

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 | Ana Golubović |
| Project title | Turtles in Serbia – population status, conservation and distribution of the understudied European pond turtle and Hermann's tortoise |
| RSG reference | 20507-B |
| Reporting period | April 2017 – September 2018 |
| Amount of grant | 10000 Pound Sterling |
| Your email address | lunja975@yahoo.com |
| Date of this report | 11.09.2018. |

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 |
|---|--------------|--------------------|----------------|--|
| Continuation of population studies on European Pond Turtles at three localities in Serbia | | | | <p>Malo Crniće pond – We had 40 captures (23 in 2017 and 17 in 2018). With this project we reached number of 43 marked turtles at this locality. We now have 38.6% of recaptures. Although further studies would be beneficial, so far data indicates this population might be small.</p> <p>Galovica canal – We had 16 captures (eight in 2017 and eight in 2018). With this project we reached number of 31 marked turtles at this locality. Low number of recaptured individuals (8.8%) show that further studies are necessary.</p> <p>Ludaš Lake - We had 113 captures (24 in 2017 and 89 in 2018). With this project we reached number of 212 marked turtles at this locality. Population studies at this locality started in 2011, and with completion of this project we reached recapture rate of 44.4%.</p> |
| Continuation of population studies on Hermann's tortoises at three localities in Serbia | | | | <p>Pčinja River Valley – We had 176 captures (100 in 2017 and 76 in 2018). With this project we reached number of 493 marked tortoises at this locality. The study on this population started on 2008, and although several years were skipped, the recapture rate now reached 38.3%! Duration of the study and the recapture rate makes this population one of highly suitable for further study of population trends.</p> <p>Veliki Jasenovac - We had 32 captures (11 in 2017 and 21 in 2018). With this project we reached number of 34 marked tortoises at this locality, reaching recapture rate of 10.5%. This population seems to have lower density comparing to other two populations we are working with. Although work on this population is not as rewarding as in other two, this research provides valuable data, since it might represent an</p> |

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| | | | <p>ordinary population of Hermann's tortoises in Serbia.</p> <p>Trstenik – We had 96 captures (29 in 2017 and 67 in 2018). With this project we reached number of 384 marked tortoises at this locality. First tortoise was marked in 2009 at this locality, and now the recapture rate is 18%. Continuation of the study would be beneficial.</p> |
| Collecting additional tissue samples from Hermann's tortoises and European Pond Turtles | | | <p>We gathered tissue samples for future DNA analysis.</p> <p>For European Pond Turtles we sampled tip of the tail and in some cases small amounts of blood:</p> <p>at Galovica - 21 individuals, at Malo Crniće - 19 individuals, and at Ludaš Lake - 18 individuals</p> <p>For Hermann's tortoises we sampled small amounts of blood:</p> <p>at Veliki Jasenovac - 29 individuals, at Trstenik – 55 individuals, and at Pčinja River Valley - 49 individuals</p> <p>All the sampled animals were monitored for short period of time after sampling. They were all in good condition and had no health issues after tissue sampling.</p> <p>During field season 2018 at Ludaš Lake we skipped tissue sampling, since about 56% of caught animals had skin and shell overgrown by fungi. Thus we avoided to cause any additional, even minimal skin damage.</p> |
| Gathering of additional distributional data on both turtle species, and other reptile species | | | <p>During the project we gathered distributional data for European pond turtle, Hermann's tortoise and other reptile species in Serbia. All these data are now included in Biologer database.</p> <p>Additionally, with development of Biologer, far more people all across Serbia are included in gathering of distribution data.</p> <p>Maps of gathered data on <u>European pond turtles</u> and <u>Hermann's tortoises</u> are available at the Biologer site.</p> |
| Developing an internet site and compatible mobile phone application for easy and | | | <p>We developed a platform, Biologer, which promptly exceeded all our expectations! Both <u>website</u> (biologer.org) and application are in use from the beginning of field season of 2018. For now, the data</p> |

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| precise gathering of distribution data | | | <p>base covers reptiles, amphibians, butterflies, dragonflies and few crayfish species, and it grows fast. Additionally, in collaboration with colleagues from Croatia, Biologer further develops, and it will soon be adopted also for use in this neighbouring country. The software is available for further use and development, since it is open source and publicly available at GitHub.</p> |
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

Obvious reduction of habitat quality of two investigated European pond turtle populations – Comparing to previous season, during 2018 we noticed habitat quality decrease at Malo Crniće pond and Ludaš Lake.

