

MedWet Habitat Description System

(Version 2005)

João Carlos Farinha

Paula Rito Araújo

Emília Paula Silva

Sílvia Carvalho

Elizabete Fonseca

Carlota Lavinás

1. Introduction

MedWet habitat description system (Farinha *et al.*, 1996), a hierarchical classification system which allows describing and defining wetland habitats, was presented during the MedWet 1 (1993-1996) project. This system was based from the one adapted in United States of America's Wetlands Inventory (Cowardin, 1979) and since then, it has been adapted many times, as in the South Africa's Wetlands Inventory (Dini & Cowan, 2000).

This classification system is based on explicit criteria, through the presence of specific attributes, intending to describe ecological units of inventoried sites which have certain homogeneous natural attributes.

The primary purpose of the MedWet classification system is to assist wetland mapping, which not only allows data visualization but also provides information for monitoring and management. With habitat maps, managers and investigators can identify, analyze and locate problems, quantify its extension and easily access to useful data.

Among the advantages of using a hierarchical habitat description system are:

- to make use of remotely detectable parameters in the habitat description system process, allowing the achievement of the maximum information amount with a minimum amount of field work;
- to make a detailed habitat description through the use of successive levels, making it possible to produce a map of uniform quality and accuracy;
- to combine different levels of information detail and survey intensity without any loss of data; and
- to allow the application to a mapping program.

1.1. Boundaries

Through the employment of the MedWet habitat classification system, it is most times possible to establish the boundaries of the inventorying site (Annex 1). Therefore, according to these principles, the boundary between wetland and non wetland is designated as:

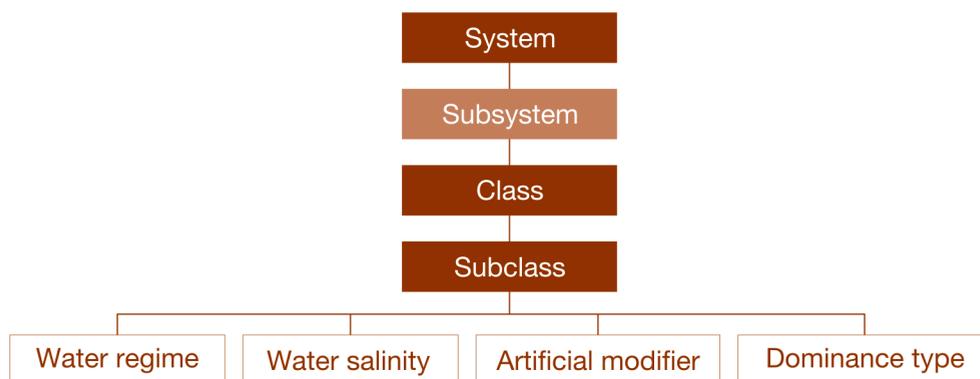
- the boundary between land with predominantly hydrophytic cover and land with mesophytic or xerophytic cover;
- the boundary between soil that is predominantly hydric and soil that is predominantly non-hydric;

- Where there is neither vegetation or soil, the boundary between land that is flooded or saturated at some time each year and land that is not;
- Wetlands lying below a depth of six meters at low tide shoreward in marine waters are outside the scope of the MedWet habitat description system.

1.2. Classification system structure

The structure of this System is hierarchical and progresses from Systems and Subsystems at the most general level, to Class, Subclass and Dominant Types at the lowest levels. This system also includes Modifiers to describe water regime and water salinity and there is also a list of Artificial Modifiers for habitats, which have been either created or altered by human activity, and the Dominance types that identify the dominant plant species.

When the MedWet Habitat Description System is used as a tool of wetland inventories, a coding system of an 8 to 10 digit allows us to describe each habitat unit. The description code of each habitat is based on the category's codes, one digit for each level, and following the order: System – Subsystem – Class – Subclass - Water regime - Water salinity – Artificial modifier – Dominant type – Counter (Anex II). At first glance, it may appear a very complex system, but its hierarchical structure turns its application direct and user-friendly, once each category has a precise definition.



1.3. Use of the habitat description system

Before attempting to apply the habitat description system, the user should consider the following points:

- information about the area to be described must be available before the system can be applied;
- it is important that users pay particular attention to the definitions in the habitat description system. Attempts to modify these will lead to lack of uniformity in application.
- any attempt to change the described categories must be avoided, because habitat description will lose uniformity and precision.
- one of the principal uses of this system will be the inventory and mapping of wetland habitats. The system may be adapted to the chosen mapping scale, with obvious differences between the minimum habitat area, depending on the scale used (1:5000, 1:25000 or 1:50000).
- The system is designated for use at varying levels:
 - a) **Systems** and **Subsystems** are more important to data visualization at large scales, for example, at national or regional levels.
 - b) **Classes** and **Subclasses** are the basic units at each wetland's map level ⁽¹⁾.
 - c) **Dominance types** are more important for detailed studies at small scales, and for habitat's management and monitoring.

⁽¹⁾ In the scope of MW/ SUDOE Project (part of the Community Initiative INTERREG III – B European Southwest 2000/2006 program) it was elaborated an "Aquatic Vegetation Guide" which attempts to make easier the description of habitat's structure at Class/Subclass level, supporting the identification of some aquatic vegetation species (Fonseca *et al.* 2004).

2. Wetland Systems and Subsystems

The term **System** refers to a complex of wetland habitats that share the influence of similar hydrologic, geomorphologic, chemical or biological factors. 5 major Systems are identified: Marine, Estuarine, Riverine, Lacustrine and Palustrine.

Subsystems are more specific subdivisions, which reflect hydrologic conditions within Systems.

2.1. Marine System

(M) Marine

The Marine System consists of permanent shallow waters less than 6m deep at low tide (hydrographical zero as referential). The salinity exceeds 30 g/L, with little or no dilution except outside the mouths of Estuarine Systems.

The Marine system occurs in all zones bordering the mainland and islands of the Mediterranean Region and includes coastal waters, bays, gulfs and straits, which generally support typical marine biota.

Boundaries:

This system extends from a depth of 6m at low tide shoreward to:

1. the non-wetland limit of the wetland (in coastlines with weak tides), including the associated splash zone (Fig. 1A - a);
2. the landward limit of tidal inundation, (in coastlines with high tides) including the splash zone from breaking waves (Fig. 1B - b);
3. the seaward limit of wetland emergent vegetation, shrubs or trees (Fig. 1B - c);
4. the seaward limit of the Estuarine System where the limit is determined by factors other than vegetation (Fig. 2B).

Subsystems:

The Marine system includes the following subsystems:

(MP) Permanently submerged

The substrate is continuously covered with water.

(MI) Intertidal

The substrate is alternately flooded and exposed by tides. It includes the splash zone.

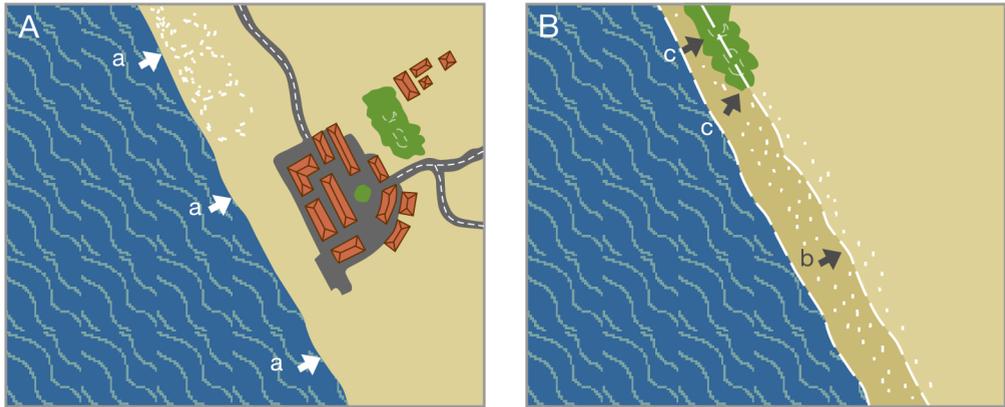


Fig.1 - Marine boundaries: A - Mar Mediterrâneo; B - Oceano Atlântico. a - non-wetland limit of the wetland; b - landward limit of tidal inundation; c - seaward limit of wetland shrubs.

