Department for Environment Food & Rural Affairs

DARWIN INITIATIVE

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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	22-006
Project title	Mainstreaming biodiversity conservation and climate resilience at Yayu Biosphere Reserve
Host country(ies)	Ethiopia
Contract holder institution	Royal Botanic Gardens, Kew
Partner institution(s)	Environment and Coffee Forest Forum (ECFF); HiU Coffee; Union Hand-roasted Coffee (UHRC)
Darwin grant value	£315,790
Start/end dates of project	1 April 2015 to 31 March 2018
Project leader's name	Dr Aaron Davis
Project website/blog/Twitter	http://www.kew.org/science/projects/mainstreaming-biodiversity-conservation-and-climate-resilience-yayu-biosphere http://www.kew.org/blogs/kew-science/mainstreaming-biodiversity-conservation-and-climate-resilience-in-ethiopia%E2%80%99s-wild https://www.unionroasted.com/blog/03/18/at-origin-yayu-coffee-forest-in-ethiopia/
Report author(s) and date	Aaron Davis (29 June 2017)

1 Project Rationale

The locality. The project site is located in SW Ethiopia (Fig. 1), in the province of Illubabor, within the southern part (buffer and transition zones) of the UNESCO registered Yayu Biosphere Reserve. The project includes five primary cooperatives: Achebo, Wutate, Gechi, Geri and Yayu Zuria, which are located within seven kebeles (smallest administrative units in Ethiopia).

