BENEFICIAL SERVICES OF WETLANDS AND THEIR INDICATOR BIRD SPECIES IN WETLAND AREAS OF AYEYARWADY REGION

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Abstract

The present research conducts with the beneficial services of wetlands and their indicator bird species in wetland areas of Ayeyarwady Region. Wetlands are critical habitats for wetland dependent bird species. These habitats are facing rapid degradation due to anthropogenic activities that affect the wetland indicator bird distribution by changing their habitats. Distance sampling point count method (Buckland *et.al*., 2004) was applied. Vegetation types were recorded by using the visual estimation. Vegetation covers were categorized by peripheral and mosaic by (Semeniuk *et al*.,1990). Field surveys were carried out from May 2017 to April 2018. During the survey period, 101wetland indicator bird species were recorded including three globally threatened bird species and four near- threatened bird species. These bird species were also indicate the wetland habitats.

Keywords: wetlands, globally threaten, birds, species, habitats, vegetation, visual estimation

Introduction

Wetlands provide many benefits to society – such as fish and wildlife habitats, natural water quality improvement, flood storage, shoreline erosion protection, opportunities for recreation and aesthetic appreciation, and natural products for our use at little or no cost. Wetlands are among the most productive ecosystems in the world, comparable to rain forests and coral reefs. They also are a source of substantial biodiversity in supporting numerous species from all of the major groups of organisms – from microbes to mammals. Physical and chemical features such as climate, topography (landscape shape), geology, nutrients, and hydrology (the quantity and movement of water) help to determine the plants and animals that inhabit various wetlands. Wetlands can be thought of as "biological supermarkets." They produce great quantities of food that attract many animal species. Many animals need wetlands for part or all of their life cycle. Numerous species of birds and mammals rely on wetlands for food, water, and shelter, especially while migrating and breeding. There are many studies and researches on wetlands for delineate the wetlands in many parts of the world. In some country, planning to do the project that transform farmlands into wetlands. The current situations of wetlands are still poorly known and the concept is still in its infancy in Myanmar. The objectives of research were to examine the functions and values of wetland, to record the wetland indicator bird species and their habitat characteristics (vegetation cover) and to observe the vegetation types (i.e. emergent, submerged and free-floating).

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Materials and Methods

Study area

Ayeyarwady region (Ayeyarwady Delta) lies between north latitude 15° 40' and 18° 30' approximately and between east longitude 94° 15' and 96° 15'. Data were recorded in wetlands of two districts (Maubin and Myaungmya).

Study sites

Maubin District

1. Maubin Township (Site I)

   (North latitude 16° 41' and East longitude 95° 32')

2. Nyaungdon Township (Site II)

   (North latitude 17° 07' and East longitude 95° 31')

Myaungmya District

1. Wakhema Township (Site III)

   (North latitude 16° 45' and East longitude 95° 14')

Study period

The survey was conducted from May, 2017 to April, 2018.

Field data collection

The present research was conducted in some wetlands of Ayeyarwady Region by field survey. The research data were collected the functions and values of wetland, diversity of the wetland indicator bird species, habitats and vegetation types. Distance sampling point count method (Buckland *et al*., 2004) was applied for this research. Recorded wetland indicator bird species were identified by Robson, 2011. The vegetation types were categorized by emergent and submerged using the visual estimation. Habitats (vegetation cover) were collected by rapid assessment by level 4 of Asian Wetland Inventory Handbook (Finlagson *et al.*, 2002). Field data were carried out three days per trip and couple times every month during the research period.

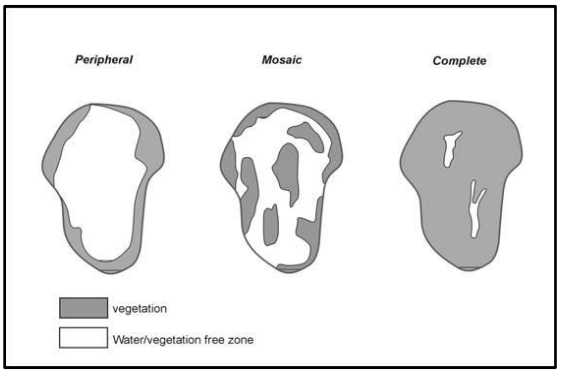

Figure 1 Categories of vegetation cover (Semeniuk *et al*.,1990)

