

Final Evaluation Report

Your Details	
Full Name	Milan Ilić
Project Title	Impact of fires on threatened butterfly species in southeastern Serbia and rising capacity for biodiversity conservation
Application ID	30495-1
Date of this Report	August 5, 2021

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
Assess the effect of fire				<p>This phase of the project was a great success as we covered all pre-planned sites for all 3 key species (<i>Lycaena helle</i>, <i>Boloria eunomia</i>, <i>Erebia orientalis</i>). We managed to cover the sites that we confirmed to be under the direct influence of wildfire, such as Vražja glava and Tri čuke, during the 2020 and the next season as well. The wildfire caused the greatest damage to these two localities, where almost half of the total population of <i>Lycaena helle</i> was previously located. As for the locality Ponor and the stretch Babin zub-Midžor, <i>L. helle</i> is there still present with decent number of individuals: for a short period of time, we have noted more than 20 individuals and additional 30-40 individuals, respectively. Two other species i.e <i>B. eunomia</i> and <i>E. orientalis</i> are present with a good number of individuals (we noted more than 80 individuals) and the wildfire did not affect their habitats, although we noticed a reduced number of those species at the locality Jabučko ravnište (where they were much more numerous in previous years), most likely as the consequence of the construction of a hotel earlier or as a result of microclimate changes nowadays. During the field trips, we collected a large amount of data on other species, and as a particularly interesting information we can single out the discovery of a new distant population of the species <i>Parnassius apollo</i> at 1500-1600 m above sea level, which on Stara Planina Mt. until then was usually recorded at a much lower altitude, on average 800-900 m above sea level.</p>

Workshops			<p>In 2020, CSO Biological Society "Dr. Sava Petrović" organized the scientific-research camp "Crni vrh", and in 2021, the scientific research camp "Temska". Our team members organized planned workshops within those camps. The workshops turned out to be good for several reasons. By involving volunteers in the activities and group work, volunteers are prepared for independent further work in the field. By entering data into the Biologer application directly in the field, the volunteers made a significant contribution to collecting precisely georeferenced data on a large number of species, which is reflected in more than 2000 data points (approximately 2400) collected during these two research camps. We mentioned this part of the project as "partially achieved" due to the fact that the third workshop - outdoor festival "Jerma", organized by "Adventure Travel Network" in cooperation with Special Nature Reserve "Jerma" co-financed by the Ministry of Environment Protection, was not held during the project. The organizers estimated that the situation with the COVID19 pandemic was not favorable for the maintenance of the camp at that time, and it was postponed. However, the outdoor fest "Jerma" will be held in August 2022 and then our Biological Society "Dr Sava Petrović" will have a workshop in order to educate participants about the importance of butterfly species through fieldwork.</p>
Zerynthia research spp.			<p>Research on species of the genus Zerynthia has been very valuable. As planned in the project, we explored all UTM fields (surface areas measuring 10 x 10 km) within which the presence of these species on Stara Planina Mt. has not been recorded before according to Biologer database. We noted the presence of Zerynthia polyxena for the first time in two UTMs, as well as Zerynthia cerisyi in one UTM. This project activity is a continuation of an experiment designed to determine habitat type preferences between Zerynthia cerisyi and Zerynthia polyxena species, that was carried out during the Booster project "Endangered Serbian Butterflies - working together" (24652B), funded by The Rufford Foundation.</p>

