The wetland ecosystems in MAES nomenclature

SWOS modifications

Version 1.2

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Contributors:

Eleni Fitoka, EKBY
George Poulis, EKBY
Christian Perennou, Tour de Valat
Susanne Thulin, Brockmann-geomatics
Dania Abdul Malak, University of Malaga
Jonas Franke, Remote Sensing Solutions
Anis Guelmani, Tour de Valat
Christoph Schröder, University of Malaga

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Table of Content

Introduction

The SWOS project has the objective to develop a satellite based monitoring and information service for wetland ecosystems that complements the MAES process and supports the consideration of wetlands in the implementation of key policy areas.

As a first step, SWOS attempts to enhance, expand and harmonize the MAES nomenclature to fully cover the wide range of wetland ecosystems. To this target, new classes are introduced to the wetland ecosystem nomenclature such as rice fields, wet grasslands, wet heathlands, and riparian forests. These newly included classes, although belonging to agroecosystems, grasslands, heathlands and shrubs, woodland and forests (under the MAES nomenclature) are mapped and assessed as being part of wetland ecosystems in SWOS. As such, in the SWOS approach, the wetlands are defined based on their hydro-ecological criteria, and can therefore be found under any other ecosystem type of the MAES typology (at Level I). Also, modifications are done in class name definitions to become more representative and discrete as well as to follow relevant wetland research considerations.

This document provides a comprehensive list of the wetland ecosystem classes that SWOS is proposing to be integrated in the MAES nomenclature along with application guidelines and mapping conventions. Cross walks between the MAES wetland classes with the Ramsar types, EUNIS and CLC classes are provided to ensure a user friendly shift amongst each other as well as for documentation needs. Important to note that the list of the Ramsar types, as provided by the Ramsar Convention, serves as the basic background context for considering specific areas as wetland ecosystems.

In particular, the document is structured as follows:

a) **First chapter** “About wetland ecosystems: definitions and terms” provides definitions and terms that are needed to be adopted by MAES practitioners in order to share a “common language” including how a wetland is identified, and what is a wetland ecosystem and habitat.

b) **Second chapter** “The wetland ecosystems in the MAES nomenclature” provides the modified MAES typology for wetland ecosystems along with justifications and cross walks with Ramsar types, EUNIS and CLC.

The document is indented for a wider audience than SWOS and at multi-level use, including the Ramsar and MAES communities as well as their Member States interested in wetland ecosystems. In presenting it, the SWOS contributing team aims to enhance the knowledge on wetland ecosystem mapping and to provide a common context with application rules in order to serve harmonization and contribute in limitation overcoming.

This document will be updated based on SWOS mapping results up to the end of its life (May 2018). In its updated version, application guidelines and remote sensing feasibility mapping tests will be provided.

We would be happy to receive back comments and suggestions for improvements (please use this mail helenf@ekby.gr).

1. About wetland ecosystems: definitions and terms

1.1 What are wetland ecosystems?

Wetlands are complex ecosystems that interact strongly with adjacent terrestrial and aquatic ecosystems, the latter being themselves considered as “wetlands” under certain definitions (see below). Usually they are defined, delineated and classified based on the presence of water, and the geological/geomorphic, hydrological, hydro-chemical and biotic characteristics.

According to Article 2 of the Convention on Biological Diversity, "Ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit". COP 5, considering the ecosystem approach, pointed out that the ecosystems can refer to any functioning unit at any scale ranging from a grain of soil to the entire biosphere.

Within this ecosystem-based approach, wetland ecosystems are connected with broader landscapes in hydrological and ecological terms, and also exist within a human context. As such, wetland ecosystems can encompass their larger surroundings, both waterscapes and landscapes, including even the non wet habitats such as sand dune systems and beaches along coastal wetlands, or the deep water habitats of lakes, underground aquifers, and even degraded wetlands which have significantly lost their naturalness and could be potentially restored. Ultimately, this approach meets and supports the wise use of wetlands; where wetland management should be undertaken within the context of their larger surrounding “waterscape” (the river basin or catchment,) as well their larger surrounding landscape.

The Millennium Ecosystem Assessment (2005) estimated that global wetland ecosystems (including lakes, rivers, marshes, and coastal regions to a depth of 6 meters at low tide) cover more than 1,280 million hectares, an area 33% larger than the United States and 50% larger than Brazil. However, this estimate is known to under-represent many wetland types, and further data are required for some geographic regions.

1.2 How wetlands are defined?

A wide range of wetlands exist such as permanent and temporal rivers, streams and wadis, lakes, marshes, alpine and tundra wetlands, springs and oases, geothermal wetlands, underground wetlands, estuaries and salt marshes, lagoons, salt ponds, intertidal flats, seagrass beds, or chots and chepkhas of arid regions (Mitsch & Gooselink, 2015). Because of this great diversity over the globe, defining the term “wetland” has been proven a most difficult and intriguing task. The question of what is and what is not a wetland is by its nature difficult to explicitly answer, as it is the case with transitional zones and spatially and temporally dynamic areas.

According to a review of classification of wetlands (Semeniuk & Semeniuk , 2011), amongst wetland scientists, there is no real agreement about what constitutes a wetland or on exact placement of the wetland boundary. There is broad agreement that some landscape features such

as wet basins and flats are wetlands but much less agreement about the inclusion of other features such as springs, channels, cliffs, and seepage zones. Also the report, finds out that the expression of wetness (hydroperiod) on the earth ranges from being permanently wet all year round year after year, to being wet all year round every fifty years, to being wet for a couple of months every year.

Widely, the most accepted definition is the one set out in the text of the Convention on Wetlands. Article 1.1 of the convention states that wetlands are: “areas of marsh, fen, peatland or water, whether natural or 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 six metres”. In addition, Article 2.1 states that wetlands “may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands”.

1.3 About wetland boundaries and limits

In the strict sense, wetlands, as transitional zones in between terrestrial and aquatic ecosystems, form a continuous gradient. As such, inconsistencies in mapping and delineating wetlands appear, while questions like how far the wetland boundary goes towards the upland area or towards the deepwater or questions like what is the frequency of flooding required for an area to be considered as wetland, are not approached similarly by different users.

As a result, the exact upper and the lower limits of wetlands are arbitrary boundaries in any definition (Mitsch and Gosselink 2015). However, boundaries of wetlands have been delineated with respect to their geological, hydrological, and biotic properties (Cowardin et al., 1979; Richardson & Vepraskas, 2001).

The three main wetland features that appear in every wetland type, despite the differences and peculiarities, are (Mitsch and Gosselink 2015):

1. Wetlands are distinguished by the presence of water, either at the surface or within the root zone.

2. Wetlands often have unique soil conditions that differ from adjacent uplands.

3. Wetlands support biota such as vegetation adapted to the wet conditions (hydrophytes) and, conversely, are characterized by an absence of flooding-intolerant biota.

SWOS, recognizing the above inconsistencies in defining wetland boundaries and in order to introduce the ecosystem-based approach in wetland mapping applications, developed and published specific guidelines for the delimitation of the boundaries of the functional area of wetland ecosystems (i.e., water basin, underground aquifers, and coastal zone). This is proposed to be followed by wider stakeholders as the appropriate area that should be mapped beyond administrative, social, and protection boundaries (Abdul Malak et al., 2016).

1.4 The term "wetland" in SWOS approach

Within SWOS, the widely accepted Ramsar wetland definition and typology, is adopted as the background context. It is worthy to note that similarly, the coverage of different types of wetlands in the TEEB report for Water and Wetlands (Russi, et al., 2013) follows the definition adopted in the text of the Ramsar Convention.

As defined by the Ramsar Convention, wetlands include a wide variety of habitats such as marshes, peatlands, floodplains, rivers and lakes, and coastal areas such as saltmarshes, mangroves, and seagrass beds, but also coral reefs and other marine areas no deeper than six metres at low tide, as well as human-made wetlands such as waste-water treatment ponds and reservoirs. The treaty also provides for waters deeper than six meters, as well as islands, to be included within the boundaries of protected wetlands, as well as sub-surface hydro-ecosystems (e.g. karstic caves or oasis including their human-dug sub-surface canals where land-cover may be pure desert). Also, lakes and rivers are understood to be covered by the Ramsar definition of wetlands in their entirety, regardless of their depth. The Millennium Ecosystem Approach (2005) has also estimated wetland ecosystems within this approach. In this context, the present SWOS document uses the term "wetland" as an umbrella over the freshwater ecosystems, the marine ecosystems (up to a depth of 6 m at low tide), the coastal ecosystems as well as the marshes and mires. In addition, the term encompasses all wetland areas that are possibly found under croplands (i.e rice fields), forests (i.e riparian woodlands), grasslands as well as wet heaths and riverine and fen scrub ecosystems.

In SWOS, in conformity with these definitions, wetlands are therefore mapped as ecosystems that are connected with broader landscapes in hydrological and ecological terms, and also exist within a human context. As such, wetland ecosystems can encompass their larger surroundings, both waterscapes and landscapes, including even the non-wet habitats such as sand dune systems and beaches along coastal wetlands, or the deep water habitats of lakes, underground aquifers, and even degraded wetlands which have significantly lost their naturalness, but could potentially be restored.