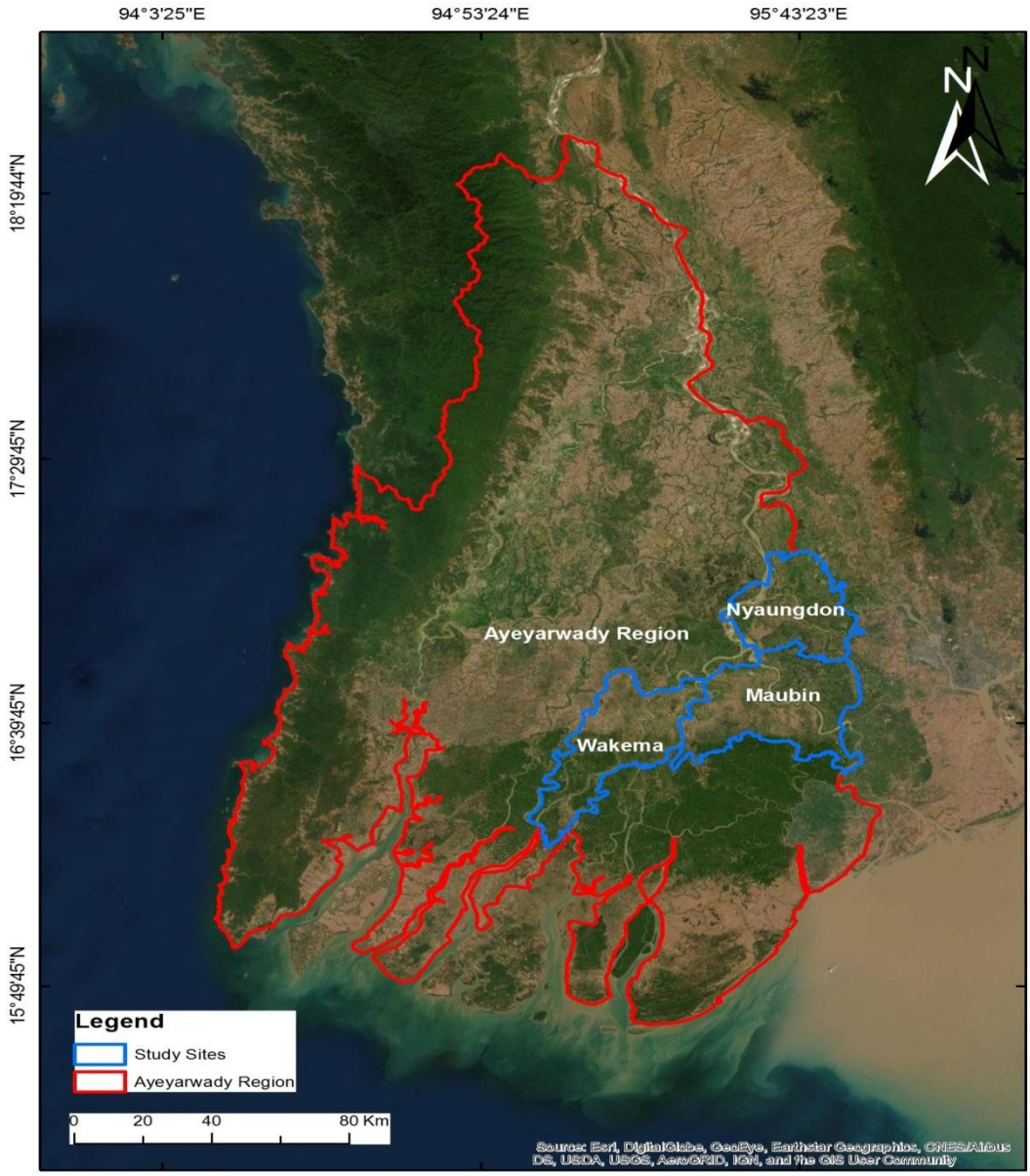

Figure 2 Map of the study sites

Results

Beneficial services of wetland in three sites

According to the result, all of three study sites were provided benefit for local peeople who depends on wetlands and biodiversity especially bird species by many ways. These wetlands provided wildlife resources or wild foods (snakes, turtles, and mollusks), fisheries and aquatic resources, agricultural resources (rice, vegetables, and crops), and food resources for animals (grass, rice straw, bush and shrubs). Additional, water transportation, recreation and tourism, and education and research were supported by these wetland sites (Plate II, III, IV).

