



Republic of the Philippines

Department of Environment and Natural Resources

BIODIVERSITY MANAGEMENT BUREAU

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BMB TECHNICAL BULLETIN

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SUBJECT: Prescribing the Forms for Inland Wetland Inventory and Profiling

In pursuit of DENR Memorandum Circular 1997-17 (Criteria for the Identification of Wetlands Critical to Biodiversity Conservation), as part of our commitments under the Ramsar Convention on Wetlands, and in order to ensure uniformity in generating information on inland wetland resources and ecosystem services, the forms for the conduct of inland wetland inventory and profiling, attached as Annexes A and B, are hereby adopted.

This Technical Bulletin is issued for the information and guidance of all concerned.


CRISANTA MARLENE P. RODRIGUEZ



United Nations Decade on Biodiversity

Annex A. FORM FOR INVENTORY OF INLAND WETLANDS IN THE REGION

Region: _____

WETLAND SITE NAME	WETLAND TYPE/S	WATERBODY CLASSIFICATION	LOCATION / ADMINISTRATIVE COVERAGE	NEAREST LARGE CITY/ MUNICIPALITY	CENTROID (LATITUDE AND LONGITUDE)	REMARKS
	<i>Include component types of a wetland complex (e.g. lake, swamp, marsh, peatland, etc.)</i>	<i>EMB - Water Body Classification and Usage of Freshwater (Class AA, A, B, C, D)</i>	<i>Mention the Purok, Sitio or at least the Barangay or Municipal level, if possible</i>		<i>Provide the coordinates of the approximate center of the site and/or the limits of the site. Indicate the latitude/ longitude, in degrees and minutes; to be used for mapping</i> <i>For rivers/creek provide three (3) coordinates taken from the upstream, midstream and downstream of the river main channel</i>	<i>Mention whether assessed, date assessed, whether with management plan; whether with management body; conservation measures e.g. within Protected Area, within Key Biodiversity Area, within Major River Basin, established local conservation area, critical habitat, Asian Waterfowl Census site, Ramsar site, EAAFP site etc.</i>
Province						
1)						
2)						
3)						
4)						

ANNEX B. FORM FOR WETLAND PROFILING (WETLAND INFORMATION SHEET)

Core (minimum) Data Fields for Wetland Profiling

(Adapted and revised from: Ramsar handbooks for the wise use of wetlands, 4th edition.2010. Handbook 13: Inventory, assessment, and monitoring.)

A. GEOGRAPHICAL INFORMATION

1. **Site name** (official name of site): _____

Other names (If there is a non-official, alternative name, including for example in a local language, catchment name/other identifier(s)(e.g., reference number) provide it here:

Photograph. (Provide at least one high-resolution and one geotagged photograph of wetland).

<i>High-resolution photograph</i>	<i>Geotagged photograph</i>
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2. **Wetland type** (Circle or underline the applicable codes for the wetland types based on the Ramsar “Classification System for Wetland Type” present in the site. Descriptions of each wetland type code are provided in Appendix 1)

Marine/coastal : A • B • C • D • E • F • G • H • I • J • K • Zk(a) •

Inland : L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts •

U • Va • Vt • W • Xf • Xp • Y • Zg • Zk(b) •

Human-made : 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c) •

3. **Area, boundary and dimensions:**

Site shape (cross-section and plan view (i.e. circular, oval, elongated)):

Administrative boundaries (to the North, East, South and West etc.):

North	East	West	South

Area (total size in hectares, seasonal max/ min, where relevant)

	Dry Season		Wet Season	
	Min	Max	Min	Max
Including watershed :	_____	_____	_____	_____
Area of water/wet area : (river/creek not included)	_____	_____	_____	_____

Length, width, depth (in meters, seasonal max/min, where relevant; For rivers, provide data for at least three sections—upstream, midstream, downstream, measurement should be taken only from the main tributaries of the rivers):

	Dry Season		Wet Season	
	Min	Max	Min	Max
Length :	_____	_____	_____	_____
Width :	_____	_____	_____	_____
Depth :	_____	_____	_____	_____

Elevation (in meters above sea level) : _____

Administrative location/coverage:

Sitio	Barangay	Municipality	Province/Island

Demographic Information: (Socioeconomic characteristics of communities within the administrative location mentioned above)

Municipality	Barangay	Population			Primary Sources of Income	Describe the location in wetland area (i.e. near shoreline, landlocked)
		Male	Female	Total		
Total Population						

Source and Date of Information : _____

River Basin/Watershed Name (name of river basin/watershed where the wetland is located):

Geomorphic setting (Describe the setting in the landscape/catchment/river basin - including altitude, upper/lower zone of catchment, distance to coast where relevant, etc.):

Map Centroid (mid-point) (Provide the coordinates (in degrees, minutes and seconds) of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas. *For rivers/creek provide three (3) coordinates taken from the upstream, midstream and downstream of the river main channel):

	Latitude	Longitude
Centroid	: _____	_____
*Upstream	: _____	_____
*Midstream	: _____	_____
*Downstream	: _____	_____

Mapping details (Attach GIS generated map in a separate sheet, Projection system: World Geodetic System 1984; Map coordinates: latitude/longitude, in degrees and minutes, refer to Appendix 2 for the required map scale.)

