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	Branislav Dimitrov
Project title	A Way to Increase Local Government and Public Participation in Protecting Macroinvertebrate Biodiversity of Local Streams in South-Eastern Serbia
RSG reference	24273-1
Reporting period	February 2018 – November 2019
Amount of grant	£4,998
Your email address	branislav.dimitrov@gmail.com
Date of this report	25 November 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
Equipping the laboratory			■	It was the first task of the project - procurement of the necessary equipment so we could continue our work in the field and the lab. The laboratory was equipped with a stereo microscope and additional supplies for field and lab work, such as water quality meter, GPS device, tweezers, Petri dishes, tubes, microscope slides, alcohol, etc. For the identification of Ephemeroptera and other organism groups, an upright microscope was needed, so I was lucky enough to find a used microscope for an extremely low price which I purchased with my own money. All this equipment was sufficient to carry on with our planned work.
Initial project promotion			■	As soon as the project was approved, we started sharing the news about the idea behind the project and all the planned activities. Volunteers were invited to take part in its realization. For this purpose, electronic and social media were used, as well in-person invitations.
Field trips, macrozoobenthos sampling, and ecological data collection			■	First samples were taken in late April 2018. This is when we realized that the work proposed was too ambitious and that it could not be achieved within the defined timeframe. The localities were very remote, and the terrain was inaccessible, so it took much more time to collect the samples. Only a few samples could be collected per day, although we were in the field from early morning to late at night. For this reason, we prolonged the sampling of all localities throughout all the seasons, although only one season per locality was covered (with few exceptions with

				two seasons). What is important is that all the planned localities have been covered so the ones with the least conservation significance will be omitted from future investigations.
Sorting out of samples				Due to relatively large samples that we took (6 subsamples per each sample), sorting them was more time consuming than expected. Their storage in the refrigerator proved to be very useful for keeping them fresh for longer periods.
Identification of organisms to species level				The fauna of the Balkan peninsula is characterized by a high percentage of endemic species, which is the case in Serbia. As part of the benthic macroinvertebrates, Trichoptera, Ephemeroptera and Odonata larvae are in the most favourable position in terms of availability of reliable ID keys. These are also the groups with the largest number of protected species. Order Trichoptera in the study area also has the highest species diversity. Many other organism groups lack descriptions of their larvae representatives, so some of them were identified only to genus level. I made connections with some leading experts for organism groups whose identification is very difficult, so with their help we will try to identify them in the future. Most of these groups don't have protected representatives, with the exception of Plecoptera. Nevertheless, identification of many rare and unexpected species was successful, including species from the orders of Trichoptera, Ephemeroptera, Mollusca, Neuroptera, Decapoda and other organism groups. We also created preliminary species list of benthic macroinvertebrates, which so far consists of 98 species, 10% of them being protected. At least five new species for the fauna of Serbia have been identified.
Determination of water quality and assessment of the				All of the 2nd order watercourses (The Law on Waters, 2018) that were subject of our research are characterized by

human impact on investigated streams				pristine water of 1st to 2nd quality class (using BalkaN Biotic Index and other relevant indices used by the state). The investigated area is facing a high rate of depopulation, so some of the villages are completely empty. It was hard to find local residents to conduct interviews. The existing agricultural activities are done by traditional methods with minimal fertilizer or pesticide use. The only human impact that was present is due to increased forest cutting done near the water bodies of the streams. Another serious problem is caused by climate changes, due to prolonged drought periods, causing some of the streams to dry out for the first time or some intermittent streams to be dry for longer periods of time than before. It is important to note that across Serbia and other Balkan countries there is a trend of building small hydropower plants, causing massive destruction of stream habitats and accompanied biota, including many rare and endemic species. They are mostly built in the most preserved and valuable mountain streams. Streams in unprotected areas are threatened the most, since building of hydropower plants on them is not environmentally regulated - their construction is possible without carrying out an environmental impact assessment. In contrast to the preserved streams, Nišava and Gaberska rivers after flowing through Dimitrovgrad and Lukavica village become heavily polluted rivers, mostly by organic and microbiological pollution. This was tested by the Institute of Public Health in Pirot.
Preparation of promotional material				All of the promotional materials (T-shirts, leaflets, memo pads and calendars) have been prepared and distributed to relevant stakeholders as planned.
Promotion of the project results				The obtained results were promoted with the public through sharing leaflets and