Classes:

Rocky/ unconsolidated substrate, Naked soil, Aquatic vegetation and Reef.

Water regime modifiers:

Permanently flooded, Subtidal, Regularly flooded, Irregularly flooded, Irregularly exposed and Saturated-tidal.

Salinity modifiers:

Euhaline and Hiperhaline.

Please note:

- There is no permanent wetland vegetation in habitats of this system. However, there may be algae, sea grasses and pioneer vegetation.
- Areas with a narrow tidal range along most of its coastline (for example, the Mediterranean Sea), water level is major influenced by storms and by wind direction. This situation contrasts with high energy coastlines (for example, the Mediterranean region bordered by the Atlantic Ocean), which has an evident intertidal zone.

Changes to previews version (Farinha *et al.* 1996):

Two subsystems were introduced. At the Mediterranean Sea or other small or null tidal amplitude areas, these two subsystems will still be valid. Nonetheless, at the western Mediterranean, true typical intertidal wetland biota are described although the small tidal range (*Litophyllum tortuosum* "troitours").

2.2. Estuarine System

(E) Estuarine

The Estuarine System consists of habitats with low energy and variable salinity, in which seawater is at least occasionally diluted by freshwater runoff from the land. This system is influenced by the Marine System, is usually semi-closed by landward, having open, partly obstructed, sporadic or artificial access to the sea.

The Estuarine System habitats include marine areas with low salinity, as coastal lagoons and estuaries, which include salt and brackish marshes of halophytic vegetation, mud and sand flats under tidal influence.

Boundaries:

This system is bounded at:

1. the upstream end to where marine derived salts measure less than 0,5g/l during the period of average annual low flow (Fig. 2A - a);
2. the landward side by habitats that are not inundated by tides or storm surges;
3. the at the downstream end, in the absence of salinity data, by an imaginary line closing the mouth of a river or bay (Fig. 2B - b);
4. the seaward limit of wetland emergent vegetation, shrubs or trees where they are not included within the imaginary line drawn in (Fig. 2C).

Subsystems:

The Estuarine system includes the following subsystems:

(EP) Permanently submerged

The substrate is continuously covered with water.

(E) Intertidal

The substrate is alternately flooded and exposed by tides. Includes the splash zone.



Fig.2 - Estuarine boundaries (A, B and C): a - Estuarine - Riverine boundaries; b - Estuarine-Marine boundaries.

Classes:

Rocky/ unconsolidated substrate, Naked soil, Aquatic vegetation, Reef, Emergent vegetation, Shrubs and Trees.

Water regime modifiers:

Permanently flooded, Subtidal, Irregularly exposed, Regularly flooded, Irregularly flooded and Saturated-tidal. In non-tidal areas (eg. coastal lagoons) it can also be Semi-permanent flooded, seasonally flooded, Temporary flooded and Saturated.

Salinity modifiers:

Oligohaline, Mesohaline, Polihaline, Mixohaline, Euhaline and Hiperhaline.

Please note:

- This system is strongly influenced by Marine System habitats.
- Estuarine System habitats are often bounded by Marine and by Riverine habitats.
- Coastal areas that are brackish from remnant salinity are considered Palustrine or Lacustrine habitats.
- Salinity may be periodically increased above that of the sea by evaporation.
- Areas with a narrow tidal range along most of its coastline (for example, the Mediterranean Sea), this system is less present than in areas with high energy coastlines and therefore with an intertidal zone more evident (for example, the Mediterranean region bordered by the Atlantic ocean). Marine areas with typical estuarine plants or animals, as salt marshes, mangroves or mollusk banks are included in the Estuarine system.
- Habitats where tidal influence is partially obstructed by a dike and those where the tidal flow reaches the area by subsurface seepage are considered Estuarine. However, if the habitat is completely isolated from tidal action, (for example, totally obstructed by a dike), it should be considered Lacustrine or Palustrine, independently of its location and salinity.

Changes to preview version (Farinha *et al.* 1996):

Two subsystems were introduced. At the Mediterranean Sea or other micro or non-tidal areas, these two subsystems will still be valid. At water regime level, four modifiers were added to Estuarine system, in cases where a partly obstructed, sporadic or artificial access to the sea exists.

2.3. Riverine System

(R) Riverine

The Riverine System is contained in natural or artificial channels where water is usually flowing. As an exception, all wetlands within an open channel that are:

- dominated by mosses or lichens, persistent emergent vegetation, shrubs or trees; or
- have sea-derived salinity over 0,5g/l.

The Riverine System includes fresh water habitats in permanent or intermittent, tidal or non-tidal rivers and streams.

Boundaries

This system is bounded:

1. on the landward side by: non-wetland areas; or channel banks including natural and man-made levees (Fig. 3 -a); or wetlands dominated by trees, shrubs, emergent persistent vegetation, emergent mosses or lichens (Palustrine System);
2. at the downstream end by habitats with sea-derived salinity over 0,5g/l during the period of annual average flow (Estuarine System), or where the channel enters a natural or artificial lake (Fig. 3 -b);
3. at the upstream end where tributary streams originate or where the channel leaves a lake (Fig. 3 -c).

Subsystems:

The Riverine System comprises seven subsystems:

(Z) Ephemeral

The flow occurs as a direct consequence of precipitation and water only flows in the channel when this is lower to the freatic level. Water does not flow continuously more tan 30 days.

(S) Underground

The channel is located under the soil.

(U) Upper Perennial

The stream gradient is high and the flow is fast. Water flows throughout all the year; substrate is rocky to sandy; natural dissolved oxygen concentration is normally near



Fig.3 - Riverine boundaries: a - Non-wetland limit of the wetland; the channel bank including natural and man-made levées; wetlands dominated by trees, shrubs and emergents; b - downstream end where the concentration of marine derived salts exceeds 0,5 g/l; or where the channel enters to a natural or artificial lake; c - at the upstream end where tributary streams originate or where the channel leaves a lake.

saturation; fauna is characteristic of running water and there are few or no planktonic forms. The floodplain is poorly developed.

(X) **Upper non-perennial**

the stream gradient and the substrate are similar to the upper perennial. The water flows for more than 30 days, but only during some seasons of the year. When the water is not flowing, it may remain in isolated pools or more frequently surface water is absent.

(W) **Lower Perennial**

The stream gradient is lower than the upper perennial and water velocity is slow: there is no tidal influence and some water flows throughout all the year; substrate consists mainly of sand and mud; oxygen deficits may sometimes occur and substrate fauna is typically composed of species which reach their greatest abundance in still water; true planktonic organisms are common; the adjacent floodplain is well developed.

(V) **Lower non-perennial**

Stream gradient and substrate are similar to that of Lower perennial; The water flows for more than 30 days, but only during some seasons of the year, although isolated pools may persist when water is not flowing.

(T) **Tidal**

The stream gradient is low and water velocity fluctuates under tidal influence: The substrate is usually mud with occasional patches of sand; oxygen deficits may sometimes occur; benthic fauna is usually similar to the Lower perennial subsystem; floodplain is typically well developed.

Classes:

Rocky/ unconsolidated substrate, Naked soil, Aquatic vegetation and Non-persistent emergent.

Water regime modifiers:

Permanently flooded, Semi-permanently flooded, Seasonally flooded, Temporarily flooded, Intermittently flooded, Artificially flooded, Permanently flooded-tidal, Semi-permanently flooded-tidal, Regularly flooded, Seasonally flooded-tidal and Temporarily flooded-tidal.

Salinity modifiers:

Fresh, Mixosaline, Eusaline and Hipersaline.

