Ramsar Information Sheet

Published on 1 February 2017

Myanmar

Meinmahla Kyun Wildlife Sanctuary

Designation date	3 January 2017
Site number	2280
Coordinates	15°50'42"N 95°15'57"E
Area	50 000,00 ha

Color codes

Fields back-shaded in light blue relate to data and information required only for RIS updates.

Note that some fields concerning aspects of Part 3, the Ecological Character Description of the RIS (tinted in purple), are not expected to be completed as part of a standard RIS, but are included for completeness so as to provide the requested consistency between the RIS and the format of a 'full' Ecological Character Description, as adopted in Resolution X.15 (2008). If a Contracting Party does have information available that is relevant to these fields (for example from a national format Ecological Character Description) it may, if it wishes to, include information in these additional fields.

1 - Summary

Summary

The Irrawaddy (or Ayeyarwady) Delta is one of Myanmar's key areas of conservation concern (Scott 1989, Tordoff et al., 2005; NBSAP 2011, 2015). Meinmahla Kyun Wildlife Sanctuary (MKWS), located in the southern section of the Delta, is the last vestige of green space, along what was once the largest tract of mangroves in Myanmar. However, a recent drone mapping assessments determined that 85% of MKWS is covered by the Mangrove Date Palm (Phoenix paludosa), not true mangrove species. Resource exploitation within and surrounding Meinmahla Kyun island has led to a severe decline in mangrove cover. However, despite this severe lack of mangrove habitat, conservation value remains, and MKWS hosts the world's largest population of Sonneratia griffithii (IUCN Red List Critically Endangered species) (Yong, 2016), and more than 30 species of IUCN listed fauna (IUCN, 2011) including the critically endangered mangrove terrapin (Batagur baska), endangered wild dog(Cuon alpinus), vulnerable Ayeiyarwheady dolphin (Orcaella brevirostris) and Lesser Adjutant Stork (Leptoptilos javanicus) (IUCN,2011). Threatened Migratory bird species includes the critically endangered spoon-billed sandpiper (Calidris pygmaea) and the endangered Nordmann' Greenshank (Tringa guttifer) and Great Knot (Calidris tenuirostris) (Zöckler et al 2014, Moses & Zöckler 2013, 2015). The Site also support > 1% of the population of estuarine crocodile (Crocodylus porosus).
Additionally, the flora of MKWS represents a substantial capacity for carbon sequestration, which is an important component of global climate change mitigation (Donato et al., 2011).

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Compiler 1

Name	Mr. Win Naing Thaw
Institution/agency	Nature and Wildlife Conservation Division, Forest Department, Ministry of Natural Resources and Environmental Conservation
Postal address	Office No. 39, Forest Department, Ministry of Natural Resources and Environmental Conservation, Naypyitaw, The Republic of the Union of Myanmar
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Phone	+95 67 405002
Fax	+95 67 405397

2.1.2 - Period of collection of data and information used to compile the RIS

From year	2012
To year	2016

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)	Meinmahla Kyun Wildlife Sanctuary
Unofficial name (optional)	Burmese Name=Meinmahla Kyun Hnint Won Kyin Day Tha

2.2 - Site location

2.2.1 - Defining the Site boundaries

b) Digital map/image
<1 file(s) uploaded>

Boundaries description (optional)

The Ramsar site corresponds to the southern section of the Bogalay River in the Ayeyarwady Delta in Myanmar, within which the main feature is Meinmahla Island. One island, Law Ka Dat Kyun, is situated in the east of Meinmahla Kyun and is included in the wildlife sanctuary. The total wildlife sanctuary area is 13619.35 ha. The proposed Ramsar boundary is defined in the north by the border of the Meinmahla Kyun Wildlife Sanctuary, to the east and west by the banks of the Bogalay river at high tide, and in the south by the Gadongalay island chain (west to east; Hgnet Oo Thaung, Ma Sein, Gadongalay, Gayetgyi and Nga Mann islands), covering a total area of approx. 50,000 ha. GPS location of Centre-point is 15°52'45.21"N, 95°15'35.56"E.

2.2.2 - General location

a) In which large administrative region does the site lie?	The Ramsar site lies within Bogalay Township, Ayeyarwady Region, in the eastern Ayeyarwady delta region of Myanmar, about 140 km southwest of Yangon. It is roughly 46 km north-south and from 5 to 10 km across. The township main town of Bogalay lies 24 km
b) What is the nearest town or population centre?	The nearest town or population center is Kadon Kani.

