

Project Update: July 2022

INTRODUCTION

The Secretariat of the Convention on Biological Diversity is announce that the Biodiversity Day 2022 slogan is: "*Building a shared future for all life*". The slogan was chosen to continue building momentum and support for the post-2020 global biodiversity framework to be adopted at the upcoming UN Biodiversity Conference #COP15. Biodiversity remains the answer to several sustainable development challenges. From nature-based solutions to climate, health issues, food and water security, and sustainable livelihoods, biodiversity is the foundation upon which we can build back better¹.

Today, biodiversity faces a number of serious and growing challenges. Habitat degradation caused by unsustainable clearing of land results in erosion of fertile soil and increases the threat of avalanches, landslides and flooding. With this change in habitat, rare species of plants and animals can face extinction. Species and habitats are subject to many stresses and vulnerabilities due to anthropogenic factors, including land-use practices and changes, freshwater abstraction, tourism and recreation, infrastructure development, the introduction and expansion of invasive species, and also air and water pollution^{2,3}.

Thanks to the grant, which was awarded by the Rufford Foundation, we started the implementation of the project entitled "Conservation of Freshwater Oligotrophic Habitats on Vranica Mountain and Establishment of Long-Term Monitoring of Biodiversity" which is primarily focused on different freshwater oligotrophic habitat types on this mountain and on rich algal biodiversity, especially diatoms.

During the previous months, various project activities were realized, followed by the dynamic plan of our project.

In the continuation of the current fourth project update, all realised activities will be described in detail, but also those that are still in the process of realisation.

It is important to note that all project activities were realised according to the dynamic plan and until now we have not encountered any problems that would prevent the implementation of the proposed project.

Further in the fourth project update, description of various project activities and those which are still in progress are presented.

¹ <https://www.cbd.int/biodiversity-day>

² <https://biodiversity.europa.eu/topics/ecosystems-and-habitats/mountains>

³ <https://www.eea.europa.eu/data-and-maps/figures/mountain-massifs>

OVERVIEW OF REALIZED ACTIVITY

Through our Fourth project update, several realized activities were presented as follows:

- Activity 1.** Bibliographic review of algological works of B&H
 - Activity 2.** Detailed fieldwork
 - Activity 3.** Promotion of our project through social media
 - Activity 4.** Education and work with students on the field
 - Activity 5.** Preparation of original scientific papers and attendance to conference
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Activity 1. Bibliographic review of algological works of B&H

During the implementation of the 1st, and currently the 2nd Rufford Project, all scientific papers related to the research of algae in Bosnia and Herzegovina were collected. Based on the available scientific papers, the first review of the literature on algae diversity was prepared. During the past period, a significant number of scientific papers in the field of algology have been published and included in the our database, and in the next period a second review of algological works for the territory of Bosnia and Herzegovina will be prepared. The first bibliographic review of algological works is available at the following link:

https://www.researchgate.net/publication/348408719_Bibliography_of_phycological_research_in_Bosnia_and_Herzegovina_1849-2019

Activity 2. Detailed fieldwork

During May 2022, 3 days of planned fieldwork were realised. In addition to sampling phytobenthos, sampling of water for chemical analysis was performed. As with the previous fieldwork, special attention in this project is focused on the following habitat types: a) mountain springs, b) mountain creeks, c) mountain rivers, d) mountain lake and e) mountain peatlands. In order to obtain comparable results, for each studied habitat type, a robust field protocol was used, which was previously prepared⁴. Field protocols are stored in the Dropbox database, and it can be accessed by scanning a QR code that is unique for each location, but also for each sample. Collected samples of phytobenthos and aquatic macrophytes were stored in the Laboratory for Systematics of Algae and Fungi at the Faculty of Science, University of Sarajevo.

Activity 3. Promotion of our project through social media

In order to raise ecological awareness about the importance of freshwater oligotrophic habitat types, during current phases, continuous promotion of our project was carried out. For the promotion of results and current activities, we relied on social media. All photo albums and other information about current project activities are available at the following links:

