Darwin Initiative Main Annual Report

To be completed with reference to the "Project Reporting Information Note": (https://www.darwininitiative.org.uk/resources-for-projects/information-notes-learning-notes-briefing-papers-and-reviews/).

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

Submission Deadline: 30th April 2022

Darwin Initiative Project Information

Project reference	26-017
Project title	Maximising community and conservation benefits from plants of Mount Mulanje
Country/ies	Malawi
Lead partner	Botanic Gardens Conservation International (BGCI)
Project partner(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 2023
Reporting period (e.g. Apr 2021 – Mar 2022) and number (e.g. Annual Report 1, 2, 3)	Apr 2021 – Mar 2022 Annual Report 3
Project Leader name	Kirsty Shaw
Project website/blog/social media	https://globaltrees.org/projects/save-our-cedar-malawis-national-tree/
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 – eight remain active. 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 stakeholders/ partners

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). This took place in October 2021 remotely over Zoom due to COVID-19 impacts in Malawi at that time. In the meeting, project progress was fed back to the group with decisions for adaptive management made (see minutes in Annex 4.1).

MMCT has the role of leading on organisation and implementation of project activities in Mulanje, through their Project Manager, Ibrahim Mitole. This included restoration fieldwork, monitoring nurseries and their sales, installation of new essential oil distillation equipment at MMCT, and the training courses – i.e. distillation equipment use and seed collection. For all activities, MMCT liaise with all participants and mobilise them on the agreed dates for activities. MMCT has also started promotion and engagement activities in 2022: setting up promotional signs and billboards in Mulanje and starting the Knowledge, Attitudes and Perceptions survey within communities around Mount Mulanje to understand people's thoughts about conservation of the mountain and the Mulanje Cedar tree.

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). BGCI has also trained MMCT staff to develop electronic data collection forms on the Open Data Kit software / app, which have been used in fieldwork in January and March. Following the passing of the project essence marketing and use consultant (Arthur Stevens), BGCI has also been communicating with alternative expert support for the final year (e.g. John Forbes from Ceressence Consultancy). 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. FRIM also connected the team with a soil microbial community specialist, Samuel Mwafuliwra, who provided the project with some microbial inoculant to test in the restoration trials. MMCT and FRIM have jointly taken part in fieldwork expeditions to Mount Mulanje for restoration activities, and to collect seeds from other seed sources in Malawi. Other Department of Forestry staff also took part in these fieldwork activities. BGCI and ERA experts also participated in fieldwork this year (January 2022) following some easing of travel restrictions due to COVID-19. Fieldwork took place in:

- July 2021 – to collect seeds of native plant species to use in propagation trials at FRIM offices in Zomba and propagate seedlings to use in restoration trials.
- January 2022 – field-based seed collection training to build capacity of local nurseries groups
- January 2022 – to establish new restoration trials in 4 sites around Mount Mulanje
- March 2022 – to collect the baseline data from the restoration trial plots established in January and reassess the restoration trial plots established in

The ERA experts have continued to contribute to the project with remote attendance of restoration planning meetings in May, November, and December 2021, and January 2022. These meetings also involved MMCT, FRIM and BGCI. These led to updated restoration trial designs following the team's assessment of situation changes (see the implemented design document in Annex 4.2).

Local communities have continued to be involved in various components of the project: community nurseries sold seedlings for restoration on the mountain, community members helped establish the new restoration plots, and were trained to collect and process seeds of native plant species from Mount Mulanje by FRIM. Nurseries are also propagating companion species so that successful companion species can be planted alongside Mulanje Cedar in the future (2022/2023 rainy season).

WeForest has continued to support restoration activities on the mountain and will plant once more in the 2022/2023 rainy season. BGCI has been sharing information on target flora to help plan seed collection and propagation for the rest of the year.

