



Republic of the Union of Myanmar

National Wetland Inventory



Volume 1: Technical Data



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2019

The National Wetland Inventory for the Republic of the Union of Myanmar is an output from:

Project Title:

Conservation of Biodiversity and Improved Management of Protected Areas in Myanmar

Task:

National Wetland Inventory

Duration:

30-11-2015 to 29-11-2018

Implementing Agencies:

Nature and Wildlife Conservation Division (NWCD), Forest Department,
Ministry of Natural Resources and Environmental Conservation (MONREC), Myanmar

Funding body:

Norwegian Environment Agency (NEA), Norway

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Suggested citation:

NWCD (2019) *Republic of the Union of Myanmar: National Wetland Inventory*. Vol. 1: Technical Data. NWCD, Nay Pyi Taw, Myanmar.

Cover photographs:

Inlay Lake Wildlife Sanctuary; Indawgyi Wildlife Sanctuary; Rice farmers at Moeyungyi Wetland Sanctuary; Meinmahla Kyun Wildlife Sanctuary. © R. J. McInnes

Chapter 1 Technical Data

1.1 Introduction

This volume sets out an explanation and presentation of the technical data used in the development of the National Wetland Inventory for the Republic of the Union of Myanmar. Volume 1 should be used to understand the data and information stored on the accompanying CD and paper maps.

A fisherman returns
home, Moeyungyi
Wetland Wildlife
Sanctuary Ramsar Site



Chapter 2 Directory Structure

2.1 Introduction

Vector data store information as coordinates and are represented by points, lines or polygons

Raster data store information in (usually) square cells (or pixels) which are organised into rows and columns

The National Wetland Inventory is provided in a folder on the accompanying CD as a combination of geographical information system (GIS) data layers and maps in a printable format. The GIS layers are all in ArcGIS shapefile. Shapefiles refer to vector data which is in the form of either points, lines or polygons. Some of the data have been derived from ESRI GRID format, a raster dataset where the data is represented as a grid of cells of an equal size (resolution) which have specific values pertaining to the nature of the data. The shapefile in this instance will display a pixelated outline when zoomed in to a large scale following the cell outlines of the original raster. Shapefiles also have associated attributes which is a table of data with records for each individual spatial element.

The shapefiles are held within the folder “GIS data”. It is recommended that ArcGIS software is used to view the spatial component of the data, view the attributes and to manage the data (such as copying from one folder to another). The structure of the data is such that when viewed in Windows Explorer a single shapefile will show up as a number of files, which can potentially be confusing. The files can be added to an ArcGIS Map Document in either ArcGIS ArcMap or ArcGIS Pro, or can be moved, copied and properties viewed using ArcCatalog. The data can be imported to other GIS software such as the freely available QGIS. Simply double clicking on a file to open as would be done with standard windows programmes such as MS-WORD will not open the file in ArcGIS. All the data layers are in a standard WGS 1984 projection with the default unit of decimal degrees. The name of each data layer describes the content, but more details are given in the sections below.

Maps of each of the wetland types in a printable format (jpeg and pdf files) are in the folder “Maps”. These have been formatted to print at A0. An example of the map for all wetlands in Myanmar is shown on the next page. In addition to each layer from the wetland inventory the maps include baseline data (shapefiles) showing the Myanmar national border (polygon), Myanmar administrative boundaries at the state level (polygons) and the 10 largest cities in the country (points).

2.2 Wetland Inventory Files

The full list of files which have been generated for the wetland inventory is shown in Tables 1 and 2 below. **Table 1** provides the list of files in terms of the adopted Ramsar wetland classification system. Wetland types where the text is in grey denote that data was not provided, obtained, or processed during Phase 1 of the Project. The data listed under the heading “Other Classification” are either wetlands which have been mapped from previous studies and fall across a number of classifications (*Myanmar Important Wetlands*), or the baseline data used for the print format maps. The layer *Myanmar Important Wetlands* was generated from location data in the form of latitude and longitude grid references from the 1989 Asia Wetlands Directory (Scott, 1989) the 2004 Wetland Inventory for Myanmar (Davies *et al.*, 2004), and further information gathered as part of Phase 1 of the Project.

