

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	Emily Jepkorir Kiplagat
Project title	Ethno-botanical Study of Indigenous Knowledge on Use and Management of Medicinal Floral Species by Local People in Baringo County, Kenya.
RSG reference	19802-1
Reporting period	September 2016-July 2017
Amount of grant	£5000
Your email address	Emilykiplagat90@gmail.com
Date of this report	30 th November, 2017

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
<p>1. Investigate and document indigenous knowledge of medicinal plants used by the Tugen community in Baringo County for the treatment of human and livestock ailments.</p>				<p>The project team members worked with local leaders, community elders, church leaders and other stakeholders to identify traditional medicinal herbalists and request them to provide the information on medicinal plants, methods of preparation and modes of administration. Ethno-botanical data was collected using questionnaires containing predefined questions about the local medicinal plants, utilisation and management. A total of 50 traditional herbalists, both men and women, were interviewed across the entire study areas. The interviews were conducted in local language (Kalenjin) by visiting each responded individually. The following information was recorded; name of the disease, vernacular name of the plant, part of the plant used and other ingredients, drug preparation and drug application.</p>
<p>2. Undertake ecological survey to search for the medicinal plants and document threats to biological diversity of medicinal plants.</p>				<p>Ecological plant surveys were conducted for three seasons i.e. Season 1 (January 2017-March 2017), Season 2 (April 2017-June 2017 and August 2017-October 2017). Two traditional herbalists were selected (one male and one female) to accompany the project team members in the field. A scientist and a technician from Botany Department, National Museums of Kenya (NMK) were also incorporated in the team. Medicinal plants were searched for in suitable habitats across the project sites. Photographs were taken to document threats to biological diversity of medicinal plants in their natural habitats. Photographs of the plant species were also captured for the production of PDF.</p>

			<p>Ethno-medicinal value of each medicinal plant was enumerated in the following pattern: common name, botanical name and habitat. Medicinal plants specimens were collected and deposited at the East African Herbarium, Botany Department National Museums of Kenya. The specimens were pressed, identified and mounted.</p>
<p>3. Create awareness to primary school children (next generation) about the importance of grasping medicinal indigenous knowledge, significance of their conservation and involving them in restoration activities.</p>			<p>Project team members identified the schools to be involved in awareness creation. A letter was sent to the Ministry of Education, Baringo County to request for authorisation to engage selected schools in the outreach. Three primary schools were selected (one per project site)</p> <ol style="list-style-type: none"> i. Kipkaech Primary School in Project site 1. ii. Lake Bogoria Primary School in Project site 2. iii. Lake Baringo Day Secondary School in project site 3. <p>In project site 1 and 2, the nature clubs were established. In project site 3, the existing nature club was strengthened. Tree nursery was constructed and nature clubs were provided with equipment for maintenance. Each of the nature clubs was provided with medicinal plant seeds. The project team members and the nature club members worked together to fill 2000 sachets with soil, and artificially propagate the seeds. T-shirts for the nature club members were printed and distributed. First phase of restoration was organised and 1500 medicinal plants transplanted in school compounds.</p>
<p>4. Produce a PDF containing photographs of medicinal plants, disease treated, parts used, and method of preparation and mode of administration.</p>			<p>To this far, a checklist of medicinal plants species has been compiled. The next step (an ongoing activity) is the production of the PDF. Clear photos are being selected to feature in the PDF. The details to be included in the PDF are;</p> <ol style="list-style-type: none"> i. Medicinal plant name (local and botanical name). ii. Disease treated.

			<ul style="list-style-type: none"> iii. Part of the plant used. iv. Method of preparation. v. Mode of administration. <p>More educative information is also being gathered from previous research undertaken by Kenya Resource Centre for Indigenous Knowledge (KENRIK) and Indigenous Agricultural Knowledge Systems (INDAKS). The product will also entail a brief botanical description, habitat, threats as well as the IUCN category of the associated medicinal plant species. The PDF will be an important reference and a result of a significant study on indigenous knowledge of the Tugen Community in Baringo County-Kenya. As such, I have developed networks with scientists from in the National Museums of Kenya and the Nature Kenya who have volunteered to assist in the final review and edit before uploading to various websites.</p>
--	--	--	--

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

The time I was planning to commence the project, one team member, a scientist at Botany Department National Museums of Kenya (NMK) left for further studies abroad. At that time, I got employment at Botany Department, NMK. This presented an opportunity for me to network with other scientists and technicians who offered enormous support both in the field and at the herbarium (processing, identification and preservation of plant specimens) as well as other logistics during the implementation of this project.

