Final Evaluation Report

Your Details	
Full Name	Gerald Keneth Kaniaru
Project Title	Preserving Indigenous Knowledge on Locally Threatened Medicinal Plants: Meeting the Bonn Challenge and Building Community Resilience against COVID-19 in the Arid Makueni County, Kenya
Application ID	35110-2
Date of this Report	14th August 2022

1. 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
Documenting indigenous knowledge on wild medicinal plants' diversity, use, distribution, and abundance for culture and heritage preservation as well as biodiversity protection.			■	Over 112 respondents, including 47 herbalists and traditional medicine practitioners, were interviewed for documentation of indigenous knowledge of medicinal plants within the study area. A total of 178 wild medicinal plant species, representing 62 families and 143 genera, were identified and documented. Nine modes of preparing medicine used by the local community were identified. They include: a) Boiling the plant materials in water (59.1%). b) Pounding and soaking in water (24.9%). c) Pounding and mixing with beer (1.7%). d) Pounding and mixing with porridge (0.6%). e) Pounding and mixing with soup (0.3%). f) Pounding and squeezing the plant juice (7.3%). g) Burning and powdering to ash, drying and crushing to powder (1.7%). h) Pounding and bandaging the pounded plant material cutaneous (0.8%). Seven routes of administration were identified. They include: a) Inhalation route (2.7%). b) Cutaneous route (4.7%). c) Oral route (86%). d) Nasal route (1.6%). e) Ocular route (2%). f) Optic route (1.4%). g) Transdermal route (1.6%).

				Sixteen different plant parts were used for medicinal purposes. They include: a) Leaves, roots and twigs (0.22%) b) Stems and leaves (2.17%). c) Bark and leaves (0.65%). d) Fresh fruits and leaves (0.43%). e) Shoots and leaves (0.21%). f) Leaves (37.74%). g) Roots and leaves (0.22%). h) Roots (29.51%). i) Bark and roots (0.43%). j) Stems and roots (0.43%). k) Bark (14.76%). l) Fruits and bark (0.21%). m) Fruits (2.82%). n) Twigs (0.22%). o) Stems (6.94%). p) All plant parts (3.04%). Documentation of 92 diseases and conditions affecting the local community and livestock, medicinal plants used to treat them, and their modes of preparation, administration, and dosage were documented.
Strengthening the capacities of selected community focus groups and participants on protection, conservation, and restoration of wild medicinal plant species and their habitats through training.				Knowledge of conservation and restoration science was promoted through skill transfer to the local community. There were two workshops held. Over 124 local community members were trained in-person during the workshops, virtually online or indirectly during field surveys. Members of the JAPEL Conservation Farmers Self-Help group put their newly acquired skills to use by actively participating in the implementation of project activities. The local population now has a better understanding of the diversity and the sustainable use of medicinal plants. The local community has a better understanding of conservation, and habitat restoration of medicinal plants. 86% of the trained community focus group members, participants, and the local community showed increased confidence in protecting, conserving, and restoring medicinal plants and their

				environments. Strengthened community cooperation in protecting the medicinal plants' habitats was observed. 71% of the trained community members showed improved propagation efforts for medicinal plants. All relevant stakeholders have access to information on the diversity, use, method of preparation and administration of medicinal plants. 67% of the trained farmers had a better understanding of agroforestry techniques and were using them on their farms.
Performing research on seed-quality studies of the selected medicinal plants to solve propagation and germplasm storability difficulties.				Seed storage behaviour, dormancy, germination and survival trials of 12 priority medicinal plant species were performed. They include *Senna singueana, Sclerocarya birrea, Terminalia brownie, Melia volkensii, Combretum molle, Zanha Africana, Vachellia nilotica, Vachellia tortilis, Senegalia brevispica* and *Senegalia mellifera*.
Restoring the degraded and fragmented wild medicinal plants and their habitats in collaboration with the local community.				A total of 537 seedlings of these species were distributed and planted at a distance of 3 × 3m. There was increased population size and the area of occurrence of the medicinal plant species by approximately 0.48 ha.
Promoting community resilience against economic disruption by the COVID-19 pandemic				Honey and tree seedling production and commercialisation were promoted through three sessions of training and workshops. A tree nursery was installed and is effectively managed by the JAPEL Conservation Farmers Self-Help Group. 10 beehives were procured and installed in the restored habitats for honey production and commercialisation as it is a long-term sustainable biodiversity value chain. This not only increases their household incomes but also facilitates seed production and the preservation of high plant diversity through pollination.

