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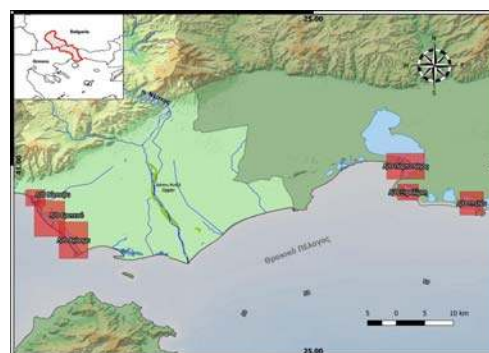
THE FIRST BRAINSTORMING SESSION OF THE PONTOS PROJECT WAS HELD IN GREECE

The first Brainstorming session of the PONTOS project was held online on May 26th 2021. The event aimed at presenting to Greek stakeholders the activities already carried out, as well as to discuss with them the development of the platform and of the next steps regarding the Nestos delta pilot area.

It was co-organized by the Greek partners of the PONTOS project, notably the teams of the Department of Environmental Engineering of the Democritus University of Thrace (DUTH) and the Information Technologies Institute of the Centre of Research and Technology Hellas (CERTH), headed respectively by Prof. Georgios Sylaios and Dr. Ioannis Manakos, while the 85 participants represented a broad range of actors involved in the design, development and implementation of policies related to the management of natural resources at local, regional and national level.

The introductory speeches by Konstantinos Simitsis and Andreas Karagiorgis, Deputy Governors of the Eastern Macedonia-Thrace region responsible respectively for Development and Fisheries, Philippos Anastasiadis, Mayor of Paggai and Georgios Gaidajis, President of the Management Body of the National Park of Eastern Macedonia-Thrace, highlighted the wider interest of local actors for innovative approaches to

Copernicus assisted environmental monitoring across the Black Sea Basin



environmental monitoring that contribute to sustainable development, reduce costs and improve performance and efficiency of public services.

In addition, political officials underlined the vital importance of decentralized cooperation with the local communities and civil society of the countries of the wider Black Sea Basin region, as it can contribute to sustaining and enriching the longstanding and multidimensional relations with Greece and particularly with Northern Greece.

The topics presented by the DUTH team included the preparatory studies undertaken on coastal erosion, eutrophication and crops irrigation in the project pilot site. The Nestos River deltaic zone constitutes a core part of the wetland complex and one of the most important protected areas in Greece, due to its biological, aesthetic, scientific, geomorphological and pedagogical value, while at the same time it is a fundamental pillar for the local agricultural sector. The common thread of the presentations and the ensuing discussions was the real and pressing need to enable public authorities and empower local communities to effectively and efficiently monitor and protect their natural capital with tools that combine frontier technologies and innovations with user-friendly operational features.



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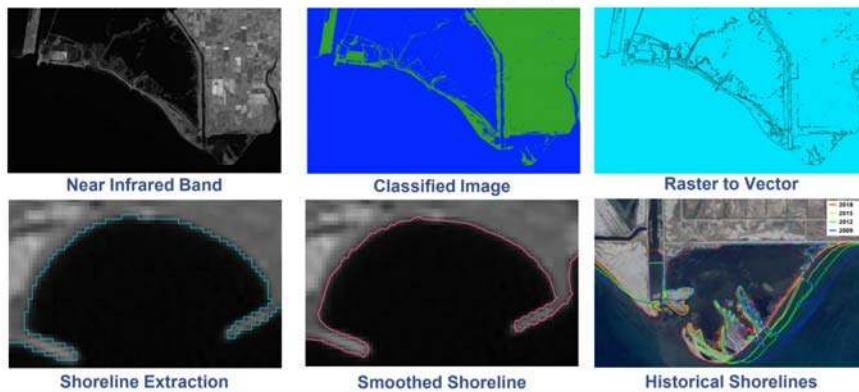
In this context, a customized questionnaire was circulated amongst participants so that their feedback can provide input in the final design of the PONTOS platform. The initial version of the PONTOS platform will be released later this year and, when finalized by the end of 2022, it will offer a broad array of applications and services that will support the use and management of Earth Observation products designed to facilitate the environmental monitoring of the Black Sea Basin area. Similar brainstorming sessions will be held in the other pilot sites of the PONTOS project in Armenia, Georgia and Ukraine, and they will be followed by training workshops this coming fall.