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. 98,086 seedlings were propagated during this reporting period (See table 1), thus 370,072 seedlings cumulative since the project commencement in 2019. These seedlings have been used for planting in restoration sites on Mount Mulanje in the programme run by WeForest (70,179 seedlings) with around 5,500 of these incorporated into the restoration trials with the BGCI, FRIM and ERA teams. There are around 50,000 seedlings left in the nurseries, which WeForest has agreed to support planting in the 2022/2023 season along with other collected and propagated target companion species.

Table 1: The project community nurseries, their numbers of members, number of Mulanje cedar seedlings propagated, planted and income generated this project year (April 2021-March 2022). Income in £ based on average rate for the year – 947.64

Nursery name	**# of members**		**# seedlings left from year 2**	**# seedlings propagated in year 3**	**Total income (MK)**	**# planted on Mount Mulanje**
	Male	Female				

Kadewere	5	9	1,900	26,858	2,176,440.00	18,137
Makolera	1	15	3,600	6,573	604,800.00	5,040
Kazembe	2	6	25	12,000	605,520.00	5,046
Nessa	9	3	6,800	11,150	1,345,200.00	11,210
Chole	5	10	1,200	9,408	434,289.00	3,619
Nakhonyo	4	5	4,000	18,330	1,280,520.00	10,671
Gambeya	1	7	8,737	11,067	1,434,720.00	11,956
Lomoliwa	3	13	2,500	2,700	540,000.00	4,500
Totals	**30**	**68**	**28,762**	**98,086**	**8,421,480.00**	**70,179**

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.

Further updates to the restoration trial designs were made this year, including the addition of a microbial inoculant mix provided free by a private provider. The trials were then established in January 2022 with the first set of data collected in March 2022. A third year of data were also collected from the trial plots established in December 2019 .

Nine species of Mulanje Cedar companion species seeds were collected on Mulanje Mountain by FRIM in July 2021 and 5 during seed collection training with local communities in January 2022. These were *Erica benguelensis, Dodonaea viscosa, Diospyros whyteana, Pittosporum viridiflorum, Maytenus acuminata, Podocarpus milanjianus, Rawsonia lucida, Erica nyassana, Myrsine* sp., *Macaranga capensis, Myrica pilulifera, Apodytes dimidiata, Dracaena steudneri* and *Cussonia arborea*. The species collected in July 2021 were collected to establish propagation protocols and to be propagated to be used in restoration planting. Propagation trials for the companion species were established at six sites in August 2021; three on Mulanje mountain (Sombani, Thuchira and Lichenya); two in community Mulanje Cedar nurseries (Nessa and Nakhonyo); and in FRIM offices in Zomba. The Lichenya site was lost in a fire later in the year. The new propagation protocols will be produced from these trials. The results from the propagation trials in Zomba are in Annex 4.3. The report from the seed collection training can be found in Annex 4.4.

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.

The data collected from the restoration trials is still to be processed and analysed to create new restoration protocols and review the survival rate improvements for the Mulanje Cedar tree. This will be undertaken in the extended fourth year of the project. The team also plans to fundraise further to enable fieldwork to be undertaken in March 2023 to collect a fourth year's worth of data from the 2019 plots and a second year for the 2022 plots (e.g. through the British Ecological Society – Ecologists in Africa grant).

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.

Kondwani Chamwala, MMCT Environmental Education & Communications Specialist, put together a plan for engagement including a Knowledge, Attitudes and Perceptions survey of the general population around Mulanje (See Annex 4.5). Some of this has been undertaken and is to be completed in the extended final project year, with a Change Request accepted to split the budget across the years for this.

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.

Nursery monitoring was conducted in December 2021. All eight active nurseries - namely, Kadewere, Lomoliwa, Kazembe, Chole, Nessa, Gambeya, Makolera and Nakhonyo - qualified for accreditation this year. The nurseries have shown great commitment to produce quality seedlings that meet the accreditation criteria and restoration standards (See Annex 4.6 for the full report)

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 can 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.