				by organizing lectures, also through social media by writing Facebook posts to relevant groups and websites. We also organized several public forums on the subject of the importance of freshwater ecosystems and their biota. Throughout the whole process of the project development we planned and conducted an advocacy campaign with the representatives of the local government of Dimitrovgrad and the Institute for Nature Conservation of Serbia. Final presentation of the project results is going to be organized in the second week of December 2019. Regarding publication of the project results and sharing them with wider scientific community, this will be our next primary goal.
Organizing photography field trips				We organized 10 photography field trips as planned, during the spring and the summer in 2019. We edited about 50 photographs of rare species from Dimitrovgrad and they are ready to be exhibited at the final presentation of the project results.
Organizing hydrobiological section for high-school students				Lectures about water, freshwater ecosystems, freshwater biodiversity, and biomonitoring have been organized for high-school students from the local high-school. https://www.cargim.edu.rs/SR/vesti/svetski-dan-vode1819.htm - 1st lecture https://www.cargim.edu.rs/SR/vesti/hidrobiologija1920.htm - 2nd lecture We still need to conduct the practical part of the hydrobiological section.
Determining streams of the highest conservation importance				Six sub-catchments have been chosen for protection, which was proposed to the local government. They were determined through analysis of the overall ecological state of their ecosystems, presence and number of protected and endangered species, state of their populations and their conservation priority. These ecosystems have the best overall water quality, high

				species diversity and largest number of threatened species with a good state of their populations. These proposals may be modified after further analysis and species identification.
Designation of a new protected area (conservation of streams at the local level)				The initiative for protection of the new area has been launched, as the local government accepted our research results and suggestions. The next step is adoption of an Initiative for the beginning of the protection process. Protection of all three categories of protected areas in Serbia is done according to a protection study designed by the Institute for Nature Conservation of Serbia, which would be the next step in the process, after which the newly protected area is validated and its manager is declared.

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

The original idea was to have the sampling done in all four seasons at all localities. As I explained earlier, this was not feasible over the planned period of time as the entire project would be reduced to sampling and sorting only due to a large number of sampling sites. We decided to extend our sampling at all planned localities throughout the whole year, but with only one sample taken per locality, with few exceptions. This allowed us to reject certain streams from further consideration for protection and future research and to focus on the ones with the highest species diversity and the largest number of rare species.

It turned out that our initial plan, in terms of the number of samples, was too ambitious for the proposed time period of the project. We learned our lesson and will keep that in mind for planning our future research.

It was not easy to find volunteers in Dimitrovgrad interested in fieldwork. That had an effect of delaying certain field trips because we were waiting for the team to be assembled.

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

a) Equipping the laboratory with necessary basic equipment for field and lab work will enable us to continue doing research independently. This is also a great opportunity for us to establish connections with managers of protected areas for the needs of macrozoobenthos biodiversity monitoring within their territories. The laboratory and the equipment are currently situated at my home in Dimitrovgrad.

b) Identification of new species for the fauna of Serbia. This indicates the existence of certain gaps in the knowledge of macrozoobenthos species distribution in Serbia. At least 5 new species for Serbia have been identified, and by studying species lists from neighbouring countries, several newer species can be expected. For 9 rare species whose presence in Serbia was confirmed in earlier research and are protected by state, newly discovered localities were recorded. In addition to that, 7 fish, amphibian and bird species of national and international importance were recorded.

c) Involving the local government of Dimitrovgrad municipality in nature conservation. Local government representatives are usually very conservative in their understanding of nature protection. They mainly rely on regulations issued by the state and very rarely independently initiate protection of a particular area. With this project, we actively involved representatives of the local government of Dimitrovgrad municipality and launched an initiative to protect a new area. This model was also introduced to other young researchers who saw the great potential of nature conservation through establishing cooperation with their local authorities. Hopefully, this cooperation will continue in the future.

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

The area of research is sparsely populated. We were able to contact only a few residents. We informed them about our activities, and they were willing to help us. One of them was our guide for the most inaccessible streams.

Leaflets were distributed among the inhabitants of Dimitrovgrad and other stakeholders, such as forestry department “Srbijašume” in Dimitrovgrad, local government employees, elementary and high-school teachers and students, etc. We have also held several public education meetings, which were attended with great interest by the citizens. The results of the research were also used in the adoption of new spatial plans for the Special Nature Reserve "Jerma" and the municipality of Dimitrovgrad, with an emphasis on the importance of preserving the biodiversity of freshwater organisms and the detrimental nature of the construction of hydropower plants for their survival. We were also stressing the importance of intact flowing freshwater for the local communities. Our suggestions were mostly adopted.

Specially prepared trainings and presentations for university and high-school students were organized as well, attended with great interest. The cooperation with the local high school will be continued.