DUTH Presents PONTOS to Key Stakeholders in Greece

On February 2, 2021, the ongoing activities of the PONTOS project were presented by the head of the Democritus University of Thrace (DUTH) PONTOS team, Prof. Georgios Sylaios, to the Board of Directors of the Management Body (FD) of the National Park of Eastern Macedonia-Thrace (EPAMATH) in Greece. The National Park representatives are key stakeholders as the park covers one of the most important wetland complexes in the country and in Europe, due to the wide range and variety of its habitats. EPAMATH includes the Nestos River Delta, extending over an area of approximately 55,000 acres with a 50 km long coastline. It is also the pilot site of the PONTOS project, in which Project partners aim to leverage the Copernicus Earth Observation program and enable key relevant actors to improve environmental monitoring at a local scale through the use of innovative and tested tools. The overarching goal of the Project is to introduce a cutting-edge methodology that will allow FD-EPAMATH to monitor the environmental status of its coastal area efficiently and cost-effectively and thus improve the management of its natural capital which is crucial for the sustainable development of the region of Eastern Macedonia-Thrace. In this context, Prof. Sylaios gave an overview of the initial steps that have already been taken since the start of the project in July 2020, to assess the current situation of coastal erosion in the Nestos river delta area and explained the planned activities that will be pursued. “The use of satellite products, combined with online sensors and models will enhance our capacity to

monitor and manage this sensitive and valuable area”, Sylaios explained. More precisely, until its completion in December 2022, the PONTOS project will develop for the National Park area reports on the expected dynamics of coastal line changes, an integrated assessment on wetland floating and emerged vegetation, an assessment on chlorophyll concentration and eutrophication dynamics, and an evaluation of the agricultural water balance, water productivity and water stress indices of the area.

Shoreline extraction methodology
Semi-Automatic Classification Plugin (SCP) for QGIS



Furthermore, the EPAMATH staff will get training from the Project team to incorporate the project methodology and tools in their operational activities and develop an informed, fact-based strategy for countering major challenges. As the Chairman of the Board of FD-EPAMATH, Assistant Professor Georgios Gaidajis, noted after the ensuing discussion, “PONTOS is a valuable support in our quest to carry out integrated nature management processes based on scientific evidence and methodologies”. The presentation prepared by the DUTH team is available [online](#).

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Launch of the Field Campaign in Ukrainian Pilot Area

In April 2021, Odessa National I.I. Mechnikov University (ONU) started the field survey program in the Ukrainian pilot area in the framework of the Copernicus assisted environmental monitoring across the Black Sea Basin (PONTOS), an international project aimed at strengthening cross-border cooperation in harmonized large-scale environmental monitoring in all the participating countries and the wider Black Sea Basin region. On April 21-24 and June 11-12, 2021, two surveys were conducted in two important areas of the Dniester River deltaic part (Fig. 1). The first one was the Lake Bile – a picturesque corner of pristine beauty in the Southern Bessarabia Region, located in the Lower Dniester National Nature Park, a place of wild birds nesting and the Mecca for eco-tourism in the summer when white and yellow water lilies bloom (Fig. 2). The second is the Dniester Estuary, which has economic, recreational, and cultural significance for the region while its upper reaches are a biodiversity hot spot with several Ramsar sites located there.

