

**Deliverable 2.x.5. from project  
WetMainAreas: e-Publication (via internet)**

**Results of the implementation of project:  
Improving the conservation effectiveness of wetlands  
(WetMainAreas) –  
Transnational Cooperation Programme Balkan-Mediterranean  
2014-2020**



In the frame of project:  
“Improving the conservation effectiveness of  
wetlands”/ WetMainAreas  
Under TNCP Balkan – Mediterranean 2014 –  
2020

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This document was developed in the frame of project BMP1/2.1/2342/2017 „Improving the conservation effectiveness of wetlands” (WetMainAreas), funded under Transnational Cooperation Programme Balkan – Mediterranean 2014-2020, co-funded by the European Union and the national funds of the participating countries. The contents of the document are sole responsibility of the project partners and can in no way be taken to reflect the views of the European Union, the participating countries, the Managing Authority and the Joint Secretariat.

## Introduction

Project „Improving the conservation effectiveness of wetlands“ (WetMainAreas) was launched in September, 2017, under Transnational Cooperation Programme Balkan-Mediterranean 2014-2020 with the main goal to contribute to protection, conservation and development of wetlands, as a shared asset of the Balkan-Mediterranean territory. It comprises partner institutions from 4 different countries (Bulgaria, Greece, Albania and North Macedonia), which helps to overcome national borders and build shared knowledge on wetlands and transnational ecosystems.

The project addresses adequately the transnational challenge for promoting ecological connectivity and transnational ecosystems' integration by focusing on wetlands conservation and scientific policy improvement.

The project area covers the whole Balkan-Mediterranean area, including the territories of Bulgaria, Greece, Cyprus, North Macedonia and Albania (**Figure 1**).

The project tackles the lack of data and the assessment on wetlands connectivity within protected networks.



*Figure 1. Project area*

The main specific objectives are:

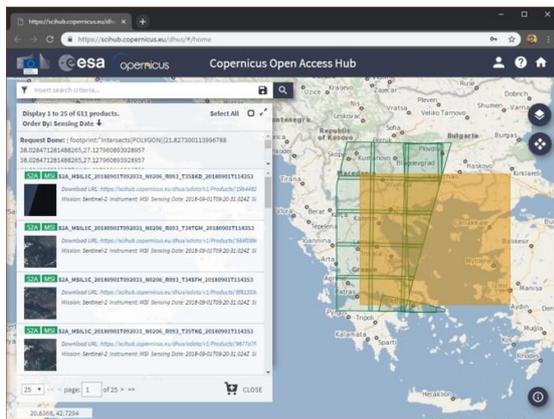
- (i) To assess Balkan-Mediterranean wetland connectivity beyond the boundaries of protected areas and national borders, in order to improve knowledge on ecological connectivity and transnational ecosystems' integration in the Balkan-Mediterranean territory;
- (ii) To support policy and action plans by integrating scientific knowledge into guidance documents, available to everybody and thus improve the capacity of authorities, spatial planners, and developers to take informed decisions and to cooperate towards ecosystem integration and sustainability.

The project's approach is innovative and lies at the edge of nature conservation (ecosystem connectivity), promotion of the whole region and its natural and

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cultural importance and technological - i.e. Earth Observation techniques are applied. Through the help of Sentinel-2 images integration (Figure 2), analysis of new maps and in-situ measurements a comprehensive and updated picture of wetlands over the Balkan-Mediterranean territory is provided as key information source for sustainable management and conservation issues.



**Figure 2.** Processing of Sentinel-2 images

The project encourages partnerships and networking among all relevant actors - public institutions, NGOs, civil society, etc. and shares project findings.

### Project results

**Result: Harmonized database and mapping layers on BalkanMed wetland ecosystems available to everybody through a portal**

More than 8 500 sites of natural and artificial wetlands (Figure 3), with a

minimum size of 0.05 ha have been mapped (excluding rivers and streams). Among them - 2200 in Greece, 5374 in Bulgaria, 692 in Albania, 162 in North Macedonia and 373 in Cyprus. They cover more than 530 000 ha (2% of the Balkan-Mediterranean territory), 1/3 of which is designated as internationally important according to the Ramsar Convention, and is included in the NATURA 2000 and Emerald network as well as in the national designated areas.



