The Rufford Foundation
Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Ermin Mašić
Project title	Conservation of freshwater oligotrophic habitats on Vranica mountain and establishment of long-term monitoring of biodiversity
RSG reference	24578-1
Reporting period	June 2018 to June 2019
Amount of grant	£4,980
Your email address	erminmasic@hotmail.com
Date of this report	17 June 2019

1. Please 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
Identification and preparation database of oligotrophic freshwater habitats in the wider area of Vranica.				During fieldwork in the wider area of Vranica Mountain, for the first time we have identified and mapped freshwater oligotrophic habitat types, and also established a long database of abiotic and biotic parameters. This long database will, in the future, represent a good basis for preparation of original scientific papers and for generating future projects.
Establishing a database for abiotic and biotic parameters of oligotrophic freshwater habitats which will serve for long-term monitoring.				On the field, the basic physical and chemical parameters of water were measured. After completing of all phases of the project, long database is produced and introduced in our project update. In addition to abiotic parameters, biotic parameters were also established.
Preparing diatom taxa comprehensive checklist with their basic autecological characteristics and map of their distribution in the wider area of Vranica.				After the analysis of permanent slides, a comprehensive checklist of diatoms from freshwater oligotrophic habitats in the wider area of Vranica Mountain was established. In addition to the checklist of diatoms and their distribution in the studied habitats, data about ecological characteristics are also presented.
Highlighting the presence of rare and vulnerable species of diatoms in the investigated area.				In our samples, a lot of rare and endangered species of diatoms were identified. These species have a great conservation significance.
Developing robust field survey protocols for continuous and long-term monitoring of the biodiversity in oligotrophic freshwater				In order to establish future long-term monitoring of biodiversity and state of freshwater oligotrophic habitat types in the wider area of Vranica Mountain, a robust field protocol has been developed, introduced and

habitats.				tested on the field. Also, as a great contribution of our project, we consider our android application which will be used in the future monitoring program of freshwater oligotrophic habitat types, not just in the wider area of Vranica Mountain, but also in the area of Bosnia and Herzegovina.
State assessment of oligotrophic freshwater habitats.				With the help of the OMNIDIA software, the state of the freshwater oligotrophic habitat types was assessed. All explored sites (habitat types) have a good ecological state. Unfortunately, due to different anthropogenic influences, the ecological state of Prokoško Lake is somewhat changed in comparison to the other freshwater habitat types identified in the wider area of Vranica Mountain
Creating plans for the future restoration and conservation activities of this very unique and sensitive habitat types.				Our future planned activities will be also related to the freshwater oligotrophic habitats, but not only on Vranica mountain but also on other mountains in Bosnia and Hercegovina. Our study has revealed that these habitat types are extremely sensitive and that they represent a hot spot of biodiversity. Because of that it is necessary to establish long-term monitoring and protect them as soon as possible.
Workshops and final presentation of the project results				During the duration of our project, two workshops were organised. The first workshop was held at the Faculty of Science, University of Sarajevo. Students from the Department of biology have participated in this workshop. The second workshop was held in the area of Vranica Mountain, near Prokoško Lake. I had also the opportunity to talk about our project during different occasions and in that sense raised awareness about the importance of these habitat types at a local, but also global level.

				The final presentation of the results of our project and assignment of the certificates to the team members and participants of the workshop was held in Fojnica after the completion of all project activities. At the presentation, members of the project team, students, representatives of NGO organisation and members of the local community were attending. In the future period, the presentation of the results of our project will be delivered to the broad audience and to the representatives of the Fojnica Municipality.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

Due to unfavourable weather conditions which prevailed during July 2018, fieldwork began in August. Unfortunately, the roads leading to the Vranica Mountain, as well as to the other explored sites are not at a satisfactory level, and in this respect fieldwork itself was difficult. In addition, no other difficulties have been identified.

3. Briefly describe the three most important outcomes of your project.

Three of the most important outcomes of this project are:

1. Identification and mapping of oligotrophic freshwater habitats in the wider area of Vranica Mountain.
2. Developing robust field survey protocols for continuous and long-term monitoring of the biodiversity, with special emphasis on diatoms.
3. Preparation of comprehensive checklist of diatom species, as well as other groups of algae in the wider area of Vranica Mountain and dissemination of knowledge and raising of ecological awareness about the values and importance of oligotrophic freshwater habitats.