4. Climate: (Overview of prevailing climate type, zone and major features i.e. precipitation, temperature, wind)

Climate Type (Based on PAGASA Classification): _____

Climatic Type Description:

Precipitation/Rainfall (in millimeter (mm), average per month; total amount per year; maximum and minimum level):

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Minimum (mm)													
Maximum (mm)													
Average (mm)													

Temperature (in Degree Celsius °C, average per month; maximum and minimum level):

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Minimum (°C)												
Maximum (°C)												
Average (°C)												

Heat Index (in Degree Celsius °C, average per month; maximum and minimum level):

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Minimum (°C)												
Maximum (°C)												
Average (°C)												

Wind (in kilometer per hour (KPH), major features such as prevailing wind direction, velocity): _____

B. BIO-CHEMICO-PHYSICAL INFORMATION

5. Soils:

Geology (*How did the wetland evolved? i.e. develop through erosion processes, deposition of sediment on adjacent lands during floods, forces of nature, rivers deposit sediment, rising sea levels, human activities alter drainage patterns, etc.*):

Type/order of soils (*Based on BSWM nine (9) soil orders recognized in the Philippines, refer to Appendix 3*):

Type of substrates (*sandy, muddy, clayey, gravel etc.*):

Terrestrial/riparian area : _____

Wetland/aquatic area : _____

Soil biology (*presence of small organisms, organic debris, organic matter etc.*):

Terrestrial/riparian area : _____

Wetland/aquatic area : _____

6. Water regime:

Water source (*check the source and write the name and/or location of inflow and outflow*):

Surface source

Ground water source

Inflow/s (*Name and/or location of wetland/s which flows into the site; show in map, if possible*):

Outflow/s (*Name and/or location of wetland/s which flows out of the site; show in map, if possible*):

Ground water classification (*for ground water source, indicate the NWRB Groundwater Classification, Appendix 4*):

7. Flooding:

Flooding vulnerability (*flooding vulnerability based on ERDB assessment*): _____

Flooding susceptibility (*rain-induced flooding susceptibility based on MGB*): _____

Flooding frequency (*how often does flooding occur within a year?*): _____

Flooding seasonality (*in what month/s does flooding usually occur?*): _____

Flooding duration (*for how long does floodwater usually stay within each season?*): _____

Magnitude of flow and/or tidal regime (*what is the maximum water level of the flood and how fast does it flows out?*):

8. Water quality (information can be obtained from EMB regular monitoring if any, or/and conduct of actual field sample collection. Secondary data from other sources could be also used to fill this section):

Waterbody Classification (Based on DENR- EMB Classification): _____

Parameter	Standard ¹	Minimum ²	Maximum ³	Average ⁴
Biochemical Oxygen Demand (mg/L)				
Chlorine (mg/L)				
Color (TCU)				
Dissolved Oxygen (mg/L)				
Fecal coliform (MPN/100mL)				
Nitrate as NO ₃ -N (mg/L)				
pH (range)				
Phosphate (mg/L)				
Temperature (°C)				
Total suspended solid (mg/L)				
Turbidity (NTU)				
Salinity				
Conductivity				
Other: _____				

¹ Based on DENR- DAO 2016-08 Classification

² Lowest value collected in a year

³ Highest value collected in a year

⁴ Average value collected in a year

Source (who conducted the monitoring?) : _____
Year Data Collected : _____
Sampling Frequency (annual or monthly) : _____

9. Noteworthy flora/Plant communities:

Vegetation structure (Describe the physical/morphological structure/appearance of existing vegetation, canopy cover such as open or closed forest):

Vegetation zones (What are the dominant species? Include indicative location of plant communities, tabulate and show in map, use extra sheet if necessary):

Zone	Local/ Common Name	Family Name	Scientific Name	Distribution	Conservation Status	Indicative Location in Wetlands and time of the year abundant	Remarks (i.e. IAS, Rare, Unique, Seasonal, etc.)
A. Terrestrial/ Riparian (i.e. trees, plant, shrub)							
B. Aquatic (i.e. aquatic trees, plants, macrophytes, phytoplankton)							

10. Noteworthy fauna/Animal communities:

Main species present (What are the dominant species? Population size and proportion where known? Indicative location of animal communities. Tabulate and show in map, use extra sheet if necessary):

Class	Local/ Common Name	Family Name	Scientific Name	Population Size	Distribution	Conservation Status	Indicative Location in Wetlands and time of the year abundant	Remarks (i.e. IAS, Rare, Unique, Seasonal, etc.)
A. Terrestrial/ Riparian								
Avifauna								
Mammals								
Herpetofauna								
Invertebrates								
Others								
B. Aquatic								
Fish								
Mammals								
Herpetofauna								
Invertebrates								
Others								

C. WETLAND BENEFITS

11. Ecosystem services: (Fill up the corresponding box for the applicable wetland function/benefit based on the list of relevant ecosystem services provided in the site. Include a key phrase/words describing the importance of the wetland and the relative location where the service is provided. Refer to Appendix 5 for the Guidance Note.)

RAPID ASSESSMENT OF WETLAND ECOSYSTEM SERVICES FIELD ASSESSMENT SHEET

- Key**
 ++ Potential significant positive benefit
 + Potential positive benefit
 0 Negligible benefit
 - Potential negative benefit
 -- Potential significant negative benefit
 ? Gaps in evidence

		Scale of benefit				
		How important?	Describe benefit	Local	Regional	Global
Provisioning Services	Fresh water					
	Food					
	Fuel					
	Fibre					
	Genetic resources					
	Natural medicines or pharmaceuticals					
	Ornamental resources					
	Clay, mineral, aggregate harvesting					
	Waste disposal					
	Energy harvesting from natural air and water flows					
Regulatory Services	Air quality regulation					
	Local climate regulation					
	Global climate regulation					
	Water regulation					
	Flood hazard regulation					
	Storm hazard regulation					
	Pest regulation					
	Disease regulation - human					
	Disease regulation - livestock					
	Erosion regulation					
	Water purification					
	Pollination					
	Salinity regulation					

