Darwin Initiative: Final Report

*To be completed with reference to the "Writing a Darwin Report" guidance: (http://www.darwininitiative.org.uk/resources-for-projects/reporting-forms). It is expected that this report will be a **maximum** of 20 pages in length, excluding annexes)*

Darwin Project Information

Project reference	23-026
Project title	Domestication of Mulanje Cedar for Improved Livelihoods
Host 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	£252,172
Start/end dates of project	April 2016 – March 2019
Project leader's name	Paul Smith
Project website/blog/Twitter	www.globaltrees.org/projects/save-our-cedar-malawis-national-tree/ #SaveOurCedar
Report author(s) and date	Kirsty Shaw (BGCI) and Ibrahim Mitole (MMCT)

1 Project Rationale

Malawi's national tree – the Mulanje cedar (*Widdringtonia whytei*) – occurs naturally only in the Mulanje Mountain Biosphere Reserve, and is critically endangered. Prior to the initiation of this project, it was estimated that cedar forest cover had declined by 37% in the last 28 years. The ecological baseline survey carried out in year 1 of this project indicated that the decline has been much more severe than this, and Mulanje cedar is now practically extinct from its natural habitat. A revised Critically Endangered conservation assessment has been submitted to the IUCN Red List. The loss of Mulanje cedar and associated forest species on the mountain has resulted in soil erosion and flash flooding during rainy periods, resulting in the loss of 18 lives in 2016. Mulanje cedar is a high value timber tree and both legal and illegal cutting have represented an important source of income for local communities. In response to the cedar's decline, the Malawi Forestry Department developed a Cedar Management Plan (2014-2019). This document recommended that: (i) large scale ecological restoration of the cedar should be undertaken, and (ii) off-take of the cedar should be prohibited for at least the next five years. Previous attempts to restore cedar forests and to grow the species more widely have been limited by its poorly understood ecology, pathology and horticulture. The cutting ban posed a risk to local livelihoods obtained from the mountain. In reality, it is the absence of cedar remaining on the mountain that has now resulted in a loss of income stream to local people, and other trees on the mountain are now being targeted for timber. Although efforts to plant the tree on Mulanje Mountain prior to this project had proved challenging, it has been successfully planted at small scale elsewhere in Malawi with better growth rates than on Mulanje. The cedar also grows in botanic gardens in Kenya, Tanzania, Indonesia and New Zealand. The Cedar Management Plan, combined with consultation with local partners, identified these problems and the need for this project. The project aimed to generate new knowledge and deliver biodiversity and livelihood benefits by:

- Defining optimal growing conditions, and improving horticultural protocols for cedar restoration on Mulanje Mountain and for wider cultivation in Malawi.
- Generating alternative sustainable income sources for poor people through the sale and planting of cedar seedlings.
- Significantly reducing unsustainable exploitation and habitat loss of natural stands of cedar.

The main project activities took place on and around Mulanje Mountain Forest Reserve. Trial plots have also been set up across Malawi to test growth limits and identify optimal growing conditions for Mulanje cedar.

Figure 1 Mulanje Mountain Forest Reserve

2 Project Partnerships

The two main implementing partners in Malawi are the Mulanje Mountain Conservation Trust (MMCT) and the Forestry Research Institute of Malawi (FRIM). Good partnerships between Botanic Gardens Conservation International (BGCI) and these organisations, and between the two organisations in Malawi, have ensured successful delivery of this project over the three years. The need for the project was identified by all partners, and all partners were involved in project planning.

MMCT's mandate is to ensure conservation and sustainable utilisation of the natural resources of Mulanje Mountain, including Mulanje cedar. MMCT has over 20 years' experience working on Mulanje Mountain and is well known by community members and the district government offices of Mulanje and Phalombe, the two districts that Mulanje Mountain spans. Ibrahim Mitole, Project Manager for this project from MMCT, helped to write this report and other MMCT staff contributed information.

FRIM's technical expertise and experience in cultivating and managing stands of Mulanje Cedar, on Mulanje Mountain and elsewhere, added huge experience to the project team. The FRIM Director, Dr. Tembo Chanyenga, has decades of experience working on Mulanje cedar, works closely with the Mulanje and Phalombe District Forest Officers and played a key role in designing, implementing and promoting this project to other government departments in Malawi. FRIM and District Forest Officers provided information for this report.

BGCI's involvement in the project is based on the need for identification of optimal growing conditions for Mulanje cedar (indicator 0.1) and improved horticultural protocols (i0.2) for cedar restoration on Mulanje Mountain and for wider cultivation across Malawi. A key success of this project, was the ability to mobilise experts from BGCI's global network to help answer these questions. In year 1, Andrew Bower from the US Forest Service helped carry out the ecological baseline survey of remaining cedar stands on Mulanje Mountain and collected material to carry out genetic analyses (i0.1). Dan Luscombe from Bedgebury National Pinetum in the UK and Richard Jinks from the UK Forestry Commission designed nursery trials to identify optimal growing conditions, which were implemented in Malawi and the UK, and they helped write horticultural protocols for Mulanje cedar (i0.2). Louise Egerton-Warburton, a soil and microbial ecologist from Chicago Botanic Garden, collected soil and foliage samples to analyse microbial associations of Mulanje cedar (i0.1). The BGCI project team regularly visited Malawi over the duration of the project. Kirsty Shaw, Project Manager, visited an average of 3-4 times per year, Paul Smith, Project Leader, visited the project each year, and Stephen Blackmore, Chair of the BGCI Board, and previous Chair of the Darwin Expert Committee, visited in year 2 to help promote the project (i5.3).

In addition to FRIM, the Malawi Forestry Department was involved in the project. For example, the Director of Forestry provided advice to the project, the District Forest Officers for Mulanje and Phalombe Districts sat on the project steering committee and, alongside forestry extension workers in these two districts, supervised nursery work and cedar planting. A representative from the National Botanic Garden and Herbarium of Malawi also sat on the project steering

committee. Non-governmental partners represented on the project steering committee include African Parks and a representative of the Traditional Authorities.

This project engaged the Traditional Authorities of Mulanje and Phalombe Districts from the project outset. Their continued support throughout the project helped to motivate nursery groups and will help ensure the sustainability of project actions beyond the formal project timeframe. Traditional Authorities and nursery representatives were also involved in all major project meetings to ensure their ideas were included in project planning. Starfish Malawi, an NGO linking schools in Malawi and the UK, supported the outreach components of the project (i5.3).

All project partners have contributed to the successful delivery of this project, and all will remain in touch.

3 Project Achievements

3.1 Outputs

The project set out to deliver five outputs, all of which were either achieved fully or good progress was made towards them within the project timeframe. Establishing a strong project management team from BGCI, MMCT and FRIM, a productive steering committee and appointing appropriate experts from the BGCI network helped ensure delivery of all outputs.

Output 1: Optimal cedar growing conditions characterised to improve reforestation success on Mulanje Mountain and to define areas suitable for cedar cultivation elsewhere in Malawi.

This output was achieved by characterising the genetic diversity of remaining cedar stocks as far as possible, carrying out symbiont analyses, and investigating optimal abiotic requirements for growing Mulanje cedar. Despite one activity not yet being completed (mapping of where Mulanje cedar will grow across Malawi), the amount of information on optimal cedar growing conditions has greatly improved over the timeframe of this project.

Genetic analyses were carried out by the US Forest Service (USFS) (i1.2). Andy Bower took part in the ecological baseline survey in year 1 (summary in Annex 7.1a) and collected foliage and wood samples for DNA analysis. Foliage samples were also collected from Zomba plantation, and seedlings grown from four different forestry stands at Zomba, Chikangawa, Sombani and Tanzania. This aimed to determine if genetic diversity varied across different basins on the mountain, between forestry stands, and to determine the provenance of the stand at Zomba, which provided the seed source for this project. Unfortunately, the only samples that yielded good results were the foliage samples. Initial analyses indicated that there is some genetic variation among samples collected from different basins. It also appears that all seed sources tested were grown from seed that originated from the Lichenya Plateau, which would mean that the genetic diversity of what is being replanted on the mountain is limited compared to original natural populations, but it is the best material available. The USFS is committed to continuing this work and new methods of DNA extraction and analysis are becoming available and at a cheaper rate, which will hopefully generate improved results in future. The USFS contributed almost £40,000 in-kind to the project to carry out these analyses.

Symbiont analyses were carried out by Chicago Botanic Garden (i1.2). In year 2, Louise Egerton-Warburton, a soil and microbial ecologist from Chicago Botanic Garden, collected root and soil samples from nursery seedlings, newly planted and remnant cedar stands on Mulanje Mountain, and native (non-cedar) vegetation on Mulanje Mountain. Analysis of soil properties and sequencing of mixed soil / root samples has helped to identify optimal growing conditions for Mulanje cedar in the nursery and when planted out. For example, analysis has shown that native Mulanje cedar arbuscular mycorrhizal fungal (AMF) communities are species rich (16 AMF genera and 39 AMF species), and composed of a unique suite of AMF species in comparison to planted seedlings or native plant communities. The following guidance was developed on soils to use / practices to follow in nurseries (i.e. aiming to replicate natural stands);

- Soil organic content (SOC) is higher and soil pH and nitrate levels are lower in Mulanje cedar stands, compared to nursery soils. Soils with properties more similar to Mulanje

Mountain, especially those with higher Soil Organic Content (SOC) and lower pH, should be used in nurseries to try to improve seedling survival rates.
- Mulanje cedar stands have the lowest nitrogen to phosphorus ratio compared to other tested soils.
- Seedlings in nurseries are also suffering from excess salts which likely comes from the supply of water used to water the plants, coupled with high evapotranspiration rates. If possible, seedlings should be watered with rainwater.

Potential causes of seedling die-off after planting include;
- High levels of deleterious soil microbial activity. Glucosidase, an enzyme produced by microbes to decompose organic matter, is highest in planted seedlings compared to other soils. This may mean that seedling die off is caused by the roots of planted seedlings decomposing.
- In the rhizosphere soils of planted seedlings, fungi that cause root diseases such as tar spot and stem blight were identified.
- Lack of suitable AMF communities in planting areas.
- Soil nitrate is higher in planted seedlings than natural cedar stands, which indicates that residual nutrients from potting soil are being transferred to the field (using soils with properties more similar to Mulanje Mountain will help with this).

More detailed results are included in Annex 7.2. The project funded Louise's trip to Malawi and contributions to analysis work (£5,000), but additional staff time and funding for analyses was contributed by Chicago Botanic Garden to the scale of more than £6,000.

Eight trial plots were designed and planted across Malawi in year 1, at Zomba, Dedza, Chikangawa and Luwawa (i1.3). Unfortunately, not all plots were well-managed so some seedlings were lost. It is thought that heightened awareness within the Forestry Department of the need to conserve Mulanje cedar will result in improved management going forwards. Data loggers were placed at all trial plots to measure temperature and rainfall. Year 2 results (Annex 7.3) and year 3 observations tell us that Mulanje cedar grows well in a much wider temperature and rainfall variation than is naturally experienced on Mulanje Mountain, as the project predicted. The trial at Luwawa is doing best, with 1m growth after 1 year (faster than on Mulanje Mountain). We are awaiting year 3 measurements from the trial plots (delayed due to a governmental election in 2019 which slowed down Forestry Department operations). When these measurements have been received, a map showing suitable areas for Mulanje cedar cultivation across Malawi will be published (A1.3).

Output 2: Improved horticultural protocols developed for the Mulanje cedar to improve survival and growth rates in community nurseries.

This output was achieved by establishing nursery trials in the UK and Malawi to identify optimal growing practices in the nursery (A2.1). The trials were designed by Dan Luscombe from Bedgebury Pinetum, Richard Jinks from the UK Forestry Commission, Louise Egerton-Warburton from Chicago Botanic Garden and Tembo Chanyenga from FRIM. The trials investigated the effect of different potting media, air pruning, and inoculation with mycorrhiza. See Annex 7.4 for trial designs and results. Training was provided to nursery groups by Dan Luscombe and FRIM, which enabled nurseries to establish trials and measure growth and survival rates in nurseries throughout the project (A2.2).

This research has enabled improved horticultural protocols to be developed for Mulanje cedar (i2.1, see Annex 7.5). This will help improve survival and growth rates in the community nurseries going forwards, enabling them to continue to sell good quality Mulanje cedar seedlings for restoration and timber plantations.

Output 3: Cedar propagation in community nurseries generates income for local households.

This output was achieved by equipping community groups with the facilities (i3.1) and skills to propagate (i3.2) and sell (i3.3) Mulanje cedar seedlings. 150 people (66% women) were appointed to work in nursery groups and received payments for seedling production (see Annex 7.6 for year 3 seedling production and payment records). A total of 568,642 seedlings were sold for restoration on Mulanje Mountain. Direct payments to nursery groups brought significant livelihood improvements over the project timeframe.

