

## The Rufford Foundation

### Final Report

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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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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Grant Recipient Details	
Your name	Adnan Zimić
Project title	Living on cultivated surfaces: The importance of amphibian species in lowland agroecosystems of Bosnia and Herzegovina
RSG reference	21687
Reporting period	March 2018
Amount of grant	£4935
Your email address	adnan.zimic@gmail.com
Date of this report	04 April 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
Perform field researches and species selection for studies				<p>We carried out field investigations in the Posavina area at the sites of Gromiželj, Čardak and Okanovići where we conducted an active search of terrain for species living on cultivable surfaces. The most common species was <i>Pelobates fuscus</i> (European common spadefoot toad) as we expected due to the fossorial way of life. In addition to this species, we also found several others: <i>Bufo</i> (common toad), <i>Bombina</i> (fire-bellied toad), <i>Hyla arborea</i> (European tree frog), <i>Pelophylax ridibundus</i> (marsh frog) and <i>Triturus dobrogicus</i> (Danube crested newt). As planned, we also conducted field investigation in the Mediterranean part of Bosna and Herzegovina – Popovo field and Blagaj (near Mostar). After active search of terrain for species living on cultivable surfaces we manage to find only one species of amphibian: <i>Bufo viridis</i> (green toad) and several species of reptiles in cultivated lands: <i>Podarcis melisellensis</i> (Dalmatian wall lizard) and <i>Pseudopus apodus</i> (European glass lizard). These data will be very significant in future planning of researches.</p> <p>We selected <i>Pelobates fuscus</i> as species to be studied in following period. Species is mostly restricted to agroecosystems close to aquatic habitats.</p>
Investigate and identify the food preferences				<p>We flushed the stomachs of 124 individuals from the locality of Čardak. The animals were released afterwards. Stomach flushes were stored in 1.5 ml tubes with 10 % formaldehyde and determined in the laboratory. Just 1 % of materials remained unidentified.</p> <p>More info in Answer 3.</p>

<p><b>Estimate population size</b></p>			<p>We used linear transects where we counted individuals/clusters found along the transects. For each individual/cluster we estimated its perpendicular distance from the transect line (in cm). A total of 50 randomly selected transects (each 25 m length with an overview of 10 m right of left) were carried out independently for each of the three sites.</p> <p>Along a total length of 1225 m of linear transects we recorded 102 individuals. The total analysed area for all three locations is 6,000 m<sup>2</sup></p> <p>The number of individuals of <i>P. fuscus</i> according to the transect method is the highest in the locality of Čardak (703 individuals), followed by locality Gromiželj (309 individuals) and lowest at locality Okanovići (191 individuals). These results are probably related to the condition of the aquatic habitat. Locality Čardak has the best habitat quality, followed by Gromiželj and Okanovići. Habitat at the locality Okanovići is hyper-eutrophicated and it is probably drying out during the early period of summer. Gromiželj differs significantly because it has a naturally clean water (water source), while the water quality at other two localities (Čardak and Okanovići) is very low mainly due to direct wastewater impacts. Gromiželj represents habitat for at least two fish species: pike (<i>Esox lucius</i> Linnaeus, 1758) and minders (<i>Umbra krameri</i> Walbaum, 1792). True forests habitats were present around water ecosystem in Gromiželj compared to other two sites with open landscapes around aquatic habitats. However, the road passes through locality Čardak on one side of the habitat where lot of dead on road (DOR) individual was found.</p>
<p><b>Microhabitat preferences</b></p>			<p>From this research it is clearly that <i>P. fuscus</i> prefers arable lands, and most of the individuals can be found on a bare cultivable surface during the spring.</p>

				Findings of individuals on a densely covered cultivated surface is probably high, but spotting individuals on this habitat type is visually limited. Arable land allows easy digging providing hiding places, and monoculture plant species that are grown (wheat, corn and sunflower) represent a good shelters from predators.
Share educational posters to the local farmers and people				Educational posters were delivered to the many farmers and local people during field research and also during the educational lecture (see next objective).
Educate the farmers about amphibian importance in agriculture lands.				We organised an educational workshop and lecture In Sarajevo during the "The Seventh Fair of Organic Production and Ecotourism" in which many organic producers and farmers from Bosnia and Herzegovina gathered.
Student enrolment in research excursions				All field activities included several students and pupils.

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

Thanks to the previous experience through the first Rufford grant we did not encounter any huge difficulties during the realisation of this project. However, at one locality, the population density was relatively high and accordingly fieldwork was much easier. At the other two sites we had to come more often, because the number of individuals was very small. Additional problem was the inability of camping at these two sites. All meadows are converted into arable land.

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

- THE DIET ANALYSIS confirms that *P. fuscus* is a generalist and shows very little specialisation in prey choice. Food analysis in studied populations seems to be quite interesting from two aspects: (1) abundance and frequency of prey occurrence from the class Diplopoda are the highest which is unusual as it is known that they secrete toxic compounds such as alkaloids, phenols, hydrogen cyanide, tepenoida and benzoquinone; (2) representatives of the families Cydnidae (Heteroptera) and Elateridae known as a serious agricultural pests which are difficult to remove, even with insecticides. Since they seem not to have natural predators, *P. fuscus* may prove to be very effective predator that can be used in Integrated pest management (IPM) programme through the popularisation and development of small aquatic ecosystems for *P. fuscus* in places where it is needed.

