

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	Natasa Mazalica
Project title	Cyanotoxins threat for Danube salmon (Hucho hucho) caused by eutrophication process in Vrbas River
RSG reference	25412-1
Reporting period	1 st of July 2018 till 1 st of July of 2019
Amount of grant	£5.000
Your email address	natasa.radoja@gmail.com
Date of this report	2019-07-15

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
Acquiring the research permit and meetings with the representatives of focus groups				Done in July of 2018.
Defining the best location for future field work according to accessibility and vicinity of the dam.				Done in July of 2018. After a couple of field visits, we decided that the sampling point would be at half way between the dam and the mouth of the river Crna Rijeka into the lake Bočac, where the quality of the water is stable and there is no other visible influences on the lake.
Field visits for summer period (July – August), according to the described methodologies				Done at the end of July and throughout August 2018. During the field visit, all the samples were collected and preserved until arrival at the laboratory.
Field visits for autumn period (October), according to the described methodologies				Done, throughout October 2018. During the field visit, all the samples were collected and preserved until arrival at the laboratory.
Field visits for late autumn period (November), according to the described methodologies				Done, throughout November 2018. During the field visit, all the samples were collected and preserved until arrival at the laboratory.
Field visits in May 2019), according to the described methodologies				Done, in May 2019. During the field visit, all the samples were collected and preserved until arrival at the laboratory.
Laboratory work				Done, through entire periods of sampling. Immediately after arrival to the laboratory, the samples were adequately processed and/or preserved. Usually a couple of days after sampling, the analyses were performed, except phytoplankton analyses which were conducted after most of the samples were collected.

Laboratory work (cyanotoxin analyses)			Done, after all the sampling was done, the preserved samples were sent to laboratory for cyanotoxin analyses.
Processing all data obtained throughout the project duration			Done, in June 2019. The determination of trophic status with all the collected data, and assessment of expected vs. obtained results.
Final presentation and making of brochure with key findings of the projects research			During the final month of the project, the presentation of project activities and outcomes was organised with administration of Sports Fishing Society of Banja Luka, representatives of the Republic Institute of protection of cultural, historical and nature heritage of Republic of Srpska. The representative of Center for Environment Banja Luka (NGO) and students of Faculty of Natural Sciences and Mathematics (University of Banja Luka) were also present. Prepared brochure with easy to understand scientific data and significance of the project were distributed at the presentation, as well as at Center for Environment, Fishing Society and at Faculty of Natural Sciences and Mathematics.
Promotion of scientific research and its feasibility among students and younger population.			Promotion was present through entire project duration. The students were involved as described in previous paragraphs, they were present at the field, were very much involved in entire process of field work, laboratory analyses, preparation of leaflet, distribution of leaflets and importance of research activities for protection of Danube salmon, and research in general, as a tool for making a difference in a local community.
Rising awareness on negative impact of existing dam on habitat and Danube Salmon as endangered species, its conservation importance and future.			Through promotional activities we showed that with scientific data it could be proven that the dams have a negative influence on the quality of the water and therefore on Danube salmon habitat.

<p>Demonstrating that hydropower plants have greater impact on habitat and species besides migratory barriers, with scientific data provided on cyanotoxin bio-accumulation in fish and its unfavourable health impact</p>		<p>Described in previous paragraph, it was demonstrated that the dam has a negative influence on the quality of water because there is clear evidence of eutrophication processes, which are causing intense algal blooming. Scientific data on cyanotoxin accumulation in fish was not obtained due the fact that the algal blooms were caused mainly by Pyrrophyta order. Although the cyanobacteria had a massive growth as well, it was not enough for cyanotoxins to detect in the water samples and presuming in the fish tissue.</p>
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

We had a difficulty with a boat that we were renting, a couple of times it was not functioning properly, but in general, it did not affect the activities timescale. It postponed the sampling for day or two, in couple of occasions, so we had extra costs for road trips because we had to turn back and come again for the next day, or prolonged the time we spent on the lake which effected the budget for renting, because we had to compensate for the extra fuel costs for the boat.

Second, we were not able to catch any Danube salmon specimens. The fishermen attempted whenever they were at the lake, which was very often and at least once a week, but it seems that the population of the Danube salmon is even smaller than estimated. It did not affect the project outcome because with cyanotoxin analyses we discovered that there are no toxins in the water, so we presume that they could not have been present in fish tissue.

Third, we sent all preserved samples for cyanotoxin analyses to Institute for Public Health "Dr Milan Jovanovic Batut" instead of analysing them at Natural Sciences and Mathematics Faculty (University of Novi Sad) as previously intended because of some misunderstandings with the faculty staff. We were not experiencing any difficulties for the decision of sending the samples to another laboratory.