Ten nursery infrastructures were established around the base of Mulanje Mountain in year 1 (i3.1). In year 2, one nursery had to be relocated as the original location was too shady and some nursery improvements were done. In year 1, all nursery workers received training from FRIM and forestry extension workers, who were trained by Dan Luscombe from Bedgebury Pinetum (i3.2). Ten nursery chairpersons were appointed in year 1 and they were given training on business skills (i3.3). Following a capacity gap assessment conducted in year 2, additional technical training was provided and business skills training was provided to all 150 nursery workers.

More than 25kg of seed was provided to nursery groups by FRIM over the project timeframe (i3.4), enabling groups to raise 359,474 Mulanje cedar seedlings in year 2 and 294,819 Mulanje Cedar seedlings in year 3 (a total of 654,293 seedlings, i3.5). In addition, nursery groups were given seed from *Faidherbia albida, Albizia lebbeck, Khaya anthotheca* and *Pinus oocarpa* and 26,108 seedlings of these species were raised in year 3 (i3.5). Although this is lower than the target of 500,000 Mulanje cedar seedlings per year, and 50,000 seedlings of other species, the project management team is very impressed with the achievements of nursery groups, most of whom had no experience propagating tree seedlings prior to this project.

A total of 568,642 seedlings were sold for restoration on the mountain (i3.6), and the remaining seedlings were purchased to support the project outreach campaign and planting elsewhere across Malawi. Payments were made directly to nursery groups, introducing an alternative source of cash income to households in rural districts of Mulanje and Phalombe. As detailed in the year 3 socio-economic report (Annex 7.7c), production of Mulanje cedar seedlings has become one of the key sources of livelihoods for people around the mountain. This has enabled nursery workers to purchase food, farm inputs, other household assets, as well as pay school fees and construct and improve houses. Before the project started, over 85% of people interviewed believed that local communities could never be involved in raising, planting and managing cedar, it was a naturally growing tree that only government could protect and manage. Now 99% of interviewees recognize that propagating Mulanje cedar seedlings is a major source of household cash income.

Output 4: Local and national cedar stakeholders work together with international experts to identify cedar markets, develop mechanisms for tapping into those markets and promote the cedar.

The key activity that led to this output being achieved is a successful national cedar publicity campaign (i4.2), the aims of which were to highlight the value of standing cedar on Mulanje Mountain to local people, bust the myth that Mulanje cedar cannot be grown, highlight the value of involvement in Mulanje cedar conservation efforts to local people and encourage other sectors to support Mulanje cedar conservation efforts, including leveraging stronger government support, private sector support and increased planting of Mulanje cedar across Malawi.

The outreach campaign was launched in year 1, led by MMCT, with support from FRIM, Bedgebury Pinetum and BGCI. The campaign targeted national and local media, including TV, radio and newspapers. School events and local community events were also organised, with an audience of more than 2,000 people around Mulanje Mountain. The campaign was also successful nationally, as more than £7,000 was raised from corporates not based in Mulanje to support cedar restoration in year 3 and heightened awareness was created nationwide that Mulanje cedar is Malawi's national tree and it needs protecting. In addition to this, FRIM provided seedlings to government ministers to raise awareness of the status of Mulanje cedar within government. A summary of outreach activities in years 2 and 3 and a review of outreach materials produced through the project is included in Annex 7.8, the results of which will guide production of future awareness raising materials. The maps that will be published soon indicating where Mulanje cedar will grow well across Malawi (i.3) will also help direct the publicity campaign and continued marketing efforts in future.

A Cedar Growers and Planters Association (CGPA) was formed in year 3 of the project, with 14 community conservation groups represented and 6 individual members (i4.1). A constitution for the CGPA was developed (Annex 7.9). FRIM is in the process of setting up voluntary certification scheme for nurseries, which was identified by the project steering committee and the CGPA as the optimum mechanism for maintaining production of good quality seedlings and

ensuring continued equitable sharing of benefits from seedling sales among nursery group members in future (i4.3).

Output 5: Unsustainable exploitation and damage to natural stands of cedar significantly reduced as a result of local communities working with the authorities to protect, restore and sustainably manage the remaining natural stands of cedar on Mulanje Mountain.

The ecological baseline survey carried out at the start of this project (i1.2) showed that destruction of natural stands of Mulanje cedar was much more severe than anticipated (Annex 7.1a). Efforts under this output have therefore focused on protection of recently planted Mulanje cedar seedlings and involvement of as many people in Mulanje cedar conservation efforts as possible.

A draft Integrated Management Plan for Mulanje Mountain Biosphere Reserve has been produced by the Forestry Department, MMCT and the USFS, which has a component on managing Mulanje cedar plantations (i5.1). Local communities, including nursery group members, were consulted during production of this document.

Over years 2 and 3, 1,500 people were paid US$ 2.04 per day for land preparation, seedling transportation or planting seedlings up the mountain. In year 3, 232,669 Mulanje cedar seedlings were planted out on the mountain, making a total of 568,642 overall (i5.2). More than 100,000 seedlings were planted in Chambe basin in year 3, i.e. the majority were planted in one site to make seedling protection easier. Additional firebreaks were added around recently planted cedar stands and natural regeneration sites identified in the year 1 ecological baseline survey (i1.2). Analysis of satellite data has shown that fire incidences have reduced each year since 2015 (i5.5) as shown below, indicating that fire management is improving on the mountain. The project also enabled additional fire-fighting equipment to be purchased to protect planted seedlings in future.

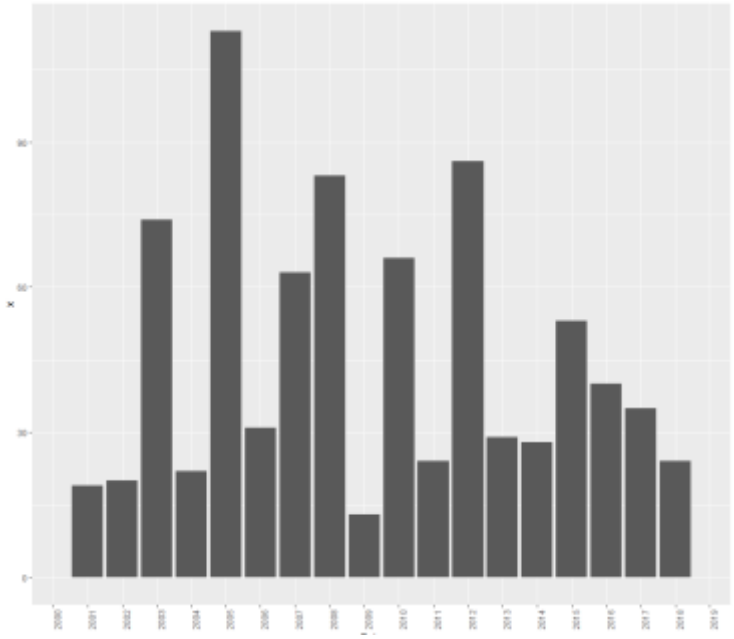

Figure 2: Number of recorded fires on Mulanje Mountain (from MODIS) in the last 18 years.

The public awareness campaign generated support for Mulanje cedar conservation and planting, both locally and nationally, through a variety of media channels, events and activities (i5.2 and i5.3). Before the project, >85% of people interviewed in the baseline socio-economic study believed that local communities could never be involved in raising, planting and management of Mulanje cedar. In the year 3 socio-economic study (Annex 7.7c), 99% of people who were interviewed agree that Mulanje Cedar has become one of their major sources of household cash income. This is a major change of people's views and perceptions of Mulanje cedar (i5.4). The socio-economic study also shows that there is also strong recognition from nursery groups (96% of interviewees) that the mountain's natural resources are no longer readily available as they were in the past, and there is a significant increase in the number of people owning woodlots in the project areas compared to the start of the project. This indicates that there is increased recognition of the importance to conserve their own forest resources

rather than solely rely on the mountain resources. The study also indicated that communities are not happy with the level of protection provided to the mountain's resources by government, nor the punishments given to people carrying out illegal harvesting. These findings indicate an increased desire to protect the mountain's resources that will hopefully contribute to reduced unsustainable exploitation in future.

3.2 Outcome

Outcome: Income from Mulanje cedar propagation supports Malawian households currently dependent on unsustainable harvesting of the cedar, and prospects of the cedar becoming a sustainable forest product are improved.

The project outcome has been achieved.

Income from Mulanje cedar propagation has brought significant livelihood improvements to households in Mulanje and Phalombe districts. 150 people (66% women) were trained in nursery techniques and business skills and have earned an average of $553.91 from seedling sales over the full project (representing two planting seasons, 2017-2018 and 2018-2019). This has enabled people to construct and improve houses, pay for school fees, buy food, farm inputs and other household assets. In addition, more than 1,500 additional people earned an average of $2.04 per day for land preparation, seedling transportation and planting of Mulanje cedar seedlings on Mulanje Mountain in years 2 and 3, representing an average earning of $84.21 per person over the project timeframe. Prior to initiation of the project, Mulanje cedar propagation was not recognised as an income generating mechanism by communities around the mountain, but the year 3 socio-economic study shows that 99% of people interviewed agree that Mulanje cedar propagation has become one of their major sources of household cash income. Socio-economic studies (i0.3 and A3.7) are included in Annex 7.7 and records of year 3 payments to nurseries (i0.3 and A3.6) are provided in Annex 7.6.

Communities are well-placed to continue to receive payments for seedling production as nursery infrastructures established by the project are still functional (i3.1) and nursery groups have been equipped with technical (i3.2) and business skills (i3.3) to continue propagating and selling Mulanje cedar seedlings, further supported by the production of improved horticultural protocols (output 2, i2.1 and I2.2) and the market for cedar restoration is in place as WeForest has committed to continue purchasing seedlings for restoration on Mulanje Mountain. FRIM will continue to provide Mulanje cedar seed to nurseries (i3.4), giving them a monopoly on seedling sales for at least the next five – ten years, until the replanted stocks on Mulanje Mountain start producing seed. Optimal growing conditions for Mulanje cedar have been identified (output 1) by carrying out genetic and symbiont analyses (i1.2) and establishing growth trials across Malawi (i1.3). When year 3 measurements have been taken, a map will be produced showing where in Malawi Mulanje cedar will grow well (i1.3), which will be the target of future marketing efforts. This project is also building on a successful public outreach campaign (i4.2) that raised awareness of the need for Mulanje cedar conservation, raised money for restoration on Mulanje Mountain and raised awareness of the fact that Mulanje cedar can be planted for timber elsewhere in Malawi (output 4 and Annex 7.8).

It is unclear whether the beneficiaries from this project are the same people that were involved in illegal harvesting of cedar. People rarely share this information as they do not want to get in trouble. Also, the project aimed to employ >60% women in nursery groups, due to limited employment opportunities available for women in the region, but it is mostly men involved in illegal timber harvesting operations. It is very likely that households involved in timber harvesting are now receiving alternative and sustainable income from seedling sales. It is also very likely that a high proportion of the 1,500 people from around Mulanje Mountain that have received payments for land preparation, planting and transporting Mulanje cedar seedlings were involved in illegal felling activities.

Prospects of the cedar becoming a sustainable forest product are further improved through the production of a draft Integrated Management Plan for Mulanje Mountain Biosphere Reserve (i5.1), which includes a section on management of plantations, the establishment of *ex situ* plots of Mulanje cedar at Forestry Department sites and planting of Mulanje cedar by government officials and others, increasing the number of conservation collections for this species (i1.3). There is heightened awareness of the status of Mulanje cedar on Mulanje Mountain and the need to protect it, as a result of the public outreach campaign. There is also

evidence in the year 3 socio-economic report that local community awareness of the need to protect Mulanje cedar has increased, and that communities are taking actions, such as planting woodlots, to reduce their own reliance on mountain forest resources in future (i5.3 and i5.4). Matched funding has been raised to support further restoration planting on Mulanje Mountain, improve restoration success rates and to control invasive species on Mulanje Mountain that currently hinder restoration efforts.

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

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.

As a result of this project, excellent progress has been made towards Mulanje cedar becoming a sustainably managed commercial product in future. Optimal growing conditions for Mulanje cedar have been characterised (i1.2 and 1.3 and Annex 7.2) and improved horticultural protocols have been developed (i2.1 and 2.2 and Annex 7.3). Local and national markets have been established for Mulanje cedar, through a successful public awareness campaign (i4.2 and Annex 7.8) which raised more than £7,000 for Mulanje cedar restoration from Malawian corporates in year 3. 150 people have been equipped with the facilities (nursery infrastructures, i3.1) and skills (i3.2 and 3.3) to propagate and sell Mulanje cedar seedlings, supported by establishment of a CGPA to encourage continued production of good quality seedlings and equitable sharing of benefits from Mulanje cedar seedling sales in future (i4.1 and i4.3 and Annex 7.9). The restoration market is already in place as WeForest has committed to continue purchasing seedlings from community nurseries for restoration.

