

# ***Briefing: Satellite imagery to support European wetland conservation policy actions***

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# SWOS

Satellite-based Wetland  
Observation **Service**



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## Briefing:

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# Satellite imagery to support European wetland conservation policy actions

### *Understanding wetlands*

Wetlands are crucial for their role in providing water-related ecosystem services. In conjunction with their part in erosion control and sediment transport, water filtration and regulation are a few of the many valuable services delivered by wetlands. Despite their multiple values to humankind, wetlands continue to be degraded or lost due to anthropogenic pressures including overexploitation, pollution, and habitat loss due to changes in land use.

There is however **a clear need to better determine wetland ecosystem boundaries**. Pinpointing, differentiating, and delineating their underpinning habitats are preliminary and necessary steps **to accurately map and assess wetland ecosystems and the services they provide**. This would contribute to fill current gaps in European and global policies addressing wetlands and water bodies in a scattered way, which affects the EU Biodiversity Strategy to 2020, the international Convention on Biological Diversity, the Ramsar Convention and the UN Sustainable Development Goals. Each of these policies attempt to conserve and manage these important ecosystems through different measures and interventions.

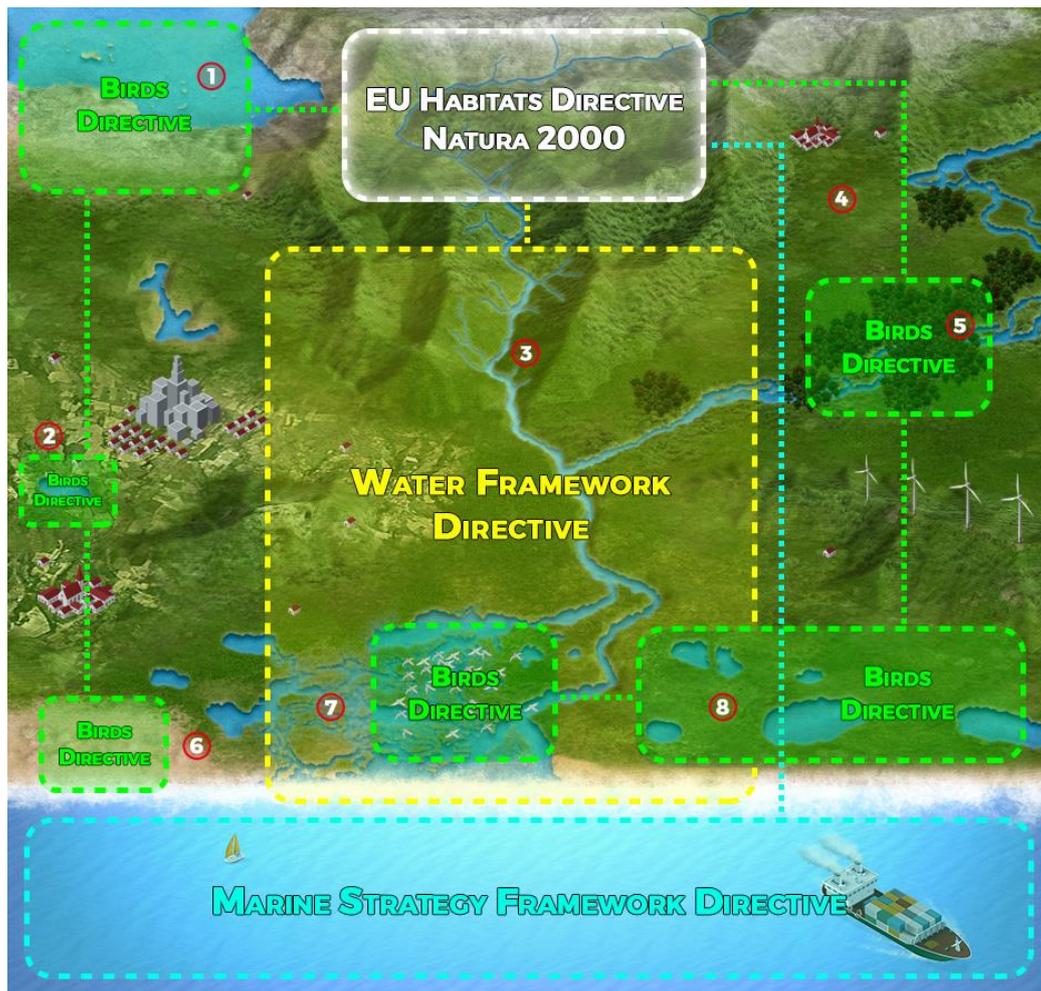
### *Applying technology to assist policy*

Between 2015 and 2018, the Horizon 2020 Satellite-based Wetland Observation Service (SWOS) project has supported such policies by developing and applying science-based methods that aim to standardise wetland definition, identification, delimitation, and delineation. The primary outputs of the project are satellite-based monitoring tools ([SWOS toolbox](#), [SWOS portal](#)) to facilitate improved wetland assessment and monitoring capabilities.