2. Wetland ecosystems in MAES nomenclature

SWOS, as an Earth Observation research project focussing on wetland ecosystems, has in its scope to contribute to the European MAES Initiative that supports in Europe the implementation of the Action 5 of the EU Biodiversity Strategy to 2020. As presented in previous sections wetland ecosystems encompass a wide range of natural, semi natural or human made habitats, extended both over waterscapes and landscapes, and with many seasonal or less frequent temporal phases. Thus, as a first step, SWOS aims to review whether the MAES ecosystem typology, in its current version[1], represents the full range of the different wetland types in Europe.

2.1 The SWOS modified MAES nomenclature version

In this context, SWOS reviewed the development of the initial MAES nomenclature version as well as the modifications that were introduced during the production of Copernicus Local Riparian component[2]. This resulted in a new version of MAES nomenclature with new modifications mainly in regard to wetland ecosystems. The proposed modifications include either the introduction of additional subclasses or changes in terminology of the class names. For this work, two main "libraries" have been followed, crossed and corresponded to MAES subclasses; a) the Ramsar Classification of Wetland Types and b) the EUNIS habitat classification. These were used to facilitate harmonized descriptions as well as to document and justify the need of the proposed modifications. In addition the cross walk with CLC was considered and updated when new classes were introduced taking into consideration the work that was done during the European Space Agency project "GlobWetland II".

Table 1 presents the modified and enhanced MAES typology that fully covers the wetland component. Given that in SWOS, similarly with the MEA and TEEB research work, the term wetland is used collectively, including rivers and lakes, coastal waters and marshes, marine ecosystems up to a depth of 6 m at low tide, peatbogs, seasonal flooded croplands, riparian forests and wet grasslands and heaths, the applicants find relevant wetland classes under the different broad MAES ecosystem units. In addition, attributes have been introduced to further describe specific classes that have been listed and described in Table 2. While, table 3 presents the class-wise justification of the proposed modifications by SWOS providing the class description of the initial MAES version and the Riparian Zone Copernicus project modifications.

[1] http://biodiversity.europa.eu/maes/typology-of-ecosystems

[2] http://land.copernicus.eu/user-corner/technical-library/RZ_CS3_17_Nomenclature_Guideline_I30.pdf

Box 1. The list of general additions proposed by SWOS under each MAES ecosystem type (Maes et al. 2013):

1 Urban: no SWOS changes have been introduced; the Riparian Zone modifications were adopted;

2 Croplands: a separate subclass for “Rice fields” has been created (former: irrigated land and rice fields);

3 Forests: the Riparian Zone Copernicus project subdivision is adapted by integrating two subclasses at the third level for alluvial and riparian forests and for swamp forests and the T.C.D as Attributes. In addition a new Attribute for dune systems (EUNIS B1.7) has been integrated;

4 Grasslands: totally new approach is proposed following the EUNIS relevant classes which are based on wetness conditions (dry, mesic and wet) and attributes for water regime have been integrated;

5 Heathland and scrub: new wetland classes have been included to represent the wet part of this ecosystem;

6 Sparsely vegetated land: few changes in class terminology have been done;

7 Inland Wetlands: totally new approach for peatbogs subclasses is proposed, few changes in class terminology and attributes for water regime have been integrated;

8 Lagoons, coastal wetlands and estuaries: changes in class terminology and attributes for water regime and land use have been integrated;

9 Rivers and Lakes: subclasses follow the divisions made by the Riparian Zone Copernicus project but also new classes have been introduced; and

10 Marine: two subclasses have been created to distinguish the deep from the shallow marine waters.

Table 1. Modified MAES nomenclature in respect to wetland ecosystems. Font in light blue indicates wetland classes. *(Remarks: New = introduced by SWOS, Class name modification = the class name is different from the initial MAES, Adopted by RZ project = the class was introduced by the Riparian Zone Copernicus project).*

MAES Code and Class Name	Remarks
1 Urban	
1.1 Urban Fabric, industrial, commercial, public, military and private units	
1.1.1 Dense to medium dense Urban Fabric (IM.D. 30-100% + industrial, commercial, public, military and private units)	
1.1.1.1 Continuous urban fabric (in-situ based or IM.D. 80 - 100%)	
1.1.1.2 Dense urban fabric (in-situ based or IM.D. 30-80% + industrial, commercial, public, military and private units)	
1.1.1.3 Industrial or commercial units	
1.1.2 Low density Urban Fabric (IM.D. 0-30%)	
1.2 Transport infrastructure (all modess)	
1.2.1 Transport infrastructure (all modes)	
1.2.1.1 Road networks and associated land	
1.2.1.2 Railways and associated land	
1.2.1.3 Port areas	
1.2.1.4 Airports	
1.3 Mineral extraction, dump and construction sites, land without current use	
1.3.1 Mineral extraction, dump and construction sites	
1.3.2 Land without current use	
1.4 Green urban + sports + leisure facilities	
1.4.1 Green urban areas	
1.4.1.1 Green urban areas T.C.D. >=30%	
1.4.1.2 Green urban areas T.C.D. <30%	
1.4.2 Sports and leisure facilities	
1.4.2.1 Sports and leisure facilities T.C.D. >=30%	
1.4.2.2 Sports and leisure facilities T.C.D. <30%	
2 Croplands	
2.1 Arable land	
2.1.1 Non-irrigated arable land	
2.1.2 Greenhouses	
2.1.3 Irrigated arable land and rice fields	
2.1.3.1 Rice fields	New

MAES Code and Class Name	Remarks
2.2 Permanent crops	
2.2.1 Vineyards	
2.2.2 Fruit trees and berry plantations	
2.2.2.1 High stem fruit trees (extensively managed)	
2.2.2.2 Low stem fruit trees and berry plantations	
2.2.3 Olive groves	
2.3 Heterogeneous agricultural areas	
2.3.1 Annual crops associated with permanent crops	
2.3.2 Complex cultivation patterns	
2.3.3 Land principally occupied by agriculture with significant areas of natural vegetation	
2.3.4 Agro-forestry T.C.D. > 30%	
2.3.5 Agro-forestry T.C.D. < 30%	
3 Woodland and Forests (see attributes in Comment)	
3.1 Broadleaved forest	
3.1.1. Riparian and fluvial broadleaved forest	Adopted by RZ project
3.1.2. Broadleaved swamp forest	Adopted by RZ project
3.1.3. Other natural & semi-natural broadleaved forest	Adopted by RZ project
3.1.4. Broadleaved evergreen forest	Adopted by RZ project
3.1.5. Highly artificial broadleaved plantations	Adopted by RZ project
3.2 Coniferous forest	Adopted by RZ project
3.2.1. Riparian and fluvial coniferous forest	Adopted by RZ project
3.2.2. Coniferous swamp forest	Adopted by RZ project
3.2.3. Other natural & semi-natural coniferous forest	Adopted by RZ project
3.2.4 Highly artificial coniferous plantations	Adopted by RZ project
3.3 Mixed forest	
3.3.1 Riparian and fluvial mixed forest	Adopted by RZ project
3.3.2 Mixed swamp forest	Adopted by RZ project
3.3.3 Other natural & semi-natural mixed forest	Adopted by RZ project
3.3.4 Highly artificial mixed plantations	Adopted by RZ project
3.4 Transitional woodland scrub	
3.5 Damaged forests	
4 Grassland	

MAES Code and Class Name	Remarks
4.1 Dry grasslands	New
4.1.1 Managed dry grasslands	New
4.1.2 Natural dry grasslands	New
4.2 Mesic grasslands	New
4.1.1 Managed mesic grasslands	New
4.1.2 Natural mesic grasslands	New
4.3 Wet grasslands	New
4.3.1 Managed or grazed wet meadow or pasture	New
4.3.2 Natural seasonally or permanently wet grasslands	New
5 Heathland and scrub	
5.1 Moors and heathland	
5.1.1 Moors and heathland	
5.1.1.1 Heathland and moorlands	Adopted by RZ project
5.1.1.2 Other scrub land	Adopted by RZ project
5.1.1.3 Wet heaths	New
5.1.1.4 Riverine and fen scrubs	New
5.2 Sclerophyllous vegetation	
5.2.1 Sclerophyllous vegetation	
6 Sparsely vegetated land	
6.1 Sparsely vegetated areas	
6.1.1 Sparsely vegetated areas	
6.2 Bare soil, rock, perennial snow & ice	
6.2.1 Beaches, dunes without vegetation, sands	Class name modification
6.2.1.1 Beaches	
6.2.1.2 Coastal and fluvial dunes without vegetation	Class name modification
6.2.1.3 River banks	
6.2.2 Bare rocks, glaciers and perpetual snow	
6.2.2.1 Bare rocks and rock debris	
6.2.2.2 Glaciers and perpetual snow	
7 Inland marshes and open mires	Class name modification
7.1 Inland marshes (small ponds below 8 ha might be included)	Class name modification
7.1.1 Inland freshwater marshes (small ponds below 8 ha might be included)	Class name modification

