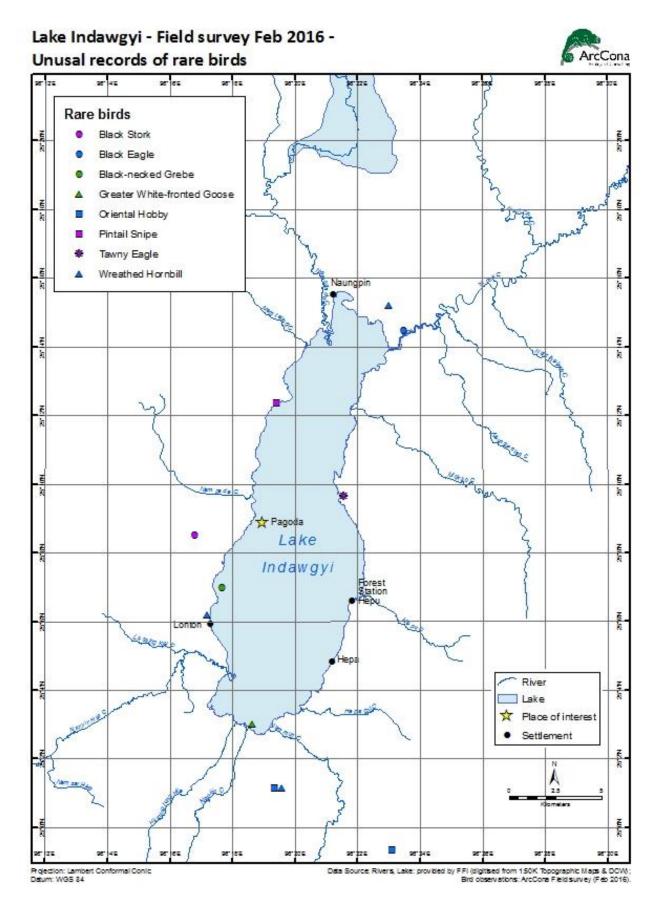


Figure 5: Distribution of some selected rare and unusual birds on Lake Indawgyi Feb 2016

In the following, the characteristic groups of birds typical for the lake are discussed in more details. Pelicans



Spot-billed Pelican at Indaw Chaung

Spot-billed Pelicans are not present all year round. However, at least eight birds were observed in the Indaw Chaung area on 8 February and another five in the Naung Khuin wetland on 10 February. It is not clear if these birds were additional birds or part of the same flock observed two days earlier. The eight birds from Indaw Chaung also roosted in trees in the forest north of the lake on 8 February. The birds were just the forefront of a larger flock of at least 100 birds found later in the lake region (F. Momberg pers. Comm.) Pelicans are known to breed in the forest but no such nesting has yet been found in the region. It is possible that the birds are either nesting in the forest within the Sanctuary and Naung Khuin wetland or are coming from further afield. These birds highlight also the direct link of the wetland with forested habitats.

Waterfowl



Common Pochard – recently uplisted to globally near-threatened (NT)

In total 18 waterfowl species have been recorded on and near the lake. Two of them were observed for the first time. The Greater White-fronted Goose Anser albifrons might have been drawn that far south by the cold spell that was triggered by unusual weather patterns caused by El Nino effects. At least four individuals were observed amongst Grey lag geese in the south of the lake. Likewise the Common Shelduck Tadorna tadorna observed on 5 February 2016 in the NE of the lake might have been equally part of a southward drift in migration. Both species are quite common and spreading in Eurasia and its increasing occurrence in Myanmar is no surprise. Regular visitors to the lake in large numbers are Coot, Tufted and Ferruginous Duck and Common Pochard. Although the Coot is not a waterfowl as such its behaviour and roosting pattern on the lake is more similar to ducks and hence grouped with these species. The last two duck species are considered near-threatened and the lake is highly important for these two species with no other lake in Myanmar hosting such large number of either species. In total all four species comprise 8000 -9000 individuals, almost half of all waterbirds on the lake. The critical endangered Baer's Pochard (CR) has been recorded for a period of several weeks in November and December (Name? pers. Comm. And photo), but could not be relocated in February 2016. Other waterfowl of interest are Cotton Pygmy Goose which seem to have already migrated to their breeding grounds in China, as their number hardly surpassed 100. Among the dabbling ducks Gadwall and Teal are most abundant. With figures over 150 they seem to be higher than previously which could be a seasonal pattern and not reflecting any increase. Also the numbers of Wigeon and Garganey were high with almost 70 and 30 birds respectively counted on 11 February.