			Scale of benefit			
		How important?	Describe benefit	Local	Regional	Global
	Fire regulation					
	Noise and visual buffering					
Cultural Services	Cultural heritage					
	Recreation and tourism					
	Aesthetic value					
	Spiritual and religious value					
	Inspiration value					
	Social relations					
	Educational and research					
Supporting Services	Soil formation					
	Primary production					
	Nutrient cycling					
	Water recycling					
	Provision of habitat					
Notes:						

Remarks/Other Information (on the importance of the particular wetland): _____

D. MANAGEMENT INFORMATION

12. Land use:

Local land use (including adjacent settlements, agricultural areas, industries etc.): _____

Land use in the river basin : _____ and/or

Land use in the coastal zone : _____

13. Existing pressures/threats and trends (*concerning any of the features listed above, and/or concerning ecosystem integrity*):

14. Conservation and management status of the wetland (*List down the legal instruments and social or cultural traditions that influence the management of the wetland; including protected area categories according to the IUCN system and/or any national system and other existing management interventions*):

15. Existing Management plans and monitoring programs: (*Indicate presence and list down the management plans and monitoring programs in place and planned within the wetland and in the river basin and/or coastal zone*)

16. References (Full citation)

17. Compiler/Contact/Focal person (including contact information: office address, telephone number; fax, email address, etc.)

Name	Designation	Office	Contact Number	Email

Date Accomplished: _____

E. ASSESSMENT AND RECOMMENDATIONS

18. Potential Threats:

19. Management Prescriptions/Proposed Management Interventions:

20. Proposed Classification (*which portions are relevant or critical for management for*)

Classification	Description	Relative location (Mention which part of the wetland where the service is provided)
<input type="checkbox"/> Food production		
<input type="checkbox"/> Water regulation		
<input type="checkbox"/> Disaster mitigation		
<input type="checkbox"/> Biodiversity importance*		

* Based on criteria mentioned in DMC 17 series of 1997.

APPENDIX 1

Classification System for Wetland Type

The codes are based upon the Ramsar Classification System for Wetland Type as approved by Recommendation 4.7 and amended by Resolutions VI.5 and VII.11 of the Conference of the Contracting Parties. The categories listed herein are intended to provide only a very broad framework to aid rapid identification of the main wetland habitats represented at each site.

To assist in identification of the correct Wetland Types has provided below a tabulations for Marine/Coastal Wetlands and Inland Wetlands of some of the characteristics of each Wetland Type.

Marine/Coastal Wetlands

- A -- **Permanent shallow marine waters** in most cases less than six metres deep at low tide; includes sea bays and straits.
- B -- **Marine subtidal aquatic beds**; includes kelp beds, sea-grass beds, tropical marine meadows.
- C -- **Coral reefs.**
- D -- **Rocky marine shores**; includes rocky offshore islands, sea cliffs.
- E -- **Sand, shingle or pebble shores**; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.
- F -- **Estuarine waters**; permanent water of estuaries and estuarine systems of deltas.
- G -- **Intertidal mud, sand or salt flats.**
- H -- **Intertidal marshes**; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes.
- I -- **Intertidal forested wetlands**; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.
- J -- **Coastal brackish/saline lagoons**; brackish to saline lagoons with at least one relatively narrow connection to the sea.
- K -- **Coastal freshwater lagoons**; includes freshwater delta lagoons.
- Zk(a) – **Karst and other subterranean hydrological systems, marine/coastal**

Inland Wetlands

- L -- **Permanent inland deltas.**
- M -- **Permanent rivers/streams/creeks**; includes waterfalls.
- N -- **Seasonal/intermittent/irregular rivers/streams/creeks.**
- O -- **Permanent freshwater lakes** (over 8 ha); includes large oxbow lakes.
- P -- **Seasonal/intermittent freshwater lakes** (over 8 ha); includes floodplain lakes.
- Q -- **Permanent saline/brackish/alkaline lakes.**
- R -- **Seasonal/intermittent saline/brackish/alkaline lakes and flats.**
- Sp -- **Permanent saline/brackish/alkaline marshes/pools.**
- Ss -- **Seasonal/intermittent saline/brackish/alkaline marshes/pools.**
- Tp -- **Permanent freshwater marshes/pools**; ponds (below 8 ha), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season.
- Ts -- **Seasonal/intermittent freshwater marshes/pools on inorganic soils**; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.
- U -- **Non-forested peatlands**; includes shrub or open bogs, swamps, fens.
- Va -- **Alpine wetlands**; includes alpine meadows, temporary waters from snowmelt.
- Vt -- **Tundra wetlands**; includes tundra pools, temporary waters from snowmelt.
- W -- **Shrub-dominated wetlands**; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils.
- Xf -- **Freshwater, tree-dominated wetlands**; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils.
- Xp -- **Forested peatlands**; peat swamp forests.
- Y -- **Freshwater springs; oases.**
- Zg -- **Geothermal wetlands**
- Zk(b) – **Karst and other subterranean hydrological systems, inland**

Note: “**floodplain**” is a broad term used to refer to one or more wetland types, which may include examples from the R, Ss, Ts, W, Xf, Xp, or other wetland types. Some examples of floodplain wetlands are seasonally inundated grassland (including natural wet meadows), shrublands, woodlands and forests. Floodplain wetlands are not listed as a specific wetland type herein.

Human-made wetlands

- 1 -- **Aquaculture** (e.g., fish/shrimp) **ponds**
- 2 -- **Ponds**; includes farm ponds, stock ponds, small tanks; (generally below 8 ha).
- 3 -- **Irrigated land**; includes irrigation channels and rice fields.
- 4 -- **Seasonally flooded agricultural land** (including intensively managed or grazed wet meadow or pasture).

