Ramsar Convention On Wetlands

Wetland Typology

Max Finlayson

**National Wetland Inventories Support Mechanism
Design Of Training Course And Guidance Material**

Development of the Ramsar wetland typology (also referred to as a classification) was described by Scott & Jones (1995). It was formulated by Scott (1989) as part of an initiative to describe the features of Ramsar sites (wetlands of internationally importance).

classification systems. It was finally decided that no attempt should be made to produce a formal wetland classification system or typology for use in connection with Ramsar sites. Instead, it was agreed that a series of "wetland terms" based on a very simple hierarchical system should be compiled to describe the 25-30 principal types of wetlands in the world. These "terms" would be coded for use in the database, and would, in effect, consist of a series of key words or key phrases used in the site descriptions in the information sheets.

The main reason for including a wetland classification system in the Ramsar database is to facilitate rapid analysis of the types of wetland habitat contained within listed sites, and to cross-tabulate these with other parameters such as region, degree of protection, degree of threat and presence of special features. If meaningful analyses are to be made, all listed sites have to be classified down to the same level.
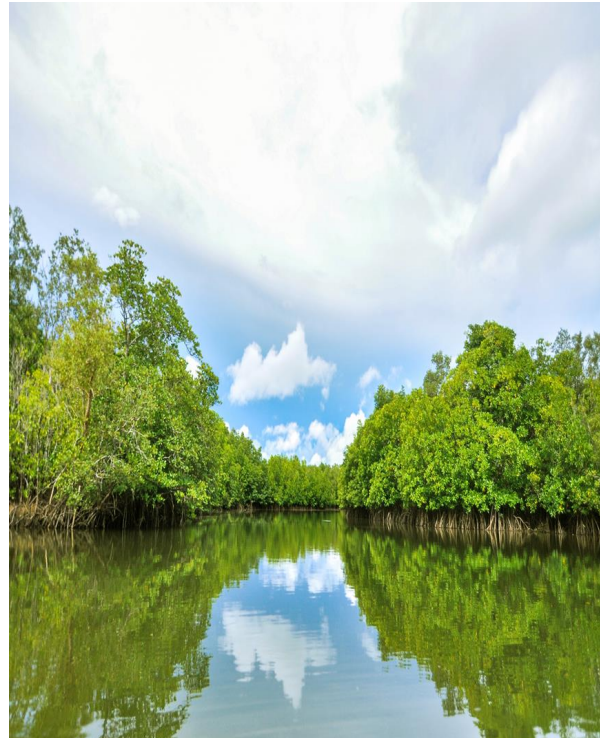
The Ramsar wetland typology
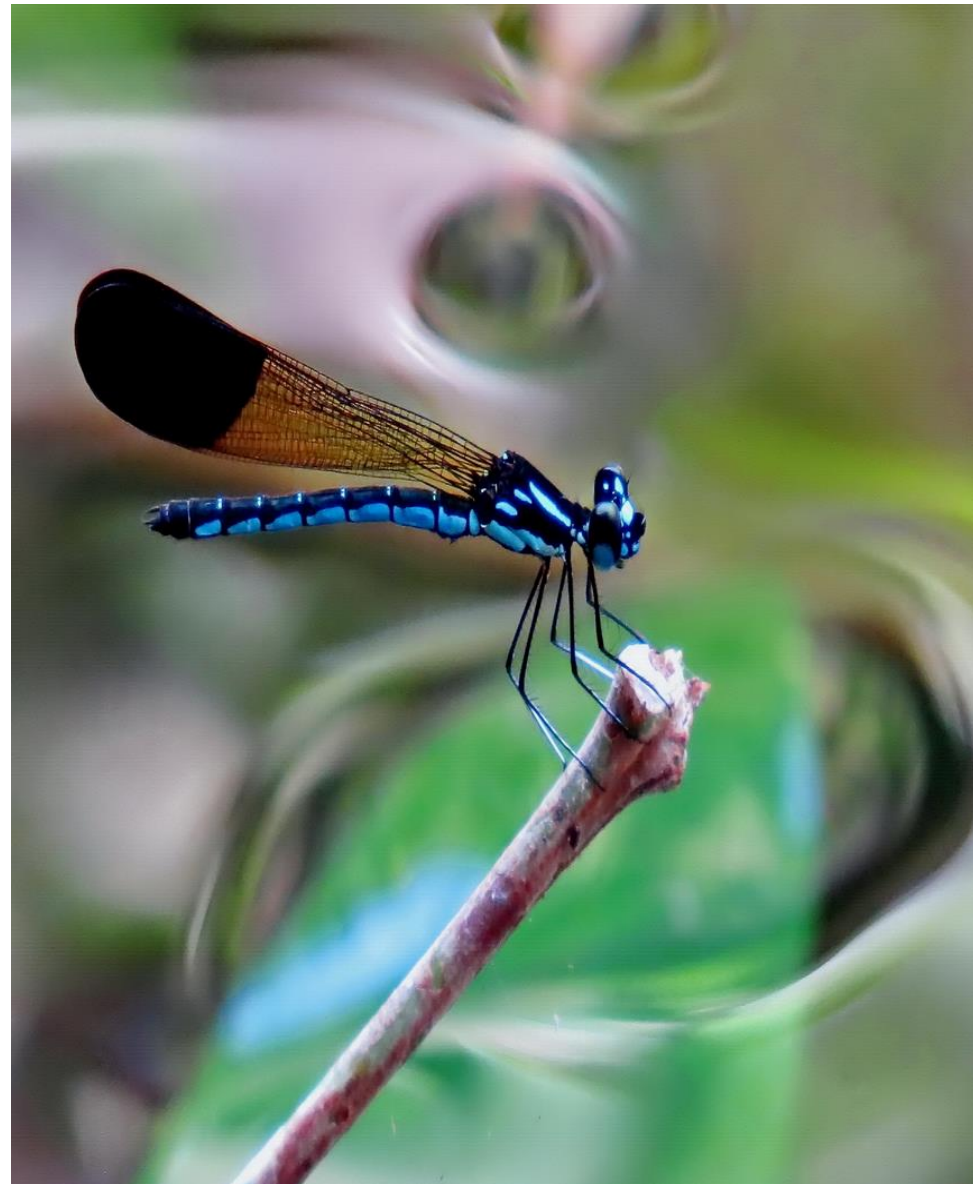
The Ramsar wetland typology was adopted by the Convention in 1990 along with an information sheet for describing Ramsar sites (that has since been adjusted further and placed online).