**Figure 3.** Wetlands within the project area

The following data sources were used:

- ✓ Sentinel 2 analysis results for water and wetness detection of the year 2017 - mapping and monitoring of water and wetness dynamics using Sentinel-2 multitemporal data for the whole Balkan-Mediterranean translational territory (Bulgaria, Greece, North Macedonia, Albania and Cyprus);

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- ✓ Existing wetland inventories of the countries;
- ✓ Other GIS layers, such as:
  - Copernicus Hydro Data - the Copernicus Land Monitoring Service uses satellite data to provide detailed information on wetland extent, type and changes;
  - Open Street Map Data - OpenStreetMap (OSM) is an open collaborative project to create a free editable map of the world. Volunteers gather location data using GPS, local knowledge, and other free sources of information and upload it;
  - Photointerpretation via Google Earth, World Imagery by ESRI and other base maps.

The first step was to review and analyze the quality of the official and public data sources. Based on this assessment the data sources were rated according their accuracy and were sequentially added to the intermediate layer.

Different GIS techniques and instruments were used to combine the separate features from the different wetland inventories of the countries into one new feature.

The second step of the approach was to process Sentinel 2 raster data. The data

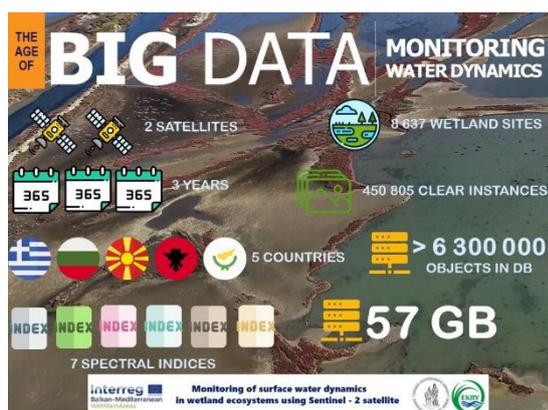
were reviewed and compared with the intermediate layer. By applying spatial selection operation new polygons of wetlands were created.

Wetlands inventory followed the MedWet data forms. Inventory data are available on the created within the project Balkan-Mediterranean Wetland Geoportal: <http://185.17.146.157> , which provides access in the national inventory geodatabases and 51 geospatial layers for wetland sites, protected areas, Natura 2000 sites, Emerald sites and for the connected areas favourable for biodiversity.

The  $\frac{3}{4}$  of wetland sites occupy a small proportion of the total wetland area (3%), given that are small wetlands, below 8 ha. These numerous small Balkan-Mediterranean wetland sites create a valuable network of corridors and stepping stones, very essential for species movement, migration and dispersal. When these small sites are found in heavily urbanized and agricultural areas they form islands for biodiversity and natural green infrastructures with multiple services, i.e. water retention, recreation, climate adaptation.

Another portal, connected to the geodatabase, presents the most recent as

well as timeseries of existing Sentinel-2 images. The portal: (<https://extrema.space/WetMainAreas/dashboard.html>) monitors systematically more than 8 500 wetlands in the programme area with in preceded level of information and scientific values. For each wetland a series of seven (7) spectral indices related to the status of the wetland are calculated for every Sentinel-2 satellite scene available from 2017 until today (Figure 4).



**Figure 4. Monitoring water dynamic**

**Result: BalkanMed wetland connectivity indicators and information graphics**

The ecosystems' continuity and integration are recognized by the EU cohesion policy as one of the main challenges for the safeguard of the biodiversity in support of sustainable development and improvement of citizens' quality of life.

Within the frame of WetMainAreas project connectivity analysis was implemented in order to support the Specific objective 2.1: "Biodiversity: promoting ecological connectivity and transnational ecosystems' integration", of the Transnational Cooperation Program Balkan - Mediterranean 2014-2020. It tackles the lack of assessments on the contribution of wetland ecosystems in the spatial connectivity of protected networks. It demonstrates the important role that wetlands can play in preserving biodiversity and in Natura 2000 sites connectivity at transnational level.