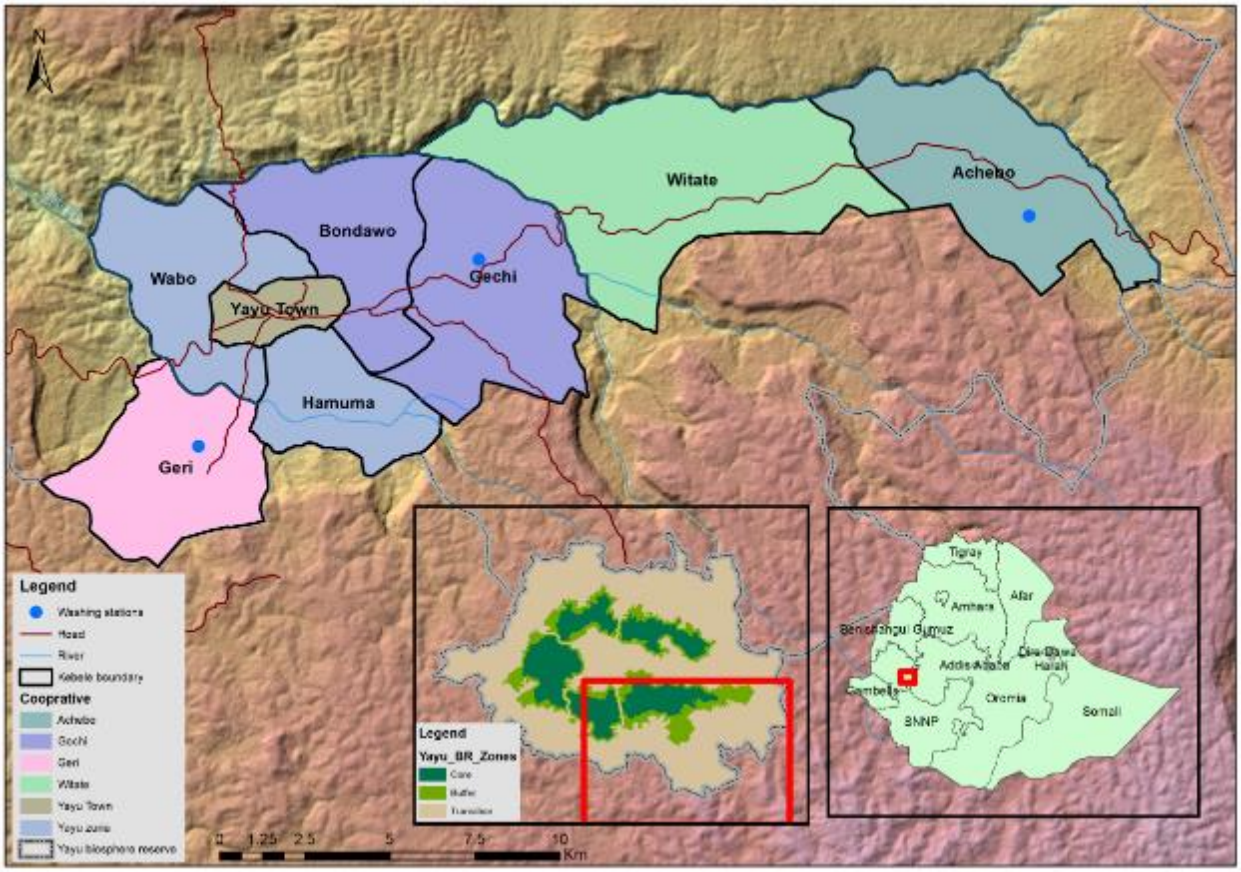

Figure 1. Location of Yayu Reserve, its five coffee cooperatives: Achebo, Witate (Wutate), Gechi Including Bondawo kebele), Geri, and Yayu Zuria (Hamuma and Wabo kebeles).

The Yayu Reserve (167,000 ha) is divided into: (1) core zone, (2) buffer zone, (3) transition area(s) (Fig. 1). It is home to around 450 higher plants, 50 mammal, 200 bird, and 20 amphibian species, plus important wild crop genetic resources, most notably for *Coffea arabica*. Coffee cultivation occurs within forests of the buffer zone and transition areas. At Yayu, coffee generates around 70% of the cash income for over 90% of the population. For some farmers, coffee provides almost all household income.

The problem (pre-project). Farmers in the Yayu area were struggling to make sufficient income from coffee, initiating a conversion away from forest-based production (coffee), to non-forest crops such as the narcotic khat and maize; leading to forest loss, biodiversity loss, and a reduction in ecosystem services. We assumed that if income from forest-based coffee production could be increased, and revenues sustained, forest loss would be stabilized, and biodiversity and ecosystem services preserved. Ecosystem services include climatic amelioration (e.g. reduction of temperatures and increase in soil moisture), water conservation, nutrient (e.g. nitrogen) recycling, and biotic services (reduction in pests and disease, and soil improvements). Low incomes from coffee severely restricts investment in resilience, e.g. on-farm adaptation to climate change and best-practice agronomy.

The most important factor restricting coffee income at Yayu was coffee quality, and access to market, rather than productivity/quantity. If high quality (higher coffee price) and market access are secured, an increase in household income should follow. This is particularly relevant to the coffee sector under the ongoing 'coffee crisis', where low commodity prices vs. rising costs are making coffee farming unprofitable and therefore untenable. In Ethiopia this usually results in the conversion from forest-based (i.e. coffee) to non-forest farm production, to crops (e.g. maize) and pasture lands (animal grazing).

For the five Yayu cooperatives our aim was to increase coffee quality to the level where the project partner, Union Hand-roasted Coffee (UHRC)) would be able to pay a substantial dividend (the elevated prices that high quality ('specialty') coffee receive), with the aspiration of increasing the income from coffee across the 950 farming households of the five cooperatives.

Increase in household income provide incentive to maintain the forest-based production system, allow the financial flexibility to invest in farm improvements (including resilience) and provide a fiscal buffer for years with poor harvests (e.g. due to drought). As our only baseline was the coffee prices paid to farmers, it was imperative to employ the services of a socio-economist, so that we could better understand the monetary and livelihood implications of our Darwin project.

The problems were identified by project partners Environment and Coffee Forest Forum (ECFF), after more than a decade of working at Yayu. A Darwin Scoping award in November 2013, undertaken by Aaron Davis (Kew), Tadesse Woldermariam Gole (ECFF) and Jeremy Torz (UHRC), was used to investigate the issues concerning coffee prices, coffee quality, and value chain and cooperative organization.

In summary, the objectives were to: (1) increase household income from coffee via quality improvements, better value chain management and direct access to market (the direct trade model); which in turn would (2) reduce or stabilize land-use change/conversion and (3) preserve biodiversity (including some of the best wild populations of wild Arabica coffee); and (4) improve farmer's potential to deal with resilience to climate change and weather perturbations (climatic variability).