At the beginning of 2017 (January-April), ethnic clashes broke out between communities living in Project site 2 and 3. The insecurity was so intense that the government declared those areas unfit for human settlement. Many locals fled to safe areas and this led to closure of more than 20 primary and secondary schools. This negatively impacted both the vegetation sampling and awareness creation. As such, I rescheduled these activities to the time when the security was restored and the project sites were calm. At those times when other project sites were unsafe, I focused the research on project site 1 (Tugen Hills) which was safe.

Prolonged drought experienced in most parts of Kenya during early 2017 led to difficulty in finding medicinal plants; some were either dead or had shed leaves to adapt to the harsh climatic conditions. At the onset of heavy rains (April-June and August-October), seasonal medicinal plants sprouted. Hence, photographs were taken and plant samples were collected. Due to heavy rains, flooding of roads

leading to project site 2 and 3 affected mobility. Some roads were impassable. I was forced to put the project activities on hold until when the floods receded. In the Tugen Hills, some areas were hilly with rugged terrain forcing the project members to trek for long distances. In most occasions during this expedition, the forest tracks were narrow, overgrown and winding. Manoeuvring through the forest was not easy. The Tugen Hills left us with memorable moments as there were some instances we were forced to scamper for safety at close encounters with deadly reptiles. Luckily for us, the reptiles never meant harm; were probably reminding us that we were intruding into their habitats. Point noted; the reptiles retreated back into the bushes leaving us to continue with our work. We kept in mind that we were just visitors and thus worked with extra caution.

The availability of seeds belonging to medicinal plants was a challenge; their propagation and seed germination. Some seeds found took long to germinate, others died shortly after germination while others failed to germinate completely. Therefore, we opted to purchase processed seeds and mature seedlings from Kenya Forestry Research Institute (KEFRI).

We experienced reluctance from the local people in disclosing any information concerning the utilisation, if any concerning the East African sandalwood. Harvesting of this plant species is strictly prohibited and tough penalties have been imposed by the Kenyan Government. This made the locals doubtful about our intentions and motives on any inquiries made.

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

- i. This project facilitated the documentation of medicinal plant species utilised by the Tugen community in Baringo County. Important information was recorded including; botanical names, vernacular names, disease treated, method of preparation and their modes of administration. During administration of questionnaires, Kenyan doctors were on strike (which lasted for over 2 months). Hence, the use of traditional medicine was found to be most prevalent in all the project sites as locals opted to seek herbal medicine. The traditional herbalists interviewed were found to be ageing and had immense knowledge on ethno-medicine. However, their significance was rapidly diminishing partly due to poor generation transfer, lifestyle changes and anthropogenic impacts. Thus, this ethno-medicinal documentation is a significant step in benchmarking future sustainable methods of conserving the medicinal plants, the preservation of the indigenous knowledge for posterity and future ethno-pharmaceutical studies. The documentation will help in the appreciation of medicinal plant resources that are traditional used, encourage their recognition and their utilisation for the wellbeing of the society at large and particularly the Tugen community who are the custodians of the resources and information presented. The information on the status of the medicinal plant species will be significant in decision making and in the efforts to encourage sustainable utilisation of the associated medicinal plants.