Based on the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979) and aligned with the Convention's definition of wetlands (as included in the text of the Convention agreed in 1972), namely

"… wetlands are areas of marsh, fen, peatland or water, whether natural of artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6 m."

The Ramsar wetland typology – based on the Ramsar definition of wetlands

Given the breadth of the Ramsar definition of wetlands the typology covers a wide range of wetland types.

The definition was broad to embrace all "wetland" habitats of migratory water birds given the emphasis on these in drafting the text of the Convention.

It includes **marine water less than 6 m deep at low tide,** which, in northern latitudes, are important wintering habitats for loons (divers), grebes, sea ducks. A large part of the world's **coral reefs** and **seagrass meadows** qualify as wetlands.

It includes **artificial wetlands,** e.g. reservoirs, seasonally flooded agricultural land, important habitats for ducks, geese, cranes, and shorebirds.

A number of wetland types have been added, e.g. **karst wetlands and caves.** A proposal to include glaciers was not accepted.

# The Ramsar wetland typology – three broad groups of wetlands

The Ramsar typology includes three broad groups of wetlands:
marine and coastal (12 categories);
inland (20 categories);
human-made (10 categories).

Within each broad group, there are a number of types that are used in the Ramsar Information Sheet when describing Ramsar sites; representing the purpose of the typology as a broad framework to assist in the identification of the main wetland habitats represented at each Ramsar site.

Within each group, a number of wetland types have been determined on the basis of: settings (e.g. palustrine or riverine);
water permanence (e.g. permanent, seasonal or intermittent);
soils, substrates; vegetation.

The Ramsar wetland typology – reviewed
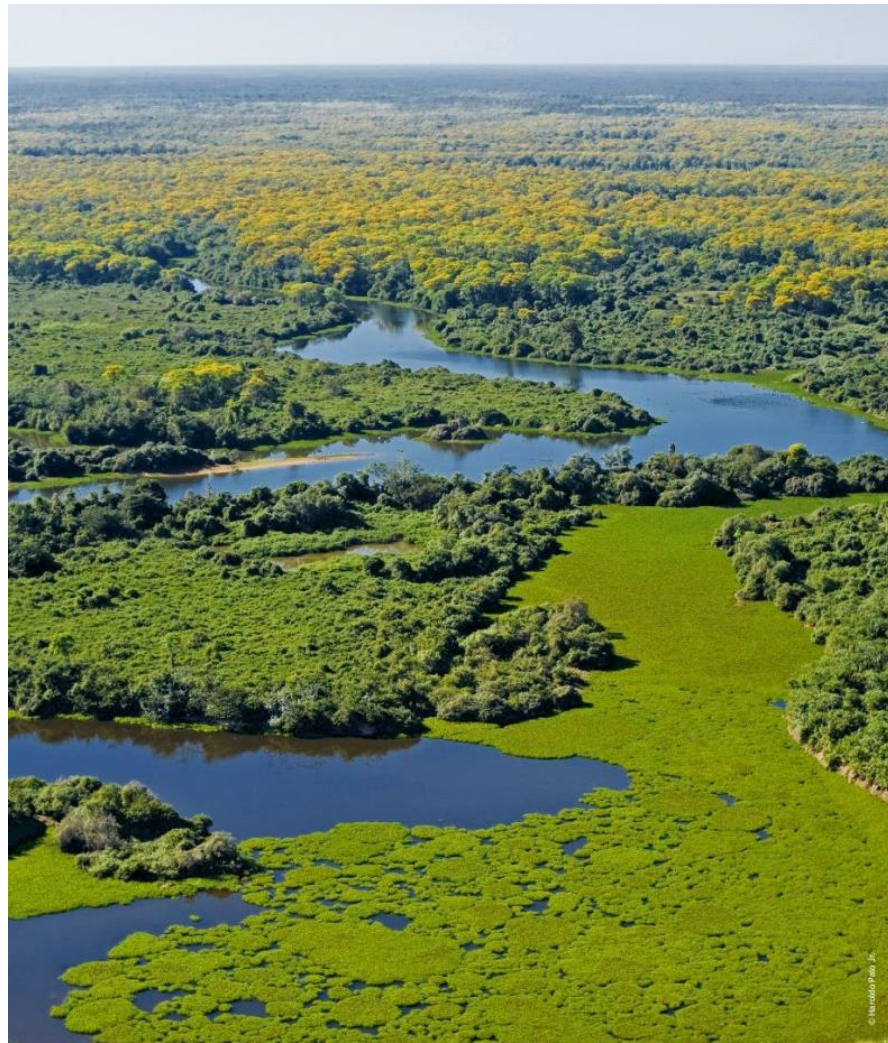
Semeniuk & Semeniuk (1997) reviewed the Inland Wetland part of the typology and noted that mixed criteria were used to separate the wetland types, and that not all inland wetlands had been unambiguously addressed.

