

## The Rufford Small Grants Foundation

### Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. 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. 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**

Grant Recipient Details	
<b>Your name</b>	Keir Soderberg
<b>Project title</b>	Water relations of <i>Welwitschia mirabilis</i> and other endemic plants in the Namib Desert in the context of increased uranium and copper mining within a protected area
<b>RSG reference</b>	08.08.08
<b>Reporting period</b>	January 2009-December 2009
<b>Amount of grant</b>	£4000
<b>Your email address</b>	<a href="mailto:ksoderberg@virginia.edu">ksoderberg@virginia.edu</a>
<b>Date of this report</b>	20 February 2010

**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
June 2008 samples will be analyzed to guide 2009 sampling			X	Samples were prepared at the University of Virginia as described in the application, and analyzed for isotopes of oxygen and hydrogen at the University of Minnesota
Additional sampling in January and May-July 2009			X	Sampling periods were shortened to 2 weeks in January and 3 weeks in June-July due to being awarded a smaller budget than proposed
Water levels near <i>Welwitschia</i> will be measured			X	Water levels were measured in January and July 2009
<i>Welwitschia</i> data compared with other plants of the area		X		Data for the June-July sampling are still being analyzed at the University of Minnesota

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

Permitting always seems to be a bit more complicated than expected – in January 2009 I had to scramble to arrange an extra CITES export permit for the *Welwitschia* samples as well as a Material Transfer Agreement with the appropriate Ministry. It is very difficult to arrange these things from outside of the country, so you just have to plan to spend an extra few business days in the capital city to make these arrangements.

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

First, I determined that the *Welwitschia* population adjacent to the proposed mine does not use fog as a significant water source. Rather, water from within the *Welwitschia* is isotopically similar to that within nearby *Acacia* trees which are known to have very deep roots tapping the water table.

Second, after the presentation of this work at the Geological Society of America (Portland, OR, October 2009) and the American Geophysical Union (San Francisco, CA, December 2009), determining groundwater dependence of *Welwitschia* populations near proposed mines appears to be a priority for mining and consulting companies assessing potential environmental impacts. I have been contacted to help address this issue in other parts of Namibia. The proposed copper mine adjacent to the *Welwitschia* I studied has stopped development, but this had more to do with a drop in copper prices than the findings of this research.

Third, carbon and nitrogen isotopes indicate microhabitat controls on photosynthesis and water efficiency as well as a decoupling of *Welwitschia* from a regional relationship between precipitation

and nitrogen cycling. These results add to the basic understanding of how *Welwitschia* survives in a hyper-arid ecosystem.

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

Interns at the Gobabeb Training and Research Centre (GTRC) were included in both the January and June - July 2009 fieldwork. I gave two lectures attended by visiting scientists, staff and students in residence at the GTRC – one in January and one in June. My time spent at Gobabeb strengthened the connection between this research centre and the University of Virginia. As a result of this connection, Hiskia Mbura, a Senior Technician at Gobabeb, was included in a course at the University of Virginia entitled “Ethics, Protocols and Practice of International Research.” This course brought together professionals from Southern Africa and undergraduates at the university to discuss environmental and social issues and to develop projects to address them.

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

Yes, I was successful in obtaining a fellowship that provided five weather stations that I installed for continuous monitoring of fog deposition and other relevant variables. Gobabeb technicians are maintaining these stations.

I have also applied for two postdoctoral fellowships that would extend this work for 1-2 years.

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

I have presented the work at two international conferences mentioned above and will present final results at the European Geophysical Union meeting in May 2010. I am also writing two papers that I will submit for publication (most likely the *Journal of Arid Environments*) in May 2010.

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

The funds were used between January and July 2009 – 7 months – faster than the expected 12 months.

**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
Airfare – USA to Namibia, Visas	1600	1601	+1	
Accommodation/ Gobabeb research station fees	800	769	-31	
In-country transport (rental car)	1400	1363	-37	Budget Rental Car – Toyota Corolla
Sampling Equipment	100	134	+34	
Shipping, Excess Luggage, Bank fees	100	133	+33	Includes £20 wire transfer fee from

				UK to USA
<b>TOTAL</b>	<b>4000</b>	<b>4000</b>	0	

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

I mentioned that I have been contacted regarding assessment of *Welwitschia* water sources with respect to other proposed mines. Continuing this dialogue will be the primary way to extend the impact of the project into real solutions for the conservation of this species.

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

Yes, I used the RSGF logo on posters presented at the Geological Society of America (Portland, OR, October 2009) and the American Geophysical Union (San Francisco, CA, December 2009).

**11. Any other comments?**

The focus of RSGF is very well received among NGOs in Namibia. I spread the word to them, which will hopefully lead to more Namibian applications in the future.