

## Darwin Initiative Main Annual Report

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

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

**Submission Deadline: 30<sup>th</sup> April 2021**

### Darwin Project Information

Project reference	27-014
Project title	Coffee natural capital for environmental and livelihood sustainability in Uganda
Country/ies	Uganda
Lead organisation	Royal Botanic Gardens, Kew
Partner institution(s)	National Agriculture Research Organization (NARO), Kampala Makerere University, Kampala Kyagalanyi Coffee Ltd, Kampala ( <u>Volcafe Uganda</u> ) Clifton Coffee, Bristol
Darwin grant value	£200,050
Start/end dates of project	1 Oct 2020 to 30 Sep 2023
Reporting period (e.g. Apr 2020 – Mar 2021) and number (e.g. Annual Report 1, 2, 3)	1 Oct 2020 to 31 March 2021
Project Leader name	Aaron Davis
Project website/blog/social media	<a href="#">Coffee natural capital for environmental and livelihood sustainability in Uganda   Kew</a>
Report author(s) and date	Aaron Davis & Aisyah Faruk 28 April 2021

### 1. Project summary

Uganda’s coffee agroforestry systems and forests are key to the sustainability of Uganda’s coffee sector, agriculture and landscape level ecosystem service provision, and biodiversity conservation.

Since the 1980s there have been serious issues for coffee production in Uganda, related to disease (coffee wilt disease) pests (coffee twig borer), and changing climate (drought). The conversion of coffee agroforestry systems to other crops leads to a decline in ecosystem services (e.g. pollinator services, climate amelioration) a loss of biodiversity (including primates and birds) and a reduction in income diversity. Importantly, in lowland Uganda, coffee production is mostly situated above arable land (as seen via satellite imagery), where it provides critical water capture and soil stabilization services.

Uganda is unique amongst the world’s coffee growing countries, being a major producer and

the home of three (of four) highest priority coffee crop wild relatives (CWRs): *C. canephora*, *C. liberica* and *C. eugenioides*. Presently the value of this natural capital is understudied, and grossly underestimated in terms of its value to provide transformative sustainability solutions for the Ugandan coffee sector.

A full assessment of wild coffee species diversity (distribution, population size/density, environmental range (including adaptive potential) in Uganda has never been undertaken. The last survey was undertaken over 80 years ago. Liberica and eugenioides coffee show potential as crop species; the development of the three main CWR coffee species and their interspecies hybrids offers substantial benefits for climate resilience, pest and disease resistance and productivity (as demonstrated by ongoing plant breeding research undertaken in Madagascar) and livelihood security and improvement.

At the same time, Uganda's forests require more effective conservation. A tangible demonstration of the value of these natural forests (as the source of coffee sector sustainability, for local and national stakeholders) will serve to strengthen conservation policy.

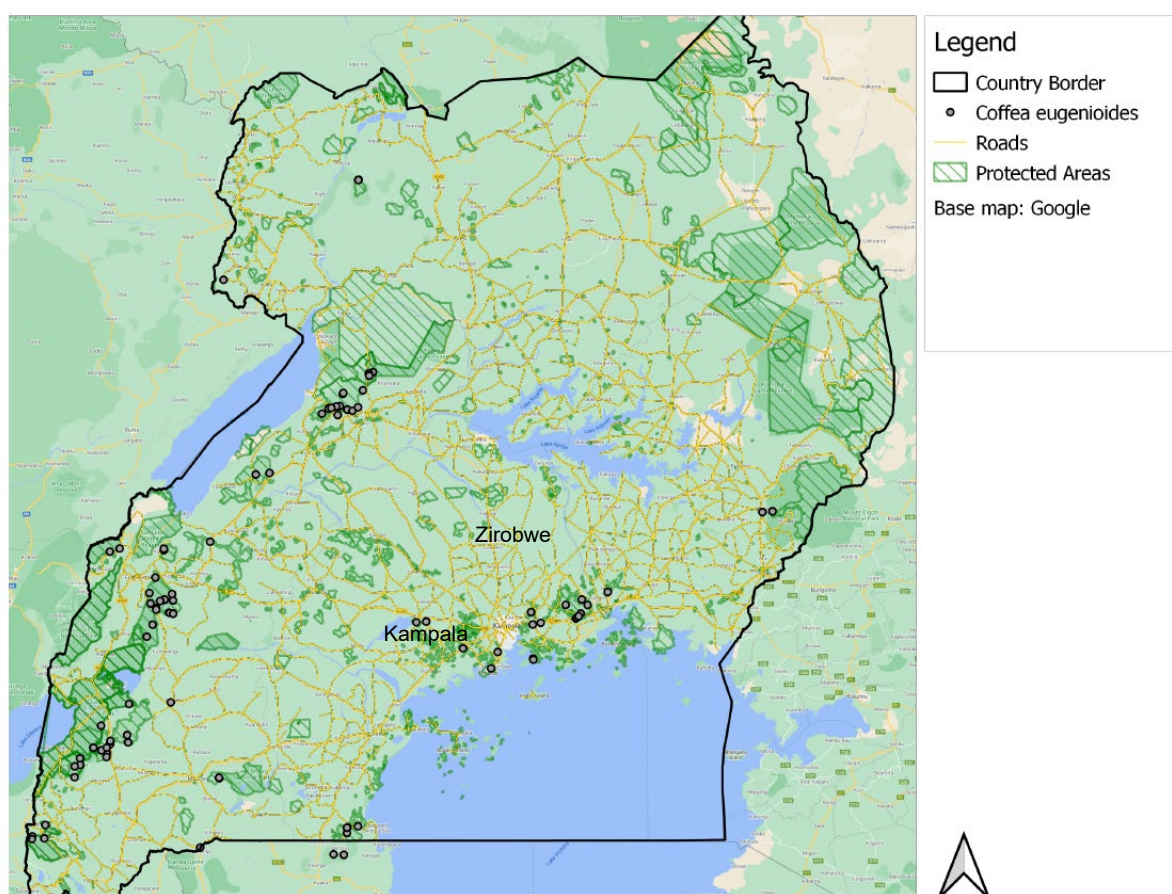


Fig. 1 Map of one of Uganda's wild coffee species (*Coffea eugenioides*), which demonstrates the overall project study area. The project farm sites are in Zirobwe (Luwero) and the partners are based in Kampala.

## 2. Project partnerships

RBG Kew is working in closer partnership with three organizations NARO, Makerere University, Kyagalanyi Coffee, in Uganda, and Clifton Coffee Company (UK).

The National Agricultural Research Station (NARO), which includes the National Coffee Research institute (NACORI). NARO is the lead government agency for agricultural research in Uganda. NARO are mainly responsible for the coffee field trials, for Liberica and eugenioides.

Makerere University is the leading university in Uganda. It has a comprehensive teaching programme and conducts research and outreach programmes in botany, economic

botany, and plant resource conservation. The university has a long-standing collaborative relationship with RBG Kew, including recent work on adapting agriculture to climate change via the use of crop wild relatives (CWRs). Makerere University are mainly responsible for coffee diversity work and biodiversity assessments.

Kyagalanyi Coffee Ltd. (part of Volcafe group), Uganda's largest exporters of coffee, are based in Kampala, and undertake production, processing, and export of coffee from Uganda, for small scale to major commercial buyers. Kyagalanyi operate coffee farmer training, development, and support programmes across Uganda.

Clifton Coffee Company (UK) supply coffee to 850 sites across the UK. Coffee purchasing includes Uganda, where they work in partnership with Kyagalanyi Coffee Ltd. (Uganda). Clifton Coffee will be responsible for the management of the business relationship between themselves and Kyagalanyi Coffee Ltd., including the evaluation and purchase of coffee.

The project was devised and developed by all partners of the project team. Scoping visits in Uganda (not Darwin funded) and associated meetings and discussions were made in 2016 and 2017. The collaboration started in 2016, which started via a request (2016) to provide climate recording expertise and GIS support for agroecological experiments in Kampala.

Even though the project has only been formally running for six months, the partnership has been extremely effective. There has been active and effective communication between partners, on all aspects of the project (see Annex 4). The only challenge so far is not being able to meet and work together in Uganda, owing to COVID-19. A notable strength is that all partners have ownership of the project. The fit (experience and expertise) of the partners to the objectives and activities of the project is seamless. Shared responsibility for monitoring and evaluation is undertaken via the log frame, implementation timetable, and M&E framework, either via use of a common document or via Teams ® file sharing.

### 3. Project progress

#### 3.1 Progress in carrying out project Activities

The following narrative provides progress on Year 1 activities (1 Oct 2020 to 30 Sept 2021), for the first six months (i.e. Qtr 3 and 4). The sources of evidence are provided in square brackets. Please note that years refer to project years (1 Oct to 30 Sep).