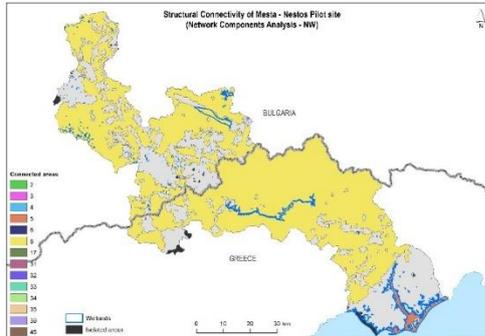
Connectivity analysis was implemented at national level for Bulgaria, Greece, Cyprus, North Macedonia and Albania and jointly at pilot site level for Mesta/Nestos River Basin, Aaos/Vjosa River Basin, Vardar/Axios River Basin.

In particular, the purposes of the analysis on the ecological landscape connectivity are to:

- (i) Map well-connected or isolated land favourable for biodiversity (Figure 5); and
- (ii) Examine spatial relationships between wetlands, Natura 2000 sites and connected land favourable for biodiversity.

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**Figure 5.** Connected land favourable for biodiversity of Mesta/Nestos

Although the total wetland area covers only 2% of the Balkan Mediterranean Territory, still a considerable area of wetlands (almost 1/3) is located in unprotected territories with very high value for biodiversity and should be integrated in ecosystem-based approaches within conservation action plans for protected habitats and species of Natura 2000 sites, Emerald sites, National Parks, Wildlife Refuges etc.

The connectivity analysis followed an innovative approach which had been developed within the HORIZON 2020 research project “Satellite-based Wetland Observation Service -SWOS” (Hatzioridou et al. 2019<sup>1</sup>).

Layers of structural wetlands connectivity are available on the created within the project Balkan-Mediterranean Wetland Geoportal: <http://185.17.146.157> .

**Result: Guidance & pilot demonstration on wetlands connectivity assessment**

Within the project four pilot sites had been defined - Mesta/Nestos River Basin (shared by Greece and Bulgaria), Aaos/Vjosa River Basin (shared by Greece and Albania), Vardar/Axios River Basin (shared by Greece and North Macedonia) and Region of Thessaly (Greece).

The pilot site’s objective is detailed assessment on connectivity within the pilot site, improving knowledge on transnational ecosystems’ integration in the Balkan-Mediterranean territory and support in policy and action plan by integrating scientific knowledge for good practices for conservation of wetlands and thus the connected ecosystems.

With this regard, four reports had been developed, presenting the results of the connectivity assessment along with classification of wetland condition in order to support managers and policy makers to justify and document the need to set

<sup>1</sup> Hatzioridou L, Fitoka E, Hadjicharalampous E, Votsi N, Palaskas D, Malak D (2019) Indicators for mapping and assessment of ecosystem condition and of the ecosystem Deliverable 2.1.5. from project WetMainAreas: e-Publication (via internet)

service habitat maintenance in support of the EU Biodiversity Strategy to 2020. One Ecosystem 4: e32704. <https://doi.org/10.3897/oneco.4.e32704>.

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priorities for restoration and protection in the context of the Habitats Directive (Article 10) and the Birds Directive (Article 4), which specifically urges for wetland conservation and underscore their importance as stepping stones or corridors enabling migration, dispersal and genetic exchange of wild species.

In particular, wetlands which were found in hostile land (not favourable for biodiversity) or in unconnected land, represent priority areas for restoration and protection, as stepping stones and biodiversity islands. Wetlands which were found in connected and in isolated land favourable for biodiversity, represent priority areas for restoration and protection, as critical zones and corridors for species movement, dispersal etc.

Based on the experience obtained within the studies on the pilot sites, a Guideline containing conservation techniques for wetland ecosystems, which are ecologically and functionally connected - WetMainAreas was produced.

***Result: Guidance & pilot demonstration on tourist/cultural heritage assessment***

The area of Mesta/Nestos has many local customs and traditions regarding the rituals and celebrations and craft skills,

including specific dishes. Keepers of local traditions and customs are museums within the pilot area. Pilot site Vardar/Axios is abundant of cultural and historical monuments. Significant part of them offers the opportunity for development of cultural and historical tourism. The history and cultural importance of the Aaos/Vjosa are reflected in the richness of tangible and intangible cultural heritage. The cultural heritage and culture of Region of Thessaly are encountered in the traditions, language, archaeological monuments, museums, cultural activities, and arts as well as in the revival of traditional professions belonging to primary sector. The customs and practices of the place are being revived today through alternative forms of tourism and they attract the interest of visitors through participation in a variety of activities.