MAES Code and Class Name	Remarks
7.1.1.1 Inland freshwater marshes without reeds (small ponds below 8 ha might be included)	Class name modification
7.1.1.2 Inland freshwater marshes with reeds (small ponds below 8 ha might be included)	Class name modification
7.1.2 Inland saline or brackish marshes (small ponds below 8 ha might be included)	Class name modification
7.1.2.1 Inland saline or brackish marshes without reeds (small ponds below 8 ha might be included)	Class name modification
7.1.2.2 Inland saline or brackish marshes with reeds (small ponds below 8 ha might be included)	Class name modification
7.2 Open mires	Class name modification
7.2.1 Bogs	NEW
7.2.1.1 Raised bogs	NEW
7.2.1.2 Blanket bogs	NEW
7.2.2 Fens	NEW
7.2.2.1 Poor fens	NEW
7.2.2.2 Rich fens	NEW
7.2.3 Mixed mires (mixture of ombrotrophic & minerotrophic)	NEW
7.2.3.1 Palsa mires	NEW
7.2.3.2 Aapa mires	NEW
7.2.3.3 Polygon mires	NEW
7.2.4 Other mires	NEW
7.2.4.1 Transition mires and quaking bogs	NEW
7.2.4.2 Valley mires	NEW
7.2.5 Peat extraction, hydrological modifications	NEW
8 Coastal marshes, waters, flats	Class name modification
8.1 Salt marshes	Class name modification
8.1.1 Salt marshes without reeds	
8.1.2 Salt marshes with reeds	
8.2 Coastal waters	Class name modification
8.2.1 Coastal lagoons	

MAES Code and Class Name	Remarks
8.2.2 River estuaries and estuarine waters of deltas	Class name modification
8.3 Coastal saltpans (highly artificial salines)	Class name modification
8.4 Intertidal flats	
9 Rivers and Lakes	
9.1 Water courses	
9.1.1 Interconnected running water courses	
9.1.1.1 Permanent Interconnected running water courses	Adopted by RZ project
9.1.1.2 Seasonal/intermittent interconnected running water courses	Adopted by RZ project with class name modification
9.1.1.3 Highly modified natural water courses and canals	Adopted by RZ project
9.1.2 Separated water bodies belonging to the river system (dead side-arms, flood ponds, below 8 ha)	Class name modification
9.1.2.1 Permanent separated water bodies belonging to the river system (dead side-arms, flood ponds, below 8 ha)	Adopted by RZ project with class name modification
9.1.2.2 Seasonal/intermittent separated water bodies belonging to the river system (dead side-arms, flood ponds below 8 ha)	New
9.2 Lakes, ponds and reservoirs	Class name modification
9.2.1 Natural water bodies	
9.2.1.1 Natural permanent water bodies (over 8 ha)	Class name modification
9.2.1.2 Natural seasonal/intermittent water bodies (over 8 ha)	New
9.2.2 Man made water bodies	Class name modification
9.2.2.1 Ponds and lakes with completely man-made structure (generally below 8 ha)	Adopted by RZ project
9.2.2.2 Artificial fish ponds	Adopted by RZ project with class name modification
9.2.2.3 Standing water bodies of extractive mineral sites	Adopted by RZ project
9.2.2.4 Other reservoirs /barrages /dams /impoundments etc (generally over 8 ha).	New
9.2.2.5 Inland saltpans	New (different approach from RZ project which has classified inland Salinas as 1.3.1.1 Mineral extraction, dump and construction sites)
10 Marine	
10.1 Marine	
10.1.1 Marine waters less than six metres deep at low tide	Class name modification
10.1.2 Marine waters depth deeper than 6 m at low tide	New

Table 2: Attributes to describe additional characteristics of MAES wetland subclasses *(e.g. Tree Cover density for forests; water regime, substrate for dunes and other bare soil areas, etc.)*

MAES Class Codes to apply Attributes	Attributes
3, 3x, 3xx, 3xxx	T.C.D Forest >80%
	T.C.D Forest > 50 – 80%
	T.C.D Forest > 30 – 50%
	T.C.D Forest ≥ 10 – 30%
3, 3x, 3xx, 3xxx	Coastal dune woods (EUNIS B1.7)
4, 4x, 4xx, 4xxx	Coastal stable dune grassland (grey dunes=EUNIS B1.4)
	Machair (EUNIS B1.9).
4.3.x	Seasonally flooded
	Intermittently flooded
	Permanently wet
	Temporary wet
51x, 51xx	Coastal dune heaths (EUNIS B1.5)
	Coastal dune scrub (EUNIS B1.6)
611	Rock
	Sand
7, 7x, 7xx, 7xxx	Permanently flooded
	Seasonally flooded
	Intermittently flooded
	Permanently wet
	Temporary wet
8, 8x, 8xx	Permanently flooded
	Seasonally flooded
	Intermittently flooded
	Permanently wet
	Temporary wet
	Tidally flooded
82x	Aquaculture
821	Salt extraction (to be applied at semi-natural lagoons used for pre-concentrating salt)
9, 9x, 9xx, 9xxx	Dominated by aquatic bed vegetation

MAES Class Codes to apply Attributes	Attributes
9, 9x, 9xx, 9xxx	Fresh
	Brackish
	Saline
9222	Intensively used fish ponds with low degree of naturalness
	Abandoned or not intensively used fish ponds with a high degree of naturalness
9224	Modified river course

Table 3: The SWOS modifications in MAES nomenclature

(MAES description presents the initial MAES version based on the EU 2010 Biodiversity Baseline –adapted to the MAES typology (EEA, 2015)*, RZ project modifications present those that implemented during the Riparian Zone Copernicus project* (GAF AG, 2015)*. SWOS modifications are those that are proposed by SWOS scientists and are implemented and tested in the SWOS mapping work).*

MAES L1	MAES (L1-4) Description	RZ project modifications	SWOS modifications
1. Urban	The definition of urban areas in general is under the Urban Atlas guidelines. The MAES level 2 separates the urban fabric from transportation network, construction & dump sites and green urban areas (including sports facilities). On MAES level 3, the urban fabric is distinguished into density classes. The MAES level 4 further differentiates the urban fabric (continuous, urban dense, low dense, industrial or commercial) and transport infrastructures (road network, port areas and airports), extraction mine, dump and construction sites and land without current use.	Additions at MAES level 4: *1.4.1 Green urban areas* is further split into: [1.4.1.1 Green urban areas T.C.D. >=30%] & [1.4.1.2 Green urban areas T.C.D. <30%] *1.4.2 Sports and leisure facilities* is further split into: [1.4.2.1 Sports and leisure facilities T.C.D. >=30%] & [1.4.2.2 Sports and leisure facilities T.C.D. <30%]	RZ additions are adopted. No new modification introduced.

MAES L1	MAES (L1-4) Description	RZ project modifications	SWOS modifications
2. Cropland	On MAES Level 2, classes are defined according to the CORINE nomenclature (CORINE Technical Addendum 2000). Three main classes are separated: • Arable Land: Land under a rotation system used for annually harvested plants and fallow lands, which are permanently or not irrigated. It includes flooded crops, such as rice fields and other inundated croplands. • Permanent crops: All surfaces occupied by permanent crops, not under a rotation system. It includes ligneous crops of standard cultures for fruit production, such as extensive fruit orchards, olive groves, chestnut groves, walnut groves, shrub orchards, vineyards and some other specific low-system orchard plantation, espaliers and climbers. • Heterogeneous agricultural areas: Areas of annual crops associated with permanent crops on the same parcel, annual crops cultivated under forest trees, areas of annual crops, meadows and/or permanent crops which are juxtaposed, landscapes in which crops and pastures are intimately mixed with natural vegetation or natural areas. Class definitions on Level 3 are CORINE level 3 classes extended by the class “Greenhouses” and T.C.D. values for class “Agro-forestry”. The CLC classes “Rice fields” and “Irrigated arable land” are merged to one single class. On level 4, a distinction of orchards into “extensively managed high stem fruit trees” and “low stem plantations of fruit trees and berries” separates ecologically valuable, extensively cultivated fruit orchards from intensively used plantations.	None.	The CLC class “Rice fields” is reintroduced at the 4th MAES level under *2.1.3 Irrigated arable land and rice fields.* Rice fields constitute a human made wetland type providing important habitats for waterfowl (correspond to Ramsar type “3”).