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

This will be ongoing with the project's extended fourth year, for publication at the project conclusion.

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

185 hedges have been planted in communities in the project, with 144 having survived up to assessments in October 2021.Within the hedges that have survived, different harvest regimes are to be tested to provide materials (leafs and twigs / small branches) to be used to create larger batches of essential oils than have previously been produced. This will show the best method to use to sustainably harvest from the plants into the future. Challenges that community members have seen include dealing with livestock, and termites as well as high temperatures resulting in water scarcity.

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 harvest tests mentioned in 3.1 will produce a larger batch of oils from Mulanje Cedar trees than has previously been produced. This will be used to provide oils to businesses to carry out their own use investigations. demonstrate to community members what is possible, and provide more oils for the essential oils researcher to build on the results from the second year.

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

The essential oil equipment, delivered to MMCT in year 2, has been set up in the newly completed housing at MMCT offices. This includes a smaller tester unit and larger piece of equipment – see figures 2 and 3 below.

Figure 2: The larger distillation equipment (100kg) with project manager, Ibrahim Mitole, explaining how the oils are produced (*left*)

Figure 3: The smaller distillation equipment (10kg) for tester production of oils from plant materials

A trainer from Essential Distillation Equipment (EDE), Werner Besner, travelled to Malawi from South Africa to help complete the equipment set up and train MMCT staff and local community members how to use the equipment in November 2021. Promotion demonstration sessions are planned for communities in April and May.


Figure 4: Werner explaining to the MMCT director, Carl Bruessow, how the 10kg distillation equipment operates, and to the right is a sample of Cedar oil produced during the demonstration

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

The development of an essential oils industry was delayed significantly by COVID-19 and an extension to the project for another year for these developments was requested and given. This will include further engagement with samples of interested businesses in Malawi.

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

This activity was changed to having a study done in year 1 by a consultant that was repeated in year 3 internally by MMCT. MMCT, through the Monitoring and Evaluation Officer. completed data collection for the final socio-economic survey, data entry is being done and report will be available in May 2022.

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

An ethnobotanical study was completed and the report finalised this year (See Annex 4.7). This identifies 195 plant species (2 endemics, 128 native and 65 exotics) used for medicine, food, construction, fodder and other uses. This represents a high reliance by local community groups on local plants and their non-timber forest products. The report recommends 12 other species for use in natural product developments: *Mondia whitei, Tamarindus indica, Aframomum angustifolium, Aloe arborescens, Annona senegalensis, Fadogia ancylantha, Flacourtia indica, Myrianthus holstii, Oxytenanthera abyssinica, Raphia farinifera, Saba comorensis* and *Uapaca kirkiana*. It also highlights nine native species that can be coppiced and are fast growing, which could be useful in diverse management systems providing potential options for more sustainable firewood and charcoal production systems.

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.

FRIM carried out seed propagation tests on 9 other target native plants species from Mount Mulanje (see Annex 4.3). Further analysis of the resource availability, current use practices and known biological factors important for sustainable use of the species identified by the ethnobotanist is needed to understand the conservation and sustainable use needs seed collection and distribution to botanic gardens can then follow this.

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.

A third year of data from the plots established in 2019 has been collected. The project team will analyse this data to suggest options for improving restoration planting protocols for the Mulanje Cedar trees. The initial results from the previous data highlighted the importance of site selection to tree survival and growth. Data from the newly established restoration trials will also

help to understand the impact of other native plants on Mulanje Cedar growth and survival as well as the addition of microbial inoculants. Further data collection in 2023 and beyond will help to improve these protocols further.

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

Nursery certification of the community nurseries has been completed in December 2021. All 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 began in 2022 after delays due COVID-19 impacts on the project. As part of the Change Request for an additional fourth year to the project, funds were moved to 2022/2023 year to continue this and promote the project results further. 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.