5. Are there any plans to continue this work?

Before planning any additional research, it is necessary to finish identifying species from our samples and processing the data obtained. Processing includes complementing the species list of the researched area, also analysis of the distribution

and status of populations of threatened species of national and international importance, as well as determining their habitat preferences. It is also necessary to publish this information in peer-reviewed scientific journals.

We will continue our cooperation with the local government and at the beginning of development of the Study on protection of the proposed streams, we will share our new findings of identified species from the remaining samples, so they can also be included.

As part of this process, it is necessary to declare a manager of the newly protected area, so it is very important that we choose the most competent organization to do such a responsible job.

The equipped laboratory will be used to monitor the populations of threatened species in the newly protected area. I also hope to deepen my cooperation with the Institute for Nature Conservation of Serbia so that we can carry out joint research. One of the ideas is to establish cooperation with protected area managers, who often lack the expertise and resources for biodiversity monitoring and are dependent on external assistance. Our independent research within unprotected areas will also continue.

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

Most of the results (except the presence of new species for the fauna of Serbia) have already been shared with relevant stakeholders. We shared them with the Agricultural and Environmental Protection Department of the local government of Dimitrovgrad municipality in order to initiate protection of the selected streams. Plans for the future include sharing the results with wider scientific public in peer-reviewed scientific journals. I will share all new findings of the identification with members of the Biological Society "Dr Sava Petrović" when organizing every next meeting.

After the official publication of our results, all the data will be entered in the existing biodiversity databases, which also need to be complemented with the newly identified species for the Serbian fauna.

When the protection of the streams is officially declared, a website will be created with attached maps and species present marked at each site. These maps will also be prepared in the form of posters, which will be distributed to relevant institutions.

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 project was realized within the time period from February 2018 to November 2019, although the photography exhibition has been scheduled for December 2019. There were some adaptations regarding the sampling dynamics due to the reasons mentioned in the earlier answers. The sampling was done from April 2018 to February 2019. A certain delay has occurred after I started doing my internship, which took a significant amount of my time. This caused a prolongation of the project length by three months because more time was needed for species identification and data

analysis. Presentation of the project was done throughout the whole length of its duration. The practical part of the hydrobiological section of the high-school still needs to be done but it also depends on the high-school's curriculum. Identification of the remaining samples and their publication represents our next step. The rest of the activities were accomplished as planned.

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
AZ 8603 Water Quality Meter	355	321	-34	
GPS device	266	311	+45	
Alcohol for preservation of samples	327	174	-153	Since the sampling was done at a smaller number of localities than we initially planned, we needed less alcohol for sample preservation. We were also able to find it for a lower price. The difference was allocated to buying identification keys.
Refrigerator	207	251	+44	
Photo camera	276	268	-8	
Stereo microscope	457	1085	+628	Equipping of the laboratory has great potential for realization of projects in the future. I saw that as an opportunity to invest my own money to buy a higher quality trinocular stereo microscope, so that a camera could be mounted for the purpose of photo documentation and sharing results with other researchers. The purchase of the camera will be a subject of future projects.
Boots	124	111	-13	
Additional equipment and materials for field and laboratory work	188	271	+83	We needed many additional accessories as we were progressing with the project realization. They were overlooked during the preparation of the

				project proposal but there was no way we could predict that they would be necessary.
Postal costs and taxes	133	48	-85	The postal costs and taxes were significantly lower than expected.
Chemical analysis of water samples	396	223	-173	Our proposed price was based on the predefined pricelist for complete physicochemical analysis of water samples (Institute of Public Health, Pirot). We were able to select only the parameters which were important for our research, so the final costs were much lower.
Identification keys	120	697	+577	We were not able to identify most of the species with the ID keys which we thought would be sufficient. For that reason, we allocated most of the excess money to buying reliable ID keys, which could cover most of the Ephemeroptera and Trichoptera species present in the area of our research: Bauernfeind E. & Lechthaler W. (2014): Ephemeroptera – Key to Larvae from Central Europe, DVD-Edition, Vienna (ISBN 978-3-9501839-2) Waringer, J. & W. Graf (2011): Atlas der mitteleuropäischen Köcherfliegenlarven/Atlas of Central European Trichoptera Larvae. More than 600 colour photos. - 468 pp., (Erik Mauch Verlag) Dinkelscherben. (ISBN 978-3-00-032177-1) This has assured certainty in identification to species level, which was necessary for our project goal.
Designer	85	93	+-8	
Printing of leaflets	108	83	-25	
Printing of posters	54	54		Instead of posters, we printed memo pads for the same price.
Printing of calendars	104	104		
Printing of T-shirts	404	396	-8	