MAES L1	MAES (L1-4) Description	RZ project modifications	SWOS modifications
3. Woodland and Forests	MAES 2 differentiates main types of forests: • Broadleaved forest: Vegetation composed mainly of trees, including shrub and understoreys, where broadleaved species predominate and represent more than 75% of the pattern. • Coniferous forest: Vegetation composed mainly of trees, including shrub and understoreys, where coniferous species predominate and represent more than 75% of the pattern. • Mixed forest: Vegetation composed mainly of trees, including shrub and understoreys, where neither broadleaved nor coniferous species predominate. The share of coniferous or broadleaved species does not exceed 25% in the canopy closure. • Transitional woodlands scrub and damaged forest by fire are also included in MAES 2. The differentiation of Woodland and Forest on Level 3 is mainly oriented based on T.C.D and on Level 4 based on species associations information (EUNIS L3 habitat).	The differentiation of Woodland and Forest on Level 3 is mainly oriented along aggregated EUNIS habitat classes. Main classes are riparian and fluvial forest, swamp forest, other natural and semi-natural forest and highly artificial forest (e.g. plantations), following the EUNIS classification scheme. Tree Cover density is included as an attribute.	The 3rd level modifications done by RZ are adopted. Riparian and fluvial forests and swamp forests constitute wetland types (correspond to Xf and Xp Ramsar types). As such, SWOS considers them as wetland ecosystems. The "*Coastal dune woods" (*EUNIS class *B1.7)* is introduced as an additional attribute. Coastal dunes with woods are considered part of coastal wetland ecosystems; this attribute makes their estimation possible.

MAES L1	MAES (L1-4) Description	RZ project modifications	SWOS modifications
4 Grassland	MAES level 2 differentiates managed grasslands and natural grasslands. • Managed or agricultural grasslands are intensively managed areas (selection of grasses, intensive cutting and grazing, fertilization, etc.) for the production of grass. From a land use point of view, in this case, grass is a crop in the same way as cereals or others. • Natural grasslands include alpine meadows and other semi-natural grasslands included in Habitat Directive (except mountain and lowland hay meadows). Semi-natural grasslands are frequently associated with trees and scrubs (MAES 3 main differentiation). MAES 4 differentiates natural grasslands based on species associations (EUNIS habitats)	A distinction between dry and mesic grasslands and alpine grasslands is introduced in MAES 4.	MAES level 2 and 3 are totally modified. Level 2 identifies three main subclasses based on the wetness conditions. These are: dry, mesic and wet and cover all the EUNIS grassland relevant classes: dry grasslands, mesic grasslands, wet grasslands. Reason : SWOS considers wet grasslands as wetland ecosystems (correspond to Ramsar types “Ts” and “4”), so these should be separated at a high enough level Level 3 has two subclasses based on management conditions: Managed grasslands and Natural grasslands. Level 4 could be further completed with L3 EUNIS habitats. Reasons: (i) Grasslands with T.C.D >30% overlap with forest classes; SWOS proposes to avoid this. (ii) Management condition are considered as a second order distinction. SWOS sees important to bring distinctions based on wet conditions adopting EUNIS classes at the second level. Attribute for dunes are introduced: - Coastal stable dune grassland (grey dunes=EUNIS B1.4) - Machair (EUNIS B1.9).

MAES L1	MAES (L1-4) Description	RZ project modifications	SWOS modifications
5 Heathland and scrub	The MAES level 2-3 separates Moors and Heathland from areas with sclerophyllous vegetation, following the CORINE Land Cover guidelines.	MAES level 4 is introduced to further distinguishe Heathlands and Moorlands from Other scrub land.	RZ modification is adopted. In addition, two subclasses at level 4 are introduced: 5.1.1.3 Wet heaths (corresponds to EUNIS F4.1) 5.1.1.4 Riverine and fen scrubs (corresponds to EUNIS F9). These correspond to Attributes are introduced for dunes: - Coastal dune heaths (EUNIS B1.5) - Coastal dune scrub (EUNIS B1.6) SWOS considers them as wetland ecosystems (correspond to Ramsar type "W").
6 Sparsely vegetated land	Differentiation of MAES Level 2 into two categories: "Sparsely vegetated areas" and "Bare soil, rock, perennial snow & ice" in order to separate vegetation classes from non-vegetated surfaces. On Level 3, a further split of non-vegetated surfaces into class 6.2.1 Beaches, dunes, sands and 6.2.2 Bare rocks, burnt areas, glaciers and perpetual snow is performed. Further differentiation in MAES level 4 into the classes 6.2.2.1 Bare rocks & rock debris, 6.2.2.2 Burnt Areas (except burnt forest) and 6.2.2.3 Glaciers & perpetual snow.	Excluded burnt forests from subclass 6.2.2.2 Burnt Areas (changed the name into Burnt Areas (except burnt forest). Changed the class name of 6.2.2.1 from Bare rocks into Bare rocks & rock debris.	RZ changes are adopted. The name of classes 6.2.1 and 6.2.1.2 changed into "Beaches, dunes without vegetation, sands" and "Coastal and fluvial dunes without vegetation" accordingly. SWOS considers the above along with subclass 6.2.1.3 River bank as wetland ecosystems (correspond to Ramsar types "E", "D"). Attributes are introduced for the substrate type: - rock -sand

MAES L1	MAES (L1-4) Description	RZ project modifications	SWOS modifications
7 Wetland	Inland marshes and peat bogs are included in MAES Level 2. MAES Level 3 differentiates between inland freshwater marshes and inland saline marshes. In MAES Level 4 marshes are divided in marshes with reeds and in marshes without reeds, and peat bogs are divided in exploited and unexploited.	Excluded the Level 4 division into marshes with and without reeds.	SWOS changes the names of classes and introduces new subclasses for peatbogs. Level 1 class name is changed from "Wetland" into "Inland marshes and open mires" and Level 2 class name "peatbogs" is changed to "open mires" Reason: the term "Wetland" is too broad since in SWOS / Ramsar understanding it includes many categories found under each MAES Level 1 class. The term "open mires" is suggested instead of the term "peatbogs" because, all mires are peatlands, with active formation of peat, but not all peatlands are mires (e.g. drained/modified peatlands now agricultural/forested lands where new peat is not currently formed). At Level 3 and 4: - in class names of marshes is added: "small ponds below 8 ha might be included". - in class names of saline marshes is added the word "brackish"; - "open mires" new subclasses are proposed following subdivisions of EUNIS in most cases. Attributes are introduced for water regime: - Permanently flooded - Seasonally - intermittently flooded - Permanently wet - Temporary wet

MAES L1	MAES (L1-4) Description	RZ project modifications	SWOS modifications
8.Lagoons, coastal wetlands and estuaries	In MAES Level 2 Coastal waters are separated into maritime wetlands (coastal salt marshes according to the EUNIS habitat classification, salines and intertidal flats) and marine waters (coastal lagoons and estuaries). Maritime wetlands are divided in salt marshes with or without reeds and salines and intertidal flats in MAES level 3. Coastal lagoons and estuaries are also distinguished.	Excluded at Level 4 the subdivision into marshes with and without reeds. It is subdivided into salt marshes, salines and intertidal flats.	SWOS changes the names of classes as follows: The name of subclass 8.2 is changed from "Maritime wetlands" into "coastal wetlands" to be in line with the class name at MAES Level 1. Accordingly, the name of subclass 8.2 from "Marine waters" into "Coastal waters" The name of subclass 8.1.1.2 is changed from "Salt marshes with reeds" into "Salt marshes with saline/brackish reeds". The name of subclass 8.2.2 from "Estuaries" into "River estuaries and estuarine waters of deltas". Attributes are introduced for water regime: - Permanently flooded - Seasonally - intermittently flooded - Permanently wet - Temporary wet - Tidally flooded for human use: - Aquaculture - Salt extraction

MAES L1	MAES (L1-4) Description	RZ project modifications	SWOS modifications
9.Rivers and lakes	Water courses and lakes and reservoir is the division of MAES Level 2. Water courses are separated according to their morphology into the riparian systems in MAES Level 3: interconnected rivers, streams or springs and separated water bodies belonging to the river systems (oxbow lakes or dead side-arms, flood ponds, etc.) MAES Level 4 subdivides Lakes and Reservoirs (which is both MAES Level 2 and MAES level 3) into Natural and Artificial water bodies	At MAES Level 4 excludes the initial subclasses and introduces the following: 9.1.1.1 Permanent interconnected running water courses 9.1.1.2 Intermittently running water courses 9.1.1.3 Highly modified natural water courses and canals 9.1.2.1 Permanent separated water bodies belonging to the river system 9.2.1.1 Natural water bodies 9.2.1.3 Pond and lakes with completely man-made structure 9.2.1.4 Intensively managed fish ponds 9.2.1.4 Standing water bodies of extractive mineral sites	RZ modification is partially adopted. SWOS keeps the initial MAES subclasses of the 2nd level subclasses and introduces additional (to those of RZ) subclasses at 4th Level 9.1.2.2 Seasonal/intermittent separated water bodies belonging to the river system (dead side-arms, flood ponds…) 9.2.1.2 Natural seasonal/intermittent water bodies (over 8 ha). 9.2.2.4 Other reservoirs / barrages / dams / impoundments etc (generally over 8 ha). 9.2.2.5 Inland saltpans Also, SWOS changes class names of: 9.1.1.2 by adding the word “Seasonal” 9.2.1.1 by adding the word “permanent” and of: 9.2 Lakes and reservoirs by adding the word “ponds” Attributes are introduced: For water salinity: - Fresh - Brackish - Saline For aquatic bed vegetation on water surfaces: - Dominated by aquatic bed vegetation. For human use: - Intensively used fish ponds with low degree of naturalness (for 9.2.2.2) - Abandoned or not intensively used fish ponds with a high degree of naturalness (for 9.2.2.2) - Modified river course (for 9.2.2.4)

MAES L1	MAES (L1-4) Description	RZ project modifications	SWOS modifications
10. (Marine) Other	The coastal areas refer to coastal, shallow, marine systems that experience significant land-based influences (MAES Level 2, 3 and 4 Marine –other-) not included in lagoons, coastal wetlands or estuaries.	None.	SWOS Keeps the 1st and 2nd level equal as so far appear in the initial MAES typology and introduces two subclasses at the 3rd level: 10.1.1 Marine waters less than six metres deep at low tide 10.1.2 Marine waters depth deeper than 6 m at low tide The first one is considered as wetland ecosystem (corresponds to Ramsar type “A”, “B”, “C”, “D”). Part of the second one might be included in the assessments of wetland ecosystems in the case of waters deeper than six meters, as well as islands that are included within the boundaries of protected wetlands.