Please note:

- Springs discharging into a Riverine channel are considered part of the Riverine System. If springs are isolated they are considered as Palustrine.
- The Riverine System is usually bordered by emergent persistent vegetation, shrubs, and/or trees and

therefore must be classified as Palustrine System.

- Non-wetland islands or islands of Palustrine wetlands may occur in the Riverine channels or on adjacent flooded plains, but in this case, they are not a part of the Riverine System.
- Oxbow lakes are placed in the Palustrine or Lacustrine Systems unless they are connected to a Riverine System by an open channel at both ends, either permanently or intermittently.

Changes to preview version (Farinha *et al.* 1996):

Two subsystems were included: the ephemeral and the underground. The intermittent subsystem was subdivided into Lower non-perennial and Upper non-perennial.

2.4. Lacustrine System

(L) Lacustrine

The Lacustrine System includes wetland habitats situated in a topographic depression or a dammed river channel. The total area exceeds 8 ha and the associated exposed or shallow shore vegetation comprises aquatic bed or non-persistent emergent vegetation. In this System, areas with emergent vegetation, shrubs and trees with more than 30% aerial coverage are excluded. Similar wetland habitats totaling less than 8 ha are also included in the Lacustrine system if they have at least one of the following characteristics:

- the water depth in the deepest part of the depression exceeds 2m at low water; or
- a wave-formed, bedrock (or similar artificial substrate), or non-vegetated substrate feature make up all or part of the shoreline boundary.

Wetlands which would otherwise be considered Lacustrine, but which possess **all** of the following characteristics **are not** classified within this system:

1. closed drainage/endorheic (lacking any outlet);
2. flat basin floor;
3. less than 2 m deep when fully inundated; and
4. usually circular to oval shape, sometimes kidney-shaped or lobed.

The Lacustrine System habitats include permanently flooded lakes and reservoirs. Typically, there are extensive areas of deep water and there may be considerable wave action.

Boundaries:

This system is bounded:

1. by non-wetland areas (Fig. 4A -a);
2. by habitats dominated by lichens, emergent mosses, persistent emergent vegetation, shrubs or trees - Palustrine System (Fig. 4A - b/c); or
3. by a Riverine channel entering or leaving the wetland (Fig. 4B - d).

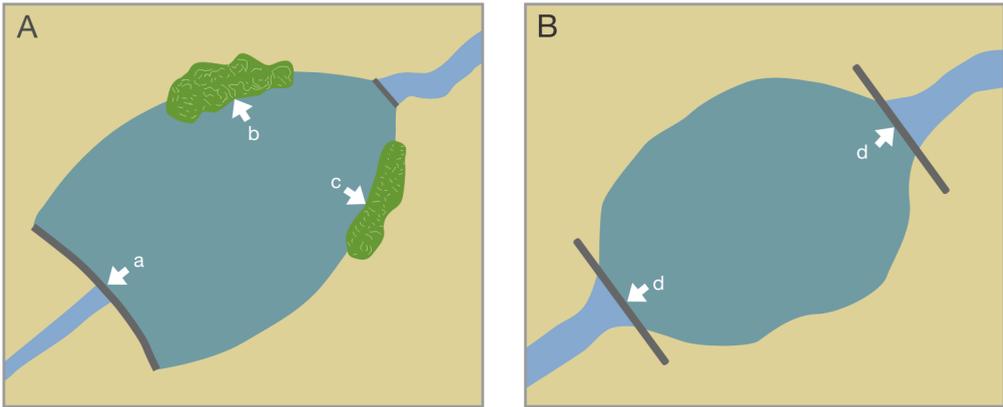


Fig.4 - Lacustrine boundaries (A and B): a - boundary formed by the contour of a dam or the Palustrine system (b - trees and c - Emergent vegetation); d - Riverine - Lacustrine boundary.

Subsystems:

The Lacustrine System comprises 3 subsystems:

(M) Limnetic

All habitats lying at a depth of 2m below low water, within the Lacustrine System. Many small or comparatively shallow Lacustrine Systems have no Limnetic Subsystem.

(L) Littoral

All wetland habitats in the Lacustrine System extending from the shoreward boundary of the system to a depth of 2m below low water, or to the maximum extent of non-persistent emergent vegetation if these grow at depth greater than 2m.

(S) Underground

The depression is located under the soil.

Classes:

Rocky/ unconsolidated substrate, Naked soil, Aquatic vegetation and Non-persistent Emergents.

Water regime modifiers:

Permanently flooded, Semi-permanently flooded, Seasonally flooded, Temporarily flooded, Saturated, Intermittently flooded and Artificially flooded.

Salinity modifiers:

Fresh, Mixosaline, Eusaline and Hipersaline. In cases when the area was former classified as Estuarine system, the salinity modifier can be Oligohaline, Mesohaline, Polihaline, Mixohaline, Euhaline and Hiperhaline.

Please note:

- The boundary between the Limnetic and Littoral Subsystems at 2m was set because it represents the maximum depth to which emergent plants normally grow.
- Islands of Palustrine wetland may lie within a Lacustrine habitat.
- Lacustrine habitats formed by the damming of a river are bounded by a contour approximating the normal spillway elevation or normal pool elevation, except where Palustrine wetlands extend lakeward of that boundary.
- If a previews classified estuarine habitat become completely isolated from tidal action, (for example, totally obstructed by a dike), it can be considered Lacustrine, independently of its location and salinity.

Changes to preview version (Farinha *et al.* 1996):

One subsystem was included: the underground. This subsystem will allow classifying lagoons and small water depressions in an underground basin.

2.6. Palustrine System

(P) Palustrine

The Palustrine System includes:

1. all wetlands dominated by emergent mosses or lichens, persistent emergent vegetation, shrubs or trees (greater than 30% surface area coverage) except habitats liable to be described as Estuarine System habitats.
2. wetlands lacking any type of the vegetation listed at (1) are also included in this system, if they exhibit **all** of the following characteristics:
 - the total area is less than 8 ha;
 - the water depth in the deepest part of the depression is less than 2m at low water;
 - there is not an active wave-formed, bedrock or non-vegetated soil shoreline features;
3. wetlands dominated or not by emergent mosses or lichens, persistent emergent vegetation, shrubs or trees, but which possess **all** of the following characteristics are classified within this system:
 - closed drainage/endorheic (lacking any outlet);
 - flat basin floor;
 - less than 2 m deep when fully inundated; and
 - usually circular to oval shape, sometimes kidney-shaped or lobed.

Palustrine system comprises wetlands where the vegetation is usually dominant. Traditionally, palustrine habitats occur in ponds, swamps and peat lands. Palustrine wetland habitats may also be situated shoreward of lakes, adjacent to river channels, inland of estuaries, on river floodplains in isolated catchments, on slopes, or as islands in lakes or rivers.

Boundaries:

This system is bounded by:

1. non-wetland areas;
2. any of the other four systems.

Subsystems:

The Palustrine System includes six subsystems that have been defined, primarily on the basis of the host landform on which the wetland is situated.

(D) Slope

Wetland occurs on a noticeable slope, including those on sloping valley bottoms.

(E) Pan

Wetland contained in a topographic depression and with all of the following characteristics:

1. closed drainage/endorheic (lacking any outlet);
2. flat basin floor;
3. less than 2 m deep when fully inundated; and
4. usually circular to oval shape, sometimes kidney-shaped or lobed.

(B) Basin

Wetland occurs in a distinct depression (concave landform) or in areas where the water flow is obstructed by natural or artificial structures. The drainage may be either open (inflow and outflow), closed (inflow but not outflow) or isolated (not inflow or outflow).

(P) Floodplain

Wetland occurs on a broad, generally flat landform which is currently dominated by alluvial processes and is adjacent to a well-defined river channel. Distinct morphological features, such as levees and oxbow lakes may be present and the substrate is dominated by alluvial or hydric soils.

(L) Flat

Wetland exists on comparatively level land with little or no relief.

