Report on selection criteria for replication sites and suitable regions with stressors and pressures

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Executive Summary

The present report (D4.1) outlines a framework for selecting regions suitable as replication sites to successfully upscale and implement targeted lakes restoration activities developed at demonstration sites. This report addresses the identification, evaluation, and selection of three replication sites that align with ecosystem challenges and target stressors observed in the initial demonstration areas. The selected sites will be critical for scaling up restoration efforts and adapting the methods to different geographical, environmental, and social contexts.

Key components of the report

Identification of the Potential Regions. A preliminary assessment of possible regions across EU Member States and Associated Countries will be conducted, with a particular focus on regions facing ecological and environmental challenges that are compatible with those addressed by the demonstration sites. This assessment will examine regional characteristics, including ecosystem health, socio-economic factors, and policy alignment, to ensure compatibility and capacity for effective replication of restoration activities. Priority will be given to regions experiencing ecosystem stressors, such as pollution, habitat degradation, and biodiversity loss, that can benefit from replicating the innovative solutions tested during the demonstration phase.

Development of Selection Criteria for Replication Sites. General and specific selection criteria will be developed to identify three replication sites that are best suited for scaling the restoration methods demonstrated in Work Package 2 (WP2). Criteria include environmental suitability, infrastructure readiness, stakeholder support, regulatory compliance, and ecosystem stressors such as pollution levels, presence of invasive species, or habitat degradation. Each potential site will be evaluated to assess its capacity to adopt, sustain, and scale restoration practices effectively.

Integration into Financial Support to Third Parties (FSTP) Call. The developed selection criteria will be documented and integrated into the FSTP call text, to guide applicants and partners on eligibility and suitability for participating as replication sites. This ensures transparency in the selection process, aiding applicants and stakeholders in understanding the project's expectations and in preparing submissions that align with the project's goals of site replication and environmental restoration, supporting the long-term objectives of lake restoration and ecological resilience.

By applying these selection criteria and focusing on regions with compatible stressors and pressures, this report provides a robust framework for identifying replication sites that can benefit from demonstrated restoration activities.

1 Introduction

The restoration and protection of natural lakes and ecosystems in Europe are increasingly urgent, as many regions face critical threats from pollution, habitat degradation, and biodiversity loss. Addressing these issues requires not only innovative restoration solutions but also the ability to replicate successful interventions across regions with similar environmental provocations. Identifying suitable replication sites is essential for effectively scaling up these restoration efforts. By focusing on regions with compatible ecosystems and similar pressures, we can maximize the impact of restoration activities and strengthen local capacity for environmental resilience. To achieve this, our criteria for replication site selection will prioritize ecological compatibility, scalability, and long-term management potential, guiding the replication of successful methods from initial demonstration sites. By identifying and supporting regions with similar environmental challenges, we aim to extend the benefits of restoration activities across Europe, creating a sustainable roadmap for broader ecological resilience.

1.1 Task 4.1

Identification of associated regions, analysis of their upscaling potential and establishing the selection criteria.

This task aims to identify regions that can leverage the experiences gained from WP1, WP2, WP3, and WP5 by establishing key indicators across environmental, economic, and social dimensions. These indicators will serve as benchmarks in selecting regions for targeted restoration activities. The process includes developing criteria focused on social, ecological, an economic-business indicator, alongside assessing regional policies development strategies and feasibility. Historical data, the significance of replication sites (RS), and their connectivity to green corridors will also play crucial roles in the selection. Assistance will be provided during the selection process, including a feasibility study of the chosen sites that examines the environmental, economic, and social interconnections. A call for restoration and protection activities will be launched in the identified regions, disseminated through various channels such as FTP, project websites, social media, and personal networks.

1.2 Objectives of the Work Reported in this Deliverable

The objective of the work reported this deliverable is to ***1) identify associated regions*** facing diverse stressors and pressures, in order to be used for knowledge-transfer and validation, from WP1, WP2, WP3, and WP5 (establish key indicators), and ***2) Develop the selection criteria and conduct a thorough selection process***, from the identified high-potential associated regions, to choose three replication sites, most suitable for upscaling and replication of targeted restoration activities employed in each demonstration sites (WP2).