For instance, there was repetition of types named as "marshes" and some types were ill-defined and encompassed a number of types (e.g. Alpine/tundra wetlands encompass bogs, meadows, and other mires).

The mixed criteria included some that were generic (e.g. geothermal); some were climatic, physiographic, or vegetational; and others were vegetative in conjunction with hydroperiod and soil types (e.g. various swamps and marshes).

Despite the inconsistencies, it seems that the typology has served the purpose it was designed for – to provide a simple listing of the wetland types that were considered by the Convention.

The Ramsar wetland typology – marine/coastal, inland, human-made

Wetland category	Code	Wetland type
Marine/ coastal	A	Permanent shallow marine waters in most cases less than 6 m deep at low tide; includes sea bays and straits
	B	Marine subtidal aquatic beds; includes kelp beds, seagrass 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. Intertidal mud, sand, or salt flats
	G	Intertidal marshes; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes
	H	Intertidal forested wetlands; includes mangrove swamps, nipah swamps, and tidal freshwater swamp forests
	I	Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea
	J	Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea
	K	Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea
	Zk(a)	Karst and other subterranean hydrological systems, marine/coastal

Human-made	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

Inland[a]	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; peatswamp forests
	Y	Freshwater springs; oases
	Zg	Geothermal wetlands
	Zk(b)	Karst and other subterranean hydrological systems, inland

Uses general descriptors – not specific named types

Codes used in RIS – not systematic

Much of the above information provided comes from this paper and the references therein

Ramsar Convention Typology of Wetlands

211

C. Max Finlayson

References

Cowardin LM, Carter V, FC G, ET LR. Classification of wetlands and deepwater habitats of the United States. Washington, DC: Fish and Wildlife Service, U.S. Dept. of the Interior; 1979. 140 pp.

Matthews GVT. The Ramsar convention; its history and development. Gland: Ramsar Convention Bureau; 1993.

Scott DA. Design of wetland data sheet for database on ramsar sites. Photocopied report to Ramsar Bureau, Gland, Switzerland; 1989.

Scott DA, Jones TA. Classification and inventory of wetlands: a global overview. Vegetatio. 1995;118(1/2):3–16.

Semeniuk V, Semeniuk CA. A geomorphic approach to global classification for natural inland wetlands and rationalization of the system used by the Ramsar Convention – a discussion. Wetl Ecol Manage. 1997;5(2):145–58.
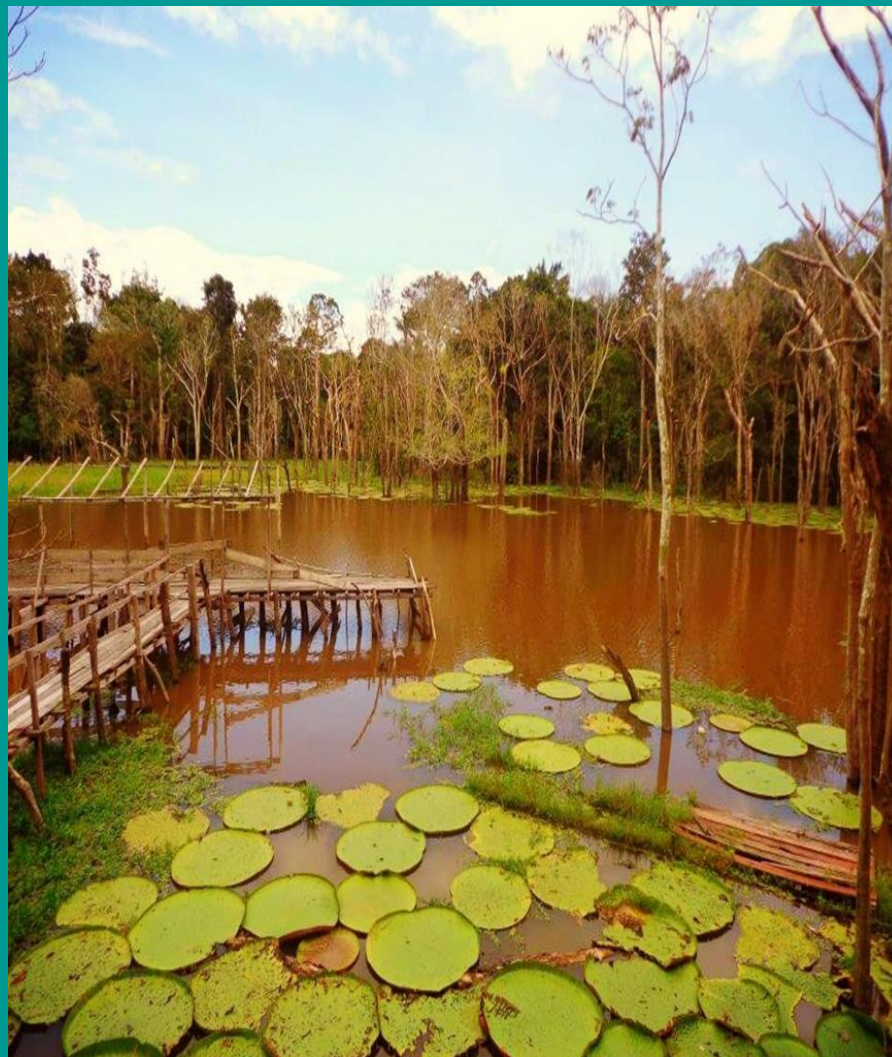
While the prime purpose of the Ramsar typology was to list the wetland types in Ramsar sites it did not previously include data on the area of the individual wetland types.

