

Final Evaluation Report

Your Details	
Full Name	Nedim Jukić
Project Title	Discovering the diversity of the alpine ascomycetous fungi in severely vulnerable ecosystems of glacial and other mountainous lakes in Bosnia and Herzegovina
Application ID	32325-B
Date of this Report	28th April 2022

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Complete preliminary checklist of fungal species inhabiting mountain lakes in Bosnia and Herzegovina				First real insight into the mycobiota of mountain lakes in Bosnia and Herzegovina have been made. Although fungal diversity is not
IUCN risk assessment for fungal species recorded				IUCN risk assessment was done for most of the species recorded during the project.
Identification of new or confirmation of earlier identified IFAs				Having in mind that the majority of the mountainous lakes are one of the most important fungal habitats in the subalpine zone of the Dinaric Alps and that most of the lakes could be treated as real biodiversity oasis in the karst vastness, it is not an exaggerate to claim that almost all of these small water bodies represents IFAs especially following the IFA earlier proposed criteria A, C and E.
Proposal of new fungal species to be included in the update of the official Red list and/or List of protected and strictly protected fungal species				All fungal species with endangered status assessed will be proposed for the upcoming update of the Red List of Fungi in Federation of Bosnia and Herzegovina and for the valid legislative in Republic of Srpska as well.
To publish comprehensive monograph				Comprehensive monograph about mycobiota of glacial and other mountainous lakes in Bosnia and Herzegovina have been published at the very end of the project. Title of the book is: "Fungi of the mountain eyes – The World that disappears".
To film documentary movie				Two documentary movies have been filmed as well as one small additional role play in the documentary about preserved wildlife in Bosnia and Herzegovina. First two documentaries were produced by National

				Broadcasting Service (BHRT) and our society (Mycological Society MycoBH), whilst third is financed and produced by ARTE television.
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2. Describe the three most important outcomes of your project.

a). Creating preliminary check list of fungal species inhabiting mountainous lakes in Bosna and Herzegovina and providing first real insight into the world of these highly specific ecosystems and organisms is one of the most important project outcomes. After this study it is necessary to continue with the field research on national, regional and even intra-continental level in order to create more comprehensive understanding of mycobiota of glacial and other mountainous lakes. All fungal species recorded within the project activities and assessed as highly vulnerable will be proposed as the supplement for the valid red or endangered list of fungi in both entities in Bosnia and Herzegovina.

b). Monograph that was published at the very end of the project is probably first book dealing with fungi which inhabits mountainous lakes worldwide. This is the reason why this project should be seen as a small progress towards building and widening global civilisation knowledge especially within the field of mycology. PDF version of the book can be downloaded at ResearchGate: https://www.researchgate.net/publication/359557808_Gljive_gorskih_ociju_-_svijet_koji_nestaje

c). Third but still very important project outcome is production and coproduction of two documentary movies and participation in filming third one. First documentary dealing with mycobiota of three mountainous, glacial lakes (Lokvanjsko, Šatorsko and Orlovačko) have been filmed by BHRT – National Broadcasting Service in Bosnia and Herzegovina and shown on BHRT in prime time. This movie is available to watch on BHRT official YouTube channel: <https://www.youtube.com/watch?v=c-9mfmxnSJg>. Some parts of this movie are filmed by project team members while editing was done by BHRT.

Second documentary called “Fungi of the mountain eyes – The World that disappears” was filmed only by project team members and premiered on 7th November last year. This film is assessable via official Mycological Society MycoBH YouTube channel: <https://www.youtube.com/watch?v=qyi3XyPZmE>

Besides these two documentaries we have been participated in shooting another documentary produced for Arte TV. This documentary will be soon exclusively broadcasted on Arte. In this documentary, part where we are participating is about exploration and mycological field research in the preserved areas of Mt. Zelengora, or at the largest mountainous lake in Bosnia and Herzegovina – Štirinsko lake.

With all media mentioned this project should have very strong impact on all stakeholders and should provide very important inputs for all upcoming studies and conservation efforts.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

No serious difficulties or obstacles have been occurred during the project implementation. Of course, we were faced, like everyone else, with the coronavirus pandemic and in that sense with some restrictions and safety measures applied.

Due to this in the first half of project implementation we have reduced number of overnights and usually go to the field with two cars in order to minimise infection risk.

On the other hand, we have not been faced with other notable obstacles. During the summer 2021, weather condition was almost perfect for long hiking field trips with most of the season being dry and sunny.

If we have to mention something that was not going in our favour that would be definitely time. Filming the scenes for the documentary, undertaking detail mycological field research at the lakes, hiking for 2-4 hours in one direction carrying all the necessary equipment, photographing in situ fungal species that have been found, all in all was not so easy to complete and quite challenging as well. Still, the goal had been accomplished for each site and each lake with total of 17 lakes and their mycobiota presented in the movies and within the book.

