Darwin Initiative Main Annual Report

To be completed with reference to the "Writing a Darwin/IWT Report" Information Note: (https://www.darwininitiative.org.uk/resources-for-projects/reporting-forms-change-request-forms-and-terms-and-conditions/).

It is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)

Submission Deadline: 30th April 2021

Darwin Project Information

Project reference	26-017
Project title	Maximising community and conservation benefits from plants of Mount Mulanje
Country/ies	Malawi
Lead organisation	Botanic Gardens Conservation International (BGCI)
Partner institution(s)	Mulanje Mountain Conservation Trust (MMCT), Forestry Research Institute of Malawi (FRIM)
Darwin grant value	£338,252
Start/end dates of project	1 April 2019 – 31 March 2022
Reporting period (e.g. Apr 2020 – Mar 2021) and number (e.g. Annual Report 1, 2, 3)	Apr 2019 – Mar 2020 Annual Report 1
Project Leader name	Kirsty Shaw
Project website/blog/social media	https://globaltrees.org/news-blog/new-value-for-an-endangered-tree-to-conserve-mulanje-mountain/
Report author(s) and date	Alex Hudson, Kirsty Shaw (BGCI) and Ibrahim Mitole (MMCT)

1. Project summary

Mulanje Cedar, *Widdringtonia whytei,* Malawi's national tree, is found naturally only on Mount Mulanje, but is now almost extinct in the wild as a result of uncontrolled logging. The Malawian project partners, Mulanje Mountain Conservation Trust (MMCT) and the Forestry Research Institute of Malawi (FRIM) have been working in the Mount Mulanje reserve for over 20 years. The partnership between Botanic Gardens Conservation International (BGCI) and these two partners in Darwin project 23-026, which ended in March 2019, successfully established ten community nurseries around Mount Mulanje and initiated a large-scale restoration programme for Mulanje Cedar. The project also created a local and national market for cedar seedlings, improving the income of >600 people from rural communities around Mount Mulanje.

Project 23-026 demonstrated that livelihoods can be improved through sustainable utilisation of plant resources, rather than short-term gains through unsustainable exploitation, and instilled pride in the cedar amongst local people growing and planting it back onto the mountain. However, successful re-establishment of the cedar, and continued demand for cedar seedlings, is not assured until optimal protocols for cedar establishment on Mount Mulanje have been developed. Community nurseries will then continue to benefit from seedling sales.

Furthermore, human population pressure remains high around Mount Mulanje, employment opportunities are limited, and other tree species are being targeted by loggers instead of Mulanje Cedar leading to a greater impact on the mountain's unique biodiversity. Communities are planting Mulanje Cedar within their homesteads, however this will not yield harvestable timber for c.30-40 years. Additional, short-term sustainable businesses that improve livelihoods and take pressure off the mountain are needed.

This project aims to expand opportunities for short-term community benefits from Mulanje Cedar by establishing sustainable cedar essence enterprises, harvested from cedar hedges and based on a precedent developed by The Body Shop in South Africa for a closely related species. This will increase the number of people benefiting directly from sustainable utilisation of Mulanje Cedar. The conservation-commerce model developed for Mulanje Cedar will be then be applied to other identified over-exploited plant species found on Mount Mulanje, maximising conservation and community benefits.

The project is taking place on and around the Mulanje Mountain Forest Reserve (see figure 1). This is a massif in South Malawi that rises from the lowlands (c.1,000m) up to the plateaux region (c.2,000m) and on to mountain peaks (the highest, Sapitwa, is 3,002m). The project incorporates communities from the two lowland districts around the mountains: Mulanje (south side) and Phalombe (north side). These are broken down into 7 and 6 Traditional Authorities respectively, each with their own local leadership, socioeconomic context and relationship with the mountain. There are over 30,000 households within these districts.

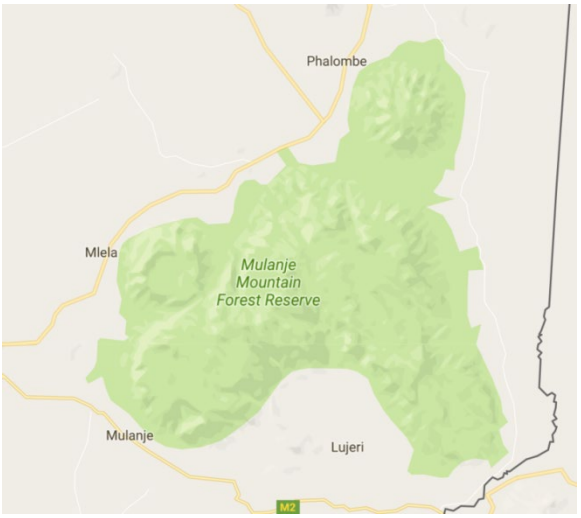

Figure 1 Mulanje Mountain Forest Reserve

2. Project partnerships

The main project partners (BGCI, MMCT and FRIM) come together at the Steering Committee (SC) meetings with other project advisors (e.g. from National Herbarium and Botanic Gardens Of Malawi, Environmental Affairs Department, African Parks Network, Chancellor College, Traditional Authority leaders). These took place in September 2020 and March 2021 this year with BGCI staff connecting remotely due to COVID-19 impacts on travel (Kirsty Shaw, Project Leader; Paul Smith, Project Advisor; and Alex Hudson, Project Manager). In the meetings, project progress was fed back to the SC with decisions for adaptive management made and discussions about responses to the Year 1 Annual Report reviewer's comments (see minutes in Annex 4).

MMCT has the role of leading on organisation and implementation of project activities in Mulanje, through their Project Manager, Ibrahim Mitole. This includes restoration fieldwork, monitoring nurseries and their sales, the ethnobotany survey, and the training courses – i.e. hedge planting and management, and business skills and marketing. For all activities, they liaise with all participants and mobilise them on the agreed dates for activities.

BGCI has the role of leading the project's direction and ensuring it is supported by international expertise (e.g. Ecological Restoration Alliance of Botanic Gardens – ERA - advisors) and equipment (e.g. distillation equipment) that cannot be sourced internally in Malawi. BGCI has also developed new data capture methods using electronic data collection forms on the Open Data Kit software / app. BGCI also organised the provision of tablets and power banks to run the tablets in the field. BGCI also continued engagement with the project essence marketing and use consultant (Arthur Stevens) including provision of a report outlining a plan for the final year based on the delayed essential oils results that were produced in March 2021 (See Annex 5). The MMCT and BGCI Project Managers are in communication with each other every week via email, Whatsapp and calls.

FRIM has the role of providing local expertise on forest flora, seed collection and propagation to the project. MMCT and FRIM have jointly taken part in fieldwork expeditions to Mount Mulanje for restoration activities, to collect seeds for propagation and to collect materials for the

essential oils research. Other Department of Forestry staff also took part in these fieldwork activities. BGCI and ERA experts would normally participate in fieldwork but were unable to take part in these expeditions due to travel restrictions of COVID. They contributed to fieldwork organisation remotely at meetings. Fieldwork took place in:

- November 2020 – To complete initial site assessments for feedback to ERA group meetings and to select 4 sites for further detailed assessments.
- December 2020 – To complete detailed assessments of the sites selected by ERA group, collect seeds of Mulanje Cedar and other target species for propagation, and materials for essential oil surveys.
- January 2021 – To plant new trial plots. This fieldwork was cancelled last minute because COVID-19 cases and deaths significantly increased in the country in early January, including unfortunate deaths of MPs in Lilongwe and a Traditional Authority leader in Mulanje.
- March 2021 –To re-assess the sites established in December 2019. It was too late in the year to plant the new trial plots because the rainy season was coming to an end and it has been shown previously that survival of planted seedlings drops significantly after planting in January.

The ERA experts have continued to contribute to the project with remote attendance of restoration planning meetings in May, September, October, and November 2020. These meetings also involved MMCT, FRIM and BGCI. These led to updated restoration trial designs following the team's assessment of situation changes. It became clear through the year that enough companion seedlings of other target species would not be available to plant in December so the team changed the design to plant Mulanje Cedar next to wild companion plants instead (see new design document in Annex 6).

Local communities have continued to be involved in various components of the project: received training in hedge planting and management; received training in business skills and marketing; Traditional Authority leaders engaged for ethnobotany study; community nurseries sold seedlings for hedge planting and restoration on the mountain. Nurseries are also propagating companion species so that successful companion species can be planted alongside Mulanje Cedar in the future (e.g. at trial plots to be planted in December 2021).

Mzuzu University: the Associate Professor of Chemistry, John Kamanula, with expertise in essential oil analysis from natural products, has undertaken an analysis of the essential oils provided by Mulanje Cedar leaves, branches and heartwood from Zomba and Mulanje (see report in Annex 7). MMCT and FRIM supported the research by providing the researcher with Mulanje Cedar materials from Mulanje, collected during restoration and seed collection fieldwork.

Essential Distillation Equipment (EDE): the technical specialists of EDE in South Africa have remained in close communication with BGCI and MMCT regarding the delivery of new distillation equipment to Malawi. An accident during road transport in December 2020 (see figure 2) meant this delivery was delayed so that the EDE team could inspect and fix the equipment which was damaged in the accident, but thankfully no one was hurt. EDE's insurance covered the costs and will also part cover the cost of an expert from EDE to travel to Mulanje to train local communities and MMCT staff to use the equipment. Successful delivery of the equipment was made in March 2021.

Figure 2: Overturned truck that was transporting distillation equipment in December 2019

WeForest: have supported restoration on the mountain by funding the planting of Mulanje Cedar, *Podocarpus latifolius* and other plant species before the lockdown restrictions in January. *P. latifolius* seedlings were propagated and planted as it has been noted in the last few years that *P. latifolius* trees are being targeted for timber now that Mulanje Cedar trees cannot be found on the mountain.

3. Project progress

3.1 Progress in carrying out project Activities

1.1 Ten nurseries, established and certified in project 23-026, produce a minimum aggregate total of 400,000 Mulanje Cedar seedlings in years 1-3, benefiting 150 nursery workers.

The eight community nurseries that remain operational from project 23-026 continued to propagate Mulanje Cedar and other species. 196,286 seedlings were propagated during this reporting period (See table 1), thus 271,986 seedlings cumulative since the project commencement in 2019. 70% of the 48,544 seedlings left in nurseries from year 1 died over the hottest part of the dry season (September to November) because of water shortages at the nurseries. The remaining 14,563 seedlings were part of hedge and restoration planting from December 2020 to March 2021. There are just over 115,000 seedlings left in the nurseries, which will be ready for planting in the final year of the project.

Table 1: The project community nurseries, their numbers of members, number of Mulanje cedar seedlings propagated, planted in hedges and income generated this project year (April 2020-May 2021). Income in £ based on average rate for the year – 947.64

Nursery Name	**# of Members**		**# seedlings left from year 1**	**# seedlings propagated**	**Total income (MK)**	**# planted as hedge**	**# planted on Mount Mulanje**
	Male	Female					
Kadewere	5	9	13,000	26,450		1,450	16,700
Makolera	1	15	3,032	31,627		2,000	8,635
Kazembe	2	6	4,390	13,821		2,600	5,653
Nessa	9	3	4,200	31,860		2,500	12,020
Chole	5	10	4,852	15,200		1,200	4,400
Nakhonyo	4	5	11,136	18,564		800	12,300
Gambeya	1	7	7,014	34,314		2,800	15,654
Lomoliwa	3	13	920	24,450		2,000	3,800
Totals:	**30**	**68**	**48,544**	**196,286**		**15,350**	**79,162**

1.2 Design and implement planting trials at 8 sites on Mount Mulanje by end of year 1, benefiting people employed to transport and plant seedlings. And FRIM and restoration experts from BGCI's network monitor planting trials in years 1, 2 and 3.