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

1. The project was written having in mind that the blooms in Bocac Lake are cyanobacterial origin, but it was discovered that the blooms are various throughout the summer and early fall with species such as *Synedra acus*, *Fragillaria crotonensis*, *Peridinium bipes*, *Ceratium hirundinella*, *Dinobryon divergens* i *Hapalosiphon sp.* We detected *Mycrocystits aeriginosa* (which is known to produce Microcystin LR) but not in a massive bloom. While reading scientific papers, we discovered that the

Peridinium bipes (dominant in most of the blooms) produces toxin that has very negative influence on *Microcystis aeruginosa*, which could be an explanation why is there so small *Microcystis* population. All the scientific data obtained during the project would not be found if there was no support from the Rufford organisation, and even though the data led us in somewhat different direction, it is still the same goal, to gather scientific data and with them to help boost the Danube salmon protection.

2. Including the younger population of students into our work is very important in a long term. Student have little opportunity to conduct a research or be involved in some way, they were grateful and willing to work, and they were very much interested in the Rufford organisation, as the organisation who could help them in the future if they decide to lead a project themselves.

3. The cooperation with the members of Sports Fishing Society of Banja Luka was very much successful. We established trust and were provided with very big support and assistance by the fishermen especially during the fieldwork. They showed to be a good cooperants and surely will we will work together for Danube salmon and habitat protection in the future.

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

Many members of the Sports Fishing Society of Banja Luka (which have nearly 12 000 members) were involved throughout the entire project. They have made efforts in catching the specimens of *Hucho*, showed a great deal of interest in the project itself as well as the Rufford organisation. At the end of the project they showed high awareness of the endangered status of Danube salmon and realised the urgent need for its better protection, and finally even had a couple of new ideas for the protection of Bočac lake and Vrbas river as a habitat not only for Danube salmon but also for all the other species sharing the same habitat.

Also, a lot of students were involved and helped distributing the promotional material, so I believe that the projects outcomes and information about Danube salmon and evident deterioration of the habitat due to the existing dam, will reach local but also a wider public in the future.

Also, during the May of 2019 the waste-net which stops the waste to enter the lake, broke and around 12 000 cubic meters of waste was floating at the lake for days. A couple of days after that, a massive bloom of *Peridinium bipes* covered the lake (<http://mondo.ba/a876058/Info/Drustvo/Mrlja-na-Vrbasu-cvjetanje-ajgi.html>). It drew huge attention to Bočac Lake and local community could see the impact of the anthropogenic influence (waste producers, dam constructor). It helped the promotional activities because the people were already interested in the theme.

5. Are there any plans to continue this work?

Plan is that the project should last for 5 years in total, until the Completion Grant, as we stated in our first application.

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

Our plan is to publish the results of the project in an international journal on freshwater ecosystem called "Knowledge and Management of Aquatic Ecosystems" and continue to share results with fishermen, students and locals of the Bočac area.

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

The Rufford Foundation grant was used from 1th of July 2018 till 25th June 2019, as it was predicted when project was approved.

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
Workshop organisation	600	600		
Elisa kit for Microcystin LR	600	500	-100	The kit was not purchased as intended, instead the samples were sent to Institute for Public Health (Dr Milan Jovanovic Batut)
The chemicals for lab analyses	200	200		
Secchi disc with graduated rope	250	250		
Books/keys identification literature	150	150		
Brochure printing and design cost	300	300		
Personal notebook	500	500		
Researcher fee	330	330		
Boat renting	460	495	+35	
Fuel costs	460	515	+55	
Accommodation and	1,150	1,160	+10	

food during the field work				
Total:	5,000	5,000		* Local unit exchange is: £1 = 2,19264 BAM

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

During the project, there has been built another dam downstream the Bočac lake, that is now used as a regulator dam. In this way, the habitat of the river is interrupted with a brand new dam and it is expected that it would have an impact on the quality of the water and therefore the Danube salmon. For these reasons, it is very important to continue this research to collect more data on how the dams are creating negative environment and opportunities for phytoplankton to thrive such as the case of Bočac Lake, where we found clear scientific data on algal blooming because of the deterioration of that specific habitat.

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?

Yes. The Rufford Foundation logo was used during the presentation of the project and in the mentioned promotional material. We also had media releases through the news portal which was shared via another local news portal as well. During these occasions, Rufford foundation was mentioned in the text as the project donator. Links below:

<http://mondo.ba/a886641/Info/BiH/Alge-u-jezeru-Bocac-cvjetanje.html>

<https://www.bl-portal.com/drustvo/kad-su-cvjetale-alge-sta-kazu-analize-iz-bocca/>

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

Milica Končar is a team member from the start of the project. She was very helpful with carrying equipment and processing samples in the laboratory. Also, she was willing to learn all methods of sampling as well as laboratory methods and she had great ideas for presentation and leaflet.

Jovana Ćulibrk, Milica Čegar, Marija Brdar and **Sandra Popović**, students from Faculty of Natural Sciences and Mathematics (University of Banja Luka) were in couple of occasions at the field and helped spreading the word about the project and distributing the promotional material among the students of the Faculty.