1.3 Outline of the Deliverable

This report outlines criteria for selection of three replication sites based on the following factors: **1) *ecological compatibility*** (ensuring that the selected sites are suitable for the ecological characteristics necessary for successful restoration), **2) *scalability*** (assessing the potential for the restoration activities to be expanded or replicated in other contexts), and **3) *sustainable management capacity*** (evaluating the ability of local stakeholders to manage and sustain the restoration activities over the long term).

2 Methodology

In order to achieve the objectives outlined in this deliverable, the following activities are being implemented:

2.1 Identify possible regions

Identify potential regions (Figure 2) that can be used as target points *by establishing key indicators related to the environmental – economic – social dimensions that can be used as lighthouses during the selection process*

2.1.1 Establish Key Indicators (environmental, economic, social)

1. Environmental Variability/Suitability: Select regions with comparable environmental conditions to the demonstration sites including *climatic and geographical characteristics, hydrology, size and depth, ecological conditions/biodiversity, water quality and eutrophication levels* and *restoration needs*: consider the degree of degradation; previous restoration attempt/to compare the effectiveness of the new solutions

2. Socio-Economic and Community Factors: a) ***Community Engagement***: Assess the level of local community or stakeholder engagement, as public participation is crucial for successful replication; consider logistic accessibility for monitoring and data collection b) ***Socio-Economic Context and Human Impact***: Consider economic viability and social impact, particularly if the region has socio-economic importance such as: fisheries, tourism; recreation use, surrounding land use (e.g. industrial waste/degree of urbanization, agriculture, natural landscape around the lake)

3. Regulatory and Institutional Framework: Identify regions where policies and/or government support can facilitate restoration, considering: existing regulatory and legal frameworks to support restoration and the lake's protected status within selected area *(national parks or wildlife reserves)*

4. Monitoring and Data collection Feasibility: To choose regions with *historical environmental data or where long-term monitoring and data collection* enabling: comparison between pre- and post-restoration conditions and *the involvement of local researchers* or organizations in monitoring and maintaining the restoration project.

2.1.2 Data Collection based on key indicators

Ecological data and Geographical databases: Identify regions with lakes that match the ecological characteristics of the original demonstration sites; GIS Tools

Stakeholder inputs: Consult with local experts, government bodies, or environmental organizations for recommendations.

Literature review: Review scientific papers, case studies, and reports that highlight regions where similar restoration efforts have been attempted or are needed.

Search for reports/data from: **Google Scholar, Web of Science** and other **academic databases**; European Environment Agency (EEA), International Environmental

Programs: UNESCO World Heritage Sites and Ramsar Convention; Copernicus Land Monitoring Service (CLMS); EU Natura 2000; Global Lakes and Wetlands Database (GLWD); Governmental and regional environmental reports; Academic Collaborations and NGOs.

Eligibility and General requirements

Local and/or regional authorities from an 'Associated Region'.

- Only legal entities, established in an EU Member State or in an Associated Countries other than those that are part of the project consortium can apply.
- Third parties from the **following countries are therefore excluded** (as part of the project consortium): Austria, Croatia, Cyprus, Czechia, Greece, Germany, France, Italy, Norway, Romania and Spain.
- Third parties can apply as a single entity or build up a partnership of more partners. Other entities, such as academia, business etc., could be eventually a subcontractor under the leadership of a Lead partner.
- Each "Associated Region" shall benefit only once from the Financial Support to Third Parties provided under this topic (HORIZON-MISS-2023-OCEAN-01-04) within the duration of the project.
- 'Associated regions' are understood as areas with similar ecosystems problems as Demonstration sites that can benefit from the demonstration activities and/or less-developed regions, with the view to build capacity to implement the innovative solutions proposed for restoration and protection of European Natural Lakes (ENL).

3 Results and Discussion

3.1 Initial identification of Associated Regions (List of potential regions with supporting data)

Based on our preliminary screening we have identified several regions, which were also included in the proposal (Figure 2).