Three online meetings were held with the Ecological Restoration Alliance for Botanic Gardens (ERA) experts from Australia, the United States and South Africa in May, September and November. This included updates of the current progress on designing and implementing planting trials and adaptive management decisions. Planting trial design was finalised and parameters for data collection were agreed upon. In September 2020, due to low numbers of germinated companion species from seed that was collected on the mountain, it was decided to set up the trials in sites where companion species are pre-existing on the mountain. Following this, two assessments were conducted to select the trial planting sites on the mountain. Four sites were selected from an initial shortlist of 8 for the 2020/2021 planting season that were based on the availability of mycorrhizal species associated with Mulanje Cedar. These sites were Lichenya, Likhubula valley Thuchila and Chinzama (See Annex 18). Unfortunately, the trials could not be planted because of COVID restrictions. We plan to set up the trials in early December 2021. The second set of data from the previous set of plots was collected in March 2020 with help from the ERA Team. This data will be analysed in the next reporting period and the results will be shared with all project partners and stakeholders.

2.4 Run a public outreach campaign in years 2 and 3 to grow demand for purchase of Mulanje Cedar seedlings for timber and essence extraction.

The public awareness campaign will commence in the third year, as it could not be initiated during this reporting period due to COVID-19 restrictions.

2.5 MMCT and FRIM monitor nursery certification scheme and Cedar Growers and Planters Association (CGPA) (established in project 23-036) which becomes fully inclusive of planters for essence extraction by end of year 3.

FRIM monitored all the nurseries for certification during the second year. Of the 8 community nurseries, 7 received certification for the standard of seedlings propagated and the nursery management practices they are implementing (Kadewele, Nakhonyo, Nessa, Makolera, Lomoliwa, Kazembe and Gambeya – See Annex 8). This is up from two certified nurseries in 2019. Only Chole nursery did not meet the certification standard. MMCT and FRIM will continue to support all the nurseries to ensure that they improve and maintain production of high quality seedlings going forwards. They will also continue to facilitate and promote seedling sales.

Some CGPA members have been involved in the project business skills and marketing training this year.

2.6 Provide training in Nagoya compliance to Mulanje Cedar essence producers in year 2

Due to the delays to the essential oils research and business development opportunities, the Nagoya compliance training for community members was not undertaken. This will be provided for all those trained in hedge planting and management and business skills and marketing, once the opportunities for Mulanje Cedar essential oils and other native plant products have become clearer.

3.1 Identify optimal sustainable extraction techniques for Mulanje Cedar essence by end of year 1.

The consultant from Mzuzu University, Prof John Kamaula, completed the essential oils research in March 2021. The study has fulfilled four objectives that included:

i) determination of optimal requirements for extraction of essential oil from Mulanje Cedar,

ii) assessment of the quantity and quality of oil produced by different parts, including a critical analysis of the profiles found and their chemical and/ or biological composition,

iii) determination of the quantity and quality of oil changes across different sites and localities', and

iv) establishment of how essential oil production changes over the course of a Mulanje Cedar tree's life.

The research has shown that the distillation of Mulanje Cedar essential oil from leaves and twigs using Clavenger apparatus took 3-4 hours for complete distillation and 5-6 hrs from old dry wood (logs). The amount of oil in Mulanje Cedar varied significantly with respect to provenance (locality) and plant part. Chinzama and Ex-Thuchila Mulanje Cedar dry wood (logs) produced significantly higher oil yield (2.06% and 1.96%, respectively) than old wood from Mulanje Lichenya (0.93%). Furthermore, leaves and twigs from Mulanje Mountain produced more oil than those from Zomba Mountain. Comparison of the oil yield from the same age of plant material, showed that Mulanje Mountain Cedar from Thuchila (20-30 years old leaves) produced more oil (0.55 %, dry matter) than the Zomba leaves (0.21 %, dry matter) of a similar age (21-40 years old).

The Gas Chromatography-Mass Spectrometry (GC-MS) results of the Mulanje Cedar oils' compositions showed a distinct difference in the chemistry of the oils from the two geographical localities. Oils from Mulanje Mountain were characterized by the high content of cis-Thujopsene while those from Zomba were dominated by α-Pinene and β-Pinene. Mulanje Cedar oil from Zomba Mountain was extracted from different ages of the plant, however, no clear trend was observed. For example, juvenile leaves from a 2017 trial plot produced the highest amount of oil (1.04 %) compared to trees between 21 and 100 years old, however, the oldest trees (>100 years old) produced more oil again (0.46 %), although not as much as the young trees.

The full report for the research is attached in Annex 7.

3.2 Send samples to potential national and international purchasers by end of year 1 AND continue to engage potential purchasers to expand markets in years 2 and 3

The delay in completion of the essence oil study and delivery of the distillation equipment affected achievement of this target. Now that the research has been completed and the distillation equipment is delivered, samples will be produced and sent to potential national companies to test inclusion of Mulanje Cedar essential oil in their products in year 3 of the project.

3.3 Communities plant ten trial cedar hedge plantations using established seedlings at sites around the base of Mount Mulanje by end of year 1 AND equip communities with essence extraction equipment at start of year 2.

Eighty community members (53 women) were trained in hedge planting and management during this reporting period taking the total in the project to 255 (156 women). Fifty hedges have been established during this reporting period, thus bringing a total of 144 planted in total. Hedge planting will continue in year 3 of the project, including replacing individual trees that die. About 76 % of the seedlings planted in the hedges last year have survived. The rest were affected by extreme heat experienced from September to November 2020. Some community members did not have the water resources to adequately look after them through this. MMCT and the Forestry Department will continue to support the hedge planters to improve survival and growth.

MMCT have been constructing the buildings to house the essential oil distillation equipment and the equipment has now been delivered to their offices (See figures 3 & 4)

Figure 3: Delivered essence extraction equipment at MMCT offices.

Figure 4: Newly developed distillation equipment building at MMCT offices, Mulanje

a. Train 150 people (60% women) in sustainable harvesting techniques and processing, business skills, Intellectual Property and marketing by end of year 2 AND Essential oil sold to commercial buyers for product manufacturing in years 2 and 3

A local trainer, Mr. Kingsley Mulekano (See consultant contract in Annex 9), was recruited and trained 200 people (with over 60% women representation) in business skills and marketing. 94 came from the nurseries, 86 were new hedge planters, and 20 were representatives from the Cedar Growers and Planters Association. The training was specifically designed to equip the nursery caretakers and hedge planters to have relevant basic knowledge and skills in how to run the nurseries and hedges as a business enterprise and generate income for local households (See consultant report in Annex 10). The training was conducted in small groups from November to December 2020.

4.1 Conduct survey to identify other plant species of Mount Mulanje and their potential uses and commercial value in year.

The ethnobotanist, in collaboration with the Environmental Affairs Department and Forest Department have completed the development of Prior Informed Consent (PIC) and Mutually Aggreed Terms (MAT) in the Traditional Authorities of Mkanda, Mabuka and Jema in Mulanje districts; and Nkhumba and Khulambe in Phalombe districts. Data collection through household interviews, focus group discussions and Key Informant Interviews to investigate the useful indigenous plants with economic development potential has just been completed. The ethnobotanist is currently analysing the data. The findings will be shared in the next reporting period.

An initial Literature review has been undertaken by the Ethnobotany consultant (See Annex 11)

4.2 Seed collected from est. 10 additional over-exploited species in years 1 and 2, stored at FRIM and distributed to at least ten botanic gardens.

Whilst the ethnobotanical survey to investigate other important useful and overexploited species from Mount Mulanje has been delayed all year and is due to be completed early in the final year, seed collections of 35 species by MMCT and FRIM have still be made in the year (See table 2). These were collected from the target list created by the restoration team as potential companion species for restoration trials. One factor considered in this choice process was plant resources uses to people (Full target list in Annex 12). Seeds were also taken from mature Mulanje cedar trees near to CCAP hut.

Table 2: Seed collections of other plant species from Mount Mulanje Forest Reserve based on their known uses and potential use in restoration trials

No.	Species	Family	Localities collected	Qty (g)
	July 2020 collection			
1	*Erica benguelensis*	Ericaceae	Thuchila-wakuya	17.2
2	*Alsophila dregei*	Cyatheaceae	Mtayamoyo – Lichenya	76.4
3	*Alsophila capensis*	Cyatheaceae	Mtayamoyo – Lichenya	247.1
5	*Kiggelaria africana*	Achariaceae	Thuchila	200
6	*Faurea racemosa*	Proteaceae	Mtayamoyo–Lichenya	100
7	*Pittosporum viridiflorum*	Pittosporaceae	Lichenya	93.7
8	*Rhamnus prinoides*	Rhamnaceae	Lichenya	54.9
9	*Psychotria zombamontana*	Rubiaceae	Lichenya & Thuchila	105.2
10	*Pleurostylia africana*	Celastraceae	Lichenya	82.3
11	*Dodonaea viscosa*	Sapindaceae	Thuchila	172
12	*Rytigynia monantha*	Rubiaceae	4 ways- Chisepo area	231.5
September 2020 collection				
1	*Tecomaria capensis*	Bignoniaceae	Chambe	80
2	*Cussonia spicata*	Araliaceae	Thuchila	2000
3	*Widdringtonia whytei*	Cupressaceae	CCAP Hut- Lichenya	20
4	*Behnia reticulata*	Philesiaceae	CCAP hut-Lichenya	10
5	*Helichrysum densiflorum*	Asteraceae	Chisepo hut	40
6	*Halleria elliptica*	Stilbaceae	Lichenya	10

7	*Agarista salicifolia*	Ericaceae	Lichenya	20
8	*Myrica pilulifera*	Myricaceae	Lichenya	260
9	*Nuxia oppositifolia*	Loganiaceae	Lichenya	78
10	*Maytenus acuminata*	Celastraceae	Mtayamoyo- Lichenya	40
11	*Indigofera lyallii*	Fabaceae	Lichenya	20
12	*Hypericum revolutum*	Cluciaceae	Lichenya, Thuchila	30
13	*Kotschya scaberrima*	Fabaceae	CCAP hut	70
14	*Podocarpus latifolius*	Podocarpaceae	Sombani	80
15	*Neocussonia umbellifera*	Araliaceae	Lichenya	80
16	*Myrsine africana*	*Myrsinaceae*	Thuchila	70
October 2020 collection				
1	*Prunus africana*	Rosaceae	Nyika National park (Zambia side)	224
December 2020 collection				
1	*Buddleja salviifolia*	Loganiaceae	Thuchila	100
2	*Eriosema montanum*	Fabaceae	Chinzama	49.1
3	*Erica benguelensis*	Ericaceae	Lichenya	8.89
4	*Aphloia theiformis*	Aphloieaceae	Chinzama, Thuchila, Lichneya	120
5	*Cyanthillium wollastonii*	Asteraceae	Thuchila	23.66
6	*Vernonia sp.*	Asteraceae	Thuchila	6.28
7	*Macaranga capensis*	Euphobiaceae	Lichenya	50
8	*Myrica pilulifera*	Myricaceae	Mzimba cluster	1440
9	*Halleria ligustrifolia*	Stilbaceae	Lichenya	230

4.3 FRIM develop propagation protocols, communities test protocols and publish protocols for all species by end of year 3.

The seeds that have been collected this year (above) are being stored at FRIM seed bank and are undergoing viability tests at their laboratories. MMCT are also undergoing propagation investigations to develop propagation protocols for these species. This will continue in the final year of the project, with results of germination success rates at the half year report and final report stage along with any newly developed propagation protocols.