Further research will also be undertaken on essential oils that are produced in hedges in communities around Mount Mulanje helping to build evidence for use of the essential oils in new industries.

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 further delayed because of COVID-19. However, essence extraction equipment has been set up at MMCT and has been tested, producing oils from small Mulanje Cedar test samples and other plants. Some local community members and staff received training in how to use the equipment in November 2021.

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. These will now be carried out in the extended fourth year to the project.

185 hedges have been planted in the project with 144 survived and 41 that have not. Generally, these have a minimum 100 trees up to a maximum of 500. Overall 375 community members were trained as part of the hedge establishment process. Varied dedication to looking after the hedges has resulted in the variability in survival.

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.

The ethnobotanical study was completed and a report submitted by the consultant in April 2022. This has highlighted many plant species of use to local people. It also recommends 12 that could be useful for sustainable natural product development in the future – the available resources and current use knowledge need to be assessed for these species, using FairWild and Non-Detriment Findings methods for which training was received from TRAFFIC in the project first year.

A project proposal has been submitted to the Darwin Initiative looking at some of these species, and others, in relation to conservation and restoration of Miombo woodlands around Mount Mulanje. Other funders this concept could be submitted to include the Global Ecosystem Based Adaptation fund and the Conservation, Food & Health Foundation.

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, funded by this project and restoration, funded by WeForest (See table 1). The expanded opportunity from essence oil production is still in development. Further studies and engagement with businesses identified as most appropriate for opportunities to be developed is still needed. Promotional activities also need to be completed in order to expand the seedlings market.

The identification of opportunities for sustainable commercial use of other over-exploited species has also progressed, with the ethnobotanical study identifying important species to people, some with markets, for which the current exploitation levels need to be further understood.

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:

The updated restoration trials were established in January with data collected from them on survival and growth, with data also collected from the 2019 plots. Those data will be used to assess survival under different conditions, including the impact of other native plant species, of the Mulanje Cedar trees planted.

Indicator 0.2: Documented example of the conservation-commerce model for Mulanje Cedar developed by end of year 3:

A method of trialling harvesting regimes (some to be cut above 1m, others to be have the lower branches harvested only) is being implemented by the community hedge managers and will be monitored by MMCT in order to understand how best to sustainably harvest from the plants. This will be included in the documentation of the conservation-commerce model development, along with further essential oils research and important communications from businesses that are engaged.

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:

Whilst the market is not yet established with local community members as beneficiaries, the initial research into the oils was completed. The above mentioned harvesting trials and further research on oil quantity and quality from hedges around communities of Mulanje Cedar, along with further business engagements, will confirm what type of industry will be possible and how best to harvest the hedges sustainably. Due to the amount of oil that has been shown to be produced so far, it has also been noted that, at least initially, Mulanje Cedar oil only may not be sufficient for products and so mixed produce might be best.

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

The ethnobotanical study has highlighted other useful plants from Mount Mulanje, including some that are currently being overexploited. In the extended fourth year for the project, further training and workshops are planned to assess the resources of some of these species.

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 and the completed ethnobotanical survey. Nursery groups have also trialled growing other native species in their nurseries. Additional community members seeing the project activities and developments have also request to have Mulanje Cedar trees to plant in their own hedges.

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 still remains to be seen with the continued 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.

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 to the project. This has included providing support to communities with hedges to help them to look after them and to deal with “pests” as they occur (e.g. livestock and termites). MMCT have provided regular communication and support to community members to deal with these issues as they arise, requesting help from partners as needed.