2 Project Partnerships

RBG Kew is the Project Leader and are responsible for the organization and overall management of the project, the science activities, budget, and project M&E.

ECFF (now ECCCFF) are the in-country Project Leader and negotiating body for government agencies, in-country civil societies, coffee exporting bodies and community governance (including cooperatives and local administration).

HiU Coffee (HiU) are the consultants responsible for providing the training in coffee harvesting, post-harvest processing, cup (taste and other sensory characteristics) evaluation and export logistics (with UHRC), for the five Yayu cooperatives.

Union Hand Roasted Coffee (UHRC) are responsible for providing access to market for Yayu cooperatives, via the direct-trade coffee purchasing model, and, in conjunction with HiU, play a key role in assessing coffee quality, market value, cooperative management, and export logistics. UHRC also provide funding and resources for socio-economic evaluation, via the employment of a socio-economist Pascale Schuit (see above).

There was a long-standing demand from the host partner (ECFF) to develop a more sustainable outcome for Yayu coffee production and farming livelihoods, after more than a decade of work and research at the Yayu Reserve. All of the partners are involved in project planning and development and M&E, as each has specific areas of expertise and experience, necessary to the success of the project.

In April 2018 RBG Kew met with ECFF in Addis Ababa to review the outcomes of the project, and to discuss project closure for the Darwin project, and continuation (including the potential for up-scaling). The final report and logframe provided the framework for discussion and evaluation. In April 2018 RBG Kew, UHRC and HiU started the final evaluation of the project outcomes. We decided that we would produce a scientific paper based on the project, investigating the impact of speciality coffee on household income and forest conservation. Our aim was to make the results of the project as credible and rigorous, via the peer review process (using PeerJ, an open access journal).

Additional activities and challenges. There were some minor staff changes during the course of the project. GIS analyst Zeleke Challa (ECFF) took up a new position at the UN as GIS analyst during the final year of the project, and was replaced by coffee specialist Techane Gonfa.

In Year 1 the overarching cooperative body (the secondary cooperative), the Oromia Coffee Farmer's Union Cooperative (OCFUC), was replaced by the Sor Gaba. The secondary cooperative are responsible for purchasing, final processing actives (e.g. milling and sorting), transportation and exportation. Sor Gaba play a key role in the Yayu coffee value chain.

UHRC undertook considerable extra work to ensure that the extra value generated via improved quality and market access reached the farmers, by improving transparency and via the payment of a direct quality bonus ($0.20). The production of the Waitrose Yayu forest

coffee, which was not one of the original project outcomes, generated considerable extra workload, although the extra effort was repaid in terms of increasing impact (a 25p donation goes directly back to the project), increased sales, and improved marketing for the project and its objectives, and the Darwin Initiative. Please see section Annex 7.9.

UHRC and HiU coffee also undertook numerous unscheduled activities, such as pre-export value chain assessment and improvement, warehouse visits (in order to improve post processing quality and traceability), and at least one extra visit per year to Yayu and or/Addis Ababa. UHRC and HiU also gathered much needed GPS farm locality data, which followed the training of a local counterparts using the project GPSs.

There were additional activities for RBG Kew in Years 1 and 2, for the outreach project at Kew (the Victoria Gate cafe display) and work on Kew branding and the development of a project coffee for Waitrose (see below). In Years 2 and 3, RBG used additional funding from external sources (Amar-Franses and Foster-Jenkins Trust) to improve the scientific credibility of the plot work, including three extra visits to Yayu.

Post project, the partnership will stay together to ensure the continuation of Yayu coffee. UHRC will continue to purchase Yayu coffee at current levels, and develop their work on primary cooperative management. The branded (UHRC, RBG Kew, Darwin Initiative) Yayu Forest Coffee will continue to be sold in Waitrose, and at other retail outlets. Techane Gonfa (ECFF) and Aaron Davis (RBG, Kew) will continue working with the plots, using additional funding

3 Project Achievements

3.1 Outputs

Output 1. Five Yayu coffee cooperatives are provided with the equipment, training, supervision, and information resources needed to improve (and sustain) coffee quality.