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

The inhabitants of the Municipality of Fojnica live in the area of Vranica Mountain during the summer months. During my fieldwork in this area, I have been actively discussing the problems with the local community, since the tourism activities have been expanding in recent years. Through the conversation, I have introduced my project which is about the need for better protection of freshwater oligotrophic

habitat types in the wider area of Vranica Mountain. I have also discussed with them about the importance of biodiversity and ecosystem services which this habitat type's offer. In this way, I have indirectly affected them in terms of increasing ecological awareness and better care of the mentioned habitats. During my stay on Vranica Mountain, I had an opportunity to collect the waste that was left behind by the tourists, giving an example to the others how they could protect this unique area and biodiversity within the oligotrophic habitat types. It is important to note that all prepared promotional materials were printed in Fojnica Municipality. In this way, we involved the local community in our project, and they have benefitted from this activity. Also, one of the members who are involved in the training of young researchers in the field of restoration and conservation ecology lived near the area where the studied sites were located. In this way, the acquired knowledge can be greatly used in the future, in a way to educate or to realise their own research project. In the future, we will actively cooperate with representatives of the authorities in the Municipality of Fojnica and together plan the protection of the studied habitats. In the foreground, there will be ecosystems of mountain peatlands, as well as other freshwater oligotrophic habitats.

5. Are there any plans to continue this work?

Yes. We have planned to continue our research. The focus of our future planned work would be also freshwater oligotrophic habitat types, especially mountain springs, peatlands and mountain lakes. In addition to the algae of phytobenthos which we are used as bioindicators to determine the ecological state, in the future work we planned to include algae of phytoplankton assemblages as powerful bioindicators of ecologic state and specific phenomena in standing water. In addition to Vranica Mountain, we are planning to expand our research also on the other mountain in Bosnia and Hercegovina. More attention would be devoted to education of students and dissemination of knowledge. Results of our future work could serve as a good basis for the preparation of high-quality diploma and master thesis in the institution where I work.

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

It is important to note that during the entire duration of our project, continuous promotion of project activities was carried out. For this purpose, we used social networks, and also other platforms for the exchange and sharing of obtained results. Preliminary results of our project were presented at International Rufford Small Grants Conference, Explore and protect the natural beauty of Balkans from 27th to 28th September 2018 at Silver Lake in Serbia. The final results of our project we will presented on *7th European Phycological Congress* which will be held from 25th to 30th August in Zagreb (Croatia). The results of our project will be also presented through the original scientific papers.

7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?

Realisation of our project lasted exactly 1 year (Period: June 2018 – June 2019). It is important to note that fieldwork was delayed about 1 month due to adverse weather conditions (i.e. rain falling July 2018). For this reason, we have conducted part of our fieldwork during 2019 and realised exactly 18 days as originally planned by the project plan. During July (2018) we collected and analysed original scientific publications and prepared protocol for sampling and establishment of long-term monitoring.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Fuel	£50	£360	+£310	In total 18 days of field work were realized. Fuel for 1 day cost App. £20.
Multi-parameter portable meter	£3000	£3000		According to the plan.
Field investigation (18 days)	£1000	£923	-£77	We are transferred £77,19 to the Registration fee of *7th European Phycological Congress* which will be held from 25th to 30th August in Zagreb (Croatia). Actual Amount of Registration fee cost 400 Euro or £355, 70 for FEPS member in Early bird.
Organization of workshop	£100	£200	+£100	As a Project Leader I am organized transport for 19 participants and part of the workshop were covered with planned budget.
Rufford Conference in Serbia September 2018	£100	£100		According to the plan.
Promotive materials	£300	£300		According to the plan.
Mountaineering equipment	£300	£300		According to the plan.
Digital Schublehre	£30	£12	-£18	This amount is transferred to the organization of workshop.
GPS Garmin	£100	£98	-£2	This amount is transferred to the organization of workshop.
Totals	**£4980**	**£5293**	**+£313**	

The rate of conversion to Pound Sterling used in this project is taken from Raiffeisen Bank B&H (17.06.2019).1 BAM=0.455331GBP / 1GBP=2.196205BAM
https://raiffeisenbank.ba/konvertor-valuta/

IMPORTANT:
External funding for this project is not provided. However, as the project leader, I provided external funding for fuel and space for work and maintenance of the workshop. Also, I provided all necessary materials for the analysis of the collected samples. This particularly applies to the chemical processing of diatom samples, identification according to the latest keys, microscope equipped with a digital camera, stereo microscope and a place to deposit permanent slides.