Grebes

For the first time since 2001 the Black-necked Grebe has been recorded on the lake. At least three birds were observed on 3 February (see Fig 5). A total of at least 260 Great Crested Grebes were

counted during their evening flights north across the lake. It is not clear if this is a regular occurrence but it means that this could prove a good monitoring opportunity from a vantage of a boat in the southern-centre part of the lake. This number is much higher, almost double of what has been counted during the midwinter counts (Kyaw Zin Htun pers. Comm.) and I suggest to regularly pay attention to the special behaviour of this species, roosting away from the shore in the midst of the lake. The number of Little Grebes surpassed 110, but are also likely higher, considering their secretive behaviour.

Rails and Crakes



Purple Swamphen – abundant resident at the lake shores

Rails and crakes were less vocal in February 2016 than in December 2014 and only few Ruddy-breasted Crakes have been recorded (see Fig 4), but at least two White-breasted Waterhens and accidental passing of Watercocks suggest that this species is more wide-spread in the agricultural areas. Purple Swamphen are very abundant on the lake. In February 2016 the number was still high and estimates of total from the entire lake region are over 2,000 or more birds. This is still below the estimates for mid-winter and could account for some shifts within the lake system or migratory movements to breeding sites further afield or even a decline in response to the wide-spread destruction of large reed areas and floating vegetation in the north of the lake. Future monitoring would need to establish the reasons behind fluctuating numbers.

A total of eight heron and egrets have been recorded. Among these are **Pond Herons**, which could comprise two different species that are very difficult to separate at this time of the year when still in winter plumage. These and **Purple Herons** are most closely associated with the wetland character. It is therefore slightly concerning that the numbers of **Purple Heron** seem to have dropped considerable compared to only December 2014. It is not clear if this is a reflection of the loss of habitat due to ploughing the reeds and converting them into arable fields or overseeing the much camouflaged heron. Considering that none of the Bitterns has been recorded however is supporting the theory of declining reed dependant birds. Further careful monitoring is required to provide further evidence.

Cranes

Sarus Cranes already left the traditional roosting by February and dispersed to their breeding sites respectively. However, none of those have been found and it is not clear how widely they are distributed within the lake region.

However, **Common Cranes**, which breed almost exclusively in Russia were still present in big numbers. In fact, big numbers of over 100 individuals were observed at several locations in the northern part of the lake and in Naung Khin wetland. The total estimated number in the Wildlife Sanctuary is well over 1200 individuals. These numbers seem to have increased which is in line with the general observed growth in population of the species.

Storks and Ibises



Woolly-necked Storks (VU) at Naung Khuin Wetland

Black Stork in paddy fields

Openbill Storks are abundant and widely distributed around the lake. Other stork species are very rare. One Black Stork has been observed in the paddy fields west of the lake. **Woolly-necked Storks** a s well as Lesser Adjutant Storks were only observed in Naung Khuin and there is a suspicion that disturbance on the lake but also increasingly in Indaw Chaung has led to abandoning some traditional roost or breeding sites of these species.

Birds of prey



Tawny Eagle on 11 February

North East Lakeside

With a total of 23 birds of prey the survey in 2016 highlighted again the significance of the area for this species group. Possibly for the first time was a record of a **Tawny Eagle** on the NE lake shore and the **Oriental Hobby** has been recorded twice in the forested hillsides near the lake in the south. Also the number of the globally threatened **Greater Spotted Eagle** is stable or has increased with a total of three birds around the lake (see also Figure 5), underpinning the importance of the wetland for this globally threatened top predator. Interestingly, the **Booted Eagle**, a new visitor to the lake in 2013 has now also been recorded in other places, such as Naung Khuin wetland NW of the lake. Although still present, the number of vultures seemed to have declined until recently since 2004, when Tordoff et al. (2007) noticed over 40 vultures of three species in total. In 2013 a flock of 9 vultures of two species was observed and in 2014 only two observations of single birds each were noted. However, in February 2016 a total of 30 vultures (22 **Himalayan Griffon**, 5 **White-rumped** and 2 or 3 **Cinereous Vultures**) assembled near a carcass in the Indaw Chaung area. Another roost near the Naung Khuin area resulted in at least 35 or more vultures, including six **Slender-billed Vultures** and seven **White-rumped Vultures** (both CR). Among the harriers, **Eastern Marsh** and **Pied Harrier** were most common, but also two different Hen Harriers from further north were observed near the lake.



Pied Harrier resting in stubble field north of the lake



Oriental Hobby - Forest Reserve south of the lake

Kingfisher

Four species of kingfisher have been recorded. Most common are **White-throated** and **Common Kingfisher**, both observed in almost all parts of the lake and adjacent streams. The rarer **Stork-billed Kingfisher** has only been recorded once along the western shore of the lake. This species is relying much more on wooded structures and benefits from the more wooded habitats along the Western side of the lake. It is a resident species at the lake and although breeding is not proven it is quite likely. For breeding the species relies on old wood trunks and or termite trunks to dig holes in. Although globally not threatened a decline due to habitat loss has been noted recently and it deserves special attention and maybe a review, when considering its conservation status.