An online knowledge exchange workshop was held between BGCI, MMCT and FRIM from Malawi; and experts from the South African National Biodiversity Institute in November 2020. This covered how to identify the environmental and biological factors that might be important to investigate for a species and how to set up propagation trials to test methods to improve survival rates and produce protocols.

3.2 Progress towards project Outputs

Output 1: Improved restoration protocols developed for Mulanje Cedar on Mount Mulanje, resulting in continued demand for seedlings for restoration.

Restoration trials on Mulanje Mountain are on track to test improvement on survival for the Mulanje Cedar. A second year of data has been collected from the plots established in year 1 and this data will be used to assess the conditions under which Mulanje Cedar has survived best. Further investigations will continue to establish best practices, including new planted restoration plots based on the designs developed with the ERA group support. This data is particularly valuable, because the planting of the 2020 plots could not take place due to COVID.

Output 2: Conservation-commerce model developed and documented for Mulanje Cedar.

Nursery certification of the community nurseries has been completed in August 2020. Seven of the eight communities nurseries were certified as a result of inspection by FRIM this year and so are providing healthy enough seedlings through correct practices to provide seedlings to markets that develop.

The public outreach campaign has been delayed due to delays to pre-activities, mainly the essential oils research. The results of the research are needed are a promotion hook for the campaign. With the initial research results produced, this promotion should be possible in the final year. Nagoya compliance training will also be delivered to those who have received business skills and marketing training this year in the final year. This also had to be delayed due to the delays to the development of new business opportunities from essential oils.

The essence oil analysis has been completed and has shown positive results which will have a significant contribution to understanding the usage of the essential oil in different products on the market.

Output 3: Manufacture of products from sustainably sourced Mulanje Cedar essence generates income for additional local households in the short-term and results in a larger market for cedar seedlings.

The development of short-term benefit options for essential oils from Mulanje Cedar trees has been delayed because of COVID-19 and a lorry accident during transport of essence extraction equipment from South Africa to Malawi. However, essence extraction equipment has now been delivered to MMCT offices, for which training will be given to local community members at the start of the final project year. Those trained will then be able to take part in and gain economically from a larger section of any value chains that develop from the use of native plant resources, but not limited to Mulanje Cedar essential oils.

The initial research report from Mzuzu University's John Kamanula, and analysis report by the project essence extraction marketing and use consultant, have shown that further investigations are necessary to confirm what products oils from Mulanje Cedar trees and hedges could sustainably be used within.

The essence oil research results have established different compounds found in Mulanje Cedar oil. These compounds are key in product manufacturing. Based on the baseline assessment that was conducted in year 1 where companies in Malawi that are interested to use cedar oil were identified, oil samples will be sent to the companies in year 3.

Output 4: Conservation measures in place for other over-exploited plant species on Mount Mulanje and conservation-commerce model replicated for five important plant species on Mount Mulanje.

Four Traditional Authority leaders met in March 2021 with PIC documents signed for the study to go ahead. The ethnobotany study has been completed in April and the list of important species will be defined and agreed upon once analysis is completed.

3.3 Progress towards the project Outcome

Outcome: Communities living around Mount Mulanje receive short-term benefits from sustainable utilisation of Mulanje Cedar and opportunities are identified for sustainable commercial use of other over-exploited plant species of Mount Mulanje

Communities are receiving short-term income benefits from the purchase of seedlings for hedge planting and restoration, funded by WeForest (See table 1). The expanded opportunity from essence oil production is still in development, with the initial essential oils research completed. Further studies and engagement with businesses identified as most appropriate for

opportunities to be developed as well as promotion of the uses and reasons to plant Mulanje Cedar trees elsewhere in the country in order to expand the seedlings market.

The identification of opportunities for sustainable commercial use of other over-exploited species has also progressed, if slower than expected. A literature review has been carried out by the ethnobotany consultant and ABS methodology for the research has been developed with the government ABS national focal point from the Environmental Affairs Department. The ethnobotany study with communities will be undertaken at the start of the final year and will be used to make informed decisions to select target species for further assessment (Nagoya protocol / FairWild workshop and fieldwork to assess the resources on the mountain) and funding applications in the final year.

Outcome indicators and means of verification (in bold):

***Indicator 0.1: Restoration protocols developed for Mulanje Cedar on Mount Mulanje improve survival rates by 30% compared to project 23-026 baseline, resulting in continued demand for seedlings for restoration*:**
Initial analysis of data from the trial plots established in December 2019 was undertaken and fed back to the ERA group meetings in order to guide new trial designs and site selection for this year's rain season. It was decided that new plots would be established to investigate the impact of planting next to different native in-situ companion species on the mountain to see if any impacted on Mulanje Cedar growth and survival. This aimed to build on research soil research which suggested mycorrhizal relationships with plants from the Fabaceae, Ericaceae and Asteraceae families are associated with Mulanje Cedar trees and could be beneficial, so the investigation was to compare planting next to plants from these families versus plants from other families. The fieldwork to establish these trials had to be cancelled last minute due to COVID cases increasing exponentially when they were supposed to set off in January. It has been decided in the latest Steering Committee meeting (March 2021) that these experiments should still be established in December this year.

A second batch of data from the plots established in December 2019 was collected in March 2021. Analysis of this data will be used to analyse the impact of different local plant communities on Mulanje Cedar **seedling growth and survival** and will feed into updates to the trial designs for this year. These further investigations will lead to new restoration **planting protocols** for use on Mount Mulanje.

Restoration trial design to introduce new planting protocols was completed. Trials could not be set in December 2020 as planned. This has been shifted to December 2021.

Community nurseries have received financial benefits through seedling sales for restoration on the mountain. Communities surrounding the nurseries benefited through provision of labour for Mulanje cedar transportation and planting activities on the mountain. This has seen the restoration planting of 79,162 Mulanje Cedar seedlings, funded by WeForest, in 32 sites in six locations across the mountain in the latest planting season (See sites planted in Annex 13).

***Indicator 0.2: Documented example of the conservation-commerce model for Mulanje Cedar developed by end of year 3*:**
Further documentation towards this end have been produced this year – the essential oils research (Annex 7) and the essence extraction marketing and use consultant report (Annex 5). Whilst much of the development of a conservation-commerce model has been delayed this year due to COVID-19, a plan for the final year has been outlined. These will further contribute to the final conservation-commerce **written record of the model project methodology**, including challenges and lessons learnt from investigations so far.

***Indicator 0.3: Optimal extraction techniques identified for Mulanje Cedar essence by end of year 1 and essential oil produced and sold by communities, resulting in benefits for 150 local community members (60% women) and a market for Mulanje Cedar seedlings for essence extraction by end of year 3*:**
The essential oil consultant has completed research and submitted his report (see above). There was still some problems with machinery to provide the full analysis, however the GC-MS machine was repaired so that chemical compositions are provided (tests not done: heavy metals of Mulanje samples. The yields from the **extraction methods** were quite low; however

with the distillation equipment now arrived at MMCT offices, the production from this larger scale **extraction method** can be tested in the final year of the project following training conducted by a specialist from EDE.

Training course attendance figures and certificates show that 256 community members have now received hedge planting and management training and 200 business and market skills training in the project. These people are the main non-economic beneficiaries of the project and will be beneficiaries of any economic opportunities that develop from the project.

The **essence producer sales figures** will still be a relevant record when any industry begins to make community members incomes, in the final year of the project.

The **Socio-economic survey report** submitted in the first year will be replicated by MMCT in the final year of the project, providing an analysis of the overall socio-economic change seen as a result of the project.

***Indicator 0.4: Over-exploited plant species of Mount Mulanje are investigated for potential sustainable use by end of year 3*:**

Seed collection and *ex situ* collection records have been made for collection of 35 species made by MMCT and FRIM (see example data collection forms in Annex 14). These are being stored and propagation methods tested by FRIM in Zomba this year. This includes eight known useful species (from literature review research carried out by the ethnobotany consultant and BGCI project manager). These, with the ethnobotany study results and further work to assess the extent of important useful plant resources on the mountain, will be used for new **funding applications** in the final year of the project.

The most important used and exploited plant species of Mount Mulanje will be selected from the previously identified list and ethnobotany research being carried out in April 2021. These will then be assessed in the final year with a second Nagoya Protocol / FairWild standards workshop and fieldwork to assess their resources extent and exploitation levels, The means of verification for this indicator will be relevant in the final year of the project.

3.4 Monitoring of assumptions

Assumption 1: Continued participation of local communities

Comments: This is still true with communities engaged by MMCT on a regular basis, including in the established nurseries. As a result, more community members have been involved in further hedge planting training and all have been involved in the business skills and marketing training this year. Further engagement is underway through ethnobotanical surveys, with 4 Traditional Authorities having been engaged and agreed to communities participation in the fieldwork signing PIC agreements.

MMCT continues to engage communities on a regular basis. This has seen continued participation of the communities in propagating Mulanje cedar seedlings and other native species in the nurseries. As a result, additional local people continue to volunteer in the hedge planting activities.

Assumption 2: Local politics and ethnic differences do not hinder progress of project activities

Comments: This is still true as no hindrances to project progress have been seen this year.

Assumption 3: Income obtained from seedlings and essential oil replaces income from illegal exploitation activities and is regarded as an alternative, not an additional activity

Comments: This remains to be seen with the development of the essential oil industry. It will still be difficult to confirm if illegal loggers have converted away from logging because they would generally be less willing to confirm having done or are doing the illegal practice.

This remains un-confirmed as no project participants have confirmed if they were or still involved in illegal activities

Assumption 4: Technical expertise is available to solve planting issues

Comments: Project partners at FRIM, the National Herbarium and Botanic Garden of Malawi, the Department of Forestry and the ERA have continued to ensure that the right expertise,

nationally and internationally, has been on hand to provide technical guidance and support improve the restoration protocols for Mulanje Cedar. Some expertise has been provided by online means since the start of COVID.

Technical expertise for essential oil extraction has also been provided by EDE with the provision of the distillation equipment and agreement to provide training to MMCT and local communities in the final year of the project.

Assumption 5: Enough seed is produced from FRIM stands to continue to supply nurseries with sufficient seed

Comments: FRIM has continued to be able to provide seed to the nurseries in this year, with > 10kg provided after the lower amount (8.4 kg) provided last year due to the year not being a mast year in Zomba. FRIM have dealt with this by collecting seeds from Chicangawa, the other remaining seed source in Malawi outside of Zomba, and Mulanje.

Assumption 6: Communities continue to be interested in nursery work

Comments: The remaining eight operational Nurseries have continued to propagate high numbers of seedlings and received incomes from their sale for hedge planting and restoration on the mountains.

Assumption 7: Restoration and commercial market for seedlings is maintained

Comments: The market for seedlings has remained from the project and another organisation, WeForest, buying seedlings for restoration on Mount Mulanje. The market for hedges has also provided incomes to nurseries and the new essential oil market would expand this sector if successful. So far some small sales have been made but expanding this market will become more of a focus when the mountain is fully replanted.

Assumption 8: Malawians will continue to respond to public outreach campaigns

Comments: The public engagement activities for this year had to be delayed until the essential oil research was completed. The efforts will be undertaken in the final year of the project, including further engagement with businesses using samples and the research.

Through public engagement activities, there has been some interest from the private sector and individuals to grow Mulanje Cedar. Some companies are waiting for samples of cedar oil to test in their products.

Assumption 9: Local politics and ethnic differences not inimical to creating a cohesive and representative essence producer association

Comments: So far, no issues have been seen. This remains to be confirmed once essential oil industry develops successfully. MMCT continue to engage community members and leaders from as many Traditional Authorities as possible. From the initial essential oil quantity results (see section 3.1), a large amount of hedges would be needed to supply any new industry, therefore there would be a lot of opportunity to teach more communities around Mulanje and Phalombe Districts how to plant hedges, once the concept is proven and they are more willing to use a part of their limited land space for the hedges.