Among three study sites, site I (Maubin) and site III (Wakhema) were more provided wetland beneficial services than site II (Nyaungdon). These two study sites were wide wetland area, low impact and good vegetation types and cover for local people and animals than site II.

According to the result, wetlands (site I and site III) were look like nearly natural wetlands. Most of the beneficial values for local people and animals including bird species were getting from these wetlands. The beneficial values of wildlife resources, fisheries and aquatic resources, agricultural resources and food resources for animals were more observed in these two sites. These two wetlands provided ecosystem services, research site for biodiversity and ecotourism site.

Recorded wetland indicator bird species in three study sites

A total of 101 wetland indicator bird species belonging to 49 families under 15 orders were recorded in three study sites (Table 1). Three globally threatened bird species (Yellow – breasted Bunting, Sarus Crane, Jerdon's Babbler, and five near-threatened species (Oriental Darter, Painted Stork, Black- headed Ibis and Asian Golden Weaver) were observed during the study period (Plate I).

Maubin District

Recorded wetland indicator bird species in Maubin Township (Site I)

Study site was chose in Thae Phyu village. A total of 79 wetland indicator bird species were recorded in Maubin Township (Table 2). According to IUCN Red list, one vulnerable bird species of Sarus Crane and five near- threatened bird species of Asian Golden Weaver, Oriental Darter, Spot- billed Pelican, Black- headed Ibis and Painted Stork were recorded during the study period. The highest near- threatened bird species numbers were recorded in site I. Most of the bird species were dependent on this wetland throughout the year. Most of the time of their life spent in wetland for foraging, roosting, breeding, and rearing their young.

Recorded wetland indicator bird species in Nyaungdon Township (Site II)

Study site was chose in Natse village. A total of 43 wetland indicator bird species were recorded in **Nyaungdon** Township (Table 2). In this site, two vulnerable bird species (Sarus Crane and Jerdon's Babbler) and two near- threatened bird species (Oriental Darter and Asian Golden Weaver) were recorded during the study period. The lowest species numbers and second highest globally threatened bird species were recorded in this site.

Myaung Mya District

Recorded wetland indicator bird species in Wakhema Township (Site III)

Study site was chose in Shwelaung village. A total of 82 wetland indicator bird species were recorded in Wakhema Township (Table 2). In this study site, three globally and four near-threatened bird species were recorded. There were one critically endangered (Yellow Breasted Bunting), two vulnerable bird species (Sarus Crane and Jerdon's Babbler) and four near-threatened bird species (Asian Golden Weaver, Painted Stork, Black- headed Ibis and Spot-billed Pelican) recorded during the study period. The highest globally threatened bird species were recorded in this site. According to the data, the rediscovered bird species of Jerdon's Babbler was recorded in site III. This species had last been recorded in 1941 and rediscovered in May, 2014 (Kathy Khine, 2019). Highest population was recorded in this site and follow after by Nyaungdon (site II).

Vegetation cover and vegetation types in three study sites

The vegetation covers were categorized by peripheral and mosaic. In site I and site II were mosaic while site III was peripheral. According to the data of vegetation types, emergent plants and submerged plants were observed in three study sites. In emergent plant, there are two kinds of type such as bottomed rooted emergent and free floating emergent. *Neptunia oleracea, Limnocharis flava, Eichhornia crassipes,* and *Pistia stratiotes* were free floating emergent plant. *Eleocharis dulcis* and *Nymphoides indica* were bottom rooted emergent plant. *Utricularia aurea* and *Ipomoea aquatic* were submerged plant.

