D6.7 Restoration Demo at Foros Bay

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WP6

Lead beneficiary: IO-BAS

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REST-COAST

Large Scale RESToration of COASTal Ecosystems through Rivers to Sea Connectivity

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Table of Contents

Preface

This contribution summarizes the advance of restoration efforts within the Foros fellow pilot and the undertaken promotion activities.

Summary

The Foros Bay fellow pilot site, which is a part of the microtidal Black Sea, is located in the innermost part of the biggest Bulgarian bay – the Burgas Bay. The pilot area is distinguished for high anthropogenic pressures and population density, combined with increasing role of tourism and fishing harbours in local economy growth. The wetland represents protected area within NATURA 2000 network. The Foros Bay accommodates seagrass meadows dominated by *Z. noltei*. Other higher plants – *Stuckenia pectinata* and *Zannichellia palustris* – are also present.

Within the REST-COAST project, an active restoration experiment for macroalgae and seagrass transplantation is planned to be carried out. The assessment of the restoration success/failure will help to gain further knowledge on existing barriers that prevent natural recolonization, and to develop a best practice for further restoration planning. Our experimental set-up will cover a total area of 300 m^2 of seagrass and several square meters of brown algae transplantation. Our long-term aim is to restore 17 ha of seagrass and 5 ha of brown algae. If successful, restoration would provide benefits in terms of both ecosystem services and increased awareness of key players in coastal restoration process in Bulgaria.

One of the most significant challenges we have encountered is a lack of adequate understanding and knowledge about the opportunities that ecosystem restoration can provide by most civil servants involved in nature conservation. The legislation is out of date and insufficient to address the current challenges, one of which is to be more restoration oriented. We would expect change in legislation and management approach if experts' viewpoint is broadened through our activity. A successful restoration project has the potential to change the perceptions of both experts willing to undertake such projects and experts in charge of the permission regime.

The outreach activities were focused on preparation of brochures both in English and Bulgarian and creation of a demo video. The video is designed to promote several topics, which we believe are crucial to make a difference in the attitude of both Bulgarian experts and wider public to ecosystems restoration and nature-based solution application. We have tried to put an accent on the Foros Bay ecosystem as a part of a larger system of the Burgas wetlands – an important biodiversity hot spot and upstream watershed area – a source of high anthropogenic pressure transferred to the bay by a cascade of water bodies. To this end, we have involved stakeholders from the NGO sector. On the other hand, the brochures popularize the REST-COASTproject aims and benefits and is delivered to interested parties (both within and outside CORE PLAT), representing different target groups, such as civil servants (environmental, land and water managers), general public and even younger people, interested in environmental sciences and oceanography.

List of Abbreviations

EU	European
NbS	Nature-Based Solutions
NGO	Nongovernmental organisation
WP	Work Package

1 Introduction to Pilot Site

The Foros Bay fellow pilot site, which is a part of the microtidal Black Sea, is located in the innermost part of the biggest Bulgarian bay – the Burgas Bay. The pilot area is distinguished for high anthropogenic pressures and population density, combined with increasing role of tourism and fishing harbours in local economy growth. A concentration of coastal zone uses is observed, some of which are conflicting with each other. There exist three important wetlands neighbouring the Foros Bay coastal area: the Burgas Lake (Vaya Lake) - a shallow estuarine lake, the" Poda" wetland - a mosaic of different wetland habitats with varying salinity and vegetation and the Mandra Lake – shallow water estuarine lake. All above mentioned wetlands represent protected zones within NATURA 2000 network.