- ORGANIC FARMERS EDUCATION. During the project we organised an educational workshop and lecture in Sarajevo during the "The Seventh Fair of Organic Production and Ecotourism". Many organic producers and farmers from Bosnia and Herzegovina gathered. They showed great interest in the project and interest for future cooperation (see next questions for details).
- STUDENT EDUCATION (see next questions for more details).

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

During the project we produced 200 posters dealing with details about our project in Bosnia and Herzegovina. All of the leaflets have been distributed during the four lectures, press releases, through the universities and during our field trips (in local communities). Local communities and farmers were very surprised that someone is performing such research on this unusual species.

Student community was quite impressed with the project. They actively participated in field work and they decided to dedicate their future work on herpetological subjects. Students that participated in field work are: Almira Olovičić, Almir Olovčić, Smiljan Tomić, Amela Džananović and Berina Vrhovac.

**5. Are there any plans to continue this work?**

Yes, we would like to explore ecology of other species of amphibians and reptiles living on arable land and work on further cooperation between organic producers, farmers and herpetologists.

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

WEB. Outcomes and results of this project are available on the website of our association (Herpetological Association in Bosnia and Herzegovina - ATRA: <http://www.bhhuatra.com/>). Results are additionally available in our Facebook page (@BHHUATRA). All promotional material was distributed to local people and farmers.

SCIENTIFIC PAPERS. The results of this project are going to be published in scientific journals and during the 2nd Balkan Herpetological Symposium that will be held in the city of Poreč, Croatia from 19th – 23rd September 2018 and also on the first Rufford Conference in Serbia (<https://epnbalkans.com/>).

**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 over a period of 1 year (March 2017 – March 2018) as anticipated in the project proposal.

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
1st field trip: Sarajevo – Čardak (central Posavina)	40	40	0	-
2nd field trip: Sarajevo – Popovo field (southern Herzegovina)	37	37	0	-
3rd field trip: Sarajevo – Gromiželj (eastern Posavina)	40	123	-83	We did additional two field research in Gromiželj.
4th field trip: Sarajevo – Laminci (western Posavina)	46	0	+46	We add to the additional field research in Gromiželj
5th field trip: Sarajevo – Popovo field (southern Herzegovina)	37	0	+37	We add to the additional field research in Gromiželj
Mini scale	30	30	0	-
Stomach flushing equipment	37	37	0	-
Kestrel 4500 Weather Meter and batteries	202	202	0	-
Tent	182	152	+30	-
Photo Camera Objective Lens	800	830	-30	We added money to the Canon SLR macro lens, from Digital endoscope which we decided to give up because of different prices of several equipment.
Hand and head Lamp band batteries	127	127	0	-
Tablet	757	757	0	-
Daily allowance	1.800	1.800	0	-
Promotional materials design	300	300	0	-
Promotional materials print	285	215	-70	-
Field book for invertebrates determination	90	90	0	-
Digital Microscope endoscope	25	25	0	-
Other (taxes, road troll etc.)	100	170	+70	-
Educational presentation to the farmers	0	133	133	Initially we did not plan this expense but we had to invest

				in preparing and organizing the lectures which was one of our main objective. Some farmers came from other cities and we covered their transportation costs to gather them as many numbers as possible.
<b>Total</b>	4935	5069	133	Difference was covered by participants of the project.

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

The most important steps are:

- (1) Analyses of collected data and their publication. The collected data will prove the significant importance of the amphibians in agroecosystems.
- (2) Work on further cooperation between organic producers and farmers.

### 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?

RF logo was used during the project in the educational posters that were handed to farmers during the field activities or educational lecture held in Sarajevo. During this we have also used the RSGF logo in project animation (<https://www.youtube.com/watch?v=1GfW-WoWXn4>). The logo has been actively advertised thorough our website ([www.bhhuatra.com](http://www.bhhuatra.com)).

Logo was used according to the instructions received from the RF.

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

**Adnan Zimić, MSc** –Project Leader managing finances; team leading, field trip organisation, educational lectures, workshop organisation, promotion.

**Adi Vesnić, PhD** – expert for invertebrate fauna, identification of samples from stomach flushes.

**Ana Ćurić, Msc** – participated in field excursions, collecting data.

**Berina Vrhovac** - student representative of Association of biology students (USB), third year student of Ecology, participated in field excursions, educational lectures and workshop.

**Emina Šunje, Msc** – supervision of all activities above.

## 12. Any other comments?

We are satisfied with the project outcome. We managed to achieve almost every goal more than we expected. The students were most grateful because they learned something new in the field of ecology.

I would like to thank RF for your support and for showing again trust in us by providing financial support for realisation of our projects.

Thank you again for the opportunity you gave me and my team!



Educational presentation to the farmers and organic producers



Amphibian fauna on the arable lands: *Lissotriton vulgaris* (a), *Triturus dobrogicus* (b), *Bombina bombina* (c), *Pelophylax ridibundus* and *P. kl. esculetus* (d), *Rana dalmatina* (e), *Bufo bufo* (f), *Pelobates fuscus* (g), *Hyla arborea* (h) and *Bufo viridis* (j) (photo: A. Zimić). Below: Flushing stomach technique; preformed during the field research