The current National Reporting requests information on the area of "marine/coastal", "inland" and "human-made" wetlands to report on SDG 6, Indicator 6.6.1, for which the Convention is a co-custodian. Does not ask for area of the individual wetland types.

Many wetland inventories and assessments have used different wetland classifications in line with their national definitions etc, or in response to the availability of information on individual wetland types.

Examples include:
- The Convention's Global Wetland Outlook
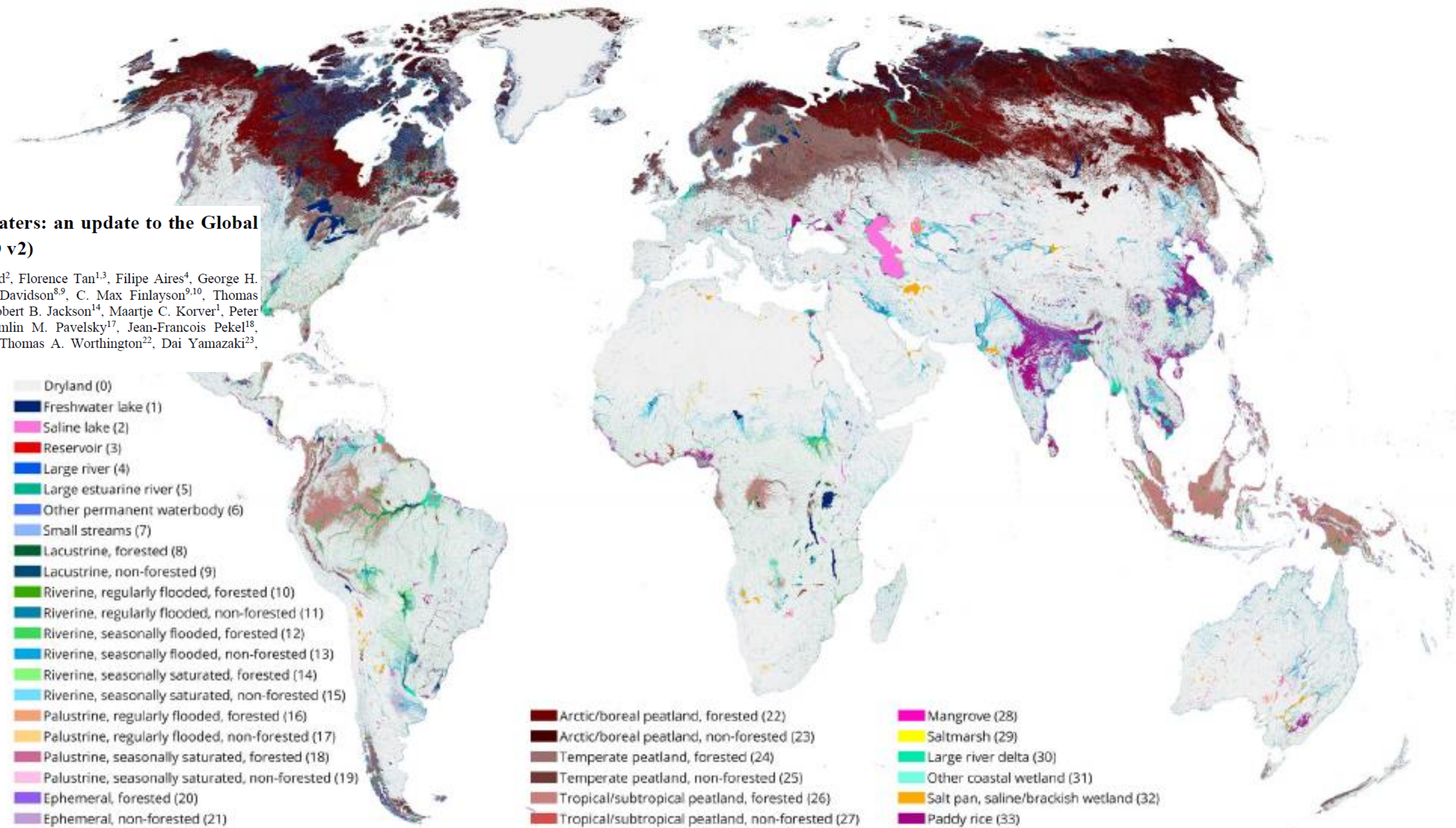- Global Lakes & Wetlands Database version 2