			<p>As a result of the experiment, I prepared and finished master thesis entitled "Differences between habitat types of Eastern and Southern festoon butterflies in Serbia (Lepidoptera: Papilionidae)". Link to master thesis: https://www.pmf.ni.ac.rs/download/master/%20biologija/2020/Master-rad-Afinitet-Zerynthia.finalna-verzija.pdf.</p>
Promo material			<p>The promotional material consisted of t-shirts, brochures and printed field guides for butterfly recognition. We distributed t-shirts and field guides to team members, to interested parties during academic presentations, as well as a reward for the most active volunteers at the workshops. The brochures were distributed both at academic presentations and during the field research to the locals.</p>
Quiz identification butterfly species for of			<p>During June 2021, the development of a quiz for butterfly recognition was completed in cooperation with the leaders from the Biologer database. This quiz is now available at Biologer database (link: https://kviz.biologer.org/?fbclid=IwAR0qTuiEN%2014Yov_5My4Mdek3NWQV7HI7Fcha4Fcz2gjL5j%20nw0DL6w0pWBg0) – an open-source software for Android devices that aims to collect distribution data about biological species. The quiz can be accessed by biologists and other nature enthusiasts, which will help them learn about butterfly species and test their knowledge, but on the other hand help scientists gather more quality data and use them to protect species and natural habitats. The quiz was promoted through the website (https://bddsp.org.rs/) and the Facebook group of the Biological Society "Dr Sava Petrović" (https://www.facebook.com/drsavapetrovic), the official website of Biologer (https://bddsp.org.rs/), as well as through numerous other popular science groups for researchers like us in Serbia. As a special activity at the camps, we had a team competition in quiz solving, with the most successful teams honored by prizes in the form of t-shirts, manuals, etc. This type of promotion and inclusion of volunteers in group work has proven to be extremely successful, and the</p>

				activity itself will certainly continue to benefit the project promotion in group gatherings of members of the Biological Society.
Academic presentations				The presentation of the project results was held at all four Universities (according to the project plan) and in several other high school institutions. It has long been known that this is one of the best ways to promote the results of work, and the presence of approximately 500 people at our promotions proved this to be the case.

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

The only major difficulty we encountered during the project was that the outdoor fest "Jerma" was postponed by the organizers - "Adventure Travel Network". As we did not manage to organize this workshop during the project, we agreed with the organizers that in 2022, when the festival will be conducted, we will realize the planned workshops in nature for camp participants in cooperation with the managers of SNR "Jerma" and the co-financing of the Ministry of Environment Protection. The project funds that were envisaged for this activity were redirected to a more important task, i.e., to the research of key species.

On the other hand, at the scientific-research camp "Temska", which numbered between 70-80 participants, 42 volunteers participated in our workshop, which is much more than 15-20 participants that we expected at this camp.

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

A. Assess the effect of fire on butterfly populations

During field research assessing the damage caused by fires in the territory of Nature Park "Stara Planina" in 2019 for three key species, *Lycaena helle*, *Erebia orientalis* and *Boloria eunomia*, we found out that the wildfires had big impact on the species *Lycaena helle*. Namely, in two localities (Vražja glava and Tri čuke) where almost half of *L. helle* population was previously located, the species has completely disappeared. We informed the managers of the protected area of the NP "Stara Planina" about this situation and agreed on a further monitoring program. This will include the monitoring of the butterfly population and the succession dynamics at the impacted sites.

B. Education and rising capacity for biodiversity conversation

By involving a large number of volunteers, both in the workshops and in the projects' research activities, we educated and prepared them further independent work. The training, which consisted of getting acquainted with the methodology of data entry in the field, as well as better species determination with the help of manuals for diurnal butterflies, was attended by about 70 volunteers. By collecting georeferenced species observations in the Biologer database, our volunteers will be helping further develop

this sustainable, easy-to-use and open-source platform, thus contributing to science and conservation of species and habitats.

Additionally, during the workshops, approximately 2400 precise georeferenced data points were collected, out of approximately 5000 data points collected during entire project, which is of great importance for assessing the state of populations of diurnal butterfly species.

By presenting the results of the project throughout the country (to a total of more than 500 people), as well as working with protected area managers, we made firm connection with a large group of experts from our field and expanded the network of people and Organizations with whom we plan further cooperation.

During the project, a quiz for butterfly recognition was created (https://kviz.biologer.org/?fbclid=IwAR0qTuiEN14Yov_5My4Mdek3NWQV7HI7Fcha4Fc z2gjl5jnw0DL6w0pWBg0). This is the only quiz to get acquainted with the species of butterflies present in Serbia, and with appropriate promotion through social networks, it is a good way to present science to a wider audience. This is just the initial version of the quiz, and we plan to further develop it through enriching the database of photos used by the quiz, creating more difficulty levels, developing an application for Android devices, etc.