Indicator 1.1. Five Yayu co-operatives are provided with the equipment required to correctly process and evaluate their coffee, in order to attain (and sustain) high quality (by Year 1). Baseline: no drying beds or cup evaluation equipment. We found that some drying bed materials were available after we started the project (see baseline), but the quality and condition was mostly unsatisfactory. Around 80% of the drying bed materials was installed within the first year of the project, and by March 2018 all materials (12, 000 m^2) were in place across the five cooperatives, although one quarter of the materials (c. 3,000 m^2) was held in reserve (some cooperatives were not yet up to capacity and there is no point in installing the drying beds when not in use). Most of the training on the installation and use of the drying beds was done by the end of Year 2, but follow-up training continued until the end of the project. The quality evaluation equipment have been delivered to newly constructed cupping lab at Wutate School. The cupping lab is a substantial building (see photographs): construction is in concrete and bricks with a tiled roof. The building will be used as a science lab for the school, when not in use as a cupping lab. The cupping lab was part-financed by the Darwin project (via an agreed reallocation of project funds (£3,000).

Coffee evaluation (i.e. the tasting and scoring/grading of the Yayu coffee) training was given to cooperative representatives in Years 1, 2 and 3. The cupping lab was delayed due appointment a new constriction company; the first defaulted on completion milestones.

Indicator 1.2. 950 cooperative members (for the 5 cooperatives) provided with the training, supervision, and information resources (including coffee processing handbook), needed to improve (and sustain) coffee quality (by Year 2 and 3). Baseline: no or minimal training in harvest and post-harvest processing. First-level training was provided to 25 core trainers (school teachers from coffee farming families), by HiU and UHRC, during nine visits to Yayu (five more visits than scheduled). The 25 trainers went on to continue the training during the entire harvest and post-harvest period in Years 1–3. 298 individuals (farmers) were trained by the trainers (with further assistance from the HiU-UHRC team) in harvest and post harvesting techniques. The four training manuals were completed in Year 2, translated into Oromifa and Amharic, and distributed to the five cooperatives.

Additional training/guidance was provided to the secondary cooperative (Sor Gaba), by HiU and UHRC, on coffee milling, storage operation and transportation (in Addis Ababa), Several

issues were highlighted and resolved, e.g. the labelling of the Yayu coffee bags to ensure traceability.

Indicator 1.3. 950 cooperative members (households) with an annual increase in income of 30% (by Year 3). Baseline: pre-project price of less than $0.50 to $1.30, or farmers not selling their coffee. Data for household income was collated from coffee purchase invoices and receipts (see Annexes 7.0, 7.1), and by workshops and surveys conducted by the socio-economist Pascale Schuit over the course of the project , including 7 workshops, 10 cooperative surveys and 272 farmer/household surveys (see Annex 7.8). By Year 1 we had a achieved a 30% increase in household income, which was sustained through to Year 3. The calculations for these figures, and other calculations, are provided in Annex 7.0.

Output 2. Yayu household members (particularly women) are provided with access to training, and then employment within the local coffee sector.

Indicator 2.1. 12,000 square meters of drying bed equipment (Africans Beds) installed for five cooperatives (by Year 1). Baseline: no materials for drying beds (little or no training, and no or minimal seasonal labour. See Output 1. Indicator 1.1.

Indicator 2.2. 250 (extra) household members (50 per cooperative) trained in coffee harvesting and processing techniques (by Year 1). Baseline: little or no seasonal labour (due to lack of training). See note below on baseline assumption. Household training in coffee harvesting and processing started in Year 1 and, peaked in Year 2 (298 recipients), but continued to Year 3. The training was provided by the 25 Yayu (school teacher) trainers, which were trained and assisted by HiU Coffee and UHRC.

Indicator 2.3 250 (extra) household members seasonally employed within the Yayu coffee sector (by Year 2). Baseline: little or no seasonal labour. Our baseline assumption was not supported by our survey work and workshops. In fact, the use of seasonal labour is common in Yayu; farmers will often hire local residents to undertake farm work (e.g. at harvest time). During the project we estimated a 40% increase in seasonal labour over the five cooperatives, over the three-year project period, based on observation and farmer interview. This metric was very difficult to measure due to the lack of a suitable baseline (as stated above), and because we found that labour hours (and payments) are very difficult to monitor, due to the flexible nature of this activity and casual methods of payment. No records are kept by farmers or the cooperative.