A Guidebook: Bridging wetlands' cultural and natural heritage: Mesta/Nestos, Vardar/Axios, Aaos/Vjosa, Region of Thessaly was developed to promote the natural and cultural heritage in the four pilot areas. It contains useful information how to get to certain sights.

***Result: State of art report on wetland relevant policies***

A unique wetland policy provides a clear opportunity to recognize wetlands as ecosystems requiring different approaches to their management and conservation, and not being masked under other sectoral management objectives. National Wetland Policy function as a framework that enables clear conclusions to be drawn about what actions are required (but does not in itself set out detailed prescriptions for actions) and what end result is expected.

According to Peimer et al. (2016) national-level environmental protection policies may be positively associated with wealth and economic development or with indicators of political and social factors; Economic and political factors correlate with whether a country has adopted an official wetland policy; National wetland policy implementation is about the trust and existing positive relationships between policymakers, government officials, and civic actors and organizations; National-level political institutions and existing economic commitments are significant factors when considering the degree and type of national wetland protection.

Study on state of art in Balkan-Mediterranean wetland relevant policies and on links with other sectoral and territorial plans such as agriculture, fishery, water management was produced.

***Result: Living Lab workshop on transnational wetland ecosystem integration***

The ecosystems' continuity and integration is recognized by the EU cohesion policy as one of the main challenges for the safeguard of the biodiversity of the Balkan-Mediterranean territory, in support of sustainable development and improvement of citizens' quality of life (Specific Objective 2.1.) The Transnational Cooperation Programme Balkan-Mediterranean 2014-2020 supported the WetMainAreas project with the goal to contribute to the protection and conservation effectiveness of the territory's wetland ecosystems.

A Balkan-Mediterranean Wetland Living Lab Webinar was organized on wetland mapping results and geoportals. Policy makers and stakeholders from the Balkan-Mediterranean territory participated and discussed the application and significance of project results for a joint strategic vision, among them - representatives of the General Secretary for Nature and

Waters of the Greek Ministry of Environment, Vice Governor of Region of Thessaly, responsible for European programmes, Department of Protected areas of Greek Ministry, Department for Analytics, Support and International Cooperation, State Environmental Inspectorate (North Macedonia), National Environmental Agency (Albania), Ministry of regional development and public works (Bulgaria), researchers and representatives of organizations (WWF-Greece, Terra Cypra, TdV), etc.

#### **Result: Integretation of project results into policy reflected in publications**

Various project documents that address various levels: “Bulgarian wetland ecosystems for enforcement of the National Biodiversity act”; “Greek wetland ecosystems “for enforcement of the national Biodiversity law (protection,conservation)””; “North Macedonian wetland ecosystems for enforcement of Law on the Conservation and Promotion of the Environment and Nature and Law on the Protection of Ohrid, Prespa and Doyran Lakes,; Albanian wetland ecosystems and their role in the context of European Directives and climate change (protection,conservation); “Thessaly Region wetland ecosystems and their role in regional promotion”; “Goce

Delchev wetland ecosystems and their role in regional promotion” were produced at national languagaes and uploaded on project website in order to integrate the project results into policy.

#### **Conclusion**

Wetlands are among the most productive and diverse ecosystems on the planet both hydrologically and ecologically. They are therefore able to deliver a wide variety of ecosystem services that are valuable for people. The wetlands deliver five basic ecosystem services: 1/ biodiversity; 2/ production of biomass; 3/ nutrient removal; 4/ carbon storage; 5/ fish production.

Transnational Cooperation Programme Balkan-Mediterranean 2014-2020 gave to our partnership the opportunity to bridge the lack of data on wetlands and ecosystems integration within the Balkan-Mediterranean territory. Achieved results are valuable not only scientifically, but also politically. They are available to all of the interested parties trhough the project website and geoportals.

Everybody is encouraged to get familiar and use the developed within the frame of WetMainAreas services and tools for priorities in protection, conservation, management and restoration.

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