Assumption 5: Enough seed is produced from FRIM stands to continue to supply nurseries with sufficient seed
Comments: Enough seed was collected this year to provide seeds for propagation and conservation work. 4kg of seeds remain at FRIM offices in Zomba at the end of the year, for future work. However, in March it was learnt that one of the two remaining stands (Zomba), that act as seed sources for the Mulanje Cedar, was illegally clear cut, leaving only one seed source left. Harvesters took advantage of a temporary legal change to allow the harvest of standing dead trees and pine trees to clear all of the remaining trees and hide the logs in the amongst the other harvested wood. This significantly hampers seed collection options in the future. On learning of this, BGCI has been organising a seed collection trip to the last source in April in order to provide seed for future conservation work in Malawi but also to send some seeds to the UK that can then be distributed on to other botanic gardens around the world. This will also link into a Global Botanic Garden Fund project to provide seeds to Inala Botanic Garden in Tasmania.

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.

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. WeForest have supported the planting of 70,179 seedlings in 2022 and will plant another 15,000 in the 2022/2023 rainy season. Markets for seedlings to plant hedges outside of the project within other communities is still dependant on the essential business developments, however other community members have request seedlings to plant separate from the project because of the project activities.

Assumption 8: Malawians will continue to respond to public outreach campaigns
Comments: Public outreach has begun in 2022 and will continue into the extended fourth year of the project. Initial results suggest that within the wider community, people would appreciate more information and engagement in activities to understand what is going on, currently they feel information is too restricted to those direct beneficiaries. MMCT aims to address this through running community demonstration days to show the distillation equipment working and to help people to understand how it could be used to benefit them.

Private individuals and organisations previously engaged about the essential oils developments will also be provided with oil samples to test for use in their products, following Non-Disclosure Agreements being agreed and signed.

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 and this remains true.

Assumption 10: Expertise is available to optimise extraction techniques and develop essence products
Comments: The expert from EDE was able to travel to Mulanje from South Africa in November 2021 to support the distillation equipment set up and provide training on its use. The essential oils researcher from Mzuzu University remains available to do follow up research on oils produced in Mulanje in the extended fourth year of the project. With the passing of Arthur Stevens, another essential oils expert, John Forbes from Ceressence Consultancy has also been communicated with and will also be able to provide support to the project in the extended fourth year.

Assumption 11: Communities are receptive to new business establishment
Comments: Hedge planters have remained engaged at looking after their hedges to varying degrees – some better than others.

Assumption 12: Seed is available for collection from target species within the project timeframe
Comments: This has remained true this year, with seed collected from Mulanje Cedar trees and other native plant species from Mount Mulanje. The availability of Mulanje Cedar trees in the future is more in question, however BGCI has organised a collection trip in April 2022 using other funds so that collections are made this year.

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, but it has been significantly delayed by COVID-19 impacts on the project.

Distillation equipment has been set up and tested at MMCT. Further research into the oils produced is going to be undertaken in the project's extended fourth year. Engagement with business is also going to be undertaken simultaneously using oils produced from the planted community hedges that have been growing for the past two years.

With Mulanje Cedar trees no longer available on the mountain, loggers are removing other species for timber from the mountain including *Podocarpus* spp. and miombo woodland species like *Uapaca kirkiana*. 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. The planting trials have included planting trees next to other Afromontane evergreen Mulanje Cedar forest species, to investigate the value to Mulanje Cedar survival and growth of including other native species in restoration strategies that would add value to the wider biodiversity on Mount Mulanje.

The partnerships created between BGCI, MMCT and other supporting partners have continued to jointly seek funds for related projects (e.g. Disney Conservation Fund and Malawi Environmental Endowment Trust). 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 restoration planting undertaken by WeForest (see Table 1 in section 3). A further 16 community members (8 women) have been trained how to collect and process other native plant seeds. 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 second socio-economic baseline was completed in the first three months of 2022 to be compared with the baseline done in the first year. The data is currently being compiled for analysis for a report to be produced in May. This will quantify the benefits created by the project based on project involvement and gender within communities, showing the higher-level wider impact of the project on wellbeing.

