

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.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Addisie Yalew Geremew
Project title	Integrating genetic diversity and local ecological knowledge for conservation and sustainable use of papyrus swamps in Lake Tana, Ethiopia
RSG reference	16029-1
Reporting period	Final
Amount of grant	£4992
Your email address	Addisie.Geremew@vub.ac.be
Date of this report	01/02/2016

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
To determine the genetic diversity and population connectivity of papyrus swamps			x	Eight hundred papyrus individuals (200 per site) were sampled from four wetlands (Ambo-Bahir, Yganda, Infranz and Selchin). The distance between individuals within the swamp was maintained to 10m apart. Individual samples were subjected to DNA analysis for further microsatellite based population genetic characterisation. We detected an overall moderate level of genetic and genotypic diversity yet, spatial variation in genetic and genotypic diversities among the four swamps observed. We were able to identify three hotspot genetic diversity sites (Ambo-Bahir, Yganda and Infranz) which we designed to keep on conserving and sustainably use. But low genetic diversity in the swamp, Selchin which highly disturbed by different factors. Thus we further plan to restoration activity for papyrus swamp in Selchin. Our analysis also highlights maintaining hydrological connectivity between swamps enhances genetic connectivity via gene flow. However, further study on corridors of gene flow between swamps fringing the lake and papyrus along the riparian environment in the upland still required.
To assess local ecological knowledge and management practices of C. papyrus by communities living around papyrus swamps in Lake Tana			x	Assessment of local ecological knowledge accumulated and embedded cultural adaptations in a context of long-term ecological changes of papyrus swamps was made to generate baseline information for conservation and restoration. To do so informants, including fishers, elders, harvesters, environmental officers, and school students around the swamps were selected. Spatial variation in knowledge and perception on papyrus regeneration, utilisation, threats and management practices by the local people were documented.
To assess the prominent			x	Major anthropogenic threats to papyrus swamps in Lake Tana identified were over-

<p>anthropogenic and environmental threats impact genetic variants and ecosystem services of <i>C. papyrus</i></p>				<p>grazing, agricultural encroachment, urbanisation, over-harvesting, sedimentation and pollution from urban sites. Generally, papyrus swamps in Lake Tana are under severe human-induced threats which need due attention to minimise their loss at different levels of diversity. Moreover, our result highlights that correlation between habitat quality measures and genetic variants differ depending on the factor considered. However, to decide which environmental factor or habitat quality to be prioritised for further restoration and monitoring activities demand continuous temporal and spatial assessments.</p>
<p>To create awareness in community on conservation of papyrus swamps</p>			<p>x</p>	<p>Community education on the ecological roles of conserving papyrus swamps have been carried out through panel discussions with school students and teachers, focused group discussion with papyrus harvesters, grazers, fishers and environmental officers and radio transmission on wetland resource management. Certification of community members sustaining their life solely by papyrus harvesting has been made in collaboration with natural resource management office. For departments teaching conservation biology and ecology flyers and brochures were distributed as supplementary course material. Field based on-site education by taking different representatives of the community was conducted using a boat trip to the swamps. On the way students gained sampling techniques for genetic analysis and environmental and biotic factors assessment.</p>
<p>To link LEK and genetic information so as to formulate local scale conservation guidelines in line with the national conservation legislation of the country</p>		<p>x</p>		<p>We developed a draft conservation and sustainable use guideline for papyrus wetlands in the Lake Tana basin at local-scale, yet extrapolating to the basin and regional scale remain to be attained. We revised the national water resource policy and biodiversity legislation by considering population genetics and local ecological knowledge of the people. Nevertheless, yet,</p>

				bringing this approach to the national level is still challenging.
To set a buffer zone for papyrus swamps conservation and restoration activities		x		Applying remote sensing and GIS we classified areas to be conserved and restored by integrating with results from LEK assessment and genetic analysis. Buffer zones were temporarily delineated. However, this part of the project needs additional data on the land classification system, more sites that could serve as corridors of gene flow from upland rivers to swamps fringing Lake Tana, and compensation of grazing land for local people.

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

Various challenges have been faced from the beginning till the successful accomplishment of the project. The budget we planned for renting boat, travel and t-shirts and banner preparation costs were more than expected due to inflation. Consequently, we pledged to compensate by cutting budgets allocated for other activities. We also used a recurrent budget from our institute as supplementary for renting a hall for panel discussion and radio transmission hour (half an hour). Moreover, thanks to the good team spirit, we had and the support from the local community to use their papyrus made boat 'tankua' sampling for the genetic analysis and biotic and abiotic factor measures completed with less challenges. The implementation of restoration and delineation of the buffer zone is one of the bottlenecks under discussion.