(M) Fringe

Wetland occurs within the banks of a river or along the shores of a lake or island; or forms an island in a river or lake.

Classes:

Rocky/ unconsolidated substrate, Naked soil, Aquatic vegetation, Moss, Lichen, Persistent emergent, Scrub-shrub and Forested.

Water regime modifiers:

Permanently flooded, Semi-permanently flooded, Seasonally flooded, Temporarily flooded, Saturated, Intermittently flooded, Artificially flooded, Permanently flooded-tidal, Semi-permanently flooded-tidal, Regularly flooded, Seasonally flooded-tidal and Temporarily flooded-tidal.

Salinity modifiers:

Fresh, Mixosaline, Eusaline, and Hiper saline. In cases when the area was former classified as Estuarine system, the salinity modifier can be Oligohaline, Mesohaline Polihaline, Mixohaline, Euhaline, or Hiperhaline.

Please note:

- adjacent to salty lakes and/or rivers there may be salty Palustrine habitats.
- adjacent to Tidal Riverine habitats there may be tidal Palustrine habitats.
- coastal areas that are brackish from remnant marine salinity are considered Palustrine habitats.

Changes to previews version (Farinha *et al.* 1996):

Palustrine system did not comprise any subsystem. However, considering the nature of these wetlands, important information was being lost. As a result, six subsystems were defined, primarily on the basis of the host landform on which the wetland is situated. Kotze *et al.* (1994) considered a hydrogeomorphological approach to be valuable because of the important influence that geomorphology has on local surface and groundwater movement patterns and the degree to which wetlands are open to lateral exchanges of sediments, nutrients and pollutants.

3. Wetland Classes

The **Classes** describe the general appearance of the habitat in terms of dominant life forms or provide a description for non-vegetated wetland. They are easily recognizable during field surveys or photo-interpretation.

If vegetation covers less than 30% of the surface, Classes are distinguished on the basis of composition of the substrate (Rocky/ unconsolidated substrate, Naked soil or Reef). If vegetation covers 30% or more of the substrate, Classes are distinguished on the basis of the life form of the plants that constitute the uppermost strata or layer of vegetation and possess an aerial coverage of 30% or greater (aquatic vegetation, moss-lichen, emergent, scrub-shrub and forested).

The following examples illustrate the definitions presented above:

- An area with 50% aerial coverage of trees over a 60% layer of Scrub-Shrub would be classified as **Forested** wetland.
- An area with 20% aerial coverage of trees over the same 60% shrub layer would be classified as **Scrub-Shrub** wetland.
- An area where trees and or shrubs both cover less than 30%, but in combination have an aerial coverage of 30% or more would be classified as **Scrub-Shrub** wetland.
- An area where trees and shrubs both cover less than 30%, but the total vegetation cover (except pioneer species) is 30% or greater would be classified according to the appropriate Class for the predominant life form below the shrub layer.

There are 8 categories of classes:

(O) Rocky/ unconsolidated substrate

This Class can be found in all Systems and includes all rocky/ unconsolidated substrates with a vegetative cover less than 30%. Rocky/ unconsolidated substrate describes the permanently flooded and regularly flooded non-vegetated portions of estuaries, deltas, gulfs, coastal lagoons, rivers, lakes and ponds. For inland wetlands, this Class is also used for water surfaces that may become dry during some portion of the growing season. If an area is covered with water for half or more of the growing season, the area is classified as “rocky/ unconsolidated substrate”. If the surface is uncovered by water for more than half of the growing season, the area is classified as “Naked soil”.

In Marine and Estuarine Systems, the rocky/ unconsolidated substrate class is only applicable to the permanently submerged subsystem, and only to Permanently flooded or Irregularly exposed areas. Mud or other non-vegetated areas, regularly or irregularly flooded, are classified as Naked soil.

Subclasses:

(R) Rock; (C) Cobbles-Gravel; (S) Sand; (M) Mud; (O) Organic; (A) Salt crust.

(S) Naked soil

This Class includes surfaces that have less than 30% aerial cover of vegetation other than pioneering plants. Common examples include rocky shores, Marine and estuarine mud and sand flats, exposed shores on the margins of lakes, reservoirs and Riverine sand bars.

Subclasses:

(R) Rock; (C) Cobbles-Gravel; (S) Sand; (M) Mud; (O) Organic; (A) Salt crust; (V) Vegetated pioneer.

(A) Aquatic Bed

This Class includes habitats dominated by plants that grow mainly on or below the water surface for most of the growing season in most years. These habitats are usually found in water less than 2 m deep. They represent a diverse group of plant communities that require surface water for optimum growth and sexual reproduction. They are best developed in relatively permanent or seasonally flooded water (e.g. lakes and ponds), or under conditions of repeated flooding such as occurs in tidal areas that are inundated daily.

Subclasses:

(A) Algal; (M) Aquatic moss; (F) Floating vascular; (L) Floating-leaved; (R) Rooted vascular.

(R) Reef

This Class includes ridge-like or mound-like structures and adjacent flats formed by the colonization and growth of sedentary invertebrates, shellfish beds or artificial structures. Reefs are characterized by their elevation above the surrounding substrate and their interference with normal wave flow.

Subclasses:

(M) Mollusc; (W) Worm; (C) Coral.

(M) Moss-Lichen

This Class includes wetlands where mosses or lichens cover substrates other than rocks,

and emergent vegetation make up less than 30% of the aerial coverage. Mosses and lichens usually form a ground cover under a dominant layer of trees, shrubs or emergent vegetation. In some instances higher plants are uncommon and mosses and lichens dominate the flora. They occur only in the Palustrine System.

Subclasses:

(M) Moss; (L) Lichen.

(E) Emergent

This class is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. In relatively stable conditions, emergent wetlands maintain the same appearance year after year. However, in strongly seasonal conditions they may revert to an open phase for several years. They are usually dominated by perennial plants. They occur in all Systems except Marine. Areas colonized by pioneer plants that become established during long periods of low water are not Emergent wetlands and should be classified as Naked soil wetland.

Subclasses:

(P) Persistent; (N) Non persistent.

(U) Scrub-Shrub

This Class includes areas dominated by woody vegetation less than 6m tall. It is characterized by true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. Scrub wetlands are most common in riparian areas that are Temporarily or Seasonally Flooded. They also occur in coastal plains, inland saline areas and deltas. They occur only in Estuarine and Palustrine Systems and may be a successional stage leading to Forested woodland.

Subclasses:

(D) Deciduous; (E) Evergreen; (A) Dead.

(F) Forested

This Class is characterized by woody vegetation 6m tall or more. Tree dominated wetlands occur primarily as Temporarily Flooded forests in the floodplain of rivers, streams and deltas. They occur only in Estuarine and Palustrine systems.

Subclasses:

(D) Deciduous; (E) Evergreen; (A) Dead

Changes to preview version (Farinha *et al.* 1996):

Previews Open Water and Non vegetated Classes are now designated as Rocky/ unconsolidated substrate and Naked soil, respectively.

4. Wetland Subclasses

The Subclasses describe more detailed differences of the habitats on the basis of:

- finer distinctions in substrate material (Mud, Sand, Cobbles-Gravel, Rock, Organic and Salt crust);
- predominant life form (Aquatic bed, Moss-lichen, Emergent, Scrub-Shrub and Forested);
- the type of organism that form the reef (Mollusks, Worms or Corals).

There are 22 categories of subclasses:

The Subclass must always be preceded by the Class description.

(M) Mud

This Subclass includes all wetland habitats with unconsolidated substrates where particles smaller than stones are predominantly clay and silt size (fine mineral sediments less than 0,063 mm in diameter) and have an aerial coverage of 25% or greater. The vegetative cover is less than 30%. Where unconsolidated shores are not subjected to strong wave current action, the mud Subclass may take form of extensive flats.