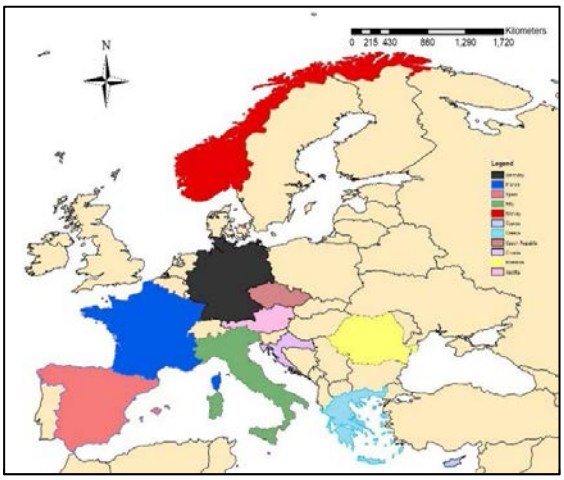

Figure 3-1 *- Geographical distribution of ProCleanLakes core-Consortium partners*

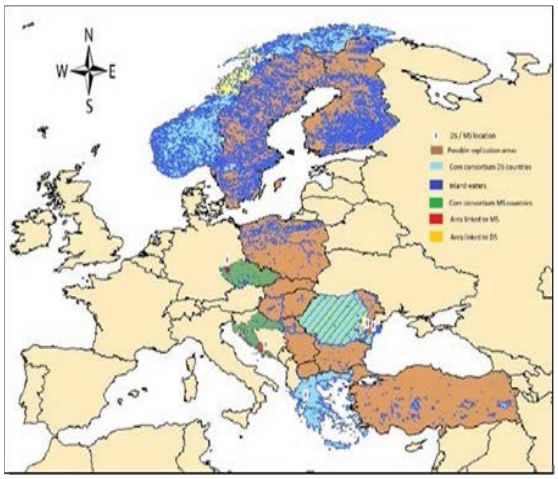

Figure 3-2 - *Location of the 3 MS, 3 DS and identification of possible* ***replication areas***

- **Balkan Peninsula** (Lake Skadar, Plav Lake and Zeta Valley in Montenegro,)
- **Carpathian Mountains** (Lakes in **Tatra National Park** like **Morskie Oko in** Poland, Lakes like **Štrbské Pleso in** Slovakia)
- **Mediterranean Region** (Lakes like **Eğirdir**, **Manyas**, and the **Meriç-Ergene River Basin in** Turkey, Lakes like **Ohrid** and **Prespa in** North Macedonia)
- **Black Sea Coastal Region** (Lakes like **Srebarna/**Bulgaria)
- **Northern Europe** (Lake Ånnsjön in Sweden, Lake Inari in Finland)
- **Western Europe** (Alqueda reservoir and Lagoa das Sete Cidades in Portugal)

3.2 Develop the selection criteria

Establish the selection criteria and conduct a thorough selection process, from the identified high-potential associated regions, *to choose three replication sites, most suitable for upscaling and replication of targeted restoration activities* employed in each demonstration sites (WP2). The selection criteria will be based on social, nature and economic–business indicators and will include the region policy, development strategy and feasibility. Also, the replication site (RS) historical database, its importance and RS connectivity to green corridors will be important triggers/criteria in the RS selection process.

3.2.1 Establish the selection criteria

Applicants must ensure that their proposed site meets the following **eligibility requirements** before applying.

1. Environmental Suitability

Climate and environmental similarity

Does the proposed site have environmental conditions similar to the demonstration sites (e.g., climate, rainfall patterns)?

[Refer to the annex for sites descriptions]

☐ **Yes** ☐ **No**
If yes, please provide details on climate and environmental characteristics. *[Open text field]*

Degree of compatibility:
☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Hydrological Characteristics

Does the proposed site have hydrological features (e.g., inflow/outflow patterns, watershed characteristics, that could influence pollution dynamics) comparable to the demonstration sites?

[Refer to the annex for sites descriptions]

☐ Yes ☐ No

If yes, please describe the hydrological connections or features of the lake. [Open text field]

Degree of compatibility:
☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Lake size and Morphology

Does the lake have physical characteristics (e.g., size, depth, shoreline) similar to those of the demonstration lakes?

[Refer to the annex for sites descriptions]

☐ **Yes** ☐ **No**
If yes, please provide dimensions of the proposed lake. [Open text field]

Degree of compatibility:
☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Climate Vulnerability

Is the region vulnerable to climate change impacts (e.g., drought, extreme weather)?

[Refer to the annex for sites descriptions]

☐ **Yes** ☐ No
If yes, please detail climate-related risks. [Open text field]

2. Water Quality Indicators / Pollution level

Current water quality status

Is the lake experiencing similar environmental challenges as the demonstration sites (e.g., pollution, habitat loss)?