The project has had a positive impact on poverty alleviation. Sale of sustainably produced Mulanje cedar seedlings and restoration activities have benefited more than 1,650 people around Mulanje Mountain in the course of this project (i.3.6, i3.7 and i5.2). This has increased household income and enabled people to construct and improve their houses, pay school fees, and purchase food, farm inputs and other assets. The public awareness campaign has informed people across Malawi that the species can be planted elsewhere in Malawi, and availability of seedlings from community nurseries will be promoted in future so that other people can purchase and gain benefit from sustainably growing a supply of Mulanje cedar timber for harvest.

This project has also had a positive impact on biodiversity. More than 550,000 Mulanje cedar seedlings have been planted on Mulanje Mountain over the timeframe of the project (i5.2). Fire protection on the mountain has increased through purchase of fire-fighting equipment, building additional firebreaks around newly planted seedlings and natural regeneration, which may have contributed to the reduced number of fire incidences experienced on Mulanje Mountain since 2015 (i5.5). *Ex situ* sites of Mulanje cedar have been planted (i1.3). The project has also raised awareness locally (i5.3 and i5.4) and across Malawi of the need to conserve Mulanje cedar, including within government. An updated IUCN Red List assessment has been submitted and a proposal has been submitted to CITES for Mulanje cedar to be listed on Appendix II.

The project mobilised £159,268 cash and in-kind contributions to scale up activities within the project timeframe, and has raised an additional £422,897 for activities beyond the timeframe of the project, to continue and to improve restoration of Mulanje cedar on Mulanje Mountain (see section 8.2 for detail). The partnerships put in place through this project include a strong project team who are committed to continuation of this work, as well as continued commitment from other partners including USFS and Chicago Botanic Garden. These factors will deliver additional contributions to the project impact. The project team anticipate that the impact will be delivered in the next decade as the cedar on the mountain starts to yield seed, and in 30-40 years' time as timber becomes available.

4 Contribution to Darwin Initiative Programme Objectives

4.1 Contribution to Global Goals for Sustainable Development (SDGs)

SDG1: End poverty in all its forms everywhere. Project contribution: 150 people (66% women) in low-income rural communities have improved household incomes for seedling sales, earning an average of USD $553.91 from seedling sales over the full project. An additional 1,500 people from rural communities have received payments averaging USD $2.04 per day for

planting activities, with an average earning of USD $84.21 per person over the project timeframe.

SDG5: Achieve gender equality and empower all women and girls. Project contribution: 66% women were appointed to nursery groups in an area where employment opportunities for women are limited. This project has provided new employment opportunities for women in the region.

SDG8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. Project contribution: Employment opportunities have been created through the project. The market for Mulanje cedar seedlings will continue beyond the project, for restoration on Mulanje Mountain, and elsewhere as a result of the successful public outreach campaign.

SDG13: Take urgent action to combat climate change and its impacts. Project contribution: The project has planted more than 550,000 seedlings on Mulanje Mountain, helping to offset carbon emissions. Some seedlings have been lost due to fire, but survival rate in other plots is 72.4%.

SDG15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. Project contribution: The project has initiated restoration of degraded forests on Mulanje Mountain. There are fewer than 50 mature individuals of Mulanje cedar remaining in its natural habitat as a result of logging. This project has initiated a species recovery project for Mulanje cedar, planting 568,642 Mulanje cedar seedlings on Mulanje Mountain.

4.2 Project support to the Conventions or Treaties (CBD, CITES, Nagoya Protocol, ITPGRFA)

This project is helping Malawi meet its obligations to the CBD by contributing to the following Aichi Targets;

Aichi 1: Raising awareness. Project contribution: The public outreach component of this project has been extremely successful. A combination of national and local outreach has led to heightened awareness of the status of Mulanje cedar on Mulanje Mountain, an attitude change by local communities who now believe that Mulanje cedar can provide income to communities in a sustainable way, an increase in the number of individuals and organisations aware of the need for, and contributing to, the conservation of Mulanje cedar. For example, donations of more than £7,000 were raised from corporations to support Mulanje cedar planting in year 3.

Aichi 2: Integration of biodiversity values into development. Project contribution: The project has promoted and enabled sustainable commercial use of Mulanje cedar as a mechanism for community development. This will be sustained beyond the project as FRIM will continue to supply Mulanje cedar seed to community nurseries, giving them a monopoly on seedling production and sales.

Aichi 3: Development of positive incentives for conservation and sustainable use. Project contribution: The project created employment opportunities that help conserve and ensure sustainable use of Mulanje cedar, as an alternative to unsustainable exploitation.

Aichi 5: Rate of loss of natural habitats reduced. Project contribution: The year 1 baseline ecological survey identified areas requiring enhanced protection to reduce the rate of loss of Mulanje cedar and additional firebreaks were put in to protect natural regeneration. Analysis of satellite imagery shows that fire incidences on the mountain have reduced since 2015.

Aichi 7: Forestry areas managed sustainably. Project contribution: The project has planted seedlings in optimum areas for restoration on Mulanje Mountain. Fire monitoring teams have been equipped with additional fire-fighting gear to protect planted seedlings. A draft Integrated Management Plan for Mulanje Mountain Biosphere Reserve has been written, which has a component on cedar plantations.

Aichi 12: Prevention of species extinction. Project contribution: Shortly after the start of this project, cutting activities had led to the near extinction of Mulanje cedar in its natural habitat. Trial plots were established across Malawi, which provide *ex situ* conservation of Mulanje cedar

and seedlings were provided for *ex situ* plantings in additional safe sites. More than 550,000 seedlings have been planted to restore natural populations and ensure the long-term survival of this species in its natural habitat.

Aichi 13: Genetic diversity of domesticated species maintained. Project contribution: Genetic analysis of Mulanje cedar samples collected during the ecological baseline survey has shown that seed stands are not as genetically diverse as original populations, but with a lack of mature trees remaining on the mountain, the seed being used for restoration is the best available. Efforts are being made to collect seed from as many *ex situ* sources as possible to maximise the genetic diversity of seedlings planted on Mulanje Mountain and in *ex situ* sites.

Aichi 14: Ecosystems safeguarded. Project contribution: Fire teams have been equipped with additional fire-fighting gear to protect planted seedlings. Awareness raising of the status of Mulanje cedar and the need for its protection will also help to safeguard Mulanje Mountain.

Aichi 15: Ecosystems restored. Project contribution: The project planted more than 550,000 seedlings on Mulanje Mountain to restore degraded forest ecosystems. Mulanje cedar is a pioneer species and so restoring this species will have positive effects on the wider ecosystem.

Aichi 16: Equitable sharing of benefits. Project contribution: The project provided payments for cedar cultivation in nurseries, following a performance-based scheme developed by the Steering Committee. A Cedar Growers and Planters Association has been set up, and a nursery certification scheme is in development, that will ensure the continued production of good quality seedlings and equitable sharing of benefits between community nursery groups.

Aichi 19: Knowledge transferred. Project contribution: 150 community nursery group members received training in nursery management and propagation and business skills. This new knowledge was applied to produce and sell seedlings. In addition, knowledge has been transferred through development of improved horticultural protocols for Mulanje cedar which have been shared with nursery groups. Information on the genetics, and soil and symbiotic relationships of Mulanje cedar were investigated in this project by external experts, and results were shared with in-country partners and are being used to inform and improve seed collection and nursery practices.

Aichi 20: Resources mobilised. Project contribution: The project mobilised a significant amount of support for Mulanje cedar conservation and restoration, including in-kind contributions and further funding to a value of £582,165 (see section 8.2 for detail).

The project also contributes directly to the targets of the Global Strategy for Plant Conservation, which sits under the CBD, most notably;

GSPC 2: Conservation assessments to guide conservation action. Project contribution: An updated IUCN Red List assessment has been submitted.

GSPC 4: Ecological regions or vegetation type secured through effective management and / or restoration. Project contribution: Restoration of Mulanje Mountain forests which represent a unique vegetation type.

GSPC 7: In situ conservation. Project contribution: Improved conservation of the next generation of Mulanje cedar seedlings on Mulanje Mountain.

GSPC 8: Ex situ conservation. Project contribution: *Ex situ* plots of Mulanje cedar established across Malawi for conservation and research. Additional seedlings planted in secure locations.

GSPC 11: No species of wild flora endangered by international trade. Project contribution: This project raised awareness of the status of Mulanje cedar and the scale of destruction. FRIM in particular worked to raise awareness within the Malawian government. This led to the government proposing listing of the species on CITES Appendix II. The project team has provided information on the status of Mulanje cedar and trade to Parties in the lead up to CITES CoP18.

GSPC 12: All wild-harvested plant-based products sourced sustainably. Project contribution: This project has facilitated the domestication of Mulanje cedar by identifying optimal conditions where Mulanje cedar will grow, establishing nurseries to sell sustainably produced seedlings and promoting the availability of seedlings for purchase across Malawi (see Annex 7.10 for a

list of some of the people / organisations who have planted Mulanje cedar so far). The expectation is that this will take pressure off restored natural populations in future.

GSPC 14: The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes. Project contributions: The public outreach programme delivered at a cost of £10,000 was very successful, engaging media at national and local levels to generate support for Mulanje cedar conservation. As a result, matched funding to a scale of £7,000 was raised in year 3 from Malawian corporates to support Mulanje cedar restoration efforts on Mulanje Mountain. Starfish Malawi, an organisation that links schools in the UK and Malawi, developed classroom teaching materials used in the UK and Malawi focused on conservation of Malawi's national tree.

GSPC 15: Trained people working with appropriate facilities. Project contributions: See detail under Aichi Target 19.

GSPC 16: Partnerships for plant conservation established or strengthened at national, regional and international levels. Project contribution: The network of people and institutions working on Mulanje cedar conservation has broadened significantly as a result of this project and all institutions are committed and enthusiastic about continuing work for the future of this species. This is one of the strongest achievements of this project.

Malawi's CBD Focal Point provided a letter of support for this project during the application process and made a recommendation that the project should incorporate an environmental and social impact baseline study and assessment (carried out under Activities 1.2 and 3.7 respectively). In relation to the Nagoya Protocol, the project has established a Cedar Growers and Planters Association and a nursery certification scheme is under development by FRIM to ensure the continued equitable sharing of benefits from seedling sales.

A proposal is pending for Mulanje cedar to be added to Appendix II of CITES. The project contributed to this proposal, as detailed under GSPC Target 12 above.

4.3 Project support to poverty alleviation

This project has introduced alternative sources of cash income to the households around Mulanje Mountain and has become one of the key sources of livelihoods for people. 150 people from rural communities living around the mountain received payments for propagating Mulanje cedar seedlings in nurseries and an additional 1,500 people received payments for land preparation, transporting and planting cedar.

A woman at Kazembe Nursery showing her newly constructed house, funded with income obtained through the project

Benefits were in the form of cash payments, which enabled people to purchase iron sheets for the roofs of their houses, hoes, food, clothes, bicycles, farm inputs, cell phones, mattresses, solar panels and radios. In addition to these items, payments helped project beneficiaries to

construct or improve houses and pay school fees, indirectly supporting improved education in the region.

According to the year 3 socio-economic study (provided in Annex 7.7c) "*If a household has a brick and iron roofed house, has food, and is able to pay schools for his or her children, then that household is considered to have moved out of the vicious cycle of poverty. This is what this project has managed to achieve in the two districts particularly to the nursery caretakers*".

4.4 Gender equality

Nursery groups formed in this project involved 66% women. Female-headed household income for those involved in nursery activities has increased over the three years, showing that the project has provided new employment in areas where opportunities for women were very limited previously. Information about household incomes is taken from the year 3 socio-economic report which measured progress against the baseline study (Annex 7.7c and Outcome indicator 0.3). According to the year 3 socio-economic study: "*Most people especially women interviewed said that they dreamed of constructing a house roofed with corrugated iron sheet and the project has enabled them to achieve exactly that*".

4.5 Programme indicators

- **Did the project lead to greater representation of local poor people in management structures of biodiversity?**

The project has led to greater representation of local people in management structures of biodiversity. This is evident through presence of strengthened and active Community Conservation Groups around Mulanje Mountain Forest Reserve. Most of the nursery group members have also joined these conservation groups to help with protection of natural resources. The leadership of these groups is represented by local people who have become active in management of Mulanje cedar and other conservation activities on and around the mountain. In addition, a Cedar Growers and Planters Association was established with representation of conservation groups, cedar nursery caretakers and individuals with a passion for conserving and protecting Mulanje cedar.

- **Were any management plans for biodiversity developed and were these formally accepted?**

A draft Integrated Management Plan for Mulanje Mountain Biosphere Reserve has been developed. This is a multi-sectoral plan that will ensure that the Mount Mulanje Biosphere Reserve has clearly defined objectives and activities to direct the protection and sustainable use of its natural, scenic and heritage resources over a ten-year period (2019-2029). The plan provides the 3-5 year, medium-term operational framework for the prioritized allocation of resources and capacity in the management, use and development of the reserve. The plan has a component that looks at Mulanje cedar plantation management, the overall objective of which is to maximise the commercial output from Mulanje cedar and protect the existing plantation areas. The Plan has not yet been formally accepted, but it is at an advanced stage.