(S) Sand

This Subclass includes all wetland habitats with unconsolidated substrates where particles smaller than stones are predominantly sand size (size range of particles: 0,063 – 2,00 mm) and have an aerial coverage of 25% or greater. The vegetative cover is less than 30%. This Subclass may take form of shores, sand beaches, bars and flats.

(C) Cobbles-Gravel

In this subclass at least 25% of the substrate is covered by unconsolidated particles smaller than stones characterized by cobbles and gravel (size range of particles over 2,00 mm). The vegetative cover is less than 30%. Sand, silt and shell fragments often fill the spaces between the larger particles.

(R) Rock

This Subclass includes all wetland habitats with substrates having an aerial cover of 75% or more of bedrock. The vegetative cover is less than 30%.

(O) Organic

This Subclass includes all wetlands with unconsolidated substrates are predominantly organic rather than mineral and have an aerial coverage of 25% or more. The vegetative

cover is less than 30%.

(A) Salt crust

This Subclass includes all wetlands with unconsolidated substrates where the particles smaller than stones are predominantly salt crust and have an aerial coverage of 25% or more. The vegetative cover is less than 30%.

(V) Vegetated Pioneer

This subclass includes some substrates that are exposed for a sufficient period to be colonized by herbaceous annuals or seeding herbaceous perennials which are usually killed by rising water levels and may be removed before the beginning of the next growing season, and has an aerial cover of at least 30%. Many pioneer species are not hydrophytes but are weedy mesophytes that cannot tolerate wet soils or flooding.

(M) Mollusk

This Subclass occurs in the Estuarine System with a substrate composed of molluscs. The aerial cover of vegetation is of 30% or less. Reef molluscs are adapted to great variations in water level, salinity and temperature, and these same factors control their distribution.

(W) Worm

Worm reefs are constructed by large colonies of Sabellarid worms living in individual tubes constructed from cemented sand grains. The aerial cover of vegetation is of 30% or less.

(C) Coral

This subclass lies almost entirely within the Permanently Flooded area of the Marine System, although the upper part of certain reefs may be exposed. the substrate is composed of corals that are characterized as stable, wee-adapted, highly diverse and highly productive ecosystems with a great degree of internal symbiosis.

(A) Algal

This Subclass includes wetland habitats with vegetation dominated by macrophytic algae growing in water or on an associated splash zone. The aerial cover of vegetation is of at least 30%. Algal beds are widespread in the Marine and Estuarine Systems where they occupy substrates characterized by a wide range of sediments, depths and textures.

(M) Aquatic Moss

This subclass includes wetland habitats with vegetation dominated by aquatic mosses. The aerial cover of vegetation is of at least 30%. They occur primarily in the Riverine System and in Permanently Flooded parts of some Lacustrine Systems.

(F) Floating Vascular

This subclass includes wetland habitats with vegetation dominated by vascular species which float freely either in the water or at the surface. The aerial cover of vegetation is of at least 30%. They occur predominantly in sheltered waters. Beds of floating vascular species (e.g. *Salvinia* sp., *Lemna* sp., *Azolla* sp.) may be moved by wind or water currents.

(R) Rooted Vascular

This subclass includes wetland habitats with vegetation dominated by submerged vascular species rooted to the substrate. The aerial cover of vegetation is of at least 30%. They occur in the Marine and Estuarine Systems as sea grass. In the Riverine, Lacustrine and Palustrine Systems rooted vascular plants occur at all depths in both flowing and standing water.

(L) Floating-leaved

This subclass includes wetland habitats with vegetation dominated by submergent vascular species with floating leaves. The aerial cover of vegetation is of at least 30%. They occur predominantly in shallow waters and are characterized by water-lilies (*Nymphaea* sp.).

(M) Moss

This subclass includes wetland habitats with vegetation dominated by mosses. The aerial cover of vegetation is of at least 30%. These wetland are uncommon and additional field information is required on their occurrence.

(L) Lichen

This subclass includes wetland habitats with vegetation dominated by lichens. The aerial cover of vegetation is of at least 30%. These wetland are uncommon and additional field information is required on their occurrence.

(N) Non-persistent

This Subclass includes wetlands with vegetation dominated predominantly by vascular hydrophytes that normally fall to the surface of the substrate or below the surface of the water at the end of the growing season. The aerial cover of vegetation is of at least 30%. At certain seasons there may be no obvious signs of emergent vegetation. This Subclass occurs extensively in the shoreward areas of the Lacustrine and Riverine Systems, and in particularly small Palustrine wetlands, predominantly in sheltered areas.

(P) Persistent

This Subclass includes wetlands with vegetation dominated predominantly by vascular hydrophytes that normally remain standing until the beginning of the next growing season. The aerial cover of vegetation is of at least 30%. This Subclass occurs extensively along the landward areas of the Estuarine System and on marine plains dominated by marsh communities such as *Spartina maritima*, *Salicornia* sp. and *Spergularia* sp. Persistent wetlands

also occur extensively throughout the Palustrine System where they contain a wide array of narrow and broad-leaved species such as *Phragmites* and associated vegetation such as *Cyperus* and *Scirpus*.

(D) Deciduous

This Subclass includes all wetlands with vegetation dominated by woody shrubs or trees where 50% or more of the species are deciduous. The aerial cover of vegetation is of at least 30%.

(E) Evergreen

This Subclass includes all wetlands with vegetation dominated by woody shrubs or trees where 50% or more of the species are evergreen. The aerial cover of vegetation is of at least 30%. These wetlands are uncommon in the Mediterranean region and additional field information is required on their occurrence.

(A) Dead

This Subclass includes all wetlands with vegetation dominated by dead woody shrubs or trees. The aerial cover of vegetation is of at least 30%. These wetlands are usually produced by prolonged rises in the water table resulting from natural or man-made causes. Such wetlands may also result from other factors such as fire, salt spray, air pollution, herbicide, etc.

5. Modifier definitions

Modifiers aid the attempt of a more complete description of habitats.

There are 3 groups of modifiers:

- Water Regime;
- Salinity;
- Artificial.

The water regime modifier must always be preceded by the System description.

5.1. Water Regime Modifiers

The precise description of hydrological features of the habitat depends on a good knowledge of duration and timing of surface inundation, both yearly and long term, as well as an indication of groundwater fluctuations. Once this information is usually difficult to obtain, water regime modifiers, which constitute general categories of wetland hydrology, were defined. These categories are easy to use and allow a good habitat characterization.

(P) Permanently Flooded

The substrate is continuously covered with water throughout the year.

In the **Marine** and **Estuarine** systems, this modifier describes areas with small tidal variation. The adjacent intertidal area is determined by the slope of the shore line and the degree of exposure of the site to wind and waves.

In the **Fluvial**, **Lacustrine** and **Palustrine** systems, this modifier describes the continuously flooded portions of lakes, river channels and ponds. These include the land surface exposed by years of extreme drought.

(S) Subtidal

The substrate is continuously covered with water with a large tidal range.

This category applies to **Marine** and **Estuarine** systems, describing high energy coastlines, as the Mediterranean region bordered by the Atlantic Ocean.

(A) Irregularly exposed

The land surface is exposed by tides less often than daily.

Water regimes or areas where water is occasionally absent (e.g. extreme low tides due to spring tides) are considered irregularly exposed.

This modifier applies to the **Marine** and **Estuarine** systems.

(R) Regularly Flooded

The substrate is alternately flooded and exposed by tides at least once a day.

Typical Regularly Flooded areas include tidal mud flats, seaward fringes of salt marshes and fresh water flooding areas under tidal influence.

This modifier applies to the **Marine**, **Estuarine**, **Riverine** and **Palustrine** systems.

(G) Irregularly Flooded

The substrate is flooded by tides less than daily. The area must be flooded by tides at least once a year as a result of extreme high tide. The irregular flooding may be due to normal tidal cycles (e.g. spring tides) or storm surges.

Typical Irregularly Flooded areas include salt marshes above the zone of daily flooding, and the upper zone of **Marine** and **Estuarine** beaches.