2. Describe the three most important outcomes of your project.

a). Documentation of indigenous knowledge of medicinal plants of Makueni, which is on the verge of erosion by the mortality of the elderly.

b). Greater participation of the local community in the protection and conservation of wild medicinal plants and their habitats, as well as a contribution to the betterment of their livelihoods.

c). Reduced threats to wild medicinal plants and their habitats: This was achieved through the promotion of agroforestry among the local community. The selected economic species in the nursery were repatriated to the local community and planted together with orange trees and other food crops. These species were planted to provide household fuel wood and charcoal and hence ease the pressure on the natural resources provided in the study area.

The project was able to document the local indigenous knowledge on medicinal plants that was on the verge of erosion. This is a key element and mandate of the host institution, National Museums of Kenya, which is to collect, preserve, study, document and present Kenya's past and present cultural and natural heritage. This is for the purposes of enhancing knowledge, appreciation, respect and sustainable utilisation of these resources for the benefit of Kenya and the world, for now and posterity.

Additionally, a checklist of the 178 wild medicinal plants of Ngutwa, Makueni county and how they are consumptively exploited for medicinal purposes, provides a good resource for the best management policy development of the district especially for the restoration of degraded area to produce seedlings which are suitable for the local area.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

Illegal wildlife traders: Existence of sandalwood (*Osyris lanceolata*) traffickers in the study area posed a security risk to the project team. We engaged the village elders and the local police officers during some of our field expeditions.

Drought: This made access to water rather challenging for all the project stakeholders to access water sources. This was tackled by scheduling the propagation of seedlings as well as the installation of water harvesting systems to coincide with the occurrence of rainfall. However, this interfered with the project's schedule, necessitating the concurrent completion of other tasks.

4. Describe the involvement of local communities and how they have benefitted from the project.

The local communities were actively involved in the implementation of project activities. This enhanced 'buy-in' and ownership by local communities, hence ensuring sustainability. Additionally, they donated a piece of land for the

construction and installation of the project's infrastructure, such as a nursery and propagators.

Promotion of agroforestry in the orange farms of the local community: *Melia volkensii* species were planted around the farm as shown in the final report to provide household fuel wood and charcoal and hence ease the pressure on the natural resources provided in the study area. These species can also be used for construction.

Economic benefits: Honey and tree seedling production and commercialisation were promoted through three sessions of training and workshops. A tree nursery was installed and is effectively managed by the JAPEL Conservation Farmers Self-Help Group. 10 beehives were procured and installed in the restored habitats for honey production and commercialisation as it is a long-term sustainable biodiversity value chain. This not only increases their household incomes but also facilitates seed production and the preservation of high plant diversity through pollination.

Increased technical capacity of local participants: Knowledge of conservation and restoration science was promoted through skill transfer to the local community.

5. Are there any plans to continue this work?

Yes, without a doubt. The first booster grant, if awarded, will aim to curb illegal trade of the rare *Osyris lanceolata* (sandalwood) that was observed to be rampant in the study area and study its biology, which includes edaphic (soil nutrients), biotic (mycorrhizal associations), and other environmental factors that affect the spatial distribution of its wild populations, which has not been studied.

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

The outcomes of this research will be disseminated to others through publications in the form of scholarly papers and widely read articles.