Inland natural wetlands	Global area (million km²)	
	Wetland classes	Wetland sub-classes[a]
Rivers & streams	0.624-0.662	
Natural lakes	3.232-4.200	
Natural lakes (>10 ha)		2.670
Natural pools (1-10 ha)		0.562
Peatlands	4.232	
Non-forested peatlands (bogs, mires & fens)		3.118
Forested peatlands		0.696
Tropical peatlands		1.505
Temperate & boreal peatlands		3.380
Marshes and swamps (on alluvial soils), including floodplains	2.530	
Tropical freshwater swamps (alluvial soils)		1.460
Forested wetlands (on alluvial soils)	1.170	
Groundwater-dependent wetlands		
Karst & cave systems		
Springs & oases		
Other groundwater-dependent wetlands		

	Global area (million km²)	
	Wetland classes	Wetland sub-classes[a]
Estuaries	0.660	
Unvegetated tidal flats		0.458
Saltmarshes		0.550
Coastal deltas		>0.030
Mangroves	0.143	
Seagrass beds	0.177	
Coral reefs (warm water systems)	0.284	
Shellfish reefs		
Coastal lagoons		
Kelp forests		
Shallow subtidal marine systems		
Sand dunes/beaches/rocky shores		
Coastal karst & caves		

Mapping the world's inland surface waters: an update to the Global Lakes and Wetlands Database (GLWD v2)

Bernhard Lehner[1], Mira Anand[1], Etienne Fluet-Chouinard[2], Florence Tan[1,3], Filipe Aires[4], George H. Allen[5], Philippe Bousquet[6], Josep G. Canadell[7], Nick Davidson[8,9], C. Max Finlayson[9,10], Thomas Gumbricht[11], Lammert Hilarides[12], Gustaf Hugelius[13], Robert B. Jackson[14], Maartje C. Korver[1], Peter B. McIntyre[15], Szabolcs Nagy[12], David Olefeldt[16], Tamlin M. Pavelsky[17], Jean-Francois Pekel[18], Benjamin Poulter[19], Catherine Prigent[4], Jida Wang[20,21], Thomas A. Worthington[22], Dai Yamazaki[23], Michele Thieme[24]

Figure 5: Dominant wetland class for each 500 m grid cell of the Global Lakes and Wetlands Database (GLWD) v2. Total wetland extent in each cell is bounded to 1-100%; cells with 0% wetland extent are classified as dryland. Legend classes include numerical class values in parentheses.

Crosswalking of wetland classifications

GLWD contains 33 classes derived from available data sources for producing a global map.

The wetland classes have been compared (cross walked) with the US national classification, the Ramsar typology, the Ramsar GWO typology, and Global Ecosystem Typology

Table 5: Class equivalency between GLWD v2 and common global wetland typologies: the wetland and deep-water classification of the US National Wetland Inventory (NWI) (Cowardin et al., 1979), the classification of the Ramsar Convention on Wetlands, the simplified Ramsar types of the Global Wetland Outlook (GWO) (Davidson & Finlayson, 2018) and the IUCN global Ecosystem Functional Groups (EFGs) (Keith et al., 2022). Classes listed on the same row signify partial equivalence, ranging from incomplete overlap to complete nestedness. Additional class overlaps are possible depending on application and we recommend case-by-case re-evaluation of this crosswalk. Some classes from Ramsar, GWO and NWI are not listed on the table because of the absence of an equivalent class in GLWD v2. Class names were modified for brevity.

GLWD v2 Class ID and Name	NWI Classification (system, subsystem, water regime modifier)	Ramsar Convention on Wetland's type classification system	Global Wetland Outlook (classes/subclasses)	IUCN Ecosystem Functional Groups (EFGs)
1. Freshwater lake	Lacustrine, Limnetic	K- Coastal freshwater lagoons O- Permanent freshwater lakes P- Seasonal/intermittent freshwater lakes	Natural lakes ≥10ha	F2.1 – Large permanent freshwater lakes F2.2 – Small permanent freshwater lakes F2.3 – Seasonal freshwater lakes F2.4 – Freeze-thaw freshwater lakes
2. Saline lake	Lacustrine, Limnetic	Q- Permanent saline/brackish lakes	Natural lakes ≥10ha	F2.6 – Permanent salt and soda lakes F2.7 – Ephemeral salt lakes
3. Reservoir	Lacustrine, Limnetic	6- Water storage areas	Reservoirs	F3.1 – Large reservoirs
4. Large river	Riverine, Lower Perennial	M- Permanent rivers/streams/creeks	Rivers & streams	F1.2 – Permanent lowland rivers F1.3 – Freeze-thaw rivers and streams F1.5 – Seasonal lowland rivers F1.7 – Large lowland rivers
5. Large estuarine river	Riverine, Tidal	F- Estuarine waters	Rivers & streams	FM1.2 – Permanent open riverine estuaries and bays
6. Other permanent waterbody		8- Wastewater treatment areas 9- Canals and ditches	Lakes & pools <10 ha Small/farm ponds	F2.5 – Ephemeral freshwater lakes
7. Small streams	Riverine, Upper Perennial and Intermittent	N- Seasonal/intermittent rivers/streams	Rivers & streams	F1.1 – Permanent upland streams F1.4 – Seasonal upland streams F1.6 – Episodic arid rivers
8. Lacustrine, forested	Palustrine, Forested	W- Shrub-dominated wetlands Xf- Freshwater, tree-dominated wetlands	Forested wetlands	TF1.1 – Tropical flooded forests and peat forests TF1.2 – Subtropical/temperate forested wetlands
9. Lacustrine, non-forested	Lacustrine, Littoral Palustrine, Emergent	Tp- Permanent freshwater marshes/pools Ts- Seasonal/intermittent freshwater marshes/pools	Marshes & swamps	TF1.3 – Permanent marshes
10. Riverine, regularly flooded, forested	Palustrine, Forested	L- Permanent inland deltas W- Shrub-dominated wetlands Xf- Freshwater, tree-dominated wetlands	Forested wetlands	TF1.1 – Tropical flooded forests and peat forests TF1.2 – Subtropical/temperate forested wetlands
11. Riverine, regularly flooded, non-forested	Palustrine, Emergent	L- Permanent inland deltas Tp- Permanent freshwater marshes/pools	Marshes & swamps	TF1.3 – Permanent marshes
12. Riverine, seasonally flooded, forested	Palustrine, Forested	L- Permanent inland deltas W- Shrub-dominated wetlands Xf- Freshwater, tree-dominated wetlands	Forested wetlands	TF1.1 – Tropical flooded forests and peat forests TF1.2 – Subtropical/temperate forested wetlands
13. Riverine, seasonally flooded, non-forested	Palustrine, Emergent	Ts- Seasonal/intermittent freshwater marshes/pools	Marshes & swamps	TF1.4 – Seasonal floodplain marshes
14. Riverine, seasonally saturated, forested	Palustrine, Forested	W- Shrub-dominated wetlands Xf- Seasonal freshwater, tree-dominated	Forested wetlands	TF1.1 – Tropical flooded forests and peat forests TF1.2 – Subtropical/temperate forested wetlands