- **Were they participatory in nature or were they 'top-down'? How well represented are the local poor including women, in any proposed management structures?**

The development of the Integrated Management Plan included consultation with different stakeholders, including representatives from local communities. Community Conservation Groups, Cedar nursery caretakers, and the Cedar Planters and Growers Association were represented through consultative meetings that were conducted with Area Development Committees. Women were consulted through Area Development Committee meetings which were conducted in different Traditional Authorities.

- **How did the project positively influence household (HH) income and how many HHs saw an increase?**

The project has increased the cash incomes of households that participated in the project activities in both Phalombe and Mulanje districts. The 150 households involved in the project benefited by receiving direct cash payments for cedar seedling sales, which has helped them to

improve their incomes. An additional 1,500 people (exact number of households unknown) benefited from income related to transporting and planting cedar seedlings on Mulanje Mountain. The project has become one of the major sources of household cash income for people in the two districts.

- **How much did their HH income increase (e.g. x% above baseline, x% above national average)? How was this measured?**

A socio-economic study was carried out in each year of the project to measure impact on household income. The 150 people involved in nursery groups earned an average of USD$ 553.91 each over the project timeframe (total amount paid to nursery groups for seedling purchase divided by 150 workers to give average). Payments were made to nursery groups over two planting seasons (2017-2018 and 2018-2019), making an average annual income per person of USD $276.95. The project target was for nursery group members to receive USD $250 per person per annum, so the target has been met. According to the baseline socio-economic survey carried out in year 1, households were earning an average of Malawian Kwacha 125679.93 per annum (USD$ 165.37). The income from seedling sales alone, represents a 67% increased income against the project baseline household income. According to the baseline socio-economic survey, female-headed households were earning an average of Malawian Kwacha 63716.65 per annum (USD$ 83.71). The income from seedling sales alone represents a 230% increased income against the project baseline for female-headed households.

4.6 Transfer of knowledge

The project has contributed to informal qualifications among project partners and beneficiaries through transfer of knowledge from Bedgebury Pinetum to FRIM, and Bedgebury Pinetum and FRIM direct to community nurseries. These were done through training courses in nursery management and propagation techniques, such as seed germination methods and seedling raising. Training was also conducted on establishing nursery trials and data capture in the community nurseries. Nursery caretakers were also trained in business skills for which they received certificates of completion. This new knowledge was applied to produce and sell seedlings.

Six members of staff from FRIM and the Department of Forestry received training and 150 nursery workers were trained. Additional informal training was also conducted throughout the project timeframe. All people trained were from Malawi. The majority of people trained were women (66% of nursery group members).

In addition, knowledge has been transferred through the development of improved horticultural protocols for Mulanje cedar, by Bedgebury Pinetum, the UK Forestry Commission and FRIM, which have been shared with nursery groups. Information on the genetics, and soil and symbiotic relationships of Mulanje cedar were investigated in this project by external experts, and results were shared with in-country partners and are being used to inform and improve seed collection and nursery practices.

4.7 Capacity building

The project has helped to increase knowledge and status among country partner staff. Ibrahim Mitole from MMCT was invited to participate in the International Seminar on Forest Landscape Restoration by the USFS. This was in recognition of his participation in the restoration of Mulanje cedar. In addition, the Executive Director of MMCT, Carl Bruessow, was invited to make a presentation on Mulanje cedar restoration at the Malawi National Trees, Forest and Resilience Symposium.

5 Sustainability and Legacy

The outreach campaign, led by MMCT's Environmental Education and Communications Officer, achieved excellent coverage in local and national press, particularly in years 2 and 3. This has helped to raise awareness of the status of Mulanje cedar on Mulanje Mountain, the scale of illegal logging that has taken place, and the need for conservation of Mulanje cedar. Due to the high profile that was raised during this project, and through continued efforts, it is hoped that unsustainable exploitation to such a detrimental level will not take place again in future.

As per the exit strategy set out at the application phase, the project aimed to:

- *Equip local communities with new skills to enable them to benefit from a potentially sustainable, local natural resource*: 150 people were trained through this project, ensuring that skills remain in the community in the long-term.
- *Put physical and social infrastructures in place to support small, self-sufficient businesses created as part of this project*: Ten nurseries were built and equipped and remain operational. Business skills training was also provided and a Cedar Growers and Planters Association set up to ensure continued equitable sharing of benefits among community groups.
- *Identify existing (local) and new (national) markets for the cedar that will long outlive the project:* Funding was raised from Malawian corporates in year 3 to support Mulanje cedar restoration efforts, demonstrating a heightened interest and awareness of the need for restoration from within Malawi. Additional funds were raised from WeForest (https://www.weforest.org/) to continue restoration efforts beyond the timeframe of the project, showing international awareness of the need for restoration of Mulanje cedar forests. The public awareness campaign also informed people across Malawi that it is possible to plant Mulanje cedar elsewhere, sourcing seedlings from community nurseries, thereby providing benefit direct to nursery groups, supporting conservation of Mulanje cedar and producing a supply of timber that takes pressure off restored populations on Mulanje Mountain. The majority of seedlings were used for restoration efforts in years 2 and 3, but interest generated will be sustained through continued outreach to highlight the availability of seedlings.
- *Create a strong, mutually dependent, positive relationship between MMCT, FRIM and local communities, ensuring sustained effort and support from technical partners:* A positive relationship was achieved at all levels. MMCT and FRIM continue to have a long-term commitment to the area and its inhabitants. In addition to this, the network of partners brought in to support delivery of this project (Bedgebury Pinetum, the UK Forestry Commission, the USFS and Chicago Botanic Garden) were motivated to continue working on the conservation of Mulanje cedar by committing large in-kind and cash contributions (see section 8.2). The USFS are still working on the genetic analyses, for example, and Chicago Botanic Garden plans to submit an application to National Geographic to carry out further soil and microbial analyses.

BGCI is also motivated to continue working on the conservation of Mulanje Mountain's natural resources, and developed a new project proposal which was submitted to the Darwin Initiative and was successfully funded. The new project works with the same lead partners, focuses on Mulanje, and will expand opportunities for community benefits from cedar seedlings by improving cedar restoration protocols and establishing cedar essence enterprises, based on a precedent developed by The Body Shop in South Africa for a closely related species. A conservation-commerce model will be developed for Mulanje cedar and applied to other over-exploited species, maximising conservation and community benefits. This new project will be managed by some of the same staff in MMCT and FRIM and will purchase seedlings from the nursery groups.

6 Lessons learned

A key part of project success has resulted from our early and continued engagement with Traditional Authorities. The nursery groups noted that their visits to nursery sites help to motivate nursery groups. The project team recommends that similar projects also engage all leadership authorities from the outset.

Throughout the project, it was difficult to measure how many sawyers and sawyer families are included in nursery groups and planting activities, because people do not openly admit to being involved in illegal activities. Our nursery groups also aimed to employ 60% women and the majority of sawyers and carriers of cut timber are male. Evidence we could gather for this includes from our socio-economic studies that indicate that improved household incomes are reducing direct reliance on forest materials. The public outreach campaign also aimed to engage sawyers and recruit them to planting teams. In some cases, reformed loggers

volunteered to be part of outreach events, sharing their stories and why they had decided to stop their involvement in illegal logging activities.

Poor management of some of the cedar trial plots by Forestry Department personnel has been a disappointment in this project. In one case, a forestry officer planted sweet potatoes in a plot, and no disciplinary action appears to have been taken. This was mitigated in part, by the identification of well-managed, private sites in equivalent climatic and soil conditions in which replacement plantings took place, but the results of the trials are limited due to some being completely lost. We are awaiting year 3 measurements to enable areas of Malawi suitable for Mulanje cedar planting to be mapped, which will allow us to complete this output (Output 1, indicator 1.3). Better efforts to engage responsible managers from the Forestry Department at the start of the project, could have avoided this. Outreach efforts have raised the profile of Mulanje cedar, including targeted outreach to the Forestry Department and other government bodies, which have increased recognition of the need to protect Mulanje cedar, and hopefully mean that this type of trial will be better looked after in future.

Communication between the team was regular and mostly via email and WhatsApp. Skype meetings were also a helpful project management tool, but were sometimes hindered due to connection difficulties.

6.1 Monitoring and evaluation

Small edits were made to the logframe after the proposal was accepted for funding. No further major changes to project design were made.

A project Steering Committee was established to lead monitoring and evaluation of project progress. The Steering Committee met twice per project year on average. At each meeting, the Steering Committee analysed progress against activities and outputs in the logframe and provided advice to address shortfalls or delays. This approach was practical and helpful throughout the project, due to the appointment of appropriate people to sit on the committee (see minutes from the final meeting in Annex 7.11). Additional monitoring and evaluation was also carried out during regular BGCI visits to Malawi.

The socio-economic survey, carried out by an external consultant, measured attitude change and livelihood improvements across the project timeframe. Key findings include:

- This project has introduced alternative sources of cash income to the households and has become one of the key sources of livelihoods for people around Mulanje Mountain.
- Income from this project has helped households to buy food, construct and roof houses, pay school fees, buy farm inputs (e.g. fertilizer and seed) and various other household assets.
- The people directly involved in the project now rely less on charcoal and firewood vending for their income.
- There is strong recognition from nursery groups (96% of interviewees) that the mountain's natural resources are no longer readily available as they were in the past.
- There has been a significant increase in the number of people owning woodlots in the project areas compared to the start of the project, indicating increased recognition of the importance to conserve their own forest resources rather than solely rely on the Mulanje Mountain Forest Reserve for their forest resource needs.
- Despite community involvement and attempts to control illegal activities on the mountain, people feel that their efforts are hampered by limited support from the District Forest Offices in terms of provision of protective clothing, transport and other materials that would enable them to effectively patrol the mountain reserve, as well as lenient penalties that the Judiciary and police give to people caught carrying out illegal activities. There is therefore a call for heightened investment from government to protect Mulanje cedar seed stocks, as well as new plantings.
- Before the project started, over 85% of people interviewed believed that local communities could never be involved in raising, planting and managing cedar, it was a naturally growing tree that only government could protect and manage. Now 99% of

interviewees recognize that Mulanje cedar is a major source of household cash income. The project has improved peoples' understanding of Mulanje cedar and hence increased their eagerness to be involved in protection and management of planted cedar.

An ecological survey was carried out at the start and end of the project by project team members, alongside an analysis of fire incidences from satellite data. This indicated that:

- The destruction of Mulanje cedar was far more severe than estimated at the start of the project (baseline survey results).
- Fire incidences on the mountain have decreased annually since 2015, with 2018 having the lowest number of fires since 2010 (see Figure 2 in section 3.1).
- Survival rate of year 2 planted plots on Mulanje Mountain (i.e. survival rate measurements one year after planting) was 72.4%.

The public outreach components of the project were evaluated by an external consultant (see Annex 7.8b). Recommendations include translation of additional materials into local languages and engagement of additional corporate partners to scale up outreach activities. This guidance will be used to help improve future outreach.

6.2 Actions taken in response to annual report reviews

Items raised in the year 1 review were addressed in the year 2 report.

Items raised in the year 2 review:

1. Provide socio-economic survey for year 2: This was delayed so the project team did not have the full report when the year 2 report was submitted. The report received from the consultant is attached in Annex 7.7b. A new consultant was appointed in year 3 and that report is also attached in Annex 7.7c.
2. Ensure review of Output-level assumptions: This has been carried out in the year 3 report (see logframe reporting).
3. How are young trees to be protected from accidental damage in the years ahead: Fire is the biggest threat to the newly planted seedlings. Some year 2 planting sites were destroyed by fire, however, overall fire incidences on the mountain have declined every year since 2015 as a result of additional firebreaks being added in priority areas (around newly planted seedlings and natural regeneration). Fire-fighting equipment has also been purchased to assist teams to protect the seedlings in future years.

7 Darwin identity

The Darwin Initiative funding was recognised as a distinct project with a clear identity, contributing to the broader goals of sustainable utilisation of the resources of Mulanje Mountain. There is good understanding that the funding comes from the UK government's Darwin Initiative at all levels.

In year 2, an event was hosted at the British High Commission in Lilongwe to promote the project. Professor Stephen Blackmore, then Chair of the Darwin Expert Committee, presented at this event, along with Dr. Paul Smith from BGCI and Dr. Tembo Chanyenga from FRIM. In addition, Paul Smith gave a presentation on the project to Defra and the Darwin Expert Committee in London in year 2. In year 3, Daniel Luscombe from Bedgebury Pinetum presented the project to the Defra Executive Committee on behalf of the Forestry Commission.