- ii. The project has led to the identification of threats to medicinal plants and the adoption of conservation strategies. Ecological survey revealed that most medicinal floral species are severely threatened by habitat loss, selective harvesting, and overgrazing, wild fires and species over-exploitation. Threats directly affecting populations and species of medicinal plants were identified. Threats affecting specific habitat for the same species and severity and causes was also assessed and documented. The sources, intensities and effects of these threats to specific medicinal flora were also documented. Conservation interventions have commenced and are ongoing. The first phase of restoration commenced in July 2017 in school compounds. In the Tugen Hills, a group of traditional herbalists was initiated and is currently being registered to spearhead the conservation initiatives of medicinal plants. This group provided me with the platform to engage the traditional herbalists' in sustainable methods of utilising medicinal plant species. Among the specific concerns discussed was the population trend locally i.e. whether the population was increasing or decreasing; seasonality and their distribution (plant endemism), the reasons for extraction (whether commercial or local treatment). A question was posed to herbalists about whether they come across dead medicinally harvested plants; how often and what are the main reasons? We probed further on threats of medicinal plant species i.e. whether they are under threat; their thoughts and mitigation strategies. We educated them on the need for documentation of their valuable indigenous knowledge, its preservation as well as the importance of understanding the interdependence between plant species and human co-existence, the significance of sustainable modes of harvesting and the adoption of conservation strategies. As the project coordinator, I consider the involvement of traditional herbalists a wise approach to take in ensuring the achievement of long term objectives of conserving medicinal plants as this will assist in gaining the local support and cooperation. Going forward, I plan to extend this initiative to other traditional medicinal practitioners in the other remaining project sites.
- iii. Medicinal plant species samples were collected and deposited at the East African Herbarium, Botany Department NMK. The samples will be important for future reference which is essential for the study of plant taxonomy, geographic distributions of medicinal plants. The deposited plant specimens will also be used for future identification of plant species, serve to preserve historical record of change in vegetation over a period of time. The samples will also be used in the future to track changes in climate and human impacts on biological diversity of associated medicinal plant species.
- iv. Another most important outcome of this project is the mass awareness created to the young generation on ethno-medicinal value of medicinal plants and the significance of their conservation. During the course of this work, three schools were involved in the outreach campaigns. On average, a total of 1000 young generation were reached, educated on conservation and were able to embrace the importance of not only conserving medicinal plants but also the conservation of other biological diversity in their environs.

For better management, the outreach programme involved the establishment/strengthening of nature clubs at the selected schools. The nature clubs provided the perfect platform to introduce general ethno botanical facts about medicinal plants, their significance and threats. Top in the list of topics discussed included medicinal plant species ecology, threats and geographical distributions within Kenya and East Africa. The participants were asked to share our advocacy to their family members and their friends. Hence our efforts for mass awareness creation were achieved. To support project conservation outputs on the ground, the students were also asked to implement the following concerning the medicinal plants and others: (i) Avoid uprooting medicinal plants in the fields and farm lands; (ii) Keep away grazing animals who browse on them in the grazing fields; (iii) Avoid debarking the medicinal species; (iv) Avoid disturbing them in the fields as humans benefit largely from them; (v) Promote their conservation since they are a source of micro-climate, livelihood health and security; and (vi) Increase their level of appreciation to support the growth of these threatened medicinal plant species. The designed conservation outreach programme was intense, participatory and involved a curriculum based educational materials entailing the engagement of nature club members in botanical art work as well as expedition for plant explorations.

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

Local communities were extensively involved in the project and have benefited in one way or another. The community outreach programme involved two groups who are paramount for the long term success of this project. The groups are:

- a) The nature clubs at selected schools; and
- b) The medicinal herbalists in the project sites.

The schools involved in the outreach benefited enormously in this project. The nature clubs were established and/or strengthened. The team members assisted in composing the constitution for the respective clubs and in holding the election for nature club officials. A tree nursery was constructed and fenced for the nature club members. The members were provided with the necessary equipment for the tree nursery maintenance i.e. a Jembe, Shovel and watering cans. T-shirts were printed and distributed to all the nature club members. Seeds and sachets were also provided for artificial propagation of medicinal plants. During the first restoration exercise, 500 seedlings were purchased for each nature club. These were restored in school compounds with the assistance of the teachers, parents/guardians.

The medicinal herbalists benefited in education on sustainable modes of harvesting of medicinal plants. Those who accompanied the team members in the field during vegetation sampling were given small stipends. In the Tugen Hills, the project team members are in extensive discussions to register a group for the medicinal herbalists. As earlier intimated, this initiative will be extended to the medicinal herbalists from the other project sites as this is vital for achievement of long term goals. I plan to link

the groups with the Kenya Forest Service (KFS) where they will be further educated on better sustainable practices.