- **Nutrient Levels**
  Are elevated nitrogen and phosphorus levels indicative of eutrophication present?
  ☐ Yes ☐ No
  If yes, please provide current water quality data if available. [Open text field]

  Degree of severity:

  ☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

- **Acidification**

  Is there evidence of acid mine drainage or low pH conditions (pH ≤ 3) affecting the lake's ecosystem?

  ☐ Yes ☐ No

  If yes, please describe any issues related to pH and acidification. [Open text field]

  Degree of severity:

  ☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

- **Contaminants** (e.g., heavy metals, plastics)

  ☐ Yes ☐ No

  If yes, please provide current data if available. [Open text field]

  Degree of severity:

  ☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

- **Biological indicators** (e.g., invasive species, biodiversity loss)
  ☐ Yes ☐ No
  If yes, please describe the specific pollution challenges facing the lake. [Open text field]

  Degree of severity:

  ☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Pollution Sampling Data

Are there existing data or studies on pollution levels in different areas of the lake, especially near potential sources?

☐ Yes ☐ No

If yes, please outline the sampling history and results. [Open text field]

Degree of relevance:
☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Pollution Sources

Does the proposed site have similar pollution sources as the demonstration lakes including?

- **Agricultural Runoff**
  Presence of intensive agriculture (e.g., fruit orchards, tobacco, olives) that may contribute to nutrient loading and pesticide runoff)

  ☐ Yes ☐ No

  If yes, please describe agricultural activities in the region. [Open text field]

  Degree of impact:

  ☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

- **Industrial Pollution**
  Potential sources of pollution from nearby industries, such as mining operations or waste incineration?

  ☐ Yes ☐ No

  If yes, please describe any industrial activities and potential impacts on water quality. [Open text field]

  Degree of impact:

  ☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

- **Aquaculture Impact**
  Presence of fish farms or aquaculture operations contributing to nutrient loading and contamination?

  ☐ Yes ☐ No

  If yes, please explain any aquaculture activities nearby. [Open text field]

  Degree of impact:

  ☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

3. Replication Potential

Suitability for Replicating Restoration Solutions

Can the solutions applied at the demonstration sites (e.g., water quality management, habitat restoration, invasive species control) be effectively replicated in the proposed site?

[Refer to the annex for sites descriptions]

☐ **Yes** ☐ No

If yes, please provide details on which specific restoration solutions can be applied and how they will be adapted to the local context. [Open text field]

Replication feasibility:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Monitoring and Data Collection Capacity

Does the site have the capacity to monitor key ecological indicators (e.g., water quality, biodiversity) to measure the success of the restoration efforts?

☐ **Yes** ☐ No

If yes, please describe available monitoring infrastructure or plans to establish it. [Open text field]

Monitoring capacity:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Adaptive Management

Is there a plan to adapt restoration strategies based on initial results and changing conditions?

☐ **Yes** ☐ No

If yes, please provide details on how adaptive management will be implemented. [Open text field]

Adaptability:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

4. Economic Feasibility

Economic Dependency

Is the local economy reliant on the lake (e.g., fishing, tourism)?

☐ **Yes** ☐ No

If yes, please detail key economic activities tied to the lake. [Open text field]

Degree of dependency:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Local Economic Benefits
Will the restoration efforts provide direct economic benefits (e.g., through tourism, fisheries, water resources for agriculture)?

☐ Yes ☐ No
If yes, please describe how the local economy may benefit: [Open text field]

Degree of benefit:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Funding and Co-Funding Availability
Is there existing funding or co-funding available to complement the grant provided through this program?

☐ **Yes** ☐ No
If yes, please list any additional funding sources that will support the project. [Open text field]

Funding availability:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Long-Term Financial Sustainability
Is there a financial plan for maintaining and monitoring the lake post-restoration?

☐ **Yes** ☐ No
If yes, please provide a brief outline of the long-term funding strategy. [Open text field]

Sustainability feasibility:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

5. Social and Stakeholder Engagement

Community Involvement
Will the local community be supportive and engaged in the restoration efforts (e.g., through consultations, volunteering, or other participatory approaches)?

☐ **Yes** ☐ No
If yes, please explain how the community will be involved in the project. [Open text field]

Degree of involvement:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Social and Cultural Benefits

Will the restoration improve the quality of life, recreation, or cultural value for local residents?

☐ **Yes** ☐ No
If yes, please describe the social benefits of the project. [Open text field]

Degree of benefit:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Local Governance Support

Is there institutional or government support for the project, ensuring alignment with local policies and long-term sustainability

☐ **Yes** ☐ No
If yes, please provide details on the involvement of local governments or relevant institutions. [Open text field]

Governance support

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Cultural and Historical Significance

Does the lake hold cultural or historical value?