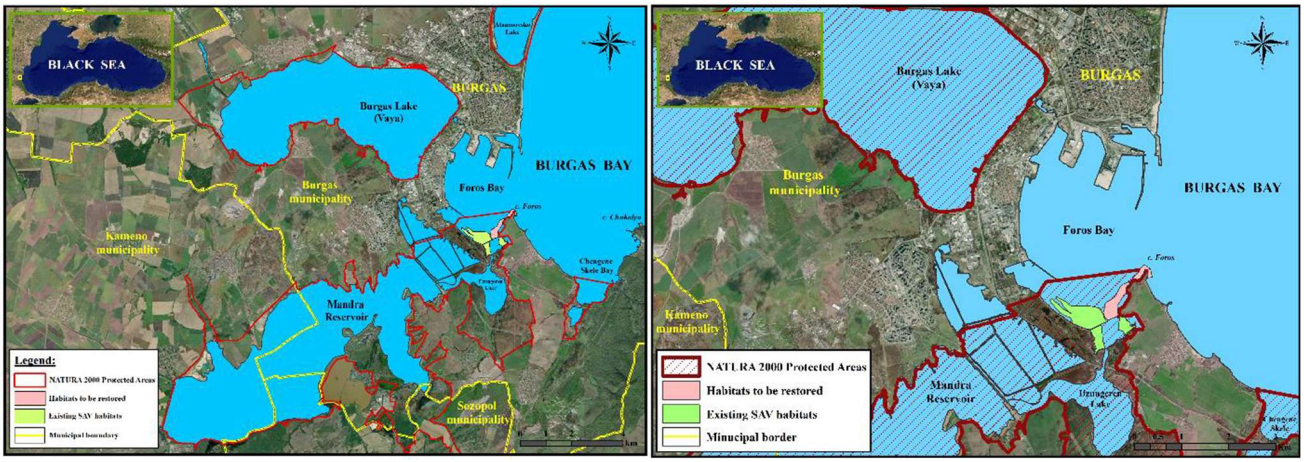

Fig. 1. Map of the Foros Bay study area and adjacent wetlands and boundaries of the NATURA 2000 zones(maps by N. Andreeva)

The Foros Bay area is heavily modified as a result of a shallow stone barrier constructed in the beginning of the XX century.

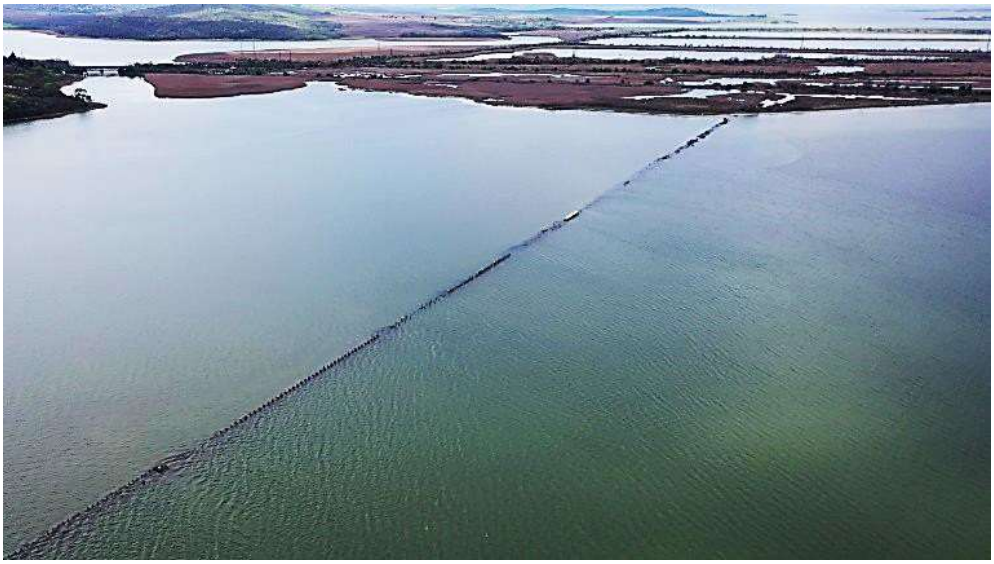

Fig. 2. A stony barrier divides the Foros Bay into two parts (photo by B. Prodanov)

The barrier allows only limited water exchange between the inner and outer part of the bay. During high water levels, its upper edge is submerged, while it protrudes during low water levels. Thus, the bay area is divided into two parts: smaller inner part – the most wave sheltered and significantly impacted by the Mandra Lake inflows, and the outer part, which freely exchanges water with the adjacent coastal area. The

Mandra lake flow carries nutrients and suspended matter which interact with the Foros Bay dynamics thus affecting both water quality and benthic habitat colonization. In the past, the rocky habitats at the seaward boundary of the bay were covered by sensitive to nutrient levels brown algae. The outer Foros Bay soft-bottom area accommodates a seagrass meadow dominated by *Z. noltei*.