(U) Saturated

The substrate is saturated to the surface for extended periods, but surface water is never or only occasionally present.

This modifier describes non tidal habitats, such as wet grass meadows and shrub areas (**Palustrine** and **Lacustrine** systems). Wetlands with organic soils typically have saturated water regimes. It also includes wetlands temporary isolated from tidal influence, e.g. coastal lagoons, which access to the sea occurs naturally or artificially one or more times per year. In these cases, it can succeed a water level rise and a consequent flood of the bordering land. These habitats are classified as **Estuarine** System and are non-tidal.

This modifier applies to the **Estuarine**, **Lacustrine** and **Palustrine** systems.

(D) Saturated- Tidal

The substrate is saturated to the surface for extended periods, but surface water is never or only occasionally present.

It applies to areas where wetness is primarily due to capillary rise or to tidal subsurface seepage.

This modifier applies to the **Marine** and **Estuarine** systems.

(F) Permanently Flooded-Tidal

Fresh tidal waters flood the surface throughout the year. These include the land surface exposed by years of extreme drought.

This modifier applies to the **Riverine** and **Palustrine** systems.

(Y) Semi-permanently Flooded-Tidal

Fresh tidal waters flood the surface throughout all the growing season in most years.

This modifier applies to the **Riverine** and **Palustrine** systems.

(E) Seasonally flooded-tidal

Fresh tidal water floods the surface for extended periods during the growing season in most years.

This modifier applies to the **Riverine** and **Palustrine** systems.

(M) Temporarily flooded-tidal

Fresh tidal water floods the surface for brief periods of the growing season.

This modifier applies to the **Riverine** and **Palustrine** systems.

(L) Semi-permanently Flooded

Surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the soil surface.

This modifier applies to the **Estuarine** system (at non-tidal areas) and to the **Riverine**, **Lacustrine** and **Palustrine** systems.

(S) Seasonally Flooded

Surface water is present for extended periods of the growing season. Inundation periods range from approximately 6 weeks to most of the growing season. When surface water is absent, the water table is often near the land surface. Common examples of seasonally flooded wetlands include *Phragmites* marshes, *Typha* stands and wet *Juncus* meadows.

This modifier applies to the **Riverine**, **Lacustrine** and **Palustrine** Systems.

(T) Temporarily Flooded

Surface water is present for brief periods (approximately 3 to 6 weeks) of the growing season. When surface water is absent, the water table usually lies well below the soil surface.

Examples of Temporarily Flooded wetlands include shrub areas on river and stream floodplains, and briefly flooded grass meadows.

This modifier applies to the **Estuarine** system (at non-tidal areas) and to the **Riverine**, **Lacustrine** and **Palustrine** systems.

(I) Intermittently Flooded

The substrate is usually exposed, but surface water is present for variable periods without detectable seasonal precocity. Weeks, months or even years may intervene between periods of flooding.

Examples of Intermittently Flooded wetlands include chotts, wetlands typical of the northern edge of the Sahara. These salty lakes rarely hold water for longer than four months at a time, usually during the winter.

This modifier applies to the **Riverine**, **Lacustrine** and **Palustrine Systems**.

5.1.1. Artificial modifier

In the case of habitats where the amount and duration of flooding is controlled by means of pumps or siphons in combination with dams we can use another water regime modifier:

(X) Artificially Flooded

The vegetation growing on these areas cannot be considered a reliable indicator of water regime. Neither wetlands within, or resulting from leakage from, man-made impoundments, nor irrigated pasture lands supplied by diversion ditches or artesian wells, are included under this modifier. In cases, where the water regime is known, this Artificial Flooded modifier can be replaced with any non-tidal water regime.

5.2 Salinity Modifiers

The accurate characterization of water salinity of a wetland salinity of a wetland can be difficult due to problems with measurements and the variation of the values due to changes

with season, weather, time of day and other factors. Despite these problems, the differences in salinity are important, as it determines species composition of habitats and has implications for utilization and management of wetlands.

The salinity of coastal and inland waters differs as a result of the concentrations of various salts. The term “haline” is used to describe the sea-derived salinity of coastal waters (NaCl salts), while “saline” is used for the salinity of inland waters of any origin caused by the presence of cations (such as calcium, magnesium, sodium and potassium) and anions (carbonates, sulphates and chlorides).

Seven classes of salinity are considered, expressed in g/l (grams per liter), in order to define the salinity of the wetland.

Coastal modifiers	Inland modifiers	Salinity (g/l)
(F) Fresh	(F) Fresh	< 0,5
(O) Oligohaline		0,5 – 5,0
(M) Mesohaline		5,0 – 18,0
(P) Polyhaline		18,0 – 30,0
(B) Mixohaline	(X) Mixosaline	0,5 – 30,0
(S) Euhaline	(E) Eusaline	30,0 - 40,0
(H) Hyperhaline	(Y) Hypersaline	> 40,0

5.3 Artificial Modifiers

Many wetlands man-made, and many natural ones have been modified to some degree by the activities of humans. The following Artificial Modifiers are used to describe modified and created wetland environments. The following Artificial modifiers are defined and can be used singly or in combination wherever they apply to wetlands:

(F) Farmed

The soil surface has been mechanically or physically altered for crop production, but hydrophytes will become re-established if farming is discontinued (e.g. farmed intermittent lake bottoms).

(A) Artificial substrate

Substrates placed by humans, using natural or synthetic materials. Jetties and breakwaters are examples of Non-vegetated Artificial shores.

(S) Spoil

Wetland habitat where the substrate is a result of deposition of spoil materials.

(E) Excavated

A wetland lying within a excavated basin or channel (e.g. land cut canals, ditches, earth tanks and farm ponds).

(D) Diked/Impounded

Created or modified by man-made barrier or dam which obstructs the inflow or outflow of water. The normal spillway elevation (contour) determines the boundary of the wetland formed behind a dam.

(P) Partially Drained/Ditched

The water level has been artificially lowered, usually by means of ditches, but the area is still classified as wetland because soil moisture is sufficient to support hydrophytes. Drained areas are not considered wetland if they can no longer support hydrophytes. This modifier is used to indicate extensive ditch networks in wetlands.

The above Artificial modifiers can be used singly or in combination wherever they apply to wetlands. In the last case, different combinations can be used in the Inventory:

- (B) Farmed - Diked/Impounded
- (C) Artificial substrate/ Excavated
- (G) Artificial substrate/ Diked/Impounded
- (H) Artificial substrate/ Excavated/ Diked/Impounded
- (J) Spoil/ Excavated
- (L) Spoil/ Diked/Impounded
- (M) Spoil/ Excavated/ Diked/Impounded
- (N) Excavated/ Diked/Impounded



Rio Maior salines, near Candeeiros mountain (Portugal).

MedWet habitat coding:

1	2	3	4	5	6	7	D	C	C	C
P	D	O	A	X	Y	C	-	-	-	-

Palustrine, Slope (the wetland occurs near a mountainous area), -, Sal crust, Artificially flooded, Hypersaline, Artificial-Excavated, - the counter was not used.

6. Dominance

The **dominance type** is very important for users interested in more detailed studies. The most common procedure will be to identify Dominance Types on the basis of dominant plant species (*e.g. Phragmites* sp.), particular sensitive in terms of management and conservation.

Identification of these units is important to evaluate changes in particular habitats throughout time.

The substrate or vegetation types that designate Dominance must have an aerial coverage over 30%.

When the MedWet Habitat Description System is used as an inventory tool, the inventory coordinator should define the relevant dominant species (or combination of species) and attribute a letter to use in the habitat code.



Poço do Barbarroxa de Baixo, Lagoas de Santo André e Sancha Natural Reserve (Portugal). Depression behind a sand dune.

MedWet habitat coding:

1	2	3	4	5	6	7	D	C	C	C
P	B	E	P	P	F	-	P	-	-	-

Palustrine, Basin (occurs in a isolated depression), Emergente vegetation, Persistent, Permanently flooded, Fresh, not artificial / Dominante species *Phragmites australis* and it was not used a counter.