Waders

Although a total of 18 different species were recorded in February 2016 the lake is not very important for waders. The total number of individuals in the wetland is small with a maximum of 300 individuals. The number of **Grey-headed Lapwings** seemed to have been lower than in December 2014, when over 40 were recorded and in 2016 only 23. We also noted a lower number of **Pheasant-tailed Jacanas**, but these birds are hiding in the vegetation and could have been overlooked. Interestingly, the number of **Small Pratincoles** on the sandbank in the NE of the lake has increased from 32 in 2014 to 77. This species is breeding on river islands in the Ayeyarwaddy River near-by but could establish a small colony here if disturbances by local people were not too large. The swift sands do not allow humans to approach the sands easily and a colony might establish. Surveys in April or May should check for the presence of chicks. Only as recently as December 2015, one **Eurasian Curlew** has been recorded in the lake area (Htun pers. comm.). Also a record of the globally threatened **Wood Snipe** (VU) on February

5 near Lonton has been the first since 2005 (Kyaw Zin Htun) and seems to confirm this species, largely only known from higher elevations occurs regularly near the lake. For the first time a **Pintail Snipe** has been recorded from the lakeside on the Western shore of the lake (see Fig 5). Apart from the two jacanas it is likely that **Red-wattled Lapwings** and **Little Ringed Plovers** are nesting in the wetlands near the lake. In 2015, also **Painted Snipe** has been observed with young (Ngwe Lwin pers. Comm.), proving that this elusive wader species is also nesting near the lake. It is unclear if **Common Snipe** or any other waders are breeding in the wetland. The large majority of waders are migrants from Siberia and China or the Himalayas as in the case of the **Wood Snipe**.

Selected Passerines



Citrine Wagtails wintering in the thousands in Indawgiy wetland.

Among the passerines, the wagtails are the most dominating groups on the lake. The floating vegetation but also most of the shoreline are occupied with hundreds if not more than one thousands of wagtails. Most of them are **Citrine Wagtails**, originating from temperate Russia and China, wintering in large numbers on the lake. Yellow and White wagtails are fewer but still numerous. Among the pipits, **Rosy Pipit** and **Richard Pipits** winter close to the shore and in paddy fields, while Siberian **Olive-backed Pipits** prefer more forested habitats on the lakeshore.

Among the reedbirds the **Striated Grassbird** is abundant and dominating all wetland habitats. Reed Warblers itself are much less common. Only very few oriental Reed Warblers and also few Pallas' Grasshopper Warbler have been recorded. The reeds are also home to **Bluethroat**, **Siberian Rubythroat**, **Black-faced** and **Little Buntings**. The latter also frequent the paddy fields in the neighbouring areas. Among the new bird species recorded on the lake, there are two passerines. The

Radde's Warbler recorded near Hepu on the eastern shore is maybe not exceptional and just might have been overlooked. Also new was a female **Hodgson's Redstart** on 9 February in the SW corner of the lake. It is likely that this species is passing through in small numbers and has been overlooked before or it is part of the influx of northern species that has been noticed this winter 2015/16.

Forest birds





Green-billed Malkoha Striated Bulbul and White-bellied Yuhina in the Forest Reserve of the Wildlife Sanctuary

Two excursions into the forest areas on 7 and 9 February resulted in a number of interesting observations of forest birds. Most noticeable were Oriental Hobby at two sites and also large numbers

of Barred Cuckoo Doves with at least 6 birds at one site in the south on the 7 February and two more at another site on 9 February. The information on the bird fauna is still scattered and surveys of vast areas of the forest could reveal a much more complete picture. A total of almost 340 species have been recorded over the years (Kyaw Zin Htun per. Comm.), but little detail is available on references or how these observations have been obtained. A total species list for all species recorded within the reserve is in preparation.

New recorded birds

It is difficult in some cases to determine if the species has been observed in the Indawgiy already. Eight species were apparently recorded for the first time.

Among the waterbirds were the already mentioned **Greater White-fronted Goose**, as part of a influx of northern birds and the **Common Shelduck**, a species known to be in expansion and already as recent as Dec 2015 observed on the lake (Thura pers. Comm.). The **Cinereous Vulture** noted in the first large flock of vulture near the carcass in the Indaw Chaung area has not been recorded before and the views were quite distant and further confirmation of this elusive vulture in this area is required. It is surprising that the **Pintail Snipe** has not been observed previously, but the species is easily mistaken with the similar and more wide-spread **Common Snipe**. A **Brown Hawk Owl** has been heard in the village of Lonton. Further inquiries might be necessary to establish if this species is breeding in the vicinity of the lake. It is surprising that this vocal species has not been recorded before. The **Radde's Warbler** might be more wide-spread within the area than this one record suggests and further survey should pay attention to this elusive small warbler. The **Red-throated Thrush** is a rare northern migrant and likely part of this influx of northern birds. **Hodgson's Redstart** also new for the lake might also be part of the influx of northern birds.