4. Project support to the Conventions, Treaties or Agreements

Funds have been moved to the extended fourth year of the project to run a second workshop in the 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. This will help Malawi to ensure the developments that come out of the project, for the Mulanje Cedar essential oils or other species, will meet objectives related to CITES and ABS. These activities will also support Malawi to stick to Convention on Biological Diversity Aichi targets 3 and 4; Aichi target 7 is being supported by establishment of new restoration trials and data collection from all restoration trial sites.

Throughout the project, the team has been in communication with the ABS focal point, Ms Mphatso Kalemba. She has particularly advised on the creation of a Prior Informed Consent and Mutually Agreed Terms system for the Ethnobotany survey.

5. Project support to poverty reduction

Table 2: Project beneficiaries and monetary benefits they received each project year

Beneficiary group	Monetary benefits received 2019-2020	Monetary benefits received 2020-2021	Monetary benefits received 2021-2022
8 community nursery groups (70% of women)	9,084,000 MK received from 75,700 seedling sales, 21,715 of which have so far been used to plant in hedges	12,370,440 MK received from 94,512 seedling sales, 15,350 of which have so far been used to plant in hedges and 79,162 to plant in restoration sites on Mulanje	8,421,480 MK received from 70,179 seedling sales. These have been used for restoration on the mountain
Community hedge planters / owners (% of women)			
Seedling transporters for restoration and hedges	1,500 MK/person/day was paid for transporting 10,000 sapling for restoration on the mountain	1,500 MK/person/day was paid for transporting 79,162 sapling for restoration on the mountain	1,500 MK/person/day was paid for transporting 70,179 saplings for restoration
Community members involved in plot clearance and preparation activities		1,350 MK / person / day was paid for the plots planted on 32 sites	1,995 MK/person/day was paid for planting activities on the mountain

Table 3: Project beneficiaries and non-monetary benefits they received each project year

Beneficiary group	Non-monetary benefits received 2019-2020	Non-monetary benefits received 2020-2021	Non-monetary benefits received 2021-2022
8 community nursery groups (70% of women)		94 (over 60% women) trained in business skills and marketing	16 (8 women) trained how to collect and process other native plant seeds
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 planting and management	
CGPA members		20 (over 60% women) trained in in business skills and marketing	

6. Consideration of gender equality issues

98 nursery workers (68 women) have continued to benefit from the restoration work carried out on the mountain, including the establishment of new restoration trials this year. 8 of those trained to collect seeds (50% of those trained) were also female participants in January 2022. Those trained will take part in future training in the extended fourth year, related to plant resource assessments and further business training, including Nagoya protocol compliance.

7. Monitoring and evaluation

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 met once after COVID-19 related delays in October 2021 (See Annex 4.1)

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

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

1. Distillation equipment was set up at MMCT with training on its use given (Activity 3.3)
2. The outreach campaign was planned and started in 2022, to be completed in an extended fourth year to the project (Activity 2.4)
3. A socio-economic survey was repeated by MMCT (Activity 3.5)
4. A Change Request has been accepted (14) to transfer funds to an extended fourth year of the project to re-assess Mulanje Cedar and assess other overexploited plants from Mount Mulanje, carry out further research into the oils quantity and quality from planted hedges (since initial research suggested locations around the country had different chemical compositions – Activity 3.1), engage businesses with oil samples (Activity 3.2, carry out further Nagoya protocol compliance and business skills training (Activity 2.6), provide demonstrations to communities of the distillation equipment (Activity and complete the outreach programme (Activity 2.4).

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

1. The ethnobotanical survey was completed and report submitted to the project team (Activity 4.1)
2. Local community members were trained to collect native seeds by FRIM (Activity 4.2)
3. The results of propagation trials implemented so far will be used to create propagation protocols for those species (Activity 4.3)
4. 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 – 1 meeting held. The meeting minutes, written by BGCI and MMCT, acts as an indicator of the SC meetings that have been undertaken (see Annex 4.1).