☐ **Yes** ☐ No
If yes, please outline cultural or historical importance. [Open text field]

Degree of Significance:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Social Equity: Will the project promote social equity (e.g., water access, ecosystem services)? [Open text field]

☐ **Yes** ☐ No
If yes, please describe equity benefits.

Degree of impact:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

6. Environmental Impact and Urgency

Urgency of Restoration

Does the lake face urgent environmental risks (e.g., severe pollution, biodiversity loss) that make it a priority for restoration?

☐ **Yes** ☐ No
If yes, please describe the ecological urgency and potential consequences of inaction. [Open text field]

Degree of urgency:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Positive Environmental Impact
Will the restoration activities lead to measurable environmental improvements, such as enhanced water quality or increased biodiversity?

☐ **Yes** ☐ No
If yes, please describe the expected environmental outcomes. [Open text field]

Degree of impact:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

7. Site Readiness and Capacity

Technical Readiness
Is the site ready for immediate implementation of the proposed restoration activities, or is additional preparatory work required?

☐ **Yes** ☐ No
If yes, please describe the current readiness of the site. [Open text field]

Readiness:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

Data Availability
Is there baseline environmental data (e.g., water quality, species inventories) available for the site to support planning and monitoring?

☐ **Yes** ☐ No
If yes, please provide any relevant data that can serve as a baseline for monitoring success. [Open text field]

Data availability:

☐ 1 (low) ☐ 2 ☐ 3 ☐ 4 ☐ 5 (high)

3.2.2 Selection Process

Phase 1: Eligibility Screening
Applicants must first pass the eligibility criteria, ensuring that their sites meet key environmental, social, and economic indicators. Only those that meet the basic requirements will proceed.

Phase 2: Detailed Evaluation

Regions that pass the initial screening will undergo a detailed evaluation based on the criteria above, focusing on **environmental suitability, replication potential, economic feasibility, social engagement, urgency**, and **readiness**. ***Interview.***

Phase 3: Final Selection

The top three replication sites will be chosen based on the overall score in the detailed evaluation. The selection will prioritize regions with high replication potential, environmental urgency, and the ability to sustain long-term benefits.

4 Conclusions

The establishment of a standardized approach to identifying suitable regions will facilitate the successful transfer of proven restoration practices from demonstration sites to areas facing similar ecological challenges. By establishing clear and standardized criteria for eligibility and suitability, we enhance transparency in the selection process, which will empower stakeholders and applicants to actively engage in the project. The integration of these criteria into the Financial Support to Third Parties (FSTP) call not only facilitates effective communication of expectations but also ensures that selected regions align with the project's long-term goals of ecological resilience and lake restoration.

The recommendations outlined in this report advocate for building capacity within identified regions, promoting collaboration among local stakeholders, and enhancing regional partnerships. Such efforts are essential to addressing the shared ecological challenges faced by these areas, ultimately leading to more effective and sustainable restoration practices. By focusing on regions with compatible stressors and ecosystem challenges, the report (D4.1) provides a robust framework for identifying sites that can truly benefit from the replication of successful restoration activities.

The successful transfer of these restoration practices to broader regions is expected to yield significant ecological benefits, advancing sustainable solutions for lake conservation across Europe. The commitment to fostering regional resilience will not only improve the health of natural lakes but also contribute to the overall protection and preservation of Europe's unique ecosystems

Annex A

Demonstration lakes characteristics

Demonstration site 1 (DS1)- Trichonis Lake (Greece)

General data: Trichonis lake is the largest lake in Greece, covering an area of 95.8 km2 , a maximum length of 21.5 km, a maximum depth of 58 m, and surface elevation 15 m, with a water temperature varying from 4° to 25° C), with great biodiversity and a rich wild life (endemic species of algae, birds and fishes).

Pressures and stressors that affect the ecological status of DS One of the main pressures consist in human activities, which have degraded large parts of the shoreline habitats, but the following can be added: chemical pollution partly from agriculture (mainly from the wastes of olive oil mills), water abstraction, climate change, biodiversity loss.