The local guides also benefited from this work through short term employment during field work, data collection, receiving experience on data collection, seed propagation and restoration.

Local business people benefited from the project as most of the materials for tree nursery construction were purchased locally. Food consumed during project implementation was locally purchased. The T-shirts for the nature clubs were also locally printed.

5. Are there any plans to continue this work?

Yes. For realisation of long term objective, there is need to expand the involvement of local community. As indicated in question 4 above, the local schools and the medicinal herbalists in project sites are crucial for the conservation of medicinal plants. Three schools have so far been involved in the project. I envisage expanding this by adding three schools per project site. This will significantly boost my project efforts aimed at increasing education on the significance of conserving traditional knowledge about the medicinal plants and also the restoration. As intimated (in question 4), during this project, 500 medicinal plants have been planted in each selected school. The nature club members were assisted to artificially propagate over 1500 seedlings in each tree nursery. Hence, expanding this by another three schools will have incremental benefits in microclimate, the local appreciation in conservation of not only medicinal plant species but other tree species as well.

The medicinal herbalists have been involved in the education on sustainable harvesting of medicinal plants. The next step in this activity involves registration of the medicinal herbalists in groups per project site. This is an ongoing activity and is at final stages in the Tugen Hills. As indicated above once the registration is complete, I plan to link them with the Kenya Forest Service (KFS) where we will work together on further engagement in education especially on sustainable community forest management practices. This too, will have long term conservation benefits on the ground.

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

Ethno-botanical information has already been shared locally. For instance, the awareness creation organized with the nature club members in the schools selected as well as the platform we had with the traditional herbalists at the project sites. This largely assisted in result dissemination.

The activities in the awareness creation have been shared in (children4nature.weebly.com); a site belonging to naturalist at Lake Bogoria. I am designing a personal blog where I plan to share the results of this project to a wider audience.

The results will also be shared at National Museums of Kenya and at the African Nazarene University, Faculty of Environment and Natural Resources where I am pursuing my masters' degree.

Additionally, I applied to participate in an upcoming Rufford Foundation Conference scheduled to be held in Uganda early 2018 where I plan to share the results of my work.

I am developing positive network with various editors of journals who can help get my work published and be shared with a global audience. The publications will contain acknowledgments to the Rufford Foundation and copies of those will be shared with the Rufford Foundation.

Finally, the PDF once finalised will be uploaded to various websites including the Rufford Foundation.

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 Rufford Foundation grant was used from July 2016 until October 2017. The ethnobotanical interviews followed the anticipated plan. However, due to insecurity cases and floods in some project sites (mentioned in section 2 of this report), vegetation sampling and awareness creation were rescheduled causing a delay of 3 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. The exchange rate as at 24th June, 2016 was £1=Ksh 125.8

Item	Budgeted Amount	Actual Amount	Difference	Comments
Interviews And Administration Of Questionnaires (Hall hiring cost, refresher training of team members and local guides, Food and Refreshments, Communication-Airtime credit cards and internet data bundles)	357	357	0	The logistics for data collection was carefully planned to fit the allocated budget and to ensure maximum data collection.
Ecological Surveys (Communication, Work permit fee, Insurance, first aid kit, Medical supplies, topographical maps and field	2002	2080	-78	Budget planned to cover for all the three vegetation sampling seasons. The team members worked in full cooperation throughout. The

guide books, floral books, forceps, blotters, herbarium plant press, field allowance and subsistence, permanent pens, field note books, leather gloves, secateurs, pruners and knives).				local guides were very helpful. Subsistence and allowances cost differed in the three project sites which hiked the budget by 78.
Awareness Creation (Communication, Nature Clubs establishment and Tree Nursery Construction cost and materials (Barbed wire, wire mesh, jembes, shovels, watering cans, seeds, seedlings and sachets, nails). Printing T-shirts, Banners, Poster and Stickers).	1571	1396	175	The surplus in this budget was used to counter the deficit in project administration and logistics and for the production of PDF.
PROJECT ADMINISTRATION and LOGISTICS (Transport, accommodation, scientific equipment i.e. 2 digital cameras, 4 magnifying glasses, 1 GPS and 1 laptop)	1070	1167	-97	Despite careful planning of all the logistics in these activities, the cost of transportation exceeded the amount allocated as some roads in some project sites were flooded and required 4WD vehicle. Additionally, we purchased 1 GPS to assist in field work.
Total	5000	5000		

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

My next step is to design a follow-up project to address the issues identified during this project. The issues are explained below.