Conclusions and management recommendations

Lake Indawgyi is a very diverse and rich wetland in the North of Myanmar supporting significant numbers of water bird and other species' habitat and is still relatively pristine. Pressure on the resources and pollution are gradually building up and creating a conservation challenge. It deserves the highest degree of protection and it is highly recommended that the conservation status of the present reserve is been upgraded to an international status. Ramsar status and M&B status are both suitable and important options for enhancing its conservation status.

Recommendations for conservation

At present the lake is supporting a huge number of different water bird and other bird species' habitats and is regularly hosting a large number of wintering migrants from predominantly China and Siberia. It also is home for several breeding birds and birds that stay here year round. The habitat structure and diversity is great and especially the rich reed and grassland areas as well as the floating vegetation are responsible for the rich diversity in bird species.

Threats

There are quite a few threats noticed that impact either the habitat structure or extent, as well as direct impacts observed on the birds, such as hunting and trapping of birds as well as disturbance by increasing human activities.

Figure 6 shows the distribution of various observed threats around the lake

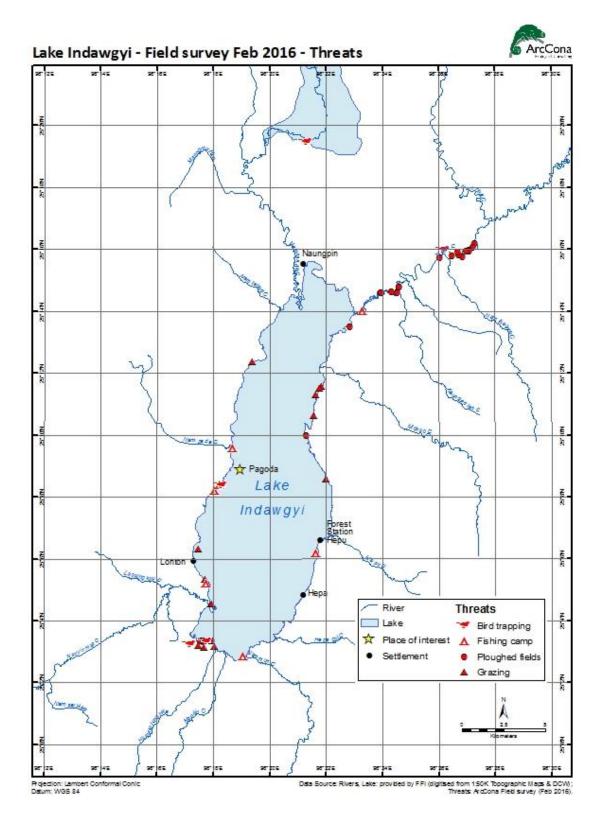


Figure 6: Observed threats to waterbirds and their habiats in Lake Indawgiy in Feb 2016

Agricultural expansion

Compared with two years ago human activities seem to have increased and the encroachment of agricultural activities in particular appears to be increasing and expanding. Worse, it looks like there is no institution that is able or willing to stop this development. Recommendations in the following sections are urgently implemented to prevent the disappearing of large sections of reeds and grassland into arable land. Figure 6 shows the areas where only recently reeds or grasslands have been ploughed. In total 14 of such incidences have been noted. Most concerning is the high distribution within the highly ecological important Indaw Chaung area but also in the NE of the lake. The actual number of ploughed fields might be even higher.







Freshly ploughed fields, mainly in the north of the lake Feb 2016

Fishing

Fishing activities still seem to be widespread. The encroaching temporary fishing camps have been observed. Although these are not new phenomenon it appears that some have been not noticed previously or are expanding. In two cases there were more than 16 and 12 boats respectively. The impact on the surrounding vegetation is obviously devastating but firewood collection is even more widely applied and can be more seriously harmful for the fragile bank vegetation all along the shore. Disturbance from fishing boats and engine activities is dominant everywhere and it is important to stress the implementation and enforcement of no fishing and no boat zones (see red areas in Figure 2)



Bird trapping

Bird trapping has been consider so far as marginal and has not been regarded as a serious threat to waterbirds on the lake. However, our observations during the short period in February confirmed a much larger scale problem. Figure 6 shows the extent of bird trapping with nets, slings and snooze traps. In total we located and dismantled ten nets and traps at four different locations across the lake and Indaw Chaung. Specifically prominent and not disguised at all is the extent of 7 large nets put across the grassland and reeds in the south of the lake. We also heard of stories that bird poising using baits is common practise among villagers in the Naung Khuin wetland area.







Top Bird net dismantled **Below left** Intermediate Egret caught in sling **Below right** Trap for catching perching birds

Motor boat noise

There are several hundred motorboats around the lake in action on a daily basis. Regardless where on the lake you are boats are almost always audible. Some of the boats have no or little sound absorber. Some of the noise is so loud that it is actually a health hazard for the boatmen. However, the noise is impacting also the fauna and the overall soundscape of the lake. Many bird species respond adversely to the noise and are either retreating, subdued in their activities, displaying a restricted and disturbed or avoid the lake wetland entirely.