2.2 Cross-walks: MAES version of SWOS along with EUNIS, Annex I, CLC and Ramsar types

Table 4a presents the cross walks between the SWOS modified MAES wetland classes with the 3rd level EUNIS classes and the Annex I habitat types. Table 4b presents the cross walks between the SWOS modified MAES with CLC and the Ramsar types in the case of the wetland classes. The table shows that correspondences do not always work one to one but one to many or many to one. The cells in blue represent classes for wetland ecosystems.

Table 4a: Cross walk of SWOS modified wetland closes with EUNIS and Annex I habitat types

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
				1 URBAN
				1.1 Urban Fabric, industrial, commercial, public, military and private units
				1.1.1 Dense to medium dense Urban Fabric (IM.D. 30-100% + industrial, commercial, public, military and private units)
				1.1.1.1 Continuous urban fabric (in-situ based or IM.D. 80 - 100%)
				1.1.1.2 Dense urban fabric (in-situ based or IM.D. 30-80% + industrial, commercial, public, military and private units)
				1.1.1.3 Industrial or commercial units
				1.1.2 Low density Urban Fabric (IM.D. 0-30%)
				1.2 Transport infrastructure (all modess)
				1.2.1 Transport infrastructure (all modes)
				1.2.1.1 Road networks and associated land
				1.2.1.2 Railways and associated land
				1.2.1.3 Port areas
				1.2.1.4 Airports
				1.3 Mineral extraction, dump and construction sites, land without current use
				1.3.1 Mineral extraction, dump and construction sites
				1.3.2 Land without current use
				1.4 Green urban + sports + leisure facilities
				1.4.1 Green urban areas

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
				1.4.1.1 Green urban areas T.C.D. >=30%
				1.4.1.2 Green urban areas T.C.D. <30%
				1.4.2 Sports and leisure facilities
				1.4.2.1 Sports and leisure facilities T.C.D. >=30%
				1.4.2.2 Sports and leisure facilities T.C.D. <30%
				2 CROPLANDS
				2.1 Arable land
				2.1.1 Non-irrigated arable land
				2.1.2 Greenhouses
				2.1.3 Irrigated arable land and rice fields
no Annexl habitat type		I1.4	Inundated or inundatable croplands, including rice fields	2.1.3.1 Rice fields
				2.2 Permanent crops
				2.2.1 Vineyards
				2.2.2 Fruit trees and berry plantations
				2.2.2.1 High stem fruit trees (extensively managed)
				2.2.2.2 Low stem fruit trees and berry plantations
				2.2.3 Olive groves
				2.3 Heterogeneous agricultural areas
				2.3.1 Annual crops associated with permanent crops
				2.3.2 Complex cultivation patterns
				2.3.3 Land principally occupied by agriculture with significant areas of natural vegetation
				2.3.4 Agro-forestry T.C.D. > 30%
				2.3.5 Agro-forestry T.C.D. < 30%
				3 WOODLAND AND FORESTS
				3.1 Broadleaved forest
92B0	<	G1.1	Riparian and gallery woodland, with dominant alder, birch, poplar or willow	3.1.1 Riparian and fluvial broadleaved forest
92A0	#			
91E0	#			
'92C0	<	G1.3	Mediterranean riparian woodland	
92A0	#			

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
no Annexl habitat type		G1.4	Broadleaved swamp woodland not on acid peat	3.1.2 Broadleaved swamp forest
9080	<	G1.5	Broadleaved swamp woodland on acid peat	
91D0	#			
				3.1.3 Other natural & semi-natural broadleaved forest
				3.1.4 Broadleaved evergreen forest
				3.1.5 Highly artificial broadleaved plantations
				3.2 Coniferous forest
				3.2.1 Riparian and fluvial coniferous forest
'91D0	#	G3.D	Boreal bog conifer woodland	3.2.2 Coniferous swamp forest
'91D0	#	G3.E	Nemoral bog conifer woodland	
				3.2.3 Other natural & semi-natural coniferous forest
				3.2.4 Highly artificial coniferous plantations
				3.3 Mixed forest
91F0	<	G1.2	Mixed riparian floodplain and gallery woodland	3.3.1 Riparian and fluvial mixed forest
91E0	#			
9030	<	G5.6	Mixed swamp woodland	3.3.2 Mixed swamp forest
no Annexl habitat type		G4.1		
				3.3.3 Other natural & semi-natural mixed forest
				3.3.4 Highly artificial mixed plantations
				3.4 Transitional woodland scrub
				3.5 Damaged forests
				4 GRASSLAND
				4.1 Dry grasslands
				4.1.1 Managed dry grasslands
				4.1.2 Natural dry grasslands
				4.2 Mesic grasslands
				4.1.1 Managed mesic grasslands
				4.1.2 Natural mesic grasslands

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
6420	=	E3.1	Mediterranean tall humid grassland	4.3 Wet grasslands
6460	<			
no Annexl habitat type		E3.2	Mediterranean short humid grassland	
no Annexl habitat type		E3.3	Sub-mediterranean humid meadows	
6440	<	E3.4	Moist or wet eutrophic and mesotrophic grassland	
6450	<			
'6410	<	E3.5	Moist or wet oligotrophic grassland	
3280	#	E5.4	Moist or wet tall-herb and fern fringes and meadows	
6430	#			
6430	#	E5.5	Subalpine moist or wet tall-herb and fern stands	
6420	=	E3.1	Mediterranean tall humid grassland	4.3.1 Managed or grazed wet meadow or pasture
6460	<			
no Annexl habitat type		E3.2	Mediterranean short humid grassland	
no Annexl habitat type		E3.3	Sub-mediterranean humid meadows	
6440	<	E3.4	Moist or wet eutrophic and mesotrophic grassland	
6450	<			
'6410	<	E3.5	Moist or wet oligotrophic grassland	
6420	=	E3.1	Mediterranean tall humid grassland	4.3.2 Natural seasonally or permanently wet grasslands
6460	<			

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
no Annexl habitat type		E3.2	Mediterranean short humid grassland	
no Annexl habitat type		E3.3	Sub-mediterranean humid meadows	
6440	<	E3.4	Moist or wet eutrophic and mesotrophic grassland	
6450	<			
'6410	<	E3.5	Moist or wet oligotrophic grassland	
				5 HEATHLAND AND SCRUB
				5.1 Moors and heathland
				5.1.1 Moors and heathland
				5.1.1.1 Heathland and moorlands
				5.1.1.2 Other scrub land
'4010	<	F4.1	Wet heaths	5.1.1.3 Wet heaths
'4020	<			
3240	<	F9.1	Riverine scrub	
3230	#			
no Annexl habitat type		F9.2	Willow carr and fen scrub	5.1.1.4 Riverine and fen scrubs
92D0	=	F9.3	Southern riparian galleries and thickets	
				5.2 Sclerophyllous vegetation
				5.2.1 Sclerophyllous vegetation
				6 SPARSELY VEGETATED LAND
				6.1 Sparsely vegetated areas
				6.1.1 Sparsely vegetated areas
				6.2 Bare soil, rock, perennial snow & ice
				6.2.1 Beaches, dunes without vegetation, sands

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
'1210	#	B2.1	Shingle beach driftlines	6.2.1.1 Beaches
1610	#			
no Annexl habitat type		B2.2	Unvegetated mobile shingle beaches above the driftline	
1220	=	B2.3	Upper shingle beaches with open vegetation	
'1210	#	B1.1	Sand beach driftlines	
1640	#			
1610	#	B1.2	Sand beaches above the drift line	
1640	#			
1640	#	B1.3	Shifting coastal dunes	6.2.1.2 Coastal and fluvial dunes without vegetation
2110	>			
2120	>			
3220	<	C3.5	Periodically inundated shores with pioneer and ephemeral vegetation	6.2.1.3 River banks
3250	<			
3270	<			
3130	#			
no Annexl habitat type		C3.6	Unvegetated or sparsely vegetated shores with soft or mobile sediments	
no Annexl habitat type		C3.7	Unvegetated or sparsely vegetated shores with non-mobile substrates	
				6.2.2 Bare rocks, glaciers and perpetual snow
				6.2.2.1 Bare rocks and rock debris
				6.2.2.2 Glaciers and perpetual snow
				7 INLAND MARSHES AND OPEN MIRES