Link 1: <https://sway.office.com/PqzMm8lrVF92OfAt?ref=Link>

Link 2: <https://sway.office.com/wcwYg2saLVhGqpF3?ref=Link>

Link 3: <https://sway.office.com/JtVgM6YS0TsvfKBw?ref=Link>

Link 4: <https://sway.office.com/KcY3bC8g2afOxvo7?ref=Link>

⁴ <https://www.rufford.org/files/24578-1%20June%202018.pdf>

Link 5: <https://sway.office.com/iYhRQbYpp4mmE5bm?ref=Link>

Link 6: <https://sway.office.com/tp2kYcb1dUz1Zakw?ref=Link>

Link 7: <https://sway.office.com/JWYzl7mJmmHS3pD?ref=Link>

Link 8: <https://sway.office.com/zDBG4icDvzia0DMA?ref=Link>

Link 9: <https://sway.office.com/kOcTAznST3x57oTd?ref=Link>

Link 10: <https://sway.office.com/FKBvgJeXjHJQP2tr?ref=Link>

Link 11: <https://sway.office.com/Y8jjEmlpPp2jWXew?ref=Link>

Link 12: <https://sway.office.com/VLGGgul9i8RmFone?ref=Link>

Link 13: <https://sway.office.com/EwUhvESlvCCfw5H1?ref=Link>

Activity 4. Education and work with students on the field

During all phases of the project, students from the University of Sarajevo were involved. Primarily students from the Faculty of Natural Sciences and Mathematics and the Faculty of Pharmacy. Students are introduced to the main goals of the project, but also to the final outcomes. In addition to the theoretical part of the project, which was presented in detail, students had the opportunity to get acquainted with the equipment and work in the algology laboratory. In addition to the laboratory part, field work was also realised. In the field, students had the opportunity to get acquainted with the equipment for measuring the basic physical and chemical parameters of water, and equipment for phytoplankton sampling. Special focus of our workshop were qualitative-quantitative analysis of phytoplankton and phytobenthos.

Activity 5. Preparation of original scientific papers and attendance to conference

After synthesis of all obtained results, original scientific papers were prepared. In our papers, we are indicated the presence of rare and endangered species of diatoms, and also highlight the state of freshwater oligotrophic habitat types on Dinaric Alps. As we mentioned in our project proposal the main goal of this project is protection and monitoring these very unique and sensitive habitat types for the future generation.

Other additional activities

We owe a great deal of gratitude to The Rufford Foundation, which for the second time supported the project proposal and awarded a significant grant, which was primarily aimed at equipping the laboratory, and then at studios and detailed scientific research work. Without the support of The Rufford Foundation, this complex project could never have been realised.

In addition to the detailed field work that was carried out in the previous period (2021-2022), and the collection of samples of cyanobacteria and algae from different freshwater oligotrophic habitat types, water samples, sampling of phytoplankton, a detailed qualitative and quantitative analysis of phytoplankton and phytobenthos was carried out in laboratory conditions.

With the help of the Üthermol method and an inverted microscope, a quantitative analysis of the phytoplankton of three glacial lakes was performed and their ecological status was assessed.

During the entire duration of the project, continuous promotion was carried out through social networks, and students also had the opportunity to become familiar with individual phases of our project.

Since a large amount of data was collected on the abiotic and biotic components of freshwater oligotrophic habitat types, several original scientific papers were prepared and published in journals that are indexed in international databases and in Proceedings as follows:

Mašić, E. (2020). Bibliography of phycological research in Bosnia and Herzegovina (1849–2019). *Phytologia Balcanica*, 26(3), 437-443.

Mašić, E. (2021). Diversity, distribution and ecology of freshwater centric diatoms in Bosnia and Herzegovina. *Borziana* 2: 15-30.

Smječanin, N., Bužo, D., **Mašić, E.**, Nuhanović, M., Sulejmanović, J., Azhar, O., & Sher, F. (2022). Algae based green biocomposites for uranium removal from wastewater: Kinetic, equilibrium and thermodynamic studies. *Materials Chemistry and Physics*, 283: 125998.

Šovran, S., **Mašić, E.** (2022). Diversity of freshwater red algae (Rhodophyta) in Bosnia and Herzegovina. *14th Symposium on the Flora of Southeastern Serbia and Neighboring Regions, Kladovo, 2022*, pp **20**.

Pašanbegović, A., Zildžić, A., Zimić, A., **Mašić, E.** (2022). First records of freshwater epizoic cyanobacteria and algae on two turtles *Trachemis scripta* Thunberg and Schoepff, 1792 (Reptilia, Emydidae) and *Emys orbicularis* Linnaeus, 1758 (Reptilia, Emydidae) identified in selected artificial ponds from Bosnia and Herzegovina. *14th Symposium on the Flora of Southeastern Serbia and Neighboring Regions, Kladovo, 2022*, pp **21**.

Markanović, N., Pašanbegović, A., Zildžić, A., **Mašić, E.** (2022). Diversity and ecological properties of epiphytic algae identified from selected macroalgae and aquatic macrophytes in Bosnia and Herzegovina. *14th Symposium on the Flora of Southeastern Serbia and Neighboring Regions, Kladovo, 2022*, pp **21**.

Plans for the future

We continued also with the promotion of our work to the broad range of public through very popular media as follows: iNaturalist⁵ and Youtube⁶. More information about progress dealing with planned activities will be presented in our final project update which is still in progress and in additional material which will be also prepared. Progress about our project is also available on [ResearchGate](https://www.researchgate.net). On the next pages of our fourth project update, we present our activities through some very interesting pictures.

⁵ <https://www.inaturalist.org/projects/conservation-of-freshwater-oligotrophic-habitats-on-vranica-mountain?tab=about>

⁶ https://www.youtube.com/channel/UCSZBVEUVQG04oETRFVYyGieA?view_as=subscriber

