Other higher plants are also present – *Stuckenia pectinata* and *Zannichellia palustris*. Part of the bottom that is supposed to be colonized by seagrass and/or other higher plants is actually lacking rooted vegetation. Instead, it is covered by eutrophication tolerant mat-algae (*Ulva spp., Ceramium spp., Cladophora spp*.). We relate this condition to heavy nutrient and suspended matter loads originating from upstream hydrological cascade consisting of the Mandra Reservoir, Mandra Lake, the inner and the outer parts of the Foros Bay. Within the REST-COAST project we have planned to carry out an active restoration in-situ experiment for macroalgae and seagrass transplantation. The assessment of the restoration success/failure will help to gain further knowledge on existing barriers that prevent natural recolonization, and to develop a best practice for further restoration planning. Our experimental set-up will cover a total area of 300 m^2 of seagrass and several square meters of brown algae transplantation. Our long-term aim is to restore 17 ha of seagrass and 5 ha of brown algae.

Any activities within the NATURA 2000 zones are strongly regulated by the Bulgarian legislation. To do our restoration experiments we were obliged receive a permit from Bulgarian Ministry of Environment and Waters. The process of gaining a permit is long and complicated since a heavy agreement procedure is in place. This is one of the main challenge and bottleneck that we have experienced during the process up to now.

1.1 Demonstrative material of restoration benefits

If successful, restoration would provide benefits in terms of both ecosystem services and increased awareness of key players in coastal restoration process in Bulgaria.
One of the most significant challenges we have encountered is a lack of adequate understanding and knowledge about the opportunities that ecosystem restoration can provide by the majority of civil servants involved in nature conservation. The legislation is out of date and insufficient to address the current challenges, one of which is to be more restoration oriented. We would expect a legislation and management change if experts' viewpoints are changed in advance. A successful restoration project has the potential to change the perceptions of both experts willing to undertake such projects and experts in charge of the permission regime.
Within the REST-COAST, we have not only identified these challenges, but we also have the opportunity to draw the attention of responsible institutions and interested environmental experts. A successful restoration project will help us get closer to the viewpoint shift required to make future ecosystem restoration projects easier and more successful.

1.1.1 Benefits of restoration (perceived, achieved, not achievable, expected)

The benefits of the restoration experiment that we intend to conduct are related to testing the possibility of restoring seagrass for the first time along the Bulgarian coast. Depending on the results of the experiment, we will be able to gain a better understanding of the local environment and the barriers that prevent seagrasses from naturally recolonizing the target area. If the experiment is successful, it will help to better convince water managers and the public about the importance of coastal restoration, as well as to advance restoration programs and plans in Bulgaria.

The actual restoration of Foros Bay has yet to begin due to the prolonged permission procedure required by the Bulgarian Ministry of Environment and Waters. The requirement to prepare a restoration program that is comparable to the volume of a monograph containing information on the biology and ecology of the target species is the main obstacle that has slowed progress.

The ministerial experts have the right to return the program as many times as they want if they believe it is insufficiently detailed and comprehensive. We wished to avoid several program returns because they would have slowed everything down even more. We were unable to include all published information for the target species in the program we made, but we tried to make it informative enough for experts to approve without requesting additional information. Meanwhile, REST-COAST tasks on various WPs were completed on time, and time-consuming program preparation was nested among other tasks whenever possible.

2 Foros Bay outreach activities

A preliminary version of the demo-video for the pilot site is prepared but more content on the restoration process will be added later on (https://www.youtube.com/watch?v=3Tuyzq0DwXA). The video is designed with the intention to popularize several topics, which we believe are crucial to make a difference in the attitude of both Bulgarian experts and wider public to ecosystems restoration and nature-based solution application. We have tried to put an accent on the ForosBay ecosystem as a part of a larger system of the Burgas wetlands – an important biodiversity hot spot and upstream watershed area – a source of high anthropogenic pressure transferred to the bay by a cascade of water bodies. We have focused on seagrass ecosystems as a source of benefits for humans and emphasizedthe importance of preserving and restoring them. The scientific studies, which are the foundation of any restoration activity, are present, both the fieldwork and modeling component of the study.

Special accent is put on the important ecosystem function the existing seagrass meadow the erosion prevention, proven as a result of scientific studies performed during the project. The video discusses some of the most significant challenges we have faced during restoration efforts. One of the important pillars of the restoration is the inclusion of the stakeholders. For this reason, we have given the opportunity to locals NGOs to share their views on important topics such as anthropogenic pressures and risks, the possibilities for restoration, current barriers, and enablers.