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
				7.1 Inland marshes (small ponds below 8 ha might be included)
				7.1.1 Inland freshwater marshes (small ponds below 8 ha might be included)
1150	#	C3.4	Species-poor beds of low-growing water-fringing or amphibious vegetation	7.1.1.1 Inland freshwater marshes without reeds (small ponds below 8 ha might be included)
3110	#			
3120	#			
3130	#			
3170	#			
no Annexl habitat type		D5.3	Swamps and marshes dominated by Juncus effusus or other large Juncus spp.	
no Annexl habitat type		C3.1	Species-rich helophyte beds	7.1.1.2 Inland freshwater marshes with reeds (small ponds below 8 ha might be included)
no Annexl habitat type		C3.2	Water-fringing reedbeds and tall helophytes other than canes	
no Annexl habitat type		C3.3	Water-fringing beds of tall canes	
no Annexl habitat type		D5.1	Reedbeds normally without free-standing water	
7210	<	D5.2	Beds of large sedges normally without free-standing water	

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
				7.1.2 Inland saline or brackish marshes (small ponds below 8 ha might be included)
1340	<	D6.1	Inland saltmarshes	7.1.2.1 Inland saline or brackish marshes without reeds (small ponds below 8 ha might be included)
1510	#	E6.1	Mediterranean inland salt steppes	
1530	<	E6.2	Continental inland salt steppes	
1410	#	D6.2	Inland saline or brackish species-poor helophyte beds normally without free-standing water	7.1.2.2 Inland saline or brackish marshes with reeds (small ponds below 8 ha might be included)
				7.2 Open mires
				7.2.1 Bogs
'7120	<	D1.1	Raised bogs	7.2.1.1 Raised bogs
'7130	>	D1.2	Blanket bogs	7.2.1.2 Blanket bogs
				7.2.2 Fens
no Annexl habitat type		D2.2	Poor fens and soft-water spring mires	7.2.2.1 Poor fens
7160	<	D4.1	Rich fens, including eutrophic tall-herb fens and calcareous flushes and soaks	7.2.2.2 Rich fens
'7230	=			
				7.2.3 Mixed mires (mixture of ombrotrophic & minerotrophic)
'7320	=	D3.1	Palsa mires	7.2.3.1 Palsa mires
'7310	=	D3.2	Aapa mires	7.2.3.2 Aapa mires
no Annexl habitat type		D3.3	Polygon mires	7.2.3.3 Polygon mires
				7.2.4 Other mires
'7140	<	D2.3	Transition mires and quaking bogs	7.2.4.1 Transition mires and quaking bogs
'7150	<			

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
no Annexl habitat type		D2.1	Valley mires	7.2.4.2 Valley mires
				7.2.5 Peat extraction, hydrological modifications
				8 COASTAL MARSHES, WATERS, FLATS
				8.1 Salt marshes
1330	<	A2.5	Coastal saltmarshes and saline reedbeds	8.1.1 Salt marshes without reeds
'1630	<			
'1420	<			
'1310	<			
'1320	<			
2190	#	B1.8	Moist and wet dune slacks	
no Annexl habitat type		A2.5	Coastal saltmarshes and saline reedbeds	8.1.2 Salt marshes with reeds
				8.2 Coastal waters
'1150	>	X02	Saline coastal lagoons	8.2.1 Coastal lagoons
1160	>	X02		
'1150	>	X03	Brackish coastal lagoons	
'1130	=	X01	Estuaries	8.2.2 River estuaries and estuarine waters of deltas
no Annexl habitat type		J5.12	Saltworks	8.3 Coastal saltpans (highly artificial salinas)
1140	#	A2.1	Littoral coarse sediment	8.4 Intertidal flats
	>	A2.2	Littoral sand and muddy sand	

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
	>	A2.3	Littoral mud	
	#	A2.4	Littoral mixed sediments	
	#	A2.6	Littoral sediments dominated by aquatic angiosperms	
				9 RIVERS AND LAKES
				9.1 Water courses
				9.1.1 Interconnected running water courses
3210	#	C2.2	Permanent non-tidal, fast, turbulent watercourses	
3260	#			
3260	#	C2.3	Permanent non-tidal, smooth-flowing watercourses	9.1.1.1 Permanent Interconnected running water courses
no AnnexI habitat type		C2.4	Tidal rivers, upstream from the estuary	
'3290	<	C2.5	Temporary running waters	9.1.1.2 Seasonal/intermittent interconnected running water courses
no AnnexI habitat type		J5.2	Highly artificial saline and brackish running waters	9.1.1.3 Highly modified natural water courses and canals
no AnnexI habitat type		J5.4	Highly artificial non-saline running waters	
				9.1.2 Separated water bodies belonging to the river system (dead side-arms, flood ponds below 8 ha)
'3110	<	C1.1	Permanent oligotrophic	9.1.2.1 Permanent separated water bodies belonging to

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
3120	<		lakes, ponds and pools	the river system (dead side-arms, flood ponds below 8 ha)
3140	#			
2190	#			
31A0	<	C1.2	Permanent mesotrophic lakes, ponds and pools	
'3130	<			
3140	#			
'3190	<			
3150	#	C1.3	Permanent eutrophic lakes, ponds and pools	
3160	#	C1.4	Permanent dystrophic lakes, ponds and pools	
7110	#			
no Annexl habitat type		C1.5	Permanent inland saline and brackish lakes, ponds and pools	
'3180	<	C1.6	Temporary lakes, ponds and pools	9.1.2.2 Seasonal/intermittent separated water bodies belonging to the river system (dead side-arms, flood ponds below 8 ha)
				9.2 Lakes, ponds and reservoirs
				9.2.1 Natural water bodies
'3110	<	C1.1	Permanent oligotrophic lakes, ponds and pools	9.2.1.1 Natural permanent water bodies (over 8 ha)
3120	<			
3140	#			
2190	#			
31A0	<	C1.2	Permanent mesotrophic lakes, ponds and pools	
'3130	<			
3140	#			

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
'3190	<			
3150	#	C1.3	Permanent eutrophic lakes, ponds and pools	
3160	#	C1.4	Permanent dystrophic lakes, ponds and pools	
7110	#			
no Annexl habitat type		C1.5	Permanent inland saline and brackish lakes, ponds and pools	
'3180	<	C1.6	Temporary lakes, ponds and pools	9.2.1.2 Natural seasonal/intermittent water bodies (over 8 ha)
3130	#	C3.5		
no Annexl habitat type		C3.6		
no Annexl habitat type		C3.7		
				9.2.2 Man made water bodies
no Annexl habitat type		J5.1	Highly artificial saline and brackish standing waters	9.2.2.1 Ponds and lakes with completely man-made structure (generally below 8 ha)
no Annexl habitat type		J5.3	Highly artificial non-saline standing waters	
no Annexl habitat type		J5.1	Highly artificial saline and brackish standing waters	9.2.2.2 Artificial fish ponds

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
no Annexl habitat type		J5.3	Highly artificial non-saline standing waters	
no Annexl habitat type		J5.1	Highly artificial saline and brackish standing waters	9.2.2.3 Standing water bodies of extractive mineral sites
no Annexl habitat type		J5.3	Highly artificial non-saline standing waters	
no Annexl habitat type		J5.1	Highly artificial saline and brackish standing waters	9.2.2.4 Other reservoirs/barrages/dams/impoundments etc (generally over 8 ha)
no Annexl habitat type		J5.3	Highly artificial non-saline standing waters	
no Annexl habitat type		J5.1	Highly artificial saline and brackish standing waters	9.2.2.5 Inland saltpans
				10 MARINE
				10.1 Marine
1160	#	A1.1	High energy littoral rock	10.1.1 Marine waters less than six metres deep at low tide
1170	#			
1160	#	A1.2	Moderate energy littoral rock	
1170	#			
1160	#	A1.3	Low energy littoral rock	
1170	#			
1160	#	A1.4	Features of littoral rock	
1170	#			
8330	#			
1160	#	A2.1	Littoral coarse sediment	

Annex I	Annex I_ EUNIS Relation	EUNIS Level 3 Class Code	EUNIS Level 3 Class Name	MAES Class Name and Code (as modified by SWOS H2020 project)
1160	#	A2.2	Littoral sand and muddy sand	
1160	#	A2.3	Littoral mud	
1160	#	A2.4	Littoral mixed sediments	
				10.1.2 Marine waters depth deeper than 6 m at low tide