The Darwin Initiative logo was used on project promotional and informational resources, including project web pages (see for example http://globaltrees.org/projects/save-our-cedar-malawis-national-tree/). The project is promoted on Twitter using the hashtag #SaveOurCedar which has helped to raise the profile of the project internationally. Facebook has also been a useful tool for raising awareness interest locally.

8 Finance and administration

8.1 Project expenditure

Project spend (indicative) since last annual report	2018/19 Grant (£)	2018/19 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)			-5%	
Consultancy costs			-7%	
Overhead Costs			-4%	
Travel and subsistence			-4%	
Operating Costs			0%	
Capital items (see below)			1%	
Monitoring & Evaluation			7%	
Others (see below)			0%	
TOTAL				

Staff employed (Name and position)	Cost (£)
Paul Smith, Project Leader, BGCI	
Kirsty Shaw, Project Manager, BGCI	
Liliana Derewnicka, Education Officer, BGCI (helped with the public awareness campaign)	
TOTAL	

Capital items – description	Capital items – cost (£)
Improvements to nursery infrastructures Fire monitoring and management equipment – Including fire beaters and satellite imagery	
TOTAL	

Other items – description	Other items – cost (£)
Consumables for the FRIM nursery Consumables for the ten community nurseries including potting bags fertilizer, etc.	
TOTAL	

8.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
BGCI in-kind (Paul Smith staff time, 6%, in addition to 5% funded by the project)	
MMCT cash (travel, workshop costs, seedling purchase and payments for land preparation, transporting and planting seedlings)	
MMCT in-kind (Carl Bruessow, Henry Chinthuli, Ibrahim Mitole and Kondwani Chamwala staff time, % varies per person)	
FRIM in-kind (Tembo Chanyenga staff time, 25%)	
TEVETA (www.teveta.mw) donation to support Mulanje Cedar seedling purchase and planting for 2018 – 2019 planting season	
MACRA (www.macra.org.mw) donation to support Mulanje Cedar seedling purchase and planting for 2018 – 2019 planting season	
Cedar Capital (www.cedarcapital.mw) donation to support Mulanje Cedar seedling purchase and planting for 2018 – 2019 planting season	
Escom (www.escom.mw) donation to support Mulanje Cedar seedling purchase and planting for 2018 – 2019 planting season	
Fondation Franklinia support for establishment of Mulanje Cedar trials across Malawi (2016 – 2017)	
Stephen Blackmore (BGCI) in-kind staff time on public awareness campaign in Malawi (5 days @£XXX)	
Dan Luscombe (Bedgebury Pinetum) in-kind staff time (20 days @£XXX per day, in addition to 15 days funded by the project)	
In-kind staff time from additional Bedgebury Pinetum staff for propagation trials and public awareness (50 days @£XXX per day)	
Richard Jinks (UK Forestry Commission) in-kind staff time (23 days @£XXX per day)	
Chicago Botanic Garden covering costs of soil and microbial analyses and in-kind staff time	
US Forest Service covering costs of genetic analyses and in-kind staff time	
Friends of Bedgebury Pinetum purchase of 200 T-shirts for public awareness campaign in Malawi	
TOTAL	

Source of funding for additional work after project lifetime	Total (£)
WeForest (www.weforest.org) to support planting and aftercare of Mulanje Cedar seedlings on Mulanje Mountain (2019 – 2020)	
Darwin Initiative project 26-017 Maximising Conservation and Community Benefits from Plants of Mount Mulanje	
TOTAL	

8.3 Value for Money

This project is deemed to be good value for money for the following reasons;

- The amount of staff time charged to the project by lead project partners is very low in comparison to the amount of time that was actually put in by partners in-kind.
- A large amount of in-kind and cash contributions were made to this project from experts from the BGCI network, who became enthused after their initial involvement in the project. This includes contributions from the UK Forestry Commission (£6,900 in-kind contribution), Bedgebury Pinetum (£13,230 in-kind contribution) and Friends of

Bedgebury Pinetum (£1,700 cash contribution), Chicago Botanic Garden (£6,021 cash and in-kind) and from the US Forest Service (£39,737 cash and in-kind).

- The project manager from BGCI relocated to Nairobi, Kenya, at the end of the first year of this project, which led to more efficient project management, e.g. less long-haul flights meant that more frequent trips to Malawi could be made.
- The outreach campaign which cost the project £10,000 had a large impact, in the final months raising more than £7,000 of funding from Malawian corporations to support Mulanje cedar planting on Mulanje Mountain.

Annex 1 Project's original (or most recently approved) logframe, including indicators, means of verification and assumptions.

Note: Insert your full logframe. If your logframe was changed since your Stage 2 application and was approved by a Change Request the newest approved version should be inserted here, otherwise insert the Stage 2 logframe.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
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. (Max 30 words)			
Outcome: Income from Mulanje cedar propagation supports Malawian households currently dependent on unsustainable harvesting of the cedar, and prospects of the cedar becoming a sustainable forest product are improved. (Max 30 words)	0.1. Optimal growing conditions for the Mulanje cedar characterised, enabling broader use of this tree in the Malawian domestic market by the end of year 3. 0.2. Improved horticultural protocols developed for establishment and propagation of the Mulanje cedar in nurseries by the end of year 2 0.3. Cedar propagation in community nurseries generates income for local households. 150 local people (at least 60% women) trained and earn >US$250 per annum each, directly from seedling sales, by the end of year 2 and 150 local people earn US$1.50 per day planting cedar on Mulanje Mountain in years 2 and 3. 0.4. Local and national markets are established for the Mulanje cedar based on the sale of 500,000 seedlings per annum for reforestation of Mulanje Mountain (years 2 and 3) and promotion and licensing of the cedar on the national market (year 3). 0.5. Unsustainable exploitation and damage to natural stands of cedar reduced by at least 50% against the year 1 baseline by the end of March 2019 as a result of local communities working with the authorities to protect,	0.1. Scientific papers & reports 0.2. Protocols published. Seedling production records 0.3. Nursery records and accounts. Training course attendance figures and attainment certificates. Socio-economic survey report against project inception baseline. MMCT Annual Report and accounts. 0.4. MMCT Annual Reports and accounts (reforestation). Publicity materials, radio broadcasts, policy documents etc. (cedar promotion). 0.5. Meeting minutes and records. Posters and leaflets produced. Socio-economic survey report. Cedar ecological survey, satellite imagery fire study, scientific papers.	• Technical challenges can be overcome. • Full participation of local communities. • Local politics and ethnic differences not inimical to creating a cohesive and representative Cedar Growers and Planters Association • Income obtained from selling and planting cedar seedlings replaces income from the exploitation of cedar timber and is regarded as an alternative, not an additional activity.

	restore and sustainably manage the remaining natural stands of cedar on Mulanje mountain		
Outputs: 1. Optimal cedar growing conditions characterised to improve reforestation success on Mulanje Mountain and to define areas suitable for cedar cultivation elsewhere in Malawi.	1.1. Project infrastructure established, including project management, employment of experts, full stakeholder engagement, acquiring Prior Informed Consent and Monitoring and Evaluation. 1.2. Genetic diversity and provenance of remaining cedar seed stocks characterised by end of year 1, and cedar pathology and symbiont biology understood by end of year 2 1.3. Optimal abiotic (soil, climate) requirements for growing cedar elucidated and areas of Malawi suitable for cedar cultivation mapped and published by end of year 3.	1.1. Employment contracts, Workshop minutes, Steering Committee minutes, consultant contracts, permits, M & E reports. 1.2. Scientific papers & reports 1.3. Trial plot records, scientific reports and papers, maps.	• Expertise is available to solve the technical challenges
2. Improved horticultural protocols developed for the Mulanje cedar to improve survival and growth rates in community nurseries	2.1. Improved horticultural protocols developed and available to local users by year 2 2.2. Seedling establishment and survival rates increased throughout life of the project	2.1. Propagation leaflets 2.2. Nursery seedling production figures	• Expertise is available to optimise propagation
3. Cedar propagation in community nurseries generates income for local households	3.1. 10 tree nurseries established in Mulanje and Phalombe Districts by the end of the third quarter of year 1 3.2. 150 people (60% women) from 10 different communities trained in nursery techniques, cedar propagation, and basic business skills by the end of the third quarter of year 1. 3.3. 10 community nursery managers appointed and trained in business skills by the end of year 1 3.4. 10 kg of cedar seed, and 15 kg of other tree species seed collected and	3.1. Infrastructures and consumables in place 3.2. Staff records. Training course attendance figures and attainment certificates 3.3. Staff records. Training course attendance figures and attainment scores 3.4. Nursery records 3.5. Nursery records 3.6. Nursery accounts and records 3.7. Socio-economic research results	• New communities are receptive to nursery establishment • Suitable nursery managers can be recruited from trainees

	sown in 2016, 2017, 2018 3.5. 10 nurseries produce a minimum aggregate total of 500,000 cedar seedlings and 50,000 other tree seedlings per annum in years 2 and 3 (assumes 60% cedar seedling survival). 3.6. 500,000 cedar seedlings sold at end of years 2 and 3 at a minimum cost of US$0.10 each to support the Mulanje cedar restoration programme (creates a 10% profit margin for each nursery). At least 25,000 other tree seedlings sold. 3.7. 150 local people earn >US$250 per annum each, directly from seedling sales, by the end of year 2.	(disaggregated by gender). 3.7. MMCT Annual Report and accounts	
4. Local and national cedar stakeholders work together with international experts to identify cedar markets, develop mechanisms for tapping into those markets and promote the cedar.	4.1. Mulanje Cedar Growers and Planters Association formed from nursery staff, cedar planters and local community leaders in year 2 4.2. Forestry Department and Environmental Affairs Department works with local growers to promote cedar to farmers in appropriate areas nationwide by end of year 3. 4.3. Consultant works with Cedar Growers and Planters Association and EAD to develop licensing and benefit-sharing models for selling certified cedar stocks nationwide by end of year 2.	4.1. Association registered as an entity, meeting minutes 4.2. Publicity materials, radio broadcasts, policy documents etc. 4.3. Report, certification scheme.	• Local politics and ethnic differences not inimical to creating a cohesive and representative Cedar Growers and Planters Association
5. Unsustainable exploitation and damage to natural stands of cedar significantly reduced as a result of local communities working with the authorities to protect, restore and sustainably manage the remaining natural stands of cedar on Mulanje mountain	5.1. Mulanje Cedar Growers and Planters Association adopts the Cedar Management Plan by the end of year 2. 5.2.150 local people earn US$1.50 per day planting cedar on Mulanje Mountain in years 2 and 3. 5.3. Local cedar public awareness programme launched by end of year 2 5.4. In 2019, a >40% increase in positive	5.1. Meeting minutes and records. 5.2. Cedar seedlings planted on Mulanje 5.3. Posters and leaflets produced 5.4. Socio-economic research report 5.5. Cedar ecological survey results, satellite imagery fire study, scientific papers.	• Income obtained from selling and planting cedar seedlings replaces income from the exploitation of cedar timber and is regarded as an alternative, not an additional activity.

	responses are recorded in the socio-economic survey for both attitudes to, and benefits received from, the cedar compared to the 2016 baseline study. 5.5. Cutting and fires demonstrably reduced by end of year 3 against year 1 baseline.		

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)

1.1. Inaugural Project Workshop held with all stakeholders present. Project plan communicated, refined and all necessary mechanisms for acquiring permits and Prior Informed Consent defined and implemented.

1.1. Project Steering Committee established, including all existing stakeholders (national and local authorities, communities, NGOs, academics etc.).

1.1. Detailed briefs written for external consultants

1.1. Monitoring and evaluation methodology defined and implemented.

1.2. Ecological survey of cedar populations (remnant and restored), measuring numbers of trees, size classes, genetic provenance, climate, soils and exploitation, carried out on Mulanje Mountain in year 1 and repeated in year 3.

1.2. International study carried out on microbial associations and pathology of cedar in years 1 and 2. Results published by end of year 2.

1.3. Edaphic and climatic conditions measured for *in situ* populations of cedar on Mulanje Mountain and *ex situ* stands in Malawi and in botanic gardens around the world

1.3. Cedar trial plots designed and planted (using existing seedling stocks) in 10 edaphically and climatically diverse sites across Malawi by end of year 1.

1.3. Cedar growth rates monitored in all trial sites (years 2 and 3), and optimal requirements for cedar growth determined by end of year 3.

1.3. Areas of Malawi suitable for cedar cultivation mapped and published by end of year 3.

2.1. Nursery trials designed and implemented by international experts within first 6 months of the project, investigating optimal media, watering regimes, light, temperature etc.

2.2. Seedling establishment, survival and growth baselines measured and monitored in nursery trials throughout the project

2.3. Optimal horticultural protocols published and available in local languages to users by beginning of year 3.

3.1. 10 nurseries established and fully equipped with shade netting, grow bags and other consumables by the end of year 1.