In addition to this demonstration video, brochures popularizing the REST-COAST project aims and benefits, as well as a brochure in Bulgarian presenting the study site and its peculiarities were produced and delivered to interested parties (both within and outside CORE-PLAT), representing different target groups, such as civil servants (environmental, land and water managers), general public and even younger people, interested in environmental sciences and oceanography. The project was presented via media (radio interviews and on-line media), as well as on different events among which the International Black Sea Day, the Science Night, the World Earth Day, a meeting of the Burgas Lake Management Council and a Black Sea expert round table should be mentioned.

3 Demo activities

3.1 Hands-on restoration actions

We experience a delay in the practical restoration efforts due to administrative requirements concerning any activities planned in a NATURA 2000 site.

The practical restoration activities have yet to begin because a laborious and prolonged planning and permission process is required. Following the Biodiversity Act requirements we have asked the Ministry for authorization of the restoration. This matter is regarded in the Act as "reintroduction of indigenous species individuals with the goal of reinforcing their existing population(s)."

According to the Ordinance № 4 for issuing permits to introduce non-indigenous species and reintroduction of indigenous plant and animal species we had to notify the Ministry of Environment and Waters for our intent to reintroduce indigenous species at a new location and to develop a restoration program for the targeted species.

The program includes following obligatory topics:

1. Subject

2. Aims and targets

3. Description of the biology of the targeted species

4. Description for the ecology of the targeted species

5. Geographic factors at the natural species areal

6. Information concerning threats and limiting factors for species distribution and for the expected impact of the introduction on other local species

7. Measures, necessary to maintain the species and any other necessary actions, such as keeping the species outside of its natural habitat if such action is required

8. Method for species introduction in the pilot area

9. Donor population(s), description of methods (techniques) for collecting transplant units from the donor population(s) in a way that does not harm the population and ensures its (their) stability; criteria for donor population choice

10. Geographic coordinates of the site and polygons within the donor and the recipient locations

11. Expected compatibility of the program with the NATURA 2000 subject of protection; methods for recipient site selection, suitable for germination, growth, and survival of young seedlings and mature plants; data on the minimum number of transplant units that must be reintroduced to ensure the success of the restoration

10. Technical activities required to maintain transplants after their introduction; recommendation for the implementation of restrictive regimes within the area if necessary

11. Reference to successful restoration projects outside Bulgaria

10. Tenure on water areas, where the species will be introduced, and hypotheses for agreement between the applicant and the other owners regarding their relations, in cases where water ownership is not solely to the applicant

11. Implementation terms and a time-schedule for programme implementation, financial cost and sources of financing.

So far, we were engaged with program preparation, which contain 37 pages, 82 literature sources. It was approved without any remarks and objections but the approval was issued with 2-month delay. As the location is also an archeologically important object, approval from the Underwater Archeology Center must be obtained.

At present we are dealing with public procurement concerning the diving works, which is a part of restoration. Actual restoration is planned to start during the dry season and to span July and August 2024. As we are still in the preparatory phase any stakeholder inclusion into restoration was not necessary. To raise awareness of the REST-COAST project, the Foros Bay and nearby wetlands, and coastal restoration, we have created a short clip targeted at non-specialists and the general public. The clip will be updated with more footage once the restoration experiment begins.

3.2 Demonstration value and replication

At the moment we present only an initial version of the demonstration material, which is to be further developed and improved as soon as the restoration work is started. If successful, the demonstration seagrass restoration project has the potential to draw the attention of both experts (water managers, natural resource managers, scientists, environmental NGOs) and non-experts (general public) to coastal restoration opportunities. The seagrasses, which are easily distinguishable and accessible to anyone walking on the beach, are an excellent demonstrative object that could become a symbol for the importance of preserving and, if necessary, restoring coastal ecosystems.

Because of the important ecosystem services they provide, seagrass is a popular nature-based solution (NbS) building block around the world, but it is a little-known option in Bulgaria. The demonstration project is an excellent opportunity to promote seagrasses as a NbS building block and the NbS alternative in general. A successful demonstration could benefit both coastal and upstream restoration projects in future.
Fors Bay is located near two wetlands known for their bird and habitat diversity. A successful restoration project could raise awareness about the region's structure and functions, emphasizing the importance of preserving and restoring its diversity.