In this context it was interesting to note the Indaw Chaung channel being blocked during the survey in February 2016 preventing any motorboat traffic through the channel. The Naung Khuin wetl; and can only be accessed by small boats and canoes using rowing and paddling devises. This wetland hosts more Wooly-necked storks, Lesser Adjutant Storks and other larger waterbirds and birds of prey. There are many factors involved but noise could be responsible for the presence or absence of some of the larger birds and maybe even impact the distribution and reproduction of smaller brid species and mammals, amphibians and others likewise.

It is strongly recommended to pay more attention to the noise of motor boats and try to promote the introduction of electric or other motors.

Threat to forest birds

Deforestation is of cause a big issue and despite the fact that the forests within the Wildlife Sanctaury are officially protected logging and selected cutting of trees is continueously going on. On 7 February we observed a group of villages freshly cutting a tree.



Illegal logging in the Indawgiy Wildlife sanctuary

February 2016

Recommendations by lake section

In order to list recommendations most efficiently, the lake has been roughly divided into nine sections (I-VIII, see Figure 2) and the Naung Khuin wetland in the north. Below recommendations on conservation measure and management are compiled for each of those sections.

Section I

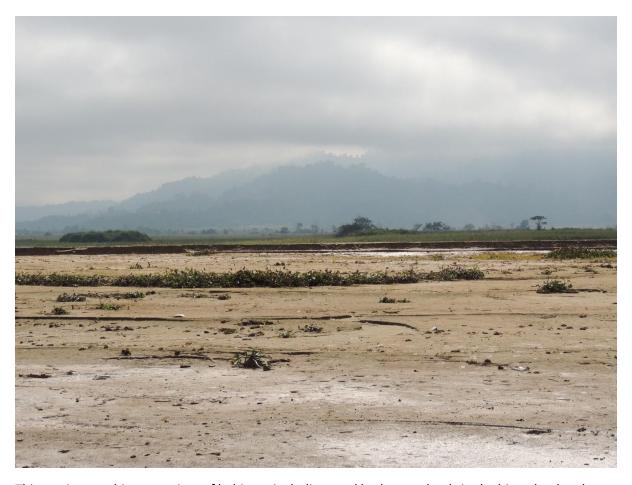


This relatively small section in the SW corner of the lake is near the villages Lonton and others further south and under pressure from fishermen and other visitors. However, the area still holds one of the most intact and dense woodland stretches along the lake, even though they are small and partly already degraded. Several 'illegal' preliminary fishing camps are spread out in these woodlands with temporary camping accommodation. These might be there only for seasonal fishing activities but provide sufficient disturbance for certain birds to avoid the area. These are mostly larger birds and the more threatened species such as Darter, Stork-billed Kingfisher, but also Cotton Pygmy Goose and others.

This section would hugely benefit from an extension of the woodland belt inwards towards the grassland and agricultural areas. Likewise a reduction in these camps or channelling into less sensitive areas would enhance the presence of some of the endangered species.

It has been observed with concern that the prominent peninsula in this section has been grazed by water buffalo or cut otherwise and is much shorter in vegetation. It harbours many bird species, in particular Cotton Pygmy Goose Purple Swamphen, but also Ferruginous Duck and Glossy Ibis live here in good numbers. For some of the species, in particular Cotton pygmy Goose these numbers went down. Also the peninsula hosts a regular mass roost of Swallows and Martins. Up to 3000 were counted. Without tall vegetation the site looses its attractiveness. It is strongly recommended to abandon any grazing or cutting from this Peninsula for the vegetation to recover.

Section II



This section combines a variety of habitats, including reed beds, grasslands in the hinterland and even water buffalo pastures in the SW corner, as well as a broad belt of floating vegetation. Maybe a bit more exotic, but not the less important is a medium-sized sandbank, large enough to host several different waders and over a thousand roosting gulls. This area is adjacent also to one of the most prominent duck roosting areas. All this together makes this section highly important.

This section should be designated as a special conservation area (core zone) with reduced human activities. Especially important is to reduce fishing activities in the duck roosting areas and along the entire southern coast, including an access restriction to the sandbank, at least during breeding period but ideally most of the year. The reed area in the south should if possible be extended inland and adjacent agricultural areas maintained in their present low extensity practices. This is also valid for the water buffalo pastures, which in its present form are attractive for waders and could also serve as breeding areas for Little Ringed Plovers, Red-wattled Lapwings and others. During breeding period the buffaloes might need restricted access to the area for a short period of two months. The SE corner of the lake consists of large extensive floating vegetation that gradually merges with the short grassland. At present this grassland areas look like suitable habitats for wintering waterfowl and also especially hunting harriers. Towards the northern end of this section we noticed a relatively high density of grazing cattle (> 100 water buffalo and cattle mixed), which partly intrude their grazing activities into the floating vegetation. The further north the more intense the agricultural activities, mostly by cattle and buffalo grazing, but increasingly also fencing of land used for other agricultural purposes.