3.2. 10 experienced nursery staff recruited to establish nurseries and act as mentors. These staff will be drawn from existing MMCT nurseries, prioritising women and people with a proven track record.

3.2. 10 x 1 week nursery techniques training course offered for up to 20 people each (priority given to cedar sawyer families). 140 staff recruited from people who complete the course successfully (at least 60% women).

3.3. Nursery management and business skills training given to 10 individuals assessed by the Business skills consultant as having the necessary skills to manage production, nurture markets and make sales (end of year 1).

3.4. At least 10 kg of cedar seed collected and sown by the 10 nurseries in the fourth quarter of each year (equivalent to 900,000 seedlings).

3.4. Seed collected and sown from at least five other useful tree species in local demand, equivalent to at least a further 10,000 seedlings.

3.5. At least 500,000 cedar seedlings and 10,000 seedlings of other species produced by the 10 nurseries per annum in years 2 and 3.

3.6. Based on survey carried out in 1.2. MMCT and FRIM identify suitable sites for reintroduction of cedar by end of year 1.

3.6. 500,000 cedar seedlings sold at the end of years 2 and 3 to support the Mulanje cedar restoration programme. At least 25,000 other tree seedlings sold to local people.

3.7. Baseline socio-economic survey of recruited staff (disaggregated by gender) carried out by socio-economic consultant, assessing household income levels, income sources, use of natural resources and attitudes to cedar and natural resource conservation and management. Survey repeated in years 2 and 3.

4.1. Mulanje Cedar Growers and Planters Association formed from nursery staff, cedar planters and local community leaders.
4.2. National cedar publicity campaign launched by FRIM and EAD with support from the Eden Project, targeted at areas of Malawi where the cedar will grow successfully as defined in Output 1.
4.3. Consultant works with Cedar Growers and Planters Association and EAD to develop licensing and benefit-sharing models for selling certified cedar stocks nationwide.

5.1. Cedar Management Plan discussed, modified as appropriate and adopted by Cedar Growers and Planters Association.
5.2. At least 150 people employed at US$ 1.50 per day to plant 500,000 cedar seedlings per annum on Mulanje Mountain in years 2 and 3 as stipulated in the Cedar Management Plan (2014-2019).
5.3. Mulanje Cedar Growers and Planters Association works with MMCT and FRIM to promote the Cedar Management Plan, and the value of the cedar to local communities.
5.4. Socio-economic survey outlined in 3.7 re-assesses attitudes to and benefits received from cedar amongst growers and planters
5.5. Ecological survey of remaining cedar populations' exploitation and damage by fire repeated on Mulanje Mountain at end of year 3, and compared to baseline (Output 1.2)

Annex 2 Report of progress and achievements against final project logframe for the life of the project

Project summary	Measurable Indicators	Progress and Achievements
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.		Sale of sustainably produced Mulanje cedar seedlings and restoration activities have benefited more than 1,650 people around Mulanje Mountain, and resulted in the planting of >550,000 Mulanje cedar seedlings back on to the mountain. More than £420,000 funding has been raised for projects to continue and improve restoration on Mulanje Mountain and sustainably utilise native plant species of Mulanje Mountain, which will have a direct impact on Mulanje cedar and help ensure its long-term survival in its natural habitat.
Outcome Income from Mulanje cedar propagation supports Malawian households currently dependent on unsustainable harvesting of the cedar, and prospects of the cedar becoming a sustainable forest product are improved.	0.1. Optimal growing conditions for the Mulanje cedar characterised, enabling broader use of this tree in the Malawian domestic market by the end of year 3. 0.2. Improved horticultural protocols developed for establishment and propagation of the Mulanje cedar in nurseries by the end of year 2 0.3. Cedar propagation in community nurseries generates income for local households. 150 local people (at least 60% women) trained and earn >US$250 per annum each, directly from seedling sales, by the end of year 2 and 150 local people earn US$1.50 per day planting cedar on Mulanje Mountain in years 2 and 3. 0.4. Local and national markets are established for the Mulanje cedar based on the sale of 500,000 seedlings per annum for reforestation of Mulanje Mountain (years 2 and 3) and promotion and licensing of the cedar on the national market (year 3). 0.5. Unsustainable exploitation and damage to natural stands of cedar reduced by at least 50% against the year 1 baseline by the end of March 2019 as a result of local communities	The project outcome has been achieved. Households around Mulanje Mountain are receiving income from propagation of Mulanje cedar (as detailed against indicator 0.3 below). This will be sustained by the improved information on how to grow Mulanje cedar (i0.1 and i0.2) and establishment of markets for Mulanje cedar seedlings (i0.4). Prospects of Mulanje cedar becoming a sustainable forest product have been improved (i0.5). 0.1 By carrying out genetic analyses, soil and microbial studies and establishing trial plots growing Mulanje cedar at edaphically and climatically different sites across Malawi, this project has made excellent advances towards identifying the optimal growing conditions for Mulanje cedar. We are awaiting the year 3 trial plot measurements, which will enable mapping of areas suitable for Mulanje cedar cultivation. *0.1 assumptions:* Expertise is available to solve the technical challenges. This assumption was proved correct as suitable experts from the BGCI network were identified and mobilised to achieve this output. 0.2 Improved horticultural protocols have been developed based on trials carried out at Bedgebury Pinetum in the UK and community nurseries around Mulanje Mountain. The protocols are also informed by the findings of the soil and microbial studies carried out in 0.1. The protocols will be translated into local languages and will help improve survival and growth rates of Mulanje cedar in nurseries. *0.2 assumptions*: Expertise is available to optimise propagation. This assumption was proved correct as suitable experts from the BGCI network were identified and mobilised to achieve this output. 0.3 150 people (66% women) were trained in nursery techniques and business skills. Each nursery worker earned an average of USD$ 553.91 from seedling sales over the full project. More than 1,500 additional people earned $2.04 per day for land preparation, transporting and planting of Mulanje cedar seedlings on Mulanje Mountain in years 2 and 3. *0.3 assumptions*: New communities are receptive to nursery establishment; And suitable nursery managers can be recruited from trainees. These assumptions proved correct. Communities were

Project summary	Measurable Indicators	Progress and Achievements
	working with the authorities to protect, restore and sustainably manage the remaining natural stands of cedar on Mulanje mountain	receptive to nursery establishment and actively participated in the project and nursery chairpersons were identified who represented the nursery groups. 0.4 Most seedlings produced were sold for restoration on Mulanje Mountain, at a price of 100 Kwacha per seedling in year 3, with payments going direct to nursery groups. A Cedar Growers and Planters Association (CGPA) was set up to ensure equitable access to and benefits received from Mulanje cedar sales in future. Matched funding has been raised to continue restoration on Mulanje Mountain from WeForest. *0.4 assumptions*: Local politics and ethnic differences not inimical to creating a cohesive and representative CGPA. This assumption proved correct as people were willing to sign up to the CGPA, which is representative of cedar growers and planters. 0.5 Fire incidences on the mountain have decreased since 2015. Despite this, two of the year 2 planting plots were completely destroyed by fire set by illegal harvesters. Excluding the plots that were destroyed by fire, survival rates in other planting sites were good, with an average of 72.4% survival. There has been a hiatus on Mulanje cedar cutting as shortly after the project started, cutting activities had led to there being no sizeable Mulanje cedar trees left on the mountain. 1,500 people were employed in planting activities through the project, and the socio-economic survey shows a major change of people's views and perceptions of Mulanje cedar as a factor improving livelihoods. *0.5 assumptions*: Income obtained from selling and planting cedar seedlings replaces income from the exploitation of cedar timber and is regarded as an alternative, not an additional activity. There was hardly any cedar timber remaining on the mountain at the start of the project. It is hoped that increased protection and awareness of the status of Mulanje cedar on the mountain, as well as increased recognition of the ability to obtain a sustainable income from Mulanje cedar will take pressure off restored populations.
Output 1. Optimal cedar growing conditions characterised to improve reforestation success on Mulanje Mountain and to define areas suitable for cedar cultivation elsewhere in Malawi.	1.1. Project infrastructure established, including project management, employment of experts, full stakeholder engagement, acquiring Prior Informed Consent and Monitoring and Evaluation. 1.2. Genetic diversity and provenance of remaining cedar seed stocks characterised by end of year 1, and cedar pathology and symbiont biology understood by end of year 2 1.3. Optimal abiotic (soil, climate) requirements for growing cedar	The project team is very happy with progress made under this output. Notable achievements include; A strong project management team was established from BGCI, MMCT and FRIM. Experts were appointed from the BGCI network as well as local consultants. Engagement was ensured from the project outset through a launch event to enable consultation with relevant stakeholders and establishment of a steering committee to guide, monitor and evaluate project progress. The genetic diversity of remaining cedar stocks was characterised as far as possible and symbiont biology was investigated (see Annex 7.2). These analyses were made possible by in-kind contributions from the US Forest Service and Chicago Botanic Garden, to the sum of >£45,000. Trials were established across Malawi to investigate optimal abiotic requirements for

Project summary	Measurable Indicators	Progress and Achievements
	elucidated and areas of Malawi suitable for cedar cultivation mapped and published by end of year 3.	growing Mulanje cedar. We are awaiting 2019 measurements of the trials. When this data is received, maps will be published that show suitable areas for cultivating Mulanje cedar across Malawi.
Activity 1.1 Inaugural Project Workshop held with all stakeholders present. Project plan communicated, refined and all necessary mechanisms for acquiring permits and Prior Informed Consent defined and implemented.		**Complete -** Inaugural project workshop held in year 1 with all stakeholders present, including Traditional Authorities from Mulanje and Phalombe districts. The project plan was communicated, and feedback was received to guide project implementation.
A 1.1. Project Steering Committee established, including all existing stakeholders (national and local authorities, communities, NGOs, academics etc.).		**Complete -** The project steering committee was established in year 1, with representation from project partners (BGCI, MMCT, FRIM), Traditional Authorities, African Parks, District Forest Officers, the District Environment Officer for Mulanje, the National Botanic Garden and Herbarium of Malawi and Chancellor College: University of Malawi. A new project coordinator was appointed at MMCT to deliver the project from year 2 onwards (the position was vacant and covered by another MMCT staff member beforehand).
A 1.1 Detailed briefs written for external consultants		**Complete** - Detailed briefs were written for all consultants appointed by the project. Consultants were appointed from the BGCI network; Andrew Bower from the US Forest Service and Louise Egerton-Warburton from Chicago Botanic Garden to help with Output 1, Dan Luscombe from Bedgebury Pinetum UK and Richard Jinks from UK Forestry Commission to help with Output 2, and Justin and Alison Moat to help with Output 1 (A 1.3) and Output 5 (A 5.5). MMCT appointed Charles Jumbe in years 1 and 2 and Robert Kafakoma in year 3 to carry out socio-economic surveys. MMCT also appointed a business skills consultant to provide training to nursery groups in year 1 and a public awareness consultant in year 3 to evaluate the public outreach materials produced in the project.
A 1.1 Monitoring and evaluation methodology defined and implemented.		**Complete -** The methodology for monitoring and evaluating progress was determined in the first steering committee meeting, which was held in the first quarter of year 1. The steering committee met regularly (usually twice per year) to monitor and evaluate progress. See Annex 7.11 for notes from the final steering committee meeting.
A 1.2 Ecological survey of cedar populations (remnant and restored), measuring numbers of trees, size classes, genetic provenance, climate, soils and exploitation, carried out on Mulanje Mountain in year 1 and repeated in year 3.		**Complete -** A baseline ecological survey was carried out in year 1. This highlighted that the population decline was much more severe than available estimates when the application was written. An updated IUCN Red List assessment has been submitted. Samples were collected for genetic analyses. The year 3 survey measured survival rates of planted seedlings. Results of the baseline survey and year 3 survival rate measurements are included in Annex 7.1. The average survival rate of planted seedlings is 72.4% one year after planting.