Historical and existing data/previous actions*: data from previous research projects: "Hydrobiological surveillance for a biotypological classification and management of inland waters of Greece- The Aetolian-Akarnanian water basin, Central Western Greece" (1984-1987)* – creating databases related to hydrobiological parameters in order support the adoption of ecosystem protection plan; "*Aerobic post-treatment of the anaerobic pre-treated liquid waters from olive oil mills by using a rotating disc reactor with longitudinal flow*" (1984-1985) - developing treatment solutions in order to minimize the environmental impact of agriculture waste water within Trichonis lake area; "*Limnological Studies of the Aetoloakarnanian Lakes*" (1985-1988) – limnological framework for reconstruction; publications and organization of meetings of the past years) are available and will be used as a part of the NbS development.

Importance of lake: Trichonis lake is used mostly for agriculture/irrigation/food supply/fishing and secondly for recreation/tourism (religious tourism due to many monasteries around) providing added value to the community.

Proposed solutions: After quality assessment of the ecological status based on biodiversity, NbS will be applied, e.g., vegetation buffer strips extended in different habitat types, installed around the lake or on specific sections, are proposed as an NbS, Also, wetland integration might be considered as a possible NbS solution in order to increase the resilience of Trichonis lake to point source pollution.

Demonstration site 2 (DS2) - Brates Lake (Romania)

General data: Brateş lake had a water surface of 27,000 ha (about a century ago), representing an important pillar of blue economy sustainability in the Romanian Lower Danube Region. Starting with the third decade of the 20th century, the lake

underwent important transformations, mostly of anthropogenic origin turning Brates Lake into a heavily impacted ecosystem with a total surface of only 2,120 ha.

Pressures and stressors that affect the ecological status of DS: Currently, Brateș Lake is heavily affected by anthropogenic pollution, having an average water depth of approximately 1-1.2 m. and recording nutrient enrichment; pollution by pesticides, heavy metals, and possible emerging pollutants; accumulation of large quantities of sediments which are transported by the affluent; water quality of the affluent.

Historical and Existing data/previous actions: Few historical data are available. No holistic monitoring had been performed in the last decades, fact that creates a serious knowledge gap and imposes pre-monitoring of ecological status.

Importance of lake: Important resources (fish, wood, reeds, reeds, pastures, gardens, hunting fund, tourist potential, aesthetic value) and ecological services (hydrological control of waters in the Chineja river basin, improvement of water quality through sedimentation and filtration of suspensions and retention of nutrients from stored water, environment for reproduction and growth of the fry of semi-migratory and stagnophilic fish. Ihtiofauna of Brateş Lake is varied and abundant, represented by 46 species of fish belonging to 31 genera and 11 families.

Proposed solutions: Vegetation buffer strips extended in different layers and vegetation types, planted around the lake or on a section, are proposed as an NbS. Also, solutions for counteracting the sediment accumulation on the entire lake area will be applied (sediment barriers/nature sedimentation areas) - floating wetlands can be considered as a solution.

Demonstration site 3 (DS3)-Langvatnet lake (Norway)

General data: Langvatnet lake is located in Fauske Municipality in Nord land county, northern Norway, approximately 10,7 km long and 0,9 km wide, stretching in NW-SE direction, with a total area of 5,63 km2

Pressures and stressors that affect the ecological status of DS: The whole mining area drains into Lake Langvann in the Sjønstå River system which creates the major ecological threat: runoff of acidic waters (acid mine drainage, AMD) and metal pollution. AMD occurs as a result of oxidation of sulphide-rich rocks. The water flows through and out old mine shafts, adits, smelter, and waste rocks piles both via rapidly infiltrating surface waters and groundwaters.

Historical and Existing data/previous actions: Historical data recorded in the last decades are available. Remediation efforts to mitigate the effect of mining activities were performed during various years. Underground mines of the northern part of the mining district were flooded with water in order to prevent the oxidation of sulphide minerals and further the openings were sealed using concrete plugs. This however did not lead to decrease in heavy metals concentration. Measurements were also taken in 2001-2005 when control of the outlets from mines.

Importance of lake: The Langvatnet lake was for decades an environmental catastrophe for Nordland County due to continuous leaching of heavy metals from historical mining operation. Due to this, the area could not be properly used by local people for fishing, reindeer farming, husbandry, and leisure time activities.

Proposed solutions: Vegetation buffer strips extended in different layers and vegetation types, planted around the lake or on a section, are proposed as an NbS. Also, floating wetlands could be a solution in order to decrease the level of pollutants concentration.