Since December 2014 the area of grazing has rather been extended than reduced and is posing a threat to one of the largest and second most attractive reed areas of the lake. Cattle numbers need to be strongly reduced and temporarily banned from the grassland in March – May during breeding season.

Bird Hunting with nets has been specifically prominent and needs to be tackled through penalties and also awareness raising

Section III



This section includes a huge stretch along the eastern coast and is mostly characterised by large swathes of floating vegetation which near the forest station Hepu and north of Hepu is more interspersed with remains of former woodlands. Especially in the southern part of the shore the floating vegetation is more thinly stretched and a few scattered trees are remainders of a former more extensive woodland along the lake shore. Almost all along the shoreline the water quality is also visibly declining. Increased algae and the flocking of dead *Characeae* algae are a clear sign of deteriorating water quality in this section. Even further from the shore and near the centre of the lake between section II and Lonton huge areas of algae indicate poor water quality in this section.

Section III is most in need of restoration. It is recommended to restore woodlands in parts of this section by encouraging regrowth and possibly by planting native tree species. The focus of woodland restoration should be more in the northern part, north of the forest station, as the more southern part is attractive for many water birds in its present open character. However the floating vegetation and the grassland character here have been far too much reduced and should be encouraged to extend by about 200- 300m in breadth to encourage larger floating vegetation areas and attractive grassland habitats to thrive and also to reduce the potential increase of residues of agricultural activities.

The immediate hinterland of the lake is quite intensively grazed by cattle and some selected areas should be set aside and fall fallow to allow the establishment of reed and grassland also as a buffer for the water quality.

The temporary fishing camp observed on the shore should be dissolved to to allow for the vegetation on the shore to recover.

Section IV



Section IV consists of a large extensive reed bed and grassland area interspersed by winding river arms, old river stretches and oxbow lakes that provide a rich and diverse water bird fauna. The area is only accessible by boat and here only along the main stream the Indaw Chaung. This river though is highly frequented by motor boat traffic, connecting upstream settlements with the lake communities and cuts right through the area. There are also several fishing huts that are built on stilts over standing water. Water buffaloes are grazing parts of the area and evidence of bird hunting and trapping has been observed here.

It is recommended to channel and restrict the boat traffic as much as possible, in frequency and in mode of traffic. The very noisy motor boats should be replaced by battery driven boats. This could be applied much more widely for the entire lake region and would benefit not only the wildlife but also tourism in the region. It has been very fortunate that floating vegetation blocked the channel in February 2016 and hardly any boats were active, which did make a huge difference for the mouth area of the Indaw Chaung.

However, it was observed with great concern that at several locations at the Indaw Chaung area near the mouth to the lake (five locations) and near the village of Chaungwa (a total of 9 locations on both sides of the channel, where the ground was freshly ploughed or just in the process of being ploughed, in some cases with new wired fences to claim land from the previous reeds. Furthermore the fishing activities though less intense do have a disturbing effect on the bird fauna and other wildlife. Fishing nets and traps are regularly controlled and create disturbance in remote areas. More importantly law

enforcement on illegal bird trapping needs to be implemented and if necessary accompanied by education programmes. So far the observed incidents suggest a low frequency of hunting but deserves close monitoring. The buffalo grazing density is not too high and also favourable for some species that prefer the openland character. However, some specially designated areas with high density of breeding crakes and bitterns etc. as well as rare wintering storks, cranes etc. should be excluded from grazing activities entirely and these areas should be clearly communicated and sign posted if necessary.

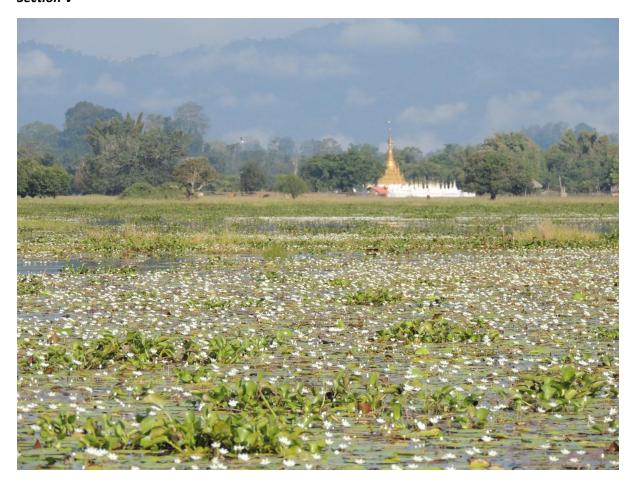
The area is very attractive hosting most of the globally threatened species and hosts many wintering birds. For this reason it is highly recommended to extent the area where possible to the south and north, although the north is much restricted by nearby hills. The potential for an eastern extension is unknown as further visit have not been undertaken, but should be explored in any management.