2.2.3 - For wetlands on national boundaries only

a) Does the wetland extend onto the territory of one or more other countries? Yes ○ No ◉

b) Is the site adjacent to another designated Ramsar Site on the territory of another Contracting Party? Yes ○ No ◉

2.2.4 - Area of the Site

Official area, in hectares (ha):	50000
Area, in hectares (ha) as calculated from GIS boundaries	51087.12

2.2.5 - Biogeography

Biogeographic regions

Regionalisation scheme(s)	Biogeographic region
Marine Ecoregions of the World (MEOW)	Indo-Malayan

Other biogeographic regionalisation scheme

The biogeographical unit used here is taken from the regional analysis of the Indo-Malayan Realm in MacKinnon (1997). This is the system adopted by the Myanmar government (Forest Department 2012).

3 - Why is the Site important?

3.1 - Ramsar Criteria and their justification

☑ Criterion 1: Representative, rare or unique natural or near-natural wetland types

Hydrological services provided	The entire proposed area represents a delta area of a large river (Ayeyarwaddy River) that has not been hydrologically impacted and represents undisturbed hydrological and sedimentological features that sequester carbon and nutrients as well as purify the water from biological and chemical toxins.
Other ecosystem services provided	The area is providing shelter and important nurseries for fish stocks and other marine life forms such as shrimps and crabs. The mangrove area is providing shelter and important habitat for the estuarine crocodile (Crocodylus porosus) and nurseries for fish stocks and other estuarine life forms such as mud crab that is important for daily income of the local communities
Other reasons	The site represents some of the most representative mangrove forest and tidal mudflats in bio unit 04, the Myanmar Coast.

☑ Criterion 2 : Rare species and threatened ecological communities

☑ Criterion 3 : Biological diversity

Justification	MKWS is home to an IUCN listed plant species of Heritiera fomes (EN) and Sonneratia griffithii (CR) and animal species including fishing cat (VU), estuarine crocodile (VU), Irrawaddy dolphin (VU), olive ridley (VU), green turyle (EN), wild dog (EN), mangrove terrapin (CR), hawksbill turtle (CR) and 17 bird species including a considerable proportion of the range restricted and globally near-threatened Mangrove Pitta, Pitta meg,k,arbyncha (Zöckler et al. 2014, Moses & Zöckler 2013, 2015).

☑ Criterion 4 : Support during critical life cycle stage or in adverse conditions

☑ Criterion 6 : >1% waterbird population

☑ Criterion 9 : >1% non-avian animal population

3.2 - Plant species whose presence relates to the international importance of the site

<no data available>

3.3 - Animal species whose presence relates to the international importance of the site

Phylum	Scientific name	Common name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
			2	4	6	9	3	5	7	8								
Birds																		
CHORDATA / AVES	*Calidris tenuirostris*	Great Knot	☑	☐	☐	☐	☐	☐	☐	☐				EN	☐	☑		