4. Describe the involvement of local communities and how they have benefited from the project.

Local communities will benefit mainly through initiative for conservation arguments and efforts for additional protection in certain areas. Although, majority of the mountainous lakes does not have settlements and villages in their vicinity, local communities can only benefit with preservation of the current status of these lakes. Some of the lakes are already within the boundaries of the national parks or some other protected areas, still current trends and anthropogenic influences are too pronounced, and revision of the current measures and practices should be undertaken. In certain areas local communities lived close to these fragile ecosystems for centuries, without provoking any serious damages to the lakes and their sporadically overgrown lakes. This should be goal for the future too combined with additional restoration plans for certain "swampy" lakes.

5. Are there any plans to continue this work?

Yes, there is. Already in this year we are planning to visit few lakes that have not been explored within project activities. We will probably organise field research in Mt. Čvrsnica (Lake Orlovačko and Ledeno) and Zelengora (Lake Kotalničko). Meanwhile, we are planning to do some extra research and study of some of the most interesting lakes we have visit during the project. Particularly, these are Crvanjasko lake on Mt. Crvanj, and Bijelo lake at Mt. Treskavica each one of them with few intriguing fundal species recorded and some potential taxonomical novelties. With our colleagues from Croatia, we have been already discussed idea of international collaboration and project aimed at mycological study of mountainous lakes in the south-east Europe.

6. How do you plan to share the results of your work with others?

Documentary movies are open access and can be seen on YouTube as previously mentioned. Although published book was printed in just 100 copies it can be downloaded in PDF on ResearchGate: https://www.researchgate.net/publication/359557808_Gljive_gorskih_ociju_-_svijet_koji_nestaje

At the beginning of June 2022 we are planning to do some extra book promotion and to prepare PR text about implemented project, main outcomes and plan for the future. PR text will be sent to relevant electronic media and portals in Bosnia and Herzegovina. Besides this, some project outcomes were briefly introduced via social media and official MycoBH web page.

7. Looking ahead, what do you feel are the important next steps?

The most important upcoming activities will be to organise mycological field research at all other mountainous lakes in Bosnia and Herzegovina which have not been investigated within this project. Probably many more stenovalent and specific fungal organisms are yet to be discovered, whilst some taxonomical novelties might be revealed. Lakes like Orlovačko and Ledeno at Mt. Čvrstica; Jagodino at Mt. Lebršnik; Kotalničko, Bijelo and Crno at Mt. Zelengora; Zmijsko lake at Mt. Treskavica, are just some of the most significant mountainous lakes which were not object of scientific exploration in the past 18 months. These lakes represent well preserved alpine biodiversity reservoirs and locations where evolution might produce some highly conspecific organisms and rarities.

Besides field investigation that will continue soon we will put great effort in order to create initiative for conservation of some lakes and their surrounding where significant number of rare, stenovalent and indicative fungal species was recorded. One of the best examples is Crvanjsko lake where highly endangered fungal species like *Bovista paludosa* and *Peziza acroornata* have been registered. Our plan is to organise more field research on this site, probably in cooperation with some other field biologists and experts in order to document all relevant natural values this specific location have which will be afterwards used as a strong conservation argument.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

The Rufford Foundation logo have been used on all relevant outcomes of this project. This was the case with comprehensive monography published at the end of the project but also with two documentary movies broadcasted at the end of the last year. If we add relevant social media posts and our official web page www.mycobh.com where The Rufford Foundation was continuously mentioned, we can conclude that probably more than 5,000 people have read, seen or watch

some of the project outputs with presence of Rufford logo and organisation name on each one of them.

9. Provide a full list of all the members of your team and their role in the project.

Nedim Jukić, Msc in Biology – Project manager, financial planning and implementation, organizing of field research, sampling, laboratory analysis, author of book that have been published, project promotion through social media, promo material, main cameraman for documentary shooting, assembling and editing of video material, drone pilot, correspondence with relevant authorities and organizations.

Nihad Omerović, Agronomists (Olovo, Bosnia and Herzegovina) – participating in the field research, sampling and laboratory analysis, participating in the documentaries shooting, participating, co-author of the book, fungi photographing, landscape photographer, assistance cameraman.

Smiljan Tomić, Msc in Biology (Kakanj, Bosnia and Herzegovina) – participating in most of the field research, sampling material, co-author of the book, assistance cameraman, landscape photographer.

Neven Matočec, Mycologist (Croatia) – expert in mycology (with ascomycetous fungi as the main field of interest), expert review of the final monograph.

Braco Babić, (Sarajevo, Bosnia and Herzegovina) – professional mountaineering guide.

10. Any other comments?

We all wish to sincerely and gratefully thank to the Rufford Trustees for supporting our efforts to discover so far unknown fungal organisms which inhabits mountainous lakes.