- 5 -- **Salt exploitation sites**; salt pans, salines, etc.
 - 6 -- **Water storage areas**; reservoirs/barrages/dams/impoundments (generally over 8 ha).
 - 7 -- **Excavations**; gravel/brick/clay pits; borrow pits, mining pools.
 - 8 -- **Wastewater treatment areas**; sewage farms, settling ponds, oxidation basins, etc.
 - 9 -- **Canals and drainage channels, ditches.**
- Zk(c) – **Karst and other subterranean hydrological systems**, human-made

APPENDIX 2

Additional guide for the provision of maps and other spatial data for wetlands

(Adapted and revised from the Ramsar Resolution XI.8 Annex 2 Appendix C. *Additional guidelines for the provision of maps and other spatial data for Ramsar Sites. 2012.*) Please note that the map generated could also be used when applying for inclusion to the Ramsar List of Wetlands of International Importance.

1. The provision of a suitable map or maps is a requirement under Article 2.1 of the Ramsar Convention – it is fundamental to the process of designating a Wetland of International Importance (Ramsar site), and is an essential part of the information supplied in the *Wetland Information Sheet (WIS)*. Clear mapped information about the site is also vital for its management.
2. This guidance recognises that Field Offices have increasing capacity to prepare and supply wetland site maps in digital formats (for example, through the use of electronic Geographical Information System (GIS) software) and to delineate site boundaries through the establishment of precise Global Positioning System (GPS) way-points.
3. Maps provided by a Field Office should, as far as possible, and as high priority attributes:
 - i) be prepared to professional cartographic standards: maps not prepared to professional cartographic standards are problematic, since even moderately-opaque hand-drawn site boundaries or cross-hatching (e.g., to indicate zonation) often obscure other important map features. Although coloured annotations may appear distinguishable from the underlying map features on the map original, it is important to remember that most colours cannot be differentiated in any black and white photocopies. Such additional information should be provided on additional outline maps;
 - ii) show the wetland in its natural or modified environment and should be within the scale ranges specified below, depending upon the size of the site;
 - iii) clearly show the boundary of the wetland ecosystem and the wetland management unit, including buffer zones, if any;
 - iv) if the site is adjacent to other wetlands, the boundaries of all of such sites should be shown, making clear the connectivity between the sites, if any;
 - v) include a key or legend that clearly identifies the boundary and each other category of feature shown on the map; and
 - vi) show the map's scale, an indication of geographical coordinates (latitude and longitude), an indication of compass bearing (north arrow) and, if possible, information on the map's projection. The map (or a companion map) should also show the position of several other features if feasible.
4. The most suitable map will also clearly show the following, although provision of such information is of lower priority than the attributes listed in paragraph 3 above:
 - i) basic topographical information;
 - ii) the boundaries of relevant protected area designations and administrative boundaries (e.g., province, district, etc.);
 - iii) clearly delineated wetland and non-wetland parts of the site. Where available, information on the distribution of the main wetland habitat types and key hydrological features is also useful. Where there is substantial seasonal variation in the extent of the wetland, separate maps showing the wetland extent in the wet and in the dry seasons are helpful;
 - iv) major landmarks (towns, roads, etc.); and

- v) distribution of land uses in the same catchment.
5. A general location map, showing the location of the wetland within the territory of the Country, Region, or Province, is also extremely useful.
 6. Maps should not be trimmed, so that data managers can consult any printed marginal notes or coordinate tick marks.
 7. A map having all the above attributes, including being at the appropriate scale (see guidance below), will facilitate digitization of maps for inclusion in a Geographic Information System (GIS) if the map (or maps) are supplied only in printed form (i.e., when no digital coordinates are available).
 8. To allow for subsequent digitization to be undertaken accurately and without distortion, the map should be an original print (two copies of which should be supplied) and not a photocopy.
 9. Additionally, to facilitate copying and presentation, it is extremely helpful to include two other versions of the principal map(s) to be e-mailed to the compiler at the National Administrative Authority (DENR-BMB):
 - i) a colour photocopy of the map reduced to A4 size;
 - ii) a GIS file providing geo-referenced site boundary vectors and attribute tables, if possible;
 - iii) a TIFF, JPG, BMP, GIF or other common digital image file.

Scale of maps

10. The optimum scale for a map depends on the size of the site depicted. The optimal scales of maps for different sizes of wetland sites are:

Size of site (ha)	Preferred (minimum) scale of map
> 1,000,000	1:1,000,000
100,000 to 1,000,000	1:500,000
50,000 to 100,000	1:250,000
25,000 to 50,000	1:100,000
10,000 to 25,000	1:50,000
1,000 to 10,000	1:25,000
< 1,000	1:5,000

11. In summary, the map should be of suitable scale to depict the detail necessary to clearly indicate the features of the site described in the WIS and, particularly, to show a precise boundary.
12. For moderate to large sites, it is often difficult to show sufficient detail on standard A4 (210mm x 297mm) or Letter-format (8.5" x 11") sheets at the desired scale, so generally a sheet larger than this format is more appropriate. However, whenever possible, each map should be no larger than A3 (420mm x 297 mm) as larger formats present difficulties for subsequent copying.
13. When the site is large or complex and/or when it is composed of several sub-sites with discrete boundaries, a larger-scale map of each section or sub-site should be provided, accompanied by a smaller scale location map of the whole site which indicates the location of each sector or sub-site relative to the others. All such maps should follow the scale guidance above.

Boundary description (text)

14. When detailed topographical maps are not available, a description of the boundaries of the site should be provided to accompany the map(s), indicating topographic and other legally defined national, regional, or international boundaries followed by the site boundaries, together with the relationship of the boundary of the wetland with the boundaries of any other existing protected area which cover part or all of the wetland site.