Phylum	Scientific name	Common name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
			2	4	6	9	3	5	7	8								
CHORDATA / AVES	*Charadrius leschenaultii*	Greater Sand Plover; Greater Sand-Plover	☐	☑	☑	☐	☐	☐	☐	☐	1500	2013	2.1	LC	☐	☐		Population names: leschenaultii, SE Asia, Australia Non-breeding
CHORDATA / AVES	*Charadrius mongolus*	Lesser Sand Plover; Lesser Sand-Plover	☐	☑	☑	☐	☐	☐	☐	☐	3500	2010	1.8	LC	☐	☐		Populations names: mongolus, artifrons & stegmanii Non-breeding.
CHORDATA / AVES	*Chroicocephalus brunnicephalus*	Brown-headed Gull	☐	☐	☑	☐	☐	☐	☐	☐	2800		2.8	LC	☐	☐		Population name: East Asia Breeding
CHORDATA / AVES	*Leptoptilos javanicus*	Lesser Adjutant	☑	☐	☐	☐	☐	☐	☐	☐				VU	☐	☐		
CHORDATA / AVES	*Threskiornis melanocephalus*	Black-headed Ibis	☐	☐	☑	☐	☐	☐	☐	☐	120	2013	1.2	NT	☐	☐		Population name: SE Asia Non-breeding
CHORDATA / AVES	*Tringa guttifer*	Nordmann's Greenshank	☑	☑	☑	☐	☐	☐	☐	☐	48	2015	4.8	EN	☑	☑		The species is wintering in SE Asia in the Site and specifically the area around Nga Mann Island hosts 4-5% of the global population and hence provide a significant wintering site. Non-breeding
Others																		
CHORDATA / REPTILIA	*Batagur baska*	Mangrove Terrapin	☑	☐	☐	☐	☐	☐	☐	☐				CR	☑	☐	Regionally extinct-IUCN Redlist	
CHORDATA / REPTILIA	*Chelonia mydas*	Green turtle	☑	☐	☐	☐	☐	☐	☐	☐				EN	☑	☑		
CHORDATA / REPTILIA	*Crocodylus porosus*	Salt water crocodile	☐	☐	☐	☑	☐	☐	☐	☐	220	2016	30		☑	☐		Meinmahla Kyun Wildlife Sanctuary is the last the estaurine (salt water) crocodile habitat in Myanmar
CHORDATA / MAMMALIA	*Cuon alpinus*	Dhole	☑	☐	☐	☐	☐	☐	☐	☐				EN	☐	☐		
CHORDATA / REPTILIA	*Eretmochelys imbricata*	Hawksbill Turtle	☑	☐	☐	☐	☐	☐	☐	☐				CR	☑	☑		
CHORDATA / REPTILIA	*Lepidochelys olivacea*	Olive Ridley/Pacific Ridley	☑	☐	☐	☐	☐	☐	☐	☐				VU	☑	☑		
CHORDATA / MAMMALIA	*Orcaella brevirostris*	Irrawaddy Dolphin; Irrawady Dolphin	☑	☐	☐	☐	☐	☐	☐	☐	20	2016		VU	☑	☑		
CHORDATA / MAMMALIA	*Prionailurus viverrinus*	Fishing Cat	☑	☐	☐	☐	☐	☐	☐	☐				VU	☐	☐		

1) Percentage of the total biogeographic population at the site

There is scant baseline data available for the delta, including Meinmahla Kyun Wildlife Sanctuary. Therefore, exact figures are unavailable at present for most of the non-avian animal species in Meinmahla Kyun. However, being that Meinmahla Kyun Wildlife Sanctuary is the last the estaurine (salt water) crocodile habitat in Myanmar, this population, estimated by the forestry staff at ~220..individuals, represents the sole population of Myanmar. The Irrawaddy Dolphin population has not been studied in this region, personal accounts from forestry staff estimate the population at ~20 individuals, based on the IUCN estimate of ~6100 individuals (http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T15419A4579987.en), the population could account for ~20 % of Myanmar's Irrawaddy dolphin population (58-72 in the Ayeyarwady River, Myanmar (Smith et al. 2007-a). Fauna & Flora International (FFI) is working to conduct bat and fishing cat surveys in the area beginning 2017 and increasing the availability of baseline data for the area is a top priority for future management of the wildlife sanctuary.

3.4 - Ecological communities whose presence relates to the international importance of the site

<no data available>

4 - What is the Site like? (Ecological character description)

4.1 - Ecological character

Meinmahla Kyun Wildlife Sanctuary Site used to support the largest tract of mangroves in Myanmar. Now the mangrove tract is composed of approximately 85% Phoenix paludosa giving the deceptive greenery aerial view which was thought to be mangrove. The area of this wetland type covers more than 80% of the total area of the Meinmahla Kyun Wildlife Sanctuary. Another important of the wetland is the presence of the salt water crocodile (Crocodylus porosus) on the Site is the last estuarine crocodile habitat in Myanmar. The Site supports globally important species such as the critically endangered Hawskbill turtle (Eretmochelys imbricata) and Mangrove terrapin (Batagur baska). The salty estuarine wetland serves an important role as the last in estuarine water supporting the salt water crocodile (Crocodylus porosus). The Site is also is an important wintering site for the Nordmanns Greenshank (Tringa guttifer), supporting 4-5% of the global population. In addition to this, Meinmahla Kyun Wildlife Sanctuary holds a rich historic and cultural value to the people of Myanmar. This Site has some mythic and pilgrimage background to it and bases the story on “island of the beautiful women”. Also signifying the importance of the Site is the relationship with the surrounding communities and the sanctuary and the need to have a sustainable conservation strategy.

4.2 - What wetland type(s) are in the site?