Project summary	Measurable Indicators	Progress and Achievements
A 1.2 International study carried out on microbial associations and pathology of cedar in years 1 and 2. Results published by end of year 2.		**Complete** – In year 1, Andrew Bower from the US Forest Service participated in the baseline ecological survey and collected foliage and wood samples for genetic analysis. Foliage samples were also collected from Zomba plantation, and seedlings grown from four different forestry stands at Zomba, Chikangawa, Sombani and Tanzania. This aimed to determine if genetic diversity varied across different basins on the mountain, between forestry stands, and determine the provenance of the stand at Zomba, which provided the seed source for this project. Andrew Bower's trip to Malawi was funded by this project, and a contribution was made to genetic analyses from the project budget. The bulk of analysis was funded by the US Forest Service, to the sum of £39,737. Key findings: • The only samples that yielded results were the foliage samples from Zomba plantations and the samples collected from seedlings. • Initial analyses indicated that there is some genetic variation among samples collected from different basins. • It also appears that all seed sources tested were grown from seed that originated from the Lichenya Plateau, which means that the genetic diversity of what is being restored on the mountain is limited compared to original natural populations, but it is the best material available. In year 2, Louise Egerton-Warburton, a soil and microbial ecologist from Chicago Botanic Garden, travelled to Mulanje in the second year of the project. Soil and root samples were collected from nursery seedlings, newly planted and remnant cedar stands on Mulanje Mountain, and native (non-cedar) vegetation on Mulanje Mountain. Analysis of soil properties and sequencing of mixed soil / root samples has helped to identify optimal growing conditions for Mulanje cedar in the nursery and when planted out. See Annex 7.2 for results. Louise's trip to Malawi was funded by this project, and a contribution was made to analyses from the project budget. An additional £6,021 was contributed to the project by Chicago Botanic Garden, covering staff time and analysis costs. Key findings: • Native Mulanje cedar arbuscular mycorrhizal fungal (AMF) communities are species rich (16 AMF genera and 39 AMF species), and composed of a unique suite of AMF species in comparison to planted seedlings or native plant communities. • Soils with properties more similar to Mulanje Mountain should be used in nurseries, especially those with higher Soil Organic Content (SOC) and lower pH, to try to improve seedling survival rates in nurseries. • Seedlings in nurseries are also suffering from excess salts which likely comes from the supply of water used to water the plants, coupled with high

Project summary	Measurable Indicators	Progress and Achievements
		evapotranspiration rates. If possible, seedlings should be watered with rainwater. • Potential causes of seedling die-off after planting include; o High levels of deleterious soil microbial activity. Glucosidase, an enzyme produced by microbes to decompose organic matter, is highest in planted seedlings compared to other soils which may mean that seedling die-off is caused by the roots of planted seedlings decomposing. o In the rhizosphere soils of planted seedlings, fungi that cause root diseases such as tar spot and stem blight were identified. o Lack of suitable AMF communities in planting areas. o Soil nitrate is higher in planted seedlings than natural cedar stands, which indicates that residual nutrients from potting soil are being transferred to the field (using soils with properties more similar to Mulanje Mountain will help with this).
A 1.3 Edaphic and climatic conditions measured for *in situ* populations of cedar on Mulanje Mountain and *ex situ* stands in Malawi and in botanic gardens around the world		**Complete -** Data loggers were placed on Mulanje Mountain and information collected from botanic gardens with Mulanje Cedar in their collections.
A 1.3 Cedar trial plots designed and planted (using existing seedling stocks) in 10 edaphically and climatically diverse sites across Malawi by end of year 1.		**Complete** – Eight trial plots were designed and planted in year 1, at Zomba, Dedza, Chikangawa and Luwawa, although not all plots were well-managed so some seedlings were lost.
A 1.3. Cedar growth rates monitored in all trial sites (years 2 and 3), and optimal requirements for cedar growth determined by end of year 3.		**In progress –** We are waiting for year 3 measurements from FRIM. Trial plot design and results from year 2 measurements are provided in Annex 7.3. Year 2 results and year 3 observations tell us that Mulanje cedar grows well in a much wider temperature and rainfall variation than is naturally experienced on Mulanje Mountain, as the project predicted.
A 1.3. Areas of Malawi suitable for cedar cultivation mapped and published by end of year 3.		**In progress** – When the results are received from FRIM, areas suitable for cedar cultivation will be mapped.
Output 2. Improved horticultural protocols developed for the Mulanje cedar to improve survival and growth rates in community nurseries	2.1. Improved horticultural protocols developed and available to local users by year 2 2.2. Seedling establishment and survival rates increased throughout life of the project	The project team is happy with progress made under this output. Notable achievements include; Establishment of nursery trials in the UK and Malawi to investigate preferred conditions and nursery practices to assist Mulanje cedar cultivation. Based on the results of trials, improved horticultural protocols have been developed and distributed to nurseries to improve seedling establishment and survival rates in future.

Project summary	Measurable Indicators	Progress and Achievements
A 2.1. Nursery trials designed and implemented by international experts within first 6 months of the project, investigating optimal media, watering regimes, light, temperature etc.		**Complete -** In year 2, nursery trials were designed and established at Bedgebury Pinetum in the UK. In year 3, these trials were replicated in two community nurseries, with training provided by Dan Luscombe and FRIM. The trials investigated the effect of different potting media, air pruning, and inoculation. See Annex 7.4 for nursery trial designs and results.
A 2.2. Seedling establishment, survival and growth baselines measured and monitored in nursery trials throughout the project		**Complete -** Seedling establishment, survival and growth rates were measured by nursery groups throughout the project. Nursery groups received further training in year 2 to improve monitoring.
A 2.3. Optimal horticultural protocols published and available in local languages to users by beginning of year 3.		**In progress -** Optimal horticultural protocols were developed by Dan Luscombe (Bedgebury), Richard Jinks (Forestry Commission UK) and Tembo Chanyenga (FRIM). These are currently being translated into local languages. The protocol recommends that: • Cold stratification of seed in a domestic fridge ideally around 4 degrees centigrade will improve the speed and consistency of germination. • Sowing seed in seed germination beds or direct sowing into polythene tubes are both appropriate methods. Sowing at the right density and depth is important for seedling survival and growth. • Seedlings should be pricked out when the first true needles emerge and this must be done with care. • Watering should be done when needed, not at regular intervals. Clean water should be used to prevent disease. • Seedlings should be graded based on size, diseased seedlings should be removed and immediately destroyed, weeding should be done regularly. • It is worthwhile conducting further trials to see if air pruning assists growth and survival rates. More detailed guidance is presented in Annex 7.5.
Output 3. Cedar propagation in community nurseries generates income for local households	3.1. 10 tree nurseries established in Mulanje and Phalombe Districts by the end of the third quarter of year 1 3.2. 150 people (60% women) from 10 different communities trained in nursery techniques, cedar propagation, and basic business skills by the end of the third quarter of year 1. 3.3. 10 community nursery managers	The project team is very happy with progress made under this output. Notable achievements include; Ten community tree nurseries were established across Mulanje and Phalombe Districts, with 150 people representing ten nursery groups, growing cedar seedlings. Only two people dropped out from nursery groups over the timeframe of the project. All nursery workers received training in propagation techniques and business skills. Seed was provided to nursery groups for free by FRIM and the ten nurseries produced a total of 654,293 Mulanje cedar seedlings.

Project summary	Measurable Indicators	Progress and Achievements
	appointed and trained in business skills by the end of year 1 3.4. 10 kg of cedar seed, and 15 kg of other tree species seed collected and sown in 2016, 2017, 2018 3.5. 10 nurseries produce a minimum aggregate total of 500,000 cedar seedlings and 50,000 other tree seedlings per annum in years 2 and 3 (assumes 60% cedar seedling survival). 3.6. 500,000 cedar seedlings sold at end of years 2 and 3 at a minimum cost of US$0.10 each to support the Mulanje cedar restoration programme (creates a 10% profit margin for each nursery). At least 25,000 other tree seedlings sold. 3.7. 150 local people earn >US$250 per annum each, directly from seedling sales, by the end of year 2.	A total of 335,973 Mulanje cedar seedlings were sold at 80 Kwacha each in year 2 and 232,669 were sold at 100 Kwacha each in year 3 (568,642 total) for planting on Mulanje Mountain, with payments made directly to nurseries. Remaining Mulanje cedar seedlings, plus additional seedlings from the FRIM nursery, were given away or sold for planting elsewhere in Malawi by the end of year 3 (see Annex 7.10 for a list of some of the people / organisations who have planted Mulanje cedar so far). Some seedlings will be purchased for establishment of cedar hedges under Darwin project 26-017. An additional 26,108 seedlings of other species were produced by nurseries and either planted in homesteads or given to local school for planting. On average nursery workers received payments of $553.91 over the project timeframe (two planting seasons, 2017-2018 and 2018-2019) for Mulanje cedar sales.
Activity 3.1. 10 nurseries established and fully equipped with shade netting, grow bags and other consumables by the end of year 1.		**Complete –** This activity was completed in year 1. Ten nursery infrastructures were established around the base of Mulanje Mountain. In year 2, one nursery had to be relocated as the original location was too shady and some nursery improvements were done. All nurseries are still functional at the end of the project and infrastructures belong to the community groups.
A 3.2. 10 experienced nursery staff recruited to establish nurseries and act as mentors. These staff will be drawn from existing MMCT nurseries, prioritising women and people with a proven track record.		**Complete –** Ten nursery chairpersons were recruited in year 1. The chairpersons represented nursery groups at regular meetings throughout the rest of the project.
A 3.2. 10 x 1 week nursery techniques training course offered for up to 20 people each (priority given to cedar sawyer families). 140 staff recruited from people who complete the course successfully (at least 60% women).		**Complete –** 150 people (66% women) received training in nursery techniques from Dan Luscombe (Bedgebury Pinetum) and FRIM in year 1. An assessment of capacity gaps was undertaken in year 2 and additional training was provided.
A 3.3. Nursery management and business skills training given to 10 individuals assessed by the Business skills consultant as having the necessary skills to manage production, nurture markets and make sales (end of year 1).		**Complete –** One person from each nursery received training in business skills in year 1. All 150 nursery workers received training in business skills in year 2.
A 3.4. At least 10 kg of cedar seed collected and sown by the 10 nurseries in the fourth quarter of each year (equivalent to 900,000 seedlings).		**Complete –** More than 25kg of seed was provided to nurseries over the project timeframe. FRIM is committed to continuing to provide seed to the community nurseries established in this project in future, giving them a monopoly on cedar seedling sales.

Project summary	Measurable Indicators	Progress and Achievements
A 3.4. Seed collected and sown from at least five other useful tree species in local demand, equivalent to at least a further 10,000 seedlings.		**Complete –** In year 3, nurseries were given seed of *Faidherbia albida, Albizia lebbeck, Khaya anthotheca* and *Pinus oocarpa.*
A 3.5. At least 500,000 cedar seedlings and 10,000 seedlings of other species produced by the 10 nurseries per annum in years 2 and 3.		**Complete** – 359,474 Mulanje cedar seedlings were raised by nursery groups in year 2. In year 3, 294,819 Mulanje Cedar seedlings were raised. Although this is lower than the target of 500,000 Mulanje cedar seedlings per year, the project management team is very impressed with the achievements of nursery groups. 26,108 seedlings of other species were also produced by the ten nurseries in year 3. Of these species, the majority were *Albizia lebbeck* and *Faidherbia albida.*
A 3.6. Based on survey carried out in 1.2. MMCT and FRIM identify suitable sites for reintroduction of cedar by end of year 1.		**Complete –** Candidate sites for reintroduction on Mulanje Mountain were identified and ranked based on fire risk, accessibility, public outreach potential, soil, etc., during a workshop group exercise in year 2. Priority sites for planting in year 2 were then selected and sites for planting in year 3 were those that were ranked next highly.
A 3.6. 500,000 cedar seedlings sold at the end of years 2 and 3 to support the Mulanje cedar restoration programme. At least 25,000 other tree seedlings sold to local people.		**Complete** – 335,973 Mulanje cedar seedlings were sold at the end of year 2 and 232,669 Mulanje cedar seedlings were sold at the end of year 3 for restoration on Mulanje Mountain. Mulanje cedar seedlings were purchased at 83 Kwacha each in year 2 and 100 Kwacha each in year 3 for planting on the mountain, with payments made directly to nursery groups (see record of year 3 nursery payments in Annex 7.6). 26,108 seedlings of other tree species were distributed to communities and schools.
3.7. Baseline socio-economic survey of recruited staff (disaggregated by gender) carried out by socio-economic consultant, assessing household income levels, income sources, use of natural resources and attitudes to cedar and natural resource conservation and management. Survey repeated in years 2 and 3.		**Complete –**The year 3 survey measured progress against the baseline established in year 1. Key findings of the year 3 survey are; • This project has introduced alternative sources of cash income to the households and has become one of the key sources of livelihoods for people around Mulanje Mountain. • Income from this project has helped households to buy food, construct and roof houses, pay school fees, buy farm inputs (e.g. fertilizer and seed) and various other household assets. Socio-economic surveys are attached in Annex 7.7.
Output 4 Local and national cedar stakeholders work together with international experts to identify cedar markets, develop mechanisms for tapping into those markets and promote the cedar.	4.1. Mulanje Cedar Growers and Planters Association formed from nursery staff, cedar planters and local community leaders in year 2 4.2. Forestry Department and Environmental Affairs Department works with local growers to promote cedar to	The project team is happy with progress made under this output. Notable achievements include; A Cedar Growers and Planters Association (CGPA) was formed, with ten committee members. The membership represents 14 community conservation groups (including the nursery groups established in this project) and 6 individual members. A very successful national publicity campaign was launched in year 1 to support Mulanje cedar conservation and planting. In year 3 of the project, more than £7,000