Assumption 10: Expertise is available to optimise extraction techniques and develop essence products

Comments: The essential oils researcher from Mzuzu University has been engaged and completed the initial study of essential oils from Mulanje Cedar trees in Zomba and Mulanje. Further work is needed to better calculate what is needed for a sustainable industry. An industrial scale distillation machine has been delivered from South Africa with the provider also offering the expertise for training at the start of the final year of the project.

Assumption 11: Communities are receptive to new business establishment

Community members have voluntarily been involved in training with a view to it being part of the new essential oil business development.

Assumption 12: Seed is available for collection from target species within the project timeframe

Comment: Seeds have been successfully collected this year and will continue to be collection, stored and propagation trials carried out with FRIM.

3.5 Impact: achievement of positive impact on biodiversity and poverty alleviation

A key impact of the project is to expand opportunities for short-term benefit to communities by establishing sustainable cedar essence enterprises. This will increase the number of people benefiting directly from sustainable utilisation of Mulanje Cedar, providing employment opportunities that increase income and reduce poverty.

The initial essential oils analysis has been completed highlighting further investigations that are needed for engagement with business partners. The provided distillation equipment will further support this assessment process, with further engagement with the researcher John Kamanula. This research and engagement with businesses will then allow us to calculate the number of hedges needed to service new industry in a sustainable manner.

The Nagoya protocol workshop has started to pave the way to ensuring benefits are shared equitably and that the industry does not harm the target species in the wild or result in environmental degradation or pollution along the whole product life cycle. A reassessment workshop to look at Mulanje Cedar and other local overharvested species, outlined by the ethnobotanical study, is now planned for the final project year after an accepted Change Request to move funds unspent due to COVID-19 in the second year to the third year.

Since Mulanje Cedar trees are no longer available on the mountain, loggers are removing other species for timber from the mountain instead, including planted Cypress and indigenous *Podocarpus milanjianus* and *P. latifolius*. This is exacerbating the detrimental effect that people are having on forests, biodiversity and the local watershed. These other species are likely to go locally extinct too without good alternative sources of income for people.

For re-planting Mulanje Cedar in order to restore the biodiverse Afromontane evergreen Mulanje Cedar forests, improved survival rates are needed to ensure planting strategies do not switch to planting exotic species. The planting trials that are being designed will produce data that show how to carry out Mulanje Cedar restoration of the mountain with improved survival.

The project team has also influenced national and international biodiversity policy. An update to the Mulanje Cedar Management Plan has been included in the Integrated Management Plan required for Mulanje Mountain Biosphere Reserve status. This was published in December 2020 after delays of publication at the initial target time of April 2020 due to COVID-19 Malawian Government has suspended all meetings/gatherings until further notice.

The partnerships created between BGCI, MMCT and other supporting partners will continue to jointly seek funds for related projects. These will include expanding restoration on Mount Mulanje as well as implementing restoration of other important and useful habitats of the mountain, such as the Miombo woodlands on the lower slopes.

98 members (68 women) of the 8 community nurseries have continued to receive incomes from the purchase of seedlings to use in hedge planting activities in the first project year (see Table 1 in section 3). A further 80 community members (53 women) have been trained how to plant and manage Mulanje Cedar hedges and 200 (over 60% women) business skills and marketing in preparation for the essence oil industry. The continued inclusion of women in this project is increasing the recognition that women can bring income to households, making control over assets more balanced as a result.

The socio-economic baseline survey was completed in the first year to describe the current economic situation, including disaggregated analysis by involvement or not in project activities and gender. This will enable benefits to be quantified at the end of the project based on project involvement and gender within communities, showing the higher-level wider impact of the project on wellbeing.

4. Contribution to the Global Goals for Sustainable Development (SDGs)

Contributions made in 2020-2021:

SDG1: the project provides incomes to local community members through the purchase of seedlings and payments to transport and plant seedlings in hedges. Communities have also been trained in business skills and marketing, which they can use in essential oil enterprises that develop, which will contribute to their incomes in the future.

SDG9: distillation equipment for new innovative essential oil industries using plants from Mount Mulanje, including the Mulanje Cedar, has arrived at MMCT's offices. This will be important to enable communities to establish small-scale sustainable essential oil enterprises (SDG1).

SDG12: the ethnobotany researcher has worked with the Environmental Affairs Department's Access and Benefit Sharing National Focal Point, Ms Mphatso Kalemba, to develop PIC and MAT agreements and methodology. This is being used for the ethnobotanical research (See the agreements in Annex 15) and will contribute to the identification of local plant resources that can be consumed sustainably with full local community participation following further Nagoya Protocol / FairWild workshops and fieldwork to assess the resources on the mountain in the final year of the project. The PIC and MAT methodology developed will also be re-usable nationally elsewhere in the country.

SDG15: the updated restoration trial design and fieldwork to re-collect data from the plots set up in December 2019 will improve the restoration protocols for Mulanje Cedar. Final year investigations into the impact of other native companion species on survival and growth of Mulanje Cedar plants could lead to more biodiverse forest restoration practices.

Others targets that the project contributes towards are:

- SDG4 (indirectly): increased income can be used to ensure children attend school and have materials (income obtained in project 23-026 supported this);
- SDG5: the project has continued to ensure that at least 60% of community members trained and involved in project activities are women;
- SDG8: decent work opportunities have continued to be provided to nursery members.

5. Project support to the Conventions, Treaties or Agreements

The Mulanje Cedar was listed on CITES Appendix II in August 2019. As a Party to CITES the Malawian government is required to carry out the Non-Detrimental Findings process to show that trade of listed species is not damaging the wild populations. At the first year Nagoya Protocol workshop, David Newton from TRAFFIC, with expertise in trade of CITES listed species (e.g. *Pelargonium sidoides* in South Africa), led training on how to carry out an NDF process, which included government institute representatives taking part in the training.

A Change Request (7c) has been accepted to run a second workshop in the final project year to re-assess the Mulanje Cedar and at least three native plant species, selected from the ethnobotany survey, incorporating the FairWild standards methodology. These will create fuller baselines for each species and the workshops can be replicated on a yearly basis to assess the impact of any trade that develops.

Convention on Biological Diversity and Access and Benefit Sharing:

Aichi target 3: the essential oils research results have progressed the project's goal to provide positive incentives for sustainable use of biodiversity from Mount Mulanje. This will be developed further in the final project year.

Aichi target 4: ABS, PIC and MAT agreements and methodology have been developed and signed by 4 Traditional Authority Leaders in partnership with the Malawian Environmental Affairs Department (See signed PIC agreements and draft MAT agreements in Annex 15). This will act as an example of how ABS can be implemented elsewhere nationally.

Future Nagoya Protocol / FairWild assessment workshops, including one in the project final year, will help to ensure that safe ecological limits for wild harvesting of any species are followed.

Aichi target 7: Progress towards sustainable forestry on Mount Mulanje has been made through recollection of data from the restoration trial plots established in 2019 that will be analysed to suggest improved restoration protocols for the future. Progress was delayed by COVID-19.

Aichi targets 12 and 13: The continued collection of genetically diverse seeds by FRIM, propagation by community nurseries and planting of community-managed Mulanje Cedar hedges helps to prevent the complete extinction of this Critically Endangered species.

6. Project support to poverty alleviation

Table 3: Project beneficiaries and monetary benefits they received from April 2019-March 2020; April 2020-May 2021; and that they will receive in the future.

Beneficiary group	Monetary benefits received 2019-2020	Monetary benefits received 2020-2021	Future monetary benefits
8 community nursery groups (70% of women)			Sales for restoration trials and other restoration planting
Community hedge planters / owners (% of women)			Income from the harvest of leaves for essential oil enterprises
Seedling transporters for restoration and hedges			Income to transport seedlings for restoration trials and other restoration planting
Community members involved in plot clearance and preparation activities			Income from further plot clearance and preparation

Table 4: Project beneficiaries and non-monetary benefits they received from April 2019-March 2020; April 2020-May 2021; and that they will receive in the future.

Beneficiary group	Non-monetary benefits received 2019-2020	Non-monetary benefits received 2020-2021	Future non-monetary benefits
8 community nursery groups (70% of women)		94 (over 60% women) trained in business skills and marketing	
Community hedge planters / owners (% of women)	175 (61% women) trained in hedge planting and management	86 (over 60% women)trained in business skills and marketing 80 (66% women) trained in hedge	Training in sustainable harvesting Training in Intellectual Property and market models

		planting and management	Inclusion in CGPA to improve governance
CGPA members		20 (over 60% women) trained in in business skills and marketing	

7. Consideration of gender equality issues

98 nursery workers received money from the sale of 94,512 seedlings with 68 (69%) being women. 103 women were trained to plant and manage hedges (61% of trainees) in the first year with a further 58 trained in the second year. 200 women received further training on business management and marketing skills in the second year.

Four of the nurseries have a female manager and 6 have female nursery secretaries. This means that women are receiving more equitable responsibilities in the management of the nurseries and are represented in the CGPA, making the decisions more gender inclusive.

60% of the trainees that will receive training to use the essential oils equipment will also be women. The training will be undertaken early in the final year of the project. This will give women increased access to income opportunities from processing of Mulanje Cedar oil, and other oil industries that become available from Mount Mulanje plant species in the future.

8. Monitoring and evaluation

Monitoring and Evaluation (M&E) strategy

The core project team, with support from the Steering Committee (SC), are responsible for the M&E of the project. The SC members' role is to analyse the progress of Activities and Outputs towards the project Outcome and to deal with issues that arise and suggest adaptive management options when needed to keep the project on track. The SC has met 2 times this year: in September 2020 and March 2021 (See Annex 4)

The wider socio-economic impact of the project will be assessed in a socio-economic survey in the final year of the project as a comparison to the survey completed in the first year. The analysis will be disaggregated by gender and participation in project activities to show any difference in situational changes between men and women, and those involved in the project and those not.

Communities living around Mount Mulanje receive short-term benefits from sustainable utilisation of Mulanje Cedar

1. An expert from Mzuzu University (Prof John Kamanula) carried out research into essential oil production and produced a report on the quality and quantity of oil produced from Mulanje Cedar plants – leaves, branches and heartwood (Activity 3.1).
2. Activity 3.1 was delayed to March 2021 so samples will be sent to potential purchasers early in the final year to gauge what products they could use the essential oils in and what price would be paid per kg/ml (Activity 3.2).
3. The results from activities 3.1 and 3.2, with 2.3 (Nagoya Protocol workshop), will be used to assess how hedges planted in communities can be sustainably harvested to provide oil for any newly developing industry (Activity 3.3).
4. A Change Request (7) has been accepted to transfer unspent funds from the second year to the final year to run a second Nagoya Protocol / FairWild workshop to re-assess Mulanje Cedar and assess other overexploited plants from Mount Mulanje.
5. The 200 community members trained in business and marketing skills will be trained to sustainably harvest material from Mulanje Cedar. This group will gain any new short-term benefits from the sustainable utilisation of Mulanje Cedar (Activity 2.6, 3.4 leading to 3.5)

6. Membership of essence oil producers in the Cedar Growers and Planters Association (CGPA) will improve the communities' ability to negotiate prices fairly as a group beyond the lifetime of the project (activity 2.5).
7. The outreach programme, delayed due to COVID-19's impacts on the essential oils research results, will help to stimulate business for both seedlings from nurseries and essential oils in products from the hedges in the project final year (activity 2.4)

Opportunities are identified for sustainable commercial use of other over-exploited plant species of Mount Mulanje

1. For the ethnobotany study to investigate other overexploited species from Mount Mulanje, whilst COVID-19 has delayed the survey, PIC with four Traditional Authority leaders has been signed (See Annex 15). The survey is due to take place at the start of the final year (Activity 4.1)
2. The above mentioned Nagoya Protocol / FairWild workshop and fieldwork to understand the species' distribution on the mountain will be used to further assess the important over-exploited plant species (accepted Change Request 7 – extension to activity 2.3)
3. Activities 2.2, 2.3 and 4.1 will be used to identify other overexploited plant species that may be suitable for economic development and that are in need of conservation. Those with potential oil use would add value to the distillation equipment that has been purchased by increasing its productivity throughout the year. Seed collection and propagation will be undertaken for these species (activity 4.2.
4. Seed collection trips in the second year have targeted those species highlighted as useful in the first year of the project for storage at FRIM and ex situ living collections in botanic gardens (activity 4.2 – see report in Annex 16)
5. Seed collection trips in the third year will target important species highlighted in the ethnobotany survey for storage at FRIM and ex situ living collections in botanic gardens (activity 4.2).
6. Collected seeds have been used in propagation trials to create localised propagation protocols for those species (activity 4.3).
7. Activities 4.1 – 4.3 will help to select other species that can be considered for future sustainable commercial development through pilot studies based on their local use, marketability and opportunity to propagate and grow (activity 4.4).