For activities under **Output 1. Coffee diversity/forest survey** all activities are on schedule. **Activity 1.1.** All database activities have been completed [Annex 4. Evidence item 1], and a working set of maps has been produced [Evidence item 2]. The fieldwork plan for Year 1 is has been drafted [Evidence item 3], and permissions for protected areas have been applied for and acquired [Evidence item 4]. There has been a delay in fieldwork input by RBG Kew, due CV-19 but so far project partners are making up the shortfall. Going into the second half of Year 1, fieldwork funds may have to be used by project partners to complete the Year 1 fieldwork programme. **Activity 1.2.** This is a Year 2 activity, but course organization and participant needs are already at the planning stage [Evidence item 11].

All activities are on schedule for **Output 2. Liberica coffee production.** For **Activities 2.1 & 2.2.** Recruitment of the field coordinator has been completed, and the staff member is now working in the Luwero/Zirobwe area. Farms within the community were first visited in March [Annex 4. Evidence item 5]. The Baseline Survey is underway, which will be used to best allocate resources for training and drying bed allocation. **Activity 2.5 Coffee quality evaluation** is also on course. A sampling strategy has been produced by Kyagalanyi, for samples from this year's harvest, to be sent to Clifton Coffee and RBG Kew [Evidence item 5 and 5.1]. The chemical samples of Ugandan Liberica have already been extracted along with a range of control samples [Evidence item 6] and are due to be analysed in Qtr 1 & 2 (2021), ahead of schedule. For **Activity 2.6 Nursery set-up.** The farmed stock of Liberica coffee at Luwero has been assessed by NARO, Makerere and Kyagalanyi (early March 2021), cuttings have been taken and a seed collection strategy has been finalized. The first fieldwork trip to Luwero has been undertaken by project partners [Evidence item 7].

All activities are on schedule for **Output 3 Ecosystem services & biodiversity surveys**, although there have been some delays on timings due to CV-19. For **Activity 3.1 & 3.2** the climate and soil moisture recording equipment has been purchased [Annex 4. Evidence item 8] but has not yet been installed in Uganda; originally this was planned for April 2021, but will have to wait until CV-19 travel restrictions lift (hopefully by September) so that we can visit Uganda. For Year 1, The Pest and Disease survey (**Activity 3.3**), and biodiversity survey-zoological (invertebrate) (**Activity 3.5a**), and biodiversity survey-botanical (**3.5b**) are being started by two master's students, under close supervision by Makerere University supervisors [Evidence item 9]. Initial fieldwork has been undertaken (March 2021; see above Activity 2.6) and a fieldwork plan is in place [Evidence Item 10]. The field trials for Liberica (**3.4**) are now underway: material was selected and collected from Luwero farms, and planted in Kampala, and there is a strategy to complete trial plot material acquisition by Year 1 [Evidence item 7].

Activities for **Output 4** will commence, as planned, from Year 2 onwards.

Activities for **Output 5** are mostly due for Years 1 & 2. We have had various team meetings, but the main yearly meeting (**Activity 5.1**), with a broader range of stakeholders, has not yet been held (due to CV-19). We are hoping to undertake this meeting within Year 1 (when CV-19 restrictions lift).

### 3.2 Progress towards project Outputs

The output indicators, as per the Logical Framework and Implementation Timetable, are being used to provide time-bound milestones, to directly measure project progress and delivery.

**Output 1. Coffee diversity survey.** Baseline: No survey available. Progress for this output is on course, despite CV-19 issues. The database is complete, the first draft of the maps is available, and we have a firm (and legally compliant) field work plan. We have sent a course questionnaire to Ugandan partners for the GIS/SDM Course (Activity 1.2) so that learning needs can be established and planned. Kew's participation in fieldwork has been delayed due to CV-19, but the Ugandan partners are currently taking up the shortfall; we are enquiring as to whether a reallocation from Kew's fieldwork budget to Ugandan partners will be possible. We see no reason why this output will not to achieve its intended outcome, to provide the first detailed diversity survey for Uganda coffee natural capital.

**Output 2. Liberica coffee production.** Baseline: Liberica production at low volume/capacity, lacking evaluation and strategy. Progress for this output on course as per the log frame, with activities taking place within the scheduled time frame. Farm, farmer survey, and quality evaluation work for Liberica has been undertaken by Kyagalanyi Coffee (the largest coffee exporter in Uganda). Ugandan partner steerage and activity on this output has been highly effective and includes additional refinements that will help and perhaps extend delivery expectations. We have also had buy-in from an NGO programme farm in southern Uganda, to grow Liberica, and they have received support and direction from project partner Kyagalanyi Coffee. The first field trials have been planted and are under the direction of NARO, who have considerable experience in this area of work. The chemical analysis is underway and ahead of schedule. The farming of any crop is unpredictable, but a solid foundation is now in place and we have buy-in to the project throughout the value chain, from farmer to purchaser. Aside from any substantial issues or constraints, at this point in the project we see no reason for not achieving our goal of developing Liberica coffee production and establishment of producer-purchaser relationship at Luwero, as a demonstration of the use of Liberica coffee was a third coffee crop species for Uganda.

**Output 3. Biodiversity value, ecosystem service provision, and climate resiliency.** Baseline: no data or studies available demonstrating the of biodiversity value, ecosystem service provision, and climate resiliency potential for Liberica coffee production. This is off to an excellent start, via the engagement of two masters' students and two university supervisors (one botanical and one zoological) from Makerere University. Engagement in the biodiversity surveys by RBG Kew has been delayed due to CV-19, although until this point we are still within the yearly implementation milestones as per the log frame; competition within Year 1 will depend on the carry-over of funds by two quarters. The climate resiliency component for Liberica is being covered by the field trials, which are now underway. By mid Year 3 we should have gathered sufficient data and analyses to demonstrate the biodiversity value, ecosystem

service provision, and climate resiliency potential for Liberica coffee production, and thus the completion of Output 3.

**Output 4. Eugeniodes coffee cultivation study.** Baseline: minimal information or experience on the cultivation of eugeniodes coffee. Activities for this project are not due to commence until project Year 2. However, via the coffee diversity survey we have been able to gather data on the occurrence of this species in Uganda, which will be of considerable value for the collection of suitable material for the field trials and farm plantings. Work is ongoing in Year 1.

**Output 5. Strategy Document.** Baseline: assessment of coffee natural capital for Uganda, and its value, use, and threats, lacking. Output 5 brings together Outputs 1 to 4, into a single summary document for use by stakeholders and decision makers. The yearly stakeholder meeting, in Uganda (Activity 5.1), was scheduled to take place in April 2021, but due to CV-19 this has not been possible. We will either have that meeting at the end of project Year 1, or failing that, we will have an online meeting within Year 1. Data collection and analysis, and associated materials (e.g. references for supporting studies) has started and is ongoing, and our first mapping files/maps have been produced. We will be building the strategy document draft from project Year 2 onwards.

### 3.3 Progress towards the project Outcome

**Outcome:** a resilient and sustainable coffee sector supported by the use of coffee natural capital, demonstrating the value of native forests for their long-term conservation.

Please see Annex 1 for details. Progress in the first six months of the projects for Outcome Indicators, is as follows: 0.1 Database of Ugandan coffee species (natural capital) has been completed, and the first set of maps has been produced. This a major step towards building a knowledge base for Uganda coffee natural capital. 0.2 The farmer surveys have been sent out, and local project coordinator in place, enabling effective allocation of time and resources for coffee production training and support, and the delivery of associated project outcomes (e.g. export of coffee and payment of farmer premiums). 0.3 botanical and zoological studies and field trials for Liberica underway, supporting the biodiversity assessment component of the project. 0.4 The groundwork for the eugeniodes outcome is underway, which includes country-wide survey of eugeniodes populations based on herbarium and field survey data; at least one farm has agreed participation in trials. 0.5 Assembly and archiving of project data is underway.

Six months into the project we believe that our original indicators are working well and are appropriate for the intended outcome. We have used similar indicators in the past (including one Darwin project) and they have delivered the Outcome.

At this stage of the project we see no reason why the Outcome will be achieved by the end of the project. Over the next six months we will need to pick up on items that have been delayed due to the CV-19 pandemic.

### 3.4 Monitoring of assumptions

The following comments are made for project assumptions, as per the logical framework (Annex 1).

#### *Outcome assumptions*

**Assumption 0.2.** The market requires Liberica Coffee (evidence to support this comes from producer and purchaser interest/demand).

**Comments** No change. Market and consumer interest in good quality Liberica is increasing, with demand high but supply low to non-existent.

**Assumption 0.3.** Liberica coffee offers greater climate resiliency potential over robusta coffee (feedback from farmers and pilot field data supports this assumption, with further study urgently required).

**Comments** Work now underway, as per project assumptions, to test assumption.

**Assumption 0.4** Consumer purchase prices places *C. eugenioides* in the (very) high value category, but expectations need to be managed to encompass possibility of a broader price structure across the value chain. Farmers remain interested in growing non-standard crop species (see notes on Output 4 assumption)

**Comments** No change. High demand continues. We now have two farms in Uganda interested in growing this species to scale, to trial commercial viability.

