

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	Dragan Arsovski
Project title	Linking fundamental research, public awareness and practical actions to promote the conservation of the Hermann's tortoise
RSG reference	20915-1
Reporting period	16.01.2017-16.01.2018
Amount of grant	£4881
Your email address	dragan.arsovski@evobio.eu
Date of this report	09.01.2018

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
Recruiting local students				Students were informed and stimulated; lack of proper guidance and enthusiasm from their formal education often discouraged them from taking initiative. This was particularly evident in Macedonia, where from personal experience we are aware of minimal involvement of a big part of university personnel in any sort of research or conservation activities. The few involved professors helped immensely, but the final low answer to our call suggests that formal education in Macedonia urgently needs to take a step away from textbooks and more actively promote field training as a crucial part of creating efficient future research and conservation capacities.
Capture-mark-recapture studies at both localities and evaluation of threats				Sufficient funding led to the highest numbers of collected data from any previous year. Adult survival values demonstrated that so far biased sex-ratio seems to be the highest threat to adult females, likely due to intense sexual coercion. Fortunately, besides more intense human activities in Konjsko, such as fires and uncontrolled garbage disposal, high and stable survival probabilities point towards a stable population that can resist to mild anthropogenic pressure.
Training chosen students				Capacities, knowledge and in turn confidence levels were drastically increased. At least four students went on to initiated their own local conservation work; one as part of her own PhD. This is perhaps the most rewarding aspect of this year's work.

Data analysis and peer-reviewed papers				This is an ongoing activity. The above mentioned (row two) survival probabilities have been discussed in ecological, conservation and evolutionary frameworks and several manuscripts are about to be submitted to peer-reviewed journals with an appropriate acknowledgement of the crucial financial help from the Rufford Foundation. Peer-review is a time-consuming procedure, thus the acceptance of manuscripts during the project timeframe was impossible.
Educational activities at 5 local elementary and middle schools				Pupils sat through educational sessions, where they had the opportunity to witness the incredible diversity of their area and learn the science and conservation benefits that a place such as Golem Grad Island offers. We used this opportunity to break acquired stereotypes about snakes and therefore the island, and motivated local youth to visit and find new appreciation for such wild laboratories.
Promotional material				The island's scientific and conservation values were summarised in promotional material. Posters were disseminated at the Institute of Biology in Skopje, as well as schools in the Prespa area. Updated information boards (Fig. 1 & 2) about the island and Konjsko village have been prepared and will be mounted at the beginning of the following season (a turbulent political situation in Macedonia and changes in the responsible structures of National Park "Galichica" delayed the mounting of these boards).

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

During the recruitment of students at Belgrade University, Serbia and Ss Cyril and Methodius University in Skopje, Macedonia we faced varying difficulties. Belgrade University has a much larger student base and a well organised recruitment system

which made the process fairly easy. In contrast, besides a well-established network of contacts in Skopje, a substantial percentage of local personnel is uninvolved and inactive, passing similar morals to their students. Such demotivation resulted in presentations in front of demotivated students that couldn't properly understand the benefits of taking part in such studies. In all fairness, the Institute of Biology in Skopje also holds a substantially lower number of students, thus unfortunately only one Macedonian student was recruited. The other eight came from Serbia.

Furthermore, originally, we wished to train new capacities during the June field session on the mainland, but this was logistically impossible for many potential volunteers. We had to compensate for such a shortcoming by quickly training students locally before field camps and get them properly prepared to reside in difficult field conditions on Golem Grad Island. Finally, the recruitment and training procedure was extremely successful.

Another unforeseen difficulty was the turbulent political situation in Macedonia during the past year. There was a change in personnel in the National Park "Galichica" where our activities took place, postponing authorisation procedures. Thus the activity of placing updated information boards (Fig. 1 & 2) at both localities was postponed for the next season. Nevertheless, the boards have been prepared and printed on aluminium composite panels.