Output 3. Area (land-use) analysis of forest and forest-based household income areas for the Yayu Reserve.

Indicator 3.1. Ethiopian GIS technician trained and supported in advanced land-use change technology and methodology (by Year 1). Baseline: an Ethiopian GIS technician with good GIS skills. Training and support was given in Year 1 and continued throughout the project. The Ethiopian GIS technician produced all the desired outputs by the end of Year 2 (see Annex 7.5)

Indicator 3.2. Three land-use change maps produced for Yayu Reserve (by Year 2). Baseline: nothing available. We produced a forest change (with >30% canopy density) analysis for the Yayu project area (the forest cover was found to be 19,774 hectares) ha, to cover three time periods. Between 2001 and 2016, 68 ha of forest were lost, with an average annual deforestation rate of 4.53 ha. Deforestation in 2015/2016 was 2.57 ha, and in 2016/2017 = 3.63 ha. Satellite data for 2017/18 is not yet available. These figures represent very stable deforestation rates, and at 30 m resolution the forest loss (and some minor gains) are likely to represented working variances (i.e. data noise).

Indicator 3.3. One new forest-cover survey map produced for Yayu Reserve (by Year 3). Baseline: nothing available. A land-use vegetation map for the Yayu area, based on Rapid Eye data (5 m resolution) was drafted in Year 1 and completed in Year 2 (see Annex 7.5). This provides a very accurate baseline for future forest comparison, with a view to very accurately assessing forest change in 2020 (5 years) and 2025 (10 years). A short narrative report to accompany the mapping activities has been completed and will be disseminated to stakeholders via an open access publication (PeerJ), in order to demonstrate the stability of forest cover for the Yayu coffee production areas. In order improve this work we had to collect farm data localities (via GPS); this an activity not included in the original logframe.

Output 4. Yayu coffee cooperative members are provided with the training and information resources required for on-farm climatic resilience.

Indicator 4.1 Three Yayu farm plots (1 ha) provided with, and participating in, on-farm climate adaptation trials (by Year 1). Baseline: no farm plots/resilience trials. We set up three climate resilient research plots at Yayu. (1) Plot 1 – pruning trial (1400 m); (2) Plot 2 – mulching trial (1600 m); Plot (3) – mulching trial (1700 m). We could not set up these plots at a 1 ha scale because it was prohibitively expensive and counterproductive (variables are more consistent and more satisfactorily obtained from smaller plots). We used 10 x 10 m plots within 1 ha farms. Each plot was managed by the farmer, who was paid for the price of the crop (to remove risk), plus any work involved. For Plot 1 we asked the advice on major intervention agencies working in Ethiopia, who suggested that pruning improved drought tolerance. For Plots 1 and 2, we asked Yayu farmers what they would do to improve climate resilience, and they suggested mulching as having the greatest benefits in terms of drought prevention and increased productivity. We ran the plots for two and half years (after installation in Year 1) and now have some extremely powerful results. Farmer workshops were held each year, with two farm visits (RBG Kew and ECFF) each year in Years 2 and 3. Farmer feedback was critically important throughout. The plot studies were extended from their original design using additional funds (Amar-Franses and Foster-Jenkins Trust), and specifically for the payment of farm labour, mulching costs, potential loss of income, and new climate logging equipment (see Indicator 4.2). In addition, we added a drone survey and trialled the use of infrared cameras for assessing coffee plant stress, in Year 3. Mulching plot results for 2017/18 are shown in Annexe 7.6.

Indicator 4.2. On-farm adaptation evaluation provided for 3 Yayu farm plots, and this broadened to provide an overview of climate resilience, etc. (by Year 3). Baseline: no farm plots/resilience trials in operation. The first rounds of plot data evaluation was undertaken in November 2016 and March 2017. There were some methodological issues concerning the farmer's exact roles and activities, which were resolved (further time was spent providing further instruction and training for farmers) during the visits in October/November 2016 and March 2017. The scientific equipment originally used for measuring soil moisture and soil water potential was not fit for purpose, so we developed existing equipment (buried probes and data loggers), which was operational by the end of Year 2. We also added a cost benefit analysis for Plots 2 and 3. The results from all three plots have been remarkable, but we refrained from providing an overview of climate resilience for Yayu, as farm profitability needs to be carefully evaluated before providing any advice. Moreover, what our results appear to show is that farmers know what needs to be done to improve climate resilience, but do not implement these activities due to cost. Our plots appear to represent the first study to combine a cost benefit analysis and precise measurement of environmental variables (e.g. temperature, humidity and soil moisture), for investigating small holder on-farm climate resilience.