- Cedar hedge records – 185 hedges have been planted. 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, 375 attendees at hedge planting and management training and 16 attendees (7 women) to seed collection training, acts as a measure of the training given indicator.
- Nursery certification register – FRIM have certified the nurseries again granting 8 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.

8. Lessons learnt

Community members growing Mulanje Cedar trees as hedges have faced different challenges keeping the trees alive in the lowlands. For dealing with livestock impacts, fencing around the planted sites was necessary. For dealing with pests, like termites, control has been recommended through the use of orange oil, neem oil, apple cider vinegar and/or wet cardboard. It was also important for those engaged to actively look after the sites, including watering when needed, with those engaged that were less active seeing the worst survival results. For dealing with challenges seen, MMCT has been an important resource to community members, sharing knowledge they have on them and sharing experiences between community groups as needed.

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

One of the main reviewer's comments was "It is likely that for outputs to be achieved – given so much has been left to the final year – an extension will be necessary. Without that likelihood of contribution to Outcome level changes is less likely." For this reason, the team submitted a change request before the end of 2021 that was accepted by the Darwin Initiative to extend the project for another year and moving £26,000 to carry out essential oils business research and development activities.

The reviewers also commented that the business developments will take time beyond 2022 to come to fruition and that support for this industry will be needed. The extension will help with this, whilst with the distillation equipment now installed and local people trained to use it MMCT is able to use the equipment to both support Mulanje Cedar essential oils investigations and development as well as development of other essential oils local industries (e.g. from lemongrass – *Cymbopogon* spp.). MMCT will use incomes gained to support communities to conserve the Mulanje Cedar tree and Mount Mulanje into the future.

The reviewer also commented that "it would seem sensible to get as much propagation of Mulanje cedar as possible for restoration on the Plateau." Seed collection from the remaining seed source site has been undertaken in each season (February to April), including other funds being raised by BGCI to fund collection in April 2022. This will align with another project that aims to propagate Mulanje Cedar trees in Tasmania, where the team an Inala Jurassic Garden has success in propagating and growing other threatened *Widdringtonia* tree species from South Africa.

A further comment from the reviewers was on the need to ensure seedlings are not lost because of water shortages through difficult drought periods. This year this was improved by relocating two of the nurseries that struggled most with this, closer to water access points. These were Kazembe and Lomoliwa nurseries.

10. Other comments on progress not covered elsewhere

No comments to add.

11. Sustainability and legacy

Although all the hedges that were planted have not survived, this was largely due to lesser engagement and protection provided by some groups. For those that put more effort in, e.g. with fencing to protect from livestock, watering in the dry season and protection from pests – the trees appear much healthier and some have grown considerably in only a couple of years (see figure 4).

Figure 4: Mulanje Cedar hedge trees after 2 years, with fencing to protect the trees from livestock damage

The project supported 5 representatives to present work from the project at the Southern African Mountain Conference in a special session in March (See Annex 4.8). Zacharia Magombo, from the National Herbarium and Botanic Garden, Malawi, also delivered a key note presentation on the Mulanje Cedar history and conservation at the conference. This generated a lot of interest for the conference attendees with connections formed for future mountain research with the Afromontane Research Unit, South African Environmental Observation Network as well as the University of Malawi.

The exit strategy is still valid with over 200 community members having received training associated with the essential oils enterprise developments. Interest in this is going to continue to be expanded in the public awareness campaign and through the running of demonstration sessions of the use of the distillation equipment. The latter will allow people to understand what can be produced and how they could be future beneficiaries by the provision of plant materials grown on their own land. At the same time the business engagement and continuing essential oils research, will provide an understanding of the demand that will become available in the near future for essential oils of Mulanje Cedar hedges. This can be used to plan what number of hedges is needed to supply to the new industries.

Continued engagement and training in the extended fourth year with FairWild standards methodologies 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.

Analysis of the data collected for the restoration trials, along with fundraising for further data collection in 2023, will contribute to an improved understanding of how best to restore Mulanje Cedar trees on Mount Mulanje.