**Assumption 0.5** Key stakeholders will require tangible demonstration of conservation benefits, viability of conservation mainstreaming activities, commercial application and livelihood benefits.

**Comments** This assumption still stands. Project activities and dissemination geared to supporting this assumption. One Darwin Project and a recent Darwin Pilot amply support this assumption. For Sierra Leone the Prime Minister called an emergency meeting with a call to preserve Sierra Leone's wild coffee forests.

### *Output assumptions*

**Assumption 1.1 & 1.3** Timelines assume that the COVID-19 situation in Uganda doesn't significantly worsen, and that fieldwork can occur in Yr1 (if this assumption fails to hold true, more intensive fieldwork in Yr2 would compensate).

**Comments** Some delays have occurred due to CV-19, but we are still on target re. the logical framework timelines. No assumption change is required but there may have to be some reallocation of Yr 1 budget, especially to cover fieldwork (by Ugandan partners, rather than Kew).

**Assumption 1.2** Owing to the worsening COVID-19 situation in Uganda, and the UK, the training course in Uganda may be suspended (now proposed for Yr 2).

**Comments** Agreed by LTS/Darwin that this will now come in Yr 2, probably October 2021.

**Assumption 2.3** There are a number of risks involved in ensuring shipping quantities. We have set a realistic estimate for our shipping volumes. We will have a dedicated agent working with farmers at Luwero, and a Ugandan-based coffee export company working on the project, which should ensure that targets are met.

**Comments** Assumption still stands. Farmer survey ongoing to better determine shipping volumes from Luwero.

**Assumption 3.3 to 3.5** Field work activities run to schedule without interference (Gathering field data from plots and transects can be challenging due to circumstances beyond the knowledge or control of the researcher). We are mitigating these risks by undertaking the field work in areas known to us, that are close to Kampala (and Makerere University), and for which we have dedicated personnel and sufficient resources. Project partners in Uganda have long-standing experience of this type of work.)

**Comments** Assumption still stands. So far, despite CV-19, fieldwork for Yr 1 is up to date and on schedule. Kew's participation could be taken up by Ugandan partners, if CV-19 restrictions remain problematic. We are taking an agile and flexible approach; an enquiry to Darwin about fund allocation has been made.

**Assumption 5.1** Stakeholders are willing and able to attend meetings (Risk of non-attendance mitigated by early announcement of dates and by keeping meetings short (1/2 day)).

**Comments** This assumption has not been tested, as the first yearly meeting has been delayed. Project stakeholders have provided excellent communication and are keen to attend project meetings.

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

Project Impact Statement: Sustainability of the Ugandan coffee sector for environmental (biodiversity, ecosystem services, climate resilience, conservation of forest and genetic resources) and livelihood benefit (increased household income, reduced risk, social improvement)

Our project is designed to have a positive impact on biodiversity conservation, by placing a direct commercial and social (poverty alleviation) value to preserving the humid forests of Uganda. We, and others have used similar models in other countries (similar Darwin projects include Ethiopia and Sierra Leone). At this stage of the project (first six months) we have no evidence for positive effects on biodiversity and poverty alleviation.

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

### United Nations Sustainable Development Goals (SDGs)

The project will cover nine SDGs, but will focus on:

**SDG 12 Responsible consumption and production.** We will demonstrate the potential for economic improvement, climate resilience, biodiversity enhancement, and preservation of key ecosystem services, through the use of indigenous natural resources (native coffee species (coffee natural capital) and forest landscapes), via specific interventions within the value chain, at the farm/community and national level.

The Ugandan government has ratified a directive (by the Coffee Development Authority (UCDA) and Uganda Cooperative Alliance (UCA)) to increase coffee production in Uganda from 4 million bags to 20 million bags per year, by 2025.

**SDG 13 (and Convention on Climate Change) Climate Action.** Affordable adaptation is essential for the sustainability of the Ugandan coffee sector, given that climate change is already having an impact and that we are unlikely to keep warming below 2°C. We will demonstrate the benefits of new/underutilized climate resilient crop species and hybrids, compared to other resiliency options.

**SDG 15 Life on land.** We will demonstrate ecosystem benefits of the coffee agroforestry system, and the immense value of forests/biodiversity for sustainable development, economic and social wellbeing.

There has been no progress on SDGs in the 2020-21 Financial Year, in accord with the project timetable. Evidence will be available towards the end of Yr 2 and in Yr 3.

## 5. Project support to the Conventions, Treaties or Agreements

The project aims to support a range of Conventions, Treaties or Agreements, as given below, although no progress/evidence is anticipated in Year 1.

### National Biodiversity Conventions

The project supports numerous national directives, including the Ugandan National Development Plan, the Green Growth Development Strategy, Vision 2040, the National Agricultural Policy (2013), and the National Biodiversity Strategy and Action Plan [NBSAP] (2014). The Ugandan National Development Plan clearly identifies coffee as central to Uganda's economic sustainability and development. For example: the contribution of Traditional Exports (TEs) to overall formal export earnings decreased from 31.4 percent in 2011 to 25.1 percent in 2012. The TEs notable decrease in share is due to a notable decline in coffee earnings. The National Biodiversity Strategy and Action Plan (NBSAP) has been ratified by the CBD and is held by them as country-level (CBD) documentation for Uganda. Importantly, the NBSAP demonstrates the central role played by coffee in Uganda's economy, and identifies mainstreaming biodiversity as a key strategy for success.

### Convention on Biological Diversity (CBD)

The project covers numerous articles of the Convention on Biological Diversity.

In particular, the project will:

Art 10(e) "Encourage cooperation between its governmental authorities and its private sector in developing methods for sustainable use of biological resources."

This is central to the Outcome of the project. Our project will directly engage with key government agencies and the private sector (coffee producers and purchasers) in the sustainable use and benefits of Uganda's biological resources (coffee natural capital).

Art 11 "...adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity."

This is a key objective of the project: to incentivise conservation of coffee natural capital and natural forests by demonstrating that they are fundamental to the economic sustainability of the coffee sector, which includes the livelihood security of c. 5 million people. Moreover, the project will use actually use Uganda's biological diversity for economic and social benefit, and sustainable use.

Art 13(a) "Promote and encourage understanding of the importance of biodiversity, as well as its propagation through media,..."

The project will serve as an excellent example of the importance of biodiversity, through the direct employment of natural capital (biodiversity) as a means of ensuring sustainability for the country's nationally important coffee sector (coffee farming provides livelihood income for c. 4.2 million Ugandans; and generates c. 25% of export earnings). Coffee is of immense media interest. Kew's most recent coffee press release, based on a Darwin pilot grant reached millions; the associated research article (Davis et al. 2021) achieved an Altmetric score of 1615 (putting it in the top 5% of all research outputs scored by Altmetric, and the top 1% High Attention Score compared to outputs of the same age). The Darwin project will serve as an excellent example of the importance of biodiversity for economic and social security, climate change adaptation/resilience, ecosystem functioning, and biodiversity conservation.

## **6. Project support to poverty alleviation**

The project aims to support poverty alleviation, as outlined below, although no notable achievements are anticipated in Yr 1.

Our main mechanism to support poverty alleviation is to scale up one two minor crop species, Liberica and eugenioides coffee, the former as a higher value commodity crop and the latter as a high value speciality coffee. The project covers the 'lowland' [1,000–1,300 m asl] coffee farming areas of Uganda, who grow robusta, as opposed to 'highland' coffee farmers [1,400 m asl and above] who grow the higher value (c. 50% higher farm gate price) Arabica coffee. Liberica coffee has the potential for higher prices, and improved climate resiliency and pest/disease resistance, plus it crops at a different time of year to robusta coffee, thus providing an option for extending the income season. The use of Liberica coffee has been scaled up in the Luwero area by local farmers, as an alternative or addition to robusta coffee, due to its improved market price, high yield and success in cultivation. Intervention is required to assist, develop and upscale this farmer-led initiative, and to maximize support for poverty alleviation.

Despite being an Africa species, with its centre of diversity in Uganda, Eugenioides coffee is currently being grown as a high value crop (purchase price \$80 per kg) in Colombia. Despite low yields, this crop species might provide Ugandan smallholders with a high value crop option, and thus serve support poverty alleviation.

For the project, we aim to demonstrate the potential for Liberica coffee to support poverty alleviation, in the short-term (life of project) and long-term (post project). Baselines given in square brackets.

### *Short-term*

#### Output 2

Luwero (Liberica) coffee farming community (300 people) provided with the tools and knowledge (via specific training) to improve coffee quality, leading to improved income (via coffee prices) and access to market via the establishment of a trading relationship [current equipment and processing skills rudimentary; access to market volatile, inconsistent and risk laden]. Coffee nursery established as means of increasing income, and new plants, and providing a costing baseline for Liberica coffee seedling production, in order to provide data on scalability costs [minimal equipment available for seed production and plant sales]. Farmers receive a price premium of 30% above commodity (or national market price) unit price (kg) for all clean (exportable) coffee produced; leading to a potential 20% increase in household income from coffee [no premiums paid; baseline data not available].