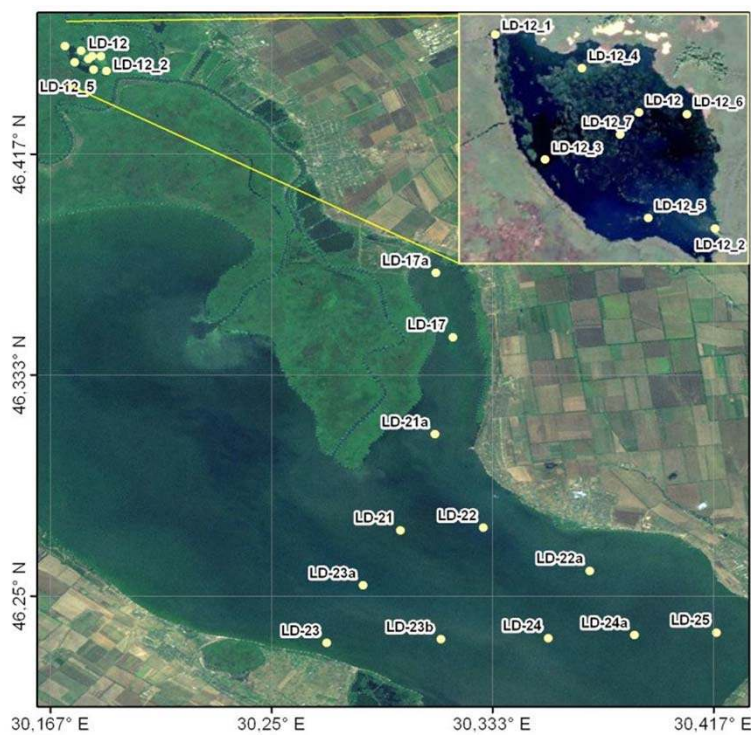


Fig. 1. Scheme of the measurement and water sampling stations (Lake Bile: the upper left corner and zoomed in the upper right corner; Dniester estuary: central to bottom)



Fig. 2. White water lily (*Nymphaea alba*) and yellow water lily (*Nuphar luteum*), Lake Bile

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Fig. 3. Examination of aquatic vegetation boundaries and area, Lake Bile

In each survey, the staff of the ONU's Regional Centre for Integrated Environmental Monitoring (RCIEM) was taking measurements of the main meteorological and hydrological parameters (wind speed and direction, water temperature, conductivity, dissolved oxygen, pH, depth, transparency) at 19 representative stations. Water samples were taken, in which the concentrations of photosynthetic pigments (chlorophyll a, b, c), the ionic composition of water (basic cations and anions), species composition, phytoplankton, and bacterioplankton biomass, and number were determined in the laboratory. In addition, for the first time the state of emerged and floating vegetation was examined using a quadcopter purchased through project funds (Fig. 3, 4).

All the data collected will be used to assess eutrophication dynamics, chlorophyll concentration spatial distribution, and boundaries/areas of different types of aquatic vegetation, as well as to validate individual Earth Observation products (space images) for the pilot area. The validation results will be used for the development of the PONTOS interactive platform tools and will be made available to the public.

Sergiy Medinets, Sergiy Snigirov, Yevhen Gazyetov, Vasyl Pitsyk, Oleg Voronyuk, Oleksandr Abakumov and other ONU RCIEM staff took an active part in the survey.

Laboratory analyses were performed by Natalia Kovalova, Alla Mileva, Valentina Khitrich, Natalia Derezyuk, Valentyna Korzun, and other ONU RCIEM staff.



Fig. 4. Examination of aquatic vegetation boundaries and area, upper part of the Dniester Estuary

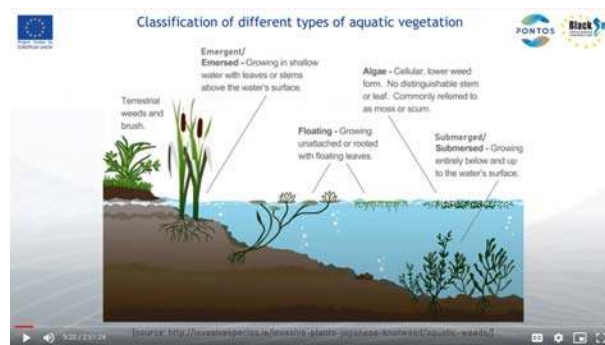
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The PONTOS workshop on Changes in Wetland and Floating Vegetation Cover

The PONTOS team continued its capacity building activities during the first semester of 2021 aiming to enhance the quality and value of project activities. Within this context, two workshops were conducted on the following topics (a)Changes in Wetland and Floating Vegetation Cover and(b) Assessment of Chlorophyll Concentration and Eutrophication Dynamics.

On 28 January 2021, PONTOS conducted its third capacity development workshop on the theme of Changes in Wetland and Floating Vegetation Cover(WFVC). The workshop was followed by practical training on space image processing. The aim was to enhance the understanding of the PONTOS project partner technical team members about Remote Sensing, and to utilise these tools in order to improve their ability to understand and plan Remote Sensing application for inland water delineation. Transfer of knowledge and exchange of experiences amongst project partner technical team members will be essential for the development of a common integrated approach.

Led by the Centre for Research and Technology Hellas (CERTH) and the Odessa National University (ONU), the workshop comprised theoretical and practical components. The theoretical part introduced an assessment on changes in WFVC elements: purpose, planned activities, targeted audience; in-situ wetland and floating vegetation cover measurements (past ONU experience and plans for PONTOS campaign); assessment of burned areas in wetlands (ONU experience in the Dniester Delta), inundation mapping and hydro period monitoring made easy through Earth Observation and Information Technologies. After the theoretical part, the participants acquired hands-on experience in pre-processing techniques such as: Image download, Corrections, Crop & merge, Bands & Proxies, Histogram Thresholding; Water mask generation: Multicriteria analysis; Hydro period map generation: Data takes frequency, Resolution expectations, Interpolation in time.