12. Darwin identity

At the Southern African Mountain Conference, the support of the Darwin Initiative was mentioned during presentations with the logo displayed – Alex Hudson (BGCI), Louise Egerton-Warburton (Chicago Botanic Garden), Innocent Taulo (FRIM), Carl Bruessow (MMCT) and Raheela Ahmed (Ethnobotany consultant). It was also shown as a sponsor of the whole conference on their website (https://www.samc2022.africa/#) and during sessions.

A blog was also published on the Global Trees Campaign website for International Women's Day in March 2021 that had responses from Raheela Ahmed about the conservation work of the Mulanje Cedar tree - https://globaltrees.org/news-blog/championing-the-women-working-with-gtc/

13. Impact of COVID-19 on project delivery

COVID-19 has continued to have delaying impacts on the project, particularly in relation to the essential oils development and investigations into other overexploited species from Mount Mulanje. However, this year, the ethnobotanical study has been completed and the distillation equipment installed at MMCT offices with training on how to use the machinery delivered.

A project extension was requested and accepted to deal with some of these issues, moving funds into a new year to research and develop essential oils business opportunities further, and assess the resources and use situation for other important Mount Mulanje plant species.

Throughout the pandemic, management meetings have been online or hybrid to reduce the risk for attendees. MMCT staff worked from home as much as possible until mid-2021 when they started to return to the office more often. All nurseries have used washing stations and worked in reduced staff numbers at any one time. These restrictions have gradually been reduced in 2021 as the situation globally has improved and vaccinations rolled out. BGCI and ERA staff only travelled to Malawi for the first time for the restoration trial fieldwork in January and March 2022. Traveling staff having received full vaccinations.

During the BGCI project manager's visit in March, his return home was delayed by a week when a PCR COVID-19 test before travel came back positive. This was due to genetic remnants of having been ill in February that still showed up on the test.

14. 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.

There have been no safeguarding incidents or concerns in the project so far.

15. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2021 – 31 March 2022)

Project spend (indicative) since last Annual Report	2021/22 Grant (£)	2021/22 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)	[redacted]	[redacted]	-0.11	
Consultancy costs	[redacted]	[redacted]	-47	£[redacted] moved to an extended fourth year of the project. It was expected that further consultancy work would be carried out by the plant survey consultant into markets of specific species, however the initial report was submitted without time available to do this
Overhead Costs	[redacted]	[redacted]	-3.6	£[redacted] moved to an extended fourth year for the project audit
Travel and subsistence	[redacted]	[redacted]	3.2	
Operating Costs	[redacted]	[redacted]	8.5	£[redacted] moved to an extended fourth year of the project
Capital items (see below)	[redacted]	[redacted]	-19	The requirements for installation of electricity supply to the distillation equipment housing for was less than expected.
Monitoring & Evaluation (M&E)				
Others (see below)	[redacted]	[redacted]	-5.6	£[redacted] moved to an extended fourth year of the project
TOTAL	**100,326**	**99,827**	**-0.5**	

These figures are a draft because some receipts are still to be received to confirm the final amount spent and to be updated for the actual claim.

16. OPTIONAL: Outstanding achievements of your project during the reporting period (300-400 words maximum). This section may be used for publicity purposes

I agree for the Darwin Initiative Secretariat to publish the content of this section (please leave this line in to indicate your agreement to use any material you provide here).

For the ethnobotany study, the ABS Focal Point in Malawi has been worked with to design the system of Prior Informed Consent (PIC) and Mutually Agreed Terms (MAT) that has been followed so far. PIC agreements were signed with Traditional Authority leaders involved in the research, informing them of the reason for the research and the process, should any further developments occur in the future. The initial outline for MATs has also been drafted so that

these can be negotiated where needed in the future. This should help other projects that look to develop products from traditional knowledge and with community engagement elsewhere in Malawi as the government has more experience and guidance for the process.