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

Some of the areas that need to be addressed by the 1st booster grant, if awarded, include:

- **Illegal Trade of CITES-listed** *Osyris lanceolata* **(African sandalwood)**

Osyris lanceolata, commonly known as African sandalwood, is an evergreen, deciduous, drought-tolerant tree. It is listed under Appendix (II) of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Globally, its populations are restricted to Kenya, Uganda, Tanzania, Burundi, Ethiopia, and Rwanda. The species has been reported to be decreasing at an alarming rate due to human exploitation for cosmetic and pharmaceutical products.
In 2007, the government made it unlawful to harvest sandalwood. However, sandalwood traffickers, who collaborate with cartels and brokers, have infiltrated the remote areas of Ngutwa, Makueni County, the study area. Unaware of the high value of the rare wood and section 92(2) of the Wildlife Conservation and

Management Act of Kenya, the villagers are lured to cut the trees and sell on the cheap (US$100 per full 4-wheel double cabin) thereby increasing the illegal trade.

Figure 1: Unpacking of the confiscated pieces of sandalwood. © DCI

During the interviews, the project team observed that the traffickers were made aware of the locations of the sandalwood populations by the villagers for easy harvesting. Over 100 live and dead stumps of the endangered species were identified. The team noticed that some of the pieces of sandalwood from the study area were transported from the study area to the coastal region through the Emali route for shipping.

There is an increased demand for this wood globally. Some of the markets include Myanmar, Japan, China, and some of the countries in East Asia.

This tree produces seeds three times a year. Various studies have reported propagation difficulties, low survival rates, and drying off of *Osyris lanceolata* seedlings in the nursery and after transplanting.

- **What are the next steps?**

If awarded, the 1st booster grant will seek to:

1. Map out the extant populations of *Osyris lanceolata* species trees, seedlings and saplings for conservation.
2. Understand the biology of the species; how edaphic (soil nutrients), biotic (mycorrhizal associations), and other environmental factors affect the spatial distribution of *O. lanceolata* in wild populations. These analyses could improve understanding of suitable conditions for species survival and adaptation to enhance conservation strategies.
3. Build capacity and understanding of the economic and ecological value of the tree.
4. Domesticate this economically viable species through community sensitisation.
5. Mass propagates the species to increase their declined population sizes.

- **The Need for Long-Term Alternative Fuel Sources**

Charcoal burning and fuelwood collection are still threats to the existence of biodiversity in the study area.

The promotion of agroforestry using indigenous species such as *Melia volkensii* reduces the threat to other rare and endangered species in the study area. However, this species is slow-growing and may not curb this threat immediately.

What is the way forward?

The first booster grant, if awarded, will aim to:

1) Promote the production of paper log briquettes from paper waste from Ngutwa Primary School and saw dust as an alternative energy source. This venture has been successful in Raila Educational Centre in Kibera, the third largest slum in the world. This was facilitated by Darubini Conservation NGO, a group that Mr. Kaniaru and Dr. Ngumbau (the authors) are members of.

This will be an alternative to charcoal and firewood and is also an environmentally friendly activity because it utilizes recycled waste papers from the nearby school (Ngutwa Primary School).

Figure 2: A sample of paper log briquettes, a cost-effective, eco-friendly alternative fuel source.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

We made use of the Rufford Foundation logo in posters, publication (in review) and acknowledged the foundation as the funder and supporter of this work in the NETFUND National Conference

9. Provide a full list of all the members of your team and their role in the project.

Mr. Gerald Keneth Kaniaru: Seed collection, propagation, seed quality studies, community outreach and project management.

Dr. Veronicah Ngumbau Mutele: Site assessment and identification of priority medicinal plant species in the study area for conservation and restoration, development of medicinal plants' checklists and profiles.

Philis Muteti – Chairlady, JAPEL Self-Help group: Project planning, organizing community-group members during training and other collaborative activities, lead the local community in the protection of existing and restored wild-medicinal plant habitats, the monitoring of planted species to ensure 'growing of trees, not just planting them,' and the management of installed beehives, tree-seedling nurseries and the income generated by them.

Other cross-cutting roles include:

- Training of the Self-Help group and the local community.
- Budget allocations to various project activities.
- Project planning.
- Report writing and submission.

10. Any other comments?

The project team intends to continue solving environmental and ecological problems caused by human in the study area. So far, we are grateful for the support granted to us by The Rufford Foundation.