		wetlands		
15. Riverine, seasonally saturated, non-forested	Palustrine, Emergent	Tp- Permanent freshwater marshes/pools Ts- Seasonal/intermittent freshwater marshes/pools	Marshes & swamps	TF1.4 – Seasonal floodplain marshes
16. Palustrine, regularly flooded, forested	Palustrine, Forested	W- Shrub-dominated wetlands	Forested wetlands	TF1.1 – Tropical flooded forests and peat forests TF1.2 – Subtropical/temperate forested wetlands
17. Palustrine, regularly flooded, non-forested	Palustrine, Emergent	Tp- Permanent freshwater marshes/pools	Marshes & swamps	TF1.3 – Permanent marshes
18. Palustrine, seasonally saturated, forested	Palustrine, Forested	W- Shrub-dominated wetlands Xf- Seasonal freshwater, tree-dominated wetlands	Forested wetlands	TF1.1 – Tropical flooded forests and peat forests TF1.2 – Subtropical/temperate forested wetlands
19. Palustrine, seasonally saturated, non-forested	Palustrine, Emergent	Ts- Seasonal/intermittent freshwater marshes/pools	Marshes & swamps	TF1.4 – Seasonal floodplain marshes
20. Ephemeral, forested	Palustrine, Forested	W- Shrub-dominated wetlands Xf- Seasonal freshwater, tree-dominated wetlands	Forested wetlands	
21. Ephemeral, non-forested	Palustrine, Emergent	W- Shrub-dominated wetlands Y- Freshwater springs/oases	Marshes & swamps	TF1.5 – Episodic arid floodplains
22. Arctic/boreal peatland, forested	Palustrine, Organic soil	Xp- Forested peatlands and peatswamp	Forested peatlands	TF1.6 – Boreal, temperate, and montane peat bogs
23. Arctic/boreal peatland/ non-forested		U- Non-forested peatlands	Non-forested peatlands	TF1.6 – Boreal, temperate, montane peat bogs
24. Temperate peatland, forested	Palustrine, Organic soil	Xp- Forested peatlands and peatswamp	Forested peatlands	TF1.6 – Boreal, temperate, montane peat bogs
25. Temperate peatland, non-forested		U- Non-forested peatlands	Non-forested peatlands	TF1.6 – Boreal, temperate, montane peat bogs
26. Tropical/subtropical peatland, forested	Palustrine, Organic soil	Xp- Forested peatlands and peatswamp	Forested peatlands	TF1.1 – Tropical flooded forests and peat forests
27. Tropical/subtropical peatland, non-forested		U- Non-forested peatlands	Non-forested peatlands	TF1.1 – Tropical flooded forests and peat forests
28. Mangrove	Marine, Subtidal and Intertidal	H- Intertidal forested wetlands	Mangroves	MFT1.2 – Intertidal forests and shrublands
29. Saltmarsh	Estuarine, Intertidal	G- Intertidal marshes	Saltmarshes	MFT1.3 – Coastal saltmarshes and reedbeds
30. Large river delta	Estuarine, Intertidal	F- Estuarine waters H- Intertidal forested wetlands	Coastal deltas	MFT1.1 – Coastal river deltas
31. Other coastal	Estuarine, Intertidal	D- Rocky marine shores E- Sand, shingle, or pebble shores J- Coastal brackish/saline lagoons H- Intertidal forested wetlands	Unvegetated tidal flats Coastal lagoons Shallow subtidal system	FM1.2 – Permanent open riverine estuaries and bays
32. Salt pan, saline/brackish wetland	Lacustrine, Limnetic, Intermittently Flooded	R- Seasonal saline/brackish lakes and flats Sp- Permanent saline/brackish marshes/pools Ss- Seasonal saline/brackish marshes/pools	Saltpans, salinas	F2.7 – Ephemeral salt lakes
33. Paddy rice	Palustrine, Emergent Wetland, Artificially Flooded	3- Irrigated land, including rice fields	Rice paddy	F3.3 – Rice paddies