Table 4b: Cross walk of SWOS modified MAES with CLC and Ramsar wetland types

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
1 URBAN	1		
1.1 Urban Fabric, industrial, commercial, public, military and private units	1		
1.1.1 Dense to medium dense Urban Fabric (IM.D. 30-100% + industrial, commercial, public, military and private units)	1.1		
1.1.1.1 Continuous urban fabric (in-situ based or IM.D. 80 - 100%)	1.1.1		
1.1.1.2 Dense urban fabric (in-situ based or IM.D. 30-80% + industrial, commercial, public, military and private units)	1.1.1		
1.1.1.3 Industrial or commercial units	1.2.1		
1.1.2 Low density Urban Fabric (IM.D. 0-30%)	1.1.2		
1.2 Transport infrastructure (all modess)	1.2.2		
1.2.1 Transport infrastructure (all modes)	1.2.2		
1.2.1.1 Road networks and associated land	1.2.2		
1.2.1.2 Railways and associated land	1.2.2		
1.2.1.3 Port areas	1.2.3		
1.2.1.4 Airports	1.2.4		
1.3 Mineral extraction, dump and construction sites, land without current use	1.3		
1.3.1 Mineral extraction, dump and construction sites	1.3		
1.3.2 Land without current use	1.3		
1.4 Green urban + sports + leisure facilities	1.4		
1.4.1 Green urban areas	1.4.1		
1.4.1.1 Green urban areas T.C.D. >=30%	1.4.1		
1.4.1.2 Green urban areas T.C.D. <30%	1.4.1		
1.4.2 Sports and leisure facilities	1.4.2		
1.4.2.1 Sports and leisure facilities T.C.D. >=30%	1.4.2		
1.4.2.2 Sports and leisure facilities T.C.D. <30%	1.4.2		
2 CROPLANDS	2.1.1		
2.1 Arable land	2.1		
2.1.1 Non-irrigated arable land	2.1.1		
2.1.2 Greenhouses	2		
2.1.3 Irrigated arable land and rice fields	2.1.2		

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
2.1.3.1 Rice fields	**2.1.3**	<	3 -- Irrigated land; includes irrigation channels and rice fields.
2.2 Permanent crops	2.2		
2.2.1 Vineyards	2.2.1		
2.2.2 Fruit trees and berry plantations	2.2.2		
2.2.2.1 High stem fruit trees (extensively managed)	2.2.2		
2.2.2.2 Low stem fruit trees and berry plantations	2.2.2		
2.2.3 Olive groves	2.2.3		
2.3 Heterogeneous agricultural areas	2.4.1		
2.3.1 Annual crops associated with permanent crops	2.4.1		
2.3.2 Complex cultivation patterns	2.4.2		
2.3.3 Land principally occupied by agriculture with significant areas of natural vegetation	2.4.3		
2.3.4 Agro-forestry T.C.D. > 30%	2.4.4		
2.3.5 Agro-forestry T.C.D. < 30%	2.4.4		
3 WOODLAND AND FORESTS	3.1+3.2 .1+3.2. 4+3.3.4	>	Xf -- Freshwater, tree-dominated wetlands.
3.1 Broadleaved forest	3.1.1	>	Xf -- Freshwater, tree-dominated wetlands.
3.1.1 Riparian and fluvial broadleaved forest	3.1.1	<	Xf -- Freshwater, tree-dominated wetlands
3.1.2 Broadleaved swamp forest	3.1.1	=	Xp -- Forested peatlands; peatswamp forests
3.1.3 Other natural & semi-natural broadleaved forest	3.1.1		
3.1.4 Broadleaved evergreen forest	3.1.1		
3.1.5 Highly artificial broadleaved plantations	3.1.1		
3.2 Coniferous forest	3.1.2		
3.2.1 Riparian and fluvial coniferous forest	3.1.2	<	Xf -- Freshwater, tree-dominated wetlands

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
3.2.2 Coniferous swamp forest	3.1.2	=	Xp -- Forested peatlands; peatswamp forests
3.2.3 Other natural & semi-natural coniferous forest	3.1.2		
3.2.4 Highly artificial coniferous plantations	3.1.2		
3.3 Mixed forest	3.1.3		
3.3.1 Riparian and fluvial mixed forest	3.1.3	<	Xf -- Freshwater, tree-dominated wetlands
3.3.2 Mixed swamp forest	3.1.3	=	Xp -- Forested peatlands; peatswamp forests
3.3.3 Other natural & semi-natural mixed forest	3.1.3		
3.3.4 Highly artificial mixed plantations	3.1.3		
3.4 Transitional woodland scrub	3.2.4		
3.5 Damaged forests	3.3.4		
4 GRASSLAND	3.2.1		
4.1 Dry grasslands	3.2.1		
4.1.1 Managed dry grasslands	2.3.1		
4.1.2 Natural dry grasslands	3.2.1		
4.2 Mesic grasslands	3.2.1		
4.1.1 Managed mesic grasslands	2.3.1		
4.1.2 Natural mesic grasslands	3.2.1		
4.3 Wet grasslands	3.2.1	<	Ts -- Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes. Ss -- Seasonal/intermittent saline/brackish/alkaline marshes/pools. 4 -- Seasonally flooded agricultural land (including intensively managed or grazed wet meadow or pasture).
4.3.1 Managed or grazed wet meadow or pasture	2.3.1	=	4 -- Seasonally flooded agricultural land (including intensively managed or grazed wet meadow or pasture).
4.3.2 Natural seasonally or permanently wet grasslands	3.2.1	=	Ts -- Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes. Ss --

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
			Seasonal/intermittent saline/brackish/alkaline marshes/pools.
5 HEATHLAND AND SCRUB	3.2.2 + 3.2.3		
5.1 Moors and heathland	3.2.2		
5.1.1 Moors and heathland	3.2.2		
5.1.1.1 Heathland and moorlands	3.2.2		
5.1.1.2 Other scrub land	3.2.3		
5.1.1.3 Wet heaths	3.2.2	<	W -- Shrub-dominated wetlands.
5.1.1.4 Riverine and fen scrubs	3.2.3	<	W -- Shrub-dominated wetlands.
5.2 Sclerophyllous vegetation	3.2.3		
5.2.1 Sclerophyllous vegetation	3.2.3		
6 SPARSELY VEGETATED LAND	3.3.3		
6.1 Sparsely vegetated areas	3.3.3		
6.1.1 Sparsely vegetated areas	3.3.3		
6.2 Bare soil, rock, perennial snow & ice	3.3.1		
6.2.1 Beaches, dunes without vegetation, sands	3.3.1		
6.2.1.1 Beaches	3.3.1	=	E-- Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks. & D -- Rocky marine shores; includes rocky offshore islands, sea cliffs.
6.2.1.2 Coastal and fluvial dunes without vegetation	3.3.1	<	E-- Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.
6.2.1.3 River banks	3.3.1	<	E-- Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks. & D -- Rocky marine shores; includes rocky offshore islands, sea cliffs.
6.2.2 Bare rocks, glaciers and perpetual snow	3.3.2+3.3.4+3.3.5		
6.2.2.1 Bare rocks and rock debris	3.3.2		
6.2.2.2 Glaciers and perpetual snow	3.3.5		

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
7 INLAND MARSHES AND OPEN MIRES	4.1	=	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. Sp -- Permanent saline/brackish/alkaline marshes/pools. Ss -- Seasonal/intermittent saline/brackish/alkaline marshes/pools. Y -- Freshwater springs; oases. U -- Non-forested peatlands; includes shrub or open bogs, swamps, fens.
7.1 Inland marshes (small ponds below 8 ha might be included)	4.1.1	=	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. Sp -- Permanent saline/brackish/alkaline marshes/pools. Ss -- Seasonal/intermittent saline/brackish/alkaline marshes/pools.
7.1.1 Inland freshwater marshes (small ponds below 8 ha might be included)	4.1.1	=	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. Y -- Freshwater springs; oases.

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
7.1.1.1 Inland freshwater marshes without reeds (small ponds below 8 ha might be included)	4.1.1	<	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. Y -- Freshwater springs; oases.
7.1.1.2 Inland freshwater marshes with reeds (small ponds below 8 ha might be included)	4.1.1	<	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. Y -- Freshwater springs; oases.
7.1.2 Inland saline or brackish marshes (small ponds below 8 ha might be included)	4.1.1	=	Sp -- Permanent saline/brackish/alkaline marshes/pools. Ss -- Seasonal/intermittent saline/brackish/alkaline marshes/pools.
7.1.2.1 Inland saline or brackish marshes without reeds (small ponds below 8 ha might be included)	4.1.1	<	Sp -- Permanent saline/brackish/alkaline marshes/pools. Ss -- Seasonal/intermittent saline/brackish/alkaline marshes/pools.
7.1.2.2 Inland saline or brackish marshes with reeds (small ponds below 8 ha might be included)	4.1.1	<	Sp -- Permanent saline/brackish/alkaline marshes/pools. Ss -- Seasonal/intermittent saline/brackish/alkaline marshes/pools.
7.2 Open mires	4.1.2	<	U -- Non-forested peatlands; includes shrub or open bogs, swamps, fens.