### *Long-term*

Output 2 Liberica coffee scaled-up across lowland Uganda to: (1) supplement (robusta) coffee farming, diversify and temporally extend income (Liberica crops two months after robusta and thus provides potential to manage annual cash flows, via the off-season); (2) increase income (via better prices) and profitability (fewer losses through pests and diseases); (3) enhanced biodiversity and ecosystem services (incl. water and climate services); (4) improved climate resilience and decrease severity of climate shocks.

## **7. Consideration of gender equality issues**

The project aims to consider gender equality issues, as outlined below, although no notable progress is anticipated in Yr 1.

Our farmer training courses at Luwero will include all members of the community, male and female. Failing this, equal numbers of places will be allocated to each gender. During the course of the training we will collect data on the control and use of income from coffee, specifically to understand the roles played by women and girls. With this baseline in place we will be suitably informed to guide on gender equality issues in coffee production.

We will promote gender equality as part of the coffee trading relationship.

Both of our academic training courses will be offered as a set number of places for each gender.

Our project team has an almost equal gender allocation, across academic and private sector partners.

## **8. Monitoring and evaluation**

The outputs and activities were designed to achieve the project outcome, based on a similar Darwin project undertaken in Ethiopia. We will not be able to demonstrate their effectiveness until the end of Year 2 and Year 3. The project pathway has the support of all project partners, as a means of delivering the Outcome. The indicators of achievements (both qualitative and quantitative) are stated in the logical framework and change pathway (as given in the project application documents). There have been no changes made to the M&E plan over the reporting period.

Project partners in Uganda have been proactive in project M&E and problem solving (due to CV-19 restriction issues). We are using a combination of an annotated and expanded Implementation Timetable and a shared M&E document (overseen by Aisyah Faruk). Information is shared openly via cloud-based file sharing (Microsoft Teams), and e-mail transfer of project documentation, including project budgets. M&E activities have been occurring mostly on a weekly basis.

## **9. Lessons learnt**

The following aspects of the project have worked well: (1) having eminently suitable project partners, in terms of expertise, commitment, resources and communication; (2) having the value (supply) chain covered, from farmer through to purchasing (we envisage good evidence as we proceed through Year 1); (3) involvement of all partners in the governance and direction of the project; (4) maintaining flexibility but within the structure of the logical framework; (5) having a of academic, commercial, and development-based partnership; (6) maintaining strong and frequent communication links; (7) having a strong in-country ownership of the project.

So far, there is nothing that we would have done differently. In an ideal world would have put more emphasis on risks due to CV-19 but few were expecting the severity and global implications of the second wave.

I would strongly recommend any project to undertake pilot studies, and extended partnership discussions before finalizing project structure and design. Design the project so that the deliverables are impactful but realistic. Accept, consider, and act on criticism and feedback.

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

Not applicable (Project Year 1).

## **11. Other comments on progress not covered elsewhere**

There were various refinements/enhancements of the project, shortly after inception and during the first six months of Year 1. Project partner Kyagalanyi Coffee decided to realign their project funds to employ a field officer at Luwero, to provide support and ease communication with farmers. This did not require a Change Request. They also devised a baseline survey for the coffee farming at Luwero, to gauge interest, capacity and potential, and to maximize the effectiveness of farmer training and support, and to guide resource allocation (e.g. provision of coffee processing equipment). Makerere University decided to work within their graduate teaching/supervision structure to undertake Year 1 biodiversity and pest and disease surveys, providing better coverage and depth than originally anticipated. Ugandan project partners (NARO, Makerere and Kyagalanyi) decided to undertake some pre-farm selection, after their first field visit to Luwero, where they detected quite substantial phenotypic (physical) variation in farmer Liberica. The rationale is to elucidate the best variants of Liberica for scaling up. NARO decided to extend their field trials to include some wild variants of Liberica coffee, starting with material to be collected in the northernmost coffee forest of Uganda.

A church-based NGO who run a farm in southern Uganda have expressed interest in developing Liberica and eugenoides coffees. The NGO has received support from project partner Kyagalanyi coffee, and we have been in discussion as to providing planting material of Liberica coffee.

By good fortune we have a Kew-funded chemistry intern for 2020/21. This means that the chemical evaluation will be extended and brought forward by one year. We will have to submit a change request in order bring Year 2 budget allocation into Year 1, to capitalize on this opportunity.

Other than COVID-19 related issues over international travel, we have not encountered any notable difficulties. COVID-19 issues are discussed below.

## **12. Sustainability and legacy**

So far, we have not promoted the work beyond providing a project website. We plan to have a project meeting, with a range of stakeholders, in Uganda, within Year 1 (ends September 2021). We need to be further advanced in the project (this is only the first 6 months) before promoting the work, which will only start to come at the end of Year 1 and in Year 2.

Our exit strategy is still valid; we are not planning any proposed changes but are keen to capitalize on any opportunities that emerge. We see this project as part of a longer-term involvement, as per other projects (such as our Darwin coffee project in Ethiopia (2015-2018), which is still delivering social and environmental benefits [now self-sustaining], and Sierra Leone (2018) [work ongoing and in development via additional funding]).

## **13. Darwin identity**

At this early stage of the project we have not started our efforts to publicise the Darwin Initiative or establish Darwin identity for the project, other than the project website. This will start at the end of Year 1.

## **14. Impact of COVID-19 on project delivery**

Due to the COVID-19 pandemic we have not yet been able to visit Uganda. Our original plan was to make our first fieldwork visit within the first four months of 2021, but this has not been possible, despite some false start (when lockdown eased in 2020). We now hope to make the first visit in late summer 2021, but this will require a late Change Request (Darwin have been

notified). If the Kew team cannot visit, due to COVID-19 travel restrictions, all Year 1 fieldwork will have to be carried out by project partners in Uganda.

We see no need to make any changes to the log frame/implementation timetable, at this stage. We are monitoring the situation and are in frequent communication with Ugandan partners regarding alternative means of delivery for fieldwork activities should travel restrictions remain in place after July 2021.

There are currently no travel restrictions within Uganda itself, and foreign nationals are allowed to visit the country. The main issues are associated with leaving and returning to the UK. Uganda is currently rated as a low-risk country for COVID-19.

Ugandan project partners have been extremely proactive in terms on ensuring project progress, particularly for the fieldwork activities. Ugandan partners are adhering to national guidance and restrictions around the pandemic, and some have already received their CV-19 vaccinations.

File sharing (Teams) and on-like meetings have helped with communication during the pandemic, although e-mail communication has been highly effective.

## 15. Safeguarding

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

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

We have nothing to report in this section.

## 16. Project expenditure

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

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

\* These variances have been discussed with Darwin and we have been advised to submit a change request so that these critical activities can be undertaken within Qtr 3, 2021.

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

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
<p><b>Impact</b></p> <p>Sustainability of the Ugandan coffee sector for environmental (biodiversity, ecosystem services, climate resilience, conservation of forest and genetic resources) and livelihood benefit (increased household income, reduced risk, social improvement)</p>		<p>No progress anticipated within first six months of project.</p>	
<p><b>Outcome</b> A resilient and sustainable coffee sector supported by the use of coffee natural capital, demonstrating the value of native forests for their long-term conservation</p>	<p><b>0.1</b> A greatly Improved knowledge base for Uganda's coffee natural capital, (<i>C. liberica</i>, <i>C. canephora</i>, <i>C. eugenioides</i> and <i>C. neoleroyi</i>), including conservation status (regional IUCN Red List assessments), biotic (phenology, morphological variation) and abiotic data (e.g. habitats, climate envelopes). By Yr 3.</p> <p><b>0.2</b> Evidence of production and procurement of Liberica coffee at Luwero, as an example of the viability of scaling up commercial production for this indigenous coffee species. By Yr 3.</p> <p><b>0.3</b> Data provided on biodiversity, ecosystem service and climate resiliency data, for Liberica coffee farming, compared to robusta coffee and non-shade farming systems. By Yr 3.</p> <p><b>0.4</b> Production of agronomy data via field trials for the high-value indigenous species <i>C. eugenioides</i>, with a view to commercial production. By Yr 3.</p> <p><b>0.5</b> Assembly of project outcomes into a public document that provides key information on Uganda's coffee natural capital, for: (i) the conservation of its four indigenous coffee species; (ii) the biodiversity and ecosystem service</p>	<p><b>0.1</b> Database of Ugandan coffee species (natural capital) completed; first set of maps produced.</p> <p><b>0.2</b> Farmer surveys sent out, and local project coordinator in place.</p> <p><b>0.3</b> Biodiversity studies and field trials for Liberica underway.</p> <p><b>0.4</b> Groundwork underway (country-wide location of eugenioides populations for field studies completed).</p> <p><b>0.5</b> Assembly of data underway.</p>	<p><b>0.1</b> Add data (including location points) from fieldwork.</p> <p><b>0.2</b> Collate data and organize interventions as per log frame.</p> <p><b>0.3</b> Complete first phase of biodiversity surveys and follow with climate variable logging equipment. Complete planting of all field trials, manage, and record data.</p> <p><b>0.4</b> Collect and plant eugenioides field trails.</p> <p><b>0.5</b> Continue data and project outcome assembly. Organize and hold yearly meeting in Uganda.</p>