The 2018 report on ***SWOS support for wetlands conservation policy developments in Europe*** seeks to link the SWOS tools, methodologies and indicators to existing policy frameworks. It aims to contribute to the refinement of EU Nature Directives, contribute towards a European environmental model for wetland management, maintenance and protection of their ecosystem services and achieve no net loss and restoration targets for wetland ecosystems. Moreover, the report summarises how SWOS can ensure a better understanding of key elements for wetland monitoring and assessment, namely:

- Definition of wetland ecosystem delimitation;
- Improvement of wetland ecosystem classification;
- Mapping of ecosystem delineation as a prerequisite for wetland inventories
- to better inform about effective wetland extents and its trends; and
- Improvement of wetland ecosystem condition and pressure assessments based on harmonised indicators.

### Wetlands and policies in the EU



The most relevant international policy instruments for wetland ecosystems are the Convention on Biological Diversity (CBD) and the Ramsar Convention (“the wetlands convention”). The compilation of wetland trend analyses by the Ramsar Convention estimates that the global

extent of wetlands has declined between 64 and 71%<sup>1</sup> in the 20<sup>th</sup> century. These downward trends in global wetland extent arise from increased wetland usage by humans and the lack of specific policy

<sup>1</sup>[https://www.ramsar.org/sites/default/files/documents/library/bn7e\\_0.pdf](https://www.ramsar.org/sites/default/files/documents/library/bn7e_0.pdf)

targets and objectives, particularly at regional scales, to address wetland degradation and propose clear objectives for restoration and conservation.

The European Commission's 2015 State of Nature communication highlighted that conservation status assessments show that 51% of habitats related to wetlands have unfavourable status. The European Environment Agency's State of Water assessment in 2012 pointed out that the status of freshwater ecosystems is not good enough, where river and lake ecosystems are the most impacted by modification of their natural condition, pollution, and agriculture; with only half of Europe's designated water bodies estimated to be in good condition.

The EU Biodiversity Baseline 2010 shows that 73% of wetland habitats and 64% of wetland species have an unfavourable status. Hence, measures to meet the goal of ensuring favourable conservation status of these species and habitats are urgently needed to improve the extent and ecological condition of wetlands across Europe, including areas within the Natura 2000 network.

### *SWOS methodologies and satellite-based tools*

The SWOS products, tools and services provide fundamental knowledge to support a more complete consideration of wetland ecosystems by EU environmental policies. Wetlands are highly functional ecological units. Nevertheless, there are no environmental policies with specific focus or clear objectives and targets for wetlands. Therefore, the effective protection, conservation and restoration of European wetland ecosystems become even more challenging and require innovative methodologies and techniques, such as those presented by the SWOS project, to facilitate their attainment. **Through the SWOS project outcomes depicted in the report, background information can be accessed to establish clear links between the Birds and Habitats Directives (Natura 2000 Network), the Water Framework Directive, the EU Flooding Directive, and other wetland-related policies.**

SWOS provides conceptual and practical frameworks for the identification of wetland extent and the assessment of ecosystem conditions and pressures, contributing to processes within the EU Biodiversity Strategy to 2020. This is facilitated through the Mapping and Assessment of Ecosystems and their

Services initiative (MAES Working Group under Action 5), supporting the achievement of the EU Biodiversity and the Aichi Biodiversity targets (e.g. target 5) in Europe.

**The SWOS project began by proposing a “hydro-ecological definition” of wetlands as a basis of the delimitation of this ecosystem<sup>2</sup> as a starting point for an ecosystem-based assessment.**

**The SWOS project addressed the cross-cutting nature of wetlands by developing a common and improved MAES classification, modifying existing classes and adding relevant wetland classes<sup>3</sup>.** This nomenclature proposal, including **cross-walks to other classification systems** (e.g. Ramsar, FAO Land Cover Classification System), together with **mapping tool capabilities (SWOS Toolbox)**, can assist in the standardisation of wetland monitoring methodologies. Additionally, it allows a more detailed definition of wetland classes using the latest technological developments through the **EU Copernicus space programme** (i.e. high-resolution satellite-based data), filling knowledge gaps and ultimately, helping to validate and produce case studies in different European regions.