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

Despite assignments and questions to be answered still exist, this project was successfully completed within the timeline set. The major outcomes are summarised as follow:

- We were able to identify three genetic hotspot and resilient swamps to anthropogenic pressures and to that extent we screened sites with low genetic diversity proposed for conservation and restoration purposes.
- Some of the most notable human-induced threats and environmental factors exacerbating the loss of biodiversity in general and the targeted species (*Cyperus papyrus*) and the swamp in particular, were identified.
- Correlation between environmental and human originated factors with variants of genetic and genotypic diversities were established. Based on this relation we formulated mitigation measures that needs to be incorporated to conservation and sustainable use at local scale.
- Local ecological knowledge and management practices of papyrus by communities living around papyrus swamps in Lake Tana were documented.
- Community awareness programmes on how to conserve and sustainably use papyrus/papyrus swamps and reduce human encroachments created a platform in which the community members agreed to work on conservation of swamps. This project also change the perception of people on the urban side towards the ecological and provisional services from papyrus

swamps as they think swamps as 'wastelands'. This project is also effective in terms of addressing the issue of conserving wetlands in sustainable way for sustainable development through wide media cover, involvement of various stakeholders and experts from different field.

- We delivered a draft conservation and sustainable use guideline for papyrus wetlands in the Lake Tana region by integrating LEK, population genetic information and remote sense based data and it is still open for discussion before implementation.
- We set buffer zone for papyrus swamps conservation and restoration activities by considering spatial and genetic connectivity.

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

The communities were part of the project as much as possible. During the community awareness campaign we interacted with the village leaders seeking their permission and assistants to organise the events of public education. Some of the local people allowed their horses to transport our logistics to our campsites.

5. Are there any plans to continue this work?

Yes, we have. This project is a starter for wetlands resource conservation programme in Lake Tana particularly and in Ethiopia generally using participatory and empirical approaches. Community perceptions towards peri-urban wetlands conservation values were strongly negative, suggesting call for in depth capacity building and awareness creation campaign in societies inhabiting in the vicinity of such ecosystem. There is a demand from the regional natural resource and environmental protection staffs to enhance and develop their conservation capacity by applying integrative approaches. Also attempt to increase the spatial scale of wetlands and multi-species conservation approaches will be made. Restoration, conservation and monitoring of already identified sites will continue. In doing so, we plan to apply for the 2nd Rufford Small Grant.

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

The results of the project have been communicated with local communities, administrations, environmental policy makers and academia in the study area to highlight what has been attained so far. Part of the results has been already communicated to the scientific community in international conferences on tropical wetland ecology and at the national level, we have a plan to present the results in the form of conference deliberations. Moreover, we submitted a genetic section of the project for publication in peer reviewed international journal while the sections on LEK and environmental factors are under preparations for submission. The final conservation guideline for the wetlands studied will be provided to the regional natural resource management office. We have already planned to present the results on international conference on tropical ecology that will be held in Gothenburg, Germany in February 2016.

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

The grant was used to execute all the activities planned within the specified time from January 2015 till January 2016.

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 costs	1100	1400	300	We used additional budget obtained from our institute
Boat rent	250	950	700	We cut the DSA so that we could be able to cover the expense for vehicle hiring
Two GPS	230	230	0	
Digital Camera	235	385	150	
DSA for team members and field assistants	2000	1300	700	
T-shirts, fliers, banners and projector rent	370	475	105	The price for t-shirts and banners (5x) was unexpectedly high
Sample collection vials	100	100	0	
Books	110	110	0	
Stationary and software	230	230	0	
Payment for research permit (logistics expense)	130	130	0	
5% for unforeseen payments	237	0	237	
TOTAL	4992	5310	318	

Note: we used additional £318 from the recurrent budget of our institute. In local currency exchange £1 was equivalent to 29.23 Ethiopian Birr.

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

Since our project restricted to four swamps in the south western Tana, in view of the spatial extent of the swamps and the lake, restoration and conservation should also include most fragmented, disturbed and isolated papyrus wetlands in a wider geographical scale. Our analysis also highlights that sustaining hydrological connectivity between swamps enhances genetic connectivity via gene flow. However, identifying corridors for gene flow that maintain spatially isolated, but hydrologically connected upland papyrus populations along rivers to papyrus swamps fringing the Lake Tana is still required. To decide which environmental factor or habitat quality has to be prioritised for mitigation, restoration and monitoring activities continuous temporal and spatial assessments of population's dynamics and connectivity will be our next steps ahead. The community awareness and engagement programmes will be invaluable for long term papyrus swamps conservation outcomes.

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?

We have used the Rufford Foundation logo on the t-shirts, posters, flyers, banners and during seminars and presentations and acknowledgements were made during the deliberations. We also fully acknowledged RSGF in the manuscript submitted for the journal 'Hydrobiologia'.

11. Any other comments?

The Rufford Foundation is sincerely appreciated for the support that enabled us to integrate the LEK with genetic/genotypic diversity to conserve papyrus populations and papyrus swamps at the brink of local extinction in Lake Tana and established the ground for further conservation and restoration activities in a broader context. Our team is committed to carry on conservation of biodiversity at various levels so that degradation of natural resources is reduced and ecosystem services will be sustained.