	benefits of coffee and indigenous coffee production; (iii) the development of these resources for the sustainable development of the country's coffee sector (including improved incomes for coffee farmers); and (iv) demonstration of the value of preserving Uganda's humid forests (i.e. indigenous coffee species used as a flagship and rationale for forest conservation). (v) Indigenous variants of <i>C. liberica</i> and <i>C. eugenioides</i> brought into cultivation (in project farms and research stations (NARO) as part of increasing <i>ex situ</i> conservation capacity. By end Yr 3.		
<b>Output 1.</b> A critical survey of Uganda's coffee natural capital (wild species diversity, distribution, and conservation threat).	<p><b>1.1</b> The completion of 1 multi-field database (Access), containing all field survey data and herbarium data. By end Yr 3.</p> <p><b>1.2</b> Delivery of 1 two-day training course on GIS data collection and QGIS, including basic species distribution modelling (SDM) and production of IUCN Red List metrics (GeoCat). By end Yr 2.</p> <p><b>1.3a</b> Production of 1 critical survey of Uganda's coffee natural capital (wild species diversity). By mid Yr 3.</p> <p><b>1.3b</b> Production of regional IUCN Red List conservation assessments for Uganda's coffee species. By mid Yr 3.</p>	<p>1.1 Main database completed. See section 3.2 and Annex 4.</p> <p>1.2 Training survey sent to NARO and Makerere University. See section 3.2 and Annex 4.</p> <p>1.3a No progress anticipated in Yr 1 (but see below).</p> <p>1.3b. No progress anticipated in Yr 1 (but see below).</p>	
<b>Activity 1.1.</b> Gather and collate field survey data for all the coffee-holding forests of Uganda, with the collection of vouchers (and living material, where required), and ground observations (geo-location, habitat, vegetation, soil type, local extinction threats), for the species <i>C. liberica</i> , <i>C. canephora</i> , <i>C. eugenioides</i> and <i>C. neoleroyi</i> and their wild hybrids. Survey work will be based on a pre-survey review of herbarium collections at key herbaria.		Completed. Database with 453 records, from herbarium records and prior field surveys; georeferencing complete; first draft maps completed.	Addition of data to continue from fieldwork.
<b>Activity 1.2.</b> Organize and run a two day course on GIS (QGIS), basic species distribution modelling (SDM), and conservation metric producing programmes (GeoCAT), at a dedicated venue for 16 to 20 Ugandan researchers/students.		Training survey sent to NARO and Makerere University, and this sent to students and other interested parties.	Finalize course structure, run course and evaluate success.

<p><b>Activity 1.3.</b> Collate and analyse data from Activity 1.1, write paper and produce figures (maps and graphs) in collaboration with project partners. Send research paper to high impact journal for open access publication. Produce regional IUCN Red List conservation assessments for Uganda’s coffee species, and submit them to IUCN via their portal.</p>	<p>A Yr 3 deadline, but much data already collected for research paper and IUCN assessments.</p>	<p>Add data from fieldwork and any other sources.</p>
<p><b>Output 2.</b> Development of Liberica coffee production and establishment of producer-purchaser relationship at Luwero. Demonstration of Liberica as an important third coffee crop species for Uganda.</p>	<p><b>2.1</b> Provision of coffee drying bed equipment (wooden posts; wire mesh, nails, plastic sheet), and associated equipment (tools), for 10 farms. 10 drying bed units per farm (100 units in total). By end Yr 2.  <b>2.2</b> Provide training in coffee harvesting, processing, value chain management and basic agronomy (300 community members, with equal gender participation, for 5 farms). End Yr 2. Repeated in Year 3 (i.e. 600 community members and 10 farms in total over project duration). By end of Yr 3.  <b>2.3</b> Ensure pre-shipment processing (milling, sorting and grading), evaluation, and export to UK, for 5,000 kg (2,500 kg per year) of clean, quality coffee. Yrs 2, &amp; 3  <b>2.4</b> Distribution of farmer payments (premium of 15–30% per unit price [\$/lb]), above commodity (global) or national coffee prices, for participating farms. Yrs 2, &amp; 3  <b>2.5</b> Sensory evaluation for 10 Liberica coffee samples, to include caffeine and basic chemical analysis. Yrs 1, 2 &amp; 3 (sensory), and end of Yr 2 (chemical).  <b>2.6</b> Provide nursery set-up and training to establish 1 Liberica seedling nursery for Luwero. Sale of 400 seedlings over course of project [e.g. 5 farms supplied with replacement stock; and 5 new farms with founding stock, per year]. By mid year 3.</p>	<p>2.1. Survey sent out (by Kyagalanyi Coffee) across Luwero farming community to identify farms that have the capacity and desire to engage in farming of Liberica coffee. See section 3.2 and Annex 4.  2.2 Survey sent out (by Kyagalanyi Coffee) across Luwero farming community to identify farms that have the capacity and desire to engage in farming of Liberica coffee, and this benefit from training and support. See section 3.2 and Annex 4.  2.3 to 2.4 Outputs for Yrs 2 and 3.  2.5 Sensory analysis samples requested. Chemical analysis underway and ahead of schedule. See section 3.2 and Annex 4.  2.6 Nursery stock evaluation started in March. See section 3.2 and Annex 4.</p>

<b>Activity 2.1.</b> Purchase, deliver and install drying beds and associated equipment, for 10 farms.	As above, for Output.	Select farms from survey and begin installation and training.
<b>Activity 2.2.</b> Train 600 community members (over 10 farms), in two sets (300 farmers, 5 farms), with equal gender involvement, for coffee harvesting, processing, value chain management and basic agronomy; revisit farms to consolidate and monitor uptake and success of training.	As above, for Output.	Select farms and start training programme.
<b>Activity 2.3,</b> Undertake the logistics and management required to ensure pre-shipment processing (milling, sorting and grading), evaluation (grading), and export to UK, for 5,000 kg of clean, quality coffee, over the lifetime of the project (with a focus on Yrs 2 and 3).	As above, for Output.	From survey and farm visits: select participating farms and provide training to ensure export quality coffee.
<b>Activity 2.4</b> Revisit farms post-export to pay 15-30% quality premium, or pay premium as part of the Freight on Board (FOB) price; payments made directly to community members supplying quality coffee (on a per unit basis, i.e. per lb or kg produced).	As above, for Output.	Start negotiations with farmers on the implications of quality, and undertake sensory evaluations to establish premiums.
<b>Activity 2.5a</b> Undertake quality evaluation using industry standard procedures (sensory characteristics (taste and aroma) and number and type of defects for 10 Liberica coffee samples from Luwero.	Samples requested from farmers for delivery to project partners (Kyagalanyi, Clifton Coffee and Kew).	Receive samples and undertake sensory evaluation.
<b>Activity 2.5b</b> Undertake laboratory survey of caffeine content and basic coffee chemistry for 10 samples of Liberica coffee; these to be compared with sensory evaluation (2.5a).	Liberica samples acquired, along with a range of other samples and controls. Around 100 samples databased and extracted ready for analysis.	Complete analyses for Liberica and share results with partners for discussion and interpretation.
<b>2.6</b> Establish and maintain (within project lifetime) a Liberica coffee nursery at Luwero. Record number of seedling produced and sold, and all costs and income.		
<b>Output 3.</b> Demonstration of biodiversity value, ecosystem service provision, and climate resiliency potential for Liberica coffee production.	<p><b>3.1</b> Provide agrometeorological survey (Liberica cultivation vs. non-forest crops) for 6 sites. Completed by Yr 3.</p> <p><b>3.2.</b> Provide soil water survey, (Liberica cultivation vs. other crops) and over a depth gradient, for 4 (of the 6) sites/farm locations. Completed by early Yr 3.</p> <p><b>3.3</b> Provide pest and diseases survey (Liberica vs. robusta coffee), over 6 sites/locations. Completed by early Yr 3.</p> <p><b>3.4</b> Undertake drought-induced field trials, via 2 plots [100 plants for each</p>	<p>3.1 &amp; 3.2 Delayed due to CV-19 (requires the presence of A. Davis in Uganda. Equipment purchased. See section 3.2 and Annex 4.</p> <p>3.3 Research and survey work underway. See section 3.2 and Annex 4.</p> <p>3.4. Field trials underway. See section 3.2 and Annex 4.</p> <p>3.5 Botanical and Zoological surveys underway. See section 3.2 and Annex 4.</p>