Although this project and study was definitely most challenging and most difficult to conduct it was pure scientific joy and happiness to be able to participate in this voyage for the last year and a half.

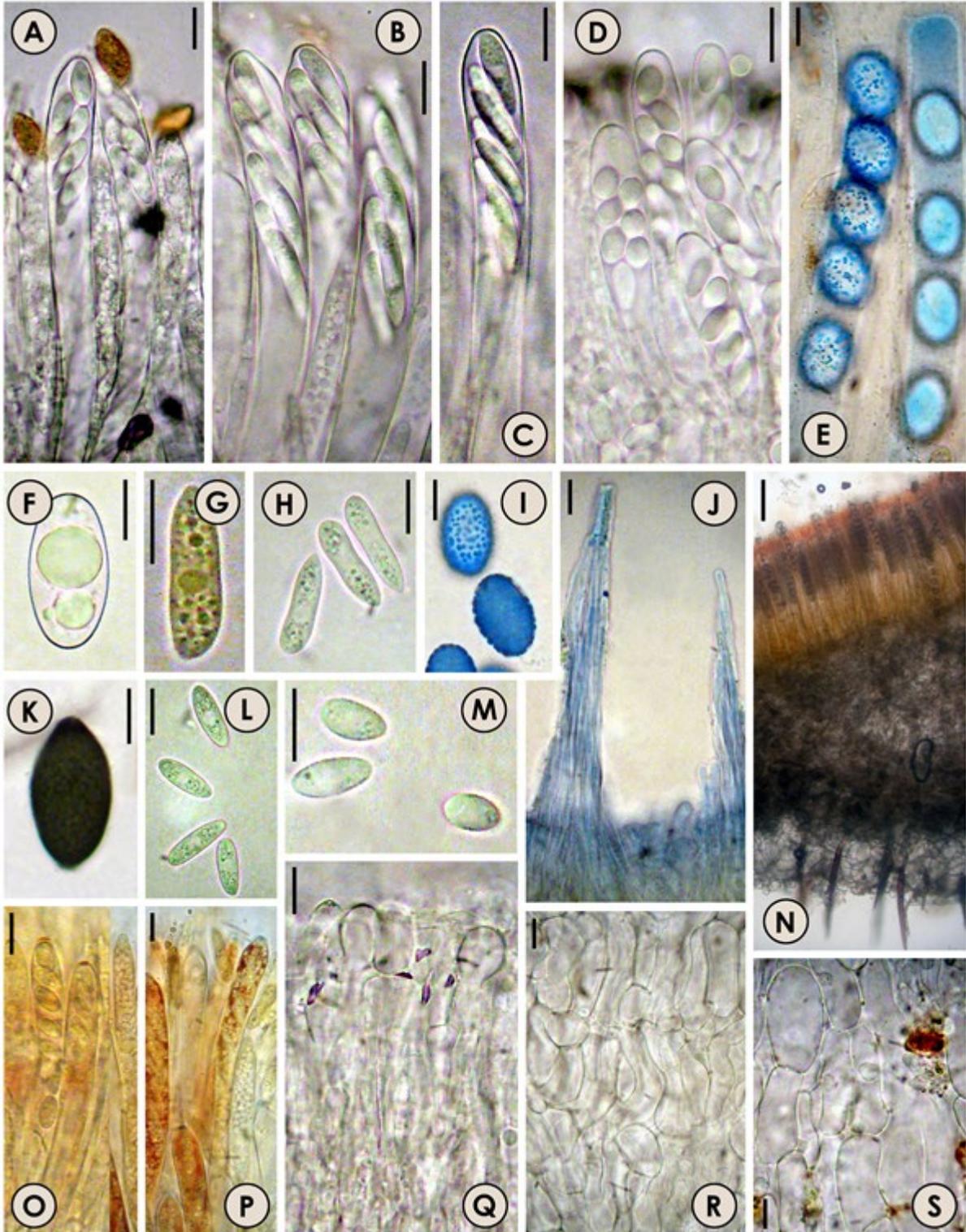
We firmly believe that project outcomes will have strong impacts for all future mycological research not only in Bosnia and Herzegovina but in the south-east Europe as well. On the other hand, we also believe that project results will have solid influence on science in Bosnia and Herzegovina in general. We are also optimists when conservation efforts in the future are about. Published monograph, promo materials, documentary movies, web channels or social media should encourage some of the young mycologist that will come.

As a project leader I am most thankful to The Rufford Foundation once more and I hope that we have met your expectations.

What is for sure we will continue our passionate scientific work and try to discover more amazing fungal organisms hidden within small water oasis in the karst vastness.



Front cover of the book "Fungi of the mountain eyes – The World that disappears".



Microphotographs of some fungal species recorded within the project activities.