Marine or coastal wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
F: Estuarine waters	Meinmahla Kyun Yay Cho Yay Ngan Sat Day Tha	2		
G: Intertidal mud, sand or salt flats	Meinmahla Kyun Thaung Pyin & Gadongalay and Nga Mang Thaung	4		
I: Intertidal forested wetlands	Meinmahla Kyun Di Yay Taw	1		Representative

4.3 - Biological components

4.3.1 - Plant species

<no data available>

4.3.2 - Animal species

<no data available>

4.4 - Physical components

4.4.1 - Climate

Climatic region	Subregion
A: Tropical humid climate	Am: Tropical monsoonal (Short dry season; heavy monsoonal rains in other months)

4.4.2 - Geomorphic setting

a) Minimum elevation above sea level (in metres): 0

a) Maximum elevation above sea level (in metres): 3

- Entire river basin ☐
- Upper part of river basin ☐
- Middle part of river basin ☐
- Lower part of river basin ☐
- More than one river basin ☐
- Not in river basin ☐
- Coastal ☑

Please name the river basin or basins. If the site lies in a sub-basin, please also name the larger river basin. For a coastal/marine site, please name the sea or ocean.

Andaman Sea of the Bay of Bengal, Indian Ocean

4.4.3 - Soil

Mineral ☐

Organic ☑

No available information ☐

Are soil types subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification)? Yes ○ No ◉

4.4.4 - Water regime

Water permanence

Presence?
Usually permanent water present

Source of water that maintains character of the site

Presence?	Predominant water source
Water inputs from surface water	☐

Water destination

Presence?
Marine

Stability of water regime

Presence?
Water levels largely stable

Please add any comments on the water regime and its determinants (if relevant). Use this box to explain sites with complex hydrology:

The hydrological values of the wildlife sanctuary likely include, but are not limited to: biodiversity conservation, shoreline stabilisation, erosion and flood control, protection from storm damage and carbon sequestration. Yong (2016) determined the following key wetland values in the Ayeyarwady Delta system, including; coastal protection and freshwater regulation services (e.g. Koch et al., 2009) to a region with poor drainage/water infrastructure and high vulnerability to seasonal flooding (Than, 2001) and extreme weather events (e.g. cyclone Nargis). There are no quantifiable data on these services for the MKWS at present. However, observational data, based on personal accounts substantiates the role of mangroves in storm damage protection during cyclone Nargis (2008), and the people of the delta clearly recognise the value of mangroves for their livelihood.

4.4.5 - Sediment regime

Significant erosion of sediments occurs on the site ☑

Significant accretion or deposition of sediments occurs on the site ☑

Significant transportation of sediments occurs on or through the site ☐

Sediment regime is highly variable, either seasonally or inter-annually ☐

Sediment regime unknown ☐

Please provide further information on sediment (optional):

Significant erosion is occurring in the northern part of the wildlife sanctuary and along the banks of the Bogale River and Kadonkani River. But significant accretion is occurring in the southern part of the wildlife sanctuary and outer islands, and those areas become important mudflats for the wintering birds.

4.4.6 - Water pH

Acid (pH<5.5) ☐

Circumneutral (pH: 5.5-7.4) ☐

Alkaline (pH>7.4) ☑

Unknown ☐

4.4.7 - Water salinity

Fresh (<0.5 g/l) ☐

Mixohaline (brackish)/Mixosaline (0.5-30 g/l) ☑

Euhaline/Eusaline (30-40 g/l) ☐

Hyperhaline/Hypersaline (>40 g/l) ☐

Unknown ☐

Please provide further information on salinity (optional):

Water salinity becomes freshwater 0 g/l from July to September because of freshwater flow from the upstream especially outgoing tide. From October to June especially in the incoming tide, water salinity becomes mixohaline (brackish) 0.5 to 30 g/l.

4.4.8 - Dissolved or suspended nutrients in water

Eutrophic ☑
Mesotrophic ☐
Oligotrophic ☐
Dystrophic ☐
Unknown ☐

4.4.9 - Features of the surrounding area which may affect the Site

Please describe whether, and if so how, the landscape and ecological characteristics in the area surrounding the Ramsar Site differ from the site itself: i) broadly similar ○ ii) significantly different ◉

Surrounding area has greater urbanisation or development ☐
Surrounding area has higher human population density ☑
Surrounding area has more intensive agricultural use ☐
Surrounding area has significantly different land cover or habitat types ☐

4.5 - Ecosystem services

4.5.1 - Ecosystem services/benefits

Provisioning Services

Ecosystem service	Examples	Importance/Extent/Significance
Food for humans	Sustenance for humans (e.g., fish, molluscs, grains)	Medium

Cultural Services

Ecosystem service	Examples	Importance/Extent/Significance
Recreation and tourism	Nature observation and nature-based tourism	Low