Table 1 Recorded wetland indicator bird species in Ayeyarwady Region

Sr.no	Scientific name	Common name	IUCN Status
1	*Dendrocygna javanica*	Lesser Whistling-Duck	
2	*Tachybaptus ruficollis*	Little Grebe	
3	*Mycteria leucocephala*	Painted Stork	Near-threatened
4	*Anastomus oscitans*	Asian Openbill	
5	*Threskiornis melanocephalus*	Black-headed Ibis	Near-threatened
6	*Plegadis falcinellus*	Glossy Ibis	
7	*Ixobrychus sinesis*	Yellow Bittern	
8	*Ixobrychus cinnamomeus*	Cinnamon Bittern	
9	*Ixobrychus flavicollis*	Black Bittern	
10	*Nycticorax nycticorax*	Black-crowned Night-Heron	
11	*Ardeola grayii*	Indian Pound-Heron	
12	*Ardeola bacchus*	Chinese Pond-Heron	
13	*Bubulcus coromandus*	Eastern Cattle Egret	
14	*Ardea cinerea*	Grey Heron	
15	*Ardea purpurea*	Purple Heron	
16	*Ardea alba*	Great Egret	
17	*Mesophoyx intermedia*	Intermediate Egret	
18	*Egretta garzetta*	Little Egret	
19	*Pelecanus philippensis*	Spot-billed Pelican	Near-threatened
20	*Phalacrorax niger*	Little Cormorant	
21	*Anhinga melanogaster*	Oriental Dater	Near-threatened
22	*Pernis ptilorhynchus*	Oriental Honey-Buzzard	
23	*Elanus caeruleus*	Black-shouldered Kite	
24	*Milvus migrans*	Black Kite	
25	*Milvus lineatus*	Black-eared Kite	
26	*Amaurornis phoenicurus*	White-breasted Waterhen	
27	*Gallicrex cinerea*	Watercock	
28	*Gallinula chloropus*	Common Moorhen	
29	*Grus antigone*	Sarus Crane	Vulnerable
30	*Vanellus cinereus*	Grey-headed Lapwing	
31	*Hydrophasianus chirurgus*	Pheasant-tailed Jacana	
32	*Metopidicus indicus*	Bronze-winged Jacana	
33	*Rostratula benghalensis*	Greater Painted-Snipe	
34	*Actitis hypoleucos*	Common Sandpiper	

Sr.no	Scientific name	Common name	IUCN Status
35	*Tringa glareola*	Wood Sandpiper	
36	*Glareola maldivarum*	Oriental Pratincole	
37	*Chlidonias leucopterus*	White-winged Tern	
38	*Chlidonias hybrida*	Whiskered Tern	
39	*Columba livia*	Rock Pigeon	
40	*Streptopelia tranquebarica*	Red Collared-Dove	
41	*Streptopelia chinensis*	Spotted Dove	
42	*Psittacula alexandri*	Red-breasted Parakeet	
43	*Clamator coromandus*	Chestnut-winged Cucukoo	
44	*Cacomantis merulimus*	Plaintive Cuckoo	
45	*Eudynamys scolopacaceus*	Asian Koel	
46	*Centropus sinensis*	Greater Coucal	
47	*Centropus bengalensis*	Lesser Coucal	
48	*Glaucidium cuculoides*	Asian Barred Owlet	
49	*Cypsiurus balas*	Asian Palm-Swift	
50	*Coracias benghalensis*	Indian Roller	
51	*Halcyon smyrnensis*	White-throated Kingfisher	
52	*Alcedo atthis*	Common Kingfisher	
53	*Merops orientalis*	Little Green Bee-eater	
54	*Mecops philippinus*	Blue-tailed Bee-eater	
55	*Megalaima haemaccephala*	Coppersmith Barbet	
56	*Dendrocopos analis*	Spot-breasted Woodpecker	
57	*Oriolus chinensis*	Black-naped Oriole	
58	*Oriolus xanthornus*	Black-hooded Oriole	
59	*Artamus fuscus*	Ashy Woodswallow	
60	*Aegithina tiphia*	Common Iora	
61	*Rhipidura albicollis*	White-throated Fantail	
62	*Dicrurus macrocercus*	Black Drongo	
63	*Corvus splendens*	House Crow	
64	*Corvus japonensis*	Large-billed Crow	
65	*Dendrocitta vagabunda*	Rufous Treepie	
66	*Lanius cristatus*	Brown Shrike	
67	*Cinnyris asiaticus*	Purple Sunbird	
68	*Cinnyris jugularis*	Olive-backed Sunbird	
69	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker	
70	*Ploceus philippinus*	Baya Weaver	
71	*Ploceus hypoxanthus*	Asian Golden Weaver	Near-threatened
72	*Amandava amandava*	Red Avadavat	
73	*Lonchura punctulata*	Scaly-breasted Munia	
74	*Lonchura atricapilla*	Chestnut Munia	
75	*Passer domesticus*	House Sparrow	
76	*Passer montanus*	Eurasian Tree-Sparrow	
77	*Anthus rufulus*	Paddyfield Pipit	
78	*Motacilla alba*	White Wagtail	
79	*Motacilla tschutschensis*	Eastern Yellow Wagtail	