	plot], for Liberica vs. robusta coffee. Completed by early Yr 3. <b>3.5</b> Provide data on biodiversity differences between coffee and non-coffee producing farming areas, 6 sites in total. Completed by early Yr 3.		
<b>Activity 3.1.</b> Install agrometeorological survey equipment (soil moisture, ambient air temp., humidity) for six farms/sites (Liberica cultivation vs. non-forest crops) using the latest logger and probe technology. Provide short report.		The climate recording equipment has been purchased but has not yet been installed in Uganda. Originally this was planned for April 2021, but will have to wait until CV-19 travel restrictions lift (hopefully September 2021) before we can visit Uganda.	Travel to Uganda (A. Davis, Kew) and install climate recording equipment.
<b>Activity 3.2.</b> Extend agrometeorological survey equipment to measure soil moisture at a range of soil depths, and measure soil water potential at four (of the six) farm sites (Liberica cultivation vs. other crops) and over a depth gradient. Provide short report.		The soil moisture equipment has been purchased but has not yet been installed in Uganda. Originally this was planned for April 2021 but will have to wait until CV-19 travel restrictions lift (hopefully by September 2021) before we can visit Uganda.	Travel to Uganda (A. Davis, Kew) and install soil moisture recording equipment.
<b>Activity 3.3</b> Undertake pest and diseases survey at the six farm sites by regular measurement of pests and diseases incidence and severity (Liberica vs. robusta coffee), and supplement using farmer survey. Provide short report.		Survey work is being undertaken by a master's students (Student 1 Zoology), under close supervision by Makerere University academic [zoologist]. Initial fieldwork has been undertaken (March 2021) and a fieldwork plan is in place for Yr 1	Continue to collect data from wild and farm sites (Luwero) via transects and site inspection (fieldwork). Collate report.
<b>Activity 3.4</b> Construct a drought-induced field trial for Liberica (vs. robusta) coffee in Kampala (and on other location), using plots of 100 plants each) and record physical growth and stress metrics (at early stage development). Provide short report.		Field trials for Liberica ( <b>3.4</b> ) are underway: material has been selected and collected from Luwero farms, and planted in Kampala (site 1)	Collect material from at least one wild locality and plant second plot/location. Manage trials and record growth/response data.
<b>Activity 3.5</b> Undertake malaise trapping survey of invertebrates, with a focus on predator species; and botanical transects for six farm sites (Liberica cultivation vs. other crops). Provide short report.		Zoological survey work is being undertaken by a master's students (Student 1 Zoology), under close supervision by Makerere University academic [zoologist]. Botanical survey work is being undertaken by a master's students (Student 2 Botany), under close supervision by Makerere	Continue to collect data from wild and farm sites (Luwero) via transects and site inspection (fieldwork). Collate reports.



		University academic [botanist]. Initial fieldwork has been undertaken (March 2021) and a fieldwork plan is in place for Yr 1	
<b>Output 4.</b> Provide data for the suitability of <i>C. eugenoides</i> as a high-value niche crop for forest-based communities.	<p><b>4.1</b> Set up of 2 trial plots [with 50 plants per plot] for <i>C. eugenoides</i> at 2 locations/elevations. By Yr 2.</p> <p><b>4.2</b> Provide base-line agronomic data for <i>C. eugenoides</i> coffee from the 2 field trials. Completed by Yr 3.</p>	Output 4 are not due to commence until Yr 2, bur planning and groundwork is underway.	
<b>Activity 4.1.</b> Set up two trial plots for <i>C. eugenoides</i> coffee, one in Kampala (1500 m asl) and another either at second NARO research station at higher elevation (1700–2000 m asl), or another suitable site. Each plot to contain 50 plants.		Wild locations of <i>C. eugenoides</i> added to database and maps, which will be used for field collection strategy. It has also provided us with agroecological information for this species.	Collection of selected <i>C. eugenoides</i> material for field trials.
<b>Activity 4.2.</b> Record physical growth and stress metrics (at early stage development) and pest and disease incidence		Activity scheduled for Yr 2.	If possible, we aim to collect material in Year 1 to start trial and data recording.
<b>Output 5.</b> Production of Wild Coffee Resources Strategy for Uganda document	<p><b>5.1</b> Meetings held (1 per year) with public and private sector strategy steering committee. End of Yrs 1–3.</p> <p><b>5.2</b> Project data assembly and synthesis of outcomes from Outputs 1–4. Completed by Yr 3.</p> <p><b>5.3</b> Production of c. 5 maps/ infographics and other GIS resources. By end Yr 3.</p> <p><b>5.4</b> Production of 1 professionally produced publication: Wild Coffee Resources Strategy, with conservation status reports for four coffee species (<i>C. liberica</i>, <i>C. canephora</i>, <i>C. eugenoides</i>, <i>C. neoleroyi</i>) and their habitats (forests). Completed by Yr 3.</p> <p><b>5.5</b> Dissemination of 200 hardcopies in Uganda (50 in UK and elsewhere) and placement of freely available pdf on the Internet (via Kew and partner websites; and Research Gate). Yr 3.</p>	<p>5.1. First meeting scheduled for mid Yr 1, but now rescheduled for end Yr 1 (due to CV-19).</p> <p>5.2. Assembly of data started. See section 3.2.</p> <p>5.3. Map production started (draft maps produced)</p> <p>5.4 and 5.5 Production and completion scheduled for Yr 3</p>	
<b>Activity 5.1.</b> Set up and hold three half day meetings (one per year) with project members and key stakeholder (e.g. government, NGOs and private-sector stakeholders), at a neutral locality (hotel or conference room) to discuss project		As above, for Output.	Plan and reschedule meeting for end Yr 1, hopefully in September 2021

rationale and direction (Year 1), progress (Year 2) and outputs and advocacy (Year 3). Feedback from meetings used as part of M&E for adaptive management processes.		
<b>Activity 5.2.</b> Assemble project data and outcomes from Output 1–4 and write draft strategy text. Send to partners/co-authors for review and comment.	As above, for Output.	Continue assembly of data and other resources. Include feedback from Yr 1 meeting, to maximize strategy reach and impact.
<b>Activity 5.3.</b> Produce maps and other GIS outputs, graphs and infographics. Send to partners/co-authors for review and comment.	As above, for Output.	Continue to refine distribution maps, after addition of new data. Produce second version of maps.
<b>Activity 5.4.</b> Send all materials (draft strategy) to publishers (GoAgency, UK) for design and production. Co-authors to review pdf, comment and provide revisions and edits; send marked up draft back to publishers. Publishers to update, provide version for sign off, and then print hardcopies and provide low and high resolution pdfs.	As above, for Output.	No activity scheduled for Yr 1 or Yr 2.
<b>Activity 5.5.</b> Organize and undertake shipping to Uganda, and then delivery to stakeholders in Uganda. Upload pdf to ResearchGate and Kew website, and hopefully partner institute websites	As above, for Output.	No activity scheduled for Yr 1 or Yr 2.

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

Project summary	Measurable Indicators	Means of verification	Important Assumptions/Risks
<b>Impact:</b> Sustainability of the Ugandan coffee sector for environmental (biodiversity, ecosystem services, climate resilience, conservation of forest and genetic resources) and livelihood benefit (increased household income, reduced risk, social improvement)			
<p>Outcome: A resilient and sustainable coffee sector supported by the use of coffee natural capital, demonstrating the value of native forests for their long-term conservation.</p>	<p><b>0.1</b> A greatly Improved knowledge base for Uganda’s coffee natural capital, (<i>C. liberica</i>, <i>C. canephora</i>, <i>C. eugenioides</i> and <i>C. neoleroyi</i>), including conservation status (regional IUCN Red List assessments), biotic (phenology, morphological variation) and abiotic data (e.g. habitats, climate envelopes). By Yr 3.</p> <p><b>0.2</b> Evidence of production and procurement of Liberica coffee at Luwero, as an example of the viability of scaling up commercial production for this indigenous coffee species. By Yr 3.</p> <p><b>0.3</b> Data provided on biodiversity, ecosystem service and climate resiliency data, for Liberica coffee farming, compared to robusta coffee and non-shade farming systems. By Yr 3.</p> <p><b>0.4</b> Production of agronomy data via field trials for the high-value indigenous species <i>C. eugenioides</i>, with a view to commercial production. By Yr 3.</p> <p><b>0.5</b> Assembly of project outcomes into a public document that provides key information on Uganda’s coffee natural capital, for: (i) the conservation of its four indigenous coffee species; (ii) the biodiversity and ecosystem service benefits of coffee and indigenous coffee production; (iii) the development of these resources for the sustainable development of the country’s coffee sector (including improved incomes for coffee farmers); and (iv) demonstration of the value of preserving Uganda’s</p>	<p><b>0.1</b> Publication of 1 open access research paper and 4 regional IUCN Red List assessments, authored by the project team.</p> <p><b>0.2</b> Accounts/records/orders: for project equipment expenditure and sales/purchases of Liberica coffee from Luwero.</p> <p><b>0.3</b> Availability of: 2 years of climate data (including soil-water) from 6 sites; biodiversity data from 6 sites; and 2-year field trial (2 plots) data, for Liberica coffee.</p> <p><b>0.4</b> Availability of at least 1 year’s agronomy field trial data (2 field trial plots) for <i>C. eugenioides</i>.</p> <p><b>0.5</b> Publication of <i>Wild Coffee Resources Development Strategy</i>; dissemination to key stakeholder and free availability via open access.</p> <p><b>0.5 i – iv</b> These elements included in the strategy document.</p> <p><b>0.5 iv</b> Meetings to demonstrate, via coffee natural capital, the value of preserving Uganda’s humid forests, with key organizations: the National Environment Management Authority; the Uganda National Commission for United Nations Educational, Scientific and Cultural Organisation (UNESCO); and the Man and Biosphere (MAB) Programme Committee. To include lessons learned and benefits encountered from coffee biosphere designation in Ethiopia (see 5.1, below)</p> <p><b>0.5 iv</b> Accession information for farms and research stations.</p>	<p><b>0.2</b> The market requires Liberica Coffee (evidence to support this comes from producer and purchaser interest/demand).</p> <p><b>0.3.</b> Liberica coffee offers greater climate resiliency potential over robusta coffee (feedback from farmers and pilot field data supports this assumption, with further study urgently required).</p> <p><b>0.4</b> Consumer purchase prices place <i>C. eugenioides</i> in the (very) high value category, but expectations need to be managed to encompass possibility of a broader price structure across the value chain. Farmers remain interested in growing non-standard crop species (see notes on Output 4 assumption)</p> <p><b>0.5</b> Key stakeholders will require tangible demonstration of conservation benefits, viability of conservation mainstreaming activities, commercial application, and livelihood benefits.</p>