Garbage disposal at Malo Crniće pond covered additional part of the pond, thus further decreased area of suitable habitat for European pond turtles. During October 2018, with end of the overall field season, I am planning to contact municipal stakeholders from Malo Crniće, and urge them to find the solution to this illegal dumping place.

More than a half of all caught turtles (~56%) at Ludaš Lake in 2018 were overgrown by fungus and bacteria on skin and/or shell. This corresponded to unusually high water level, which submerged majority of natural basking places. To avoid causing additional skin damage, we decided not to take additional tissue samples from this locality. With help of Public Enterprise Palić Ludaš we made and set five artificial basking places, with plan for Public Enterprise Palić Ludaš to make and set 20 more.

Lack of interest for lecture at Kragujevac University - Unfortunately our colleagues were not interested to host us at Faculty of Natural Science and Mathematics, and co-organise a lecture about the project for their students of biology and ecology. Nonetheless we are convinced that numerous students which attended the lectures at other three Universities (Niš, Belgrade and Novi Sad) had spread the word to their peers from Kragujevac. Additionally through numerous web-sites presentations ([Wild Balkans](#), [Serbian Herpetological Society](#), [Biologer web site](#), and [Research Gate](#)) we are certain that interested students were informed.

Lack of reproduction related data - Unfavourably for our plans, spring seasons 2017 and 2018 were very unusual. Hot wave started at second half of March, which triggered getting out of hibernation and beginning of reproduction for some reptiles, which was followed by extremely cold April with snow. Spring season then continued with swift changes between short warm and cold periods. Such weather conditions resulted in disjunctive and prolonged breeding and nesting period of many reptile species, including chelonians. During short spring periods favourable for field work, we did not manage to find females with formed clutches.

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

Gathered distribution and population data for Hermann's tortoises and European pond turtles – Both species, along with their habitats, are prioritised for protection across their distribution range. Furthermore, both species are listed at Annex 2 and Annex 4 of Habitat directive (Council Directive 92/43/ECC), and they are protected (*Testudo hermanni*) and strictly protected (*Emys orbicularis*) at national level. Paradoxically their distributions and population status in Serbia was not well known. This is especially truth for *Emys orbicularis*, which was officially assigned Data Deficient (Krizmanić, Džukić 2015 in Red Book of Fauna of Serbia II – Reptiles: 137-143). With completion of this project distribution of both species has been methodically investigated. Additionally, population data has been collected (three remote populations per species), and these data can serve as foundation for further monitoring of population statuses.

Development of Biologer database – As planned, we developed an internet site and compatible mobile phone application for easy and precise gathering of distribution data. From the start, thanks to an amazing collaboration with Miloš Popović, these plans were upgraded. Along with reptile and amphibian species, butterflies were included from the begging as one of the groups available on the platform. Biologer started gathering data from April 2018, and since then many other options are developed (e.g. map-view of gathered data and personal data export) in collaboration with [Association Hyla](#) from Croatia. With further development, the Biologer started attracting organisations and individuals interested in collaboration. Four of the Rufford grantees are among core administrators for their groups of interest including: myself in herpetology, [Miloš Popović](#) for butterflies, [Aca Đurđević](#) for dragonflies, and [Branislav Dimitrov](#) for a few species of crayfish. For each of the groups there is a growing network of collaborators.

Rising of public awareness - Many people were involved in story about turtles in Serbia. People started recognising autochthonous species as animals worth protecting, along with their habitats, even by small everyday gestures. Thus many were happy to share information about turtles in their neighbourhood. Additionally, many people are contacting me for help led by an idea not to put their pet turtles (mostly *Trachemys scripta*) into nature, but to try to find alternatives for accommodating them.