Crosswalk between wetland types in GLWDv2 and in Ramsar Global Wetland Outlook 2018

Table 1: Crosswalk between GLWDv2 and GWO wetland types

Global Wetland Outlook classes (GWO; Davidson & Finlayson 2018)	GLWD v2 (Lehner et al. in prep.)
Inland natural wetlands	
1. Rivers & streams	4. Large river 5. Large estuarine river 7. Small streams
2. Lakes ≥10 ha Lakes & pools <10 ha	1. Freshwater lake 2. Saline lake 3. Reservoir 6. Other permanent waterbody
3. Non-forested peatlands	23. Arctic/boreal peatland, non-forested 25. Temperate peatland, non-forested 27. Tropical peatland, non-forested
4. Forested peatlands	22. Arctic/boreal peatland, forested 24. Temperate peatland, forested 26. Tropical peatland, forested
5.Marshes & swamps (alluvial soils)	9. Lacustrine non-forested 11. Riverine, regularly flooded non-forested 13. Riverine seasonally flooded non-forested 18. Palustrine regularly flooded non-forested 19. Palustrine seasonally flooded non-forested 21. Ephemeral non-forested
6. Forested wetlands (alluvial soils)	8. Lacustrine forested 10. Riverine regularly flooded forested 12. Riverine regularly flooded non-forested 14. Riverine regularly saturated forested 15. Riverine seasonally saturated forested 16. Palustrine regularly flooded forested 18. Palustrine seasonally flooded forested 20. Ephemeral forested

Coastal/marine natural wetlands	
7. Unvegetated tidal flats	31. Other coastal
8. Saltmarshes	29. Saltmarsh
9. Mangroves	28. Mangrove
10. Seagrass beds	–
11. Coral reefs (warm water systems)	
12. Sandy beaches	31. Other coastal?
13. Shallow subtidal systems (<6m inundation)	31. Other coastal?
–	30. Delta
Human-made wetlands	
14. Reservoirs	
15. Small ponds	
16. Rice paddy	33. Paddy rice
17. Aquaculture ponds	–
18. Wastewater treatment ponds	–
19. Salt pans/Salinas/salines	32. Salt pan, saline/brackish wetland
20. Palm oil/pulpwood plantations (on peat soils)	

4

Area data availability for individual Ramsar wetland types

Part 1

Davidson et al 2023. Ramsar Wetlands. https://doi.org/10.1016/B978-0-12-817803-4.00006-1

Table 4.2 The availability of published wetland areas for each of the wetland types in the Ramsar classification system for wetland type.

Ramsar classification system for wetland type	Wetland classes/ subclasses (Davidson and Finlayson, 2018)	Wetland area available?	Notes
Marine/Coastal Wetlands			
A—Permanent shallow marine waters in most cases less than six metres deep at low tide; includes sea bays and straits	xiv. Shallow subtidal systems	No	
B—Marine subtidal aquatic beds; includes kelp beds, seagrass beds, tropical marine meadows	ix. Seagrass beds xiii. Kelp forests	[Yes]	Seagrass beds only
C—Coral reefs	x. Coral reefs (warm water systems)	Yes	
D—Rocky marine shores; includes rocky offshore islands and sea cliffs	xv. Sand dunes/ beaches/rocky shores	No	
E—Sand, shingle, or pebble shores; includes sand bars, spits, and sandy islets; includes dune systems and humid dune slacks	xv. Sand dunes/ beaches/rocky shores	[Yes]	Sandy beaches only
F—Estuarine waters; permanent water of estuaries and estuarine systems of deltas	xiv. Shallow subtidal systems	No	
G—Intertidal mud, sand, or salt flats	vii.a. Unvegetated tidal flats	Yes	
Ga—Bivalve (shellfish) reefs	xi. Shellfish reefs	No	
H—Intertidal marshes; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes	vii.b Salt marshes	Yes	
I—Intertidal forested wetlands; includes mangrove swamps, nipah swamps, and tidal freshwater swamp forests	viii. Mangroves	[Yes]	Mangroves only
J—Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea	xii. Coastal lagoons	No	
K—Coastal freshwater lagoons; includes freshwater delta lagoons	xii. Coastal lagoons	No	
Zk(a)—Karst and other subterranean hydrological systems, marine/coastal	xvi. Coastal karst and caves	No	

(Continued)

Table 4.2 The availability of published wetland areas for each of the wetland types in the Ramsar classification system for wetland type—cont'd