It is vital to stop any further ploughing of grassland and reed areas and the status quo ante of 2013 needs to be restored!

Bird trapping with slings and snooze traps is still widespread and needs to be tackled by law enforcement and awareness raising activities.

One temporary fishing camp was observed near the mouth of the Indaw Chaung. Although posing less a threat like those established in the woodlands it creates disturbances and sets the wrong example. It is recommended to remove this camp like any other on the lake for reasons of consistency.

Section V



Section V in the north of the lake provides a rich structure of many different bird habitats with prevailing floating vegetation, including the largest islands of floating vegetation in the lake. The section is also rich in reeds and small woodlands and scattered trees. Rocky outcasts and hills nearby provide additional diversity and explains this area's rich bird community. Some areas have mixed cattle and buffaloes grazing along the shore.

Being adjacent to section IV with its extensive reed beds IV and V together with the waterfowl roosting area (see figure 1) should be developed into another core zone with limited or no fishing activities and the development of reed beds and small woodlands. Ideally, this should include also parts of the area south of Naungpin, but the small village requires multiple access for boats and human activities that will limit the options for developing further conservation areas in the northern part of the lake. However, the most southern stretch of section V along the Western shore still has good stretches of woodland. These should be preserved and where possible extended with future restriction to fishermen.

Section VI



Section VI still contains a lot of woodland, but also shows many signs of forest degradation, cuttings and clearings. Almost all of this section is woodland and some small belts of floating vegetation. Like observed in section I there have been several fishing camps established in the woodlands, diminishing the forest extent, clearing any undergrowth, creating disturbance and problems with rubbish amongst others.

Although close to the road the area has huge potential to be developed to a nice broad stretch of woodland along the entire shoreline to enhance the woodland biodiversity in this section. The temporary fishing camps ought to be discouraged or restricted in size.

Section VII



Section VII consists of a variety of diverse habitats, good and undisturbed woodlands, small stretches of floating vegetation and extensive and interesting large areas of grasslands adjacent to the lakes and its small tributaries. One of the tributary, just 3 km north of Lonton is very pristine, surrounded by rich grassland habitats on both sides, mixed with woodland stretches and floating vegetation, sometimes even closing the stream. There is also very little boat traffic. Combining all these factors this little stream produces a very rich and diverse bird fauna with several species only observed here (e.g. Watercock and Spotted Bush Warbler). Section VII also has some rocky shores which are connected with woodlands and provide an attractive additional small habitat for separate species that have not been observed elsewhere on the lake (e.g. Grey Wagtail and Peregrine Falcon). Further north is another tributary, also surrounded by rich grasslands. However, the stream connects with a village and lots of boat traffic prevents any similar rich birdlife from developing in this stream.

The section is very attractive for many different bird species and has a huge potential for further development in conservation. However, priority is to secure the good conservation status of the stream 3 km north of Lonton in its entirety up to the crossing of the road.

Fishing should be reduced to a minimum and motor boats restricted. Most if not all temporary fishing camps in this section (see figure 6) should be dissolved and removed, as they pose a serious threat to the remaining precious woodland habitats.

The management of the grassland needs careful consideration and should be done together with the local communities that can help with cattle grazing and cutting schemes. In addition to that the woodland north of the river mouth can be enhanced by further extension landwards and creating a flow from extensively used grassland to neighbouring agricultural land, at least until the area reaches the main road. Access to the area should be restricted to only necessary few access routes and fishing restricted in winter months in the northern area where bit numbers of waterfowl are roosting.

Section VIII



This section is relatively remote and undisturbed, consisting of largely floating vegetation, rich in waterbirds, kingfishers and harriers. Only few scattered trees have remained. It would be increase in value if woodland would be encouraged to grow broader in some areas, especially towards the south where it would line up with an already existing stretch of good woodland. Ploughed fields are few at the moment but grazing intensity seemed to have increased and putting increasing pressure on the thin belt of grassland and floating vegetation.

It is recommended to reduce the density of the grazing cattle in most areas along the shore and in the hinterland adjacent to grassland areas.

Section IX (Naung Khuin Wetland)



This wetland north of the lake has been rarely visited often for security reason due to irregular insurgency by local minorities. Little is known about its fauna. However, it is not remote, and several villagers and fishermen put up a permanent living in stilted huts. The wetland is rather huge and in its core forested and hardly accessible. We were able to sue elephants to access about one third of the area (see also Figure 1). The fishermen have settled here and refrain there activities not only to fishing but also cattle and buffalo herding. Some of the area is heavily grazed but restricted to grassland on the margins, leaving still extensive grassland and reed areas. The villagers are also using baits for poisoning waterbirds and if any ducks, including Pink-headed Ducks were here they have been gone by now due to the bait poisoning activities.