Biologer is taking an important part in education of interested people and development of citizen science in Serbia. Over 100 people, including general public, took part in sending distributional data via Biologer in past five months, which resulted in gathering over 17,000 observations. We are hoping that number of interested people will amass with further development and additional popularisation of Biologer.

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

Except for the biology and ecology students, which were involved in both field research and development of Biologer (testing the beginning versions in the field), the local stakeholders of protected areas were involved. We had meetings with rangers from “Landscape of exceptional features Pčinja Valley” and “Special nature reserve Ludaš Lake” to discuss state of habitats and populations we work with. Also, they were helpful in the field when needed.

Local public was engaged in turtle and reptile related education. We talked to local fishermen about European pond turtles and their protection status, as well as their role in ecosystem. Most of fishermen had wrong beliefs of turtles being pests of their ecosystem, destroying fish community, thus education was beneficial.

Most of the people living in areas with numerous Hermann’s tortoises were aware of collecting activities over the past years, while they had no idea that such activities are prohibited. Their relationship with tortoises is mostly affected by the loss they had in gardens, due to unwanted visits of hungry tortoises. Again education through conversation with the locals was beneficial.

5. Are there any plans to continue this work?

Indeed, most of the project goals are long lasting, and we are planning to continue working to achieve them.

Good quality population studies in long living organisms such as chelonians last for decades, thus we are planning to continue our studies. Additionally, for three populations of European pond turtles, two master students will be actively engaged in season 2019. Distribution of both species is now much better studied, and hopefully the wide usage of Biologer will fill in the remaining gaps in the distribution maps.

We are planning to do genetic analyses of the tissue samples we have gathered.

Further development of Biologer website and phone application is already ongoing. The platform will eventually include: other animal and plant groups, and geographic coverage in other neighbouring countries, starting with Croatia. Additional popularisation of citizen science is necessary in Serbia, as well as in most of neighbouring countries.

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

The results of this project are actively shared, and will be further shared with research community (via publications, conferences and symposia) as well as with general public (via web-site presentations, TV broadcasts).

Conferences and symposia – I presented turtle-related results at SEH 19th European Congress of Herpetology in September 2017, Salzburg, Austria, including a poster and an oral presentation. Miloš Popović had a Biologer related oral presentation at 11th Symposium of Entomologists of Serbia, in September 2017, Goč, Serbia.

With additional field results, and development of Biologer, we presented the project outcomes again at 27th RFSG Conference “Form Mountains to Deep Seas” in February 2018, Bar, Montenegro. I further plan to present and discuss the results of the project at Rufford Conference “Explore and protect the natural beauty of Balkans” in September 2018, Silver Lake, Serbia, as well as at SEH 20th European Congress of Herpetology in September 2019, Milan, Italy.

At each of the presentations Rufford Small Grant Foundation is acknowledged for financial support.

Publications – Several scientific manuscripts are at different stages of publishing:

“Why apparently prosperous populations need strong conservation efforts? Example of Testudo hermanni boettgeri in central Balkans” has now been accepted for publication in *Herpetological Conservation and Biology*; *“A note on further spread of Trachemys scripta ssp. (Testudines, Emydidae) in Serbia”* has now been accepted for publication in *Acta Zoologica Bulgarica*; *“Actual and potential distribution of the European Pond Turtle (Emys orbicularis) in Serbia and conservation implications”* has been published in *Acta Zoologica Bulgarica* and is publicly available; while paper on distribution of Hermann’s tortoises in Serbia is in preparation phase.

At each of the manuscripts Rufford Foundation is acknowledged for financial support.

Websites -We made project pages at three web sites: Wild Balkans, Serbian Herpetological Society, and Research Gate. The project page on Research Gate, with 13 updates on field work, reached over 200 reads. In addition, Biologer web site, as one of the results of the project, additionally educates broad public, while gathering and sharing information on distribution of chelonians in Serbia. At all of the project pages Rufford Foundation is acknowledged for financial support.

During field research at Ludaš Lake, we had opportunity to share results of our research and information about European pond turtles via local TV show „Kroz grad“. We seized the opportunity in both years and the broadcasts, for 2017 and for 2018, are available at you tube channel of TV Subotica.