Wetland produce for sale, Bago Region



Table 2 provides further details on each data layer in terms of the format of the file (as explained in the **Directory Structure** section), the source of the data, scale and the dataset used. The scale of the data refers to the resolution of pixels for data derived from satellite images such as the digital terrain map (DTM), land cover and marine vegetation databases. For other data obtained from digitising using the scale refers to the scale at which images were displayed. No scale is associated with the point data which is dimensionless. Three sources of data are given as *Existing*, *Combined* or *Digitised* defined as follows:

Table 1

Wetland Inventory files in terms of their Ramsar classification (wetland types shown in grey are not included in the National Wetland Inventory due to a lack of data)

1	Inland Wetlands	Ramsar Code	Name
1.1	Rivers and streams	M, N	Myanmar rivers
1.2	Natural lakes	O, P, Q	Myanmar lakes
1.3	Non-forested peatlands	U	Myanmar non forest peatlands
1.4	Forested peatlands	Xp	Myanmar forest peatlands
1.5	Marshes and swamps on alluvial soils	Tp	
1.6	Forested wetlands on alluvial soils	Xf	
1.7	Groundwater dependent wetlands	Zk(b)	Myanmar limestone caves
2	Coastal Wetlands		
2.1	Tidal flats	F	Myanmar mudflats
2.2	Saltmarshes	H	
2.3	Mangroves	I	Myanmar mangroves
2.4	Seagrass beds	B	Myanmar seagrass
2.5	Coral reefs	C	Myanmar coral line Myanmar coral poly
2.6	Lagoons	K	Myanmar lagoons
2.7	Kelp forest	B	
2.8	Shallow sub-tidal systems	B	Myanmar 6m limit
2.9	Sand dunes and beaches	E	Myanmar sandy beaches
2.10	Rocky shores	D	Myanmar rocky shores
2.11	Shellfish reefs		
3	Human made wetlands		
3.1	Reservoirs	6	Myanmar reservoirs
3.2	Ponds	2	
3.3	Rice paddy	3	Myanmar rice paddies
3.4	Constructed/wastewater wetlands	8	
3.5	Saltpans/Salinas	5	
3.6	Aquaculture ponds	1	
4	Other Classification		
4.1			Myanmar important wetlands
4.2			Myanmar boundary
4.3			Myanmar states Myanmar cities

2.3 Existing Data

This is where a dataset already in GIS format was provided often from global datasets such as the *Global Mangrove Watch* or local datasets such as the limestone cave point locations which were provided by MONREC. The source datasets are given in **Table 2** and links to the associated websites are given in **Table 3**. In the case of Myanmar reservoirs, the data provided was only in the form of latitude and longitude point locations. These locations were plotted in ArcGIS over background satellite imagery and the full extent of the reservoir was then manually digitised from the imagery at a scale of 1:50,000.

2.4 Combined Data

This is where a new data set was generated based on combining existing datasets with each other or combining an existing dataset with another dataset that is not part of the wetland inventory. The combinations are described for each dataset:

1. The Myanmar lakes layer was based largely on the UN *Global Lakes database* which had lakes over 100 ha in area as polygons. The layer was compared with satellite imagery at 1:50,000 scale and any visible lakes not included in the *Global Lakes database* were digitised;
2. Non-forested and forested peatlands were based on the combination of maps of peat soils provided by MONREC and the Glob Cover global land use data (350m resolution raster) which gave the extent of forest cover;
3. Rice paddy areas were a combination of the irrigated croplands category from the Glob Cover dataset and the slope generated from the SRTM digital terrain model (DTM). Where the irrigated crop land was shown to be only very slightly sloping (less than 2 degrees) this was assumed to be rice paddy fields which are characterised by their lack of slope.