15. If the precise position of the site boundary has been determined using a Global Positioning System (GPS), Contracting Parties are encouraged to include an electronic or paper file listing each GPS latitude/longitude way-point determined and identifying these on a printed copy of the site map.
16. Where a revision to the boundary of a wetland site is being made, under the following circumstances:
 - a) the site boundary has been drawn incorrectly and there has been a genuine error; and/or
 - b) the site boundary does not accurately match the description of the boundary as defined in the WIS; and/or
 - c) technology allows for a higher resolution and more accurate definition of the site boundary than was available at the time of assessment;

any change should be made clear in the WIS and/or on the site map, and the reasons for such refinement should be documented in the WIS.

Boundary description (digital)

17. Contracting Parties are encouraged, where possible, to submit geographic information about the wetland site in digital form, suitable for incorporation into a Geographic Information System (GIS).
 18. For boundary and buffer zone delineation, data should be presented in vector form, prepared at the largest scale.
 19. Other information, for example on wetland types and land uses, whether vector- or raster-based, should be submitted on one or more separate layers at the largest scale possible.
 20. Metadata concerning the digitised formats should accompany the digital map(s) and should include digitising scale, projection system, attribute tables for each map layer, file format(s), and layering conventions used to prepare the data layers.
 21. The primary native format files generated by the “Arc-Info” family of GIS (ESRI Corporation) or by “MapInfo” (Corporation) GIS enjoy increasingly wide use and can be imported and used by many GIS applications.
- 21.** The Open GIS Consortium (OGC), a large group of GIS organizations including industry leaders, is addressing the issue of incompatible standards in geographic information technology. Progress on GIS standards, compatibility, and interoperability achieved under the OGC initiative should be noted and will be considered in the preparation of any updated advice on GIS file specifications for provision of digital maps for the wetland sites.

APPENDIX 3

Bureau of Soils and Water Management (BSWM) Nine (9) Soil Orders Recognized in the Philippines

Some information about the soil orders

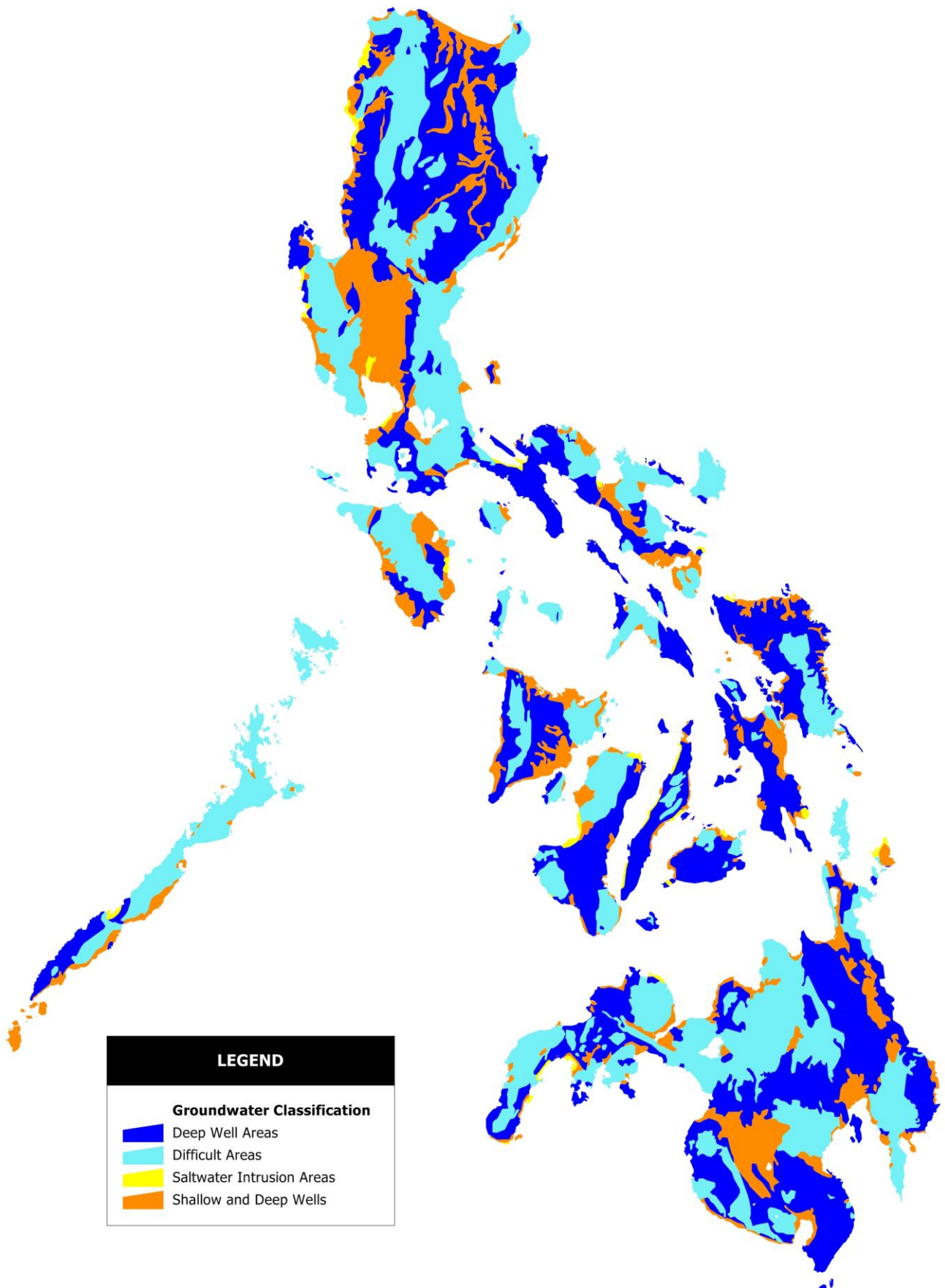
Soil Order	Location	Position	Land Use	Relief
Alfisol	Ilocos Sur, Ilocos Norte, Occidental Mindoro, Batanes, Quezon, Cagayan	old river, levees, plateaus, hilly areas	fruit trees, banana	nearly level to level moderately steep lands
Andisol	Mayon, Isarog, Zambales, Matutum, Kanlaon	alluvial terraces, fans formed from mixed alluvium of volcanic and sedimentary materials	fruit trees, banana, pineapple	undulating steep to very steep and complex slopes
Entisol	Surigao, Leyte, Zambales, Bicol, Ilocos Sur, Ilocos Norte, Palawan, Pangasinan, Samar, Iloilo, Agusan	floodplain, rough broken land, and along coastal area	diversified crops in the alluvial plain, fruit trees, paddy rice, coconuts under pasture on the hilly to mountainous landscape	nearly level plain to complex slopes on rough terrain
Histosol	Hundred Islands, Leyte, Cotabato, Samar, Agusan Valley, Bicol	along coastal area, lakes, inland marshes and mangroves	nipa palm, mangroves, mashes, some areas in Mindanao are successful for oil palm production	generally flat
Inceptisol	Samar, Agusan, Iloilo, Pangasinan, Zambales, Mindoro, Palawan	level to nearly level alluvial plain, terraces, fans, hilly and nearly mountainous	paddy rice, diversified crops, fruit trees	nearly level to moderate rugged landscape
Mollisol	Tagaytay, Negros Oriental, Bicol Region, Bohol, Ilocos Norte	alluvial terraces, fans formed from mixed alluvium of volcanic and sedimentary materials	coffee, banana and diversified crops	hilly to moderately steep, and flat lands