	humid forests (i.e. indigenous coffee species used as a flagship and rationale for forest conservation). (v) Indigenous variants of <i>C. liberica</i> and <i>C. eugenioides</i> brought into cultivation (in project farms and research stations (NARO) as part of increasing <i>ex situ</i> conservation capacity. By end Yr 3.		
<b>Outputs:</b> <b>1.</b> A critical survey of Uganda's coffee natural capital (wild species diversity, distribution, and conservation threat).	<b>1.1</b> The completion of 1 multi-field database (Access), containing all field survey data and herbarium data. By end Yr 3. <b>1.2</b> Delivery of 1 two-day training course on GIS data collection and QGIS, including basic species distribution modelling (SDM) and production of IUCN Red List metrics (GeoCat). By end Yr 2. <b>1.3a</b> Production of 1 critical survey of Uganda's coffee natural capital (wild species diversity). By mid Yr 3. <b>1.3b</b> Production of regional IUCN Red List conservation assessments for Uganda's coffee species. By mid Yr 3.	<b>1.1</b> Receipt of database by NARO and Makerere, with e-mail or letter confirming receipt and correct functioning. <b>1.2</b> Register of attendance for training courses (with equal gender allocation for 16-20 students/researchers). <b>1.3a</b> Publication of an open access research paper: <i>Wild coffee species diversity of Uganda, and its value for coffee sector sustainability</i> ( Receipts for travel to UK for James Kalema. <b>1.3b.</b> Submission of 4 regional conservation assessment to IUCN Red List portal.	<b>1.1 &amp; 1.3</b> Timelines assume that the COVID-19 situation in Uganda doesn't significantly worsen, and that fieldwork can occur in Yr1 (if this assumption fails to hold true, more intensive fieldwork in Yr2 would compensate). <b>1.2</b> Owing to the worsening COVID-19 situation in Uganda, and the UK, the training course in Uganda may be suspended (now proposed for Yr 2).
<b>2.</b> Development of Liberica coffee production and establishment of producer-purchaser relationship at Luwero. Demonstration of Liberica as an important third coffee crop species for Uganda.	<b>2.1</b> Provision of coffee drying bed equipment (wooden posts; wire mesh, nails, plastic sheet), and associated equipment (tools), for 10 farms. 10 drying bed units per farm (100 units in total). By end Yr 2. <b>2.2</b> Provide training in coffee harvesting, processing, value chain management and basic agronomy (300 community members: with equal gender participation, for 5 farms). End Yr 2. Repeated in Year 3 (i.e. 600 community members and 10 farms in total over project duration). By end of Yr 3. <b>2.3</b> Ensure pre-shipment processing (milling, sorting and grading), evaluation, and export to UK, for 5,000 kg (2,500 kg per year) of clean, quality coffee. Yrs 2 & 3.	<b>2.1</b> Bills of sale for drying bed and associated equipment, and signed document of receipt from farmers. <b>2.2</b> Attendance data for training courses (with gender disaggregation recorded). 600 community members in total. <b>2.3</b> Copies of procurement and export documents, for coffee sales/export. <b>2.4</b> Export documentation (or similar) to indicate premiums paid to cooperatives /farms. <b>2.5a</b> Cupping (taste and aroma) and defects report for 10 samples, from KCL & Clifton Coffee. <b>2.5b</b> Chemistry report on 10 samples, from RBG Kew. <b>2.6a</b> Bills of sale/receipt for potting bags and other materials.	<b>2.1 &amp; 2.2.</b> These are low risk activities for the project as they are routinely carried out by Kyagalanyi Coffee Ltd. (KCL) to train robusta coffee farmers <b>2.3</b> There are a number of risks involved in ensuring shipping quantities. We have set a realistic estimate for our shipping volumes. We will have a dedicated agent working with farmers at Luwero, and a Ugandan-based coffee export company working on the project, which should ensure that targets are met. <b>2.4</b> Farmers will receive a fair price for Liberica coffee (Farmers and exporters are aware of coffee price volatility and the risks that this brings. Setting a premium will help to offset some of the risk for farmers; the broad premium

	<p><b>2.4</b> Distribution of farmer payments (premium of 15–30% per unit price [\$/lb]), above commodity (global) or national coffee prices, for participating farms. Yrs 2 &amp; 3.</p> <p><b>2.5</b> Sensory evaluation for 10 Liberica coffee samples, to include caffeine and basic chemical analysis. Yrs 1, 2 &amp; 3 (sensory), and end of Yr 2 (chemical).</p> <p><b>2.6</b> Provide nursery set-up and training to establish 1 Liberica seedling nursery for Luwero. Sale of 400 seedlings over course of project [e.g. 5 farms supplied with replacement stock; and 5 new farms with founding stock, per year]. By mid year 3.</p>	<p><b>2.6b</b> Records for sales (number and price) of seedlings.</p>	<p>range (%) should incentivise production targets (and quality). Ideally, Liberica coffee from Luwero would be decoupled from the commodity market and farmers would receive a non-market (e.g. speciality coffee) price, but we cannot guarantee this outcome over the course of the project.)</p>
<p><b>3.</b> Demonstration of biodiversity value, ecosystem service provision, and climate resiliency potential for Liberica coffee production.</p>	<p><b>3.1</b> Provide agrometeorological survey (Liberica cultivation vs. non-forest crops) for 6 sites. Completed by early Yr 3.</p> <p><b>3.2.</b> Provide soil water survey, (Liberica cultivation vs. other crops) and over a depth gradient, for 4 (of the 6) sites/farm locations. Completed by early Yr 3.</p> <p><b>3.3</b> Provide pest and diseases survey (Liberica vs. robusta coffee), over 6 sites/locations. Completed by early Yr 3.</p> <p><b>3.4</b> Undertake drought-induced field trials, via 2 plots [100 plants for each plot], for Liberica vs. robusta coffee. Completed by early Yr 3.</p> <p><b>3.5</b> Provide data on biodiversity differences between coffee and non-coffee producing farming areas, 6 sites in total. Completed by early Yr 3.</p>	<p><b>3.1 &amp; 3.2</b> Production of climate and soil water data database, plus graphs and analyses, with results summarized in a brief summary report (c. 10 pages).</p> <p><b>3.3</b> Production of 1 pest &amp; disease survey, plus wider household survey across Luwero region, available as a short report (5 pages).</p> <p><b>3.4</b> Production of field trial data within 1 report (5 pages). Photographs of plots. Receipts for plot expenses (materials and labour). Receipts for travel to UK for Catherine Kiwuka (Yr 2 or 3)</p> <p><b>3.5</b> Production of biodiversity survey report (5 pages). Photographs of plots. Receipts for transect expenses (materials and labour).</p>	<p><b>3.1 &amp; 3.2</b> Climate data collection equipment is not damaged or interfered with (gathering in situ climate data is a vital but rarely undertaken activity, due to certain risks and difficulties. In particular, climate data (loggers and sensors) may be stolen, interfered with (e.g. by children), or damaged by animals. We are mitigating these risks by using buried and cryptic sensors, which we have developed and tested by us over the last 8 years.</p> <p>The only in situ climate data for coffee In Uganda is from (old) books and non-accessible reports. The climate data gathered for the project will be gathered using project equipment, and robust on-line resources. We will not be relying on third parties for data, which is risk laden.)</p> <p><b>3.3 to 3.5</b> Field work activities run to schedule without interference (Gathering field data from plots and transects can be challenging due to circumstances beyond the knowledge or control of the researcher. We are mitigating these risks by undertaking</p>

