Final Evaluation Report

Your Details	
Full Name	Mehari Girmay
Project Title	Vegetation Ecology and Ethnobotanical Study of Hirmi Forest, North West Zone of Tigray Region, Ethiopia
Application ID	26329-1
Grant Amount	£5000
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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
Asses floristic composition and diversity of Hirmi forest			✓	204 different plants belonging to 90 different families and 101 genera were recorded.
Determine the major plant communities in the forest ecosystem			✓	There are three vegetation communities categorised based on the species compositions and altitudinal gradients. In the lower elevation (<1400 m asl) *Combretum – Terminalia species* were confined. At mid-level of altitudinal gradients (1500-1800 m asl) more acacia species and some *Terminalia* species was recorded. At the top of the study area (>1800 m asl) Dry Afro-montane species such *Rhus* species, *Olea europiea*, *Croton* species, etc., were collected in this study
Investigating the distribution of plant community in relation to the environmental variables			✓	Terrain variables such altitude, slope and edaphic characters were identified. Type, distribution and abundance of the vegetation in the study area have a direct relation in with altitude and slope.
Correlating the soil parameters and characters in distribution of plant species			✓	Out of 75 soil sample taken, a sandy loam is the major soil type, with pH 5-6, average cation exchange capacity and total nitrogen was 32% and 0.15% respectively. This indicates soil parameters have direct or reverse relation to species distribution in Hirmi forest ecosystem.
Assess the conservation status and major threats of the for Hirmi natural forest remnant natural forests			✓	Free grazing, debarking, tree logging, agricultural expansion and rarely firing are the main anthropogenic factors that are the major threats for Hirmi ecosystem. Tree stumps, soil degradation and landslides are some natural factors threat for Hirmi forest.

Document human and animal l medicinal plants and associated indigenous knowledge for its management			About 75 medicinal plants that are of use both for humans and animals were recorded from six kebele (small local administrative units). 90% of those interviewed in the community used herbal medicine from Hirmi forest and surrounding areas to treat both human and livestock ailments. In addition the majority of respondents have good indigenous knowledge of how to manage, use and sustainably conserve it.
Share results of this project with relevant stakeholders on the overall status of the Hirmi forest and possible solutions for future conservation actions			Experience sharing and presentation was been at the RSG Conference held in Ethiopia (April 27th-28th 2019) and Shire Maitsebri Agricultural Research Center workshop(in March) with regard to the status of the Hirmi forest ecosystem, major threats to the forest, ecological services of the forest and possible solutions for future conservation actions.
Natural regeneration potential of soil, particpatory based plant ecology restoration, community capacity building and consultation			Investigating of soil seed bank of the forest enables us to investigate and forecast the present and future restoration potential of the forest. This will be done via oil seed bank investigation as well as by consulting and capacitating the local community. I hope this will be achieved in the next step.

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

As an ecologist it is obvious to face various problems while conducting such research activities. Because most ecological investigations are conducted in remote areas or in a place where basic facilities are limited. The study site is too far from transport services. The data collector team had to travel on foot for about 4 hours. In the jungle, it is difficult to expect comfort (such as sleeping, feeding, walking etc.). In the day and at night, heavy rainfall was the main challenge. Also to some extent there was flooding which prevented us crossing from one site to other site. We tried to overcome those challenges by enduring ourselves morally and physically in a patient way. Though the team faced the above challenges, we have potentially collected all the intended or required data.

Figure 1. Frequent snow and rain. Figure 2. Flood that inhibit to transportation

Figure 3. Tiredness after 4 Hours travel to the site. Figure 4. Walking challenges inside the forest

Figure 5: Heavy rainfall challenge at the study site

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

Understanding diversity, distribution and extent of use of plants in a country is a basis for designing and implementing biodiversity conservation and management. Based on this the present study has the following desired out comes:

1. **Document and identify the plant diversity in Hirmi forest.**
Hirmi is one of the dry land areas with high biodiversity. In this study 204 plant species were recorded and identified. *Combretum-Terminalia*, *Acacia-Comiphora* and dry evergreen ecological plant community is the major cover of the ecosystem.

2. **Assess the association of plant biodiversity with environmental and anthropogenic factors.**
Environmental features such as altitude slope and edaphic characters were identified. Type, distribution and abundance of the vegetation in the study area have a direct relation in with altitude and slope. About 75 soil samples from each vegetation quadrant were taken for various soil chemistry parameters laboratory analysis and to correlate with vegetation distribution. As result, sandy loam is the major soil type. Sandy loam soil type has a neutral content and with small content of total C & N. Enhancing or declining of these and other soil parameters will have a direct impact on the Hirmi biodiversity. In other aspects, anthropogenic factors such agricultural expansion, tree logging, debarking, grazing, and burning were the major threats for Hirmi forest. Prevention from such intervention in the ecosystem will have a positive impact on the conservation of the ecosystem. Therefore, conserving of Hirmi ecosystem will be associated and should consider to above terrain and human factors.

3. **Association of Hirmi forest with local community**
About 5,000 people are living around the Hirmi district. Among those, about 370 people where selected and interviewed about their conservation culture and use of Hirmi forest. About 60% of the local people are using herbal medicines from the forest for their health care. The results show that the local people have good indigenous knowledge on how to conserve and use plants in their local areas. However, anthropogenic interventions and over-exploitation of the forest are major identified threats for Hirmi forest. Hence the study concludes that participatory forest management is significant for sustainable conservation of Hirmi forest. In addition, involvement and consultation of relevant stakeholders (such as Shire Agricultural Research Center) has been done. This enables us to aware and train for the local community via their governmental l structure.