Some information about the soil orders

Soil Order	Location	Position	Land Use	Relief
Oxisol	Rizal, Northern Quezon, Palawan	undulating, rolling hilly to mountainous and other stable landscape	generally under cogon, talahib, second growth blushes and shrubs and tree type species	elevated plains, fans hilly to moderately steep to steep mountainous areas
Ultisol	Rizal, Laguna, Zambales, Cavite, Bulacan, Misamis Oriental, Zamboanga, Davao, Mindoro Oriental	elevated terraces, piedmont hills and mountains	pineapple, cassava, sugarcane, banana and forest tree species	elevated piedmont plains, moderately steep, rolling hills and mountain landscape
Vertisol	Bulacan, Cavite, Bataan, Cagayan, Zambales, Nueva Ecija, La Union, Tarlac	alluvial plains, and alluvial terraces	rice, some vegetables	nearly level to level

APPENDIX 4

National Water Resources Board (NWRB) Groundwater Classification



LEGEND

Groundwater Classification

-  Deep Well Areas
-  Difficult Areas
-  Saltwater Intrusion Areas
-  Shallow and Deep Wells

APPENDIX 5

Guidance Notes on the Rapid Assessment of Wetland Ecosystems Services (RAWES)

(Adapted from the Technical Training-Workshop on Rapid Assessment of Wetland Ecosystem Services in Suncheon, Republic of Korea, October 2016)

1. It is not always necessary to use monetary values to understand the benefits that a wetland provides. It is possible to undertake a qualitative assessment to demonstrate the broad set of values provided by wetland ecosystems. Such an approach can be implemented through the use of a standardised field assessment in order to undertake a comprehensive assessment of the ecosystem services provided by different wetlands. Qualitative assessments of the full range of ecosystem services are essential if negative implications for overlooked, potentially significant, services are to be avoided.

2. Ecosystem services should initially be identified and grouped into functional categories based on work of the Millennium Ecosystem Assessment (MA) - namely **provisioning**, **regulating**, **cultural** and **supporting** services (see below). Using this globally recognised list of ecosystem services, a checklist of ecosystem services relevant to the local context could be generated.

Provisioning services

These are the materials and products that humans obtain from ecosystems

Regulating services

These are the benefits that humans receive by the ability of an ecosystem to regulate processes.

Cultural services

These are the non-material benefits that humans obtain from ecosystems.

Supporting services

These are the ecosystem processes and functions that maintain the wetland's characteristics and that are necessary for the production of all other services.

3. Individual wetlands, and discrete parts or habitats within a larger wetland complex, can be assessed. The assessment of wetland ecosystem services is based on field assessors considering a range of questions and potential outcomes (see Tables below as a guide) in order to recognise services and their potential benefits. The assessors should use both their own knowledge of the local wetlands as well as undertaking consultation with local stakeholders and residents.

4. Working in teams of two, each ecosystem service should be assessed using the following relative scale:

Score Assessment of ecosystem service

++ Significant positive benefit provided

+ Positive benefit

0 Negligible benefit or dis-benefit

- Negative benefit

-- Significant negative benefit provided

? Gaps in evidence

5. All of these scores are subjective and it is accepted that there is scope for subjectivity in assigning relative scores. The objective of this method is to provide an illustrative 'snapshot' of the range of services generated by each wetland surveyed. A standardized recording sheet (RAWES Field Assessment Sheet) is used for the field assessment.