7. Counters

A 3 digit counter allows the distinction of two different patches with the same habitat description. It is useful to separate 2 areas with the same description, which have different information relating to activities, flora and fauna.

Example:

MedWet habitat coding:

1	2	3	4	5	6	7	D	C	C	C
P	B	E	P	P	F	-	P	0	0	1
1	2	3	4	5	6	7	D	C	C	C
P	B	E	P	P	F	-	P	0	0	2

8. References

- Cowardin, L.M., V. Carter, F.C. Golet & E.T. LaRose 1979. *Classification of wetlands and deepwater habitats of the United States*. US Fish and Wildlife Service FWS/OBS-79/31. Washington D.C.
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- Farinha, J.C., L. Costa, G. Zalidis, A. Mantzavelas, E. Fitoka, N. Hecker & P. Tomàs 1996. *Mediterranean Wetland Inventory: Habitat Description System*. MedWet/Instituto da Conservação da Natureza(ICN)/Wetlands International/ Greek Biotope/ Wetland Centre (EKBY) Publication. VolumeIII.
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Annex I

Wetland identification

Frequently, there is a clear perception of what a wetland is, however, in some situations there can be doubts about if a certain site is or not a wetland or where are its boundaries.

The definition of wetlands adopted by the Ramsar convention, is very general and widely accepted, however, it is not by itself adequate for the precise identification and delineation of wetland areas. For this reason, the MedWet inventory methodology identify and delineate wetlands, based on the presence of essential attributes such as hydrology, soils and vegetation. These criteria do not need to be applied in order to carry out a simple inventory or for obvious wetland areas. However, they will be required for precise delineation of wetlands.

A. Hydrology

This criterion can be applied whenever adequate hydrological data are available, according to which an area is identified as a wetland if:

- It is permanently or periodically flooded for at least **two** successive weeks during the growing season and for most of the years of observation, or for at least **six** years out of **ten** years of observation; or
- It presents conditions of soil saturation (ground water close to the soil surface) for at least **two** successive weeks during the growing season and for the most of the years of observation, or for at least **six** years out of **ten** years of observation.

B. Vegetation

The vegetation is greatly influenced and determined by the environmental conditions of an area. The dominance of plant species known as indicators of wetland conditions (e.g. flooded or soil saturation conditions) allows the identification of an area as a wetland. As such, it constitutes an important criterion for the identification of wetlands and their boundaries at the landward side.

A list of flora species indicative of wetland should be established for each country or region to be covered by the inventory. This list will include hydrophytes which are “species that have demonstrated an ability (because of morphological and/ or physiological adaptation and/ or reproductive strategies) to achieve maturity and reproduce in an environment where

all or portions of the soils within the root zone become, periodically or continuously, saturated during the growing season” (Reed, 1988). Amongst this list will be selected the indicator species which are restricted to wetlands. These indicator species can vary from one region to another, because of ecotypic variation within species (National Research Council, 1995).

A field survey will then be carried out in each area for which the wetland character needs to be identified. It is important to conduct this field survey when most of the hydrophytic plant species are present, which is during the growing season and when the area is flooded. The dominant plant species of the area will be recorded. The measure of dominance can be made in terms of frequency, density, percentage of coverage, etc. The most abundant species is used to determine whether the vegetation as a whole is predominantly (more than 50%) hydrophytic. If these dominant species belong to the list of wetland indicators then the area will be defined as a wetland.

The criterion has to be used carefully for controversial areas where the vegetation is only marginally hydrophytic (e.g. on the margin of a wetland area, or when the area is temporarily invaded by upland plants, etc.). A prevalence index (using fidelity rating system which gives the wetland affinity of each species) could be used to ascertain the wetland character of the plant communities of the site (see National Research Council, 1995 for further reading). The other criteria (hydrology and soils) should also be used to demonstrate the wetland character of these difficult areas.

C. Soil

The identification of hydric soils by field survey is required. Hydric soils are those usually found in the vicinity of water bodies (temporarily flooded and/ or high level of ground water), are poorly drained and under natural and undisturbed circumstances, support wetland vegetation.

The identification of hydric soils by field survey can be performed by the use of easily determined indices and it is often done by determining soil color to a standard color chart. Soil characterized by low chromas of black, grey, or brown and red indicate hydric soils. They are of two types:

Organic hydric soils

are composed primarily of the remains of plants in various stages of decomposition and accumulate in wetlands as a result of anaerobic conditions created by standing water or poorly drained conditions. The organic materials can present different stages of decomposition: in some soils (called muck) most of the material is decomposed and in some other (peat) it largely remains. They are generally dark, ranging from dark black soils characteristic of muck to the dark brown color of peat. These dark colors indicate the presence of organic matter.

Mineral hydric soils

Have little or no organic matter. Due to their wetness, the iron present in these is reduced. This leads to the development of a characteristic grey color (or greenish and blue-grey). Spots with orange to brown color (called mottles) among the grey matrix suggest temporary flooded soils. These mottles are formed by oxides of iron and manganese during the dry period, Oxidized iron with an orange color can also be found along the plant roots.

The identification of hydric soils by field survey can be performed by the use of easily determined indices and it is often done by determining soil color to a standard colors chart. Soils characterized by low chromas of black, grey, or brown and red indicate hydric soils.

The soil criterion may need to be adapted for each inventory region according to its soil specificity.

Annex II

Letter coding used in the MedWet habitat description system

Wetland habitats should be labelled using the letter code listed in the wetland legend. The habitat description code of each mapped unit should include the appropriate:

- (1) System e (2) Subsystem,
- (3) Class e (4) Subclass,
- (5) Water regime modifier,
- (6) Water salinity modifier,
- (7) Artificial modifier,
- (D) Dominance type,
- (CCC) counter.

MedWet habitat coding:

1	2	3	4	5	6	7	D	C	C	C
-	-	-	-	-	-	-	-	-	-	-

Systems and Subsystems

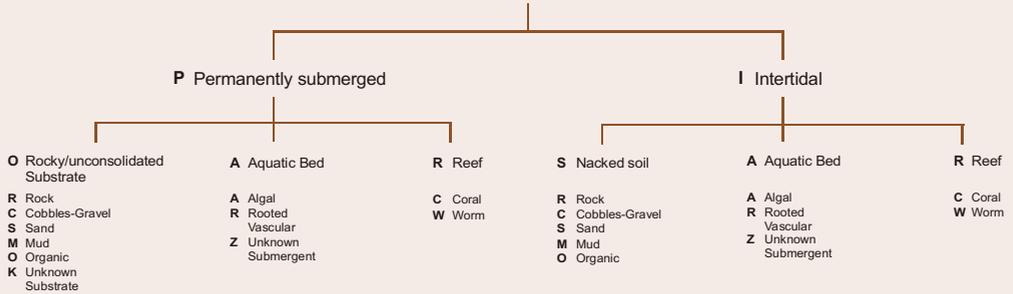
M Marine	P Permanently submerged I Intertidal
E Estuarine	P Permanently submerged I Intertidal
R Riverine	Z Ephemeral S Underground X Upper non-perennial V Lower non-perennial U Upper Perennial W Lower Perennial T Tidal
L Lacustrine	M Limnetic L Littoral S Underground
P Palustrine	D Slope E Pan B Basin P Floodplain L Flat M Fringe