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

The story about freshwater oligotrophic habitats and their conservation in the area of Vranica Mountain, but also of the whole Bosnia and Herzegovina is just the beginning. With our research, we have made a good basis for the establishment of long-term monitoring of these specific habitat types on Vranica Mountain. All studied habitats deserve a special place in conservation, but a very urgent measure of protection should be pay on mountain springs, mountain peatlands and mountain lakes. These habitat types are the most sensitive ones. A lot of rare and endangered species inhabit these habitat types. They also offer a very broad range of ecosystem services. From that point of view, as the next step in our work, it is very important to continue with mapping and identification of freshwater oligotrophic habitat types in Bosnia and Hercegovina, and focus of the future studies should be on the most sensitive and rare types. Instead of diatoms as very good bioindicators, in the future all other groups of algae and macrophytes vegetation should be counted. Instead of algae of phytobenthos, for assessment of the ecological state of the mountain lakes, we should take algae of phytoplankton. It is also very important to continue with education and training of young researchers in the field of the restoration and conservation ecology, but also relate our work and obtained results with decision makers, non-governmental organization and the local community.

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

We used the logo The Rufford Foundation in all promotional material which we have produced. In our professional publications (abstract and papers) we also thank the Rufford Foundation for providing financial support. The Rufford Foundation will be acknowledged in all forthcoming publications involving this project.

11. Please provide a full list of all the members of your team and briefly what was their role in the project.

Senka Barudanović, Ph. D. - Supervisor.
I would like to thank Ph. D. Senka Barudanović, who brought me tremendous knowledge and introduced me into the field of botany and ecology, especially to

systematics, taxonomy and ecology of algae. Since I was involved in many projects which were led by Professor Barudanović during my professional engagement at the Faculty of Sciences, it was not difficult for me to become a project leader and to lead the team to its finalization.

Sabina Žero, Ph. D. - Active member on project.
Colleague Sabina Žero, Ph. D. As an active member of the project, contributed greatly to the fieldwork and during the chemical analysis of water. She was included in the process of making all Project Updates and promotional materials. Particularly, I would like to point out a great contribution in preparing abstracts for conferences and original scientific papers.

Emina Ramić, MA - Associate member on project.
Colleague Emina Ramić, MA, as an associate member of the project, she gave a great contribution especially in fieldwork phases and during the chemical analysis of water. She was involved in the process of making Project Updates and promotional materials. Particularly, I would like to point out a great contribution in preparing abstracts for conferences and original scientific papers. The colleague made a significant contribution to the organization of a field workshop.

Macanović Armin, MA - Associate member on project.
Colleague Macanović Armin, MA as an associate member of the project has made a major contribution in preparing Project Updates and in realizing fieldwork. Since he has great knowledge in the field of plant ecology, he helped in the identification of certain critical plan taxa, especially mosses and some aquatic macrophytes. Colleague Macanović contributed to the creation of original scientific work and helped in organizing the field workshop.

Boškailo Aldin, MA - Associate member on project.
Colleague Boškailo Aldin, MA, as an associate member of the project, he has made a major contribution in the mapping of studied oligotrophic habitat types in the area of Vranica Mountain, as well as in preparing the general map of the researched area.

Fejzić Senaid, MA - Associate member on project.
Colleague Fejzić Senaid, MA, as an associate member of the project, he has made a really huge contribution during this project. The colleague was directly involved in the preparation of all materials related to the project. Colleague Fejzić did proofreading of all prepared materials, both printed and electronic. The colleague made a significant contribution to the organization of a field workshop.

12. Any other comments?

I would like to sincerely thank the Rufford Foundation, without whose support and the grant this project would never be realized. Since the greater part of the grant was used for the purchase of the equipment for fieldwork, it will also be possible to use it in our future projects, but also during the realisation of long-term monitoring. Thanks to the active promotion of our project through social networks, a large number of young researchers and students from Department of Biology have heard

about the Rufford Foundation and currently, they are greatly thinking about generating their own projects especially in the field of restoration and conservation ecology. Since this project has created a good basis for studied freshwater habitat types which are distributed on Vranica Mountain, I sincerely hope that the Rufford Foundation will support our future research. Finally, I would like to thank all my friends, colleagues, my dear students from the Faculty of Science, Department of biology who supported me during the realization of all phases of this project.