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
7.2.1 Bogs	4.1.2	<	U -- Non-forested peatlands; includes shrub or open bogs, swamps, fens.
7.2.1.1 Raised bogs	4.1.2		
7.2.1.2 Blanket bogs	4.1.2		
7.2.2 Fens	4.1.2		
7.2.2.1 Poor fens	4.1.2		
7.2.2.2 Rich fens	4.1.2		
7.2.3 Mixed mires (mixture of ombrotrophic & minerotrophic)	4.1.2		
7.2.3.1 Palsa mires	4.1.2	<	U -- Non-forested peatlands; includes shrub or open bogs, swamps, fens.
7.2.3.2 Aapa mires	4.1.2		
7.2.3.3 Polygon mires	4.1.2		
7.2.4 Other mires	4.1.2		
7.2.4.1 Transition mires and quaking bogs	4.1.2		
7.2.4.2 Valley mires	4.1.2		
7.2.5 Peat extraction, hydrological modifications	4.1.2		
8 COASTAL MARSHES, WATERS, FLATS	4.2+5.2.1+5.2.2	=	H -- Intertidal marshes; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes. 5 -- Salt exploitation sites; salt pans, salines, etc. G -- Intertidal mud, sand or salt flats. K -- Coastal freshwater lagoons; includes freshwater delta lagoons. F -- Estuarine waters; permanent water of estuaries and estuarine systems of deltas. J -- Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea.

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
8.1 Salt marshes	4.2	=	H -- Intertidal marshes; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes.
8.1.1 Salt marshes without reeds	4.2.1	<	H -- Intertidal marshes; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes.
8.1.2 Salt marshes with reeds	4.2.1	<	H -- Intertidal marshes; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes.
8.2 Coastal waters		=	K -- Coastal freshwater lagoons; includes freshwater delta lagoons. F -- Estuarine waters; permanent water of estuaries and estuarine systems of deltas. J -- Coastal brackish/saline lagoons; brackish to saline lagoons with at least one relatively narrow connection to the sea.
8.2.1 Coastal lagoons	5.2.1	=	J -- 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 freshwater lagoons; includes freshwater delta lagoons.
8.2.2 River estuaries and estuarine waters of deltas	5.2.2	=	F -- Estuarine waters; permanent water of estuaries and estuarine systems of deltas.
8.3 Coastal saltpans (highly artificial salinas)	4.2.2	=	5 -- Salt exploitation sites; salt pans, salines, etc.

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
8.4 Intertidal flats	4.2.3	=	G -- Intertidal mud, sand or salt flats.
9 RIVERS AND LAKES	5.1	=	M-- Permanent rivers/streams/creeks; includes waterfalls. N -- Seasonal/intermittent/irregular rivers/streams/creeks. 9 -- Canals and drainage channels, ditches. O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes. Q -- Permanent saline/brackish/alkaline lakes. P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes. R -- Seasonal/intermittent saline/brackish/alkaline lakes and flats. 2 -- Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha). 6 -- Water storage areas; reservoirs/barrages/dams/impoundments (generally over 8 ha). 1 -- Aquaculture (e.g., fish/shrimp) ponds. 7 -- Excavations; gravel/brick/clay pits; borrow pits, mining pools. 8 -- Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc.
9.1 Water courses	5.1.1	=	M-- Permanent rivers/streams/creeks; includes waterfalls. N -- Seasonal/intermittent/irregular rivers/streams/creeks. 9 --

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
			Canals and drainage channels, ditches.
9.1.1 Interconnected running water courses	5.1.1	=	M-- Permanent rivers/streams/creeks; includes waterfalls. N -- Seasonal/intermittent/irregular rivers/streams/creeks. 9 -- Canals and drainage channels, ditches.
9.1.1.1 Permanent Interconnected running water courses	5.1.1	=	M-- Permanent rivers/streams/creeks; includes waterfalls.
9.1.1.2 Seasonal/intermittent interconnected running water courses	5.1.1	=	N -- Seasonal/intermittent/irregular rivers/streams/creeks.
9.1.1.3 Highly modified natural water courses and canals	5.1.1	>	9 -- Canals and drainage channels, ditches.
9.1.2 Separated water bodies belonging to the river system (dead side-arms, flood ponds below 8 ha)	5.1.1	<	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.
9.1.2.1 Permanent separated water bodies belonging to the river system (dead side-arms, flood ponds below 8 ha)	5.1.1	<	O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes. 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.
9.1.2.2 Seasonal/intermittent separated water bodies belonging to the river system (dead side-arms, flood ponds below 8 ha)	5.1.1	<	P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes. Ts -- Seasonal/intermittent freshwater marshes/pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
9.2 Lakes, ponds and reservoirs	5.1.2	=	O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes. Q -- Permanent saline/brackish/alkaline lakes. P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes. R -- Seasonal/intermittent saline/brackish/alkaline lakes and flats. 2 -- Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha). 6 -- Water storage areas; reservoirs/barrages/dams/impoundments (generally over 8 ha). 1 -- Aquaculture (e.g., fish/shrimp) ponds. 7 -- Excavations; gravel/brick/clay pits; borrow pits, mining pools. 8 -- Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc.
9.2.1 Natural water bodies	5.1.2	=	O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes. Q -- Permanent saline/brackish/alkaline lakes. P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes. R -- Seasonal/intermittent saline/brackish/alkaline lakes and flats.
9.2.1.1 Natural permanent water bodies (over 8 ha)	5.1.2	=	O -- Permanent freshwater lakes (over 8 ha); includes large oxbow lakes. Q -- Permanent saline/brackish/alkaline lakes.
9.2.1.2 Natural seasonal/intermittent water bodies (over 8 ha)	5.1.2	=	P -- Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes. R -- Seasonal/intermittent saline/brackish/alkaline lakes and flats. Vt -- Tundra wetlands; includes tundra pools, temporary waters from snowmelt.

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
9.2.2 Man made water bodies	5.1.2	=	2 -- Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha). 6 -- Water storage areas; reservoirs/barrages/dams/impoundments (generally over 8 ha). 1 -- Aquaculture (e.g., fish/shrimp) ponds. 7 -- Excavations; gravel/brick/clay pits; borrow pits, mining pools. 8 -- Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc.
9.2.2.1 Ponds and lakes with completely man-made structure (generally below 8 ha)	5.1.2	=	2 -- Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha). 8 -- Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc.
9.2.2.2 Artificial fish ponds	5.1.2	=	1 -- Aquaculture (e.g., fish/shrimp) ponds
9.2.2.3 Standing water bodies of extractive mineral sites	5.1.2	=	7 -- Excavations; gravel/brick/clay pits; borrow pits, mining pools.
9.2.2.4 Other reservoirs/barrages/dams/impoundments etc (generally over 8 ha)	5.1.2	=	6 -- Water storage areas; reservoirs/barrages/dams/impoundments (generally over 8 ha). 8 -- Wastewater treatment areas; sewage farms, settling ponds, oxidation basins, etc.
9.2.2.5 Inland saltpans	1.3	=	5 -- Salt exploitation sites; salt pans, salines, etc.

MAES Class Name and Code (as modified by SWOS H2020 project)	CLC	MAES_Ramsar Relation	Ramsar wetland type (code and name)
10 MARINE	5.2.3		
10.1 Marine	5.2.3	>	A-- Permanent shallow marine waters in most cases less than six metres deep at low tide; includes sea bays and straits. B -- Marine subtidal aquatic beds; includes kelp beds, sea-grass beds, tropical marine meadows. C -- Coral reefs. D -- Rocky marine shores; includes rocky offshore islands, sea cliffs.
10.1.1 Marine waters less than six metres deep at low tide	5.2.3	=	A-- Permanent shallow marine waters in most cases less than six metres deep at low tide; includes sea bays and straits. B -- Marine subtidal aquatic beds; includes kelp beds, sea-grass beds, tropical marine meadows. C -- Coral reefs. D -- Rocky marine shores; includes rocky offshore islands, sea cliffs.
10.1.2 Marine waters depth deeper than 6 m at low tide	5.2.3		

3. Next steps

The modifications that SWOS proposes to the MAES nomenclature as discsused in this document, aim at supporting practicioners in delineating wetlands as ecosystems connected with broader landscapes in hydrological and ecological terms.

The ongoing efforts within SWOS nomenclature are now centred on testing the feasibility of detecting and of mapping these habitats that will be included in the upcoming *SWOS wetland habitats delineation guidelines (end of 2017)*. The guidelines under development will set the mapping rules for wetland habitat delineation, whenever feasible, and the considerations of these habitats within wetland ecosystem assessments.

It should be nevertheless highlighted that the delineation of this nomenclature may not always be operational at its most detailed levels (levels 3 or 4 in the hierarchical typology) when relying on Earth Observation data or even when using ancillary data. However, the most detailed nomenclature is retained for the sake of completeness, to allow for applications in exceptional cases where a site has abundant ancillary data and there is no risk of confusion between wetland habitats. In the majority of cases however, mapping at higher levels (i.e. levels 1-2) may be the only option for reliable results.

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