	Ecosystem service	Example	What questions could assessors ask about this service?
Provisioning services	Provision of fresh water	Water used for domestic drinking supply, for irrigation, for livestock, etc.	<ul style="list-style-type: none"> • Does the wetland provide a source of fresh water? • Does the wetland store fresh water for human use? • Is the wetland a net source of pollution, degrading fresh water provision?
	Provision of food	Crops, fruit, fish, etc.	<ul style="list-style-type: none"> • What is grown in the wetland, either formally or from informal harvesting? • Are animals are harvested from the wetland? • Are livestock using the wetland?
	Provision of fibre	Timber for building, wool for clothing, etc.	<ul style="list-style-type: none"> • Are any natural materials such as wood, fibre, straw, animal fibre (wool/hide/sinew/antler/other) taken from the wetland?
	Provision of fuel	Fuelwood, peat, etc.	<ul style="list-style-type: none"> • Is any material taken from the wetland and used as fuel for domestic or other uses?
	Provision of genetic resources	Rare breeds used for crop/stock breeding, etc.	<ul style="list-style-type: none"> • Are any native or rare strains of plants and animals, wild and domesticated, which could contribute genetic diversity for human uses (for instance for drug manufacture, improving resilience of domestic animals and plants, horticultural trade, etc.)
	Provision of natural medicines and pharmaceuticals	Plants used as traditional medicines, etc.	<ul style="list-style-type: none"> • Are there any plants, animals or their parts derived from the wetland which are harvested and used for their medicinal properties?
	Provision of ornamental resources	Collection of shells, flowers, etc.	<ul style="list-style-type: none"> • Are there any plants, animals or their parts are derived from wetland that are collected and used/sold for their ornamental properties?
	Clay, mineral, aggregate harvesting	Sand and gravel extracted for building use, clay extracted for brick-making, etc.	<ul style="list-style-type: none"> • What substances are extracted or dug up from the wetland for construction or other human uses?
	Waste disposal	Dumping of solid waste, discharge of waste water, etc.	<ul style="list-style-type: none"> • Does the wetland provide a location for the disposal of liquid, solid or other waste materials?
	Energy harvesting from natural air and water flows	Water wheels driven by flowing water, windmills driven by the wind, etc.	<ul style="list-style-type: none"> • Are any technologies (water wheels, wind turbines, etc.) used to capture natural flows of energy through or across the wetland?

	Ecosystem service	Example	What questions could assessors ask about this service?
Regulating services	Air quality regulation	Removal of airborne particles from the exhaust of cars, chimneys of industry, dust from agricultural land, etc.	<ul style="list-style-type: none"> • Is there a source for airborne pollutants? • Does the wetland habitat structure help to settle out airborne pollutants? • Does the state of the wetland make it a source of air pollutants (microbial, particulate or chemical)?
	Local climate regulation	Regulation of the local microclimate, through shading, reducing air temperature, etc.	<ul style="list-style-type: none"> • Does the wetland habitat structure provide shade for humans? • Does the wetland have areas of standing water with or without vegetation that will be generating evapotranspiration and consequently reducing air temperatures?
	Global climate regulation	Regulation of the global climate through control in greenhouse gas emissions, the sequestration of carbon, etc.	<ul style="list-style-type: none"> • Does the wetland store and/or sequester carbon? • Does this balance with generation of methane and other greenhouse gases?
	Water regulation	Regulation of flows of surface water during high and low flows, regulation of recharge of groundwater, etc.	<ul style="list-style-type: none"> • Do the topography, permeability and roughness of the wetland enable it to store water during high rainfall/discharge and top slowly release it back to surface waters or to groundwater? • Does the wetland regulate discharges during dry periods to buffer low flows during dry weather?
	Flood hazard regulation	Regulation and storage of flood water, regulation of intense rainfall events, etc.	<ul style="list-style-type: none"> • Does the wetland regulate, store and retain floodwaters? • Does the wetland store rainfall and surface water that might contribute to flooding and damage to property or ecosystems downstream?
	Storm hazard regulation	Regulation of tidal or storm surges, regulation of extreme winds, etc.	<ul style="list-style-type: none"> • Does the complexity of habitat, particularly trees, tall reeds and other vegetation and surface topography, absorb energy from extreme events such as storms and waves that might otherwise damage property or adjacent ecosystems?
	Pest regulation	Control of pest species such as mosquitoes, rats, flies, etc.	<ul style="list-style-type: none"> • Do natural predation and other ecological processes in the wetland regulate and control pest organisms? • Is the wetland a source of pests (for example rats thriving in dirty water systems)?
	Regulation of human diseases	Presence of species that control the species (vectors) that transmit human diseases such as malaria, West Nile fever, dengue fever, Zika virus, leptospirosis, schistosomiasis, etc.	<ul style="list-style-type: none"> • Do natural predation and other ecological processes in the wetland regulate organisms that may cause human diseases? • Are faecal deposits, bacteria or other potentially pathogenic microbes immobilised by processes in the wetland? • Is the condition of the wetland contributing to the negative spread of populations of disease vectors (such as mosquitoes)?