The indicators relevant to activities this year are:

- Nursery sales figures – seedlings propagated by nurseries and purchased to plant in hedges and on restoration plots have been recorded by MMCT (see table 1 in section 3). This acts as a measure of seedling production and use of seedlings for restoration or hedge planting.
- Steering committee minutes – 2 meetings held. The meeting minutes, written by BGCI and MMCT, acts as an indicator of the SC meetings that have been undertaken (see Annex 4).
- Consultant contracts – 3 contracts for project consultants have been signed and final payments made based on completion of activities, as a measure of involvement in relevant project indicators (See Annex 9).
- Cedar hedge records – 50 hedges have been planted bringing the total from years 1 and 2 to 144 hedges. These are being looked after by communities and monitored by MMCT and FD. These indicate progress of the essential oil industry.
- Training course attendance records (for hedge planting and management training) – the list of 200 attendees at the business skills training courses and 80 attendees at hedge planting and management training in year 2, acts as a measure of the training given indicator.
- Nursery certification register – FRIM have certified the nurseries again granting 7 of the 8 certification, indicating they are meeting standards.
- Trial plot records – data from the trial plots established in August 2019 has been recollected in March 2021, which will be analysed to progress the development of new restoration protocols for Mulanje Cedar trees.

There have been changes to the budget and timeframe of activities due to COVID-19 impacts. The essential oils research and ethnobotany study were delayed leading to delays to other activities, such as sending samples to potential industrial partners, training communities to use distillation equipment and promoting Mulanje Cedar markets. For this reason, some of the budget for public awareness and essential extraction and production training has been requested to be moved to the project final year (Change Requests 9 and 10).

M&E is shared between the project partners. BGCI is coordinating the project and bringing all reporting figures together for analysis to support decision making in SC meetings and for reporting. MMCT collects and collates the biological data from planting sites and economic data from communities (sales records and contracts with labourers) and ensures the timeline for activities is on track and within budget. FRIM monitors the nurseries for certification once a year, monitors seed collections made and propagation carried out under controlled conditions at FRIM nurseries to create propagation protocols.

Information is shared between partners at meetings (including outside of SC meetings), during field visits to Mount Mulanje (Malawian partners only because of COVID-19) and through regular communications over email and Skype or Zoom, in particular between the Project Managers from BGCI, Alex Hudson, and MMCT, Ibrahim Mitole. These regular online meetings are used to monitor progress, troubleshoot problems, confirm budget expenditure and plan.

9. Lessons learnt

Propagation of other native species for use in the restoration trials was difficult with under a year to carry out collection and propagation. The initial target list was finalised in April / May 2020 so for some species the seed collection period for the year was missed. For other species, germination failed without time for investigation into other propagation methods. Finally, for many of those collected and propagated, the seedlings were not sufficiently strong to be transplanted onto the mountain for the rainy season from December 2020 to January 2021. We have learnt that it requires faster species selection and collation of relevant information to leave at least a year to carry out collection and propagation of sufficient stocks to carry out multi native species restoration trials.

To deal with propagation issues using local knowledge, in November 2020 BGCI organised a knowledge exchange workshop over Zoom between plant experts from SANBI in South Africa and staff from MMCT and FRIM in Malawi. Methodologies on how to propagate wild seeds were swapped along with relevant biological and ecological characteristics to pay attention to and factors to incorporate into propagation trials when investigating difficult species.

The results from the essential oils research have shown that the location of Mulanje Cedar trees impacts the type of oil that can be made from trees (Zomba differing from Mulanje Mountain). It also showed the quantity is lower from leaves and branches than heartwood. This further research is required to confirm that hedges, growing in lowland areas around Mulanje, do have the same essential oil composition as up on the mountain (a Change Request – 12b - to move funds from year 2 to year 3 will support this work).

Through the worst of the dry season, it was seen that in some areas seedlings planted within the hedges died as did those remaining in community nurseries. This was linked to the fact that water availability was low for the hedge owners' and nursery workers' daily activities so that they were unable to spare water for the hedges. The development of business opportunities and incomes would provide more impetus for communities to use the scarce water resources in the driest part of the year. Some remaining seedlings in the nurseries will be used to replace individuals that have died so the hedges remain strong enough for sustainable harvesting in future.

10. Actions taken in response to previous reviews (if applicable)

For the review's comment about describing the arrangements between the three main partners, we have provided detail in section 2 of the report to describe the three main organisations roles & responsibilities in the project and the delivery management.

With regards to the reviewer's comments about the "killer assumption" – that the income will be sufficient to provide an alternate income to illegal logging - this was raised with the Steering Committee at the meeting in September. The group felt that the objective of the project is to

provide legitimate alternative livelihoods for local people but not necessarily to provide an industry that offers equivalent incomes to the illegal logging activities on the mountain.

Currently the information on the economics behind the illegal logging activities on the mountain is not well known. Timber is thought to be transported over the border into Mozambique for export, with local leadership from only a small proportion of the total communities living around Mount Mulanje benefiting from it. It is not known exactly which individuals from communities are involved in the logging activities and so is not known if the beneficiaries of the project and their families are shifting to more sustainable incomes.

With regard to the reviewer's comment about the status of seed stands and the ability to produce the project target 400,000 seedlings, this was also discussed at the SC meeting in September. It has been noted that the main issue for seed sourcing has been associated with the Mulanje Cedar tree being a mast species that does not produce high quantities of seedlings every year. Coincidently, the main remaining seed stock population in Zomba did not produce many seeds in 2019/2020. This has improved in the past year so a good supply of seeds has been given to nurseries for propagation this year. The SC group felt that the value of 400,000 seedlings propagated in the project is still viable.

It was also noted that low seedling output is not a result of poor collection and propagation practices because FRIM is the national seed collection and conservation organisation. They carry out standard practices such as laboratory testing of seed viability from collections made. They are also the institute that provides the standard for collecting and propagating seeds for other nurseries in the country. This is outlined in their report from seed collection for the year (August to December 2020) in Annex 16. Collections from Chicangawa, where mature trees have more succesffully produced seeds, have helped to provide a good amount of seeds into the final year (see figure 5)

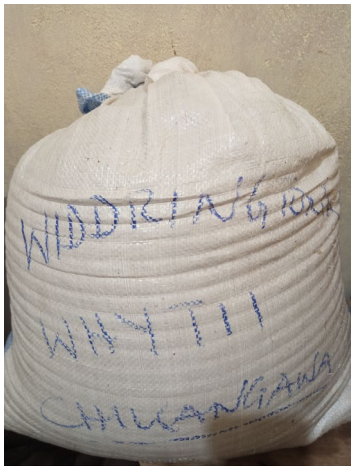

Figure 5: Full bag of seeds collected from Chikangawa seed source to deal with the shortage of seeds due to low production in Zomba, where FRIM is located.

Previous work by MMCT and FRIM has shown that watering well and keeping the soil at the right pH is important for successful propagation of the relatively limited supplies available because of a lack of seed sources for Mulanje Cedar at this time. MMCT agreed that they will continue to promote that message with community nurseries throughout the project to ensure high success rates from the propagation of seeds that they are provided.

When the repeat socio-economic survey is implemented in the final year, it will ensure to investigate how the money is treated within families (i.e. if the money is given to males in households when it is earned by women).

It is worth noting that despite delays due to COVID-19 this year, the 10 year Mulanje Mountain Biosphere Reserve Integrated Management Plan has been published in December 2020, which includes a "Mulanje Cedar and Plantation Management" programme (See Annex 17).

11. Other comments on progress not covered elsewhere

A number of change requests have been made and accepted in this project year to alter how the budget is spent. These were:

- Change Requests 5-6 - accepted in September 2021: following quotations from suppliers above the budget for year 2 for distillation equipment, we combined the partner organisation's 'Essence extraction equipment' budgets from the final year into the second year. We also moved the equivalent budget for 'Essence extraction consumables (packaging, etc.)' from year 2 to the final year to purchase consumables when the equipment is delivered, which was delayed as a result of COVID-19 impacts on cross border transport and a crash during transport in December 2020.
- Change Requests 7-8 - accepted in February 2021: due to COVID-19 impacts on international travel, we transferred the lead organisation's unspent 'International travel' budget for year 2 to the final project year. We also transferred the lead organisation's unspent 'Conferences, workshops and seminars' budget to partner organisations budgets in the final year to support a Nagoya Protocol / FairWild workshop and carry out fieldwork to assess at least 3 native species highlighted in the ethnobotany survey, including their resource availability (density and frequency) and current use levels, as well as understand the current markets.
- Change Requests 9-12 – accepted in April 2021: we requested to move the partner organisation's 'Public awareness' and 'Training – essence extraction and production' budgets to the final year because of COVID-19 delays. We also requested to move unspent lead organisation's 'International Travel' and 'Overheads' budgets to the partner organisation's budgets to support further essential oils investigations of the Mulanje Cedar hedges that have been planted in communities and to extend the ethnobotanical investigations.

12. Sustainability and legacy

The project has impacted on ABS and sustainable use of plants in Mulanje and elsewhere in Malawi through the development of ABS PIC and MAT agreements and methodology, by the ethnobotanist consultant, MMCT and EAD national focal point. This has helped to promote the project to national government and has increased he national capacity to adhere to ABS guidelines and requirements.

The essence marketing and use consultant has provided a further analysis and recommendations for activities in the final year based on the essential oils research. This will be used to further develop the business opportunities for Mulanje Cedar essential oil products in the final year, despite the delays this year due to COVID-19.

The exit strategy is still valid because 255 local people have received relevant training in hedge planting and management and 200 have received business skills and marketing training for any future essential oil industry. They will also receive training to sustainably harvest hedges for essential oil production once this is understood, making them the key beneficiaries of new short-term benefits from developed in this project.

In the project final year the Nagoya Protocol / FairWild standards workshop will be repeated to reassess plant resources from Mulanje. This will help to ensure any industries that develop from Mulanje Cedar or other plant species is ecologically, economically and socially sound, based on relevant research evidence.

The restoration trial designs have been updated based on the developing situation throughout the year at regular meetings with the ERA advisory group. Although the planned new plot establishment has to be cancelled this year, a second year of data has been collected from the plots established in December 2019 to be analysed to further update the trial designs for planting in December 2021. New, robust planting protocols for Mulanje Cedar on Mount Mulanje will come from these trials and so improve future restoration practices.