Table 2
Wetland Inventory files
in terms of their
format, source and how
they were generated

Name	Type of Data	Source of data	Scale of data	Datasets used
Myanmar rivers	line	Existing	derived from 1km DTM	HydroSHEDS
Myanmar lakes	polygon	Combined	1:50,000	Global lakes database, satellite imagery
Myanmar non-forest peatlands	polygon	Combined	350m	Maps provided by Monrec, Glob cover data
Myanmar forest peatlands	polygon	Combined	350m	Maps provided by MONREC, Glob cover data
Myanmar limestone caves	point	Existing		Limestone caves point locations from MONREC
Myanmar mudflats	polygon	Existing	30m	Global mudflat database
Myanmar mangroves	polygon	Existing	30m	Global Mangrove watch
Myanmar seagrass	polygon	Existing		Global Seagrasses database
Myanmar coral l	line	Existing		Reef base
Myanmar coral p	polygon	Existing		Reef base
Myanmar lagoons	point	Digitised	1:50,000	satellite imagery
Myanmar 6m limit	polygon	Existing	100m	British Oceanographic Data Centre
Myanmar sandy beaches	line	Digitised	1:250,000	satellite imagery
Myanmar rocky shores	line	Digitised	90m	satellite imagery SRTM DTM
Myanmar reservoirs	polygon	Existing/ digitised	1:50,000	Locations provided by MONREC
Myanmar rice paddies	polygon	Combined	90m	Glob cover data and SRTM DTM
Myanmar important wetlands	point	Existing		Locations from existing reports
Myanmar boundary	polygon	Existing	1:25,000	DCW
Myanmar states	polygon	Existing		ESRI online
Myanmar cities	point	Digitised		National Geographic base map

Table 3
Reference locations for
existing datasets

Dataset	Website
HydroSHEDS	www.hydrosheds.org
Global Lakes Database	https://gcmd.nasa.gov/records/GCMD_GLWD.html
GLOBCOVER	http://due.esrin.esa.int/page_project68.php
Global Mudflat Database	Intertidal Change Explorer (http://intertidal.app).
Global Mangrove Watch	www.globalmangrovetwatch.org
Global Seagrass Database	https://data.unep-wcmc.org/datasets/7
Reef Base	www.reefbase.org
British Oceanographic Data Centre	https://www.bodc.ac.uk/
SRTM (Shuttle Radar Topography Mission)	https://www2.jpl.nasa.gov/srtm/cbanddataproduts.html
DCW (Digital Chart of the World)	https://www.ngdc.noaa.gov/mgg/topo/report/s5/s5Avii.html

2.5 Digitised Data

Digitise data were generally based on extracting data from freely available satellite images using the ArcGIS software. The following data layers were generated in this way:

1. Lagoons were digitised at 1:50,000 scale, as any enclosed water body within 1km of the coast. The small size of these meant that the confidence associated with this layer is low as identifying standing water from satellite images at this resolution is not particularly accurate. The water bodies may be natural, impounded or parts of an industrial process which is not possible to define at this scale. Therefore, instead of representing the data as a polygon outline for the water body a central point was taken, with the view that a more detailed analysis is required to determine the exact location and purpose of the lagoon;
2. Sandy beaches were also digitised from satellite imagery based on the colour associated with this part of the coastline, often visible as white/light yellow. The areas were represented as a line since they are characterised by a narrow extent of the shoreline;
3. Rocky shores were defined based on an initial slope based classification using the DTM. All areas with slopes over 10 degrees were generated then satellite imagery was used for these areas to further identify the presence of a rocky shoreline. As with the beaches the layer was digitised as a line;
4. Locations of reservoirs generated as polygons as described above.

The same files names are used for the maps, with the addition of an overview map plotting all the wetland types (see next page). Myanmar important wetlands are not plotted with the maps and the Myanmar coral shapefiles (both line and polygon) are plotted for the line type as this is more extensive.

Collecting water from a wetland for domestic use



2.6 Attribute Data

All of the GIS data layers have attribute data associated with the spatial information. This is shown as an attribute table within ArcGIS but the data can also be opened in MS-XL as a data base format file (*.dbf) without needing ArcGIS software. The field names for all the attributes for each data layer are listed and defined below. ArcGIS has a limit on the text length and characters used for field names. For raster data the attributes are typically an identifier for the entry (row-id) the value of the pixel (VALUE) and the number of pixels for that value (COUNT). Attributes where the data layer just shows the same type of feature typically just have a unique identifier, the type of the shape file and a second unique identifier which can be edited. The Attributes are given in italics in the text below with the definition in normal font.