The assessment of changes in WFVC will be implemented by the PONTOS technical team in all four pilot areas and will include the assessment of growth intensity, associated with a nutrient concentration in surface waters, dynamic changes in wetland and vegetation cover, identification of areas and time of floating vegetation blooms. The assessment of the WFVC will also help to establish relationships between nutrient concentration in-situ measurements while the estimation of the vegetation cover for a long period will foster the optimization of the impact of PONTOS results.

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The PONTOS workshop on the Assessment of Chlorophyll Concentration & Eutrophication Dynamics

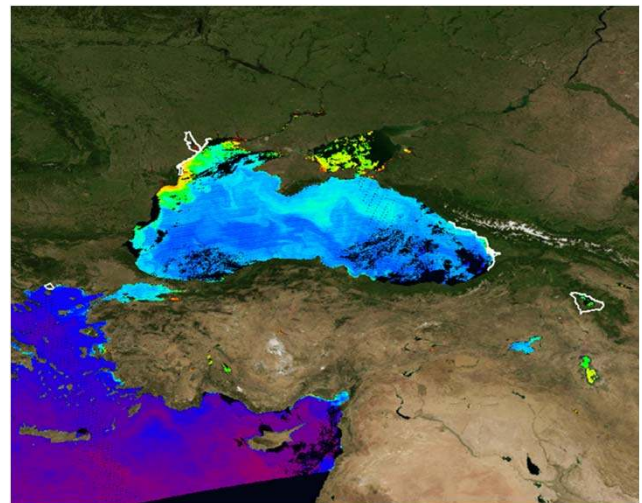
On May 26, 2021, the fourth workshop was conducted by the PONTOS partnership for the team members involved in the relevant project activities. This time the researchers covered topics on the assessment of chlorophyll concentration and eutrophication dynamics. The workshop was led by the researchers from American University of Armenia (AUA), Dr. Garabet Kazanjian and Democritus University of Thrace (DUTH), Dr. Nikolaos Kokkos.

Dr. Kazanjian presented the results of a conducted survey involving the partner organisations to determine the targeted stakeholders of the project, summarized the goals of the work package, and suggested a roadmap to achieve the set objectives. The survey results further confirmed the need for additional data accumulation, such as historical data, new measurements, as well as through conducting fieldwork.

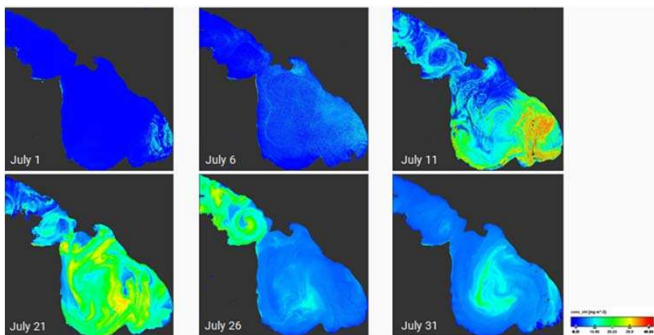
Further, during the second part of the workshop on the introduction of the Sentinel Application Platform (SNAP) and the Case 2 Regional Coast Colour (C2RCC) algorithms, Dr. Kokkos (DUTH) introduced and explained the satellite retrieval, subsetting, and manipulation of satellite reflectance data to reach the

chlorophyll concentration maps in the region of interest. SNAP and C2RCC are tools enabling the researchers to work with Copernicus data.

Researchers will then assess the dynamics of chlorophyll concentration as an indicator of water eutrophication. PONTOS will add value to the data and generate information about the nutrient pollution within the pilot areas for the period from 2009 to 2021. This method will become a vehicle for researchers, policymakers, and key stakeholders to monitor the environment and make science-based and data-driven decisions.



Map of the Chlorophyll Concentration of the Black Sea



Map of the Chlorophyll Concentration of the Black Sea

Capacity-development workshops are vital for implementing the PONTOS project goals. The trained teams will acquire knowledge that they will share later with the PONTOS project stakeholders through the planned capacity-building events for larger audiences.

The session was concluded with an introduction to the application tools integrated into the PONTOS platform by the Center for Research and Technology Hellas (CERTH).

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