Ramsar classification system for wetland type	Wetland classes/ subclasses (Davidson and Finlayson, 2018)	Wetland area available?	Notes
Inland Wetlands			
L—Permanent inland deltas	i. Rivers and streams	[Yes]	
M—Permanent rivers/streams/ creeks; includes waterfalls	i. Rivers and streams	[Yes]	
N—Seasonal/intermittent/ irregular rivers/streams/creeks	i. Rivers and streams	[Yes]	
O—Permanent freshwater lakes (over 8 ha); includes large oxbow lakes	ii.a. Natural lakes (> 10 ha)	[Yes]	
P—Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes	ii.a. Natural lakes (> 10 ha)	[Yes]	
Q—Permanent saline/brackish/ alkaline lakes	ii.a. Natural lakes (> 10 ha)	[Yes]	
R—Seasonal/intermittent saline/ brackish/alkaline lakes and flats	ii.a. Natural lakes (> 10 ha)	[Yes]	
Sp—Permanent saline/brackish/ alkaline marshes/pools	ii.b. Natural lakes and pools (< 10 ha)	[Yes]	
Ss—Seasonal/intermittent saline/ brackish/alkaline marshes/pools	ii.b. Natural lakes and pools (< 10 ha)	[Yes]	
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	ii.b. Natural lakes and pools (< 10 ha) iv. Marshes and swamps (on alluvial soils), including floodplains	[Yes] [Yes]	
Ts—Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, and sedge marshes	ii.b. Natural lakes and pools (< 10 ha) iv. Marshes and swamps (on alluvial soils), including floodplains	[Yes] [Yes]	

Part 2

Davidson & Finlayson (2018, 2019) identified sources for 15 (68%) of the 22 wetland classes in the simplified Ramsar typology used in Ramsar Global Wetland Outlook 2018.

Some information available for most inland wetland classes; gaps for natural marine/coastal systems.

Little or no information on many human-made wetland classes.

Table 4.2 The availability of published wetland areas for each of the wetland types in the Ramsar classification system for wetland type—cont'd

Ramsar classification system for wetland type	Wetland classes/subclasses (Davidson and Finlayson, 2018)	Wetland area available?	Notes
U—Nonforested peatlands; includes shrub or open bogs, swamps, and fens	iii.a. Nonforested peatlands (bogs, mires, and fens)	Yes	
Va—Alpine wetlands; includes alpine meadows, temporary waters from snowmelt	iv. Marshes and swamps (on alluvial soils), including floodplains	[Yes]	
Vt—Tundra wetlands; includes tundra pools, temporary waters from snowmelt	iii.a. Nonforested peatlands (bogs, mires and fens) iv. Marshes and swamps (on alluvial soils), including floodplains	Yes Yes	Kåresdotter et al. (2021) estimate that the area of Arctic wetlands (99% of which are permafrost wetlands, and so may largely equate to this Ramsar wetland type) is 3.5 million km^2. Of this area, 64% are on peat soils and 36% on mineral soils
W—Shrub-dominated wetlands; shrub swamps, shrub-dominated freshwater marshes, shrub-carr, alder thicket on inorganic soils	iv. Marshes and swamps (on alluvial soils), including floodplains	[Yes]	
Xf—Freshwater, tree-dominated wetlands; includes freshwater swamp forests, seasonally flooded forests, and wooded swamps on inorganic soils	v. Forested wetlands (on alluvial soils)	Yes	
Xp—Forested peatlands; peatswamp forests	iii.b. Forested peatlands	Yes	
Y—Freshwater springs; oases	vi.b. Springs and oases	No	

Table 4.2 The availability of published wetland areas for each of the wetland types in the Ramsar classification system for wetland type—cont'd

Ramsar classification system for wetland type	Wetland classes/subclasses (Davidson and Finlayson, 2018)	Wetland area available?	Notes
Zg—Geothermal wetlands	vi.c. Groundwater-dependent wetlands	No	
Zk(b)—Karst and other subterranean hydrological systems, inland	vi.a. Karst and cave systems	No	
Human-made wetlands			
1—Aquaculture (e.g. fish/shrimp) ponds	xxi. Aquaculture ponds	Yes	
2—Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha)	xvii.b. Small (e.g. farm) ponds	No	
3—Irrigated land; includes irrigation channels and rice fields	xviii.a. Rice paddy	Yes	
4—Seasonally flooded agricultural land (including intensively managed or grazed wet meadow or pasture)	xviii.c. Wet grasslands	No	
5—Salt exploitation sites; salt pans, salines, etc.	xx. Salt pans (salines/salinas)	No	
6—Water storage areas; reservoirs/barrages/dams/impoundments (generally over 8 ha)	xvii.a. Reservoirs	Yes	
7—Excavations; gravel/brick/clay pits; borrow pits, mining pools	xvii.b. Small (e.g. farm) ponds	No	
8—Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc.	xix. Wastewater treatment/constructed wetlands	No	
9—Canals and drainage channels, ditches	xviii.c. Wet grasslands	No	
Zk(c)—Karst and other subterranean hydrological systems, human-made	xxii. Human-made karst and caves	No	

Summary

- The Ramsar wetland typology was developed to describe the features of Ramsar sites. It contains three groups of wetlands: marine & coastal (12 wetland types); inland (20 types); and human-made (10 types). The differentiation between the wetland types is not fully systematic.

- Many inventories have used different classifications based on national definitions, or due to the availability of information on individual types. This includes the Convention's Global Wetland Outlook, and the Global Lakes & Wetlands Database (with map).

- The wetland classes in the Ramsar typology have been compared (crosswalked) with the US classification, the Ramsar GWO typology, and Global Ecosystem Typology.

- For many wetland types in the Ramsar classification area data is not available

Thanks for your attention

Questions?