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<sup>2</sup> [http://swos-service.eu/wp-content/uploads/2016/06/SWOS\\_Wetlands-delimitation-guidelines\\_FINAL\\_v1.1.pdf](http://swos-service.eu/wp-content/uploads/2016/06/SWOS_Wetlands-delimitation-guidelines_FINAL_v1.1.pdf)

<sup>3</sup> [http://swos-service.eu/wp-content/uploads/2016/06/SWOS\\_Wetlands-delimitation-guidelines\\_FINAL\\_v1.1.pdf](http://swos-service.eu/wp-content/uploads/2016/06/SWOS_Wetlands-delimitation-guidelines_FINAL_v1.1.pdf)

**The SWOS project provides mapping tools for a variety of end users, including local managers, national authorities, and NGOs.**

These tools have been developed in line with user requirements and cover a variety of applications; water quality, surface water dynamics, soil moisture, and indicators that will serve reporting and monitoring obligations of different policies at European and global levels.

Furthermore, several methodologies for the assessment of ecosystem service indicators relevant to wetlands have been proposed, such as **flood regulation potential** and **habitat maintenance**.

### *Filling the gaps for comprehensive wetland actions*

The development of an integrating European policy that considers all wetland ecosystems and habitats is required to ensure the conservation of those not currently protected and which include in particular grasslands and coastal wetland habitats.

Such a comprehensive policy could so provide solutions to a more effective wetland restoration and resilience, such as natural water retention measures or green infrastructure (e.g. nature-based solutions). Under the EU Biodiversity Strategy to 2020, the goal of Action 12 is to provide guidance to support the

deployment of green infrastructure for better connectivity of Natura 2000 areas. The SWOS outcomes and case studies in the report provide support in this area.

The EU Water Framework Directive (WFD) has proven to be a valuable policy instrument for maintaining and restoring riverine wetlands. A dedicated document connecting the WFD and wetlands has been produced under the WFD Common Implementation Strategy (*The role of wetlands in the Water Framework Directive, WFD CIS Guidance Document n°12, 2003*). However, the WFD does not provide any specific definition of what a wetland is, nor does it clearly state the extent to which wetlands should be used for the achievement of EU WFD environmental objectives.

The EU Flood Directive addresses flood plains and river basin management for flood risk prevention. Floods are extremely hazardous to human societies, with the greatest and most severe impacts happening in settlements adjacent to water bodies. Additional problems arise with the artificialisation or modification of water body structures and their catchment areas. The capacity to regulate floods is a vital function of wetland ecosystems and can limit the negative effects of water-related disasters. The monitoring capabilities described in the report

demonstrate the potential contribution of SWOS methodologies and tools to the management of extreme events.

### *A policy action agenda post-2020*

The SWOS report looks beyond the current policy framework, aiming at 2020 as a reference year for many targets and actions. The post-2020 agenda at the EU level focuses strongly on progress towards a resource-efficient, low-carbon economy to achieve EU environmental objectives. However, this currently lacks clear policy objectives towards protecting biodiversity, natural capital, and human well-beings.

The SWOS project fulfils the need of better wetland ecosystem observation and quantification through monitoring and assessment by applying spatial information technologies in Europe. The following outputs are mechanisms to support current reporting obligations and the post-2020 agenda with suitable environmental monitoring capabilities and information.

- SWOS developed tools in line with Action 7 of the EU Biodiversity Strategy to 2020: “assess the impact of EU funds on biodiversity and investigate the opportunity of a compensation or offsetting scheme to ensure that there is no net loss of biodiversity and ecosystem services”.

- From an international perspective, focus on the conservation and protection of wetlands is included in the UN Sustainable Development Goals (SDGs), for which indicators, measures and policy are agreed globally by multilateral environmental agreements, most prominently by the Ramsar Convention and the Convention on Biological Diversity.
- SDG 15 (Life on land) includes a target to combat desertification and restore degraded land and soil, whilst striving to achieve a land degradation-neutral world. The concept of “Land Degradation Neutrality” (LDN) requires that degradation is prevented as far as possible, but also reversed by restoring degraded land to counterbalance unavoidable losses. Wetlands are among the highest priorities of ecosystems to be addressed by the LDN principle, due to the historic declining trends and continuing threats.
- Under SDG 6 (Clean water and sanitation) on ensuring the availability and sustainable management of water and sanitation, target 6.6 focuses on the critical importance of water-related ecosystems for the regulation, cycling and provision of freshwater, as well as other ecosystem services. The SWOS project has developed indicators and tools that are specifically helpful to measure the extent of wetland ecosystems.
- Moreover, SWOS provides tools to support local and national authorities to designate suitable wetlands for the *List of Wetlands of International Importance* and to ensure their effective management. The SWOS tools and services also ensure international cooperation on transboundary wetlands and shared wetland systems, as shown in the case of the Skadar Lake across Albania and Montenegro.

All in all, the SWOS project contributes the latest technological developments in remote sensing and information systems tools to help address knowledge gaps and diverse policy needs at different scales. Therefore, the **SWOS project can assist in providing mapping tools and information solutions for a variety of end users** and is in a privileged position **to support the necessary wetlands conservation policy developments leading towards fulfilling the defined targets for 2020 and beyond.**



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