Cedar Growers and Planters Association (CGPA) have been involved in Mount Mulanje management discussions and planning, which will continue. The essential oil enterprises will be supported to join the CGPA too so that they gain a say in future management decisions as well as benefiting from the strengthened business negotiation.

Through the ethnobotanical work, further engagement has been made with the Access and Benefit Sharing National Focal Point so that they have contributed to the process and the PIC and MAT documents to be used when consulting local communities about local plant use and

markets. This is both promoting the project at the national government level, being one of the first ABS developments of its kind nationally, and the engagement by the Environmental Affairs Department highlights their increased interest in the project outcomes. The project is increasing the national capacity to adhere to ABS guidelines and requirements as it can be used elsewhere in the country in other similar situations.

13. Darwin identity

The MMCT project manager, Ibrahim Mitole, presented the project at Kew's Conference on Reforestation for Biodiversity, Carbon Capture and Livelihoods in February 2021. This was done remotely through a recorded presentation. The Darwin Initiative was noted as supporting the project, with the logo included. This can be viewed online (From minute 36:00 - https://www.youtube.com/watch?v=eSGIIL-eaLI) and the presentation slides can be viewed in the Annex 19.

This year a blog post was published on the Global Trees Campaign website on World Soil Day (5th December 2020). This linked some of the soil investigations underway to improve restoration of Mulanje Cedar on Mount Mulanje and mentioned the Darwin Initiative's ongoing support for the project as a funder - https://globaltrees.org/news-blog/world-soil-day-digging-plant-conservation/.

The Global Trees Campaign Twitter and Facebook accounts have been used to promote the project and plight of the Mulanje Cedar tree in the year (e.g. posts on 15th December and 18th September).

14. Impact of COVID-19 on project delivery

COVID-19 has caused delays to some project activities (notably ethnobotany and essential oils research) that have caused knock on delays to other activities and key project outputs 3 and 4. This means that to fully achieve its intended outcomes, the project may require an extension of time beyond April 2022 to be completed properly. The team will assess progress at the next Steering Committee meeting in the final year of the project and decide on whether to submit a Change Request to the Darwin Initiative for this (though we are not sure if an extension of project's timeframe is allowed).

The project team has responded to the impact of COVID-19 by adjusting the workplan, shifting to an online approach where possible for training activities and meetings, and pushing some activities to the final year of the project. A number of accepted change requests have been submitted to the Darwin Initiative in order to agree the amendments, and to revise the finances for the project year.

Government guidelines have been adhered to in both the UK and Malawi. BGCI staff are working from home and have not travelled to Malawi since COVID-19 impacts began. MMCT staff are working from home as much as possible. All nurseries have installed washing stations and are working in reduced staff numbers in the nursery at any one time. Some fieldwork activities and meetings with government had to be postponed due to government restrictions in Malawi. Although this has delayed the timeframe of the project deliverables, the project team is putting health and safety of everyone involved in the project first.

In terms of how the project outcomes could potentially reduce the risk of future pandemics, the project is helping to restore resilient forests on Mount Mulanje, as well as improving the income and livelihoods of people surrounding Mount Mulanje, which brings better living conditions, better sanitisation and better healthcare.

Because our project team were already split across multiple countries (Malawi, UK and ERA members from Australia, South Africa and the US) we were already using virtual meetings regularly. Particularly for training, knowledge exchange and M&E purposes, some international travel would still be built into project design for similar projects going forwards. In-person visits were noted as beneficial for both the project outcomes and for people involved in the project within Malawi.

15. Safeguarding

Please tick this box if any safeguarding or human rights violations have occurred during this financial year. ☐

If you have ticked the box, please ensure these are reported to ODA.safeguarding@defra.gov.uk as indicated in the T&Cs.

BGCI's employee handbook' was updated in 2020 and contains principles, requirements and guidance on staff and contractor conduct within and outside of the office. This includes our policies on anti-bribery and corruption, and anti-harassment and bullying, which are also shared with project partners to ensure that they adhere to the same standards as BGCI. Sub-contractors sign up to these principles and requirements. A whistle-blowing policy is included in the handbook, which includes a procedure for raising concerns, including options for referral if it is felt necessary to contact relevant government bodies (e.g. HM Revenue and Customs, The Environment Agency, The Charity Commission etc.). BGCI's policies are available from https://www.bgci.org/legal-and-policies/.

BGCI also has a Code of Conduct for staff which sets out expectations of behaviours inside and outside the work place and makes it clear what will happen in the event of non-compliance or breaches – i.e. disciplinary action up to and including dismissal as well as legal action by BGCI if it deems it necessary to do so.

All project activities have been compliant with ABS guidelines and regulations. In fact, one of the central aims of the project is to improve procedures and practice of ABS relevant PIC and MAT agreements and the methodologies being developed are in partnership with the ABS National Focal Points and permitting authorities the Environmental Affairs Department. Non-Disclosure Agreements have been put in place as part of this.

There have been no safeguarding incidents or concerns in this first year of the project.

16. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2020 – 31 March 2021)

Project spend (indicative) since last annual report	2020/21 Grant (£)	2020/21 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Monitoring & Evaluation (M&E)				
Others (see below)				
TOTAL				

Highlight any agreed changes to the budget and **fully** explain any variation in expenditure where this is +/- 10% of the budget. Have these changes been discussed with and approved by Darwin?

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2020-2021

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
Impact The Mulanje cedar is a sustainably managed commercial product, generating income for local households and the Malawian economy, and no longer threatened in the wild.		144 Mulanje Cedar hedges have been planted in communities and are being managed by community groups. These will be the resource in any future sustainable essential oil industry that develops providing incomes to local households. Those involved (200 community members) have also been trained in business skills and marketing training. 79,162 additional trees have also been planted on Mount Mulanje, funded by WeForest (see Annex 13) giving incomes to nurseries locally and acting as a security measure against extinction.	[redacted]
Outcome Communities living around Mount Mulanje receive short-term benefits from sustainable utilisation of Mulanje Cedar and opportunities are identified for sustainable commercial use of other over-exploited plant species of Mount Mulanje	0.1 Restoration protocols developed for Mulanje Cedar on Mount Mulanje improve survival rates by 30% compared to project 23-026 baseline, resulting in continued demand for seedlings for restoration. 0.2 Documented example of the conservation-commerce model for Mulanje Cedar developed by end of year 3. 0.3 Optimal extraction techniques identified for Mulanje Cedar essence by end of year 1 and essential oil produced and sold by communities, resulting in benefits for 150 local community members (60% women) and a market for Mulanje Cedar seedlings for essence extraction by end of year 3.	**0.1** Data has been recollected from 4 of the 5 plots established in December 2019 which will be used to assess what local conditions around individual trees have improved survival and growth of seedlings. **0.2** The project essence marketing and use consultant has provided an analysis of the essential oils research results and suggested some activities for the final year to help confirm the details of any future oil industries **0.3** The essential oils research on Mulanje Cedar plants from Mulanje and Zomba	**0.1** Analysis of data collected from the December 2019 plots. Feedback and input from ERA expert groups on trial design update for new plots to be planted in December 2021 Set up new companion species trial plots ready for planting - clearing in plots where needed, demarcation, etc. Plant the trials with Mulanje Cedar and companion plants on Mount Mulanje. Monitor new plots twice (once on establishment once at the end of the dry season) and the December 2019 plots one last time at the end of the dry season. **0.2 and 0.3**

	0.4 Over-exploited plant species of Mount Mulanje are investigated for potential sustainable use by end of year 3.	has been completed by the researcher from Mzuzu University, Malawi. A further 80 (53 women) local community members have received training in hedge planting and management taking the project total to 255 (56 women) 200 community members (93 women) have received business skills and marketing training from the business skills consultant, Kingsley Mulekano **0.4** COVID-19 has significantly delayed the ethnobotanical research, which has been undertaken in April 2021. A PIC agreement was signed with 4 Traditional Authorities in March 2021 to undertake this work so that national ABS guidelines are adhered to.	FRIM to re-do certification assessments of the community nurseries by August 2021 Complete training with local community members to use the distillation equipment with an expert trainer from South Africa by July 2021. Provide MMCT with investigative equipment recommended by essence marketing and use consultant by July 2021 Carry out further essential oils research based on the results from this year by December 2021 **0.4** Complete ethnobotany survey in April 2021 Finalise target plant species list for further investigation by July 2021 Complete fieldwork to assess the availability of the other plant species on the target list by November 2021 Hold second Nagoya Protocol / FairWild workshop to assess Mulanje Cedar and other plant species on the target list by November 2021 Make seed collections of the other plant species on the target list by the project completion. Run propagation trials on the other plant species from the target list that have been collected.
Output 1. Improved restoration protocols developed for Mulanje Cedar on Mount Mulanje, resulting in continued demand for seedlings for restoration	1.1 Ten nurseries, established and certified in project 23-026, continue to produce a minimum aggregate total of 400,000 Mulanje Cedar seedlings in years 1, 2 and 3 (seedling production	**1.1** Nursery propagation and sales figures are in section 3 in table 1. **1.2**	

	figures have not increased compared to project 23-026 due to limited seed availability) for restoration, commercial sales (timber and essence) and community cedar hedge plantations (output 3), benefiting 150 community nursery workers. 1.2 FRIM and restoration experts from BGCI's network design and implement planting trials at 8 sites on Mount Mulanje by end of year 1, benefiting 80 additional community members employed to transport and plant seedlings on Mount Mulanje. 1.3 Improved planting protocols for Mulanje Cedar developed by FRIM and restoration experts in BGCI's network by end of year 3. 1.4 Mulanje Cedar seedling establishment and survival rates increased throughout life of the project (target 30% improvement against baseline by end of project 23-026).	Following further online meetings with the ERA experts, MMCT and FRIM, new trial plots have been designed to investigate the impact of different companion species on Mulanje Cedar growth and survival. These could not be established in the rainy season this year due to COVID-19 impacts in Malawi making fieldwork not possible at the planned time. Evidence is in section 3.1 and the updated trial design in Annex 6 and a site selection report in Annex 18. **1.3 and 1,4** Second year of data from December 2019 plots collected to be analysed to understand better restoration planting conditions	
Activity 1.1 Ten nurseries, established and certified in project 23-026, produce a minimum aggregate total of 400,000 Mulanje Cedar seedlings in years 1-3, benefiting 150 nursery workers.		196,286 seedlings were propagated this year in 8 nurseries. The community members of the nurseries have received £13,054 for the sale of 94,512 of those that have been propagated.	FRIM will provide seeds to nurseries to continue to propagate seedlings for restoration trial establishment.
Activity 1.2 a) Design and implement planting trials at 8 sites on Mount Mulanje by end of year 1, benefiting people employed to transport and plant seedlings.		3 online meetings held with ERA group contributions updating the trial design for new restoration trial plots	Data from 2019 plots analysed and design of new restoration trials updated with ERA group input
Activity 1.2 b) FRIM and restoration experts from BGCI's network monitor planting trials in years 1, 2 and 3.		The trials established in December 2019 were monitored for a second time in March 2021	New plots established in December 2021 and monitored in December and March 2022. 2019 plots also monitored in March 2022
Activity 1.3 FRIM and restoration experts from BGCI's network publish improved restoration protocols for Mulanje Cedar by end of year 3.			To be published following data collection and analysis in the final year of the project.