Printing of 50 photographs for the photography exhibition	220	220		
Food costs for photography field trips (2 people)	100	132	+32	
Food costs during trips for fieldwork (4 people)	560	480	-80	We spent 20 days in the field instead of the planned 28, due to sampling in only one season per locality.
Fuel costs for project presentation	207	114	-93	Because of the gathering of our target student groups for project presentation at the Stara Planina Mt. camp, it was not necessary to visit all the universities for project presentation.
Fuel costs for photography field trips	80	80		
Fuel costs for fieldwork	227	163	-64	Same as mentioned above, we went 20 days to the field instead of 28.
Upright microscope		68	+68	The purchase of the upright microscope was necessary for Ephemeroptera species identification. I used my own money to buy a used microscope.
Totals	4998	5747	+749	Project costs were higher than expected. The difference was covered by my own money, which I decided I was willing to spend after starting my internship.

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

Based on our findings of new species for the fauna of Serbia and finding out that some of them have been misidentified in the past, it is clear that a lot of work in this direction needs to be done in the future. It is important to complement the existing species lists of the most important benthic macroinvertebrate groups (Trichoptera, Ephemeroptera, Plecoptera, Coleoptera, Mollusca and others) and to gather more field data on their distribution. Identification of these organisms is very difficult and requires long-term training and purchase of special equipment (including identification keys) which are very expensive. From my knowledge so far, there are no complete ID keys for the Balkan peninsula covering all of the present species and some of the larvae are still awaiting their description. Therefore, many scientific articles containing new species descriptions need to be studied. Certainty in species identification is required for their successful conservation.

When planning management of 2nd order watercourses in Serbia (The Law on Waters, 2018), it is necessary to take into account the presence of protected species in them, and to adapt any possible constructions or management plans in order to minimize the impact on their populations. For this reason, research with the purpose of collecting data on their distribution and establishing cooperation with local authorities is very important.

Unfortunately, this is not recognized by the state. As previously mentioned, changing certain regulations in the past has allowed investors to build hundreds of small hydropower plants in the most preserved and biodiversity reach streams, even in protected areas. Due to massive protests of local communities, some changes of the existing laws in favour of biodiversity protection are being promised, but for now, this is where it ends. These changes must be made more recently or a significant portion of the populations of many endemic species will be lost. We believe the work done on this project has had an impact on the decision of the local government to ban their construction on the territory of Dimitrovgrad municipality.

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?

The Rufford Foundation logo was used on all of the promotional materials that were prepared and distributed, as it was initially proposed. This includes T-shirts, leaflets, memo pads and calendars. Also, at every introduction in our presentations, during organized lectures or public forums, we were mentioning The Rufford Foundation and the contribution of the grants that you provide for developing countries. Also, The Rufford Foundation was mentioned for media articles and texts published online and on social networks. In the future, when publishing our research results in scientific articles, The Rufford Foundation will be mentioned within the "Acknowledgments" section.

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

Based on the participants involved in the project realization, the activities could be divided into several groups:

- Field work: **Ivan Medenica** (Institute for Nature Conservation of Serbia), **Boris Kotev** (ecologist – volunteer), **Nemanja Petrov** (ecologist – volunteer), **Edison Todorov** (volunteer)
- Collection of ornithological data: **Ivan Medenica**
- Sorting samples: **Nemanja Petrov**
- Promotional material and project design: **Đorđe Vukojević** (ecologist and graphic designer), **Dimitrija Savić** (ecologist and artist)

- Educational and promotional activities: **Marija Dimitrijević** (biology teacher), **Sandra Stanimirov** (biology teacher), **Boris Kotev**

- Photography field trips: **Ivan Medenica**, **Miloš Popović** (Faculty of Sciences and Mathematics, Niš)

- Media coverage: **Aleksandar Todorov** (journalist), **Sergej Ivanov** (journalist), **Internet portal FAR** (far.rs)

- Data analysis and preparation of the report for the local government: **Aleksandar Igov** (employee in the local government of Dimitrovgrad municipality)

- **Branislav Dimitrov** was the organizer and participant in all of the activities mentioned above.

12. Any other comments?

By supporting new generations of young researchers, you are encouraging them to develop and apply their knowledge and act towards nature conservation. The results of their actions can be seen in the present but will be even more noticeable in the times to come.

The results of this pilot project have shown us how little we actually know about the life in our streams, which are being recklessly destroyed in this part of the world. We gave certain contribution through our actions in protecting a small corner of Serbia but will continue developing models applicable in the whole country. I want to thank The Rufford Foundation for providing us with the tools needed to do such a work and for enabling us to continue doing it in the future as well, hopefully with your support.

Mock-up of the calendar