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

1. Four of the recruited students have already undertaken their own individual local activities, both at various independent student camps, as well as other small conservation grants. One student managed to initiate a PhD programme dealing with ecophysiological conservation aspects of the reptiles of Golem Grad. This is likely the most rewarding outcome from the long recruitment and training procedure.
2. Hundreds of pupils from local Prespa elementary and middle schools were made aware of the true science and conservation benefits of Golem Grad Island, and are now motivated to visit this extraordinary locality. We worked hard on breaking negative reptile stereotypes by exposing them to stories from our research and actual collected samples of animals. Future updated information boards (Fig. 1) on the island and village of Konjsko will hopefully maintain this activity. More importantly, there is information about the research and conservation activities we have undertaken (Fig. 2), and contact information each visitor can use to reach out to us and get involved.
3. Using fundamental research, we managed to identify sex ratio bias as a major threat to the Hermann's tortoise, as only that population suffered also a strong bias in sex-specific survival. In a globally changing climate, species with environmental sex determination, such as the Hermann's tortoise might face such a threat on a regular basis. Golem Grad island has given us the opportunity to study this phenomenon in a natural laboratory setting. It seems that localised anthropogenic pressures such as uncontrolled garbage disposal and fires do not pose an obvious survival threat when at a small-scale level, such as in Konjsko village. We still strongly discourage such

activities in our lectures and promotional materials, but are pleased to know that tortoises are not under direct threat. Moreover, for the first time we managed to estimate age-specific juvenile survival of the long phase of delayed maturity of this species. High survival values of juveniles point out that population growth for species like this is not only dependent on adult survival, but also that of their juveniles. They are apparently well canalised against the environment. However, this also means that a slight change in either could be detrimental to the species.

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

Besides the low charismatic value of reptiles, we managed to bring these organisms closer to both younger and older members of local communities. Besides initial guard, after slight education most people involved were keen on helping our cause by acting locally i.e. discouraging control of vegetation with fire, reporting any signs of illegal harvesting of tortoises etc.

5. Are there any plans to continue this work?

Capture-mark-recapture studies will continue both on the island and in Konjsko village. We are already delving deeper into the issue of lower female mortality and high sexual coercion. In a globally changing climate this is one of the most exciting aspects of this study, since it joins evolutionary and ecological theory with conservation. It would be incredibly exciting to be able to control sex ratio bias and see the effects it might have on survival probability. Additionally, life history data will be gathered at large as well as behavioural data. As it has been shown time and time again, fundamental research always finds its use in conservation and further.

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

As it has been practice so far, our studies will be published in peer-review journals. Most analyses are finished and two manuscripts are at their final stages. Often, our studies gain further publicity besides the scientific community through popular science outlets such as La Liberation, Charlie Hebdo, BBC Earth, local Serbian and Macedonian TV and magazines etc. We do not expect anything less from our future published materials.

Future efforts and possible funds could be channelled towards building an inclusive website through which possible volunteers with scientific, conservation or both interests can learn about our studies and find a way to join our team.

Additionally, efforts on preparing a short conservation documentary have been initiated.

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 only change of the initial timescale was the printing and disseminating of promotional material. Initially we planned on achieving this sporadically throughout the field season. This was however unrealistic due to the logistical difficulties of such field work. The material was thus prepared at the end of the field season and was disseminated at school presentations after the beginning of the school year in September.

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
Travel	782	1320	-538	Travel expenses were underestimated at large due to varying gas prices. Additionally, plenty more boat trips were necessary to reach the island and bring additional equipment. Villagers have a monopoly over these prices, which they additionally raised this year. Most importantly, since most students came from Serbia, rather than Macedonia (which was the primary expectation), travel expenses arranged from Belgrade (rather than Skopje) were much higher.
Accommodation	508	700	-192	Accommodation prices had slightly been raised this year
Daily allowance	2240	1878	362	Fortunately, we could save on allowance by purchasing produce from local markets
Equipment	701	803	-102	We had to additionally extend the beaks of purchased callipers in order to measure tortoises with precision.
Promotional material	650	200	450	Due to high travel expenses, instead of printing t-shirts and leaflets, we found a cheaper option for information boards (Fig. 1 & 2) and posters and reallocated the rest of the resources.
Total	4881	4901	-20	

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

Continuing this work and not allowing for gaps of data collection to appear since they can seriously hinder analyses. We strongly believe in the pillar role of fundamental research to strong and efficient conservation. The most important aspect to achieving such a goal is the recruitment of strong and capable capacities that can overtake such broad work. Therefore, the identification of at least a few such remarkable students by allocating more time and energy to this goal this year, will steer our priorities slightly more towards the continuation of active identification and training of student potentials in the future.