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

❖ In the survey conducted in regard with socioeconomic association of Hirmi forest about 370 people (based on the standard sampling method) were involved in the study to assess the indigenous knowledge, management practice, medicinal and utilisation of plants. In the data collection period,

focus group discussion was done. Hence they have shared their experiences each other, how to use their local biodiversity sustainably.

❖ About 20 different local labourers were also involved during the data collection from the local community.

❖ Six local community leaders also participated in the workshop conducted in Shire Agricultural Research Centre. They gave us their insight and feedback. They have promised that they will mainstream to the community in collaboration with governmental body and researcher in different panel conversations.

❖ Hence, having a good knowledge, experience and awareness how to keep and use the forest will have significant role in sustainably conserving of the forest. It also creates job opportunity and experience on data collection.

Figure 6: involvement of local communities and benefitted from the project (Experience sharing, discussion, awareness rising and job opportunity)

5. Are there any plans to continue this work?

Of course yes! This time this study came out with the detailed plant diversity in the forest, their relationship with environmental variables, major human threats to the forest as well as indigenous knowledge and perception of local community on how to restore and conserve an ecosystem and endemic plant species in the study area. Hence the study is planning to continue with the following fundamental issues:

1. The detailed investigation on natural regeneration potential and soil seed bank of the forest ecosystem.
2. Threats associated with Hirmi forest restoration.
3. Community-based ecological restoration mechanisms.
4. Identifying the more threatened plant species in the study forest ecosystem for conservation prioritisation.
5. Detail capacitating, consulting and discussing on how to use and conserve of the forest with community.

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

The research results will be published in reputable scientific journals. Further, in collaboration relevant stakeholders (research institutions, regional biodiversity bureau, natural resource conservation and management bureau as well as the representative local communities) it is planned to undertake various workshops, symposia and training to disseminate the scientific findings and recommendations. Those institutions give a green light to be synergistically cooperating and make available the required platforms.

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

The project was intended to be implemented within 1 year (to May 2019). It was accomplished based on the allowed time scale of Rufford Foundation. However, since this study is part of PhD dissertation, it requires an extra few months for writing, editing, and publishing process. It is important to note that, basically all the required data are finalised within the planed time range, scope and RSG plan without any constraint.

8.   Budget: 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. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Transportation	1,250	1,125	-125	Since the data collectors are cover >40 KM in walking
Clinometer	55	65	+10	A little bit exceeding of cost was revealed in this regard
Compass	125	125	0	No any cost change
Camera	450	450	0	No any cost change
Power bank	200	200	0	No any cost change

Soil laboratory	500	559	+59	A little inflation of chemical and soil reagents
Per dame for data collectors	1,200	1,271	+71	Because scale of per dame is increasing from time to time
Per dame for workshop Organizers and facilitators	600	600	0	No any cost change
Stationery items	80	100	+20	A little inflation on stationary items
Plant press	140	140	0	No any cost change
Refreshment during trainings and workshop	400	400	0	No any cost change
Total	**5,000**	**5035**	**+35**	This negligible cost difference is cover by the principal investigator

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

For this time the collected data is enough for the few next years. Basically, the collected baseline data are potentially enough for this research. However, the main quality of a research is forecasting the fate of nature and any likely problems by setting various relevant models. To predict the distribution, major threats and possible conservation opportunities of Hirmi forest it is better to have soil seed bank species modelling. The soil seedbank result will reveal the ecological restoration potential of the study area. In addition, such a study will be important to decision makers to set a mechanism or conservation prioritising of threatened, endangered or endemic species based on the research findings. The community has indigenous knowledge of how to conserve, use and reclaim the degraded ecosystem. But this will be real when the community have a common understanding about the significance of plant ecosystem and get benefit from these plants and plant products.

Generally speaking, if someone has enough baseline information and able to predict the restoration of potential of one forest ecosystem via incorporating local community's indigenous knowledge, it is possible to deserve the required sustainable forest ecosystem conservation.

10. 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?

Yes, I have used/also using/ the logo in two occurrences:

1. **On public display**: example on the workshop takes place in Shire Agricultural Center, at the Rufford workshop held here in Ethiopia; meanwhile I conduct my progress report to my supervisors, on my social media such as Twitter, Instagram and Facebook.

2. **On personal materials**: on my desktop, laptop and mobile wallpaper.

Before we commenced our data collection in the field site I provide a brief about the Rufford Foundation to my team. For the future I will also promote Rufford Foundation formally and informally in every applicable incidence.

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

Team	Role
Mehari Girmay (PhD candiate)	principal investigator
Yirga Gebretsadik(Botanist)	Botanical data collector
Nayzgi Fissaha(Analyical chemistry)	soil data collector and laboratory analysis
Dehen Abrha	daily labourer
Mulaw Hadush	Daily labourer
Debes Zegeye	GIS expert
Adhanom Abad	Daiy labourer
Shugut weldu	Daily labourer
Sebsebe Demisew(Prof)	Supervisor
Abadi Girmay(PhD)	Supervisor

12. Any other comments?

Next to God, I have a great grateful and appreciation the Rufford Foundation for the financial support of my work and contribution for the conservation of these potential areas and its commitment in supporting investigators in the entire globe on conserving of nature. I would also to thank Shire Agricultural Research Centre in supporting technical aspects, coordinating of workshop and giving valuable comments to my research projects. I will be partner of next Rufford Foundation with various related works with great hope in getting the next 2nd grant project research on natural regeneration potential, its threats and possible scientific and indigenous way of conservation for Hirmi forest.