Activity 1.4 Publish a review of survival rate improvements (target 30% improvement from Darwin project 23-026 baseline) by end of year 3.			To be published following data collection and analysis in the final year of the project.
Output 2. Conservation-commerce model developed and documented for Mulanje Cedar	2.1 Expert consultants appointed and project steering committee established by end of year 1, to guide and monitor project progress and development of conservation-commerce model. 2.2 Feasibility study commissioned to improve understanding of Mulanje Cedar potential uses and markets, including identification of local and international commercial partners and quantifying potential income from essence manufacture, complete by end of year 1. 2.3 Workshop held in year 1 involving the Union for Ethical BioTrade and TRAFFIC to determine Nagoya Protocol implications and requirements regarding access and benefit sharing in preparation for international trade of certified essence product and assess whether wild harvesting might be appropriate in future. Potential international purchasers engaged in years 2 and 3. 2.4 Public outreach campaign in years 2 and 3 to grow demand for purchase of Mulanje Cedar seedlings (for timber and essence extraction) and essential oil. 2.5 MMCT and FRIM monitor nursery certification scheme and Cedar Growers and Planters Association (CGPA) established in project 23-036, which becomes fully inclusive of planters for essence extraction by end of year 3.	**2.1** 3 consultants involved in the restoration and training in the project this year. This is described in section 3.1 and the contracts are found in Annex 9. **2.2** This was completed in year 1. **2.3** The workshop was completed in year 1 and a second workshop is to be held in the final year to reassess the situation for Mulanje Cedar and other plant species from Mount Mulanje. Potential international purchasers will also be engaged in the final year. **2.4** This was delayed this year due to COVID-19 impacts on the project and will be undertaken in year 3. **2.5** FRIM monitored the nurseries a second time with 7 of 8 achieving certification. This is evidenced in section 3.1 and Annex 8 **2.6** Training was delivered to 200 local community members as evidenced in section 3.1 and Annex 10 **2.7** The conservation-commerce model example of Mulanje Cedar Essential Oil analysis has progressed with essential oils analysis (evidence in Annex 7), business opportunities and assessment (evidence in Annex 5), These will contribute to the model to be published at the end of the project.	

	2.6 Training delivered in business and marketing skills and Nagoya compliance to Mulanje Cedar essence producers in year 2. 2.7 Model conservation-commerce project for Mulanje Cedar documented and published by end of year 3.		
Activity 2.1.a) Write contracts for consultants by end of year 1.		Business skills trainer consultant contract negotiated and signed	
Activity 2.1. b) Establish project steering committee to guide and monitor project progress and development of conservation-commerce model.		2 steering committee meetings held in the year	Hold 2 more steering committee meetings in September 2021 and March 2022 (see Annex 4)
Activity 2.2. Commission study to improve understanding of Mulanje Cedar potential uses and markets, identify commercial partners and quantify potential income, complete by end of year 1.		Completed	
Activity 2.3. Workshop involving UEBT and TRAFFIC, determining Nagoya Protocol implications and ABS requirements for international oil trade, assessing whether wild harvesting might be appropriate in future.		Completed	
Activity 2.4. Run a public outreach campaign in years 2 and 3 to grow demand for purchase of Mulanje Cedar seedlings for timber and essence extraction.		Delayed due to COVID-19 impacts on Mulanje Cedar essential oil development	Public outreach campaign will be run locally and nationally to develop the markets for Mulanje Cedar seedlings and essential oils
Activity 2.5. MMCT and FRIM monitor nursery certification scheme and CGPA (established in project 23-036) which becomes fully inclusive of planters for essence extraction by year 3.		7 of 8 nurseries certified by FRIM this year.	Certification to be carried out by FRIM again this year.
Activity 2.6. Provide training in Nagoya compliance to Mulanje Cedar essence producers in year 2.		Delayed due to COVID-19 impacts on Mulanje Cedar essential oil development	Training to be undertaken once business is confirmed.
Activity 2.7. Model conservation-commerce project for Mulanje Cedar documented and published by end of year 3.			Publication of model done at the end of the final project year
Output 3. Manufacture of products from sustainably sourced Mulanje Cedar essence generates income for additional local households in the short-term and results in a larger market for cedar seedlings.	3.1 Optimal sustainable extraction techniques for Mulanje Cedar essence are identified in year 1. 3.2 Samples sent to potential national and international purchasers	**3.1** The Mulanje Cedar essential oils research report was submitted (Evidence in Annex 7) as was a report with analysis on business opportunities and further work to be undertaken done by the essence marketing and use consultant (Evidence in Annex 5). **3.2**	

	by end of year 1, with continued engagement in years 2 and 3. 3.3 150 people (60% women) from ten communities around Mount Mulanje are identified with help from Traditional Authorities, and ten trial cedar hedge plantations are planted at sites around the base of Mount Mulanje for essential oil extraction by end of year 1 and ten community cedar essence extraction enterprises fully equipped at start of year 2. 3.4 150 people (60% women) from ten communities around Mount Mulanje are trained in planting and management techniques for cedar hedge plantations by end of year 1, sustainable harvesting techniques, processing, business skills and marketing. 3.5 150 people selling essential oil and earning at least USD250/year from sale of Mulanje Cedar essential oil by end of year 3.	This is not yet done because of COVID-19 impacts on the Mulanje Cedar essential oil research submission. Samples will be sent following the distillation equipment training and oil production done at MMCT offices. **3.3 and 3.4** 255 people (156 women) have been trained to plant and manage Mulanje Cedar hedges across both project years (evidence in section 3.1). 144 hedges have now also been planted on local community members' land. Distillation equipment has also arrived in Mulanje for essential oil extraction (see figure 3). 200 community members have received the business skills and marketing training as evidence in Annex 10. **3.5** Incomes have not been made from Mulanje Cedar essential oils this year after delays to the research and development needed.	
Activity 3.1. Identify optimal sustainable extraction techniques for Mulanje Cedar essence by end of year 1.		Mulanje Cedar essential oils research report published in March 2021 after delays due to COVID-19	
Activity 3.2. a) Send samples to potential national and international purchasers by end of year 1.		Delayed due to COVID-19 impacts on Mulanje Cedar essential oil development	Samples will be sent once training is given to MMCT and local communities and oil is produced using the new distillation equipment
Activity 3.2. b) Continue to engage potential purchasers to expand markets in years 2 and 3		Delayed due to COVID-19 impacts on Mulanje Cedar essential oil development	Potential purchasers will be re-engaged once training is given to MMCT and local communities and oil is produced using the new distillation equipment
Activity 3.3. a) Work with Traditional Authorities in year 1 to identify 150 people (60% women) from ten communities around Mount Mulanje to form essence extraction enterprises.		Completed	

Activity 3.3. b) Communities plant ten trial cedar hedge plantations using established seedlings at sites around the base of Mount Mulanje by end of year 1.		Completed	
Activity 3.3. c) Equip communities with essence extraction equipment at start of year 2.		Completed	
Activity 3.4. a) Train 150 people (60% women) in planting and management techniques for cedar hedge plantations by end of year 1.		Completed	
Activity 3.4. b) Train 150 people (60% women) in sustainable harvesting techniques and processing, business skills and marketing by end of year 2.		200 local community members have received business and marketing skills training	Sustainable harvesting training will be given to hedge owners once the business opportunities are understood and harvest methods are finalised
Activity 3.5. a) Essential oil sold to commercial buyers for product manufacturing in years 2 and 3.		Delayed due to COVID-19 impacts on Mulanje Cedar essential oil development	
Activity 3.5. b) Carry out socio-economic study in years 1 and 3 to monitor income obtained by essence extraction enterprises.			The second survey will be completed by MMCT in the final year
Output 4. Conservation measures in place for other over-exploited plant species on Mount Mulanje and conservation-commerce model replicated for five important plant species on Mount Mulanje.	4.1 Survey conducted to identify other plant species of Mount Mulanje and their potential uses and commercial value in year 1. 4.2 Seed collected from all over-exploited rare and threatened plant species on Mount Mulanje (estimated 10 additional species) in years 1 and 2, stored at FRIM and distributed to at least ten botanic gardens for ex situ conservation. 4.3 Propagation protocols developed by FRIM, tested by community nurseries and published for all collected species by end of year 3. 4.4 Pilot studies for at least 3 other over-exploited plant species with commercial potential on Mount Mulanje, diversifying income streams by end of year 3 and helping ensure the conservation of those species. Candidate enterprises include propagation of *Kniphofia mulanjeana*	**4.1** An ethnobotanical literature review has been completed (evidence in Annex 11). PIC and MAT agreements have been developed and the PIC signed with 4 Traditional Authority leaders so that the ethnobotany survey can be completed in April 2021 (evidence in Annex 15) **4.2** Seed collection of 35 other plant species has been undertaken across 4 fieldwork trips (evidence in section table 2 and Annexes 14 & 16) using the target list of companion species produced in year 1 and updated at the start of this year (see full list in Annex 12) **4.3** Propagation efforts were not as successful as hoped although those species that were propagated were planted on the mountain as part of WeForest funded restoration work. Further trials will be completed in the project final year with support from BGCI and other experts in the BGCI network - e.g. continued support from SANBI in Southern Africa after online knowledge exchange workshop in November **4.4** Pilot studies to be established in the final project year.	

	and *Encephalartos gratus* (Vulnerable) for sale as ornamental plants (matched funding dependent).		
Activity 4.1. Conduct survey to identify other plant species of Mount Mulanje and their potential uses and commercial value in year 2.		Delayed due to COVID-19, but with PIC and MAT agreements developed and the former signed by 4 Traditional Authority leaders to do the survey in April 2021	Ethnobotanical study with communities will take place in April 2021 with a report published in June 2021.
Activity 4.2. Seed collected from est. 10 additional over-exploited species in years 1 and 2, stored at FRIM and distributed to at least ten botanic gardens.		Seeds have been collected from 35 other local plant species, 8 known to have uses for people either locally or internationally	The target list will be finalised following the ethnobotany study with further seed collection following this.
Activity 4.3. FRIM develop propagation protocols, communities test protocols and publish protocols for all species by end of year 3.		Propagation trials of seed collected have largely been unsuccessful	Propagation trials will take place once seed are collected, to publish new protocols in the final year.
Activity 4.4. Develop sustainable small enterprises pilot studies for at least 3 other over-exploited plant species with commercial potential.			This will be undertaken in the project's final year.

Annex 2: Project's full current logframe as presented in the application form (unless changes have been agreed)

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: Mulanje cedar is a sustainably managed commercial product, generating income for local households and the Malawian economy, and no longer threatened in the wild.			
Outcome: Communities living around Mount Mulanje receive short-term benefits from sustainable utilisation of Mulanje Cedar and opportunities are identified for sustainable commercial use of other over-exploited plant species of Mount Mulanje	0.1 Restoration protocols developed for Mulanje Cedar on Mount Mulanje improve survival rates by 30% compared to project 23-026 baseline, resulting in continued demand for seedlings for restoration. 0.2 Documented example of the conservation-commerce model for Mulanje Cedar developed by end of year 3. 0.3 Optimal extraction techniques identified for Mulanje Cedar essence by end of year 1 and essential oil produced and sold by communities, resulting in benefits for 150 local community members (60% women) and a market for Mulanje Cedar seedlings for essence extraction by end of year 3. 0.4 Over-exploited plant species of Mount Mulanje are investigated for potential sustainable use by end of year 3.	0.1 Planting protocols published. Seedling survival rates. Records of seedling sales from nurseries. 0.2 Written record of model project methodology. 0.3 Extraction methods published. Training course attendance figures and certificates. Socio-economic survey reports. Essence producers sales figures. Records of seedling sales. 0.4 Seed collection and ex situ collection records. Mount Mulanje annual report and accounts. Funding applications.	• Continued participation of local communities. • Local politics and ethnic differences do not hinder progress of project activities. • Income obtained from seedlings and essential oil replaces income from illegal exploitation activities and is regarded as an alternative, not an additional activity. • Technical expertise is available to solve planting issues.
Output 1 Improved restoration protocols developed for Mulanje Cedar on Mount Mulanje, resulting in continued demand for seedlings for restoration	1.1 Ten nurseries, established and certified in project 23-026, continue to produce a minimum aggregate total of 400,000 Mulanje Cedar seedlings in years 1, 2 and 3 (seedling production figures have not increased compared to project 23-026 due to limited seed availability) for restoration, commercial sales (timber and essence) and community cedar hedge plantations (output 3), benefiting 150 community nursery workers.	1.1. Nursery sales records. Register of commercial planting sites. 1.2 Trial plot records. 1.3 Planting leaflets. 1.4 Planting and survival figures, MMCT annual report.	• Enough seed is produced from FRIM stands to continue to supply nurseries with sufficient seed • Communities continue to be interested in nursery work. • Restoration and commercial market for seedlings is maintained.