Selection of schools for project involvement required consideration of water availability for watering seedlings in the tree nurseries. Although the nature clubs were provided with watering cans, the following issues were noted:

- Project site 1 (Tugen Hills): Kipkaech Primary School has a borehole providing sufficient water throughout. In consultation with the head teacher, it was suggested that if more funds could be secured in future, plastic pipes can be connected from the borehole to the tree nursery.
- Project site 2 (Lake Bogoria): Lake Bogoria primary school has a water tank for harvesting rain water. Although the harvested water is used for construction purposes, little amount are currently used for watering the tree nursery. In collaboration with the school administration, it was suggested that if, in future

funds were secured, an additional water tank can be donated to harvest more rain water to ensure regular watering of the tree nursery.

- Project site 3 (Lake Baringo): Lake Baringo Secondary School is situated on the shores of Lake Baringo. Currently, nature club members fetch water from the lake. The school have a water pump and on further consultation, the school administration requested that if funds are secured in future, pipes can be connected from the lake to the tree nursery, a distance of approximately 500 metres.

Hence, the most important next steps in this project is to support the established/strengthened nature clubs as stated above in ensuring regular watering of seedlings in the tree nurseries with minimal efforts. Seedlings have been artificially propagated inside the tree nurseries (1500 per school), are currently being taken care of to maturity. Once restored, these plants will have long term conservation impacts on the ground.

The next important step is to push the registration of herbalist groups, and continue engaging them in sustainable methods of utilisation of medicinal plant resources and education on the need to adopt proper conservation measures. I plan to link the traditional herbalists in the project sites in the conservation of important conservation areas within their localities;

- Project site 1: Morop-Tarambas Conservancy in the Tugen Hills.
- Project site 2: Lake Bogoria National Reserve.
- Project site 3: Lake Baringo Conservation area.

My long term objective is to set up a medicinal plant material culture centre and establish a medicinal plant garden in Baringo County and as such, the incorporation of the traditional herbalists' groups in this work is vital.

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 in almost every material produced in this project. Banners, t-shirts, posters and stickers were printed containing the Rufford Foundation logo. The posters were distributed to the participants during the outreach programmes. The banners were used to advertise the project in the schools. The stickers were on every item donated to the nature clubs.

The Rufford Foundation logo will also be included in future publications resulting from this work.

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

The project would not have been success without the commitment of my project team members namely:

Mr. Johnson Kiprop & Mr. Dominic Kiprono Chesire (National Museums of Kenya)
Ms. Dorothy Kiprop from the Technical University of Kenya
Mrs. Edith Kirui from Egerton University-Kenya.

Finally, my most sincere thanks go to Mrs. Sokome Petrolina Chemjor who wholeheartedly and tirelessly offered her support throughout my endeavours in this work.

12. Any other comments?

As an upcoming conservation scientist, I am humbled with support from the Rufford Foundation whose grant facilitated this study. The target groups in this work (young generation and traditional herbalists') in the project sites are now better educated and appreciate the conservation of medicinal plants. I would like to sincerely thank the Rufford Foundation, without their assistance, this project would not have been successfully implemented.

I also want to thank my employer, the National Museums of Kenya for providing me with an opportunity to work at Botany Department, providing me with experience in scientific research, conservation education and herbarium techniques.

The implementation of this project involved an enormous number of people and special thanks go to my Tugen community in Baringo County (traditional herbalists in particular) who patiently provided the ethno-medicinal information and to whom much of the information belongs.

The implementation of community awareness programmes would not have been possible without the support from the Ministry of Education, Baringo County and the head teachers of respective schools involved.