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Regulation of diseases affecting livestock	Presence of species that control the species (vectors) that transmit diseases to livestock such as leptospirosis, schistosomiasis, duck virus enteritis, highly pathogenic avian influenza, tick-borne diseases, etc.	<ul style="list-style-type: none"> • Do natural predation and other ecological processes in the wetland regulate organisms that may cause diseases in livestock? • Are faecal deposits, bacteria or other potentially pathogenic microbes immobilised by processes in the wetland? • Is the condition of the wetland contributing to the negative spread of populations of disease vectors (such as mosquitoes or snails)?
Erosion regulation	Regulation of energy environment to reduce risk of erosion, presence of dense vegetation protecting soils, etc.	<ul style="list-style-type: none"> • Does the wetland vegetation provide protection from erosion for the soils? • Are there any signs of erosion, such as bare earth, in the wetland?
Water purification	Cleaning of water, improvement of water quality, deposition of silts, trapping of contaminants and pollutants, etc.	<ul style="list-style-type: none"> • Do physico-chemical (sunlight exposure in shallow waters, detention of water in aerobic and anaerobic microhabitats) and biological processes in the wetland result in the breakdown of organic, microbial and other pollutants in the water passing through? • Is there a noticeable change in the quality, such as the turbidity, of water entering and leaving the wetland?
Pollination	Pollination of plants and crops by pollinators such as bees, butterflies, wasps, etc.	<ul style="list-style-type: none"> • Do populations of pollinating organisms (butterflies, wasps, bees, bats, etc.) in the wetland contribute to pollination within the wetland? • Do pollinators using the wetland also help to pollinate nearby crops, gardens, allotments, etc.?
Salinity regulation	Freshwater in the wetland provides a barrier to saline waters.	<ul style="list-style-type: none"> • Does the hydrology of the wetland help prevent saline water contaminating freshwaters? • Does the presence of freshwater in the wetland prevent the salinisation of soils?
Fire regulation	Providing physical barriers to the spread of fire, maintaining wet conditions to prevent fires spreading, etc.	<ul style="list-style-type: none"> • Does the configuration of waterbodies (ditches, streams, etc.) help to prevent the spread of fires? • Is there water at or near the soil surface that restricts the spread of fire? • Are organic rich or peat soils drained and susceptible to fire and burning?
Noise and visual buffering	Wetland trees or tall reeds absorbing and buffering the impact of noise.	<ul style="list-style-type: none"> • Is there a source (busy road, industry, construction, etc.) and receptor (houses, wildlife, etc.) for noise pollution? • Does wetland ecosystem structure, particularly tall trees and reeds, provide visual screening as well as suppress noise transmission?

	Ecosystem service	Example	What questions could assessors ask about this service?
Cultural services	Cultural heritage	Importance of the wetland for historical or archaeological value, as an example of traditional uses or management practices, as a cultural landscape, etc.	<ul style="list-style-type: none"> Does the wetland system have cultural importance, either due to its natural character or traditional uses?
	Recreation and tourism	Importance of the wetland for providing a location for recreation such as fishing, watersports or swimming, or as a tourism destination, etc.	<ul style="list-style-type: none"> Is the wetland used for organised or informal recreational purposes? Are their wider tourism/ecotourism benefits flowing from these uses?
	Aesthetic value	The wetland is overlooked by properties, is part of an of known area of natural beauty, is used as a subject for painters and artists, etc.	<ul style="list-style-type: none"> Does the wetland provide aesthetic benefits through the desirability of siting houses of commercial development adjacent to it? Does the presence of a wetland have a significant impact on property prices? Is the wetland depicted in may works of art?
	Spiritual and religious value	The wetland holds plays a role in local religious festivals, the wetland is considered as a sacred site, the wetland forms part of a traditional belief system, etc.	<ul style="list-style-type: none"> What spiritual and/or religious values do people derive from the wetland? Does the wetland hold any important spiritual or cultural value to people? Does the wetland play any part in traditional religious ceremonies? Are there any traditional wetland management practices (such as the timing of planting and cropping of rice to Buddhist or other traditions and teachings) associated with the wetland?
	Inspirational value	Presence of local myths or stories relating to the wetland, traditional oral or written histories about the wetland or wetland animals, creation of different art forms associated with the wetland, development of distinct architecture based on the wetland, etc.	<ul style="list-style-type: none"> Are there any particular myths or other folklore associated with the wetland? Do any wetland animals appear or are featured in local stories and myths? Does the wetland inspire people to create music or other forms of art? Have particularly ways of designing and building developed which reflect the wetland?
	Social relations	Presence of fishing, grazing or cropping communities which have developed within and around the wetland.	<ul style="list-style-type: none"> Have communities formed around the wetland and its uses, including for example fishing (subsistence, commercial and recreational), cropping or stock management, walking and jogging, birdwatching and photography, etc?
	Educational and research	Use of the wetland by local school children for education, site of long-term research and monitoring, site visited by organised educational study tours, etc.	<ul style="list-style-type: none"> Is the wetland used for any educational purposes, organised or informal, ranging from school-level visits to university research and teaching?

	Ecosystem service	Example	What questions could assessors ask about this service?
Supporting services	Soil formation	Deposition of sediment, accumulation of organic matter, etc.	<ul style="list-style-type: none"> Do accretion processes (both sedimentation of mineral material and the build up of organic material) on the wetland result in the formation of soils?
	Primary production	Presence of primary producers such as plants, algae, etc.	<ul style="list-style-type: none"> Do photosynthetic processes on the wetland produce organic matter and store energy in biochemical form?
	Nutrient cycling	Source of nutrients present from inputs from agricultural land, internal cycling of plant material, inputs of nutrients from floodwaters, presence of fauna to recycling nutrients, etc.	<ul style="list-style-type: none"> Do wetland processes biochemically transform nutrients (for example nitrification/denitrification)? Are nutrients settled out in particulate forms, changing the characteristics of water passing through the system? Are there abundant invertebrates and detritivores that are decomposing and cycling organic material?
	Water recycling	Presence of wetland vegetation and open water result in evapotranspiration and local recycling of water, relatively closed canopies and low exposure to winds retains water in local cycles, sandy or coarse substrates allow exchange with groundwaters, etc.	<ul style="list-style-type: none"> Does the structure of the wetland retain water in tight cycles (for example recapture of vapour produced by evapotranspiration)? Does the wetland enable exchanges with groundwater (either discharge or recharge)?
	Provision of habitat	Presence of locally important habitats and species, presence of species and habitats of conservation concern, etc.	<ul style="list-style-type: none"> Does the wetland support a diversity of locally representative biodiversity (plants and animals)? Does the wetland support species which humans consider of conservation concern or as charismatic interests?