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 grant was used from April 2017 to September 2018, which fits well with anticipated timescale of the project.

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 |
|---|-----------------|---------------|------------|--|
| Field trip expenses (2017): Gasoline, Car services, Road tolls and daily allowances (15 GBP per person/day) | 3700 | 3700 | 0 | |
| Field trip expenses (2018): Gasoline, Car services, Road tolls and daily allowances (15 GBP per person/day) | 3700 | 3850 | -150 | Price of the gasoline increased, which enlarged our filed work expenses. |
| Buying 15 funnel traps, material for basking traps and nest protection cages | 750 | 350 | +400 | We were not able to find turtle nests. Instead of making basking traps we bought five additional funnel traps (20 in total). |
| Developing and maintenance of Biologer | 850 | 1200 | -350 | We paid fees to website and application developers 900 GBP, and used 300 GBP for five year hosting |
| Preparation and printing of promotional material | 700 | 700 | | |
| Organizing and travelling expenses for lectures | 300 | 200 | +100 | We did not held lecture at Kragujevac, thus we saved 100 GBP, which were relocated for other project related needs |
| Total | 10,000 | 10,000 | | |

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

In October 2018, I am planning to contact municipal stakeholders from Malo Crniće in order to prevent further growth of the illegal dumping place next to the pond.

Distribution data gathered for *Emys orbicularis* are already enabling reassessment of the species at national level, based on extent of occurrence and area of occupancy (IUCN Criterion B). With preparation of next red list of reptiles of Serbia, *E. orbicularis* will no longer be assessed as Data Deficient.

It is important to continue population studies and monitoring of population trends of European pond turtles, since the data, along with distribution data, is crucial for updating its conservation status at national level. With similar reasons, it is important to continue population studies of Hermann's tortoises.

Further development of Biologer is expected, with next steps in popularisation and inclusion of other animal groups (Othoptera and Hemiptera are in preparation for next field season) and neighbouring geographical regions.

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

Yes, the Rufford Foundation logo was used at all of the presentations, including lectures for biology and ecology students, and scientific conferences and symposia. Also the logo was printed on all promotional material (T-shirts and leaflets).

The Rufford Foundation logo can also be seen at the [sponsor page](#) of Biologer web site.

Additional publicity RF received from the scientific publications which came out as results of the project. In the publications RF is/will be, acknowledged for financial support.

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

Miloš Popović – Researcher (University of Niš) offered huge number of useful ideas on organizing and development of Biologer, endorsed with his great experience working with distribution data platforms. Additionally, he was very helpful in the field. He is one of administrators for butterflies on Biologer.

Nenad Živanović – Biologer web-site developer, with great enthusiasm he made all of our Biologer-ideas possible.

Branko Jovanović – Biologer android application developer.

David Grabovac - Member of NGO "Riparia", offered great help in organization and realization of field work at Ludaš Lake.

Ljiljana Tomović – Full professor (University of Belgrade) supported the project ideas, and helped in fieldwork and work with students.

Marko Maričić – Student of ecology (University of Novi Sad) was involved in field work. Hopefully he will continue to work on the three European Pond Turtle populations during his master thesis related research during next field season. He is one of the administrators for herpeto- and batrahofauna on Biologer.

Vukašin Bjelica – Student of biology (University of Belgrade) helped with field work. Hopefully he will continue work on the three European Pond Turtle populations during his master thesis related research during next field season.

In addition many students were involved in fieldwork at some of the localities.

12. Any other comments?

I would like to thank to rangers and stakeholders at “Special nature reserve Ludaš Lake” and “Landscape of exceptional features Pčinja Valley” for collaboration and help in the field. I am also thankful to many colleagues and students which helped in different stages of the project.

As over the past 5e years, I am grateful to Rufford Foundation for the continued financial support on the project. I am looking forward presenting about Biologer at upcoming RSG conference in late September 2018, among other Rufford grantees from the region, and further spreading network of collaborators. I am looking forward to applying for a second booster grant.