Hunting and bait poisoning must be abolished and law enforcement is needed here. Also, it is recommended to reduce the density of cattle and water buffalo considerably, but keep some of the cattle, so some areas can be kept open to attract waders such as lapwings and wintering sandpipers.

Awareness raising among the villagers is urgent. In particular there is a need to enlighten them about the role of the vultures which have been seen nearby in good numbers, but villagers have been observed chasing them for fear of bad luck that would come with the vultures.

Recommendations for Monitoring

The effectiveness of the conservation efforts need to be monitored. At present the monitoring is restricted to the Asian Waterbird Count (AWC) once a year and maybe the breeding colonies of obvious breeding pairs of water bird species.

The AWC require a lot of staff and cannot always include the entire lake over a period of one or two days. I recommend to focus the counting efforts during AWC on the northern and southern areas, but count these more carefully with more time allowed. It is also important to repeat these counts at different times in the year to understand more seasonal changes and movements over the period. Ideally a waterbird count is undertaken once a month between November and April to capture the dynamics of migration and shifting populations during the winter months.

In addition to general waterbird monitoring it might be important to target certain species more specifically. For example would it be good to count all Great Crested Grebe during their late afternoon migration across the lake (see above). Also, targeting special sites during migration and in winter might reveal fluctuations and responses. A more thorough search for reed species that hide or camouflage in the reeds and the floating vegetation is needed outside the AWC. Maybe, only selected areas at different sites of the lake might be feasible for such a thorough monitoring. But in order to assess changes in habitats and the progress in conserving the target species these monitoring activities are crucial. The forest department would ideally been supported by NGOs, such as FFI or In Chitu.

It is also advised to extent the monitoring efforts and include a breeding bird survey. This cannot be done on just a few days and requires a more systematic scanning of suitable breeding habitats over a period of two-three weeks when breeding for most birds is likely (e.g. March, April and May). For the breeding bird surveys it is also advised to look or listen for indications of breeding rather looking for nests. The time in the day for these surveys is important, early mornings most relevant for many passerines; late evenings most relevant for many waders and rails. Another important monitoring area are roosting sites, as they reflect on the population dynamics of specific genera. For example are there at least two to three different swallow and martin roosting sites that would be ideally monitored once a month during the winter (Nov-Apr) in the very early morning hours. Likewise the roosting sites for starlings should be monitored. More difficult to find out about, but wagtails are often roosting communally. Also harrier roosts should be found and monitored regularly once a month. The roost sites of these species vary naturally according to prey abundance but also give an indicator of habitat change. Cranes, pelicans (in the trees!!) A more detailed monitoring plan can be established together with the forest department but cannot be part of the scope of this study.

Regardless of any monitoring plan, hunting and trapping should be closely monitored and any action followed up on its effectiveness.

Acknowledgments

We like to thank FFI and here mostly Ngwe Lwin, Frank Momberg and Myint Shwe for organising and providing crucial logistics, permits and lots of local support in facilitating the ornithological survey. We like to thank the Forest department for granting permission to remote areas and providing assistance by their staff. In particular we like to thank Ni Lar Pyint, Kyaw Zin Htun and Thura from the Forest department for good company and ornithological support and our driver Nono for manoeuvring the boat in throughout smooth and tricky situations. Katharina Lorenz from ERA provided essential help in GIS mapping.

References

Davies, J., Sebastian, A.C. & S. Chan (2004): A Wetland Inventory for Myanmar. Ministry of Environment of Japan. 591p.

Thet Zaw Naing & J. van der Veen (2007): Water Birds & Other Birds Survey at Indawgyi Wetland Wildlife Sanctuary & Ayeyarwaddy River, North Myanmar,7 – 18 January 2007. Unpubl. Report.

Tordoff, A. W.; Appleton, T.; Eames, J. C.; Eberhardt, K.; Htin Hla; Khin Ma Ma Thwin; Sao Myo Zaw; Sein Myo Aung. 2007. Avifaunal surveys in the lowlands of Kachin State, Myanmar, 2003-2005. *Natural History Bulletin of the Siam Society* 55(2): 235-306.

Zöckler, C. (2014): Bird Fauna of Lake Indawgyi – Unpublished Survey Report for FFI. 25 pages plus annex.

Annex 1 Bird Species List of Lake Indawgyi and Wildlife Sanctuary in Feb 2016

See separate excel spreadsheet

Annex 2 Bird Species List of Lake Indawgyi and Wildlife Sanctuary, based on observations in 2013 and 2014, Feb 2016 as well as Davies *et al.* (2004), Tordoff *et al.* (2007) and Thet Zaw Naing & v.d. Veen (2007)

In prep.