Roosting Asian openbill
stork *Anastomus*
oscitans



Myanmar rivers: *FID* (shape file unique identifier), *Shape* (type of shape file), *ARCID* (unique id pertaining to the Hydro-sheds dataset), *UP_CELLS* (number of upstream cells), *Length* (feature length in m).

Myanmar lakes: *FID* (shape file unique identifier), *Shape* (type of shape file), *name* (lake name – not entered), *AREA* (area in sq. km).

Myanmar non forest peatlands: *FID* (shape file unique identifier), *Shape* (type of shape file), *FID_Organi*, (unique id for peat polygons) id (other unique identifier)) ,*FID_Myanma* (unique id for GLOBCOVER polygons) , *ID1*(duplicate other unique identifier), *GRIDCODE* (value of grid cell from GLOBCOVER).

Myanmar forest peatlands: *FID* (shape file unique identifier), *Shape* (type of shape file), *ID* (other unique identifier), *GRIDCODE* (value of grid cell from GLOBCOVER).

Myanmar limestone caves: *FID* (shape file unique identifier), *Shape* (type of shape file) , *ID* (other unique identifier), *CAV_ID* (unique id pertaining to the limestone caves database), *Cave_name* (local name of cave)

Myanmar mudflats: *FID* (shape file unique identifier), *Shape* (type of shape file), *ID* (other unique identifier), *GRIDCODE* (value of grid cell from raster conversion).

Myanmar mangroves: *FID* (shape file unique identifier), *Shape* (type of shape file), *FID_extrac*, *Id*, ,(various unique identifiers pertaining to the original data) *name* (name of sea), *FID_Burma_*, *ogc_fid*, *pxlval*,(various unique identifiers pertaining to the original data), *area*(area in sq. m).

Myanmar seagrass: *FID* (shape file unique identifier), *Shape* (type of shape file), *OBJECTID_1*, *OBJECTID*, *id*(various duplicate ids pertaining to the original data set), *gridcode* (Value from original raster), *Shape_leng* (length in decimal degrees), *Shape_Le_1* (length in m), *Shape-Area* (area in sq. m).

Myanmar coral: : *FID* (shape file unique identifier), *Shape* (type of shape file), *OBJECTID*, *REFID* (various duplicate ids pertaining to the original data set), *SCALE* (mapped scale), *COUNTRY* (country) , *NAME* (primary name of reef) ,*NAME2* (secondary name of reef), *ISO3* (Country code), *TYPE_* (reef type), *SOURCE*, *D_SOURCE*, (sources of the mapped data).

Myanmar lagoons *FID* (shape file unique identifier), *Shape* (type of shape file), *id* (additional unique identifier).

Myanmar 6m limit: *FID* (shape file unique identifier), *Shape* (type of shape file), *ID* (other unique identifier), *GRIDCODE* (value of grid cell from raster conversion).

Myanmar sandy beaches: *FID* (shape file unique identifier), *Shape* (type of shape file), *id* (additional unique identifier).

Myanmar rocky shores: *FID* (shape file unique identifier), *Shape* (type of shape file), *id* (additional unique identifier)

Myanmar rice paddies *FID* (shape file unique identifier), *Shape* (type of shape file), *ID* (other unique identifier), *GRIDCODE* (value of grid cell from raster conversion).

Myanmar important wetlands: *FID* (shape file unique identifier), *Shape* (type of shape file), *id* (additional unique identifier), *Wetland_na* (wetland name), *class* (type of wetland), *Northing* (latitude in dms), *Easting* (longitude in DMS), *POINT_Y* (latitude in decimal degrees), *POINT_X* (longitude in decimal degrees).

Chapter 3 References

3.1 References

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

Scott, D.A. (1989) *A Directory of Asian Wetlands*. IUCN: Gland, Switzerland.