C. Zerynthia species surveys

These surveys aimed at collecting distribution data on species of the genus *Zerynthia*, *Zerynthia cerisyi* and *Zerynthia polyxena*. Surveys were conducted within UTM fields (surface areas measuring 10 x 10 km) in which species were not previously recorded. Within each UTM field, three localities were selected to include the following habitat types: inhabited place, arable land and locality near the water surface within which the presence of one of these species on the territory of NP "Stara Planina" was recorded. During these surveys we noted the presence of *Zerynthia polyxena* for the first time in two UTMs, as well as *Zerynthia cerisyi* in one UTM. This is an important outcome because it complements an experiment to determine differences in habitat type preferences between *Zerynthia cerisyi* and *Zerynthia polyxena* species conducted during the Booster project "Endangered Serbian Butterflies - working together" (24652-B), funded by The Rufford Foundation during which my master thesis was created. Link to master thesis:

<https://www.pmf.ni.ac.rs/download/master/biologija/2020/Master-rad-AfinitetZerynthia.-finalna-verzija.pdf>.

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

The local community was involved in several ways during the project:

- Protected area managers, with whom we shared information and knowledge, were involved in all project activities. Cooperation with them and permission to work in the protected area has helped to better understand the state of populations of rare and endangered butterfly species, endangerment factors, etc. thus making it possible to work further on the protection of such species, and to acquaint the general

public with the measures to be adhered to when entering the territory of any protected area. By working in the protected areas, we help the competent institutions to manage these areas, better assess the impact of fires and more effectively prevent future damage to populations. We help them establish a butterfly population monitoring program that is mandatory for some butterfly species. Thus, managers are additionally educated on this topic and can perform their task of preserving protected areas more efficiently.

- Volunteers at the workshops were involved in project activities both during the workshops and during the field research when we tried to include a new volunteer (whenever we have additional places in the cars) and help them to get familiar with the methodology of field work. During the project, about 70 volunteers were trained and prepared for independent work in the field.
- Academic presentations are a great way to promote science in general. A large number of students and members of biological societies, professors from the Universities, and even the media were present at presentations throughout Serbia. During the presentations there were always guest lecturers, i.e., young experts from other institutions, so they had the opportunity to improve their presentation in front of a larger number of people. The academic presentations were attended by approximately 500 people.
- Also, during the field research on Stara Planina Mt. and the distribution of promotional material to the locals, we came across their great interest in what we do. On this occasion, we tried to further educate each of them about the damage that wildfires and other factors of human negligence can cause to the living world around them. Thus, hopefully, we have helped them to better understand the measures that need to be adhered to in order to preserve the rare and endangered species that live in their environment. As we have confirmed with this project that the wildfires have greatly affected some butterfly species, it is necessary to intensify cooperation with local communities, with which we plan to continue in the future projects.

5. Are there any plans to continue this work?

Of course. As we found that a large part of the population of *Lycaena helle* was "wiped out" by fires in 2019 on Stara Planina Mt. we see that the wildfires are affecting local biodiversity, and that the anthropogenic factors are still insufficiently studied in such fragile alpine ecosystems.

This project has successfully set up a monitoring program of *L. helle* species, which we plan to continue with the cooperation of the Institute for Nature Protection of Serbia, the Ministry of Nature Protection and the Public Company "Srbijašume".

Finally, the created quiz proved to be a successful way to promote science and butterfly conservation, and as this is only the initial version, of course there is room for improvement. The quiz is designed to be interesting to everyone, and in the future, we plan to create more advanced levels for more professional users, to develop the graphical interface, increase the database of photos used by the quiz (photos of different developmental stages), etc.