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?

The logo was used on posters that were disseminated at schools in the Prespa region and Skopje and Belgrade University. The logo is also present on the information boards (Fig. 1 & 2) that are to be mounted on the island and at Konjsko village at the beginning of the next field season. It was additionally present on all presentations performed during the project.

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

Lilijana Tomović – Lilijana was present at all field trips and was my main consultant and assistant for all activities. Logistically most activities wouldn't have been possible without her. Additionally, their quality was significantly raised due to her contributions.

Ana Golubović – Ana helped recruit students at Belgrade University and was present at most field trips where she helped train students. Ana was additionally consulted for the design of all promotional material.

Xavier Bonner – Xavier was involved during the field trip in July where he helped with the trainees. Xavier's most important contributions were during consults regarding the chronology and allocation of effort during field trips in order to achieve maximum efficiency in data collection and teaching techniques.

12. Any other comments?

On behalf of the whole team I express my immense gratitude for the financial support from the Rufford Foundation, which helped students get research and conservation training at crucial points of their education and gave them a head start in their careers. This will upgrade local conservation capacities, but perhaps most importantly to my team – we acquired invaluable understanding on how to properly pass on knowledge along with the irreplaceable role of high levels of enthusiasm and motivation.



Testudo hermanni

Podiceps cornutus

Во 2008 година истражувачите од Македонското Еколошко Друштво, Факултетот по биологија при Универзитетот во Белград, Србија и од Центарот за биолошки истражувања во Шњи, Франција започнаа долгорочни популациони студии на три од четирите видови кокошки на островот Голем Град: ребриката (*Natrix tessellata*), поскокот (*Vipera ammodytes*) и Хермановата жолца (*Testudo hermanni*). Докога (2017) се обележани преку 1800 жолца, 500 поскоци и преку 7000 ребрики за кои време се забележани бројни особености. Превртете постоје се:

- Алчните жолца на островот – “Moving in the real world, tortoises take the plunge to cross steep steps” во *Biological Journal of the Linnean Society*.
- Непочеканата популација на ребрика – “Unexpected life history traits in a very dense population of dice snakes” во *Zoologischer Anzeiger*.
- Замакени за ребрика – “Natrix tessellata on Golem Grad, Macedonia: a natural fortress shelters a prosperous snake population” во *Mediteranica*.
- Густата популација на жолци со итеринженерство, не полици и хомосексуално партнерство – “The prison effect in a wild population: A scarcity of females induces homosexual behaviors in males” во *Behavioral Ecology*.
- Поскокот со тесен зглоб и таласи соопшто – “Two legs good, a hundred legs better: juvenile viper devoured by an adult centipede it had ingested” во *Ecologia Montenegrina*.

Natrix tessellata

Голем Град е единствено место во Македонија, каде живееат постојеци видови кокошки. Иако е мал остров, Голем Град е единствено место во Македонија, каде живееат постојеци видови кокошки. Иако е мал остров, Голем Град е единствено место во Македонија, каде живееат постојеци видови кокошки.

Vipera ammodytes

Голем Град е единствено место во Македонија, каде живееат постојеци видови кокошки. Иако е мал остров, Голем Град е единствено место во Македонија, каде живееат постојеци видови кокошки.

Testudo hermanni

Голем Град е единствено место во Македонија, каде живееат постојеци видови кокошки. Иако е мал остров, Голем Град е единствено место во Македонија, каде живееат постојеци видови кокошки.

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Information board with research and conservation information to be mounted on Golem Grad Island