Sr.no	Scientific name	Common name	IUCN Status
80	*Emberiza aureola*	Yellow-breasted Bunting	Critically Endangered
81	*Acridotheres fuscus*	Jungle Myna	
82	*Acridotheres tristis*	Common Myna	
83	*Acridotheres burmannicus*	Vinous-breasted Myna	
84	*Gracupica contra*	Asian Pied Starling	
85	*Sturnus malabaricus*	Chestnut-tailed Starling	
86	*Saxicola maurus*	Eastern Stonechat	
87	*Saxicola caprata*	Pied Bushchat	
88	*Ficedula albicilla*	Taiga Flycatcher	
89	*Copsychus saularis*	Oriental Magpie-Robin	
90	*Alauda gulaula*	Oriental Skylark	
91	*Pycnonotus blanfordi*	Streak-eared Bulbul	
92	*Pycnonotus jocosus*	Red-whiskered Bulbul	
93	*Pycnonotus cafer*	Red-vented Bulbul	
94	*Hirundo rustica*	Barn Swallow	
95	*Phylloscopus fuscatus*	Dusky Warbler	
96	*Chrysomma altirostre*	Jerdon's Babbler	Vulnerable
97	*Chrysomma sinense*	Yellow-eyed Babbler	
98	*Cisticola juncidis*	Zitting Cisticola	
99	*Orthotomus sutorius*	Common Tailordbird	
100	*Prinia hodgsonii*	Grey-breasted Prinia	
101	*Prinia inornata*	Plain Prinia	

Table 2 Recorded number of wetland indicator bird species in two Districts

District	Name of site	Number of order	Number of family	Number of species
Maubin	Maubin (site I)	12	33	79
	Nyaungdon (siteII)	9	18	23
Myaung Mya	Wakhema (site III)	13	41	82

Habitat utilization of wetland indicator species

During the study period, bird species used by various habitats types in seasonally. Foraging, nesting, and roosting in diverse habitats such as marsh swamp, lotus swamp, paddy fields, reed bed, open water and terrestrial tree. Nesting sites of some species used in flooded paddy field and some used in reed bed and terrestrial tree were observed. Some waterbirds species used both aquatic and terrestrial for nesting sites. One near–threatened bird species of Asian Golden Weaver used reed bed and some terrestrial tree for nest during the research period. On the other hand vulnerable species of Sarus Crane used flooded paddy fields for nest site.