Have studies or assessments been made of the economic valuation of ecosystem services provided by this Ramsar Site? Yes ○ No ○ Unknown ◉

4.5.2 - Social and cultural values

i) the site provides a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland ☐

ii) the site has exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland ☑

Description if applicable

The MKWS is a place of cultural and historic value to the Myanmar people. To many it is a place of myth and pilgrimage. This is based on the story of the ‘island of the beautiful women’, said to hail from the abundance of Heritiera fomes (a tree with curvaceous roots), and the Nat (Spirit figure), U Shin Gyi, who is designated as the guardian of Meinmahala, after, as the story goes - he absent-mindedly played the harp after he was warned not to, this led to his abduction by one of the Meinmahla women. The temple of U Shin Gyi (outside of the sanctuary boundary along the Bogale River), along with the 100 Monkey Pagoda (inside the sanctuary), are well known pilgrimage sites, giving cultural value to the wildlife sanctuary. Additionally, the delta villages (22-30 approximately) surrounding the sanctuary were some of the most severely affected during cyclone Nargis in 2008. Nargis was a tragic event in Myanmar's recent history, and for many, there remains an emotive recollection of this time. During Nargis, villages with a greater amount of mangroves, and increased protection from the sanctuary were less affected - to many this event highlighted the importance of ecosystem preservation (cite socioeconomic report).

iii) the ecological character of the wetland depends on its interaction with local communities or indigenous peoples ☑

Description if applicable

The Meinmahla Kyun Wildlife Sanctuary is surrounded by village communities (22-30 approximately), these villages are governed under the leadership common to the delta region of Myanmar, and discussions are respectfully facilitated through the village head. These communities are extremely impoverished and lack basic living infrastructure like freshwater availability, sanitation, electricity; basic medical facilities etc., (Yong, 2016). Therefore, conservation of MKWS is depending upon balancing the needs of the surrounding communities (who live based on daily survival) and the ecosystem services provided by the sanctuary (which need to be based on long-term sustainable conservation).

iv) relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland ☐

4.6 - Ecological processes

<no data available>

5 - How is the Site managed? (Conservation and management)

5.1 - Land tenure and responsibilities (Managers)

5.1.1 - Land tenure/ownership

Public ownership

Category	Within the Ramsar Site	In the surrounding area
National/Federal government	☑	☑

Private ownership

Category	Within the Ramsar Site	In the surrounding area
Religious body/organization	☐	☑
Other types of private/individual owner(s)	☐	☑

5.1.2 - Management authority

Please list the local office / offices of any agency or organization responsible for managing the site:	● Meinmahla Kyun Wildlife Sanctuary: The wildlife sanctuary is managed by the Nature and Wildlife Conservation Division of the Forest Department of the Ministry of Natural Resources and Environmental Conservation. ● The Department of Fisheries: The Department of Fisheries is fully responsible for the aquatic resources in the Bogale River within the Ramsar site that lays outside the wildlife sanctuary. The Outer Islands including Gadon Galay island turtle nesting site and intertidal mudflats outside the wildlife sanctuary are part of the jurisdiction of the Department of Fisheries within the Ministry of Agriculture, Livestock and Irrigation. ● Township Forest Department: Township Forest Department manages the Byone Hmway Island situated in the western part of wildlife sanctuary. ● Other departments are involved to a lesser degree: Township General Administrative Department, Myanmar Police Force.
Provide the name and title of the person or people with responsibility for the wetland:	U Win Naing Thaw, Director, Nature and Wildlife Conservation Division
Postal address:	Forest Department, Ministry of Natural Resources and Environmental Conservation, Naypyitaw, Myanmar.

5.2 - Ecological character threats and responses (Management)

5.2.1 - Factors (actual or likely) adversely affecting the Site's ecological character

Transportation and service corridors

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Shipping lanes	Low impact	Low impact	☑	☑

Biological resource use

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Logging and wood harvesting	High impact	High impact	☑	☑
Fishing and harvesting aquatic resources	High impact	High impact	☑	☑
Hunting and collecting terrestrial animals	High impact	Medium impact	☑	☑

Human intrusions and disturbance

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Recreational and tourism activities	unknown impact	unknown impact	☑	☑

Climate change and severe weather

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Storms and flooding	unknown impact	Medium impact	☑	☑

5.2.2 - Legal conservation status

Regional (international) legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Other international designation	ASEAN Heritage Park	http://chm.aseanbiodiversity.org/templates/regionalchm/initiatives/pa/ahp/ahpsummary.php?idAHP=1 6	partly