	1.2 FRIM and restoration experts from BGCI's network design and implement planting trials at 8 sites on Mount Mulanje by end of year 1, benefiting 80 additional community members employed to transport and plant seedlings on Mount Mulanje. 1.3 Improved planting protocols for Mulanje Cedar developed by FRIM and restoration experts in BGCI's network by end of year 3. 1.4 Mulanje Cedar seedling establishment and survival rates increased throughout life of the project (target 30% improvement against baseline by end of project 23-026).		
Output 2 Conservation-commerce model developed and documented for Mulanje Cedar	2.1 Expert consultants appointed and project steering committee established by end of year 1, to guide and monitor project progress and development of conservation-commerce model. 2.2 Feasibility study commissioned to improve understanding of Mulanje Cedar potential uses and markets, including identification of local and international commercial partners and quantifying potential income from essence manufacture, complete by end of year 1. 2.3 Workshop held in year 1 involving the Union for Ethical BioTrade and TRAFFIC to determine Nagoya Protocol implications and requirements regarding access and benefit sharing in preparation for international trade of certified essence product and assess whether wild harvesting might be	2.1 Steering Committee minutes. Consultant contracts. Monitoring and evaluation reports. 2.2 Published feasibility study. 2.3 Minutes and guidance produced from workshop. 2.4 Leaflets, newspaper articles, radio and TV shows. 2.5 Nursery certification register. CGPA register. Essential oil producer certification scheme developed and certification register. 2.6 Training course attendance figures and certificates. 2.7 Published report.	• Malawians will continue to respond to public outreach campaign. • Local politics and ethnic differences not inimical to creating a cohesive and representative essence producer association

	appropriate in future. Potential international purchasers engaged in years 2 and 3. 2.4 Public outreach campaign in years 2 and 3 to grow demand for purchase of Mulanje Cedar seedlings (for timber and essence extraction) and essential oil. 2.5 MMCT and FRIM monitor nursery certification scheme and Cedar Growers and Planters Association (CGPA) established in project 23-036, which becomes fully inclusive of planters for essence extraction by end of year 3. 2.6 Training delivered in business and marketing skills and Nagoya compliance to Mulanje Cedar essence producers in year 2. 2.7 Model conservation-commerce project for Mulanje Cedar documented and published by end of year 3.		
Output 3 Manufacture of products from sustainably sourced Mulanje Cedar essence generates income for additional local households in the short-term and results in a larger market for cedar seedlings.	3.1 Optimal sustainable extraction techniques for Mulanje Cedar essence are identified in year 1. 3.2 Samples sent to potential national and international purchasers by end of year 1, with continued engagement in years 2 and 3. 3.3 150 people (60% women) from ten communities around Mount Mulanje are identified with help from Traditional Authorities, and ten trial cedar hedge plantations are planted at sites around the base of Mount Mulanje for essential oil extraction by end of year 1 and ten community cedar essence extraction enterprises fully equipped at start of year 2.	3.1. Scientific papers. Manuals for extraction. 3.2 Partnerships with national and international purchasers. 3.3 Essence enterprise member records. Cedar hedge plantations in place. Equipment and consumables in place. 3.4 Training course attendance records and certificates. 3.5 Sales records. Socio-economic surveys.	• Expertise is available to optimise extraction techniques and develop essence products. • Communities are receptive to new business establishment.

	3.4 150 people (60% women) from ten communities around Mount Mulanje are trained in planting and management techniques for cedar hedge plantations by end of year 1, sustainable harvesting techniques, processing, business skills and marketing. 3.5 150 people selling essential oil and earning at least USD250/year from sale of Mulanje Cedar essential oil by end of year 3.		
Output 4 Conservation measures in place for other over-exploited plant species on Mount Mulanje and conservation-commerce model replicated for five important plant species on Mount Mulanje.	4.1 Survey conducted to identify other plant species of Mount Mulanje and their potential uses and commercial value in year 1. 4.2 Seed collected from all over-exploited rare and threatened plant species on Mount Mulanje (estimated 10 additional species) in years 1 and 2, stored at FRIM and distributed to at least ten botanic gardens for ex situ conservation. 4.3 Propagation protocols developed by FRIM, tested by community nurseries and published for all collected species by end of year 3. 4.4 Pilot studies for at least 3 other over-exploited plant species with commercial potential on Mount Mulanje, diversifying income streams by end of year 3 and helping ensure the conservation of those species. Candidate enterprises include propagation of Kniphofia mulanjeana and Encephalartos gratus (Vulnerable) for sale as ornamental plants (matched funding dependent).	4.1 Survey report. 4.2 Data capture forms from seed collection. FRIM records. Material Transfer Agreements. BGCI's PlantSearch database of ex situ collections. 4.3 Published protocols. 4.4 Enterprise model project concepts and funding applications.	• Seed is available for collection from target species within the project timeframe.

Activities (each activity is numbered according to the output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1)

Output 1

1.1 Ten nurseries, established and certified in project 23-026, produce a minimum aggregate total of 400,000 Mulanje Cedar seedlings in years 1-3, benefiting 150 nursery workers.

1.2 Design and implement planting trials at 8 sites on Mount Mulanje by end of year 1, benefiting people employed to transport and plant seedlings.

1.2 FRIM and restoration experts from BGCI's network monitor planting trials in years 1, 2 and 3.

1.3 FRIM and restoration experts from BGCI's network publish improved restoration protocols for Mulanje Cedar by end of year 3.

1.4 Publish a review of survival rate improvements (target 30% improvement from Darwin project 23-026 baseline) by end of year 3.

Output 2

2.1 Write contracts for consultants by end of year 1.

2.1 Establish project steering committee to guide and monitor project progress and development of conservation-commerce model.

2.2 Commission study to improve understanding of Mulanje Cedar potential uses and markets, identify commercial partners and quantify potential income, complete by end of year 1.

2.3 Workshop involving UEBT and TRAFFIC, determining Nagoya Protocol implications and ABS requirements for international oil trade, assessing whether wild harvesting might be appropriate in future.

2.4 Run a public outreach campaign in years 2 and 3 to grow demand for purchase of Mulanje Cedar seedlings for timber and essence extraction.

2.5 MMCT and FRIM monitor nursery certification scheme and CGPA (established in project 23-036) which becomes fully inclusive of planters for essence extraction by year 3.

2.6 Provide training in Nagoya compliance to Mulanje Cedar essence producers in year 2.

2.7 Model conservation-commerce project for Mulanje Cedar documented and published by end of year 3.

Output 3

3.1 Identify optimal sustainable extraction techniques for Mulanje Cedar essence by end of year 1.

3.2 Send samples to potential national and international purchasers by end of year 1.

3.2 Continue to engage potential purchasers to expand markets in years 2 and 3

3.3 Work with Traditional Authorities in year 1 to identify 150 people (60% women) from ten communities around Mount Mulanje to form essence extraction enterprises.

3.3 Communities plant ten trial cedar hedge plantations using established seedlings at sites around the base of Mount Mulanje by end of year 1.

3.3 Equip communities with essence extraction equipment at start of year 2.

3.4 Train 150 people (60% women) in planting and management techniques for cedar hedge plantations by end of year 1.

3.4 Train 150 people (60% women) in sustainable harvesting techniques and processing, business skills and marketing by end of year 2.

3.5 Essential oil sold to commercial buyers for product manufacturing in years 2 and 3.

3.5 Carry out socio-economic study in years 1, 2 and 3 to monitor income obtained by essence extraction enterprises.

Output 4

4.1 Conduct survey to identify other plant species of Mount Mulanje and their potential uses and commercial value in year 2.

4.2 Seed collected from est. 10 additional over-exploited species in years 1 and 2, stored at FRIM and distributed to at least ten botanic gardens.

4.3 FRIM develop propagation protocols, communities test protocols and publish protocols for all species by end of year 3.

4.4 Develop sustainable small enterprises pilot studies for at least 3 other over-exploited plant species with commercial potential.

Annex 3: Standard Measures

Please expand and complete Table 1: new projects should complete the Y1 column and also indicate the number planned during the project lifetime. Continuing project should cut and past the information from previous years and add in data for the most recent reporting period. Quantify project standard measures over the last year using the coding and format from the Darwin Initiative Standard Measures (see website for details: https://www.darwininitiative.org.uk/resources-for-projects/reporting-forms-change-request-forms-and-terms-and-conditions/) and give a brief description. Please list and report on relevant Code Numbers only. The level of detail required is specified in the Standard Measures Guidance notes under 'definitions and reporting requirements' column. Please devise and add any measures that are not captured in the current list. Please note that these measures may not be a substitute for output level objectively verifiable indicators in the project logframe.

Table 1 Project Standard Output Measures

Code No.	Description	Gender of people (if relevant)	Nationality of people (if relevant)	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
Established codes								
6A	Local community members received training in how to plant and manage hedges, sustainably harvest and business and marketing skills	156 women	Malawian	175	80		255	150
7	Manual for sustainable harvesting of Mulanje Cedar Hedges			0	0			1
11B	Scientific papers on essential oil analysis and restoration experimentation submitted for publication			0	0			2
13A	Seed and Ex situ collections made for overexploited socio-economic plant species from Mulanje Mountain			0	35			0
14B	Project progress to be presented at the postponed AETFAT			0	0			0

	conference (March 2022)							
20	Essential oil Distillation machinery to be provided			0	2			1
22	Permanent restoration monitoring sites (of previous planted areas and newly planted sites)			5	0			5
23	Belvedere Trust funds for updating Mulanje Mountain radio system							

In Table 2, provide full details of all publications and material produced over the last year that can be publicly accessed, e.g. title, name of publisher, contact details, cost. Mark (*) all publications and other material that you have included with this report.

Table 2 Publications

Title	**Type** (e.g. journals, manual, CDs)	**Detail** (authors, year)	**Gender of Lead Author**	**Nationality of Lead Author**	**Publishers** (name, city)	**Available from** (e.g. weblink or publisher if not available online)

Annex 4 Onwards – supplementary material (optional but encouraged as evidence of project achievement)

This may include outputs of the project, but need not necessarily include all project documentation. For example, the abstract of a conference would be adequate, as would be a summary of a thesis rather than the full document. If we feel that reviewing the full document would be useful, we will contact you again to ask for it to be submitted.

It is important, however, that you include enough evidence of project achievement to allow reassurance that the project is continuing to work towards its objectives. Evidence can be provided in many formats (photos, copies of presentations/press releases/press cuttings, publications, minutes of meetings, questionnaires, reports etc.) and you should ensure you include some of these materials to support the annual report text.

If you are attaching separate documents, please list them here with an Annex reference number so that we can clearly identify the correct documents.

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	
Do you have hard copies of material you need to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	
Have you involved your partners in preparation of the report and named the main contributors	
Have you completed the Project Expenditure table fully?	
Do not include claim forms or other communications with this report.	