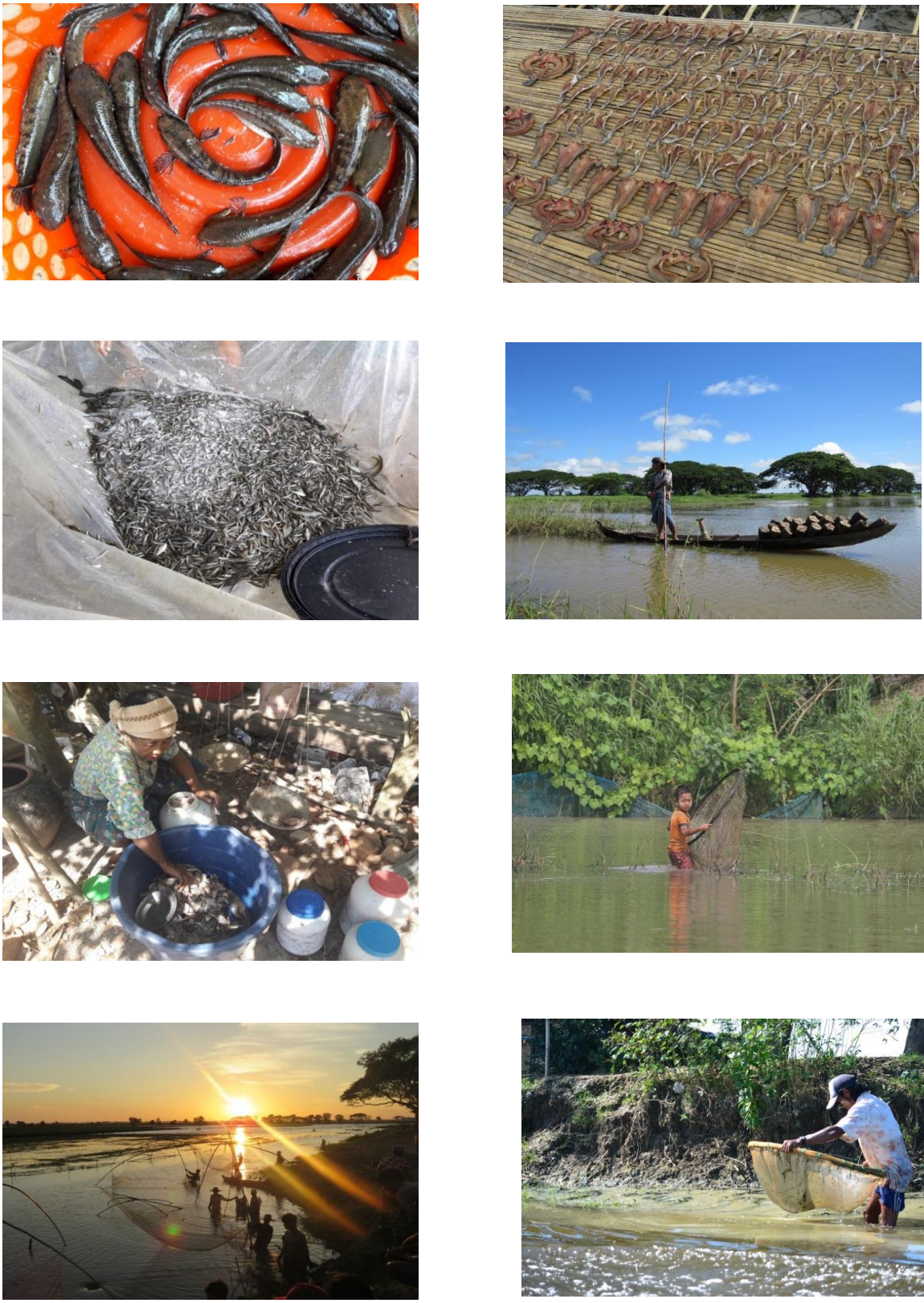

Plate I. Fisheries and aquatic resources








Plate II. Wetland's functions and values








Plate III. Ecotourism and Research

A. Yellow- breasted Bunting

B. Jerdon's Babbler

C. Sarus Cranes

D. Painted Stork

E. Purple Heron

F. Asian Golden Weaver

G. Indian Pound Heron

H. Red- collared Dove

Plate IV. Recorded wetland indicator bird species in three study sites

Discussion

According to the results, many resources can be obtained from wetlands in Wakhema and Maubin site for local people who live on these wetlands area. It may be assumed that these two study sites were invaluable supporting to local people livelihood. Some bird species foraged for food in wetland soils. Some feed on water column, some feed on the vertebrates and invertebrates that live on submerged and emergent plants. Widespread use of wetlands and their resources were common among diverse bird species. Birds have daily and seasonal dependence on wetlands for food and other life supporting systems (Stewart, 2001). According to the data of vegetation types, emergent plants and submerged plants were observed in three study sites. Some plants were useful for local people and some plants were suitable food for bird species. The plant species, *Eleocharis dulcis* (Water Chestnut) was vital food for Sarus Crane (Vulnerable) when wetlands were dry out. The plant species of *Nymphoides indica* (Water Liliy) was observed in abundant in three study sites. Almost all lily plant' parts were used for food, medicine, wrapping materials and provided small income for local people. According to the result, all of three study sites may be sufficient and suitable provided for not only bird species but also local people who depends upon the wetlands and also express the good condition of wetland habitats. It may be supposed that, wetlands provided the beneficial values to local people and bird species as well.

Conclusion

Wetlands are critical part of natural environment in Ayeyarwady region. All wetlands provided many societal benefits such as food and habitat for fish and wildlife (including threatened and endangered species), water quality improvement, flood storage, economically beneficial natural products for human use, and opportunities for recreation, education, and research. Wetlands serve as excellent study sites to learn about vegetative structure, ecological functions, natural ecological processes, biodiversity, and plant-animal interactions.Wetland birds had some unique features that enable them survive better in their environment. These adaptations make birds better equipped as a group to exploit wetland resources. Wetlands birds perform important functions in the ecosystem as main vectors maintaining biotic connection between catchments for aquatic plant and invertebrates, but also reflect the ecosystem functionality of the habitat. Birds are performed as environmental indicators.

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