			the field work in areas known to us, that are close to Kampala (and Makerere University), and for which we have dedicated personnel and sufficient resources. Project partners in Uganda have long-standing experience of this type of work.)
4. Provide data for the suitability of <i>C. eugenoides</i> as a high-value niche crop for forest-based communities.	<p>4.1 Set up of 2 trial plots [with 50 plants per plot] for <i>C. eugenoides</i> at 2 locations/elevations. By mid-Yr 2.</p> <p>4.2 Provide base-line agronomic data for <i>C. eugenoides</i> coffee from the 2 field trials. Completed by mid Yr 3.</p>	<p>4.1 Photographs of plots. Receipts for plot expenses (materials and labour).</p> <p>4.2 Production of field trial data and report (c. 5 pages).</p>	Farmers remain interested in growing non-standard crop species (For this project, we have farmers that have expressed interest in pursuing forest/niche coffee production, and the cultivation of <i>C. eugenoides</i> . Anecdotal information suggests that forest communities have tried to develop forest coffee.)
5. Production of Wild Coffee Resources Strategy for Uganda document	<p>5.1 Meetings held (1 per year) with public and private sector strategy steering committee. End Yrs 1–3.</p> <p>5.2 Project data assembly and synthesis of outcomes from Outputs 1–4. Completed by mid Year 3.</p> <p>5.3 Production of c. 5 maps/ infographics and other GIS resources. By end Yr 3.</p> <p>5.4 Production of 1 professionally produced publication: Wild Coffee Resources Strategy, with conservation status reports for four coffee species (<i>C. liberica</i>, <i>C. canephora</i>, <i>C. eugenoides</i>, <i>C. neoleroyi</i>) and their habitats (forests). Completed by mid Yr 3.</p> <p>5.5 Dissemination of 200 hardcopies in Uganda (50 in UK and elsewhere) and placement of freely available pdf on the Internet (via Kew and partner websites; and Research Gate). Yr 3.</p>	<p>5.1 Attendance lists, and accounts/receipts of expenses/costs, for 3 meetings; 3 sets of minutes distributed to attendees and interested parties.</p> <p>5.2 &amp; 5.3 Hardcopy of draft text and other materials for Wild Coffee Resources Strategy available, and sent to co-authors (e-mails to acknowledge receipt).</p> <p>5.4 Invoice and final payment documents for production (design, printing and delivery) of Strategy (250 copies; c. 30 pages, with one page summary of key points).</p> <p>5.5. Delivery receipt form for 200 hardcopies (signed by receiving institutes and organizations in Uganda). Pdf available on Research Gate and Kew website: on-line location provided; downloads metrics recorded.</p>	<p>5.1 Stakeholders are willing and able to attend meetings (Risk of non-attendance mitigated by early announcement of dates and by keepings meeting short (1/2 day)).</p> <p>5.5 Timely shipping and delivery of hard-copy (Risk of delays mitigated by planning export/income logistics early, and having a back-up plan).</p>
<b>Activities</b> (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)			
<b>Output 1</b>			

**1.1** Gather and collate field survey data for all the coffee-holding forests of Uganda, with the collection of vouchers (and living material, where required), and ground observations (geo-location, habitat, vegetation, soil type, local extinction threats), for the species *C. liberica*, *C. canephora*, *C. eugenioides* and *C. neoleroyi* and their wild hybrids. Survey work will be based on a pre-survey review of herbarium collections at key herbaria.

**1.2** Organize and run a two day course on GIS (QGIS), basic species distribution modelling (SDM), and conservation metric producing programmes (GeoCAT), at a dedicated venue for 16 to 20 Ugandan researchers/students.

**1.3** Collate and analyse data from Activity 1.1, write paper and produce figures (maps and graphs) in collaboration with project partners. Send research paper to high impact journal for open access publication. Produce regional IUCN Red List conservation assessments for Uganda's coffee species, and submit them to IUCN via their portal.

## **Output 2**

**2.1** Purchase, deliver and install drying beds and associated equipment, for 10 farms.

**2.2** Train 600 community members (over 10 farms), in two sets (300 farmers, 5 farms), with equal gender involvement, for coffee harvesting, processing, value chain management and basic agronomy; revisit farms to consolidate and monitor uptake and success of training.

**2.3** Undertake the logistics and management required to ensure pre-shipment processing (milling, sorting and grading), evaluation (grading), and export to UK, for 5,000 kg of clean, quality coffee, over the lifetime of the project (with a focus on Yrs 2 and 3).

**2.4** Revisit farms post-export to pay 15-30% quality premium, or pay premium as part of the Freight on Board (FOB) price; payments made directly to community members supplying quality coffee (on a per unit basis, i.e. per lb or kg produced).

**2.5a** Undertake quality evaluation using industry standard procedures (sensory characteristics (taste and aroma) and number and type of defects for 10 Liberica coffee samples from Luwero.

**2.5b** Undertake laboratory survey of caffeine content and basic coffee chemistry for 10 samples of Liberica coffee; these to be compared with sensory evaluation (2.5a).

**2.6** Establish and maintain (within project lifetime) a Liberica coffee nursery at Luwero. Record number of seedling produced and sold, and all costs and income.

## **Output 3**

**3.1** Install agrometeorological survey equipment (soil moisture, ambient air temp., humidity) for six farms/sites (Liberica cultivation vs. non-forest crops) using the latest logger and probe technology. Provide short report.

**3.2.** Extend agrometeorological survey equipment to measure soil moisture at a range of soil depths, and measure soil water potential at four (of the six) farm sites (Liberica cultivation vs. other crops) and over a depth gradient. Provide short report.

**3.3** Undertake pest and diseases survey at the six farm sites by regular measurement of pests and diseases incidence and severity (Liberica vs. robusta coffee), and supplement using farmer survey. Provide short report.

**3.4** Construct a drought-induced field trial for Liberica (vs. robusta) coffee in Kampala (and on other location), using plots of 100 plants each) and record physical growth and stress metrics (at early stage development). Provide short report.

**3.5** Undertake malaise trapping survey of invertebrates, with a focus on predator species; and botanical transects for six farm sites (Liberica cultivation vs. other crops). Provide short report.

## **Output 4**

4.1 Set up two trial plots for *C. eugenoides* coffee, one in Kampala (1500 m asl) and another either at second NARO research station at higher elevation (1700–2000 m asl), or another suitable site. Each plot to contain 50 plants.

4.2 Record physical growth and stress metrics (at early stage development) and pest and disease incidence.

### **Output 5**

5.1 Set up and hold three half day meetings (one per year) with project members and key stakeholder (e.g. government, NGOs and private-sector stakeholders), at a neutral locality (hotel or conference room) to discuss project rationale and direction (Year 1), progress (Year 2) and outputs and advocacy (Year 3). Feedback from meetings used as part of M&E for adaptive management processes.

5.2 Assemble project data and outcomes from Output 1–4 and write draft strategy text. Send to partners/co-authors for review and comment.

5.3 Produce maps and other GIS outputs, graphs and infographics. Send to partners/co-authors for review and comment.

5.4. Send all materials (draft strategy) to publishers (GoAgency, UK) for design and production. Co-authors to review pdf, comment and provide revisions and edits; send marked up draft back to publishers. Publishers to update, provide version for sign off, and then print hardcopies and provide low and high resolution pdfs.

5.5. Organize and undertake shipping to Uganda, and then delivery to stakeholders in Uganda. Upload pdf to ResearchGate and Kew website, and hopefully partner institute websites.



## Annex 3: Standard Measures

**Table 1 Project Standard Output Measures**

Code No.	Description	Gender of people (if relevant)	Nationality of people (if relevant)	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
Established codes								

Nothing to report in the first six months (Year 1) of the project.

**Table 2 Publications**

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

Nothing to report in the first six months (Year 1) of the project.

## Checklist for submission

	Check
<b>Is the report less than 10MB?</b> If so, please email to <a href="mailto:Darwin-Projects@ltsi.co.uk">Darwin-Projects@ltsi.co.uk</a> putting the project number in the Subject line.	Yes
<b>Is your report more than 10MB?</b> If so, please discuss with <a href="mailto:Darwin-Projects@ltsi.co.uk">Darwin-Projects@ltsi.co.uk</a> about the best way to deliver the report, putting the project number in the Subject line.	No
<b>Have you included means of verification?</b> You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
<b>Do you have hard copies of material you need to submit with the report?</b> If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	No
Have you involved your partners in preparation of the report and named the main contributors	Yes
Have you completed the Project Expenditure table fully?	Yes
Do not include claim forms or other communications with this report.	