Project summary	Measurable Indicators	Progress and Achievements
	farmers in appropriate areas nationwide by end of year 3. 4.3. Consultant works with Cedar Growers and Planters Association and EAD to develop licensing and benefit-sharing models for selling certified cedar stocks nationwide by end of year 2.	of matched funding was raised from Malawian corporates to support Mulanje cedar planting on the mountain. A constitution for the CGPA was developed which will help ensure equitable benefit sharing among nursery groups, beyond the direct support of the project.
4.1. Mulanje Cedar Growers and Planters Association formed from nursery staff, cedar planters and local community leaders.		**Complete –** The Cedar Growers and Planters Association (CGPA) was formed in year 3 of the project. The committee represents 14 community conservation groups and 6 individual members.
4.2. National cedar publicity campaign launched by FRIM and EAD with support from the Eden Project, targeted at areas of Malawi where the cedar will grow successfully as defined in Output 1.		**Complete** – A national cedar publicity campaign was launched in year 1 to support wider planting of Mulanje cedar, led by MMCT and FRIM with support from Bedgebury Pinetum and BGCI. This involved both national and local TV programmes, newspaper features and radio programmes, as well as poetry competitions and local events. A summary of outreach activities from years 2 and 3 and a review of public outreach materials is provided in Annex 7.8. The campaign was clearly successful locally as the CGPA represents a broader mix of community conservation groups than just the nursery groups. The campaign also was successful nationally, as more than £7,000 was raised from corporates not based in Mulanje to support cedar restoration in year 3 and the national coverage helped raise awareness that Mulanje cedar is Malawi's national tree and it needs protecting. In addition to this, FRIM provided seedlings to government ministers to raise awareness of the status of Mulanje cedar. Annex 7.10 provides a list of some of the organisations / individuals who have planted cedar across Malawi. Matched funding has been raised to continue restoration on Mulanje Mountain from WeForest.
4.3. Consultant works with Cedar Growers and Planters Association and EAD to develop licensing and benefit-sharing models for selling certified cedar stocks nationwide.		**In progress** – A constitution for the CGPA was developed (Annex 7.9). The CGPA agreed that a voluntary certification scheme for nurseries would be the best method. FRIM is in the process of setting up the certification scheme.
Output 5 Unsustainable exploitation and damage to natural stands of cedar significantly reduced as a result of local communities working with the authorities to protect, restore and sustainably manage the remaining natural stands of cedar on Mulanje mountain	5.1. Mulanje Cedar Growers and Planters Association adopts the Cedar Management Plan by the end of year 2. 5.2.150 local people earn US$1.50 per day planting cedar on Mulanje Mountain in years 2 and 3. 5.3. Local cedar public awareness programme launched by end of year 2 5.4. In 2019, a >40% increase in positive responses are recorded in the socio-	The project team is happy with progress made under this output. Notable achievements include; A draft Integrated Management Plan for Mulanje Mountain Biosphere Reserve has been produced, with a component on cedar plantations. Over years 2 and 3, 1,500 people were paid an average US$2.04 per day for land preparation, seedling transportation or planting seedlings up the mountain. The public awareness campaign generated support for Mulanje cedar conservation and planting, both locally and nationally, through a variety of media channels, events and activities. This included an event with presentations about the project at the British High Commissioner's residence in Lilongwe.

Project summary	Measurable Indicators	Progress and Achievements
	economic survey for both attitudes to, and benefits received from, the cedar compared to the 2016 baseline study. 5.5. Cutting and fires demonstrably reduced by end of year 3 against year 1 baseline.	At the start of the project >85% of people interviewed in the socio-economic study believed that local communities could never be involved in raising, planting and management of Mulanje cedar. In year 3, 99% of people interviewed in the socio-economic survey agree that Mulanje Cedar has become one of the sources of major household cash income. Analysis of satellite data has shown that fire incidences have reduced each year since 2015.
5.1. Cedar Management Plan discussed, modified as appropriate and adopted by Cedar Growers and Planters Association.		**Complete –** A draft Integrated Management Plan for Mulanje Mountain Biosphere Reserve has been written, which has a component on cedar plantations. Community consultation meetings were held, involving nursery group members.
5.2. At least 150 people employed at US$ 1.50 per day to plant 500,000 cedar seedlings per annum on Mulanje Mountain in years 2 and 3 as stipulated in the Cedar Management Plan (2014-2019).		**Complete** - Over years 2 and 3, 1,500 people were paid US$ 2.04 per day for land preparation, seedling transportation or seedling planting on Mulanje Mountain. In year 3, 232,669 seedlings were planted out on the mountain, making a total of 568,642 overall. More than 100,000 seedlings were planted in Chambe basin in year 3, i.e. the majority were planted in one site to make seedling protection easier.
5.3. Mulanje Cedar Growers and Planters Association works with MMCT and FRIM to promote the Cedar Management Plan, and the value of the cedar to local communities.		**Complete –** The publicity campaign had local and national reach. This resulted in a successful appeal for donations (see matched funding analysis in section 8.2).
5.4. Socio-economic survey outlined in 3.7 re-assesses attitudes to and benefits received from cedar amongst growers and planters		**Complete -** Before the project, >85% of people interviewed in the baseline socio-economic study believed that local communities could never be involved in raising, planting and management of Mulanje cedar. In the year 3 socio-economic study, 99% of people that were interviewed agree that Mulanje Cedar has become one of their major sources of household cash income. In addition: • There is strong recognition from nursery groups (96% of interviewees) that the mountain's natural resources are no longer readily available as they were in the past. • There has been a significant increase in the number of people owning woodlots in the project areas compared to the start of the project, indicating increased recognition of the importance to conserve their own forest resources rather than solely rely on the mountain resources. • There is a call for heightened investment from government to protect Mulanje cedar seed stocks, as well as new plantings.
5.5. Ecological survey of remaining cedar populations' exploitation and damage by fire repeated on Mulanje Mountain at end of year 3, and compared to baseline (Output 1.2)		**Complete** - The year 3 ecological survey measured survival rates of seedlings planted in year 2. This showed that average survival rate across measured planted plots was 72.4%. Two plots were fully destroyed by fire are removed from this analysis. Fire incidences have reduced since 2015, as shown in Figure 2 in section 3.1 of this report.

Annex 3 Standard Measures

Code	Description	Total	Nationality	Gender	Title or Focus	Language	Comments
Training Measures							
1a	Number of people to submit PhD thesis						
1b	Number of PhD qualifications obtained						
2	Number of Masters qualifications obtained						
3	Number of other qualifications obtained						
4a	Number of undergraduate students receiving training						
4b	Number of training weeks provided to undergraduate students						
4c	Number of postgraduate students receiving training (not 1-3 above)						
4d	Number of training weeks for postgraduate students						
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification (e.g., not categories 1-4 above)						
6a	Number of people receiving other forms of short-term education/training (e.g., not categories 1-5 above)	150	Malawian	66% women	Nursery management, propagation and business skills	English / Chichewa	Delivered by Bedgebury Pinetum, FRIM and District Forest Office extension workers
6b	Number of training weeks not leading to formal qualification	20	Malawian	66% women	Nursery management, propagation and business skills	English / Chichewa	Average 2 weeks per nursery group
7	Number of types of training materials produced for use by host country(s) (describe training materials)	2	Malawian	66% women	Printed propagation	English and Chichewa	Produced by Bedgebury

					guidance following training. Published horticultural protocol.		Pinetum, UK Forestry Commission and FRIM
Research Measures		**Total**	**Nationality**	**Gender**	**Title**	**Language**	**Comments/ Weblink if available**
9	Number of species/habitat management plans (or action plans) produced for Governments, public authorities or other implementing agencies in the host country (ies)	1			Integrated Management Plan for Mulanje Mountain Biosphere Reserve, which has a section on Mulanje cedar plantation management		Final draft stage. Plan development included consultation with representatives from local communities, including community conservation groups, cedar nursery caretakers, and the Cedar Planters and Growers Association.
10	Number of formal documents produced to assist work related to species identification, classification and recording.						
11a	Number of papers published or accepted for publication in peer reviewed journals	0					Papers planned on soil and mycorrhizal associations of Mulanje cedar

							(led by Chicago Botanic Garden), results of genetic analyses (led by the US Forest Service) and a summary of all finding related to improving Mulanje cedar survival and growth in the nursery and planted out (led by BGCI).
11b	Number of papers published or accepted for publication elsewhere						
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country						
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country						
13a	Number of species reference collections established and handed over to host country(s)	8 (and additional private plantings)			*Ex situ* trial plots established. Responsibility of FRIM and the Department of Forestry		Not all of the trial plots were well-managed.
13b	Number of species reference collections enhanced and handed over to host country(s)	Large-scale *in situ* planting to					Management is ongoing by MMCT and the

		the scale of 568,642 Mulanje cedar seedlings.					Forestry Department, with local communities employed to monitor and manage fire incidences.

Dissemination Measures		**Total**	**Nationality**	**Gender**	**Theme**	**Language**	**Comments**
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	4	British and Malawian	Male and female	Aims and outputs of the project, request for feedback from Traditional Authorities, raising awareness of the status of Mulanje cedar and the availability of seedlings for planting.	English and Chichewa	Project launch event to present the project concept and obtain feedback. Event organised at the British High Commission in Lilongwe including presentations from Prof. Stephen Blackmore and Tembo Chanyenga. Talk show on SpeakOut! In year 2 which was shown regularly on Malawi Broadcasting Company

Dissemination Measures		Total	Nationality	Gender	Theme	Language	Comments
							(MBC). Project closing workshop to celebrate project successes, highlight the need for continued support of TAs and continuation of conservation activities to support the long-term survival of Mulanje cedar.
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	At least 10			Aims and outputs of the project		Paul Smith gave a presentation on the project to Defra and the Darwin Expert Committee in March 2018. Ibrahim Mitole at the International Seminar on Forest Landscape Restoration under the US Forest Service.

Dissemination Measures		Total	Nationality	Gender	Theme	Language	Comments
							Carl Bruessow at the Malawi National Trees, Forest and Resilience Symposium. Additional presentations made at international and national conferences by extended project team (including representatives from Bedgebury Pinetum, US Forest Service and Chicago Botanic Garden).

Physical Measures		Total	Comments
20	Estimated value (£s) of physical assets handed over to host country(s)	£20,000	Nursery infrastructure and fire monitoring imagery and equipment. (Budgeted for £21,000 but part of fire monitoring budget was spent on GIS consultant costs to interpret data).
21	Number of permanent educational, training, research facilities or organisation established		
22	Number of permanent field plots established	37	29 planting sites on Mulanje Mountain and 8 *ex situ* trial plots across Malawi.

Financial Measures		Total	Nationality	Gender	Theme	Language	Comments
23	Value of additional resources raised from other sources (e.g., in addition to Darwin funding) for project work	£582,165			In-kind and cash contributions for project activities. Further restoration of Mulanje cedar populations, sustainable use of other plants on Mulanje Mountain.		See section 8.2 for detail

Annex 4 Aichi Targets

	Aichi Target	Tick if applicable to your project
1	People are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	Yes
2	Biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.	Yes
3	Incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.	Yes
4	Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	
5	The rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	Yes
6	All fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	
7	Areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	Yes
8	Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	
9	Invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	
10	The multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	
11	At least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	
12	The extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	Yes
13	The genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	Yes
14	Ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking	Yes

	into account the needs of women, indigenous and local communities, and the poor and vulnerable.	
15	Ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	Yes
16	The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	Yes
17	Each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	
18	The traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	
19	Knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	Yes
20	The mobilization of financial resources for effectively implementing the Strategic Plan for Biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	Yes

Annex 5 Publications

Type * (e.g. journals, manual, CDs)	Detail (title, author, year)	Nationality of lead author	Nationality of institution of lead author	Gender of lead author	Publishers (name, city)	Available from (e.g. web link, contact address etc)
Protocol	**Horticultural Protocols for Growing Mulanje Cedar.** Luscombe, D., Jinks, R., and Chanyenga, T. (2019).	British	British	Male		Attached in Annex 7.5 of this report and distributed to nursery groups.

Annex 6 Darwin Contacts

Ref No	23-026
Project Title	Domestication of Mulanje Cedar for Improved Livelihoods
Project Leader Details	
Name	Paul Smith
Role within Darwin Project	Project Leader
Address	Botanic Gardens Conservation International, Descanso House, 199 Kew Road, Richmond, Surrey TW9 3BW United Kingdom
Phone	
Fax/Skype	
Email	
Partner 1	
Name	Ibrahim Mitole
Organisation	Mulanje Mountain Conservation Trust
Role within Darwin Project	Project Manager – in country
Address	
Fax/Skype	
Email	
Partner 2	
Name	Tembo Chanyenga
Organisation	Forestry Research Institute of Malawi
Role within Darwin Project	Technical Advisor
Address	
Fax/Skype	
Email	
Additional contact	
Name	Kirsty Shaw
Organisation	Botanic Gardens Conservation International
Role within Darwin Project	Project Manager
Address	
Skype	
Email	