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Wildlife Sanctuaries and Reserves	Menmahlakyun Wildlife Sanctuary		partly

5.2.3 - IUCN protected areas categories (2008)

Ia Strict Nature Reserve ☐

Ib Wilderness Area: protected area managed mainly for wilderness protection ☐

II National Park: protected area managed mainly for ecosystem protection and recreation ☐

III Natural Monument: protected area managed mainly for conservation of specific natural features ☐

IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention ☑

V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation ☐

VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems ☐

5.2.4 - Key conservation measures

Legal protection

Measures	Status
Legal protection	Implemented

5.2.5 - Management planning

Is there a site-specific management plan for the site? In preparation

Has a management effectiveness assessment been undertaken for the site? Yes ◉ No ○

If the site is a formal transboundary site as indicated in section Data and location > Site location, are there shared management planning processes with another Contracting Party? Yes ○ No ◉

5.2.6 - Planning for restoration

Is there a site-specific restoration plan? No, but restoration is needed

5.2.7 - Monitoring implemented or proposed

<no data available>

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

Barbier, E.B. et al. (2008). Coastal ecosystem-based management with nonlinear ecological functions and values. Science 319: 321–323.

Boo, C.M. et al (2014). Plants in tropical cities. Uvaria Tide, Singapore.

Central Statistics Organization (2007). Available at http://www.myanmararchives.- com/myanmardata2007/default1.htm.

Donato, D.C. et al. (2011). Mangroves among the most carbon-rich forests in the tropics. Nature Geoscience 4: 293–297.

FAO (2013). Agro-Maps: Global Spatial Database of Agricultural Land-use Statistics.
http://kids.fao.org/agromaps

Giri, C. et al. (2008) Mangrove forest distributions and dynamics (1975–2005) of the tsunami-affected region of Asia. Journal of Biogeography 35: 519–528.

Government of Myanmar (2011). National Biodiversity Strategy and Action Plan. Yangon

Government of Myanmar (2015). National Biodiversity Strategy and Action Plan . Nay Pyi Taw

IUCN (2016). IUCN Red List of Threatened Species. Version 2012.1 . Downloaded August 2016

JiCA (2005). The Study on Integrated Mangrove Management through Community Participation in the Ayerwaddy Delta in the Union of Myanmar. Final Report. Vol 1. 55p.

Koch, E.W. et al. (2009). Non-linearity in ecosystem services: temporal and spatial variability in coastal protection. Frontiers in Ecology and the Environment 7: 29–37.

Kress, W. J., R. A. De Filipps, E. Farr and Daw Yin Yin Kyi (2003). A checklist of the trees, shrubs, herbs, and climbers of Myanmar, Smithsonian Institution, US National Herbarium vol 45: 1-590.

Kogo, M. (1993) Final Reporton Mangrove Reforestation Feasibility Study, Feasiblity Study on Mangrove Reforestation, MYA/90/003, FAO

Leimgruber, P. et al. (2005). Forest cover change patterns in Myanmar (Burma) 1990–2000. Environmental Conservation 32: 356–364.

Loneragan, N.R. et al (2005). Prawn landings and their relationship with the extent of mangroves and shallow waters in western peninsular Malaysia. Estuarine, Coastal and Shelf Science 63: 187–200.

MacKinnon, J., WCMC (Ed) (1997). Protected Areas Systems Review of the Indo-Malayan Realm. Prepared by the Asian Bureau for Conservation (ABC) in collaboration with The World Conservation Monitoring Centre (WCMC). World Bank, Washington

Maung Khin (1948). Fisheries in Burma. Superintendent of Government Printing and Stationery, Rangoon, Government of the Union of Burma.

MBNS [Myanmar Bird and Nature Society] (2006). Field Feathers 2006-1. MBNS, Yangon

6.1.2 - Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)
<no file available>

ii. a detailed Ecological Character Description (ECD) (in a national format)
<no file available>

iii. a description of the site in a national or regional wetland inventory
<no file available>

iv. relevant Article 3.2 reports
<no file available>

v. site management plan
<no file available>

vi. other published literature
<no file available>

<no data available>

6.1.3 - Photograph(s) of the Site

Please provide at least one photograph of the site:

Mangrove in Meinmahla Kyun (*Win Naing Thaw, 02-12-2015*)

Sunset of Meinmahla Kyun (*Zau Lunn, 15-12-2015*)

6.1.4 - Designation letter and related data

Designation letter

<1 file(s) uploaded>

Date of Designation: 2017-01-03