Classes and Subclasses

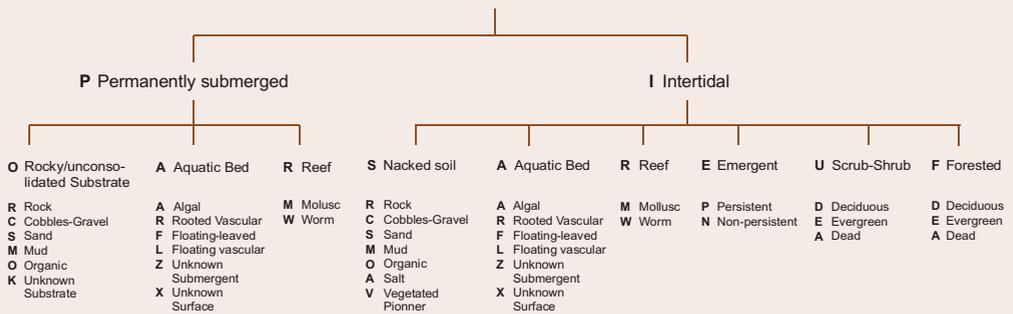
O Rocky/ unconsolidated substrate	R	Rock
	C	Cobbles-Gravel
	S	Sand
	M	Mud
	O	Organic
	A	Salt crust
	K	Unknown substrate*
<hr/>		
S Naked soil	M	Mud
	S	Sand
	C	Cobbles-Gravel
	R	Rock
	O	Organic
	A	Salt crust
	V	Vegetated Pioneer
<hr/>		
A Aquatic Bed	A	Algal
	M	Aquatic Moss
	F	Floating Vascular
	L	Floating-leaved
	R	Rooted Vascular
	Z	Unknown submergent
	X	Unknown surface*
<hr/>		
R Reef	C	Coral
	M	Mollusk
	W	Worm
<hr/>		
M Moss-Lichen	M	Moss
	L	Lichen
<hr/>		
E Emergent	P	Persistent
	N	Non-persistent
<hr/>		
U Scrub-Shrub	D	Deciduous
	E	Evergreen
	A	Dead
<hr/>		
F Forested	D	Deciduous
	E	Evergreen
	A	Dead

*Not included in the MedWet habitat description system. Created for mapping purposes.

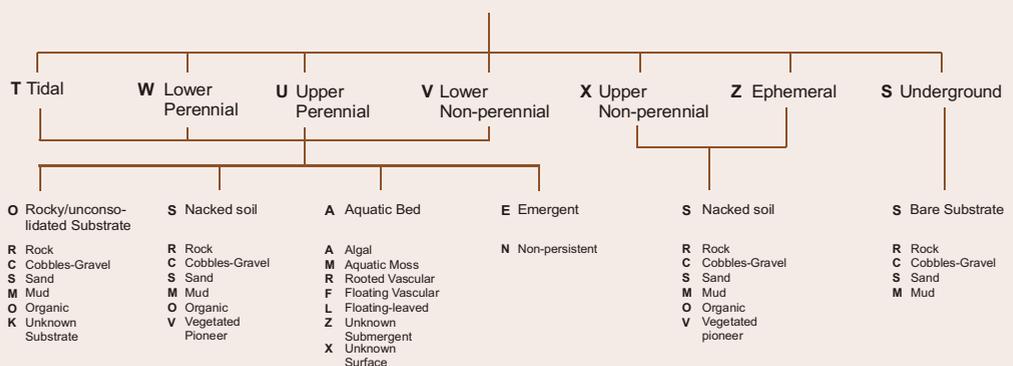
M Marine



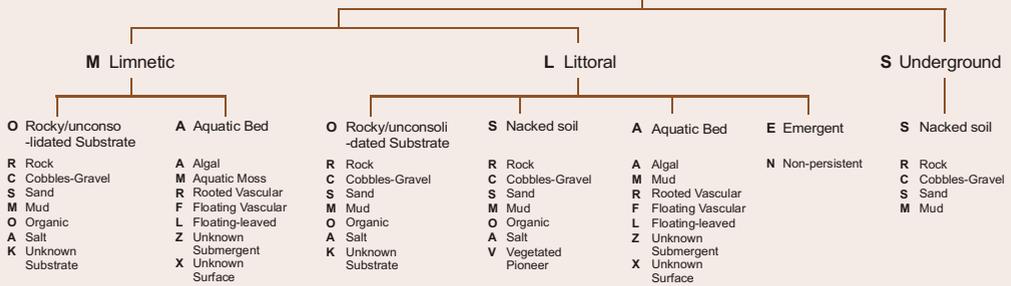
E Estuarine



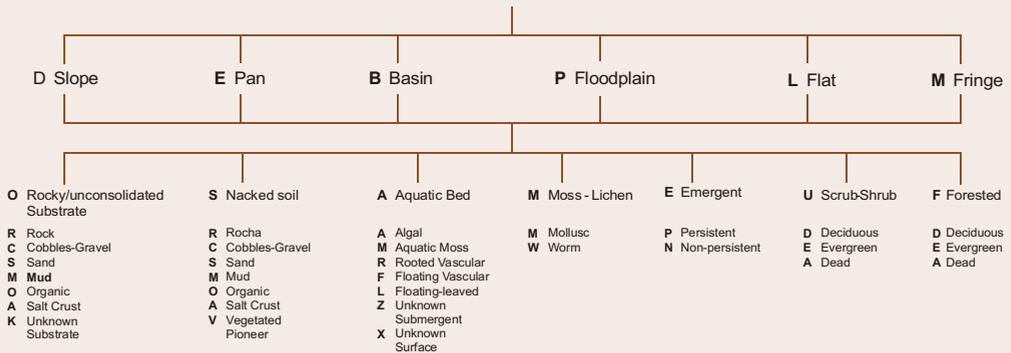
R Riverine



L Lacustrine



P Palustrine



Water regime modifiers

(Marine System)

- P Permanently Flooded
- S Subtidal
- A Irregularly exposed
- R Regularly Flooded
- G Irregularly Flooded
- D Saturated-Tidal

(Lacustrine System)

- P Permanently Flooded
- U Saturated
- L Semi-permanently Flooded
- S Seasonally Flooded
- T Temporarily Flooded
- I Intermittently Flooded

(Estuarine System)

- P Permanently Flooded
- S Subtidal
- A Irregularly exposed
- R Regularly Flooded
- G Irregularly Flooded
- L Semi-permanently Flooded
- T Temporarily Flooded
- U Saturated
- D Saturated- Tidal

(Palustrine System)

- P Permanently Flooded
- R Regularly Flooded
- U Saturated
- F Permanently Flooded-Tidal
- Y Semi-permanently Flooded-Tidal
- E Seasonally flooded-tidal
- M Temporarily flooded-tidal
- S Seasonally Flooded
- L Semi-permanently Flooded
- T Temporarily Flooded
- I Intermittently Flooded

(Riverine System)

- P Permanently Flooded
- R Regularly Flooded
- F Permanently Flooded-Tidal
- Y Semi-permanently Flooded-Tidal
- E Seasonally flooded-tidal
- M Temporarily flooded-tidal
- L Semi-permanently Flooded
- S Seasonally Flooded
- T Temporarily Flooded
- I Intermittently Flooded

(Marine, Estuarine, Riverine, Lacustrine e Palustrine Systems)

- K Unknown*

(Riverine, Lacustrine e Palustrine Systems)

- X Artificially flooded

**Not included in the MedWet habitat description system. Created for mapping purposes.*

Water Salinity Modifiers

Coastal Halinity	F	Fresh
	O	Oligohaline
	M	Mesohaline
	P	Polyhaline
	B	Mixohaline
	S	Euhaline
	H	Hyperhaline

Inland Salinity	F	Fresh
	X	Mixosaline
	E	Eusaline
	Y	Hypersaline

Artificial Modifiers

- F Farmed
 - A Artificial substrate
 - S Spoil
 - E Excavated
 - D Diked/ Impounded
 - P Partially Drained/ Ditched
 - B Farmed – Diked/ Impounded
 - C Artificial – Excavated
 - G Artificial – Diked/ Impounded
 - H Artificial – Excavated – Diked/ Impounded
 - J Spoil – Excavated
 - L Spoil – Diked/ Impounded
 - M Spoil – Excavated – Diked/ Impounded
 - N Excavated – Diked/ Impounded
-

Dominance Type

Example:

- P *Phragmites australis*
- T *Typhasp.*