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

The promotion of project activities and results was carried out throughout the whole project. Websites, Facebook groups, Instagram etc., are networks through which we informed members of society and the wider audience about the project progress. Presenting at universities and promoting the quiz was another way to promote results. Also, as BS "Dr Sava Petrović" organizes and participates in numerous symposiums for biologists, the project will be promoted along with many other activities of our Society in the coming period. We informed the managers of the protected area of the Nature Park Stara Planina about the results of the project and agreed on cooperation for further work on the protection of endangered species of this diversity spot in Serbia.

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

The project essentially went according to plan, with a few minor changes due to the late start of the project since to the situation with the COVID-19 pandemics. The only thing that has changed is that the scientific-research camp "Temska" has been moved to 2021, as well as a part of the presentation at the Universities, which was held in early 2021. Other activities went according to plan after the start of the project.

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

What is further important is to establish a stable systematic monitoring program on the populations of the species *Lycaena helle* in the localities that suffered fire damage in order to monitor the succession of habitats and potential recovery of the populations.

It is necessary to continue with the initiated ideas, and here we primarily mean the quiz for butterfly recognition. It is necessary to collect an even larger number of quality photos about all butterfly species that the quiz will use; it is necessary to work on further improvement of the graphic and user interface and further promotion of the quiz in order to reach as many users as possible. It is necessary to monitor the condition of other rare and fragile alpine diurnal butterfly species. The reason for this is that populations of such species are much more difficult to monitor due to the inaccessibility of the terrain, small numbers, inadequate information in the existing literature about the biology and ecology of the species, and due to numerous endangering factors, that can cause great unnoticed damage to such species.

On the other hand, it is necessary to establish cooperation with as many protected areas as possible, with the help of which it is possible to assess the condition of populations of many species and take preventive action before those populations face the destiny of *L. helle*.

Also, an important step is to further work on raising the awareness of the locals, as well as involving even more volunteers in order for the information to reach as wide an audience as possible.

Finally, all the collected information and data should be published in the form of scientific papers. In this way, an even more professional audience gets the opportunity to get acquainted with new conservation issues and eventually get involved in solving them.

10. 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 logo of the The Rufford Foundation was used for all the promotional material. T-shirts, brochures, quizzes and presentations contain the logo of The Rufford Foundation, and the promotion of the foundation was also done through social networks.

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

The main and most important part of the work was performed by team members: **Milan Ilić, Marko Nikolić, Aca Đurđević, Danilo Penić** and **Ivana Veljković**. From field research on key species, through research related to species of the **genus Zerynthia**, to academic presentations and the organization of workshops, all have contributed to their realization.

Dimitrija Savić-Zdravković was in charge of **designing** the T-shirts, brochures and logos of the project.

Miloš Popović and **Nenad Živanović** were in charge of **creating the quiz**.

In addition, **about 70 volunteers** were additionally prepared and trained for independent work at the workshops and field research.

12. Any other comments?

On my own behalf and on behalf of the Biological Society "Dr. Sava Petrović" Organization, I would like to express my immense gratitude to The Rufford Foundation for the financial support provided for the realization of the project. With the help of RF support, my team and I collected a large amount of data on rare and endangered species of diurnal butterflies, learned a lot about all species and field work and hopefully contributed to raising awareness of the general public about the importance of each and individual species. By creating the only available quiz for butterfly recognition in Serbia, we brought this group of insects closer to the general public, both through the media and social networks, and during the project activities themselves. By cooperating with the managers of protected areas and presenting the results of the project throughout the country, we have established a large number of contacts with professional organizations, with which we will continue to cooperate. For me personally, this project has contributed the most to confirming what I knew before, and that is that I will continue to work in conservation biology in the future, I hope with the support of the Rufford Foundation.



Educational Brochures



T-shirt logo designed by Dimitrija Savić-Zdravković. The picture shows three key species, while in the background is the locality "Tri čuke" after fires.



Locality "Vražja glava". Recorded in 2020



Team members at the scientific-research camp "Crni vrh"



Participants in a scientific-research camp "Crni vrh" 2020



Scientific-research camp "Temska"



Key species – *Erebia orientalis*



Key species – *Boloria eunomia*



Key species – *Lycaena helle*