

ASSESSMENT OF THE EFFECTS OF CONSERVATION ACTIVITIES IMPLEMENTED IN THE CIRQUE OF THE SEVEN RILA LAKES

Research Group: Biological studies
Research field: Environmental studies

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Project guidelines

Project lifespan: 1.03.2024 – 31.12.2025
Study site: littoral of lakes Bliznaka, Trilistnika, Ribnoto and Dolnoto from the Seven Rila Lakes circus.
Indicator for the investigation: sediment microbial communities.
Objective: assessing the effects macrophytes and sediment debris removing in the Seven Rila Lakes and to gain new knowledge on the change of the sediment microbial communities one year after these conservation activities.

Introduction

High mountain lakes and in particular the Seven Rila Lakes represent ecosystems which, due to the local climatic conditions and their lesser impact by anthropogenic influence, have preserved unique biological communities with rare representatives of the organism world. However, as a result of the rapidly changing climate and increased tourist flow there is an increased eutrophication and rapid growth of *Ranunculus aquatilis* and *Sparganium angustifolium*, especially in the lower-lying lakes (Bliznaka, Trilistnika, Ribnoto and Dolnoto). These are typical species for glacial lakes, but in the past the percentage of this vegetation was much lower which is a direct indication of the rapidly deteriorating conservation status of the habitat.

In order to improve the conservation status of the lakes, the Directorate of Rila National Park has carried out conservation activities in 2022/23, funded under the project "Sustainable Management of Rila National Park Phase II" (Order for BFP № РД-ОП-89/31.08.2018). These activities include cleaning the bottom of the lakes from soil particles (debris), limiting landslides into them, regulating the number of species *R. aquatilis* and *S. angustifolium*, installation of equipment for ongoing monitoring of key indicators of the status of the habitat. Such conservation activities are routine for water quality management in eutrophicated ponds at low elevations but are implemented for the first time in the world in high-altitude oligotrophic lakes.

Methodology

Sampling procedure: three times per year (June, August and October) from the littoral of Bliznaka, Trilistnika, Ribnoto and Dolnoto lakes; from treated and untreated worksites.

Sediment microbial communities:

- *Structural characteristics:* biodiversity of the communities applying Metagenomic analysis with total DNA isolation and sequencing.
- *Functional characteristics:* change in metabolic activity and metabolic profile of communities using Biolog EcoPlate™ assay system (Biolog Inc., Hayward CA, USA).

Environmental parameters:

- *Abiotic:* pH, organic matter content, inorganic content, lake trophicity.
- *Biological quality elements.* Classical methods certified according to ISO and BDS.

Ordination analyses: differentiating the factors essential for the microbiome.

Results

- ✓ Acquire new knowledge about the effects of conservation activities in oligotrophic lakes.
- ✓ Publication of results in Web of Science refereed journals.
- ✓ Training and expanding the research skills of project participants - undergraduate, graduate and postdoctoral students.
- ✓ Complementing the national database on the Seven Rila Lakes.
- ✓ Support the efforts of the Rila National Park Directorate to preserve the conservation status of the Seven Rila Lakes and their uniqueness as ecosystems through scientific data.

Conclusion

The uniqueness in the case of the Seven Rila Lakes stems from the fact that:

- 1) it is the first time that this type of conservation activities are undertaken in oligotrophic lakes and
- 2) a specific methodology for conservation activities has been developed and used for the first time.

The information will be useful to environmentalists and managers for proper planning and effective implementation of conservation activities.