Indicator 4.3. Five Yayu cooperatives provided with training in, and information resources for, on-farm adaptation (by Year 3). Baseline: no adaptation training or experience. Please see above (Indicator 4.2). We worked with three farmers over the course of the project and workshopped climate resilience during the main project workshops. As stated above, farmers know the best means for climate resilience; it is the cost vs. benefit that has to be more precisely understood. We will have better answers to these question in 2019, when our plots have run for three full years.

3.2 Outcome

The outcome of the project was: “Five coffee cooperatives in the UNESCO registered Yayu Coffee Forest Biosphere Reserve, move to sustainable and resilient livelihoods, whilst conserving local biodiversity”.

The project achieved its intended outcome, as measured by the four Measurable Indicators (MI), and sources of evidence, although MI 4 could not be fully implemented within the time frame of the project (see section 3.1, Output 4), Overall, the project exceeded its overarching objective, in that we were able to exceed Measurable Indicator 1, and increase farmer profitability (gross to net income conversion) by helping to reduce the major operating costs (i.e. helping with the switch to a secondary cooperative), and by paying an additional direct (to farmers) $0.20 per lb quality premium (rather than adding this amount to the total price paid to the secondary cooperative). The increase in household income drives all the other aspects of the project (seasonal labour increases; forest and biodiversity preservation).

Measurable Indicator 1. A 30% increase in cash income [per year] for the 950 Yayu coffee cooperative members, across the 5 cooperatives (by Year 3).

This was achieved, and indeed exceeded. Please see Section 2, Output 1, Indicator 1.3, and Annexe 7.0. Indeed, our figures for increase in household income are conservative, as we were not able to measure the increase in natural (sub) dried coffee, lower quality washed coffee, and other coffee sales outside that purchased by UHRC (or partners). Given the increase in coffee processing this is likely to be substantial.

Measurable Indicator 2. A 25% increase in seasonal employment for household members of the Yayu cooperatives (by Year 2).

Please see Section 2, Output 2, Indicator 2.3.

Measurable Indicator 3. A useful and usable forest-cover/land use survey for Yayu Reserve (by Year 3).

Please see Section 2, Output 3, Indicators 3.3 to 3.3.

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

There were two livelihood impact objectives stated on the agreed application form:

Reduction in poverty via increased income: c. 5,225 individuals (= 950 cooperative members (households) with an average of 5.5 members per household); c. 2,600 women.

Reduction in poverty via employment: 250 seasonal workers; c. 200 women.

We used various means and metrics for measure poverty reduction via increased income, and were able to show substantial increases in income from washed coffee and household income in general. Please see Annexe 7.0 for details, Section 3.2 (above), and other narrative in this report. Evidence for the increased income is provided by coffee purchase receipts (Annex 7.1). It is also important to note that the project was instrumental in the transition from the original secondary cooperative (Oromia Coffee Farmers’ Cooperative (OCFCU)) to Sor Gaba, from 2016 onwards. The secondary cooperative receives a percentage of the value of all coffee transactions. With the original cooperative this was 30% but with Sor Gaba 10%. This greatly improves the profitability (net income) for the five Yayu cooperative members, and was immediately recognized by them as a tangible livelihood improvement.

The project (through UHRC) was also able to implement a $0.20 per lb quality premium for farmers producing high quality washed coffee, which was paid outside the Sor Gaba Union contract. This was also recognized by cooperative members as a demonstrable income benefit.

Over the course of the project (five years from the Darwin Scoping Award onwards) a total of $1,258,165 **(£924,751**) was purchased across the five cooperatives. This amount constitutes additional revenue for the Yayu cooperatives, as the selling of coffee to other buyers continued as pre-project; UHRC is purchasing only the highest quality coffee lots. It is also the case that some cooperatives are now selling more coffee than pre-project given the increase in coffee

processing equipment (e.g. drying bed materials), and training brought by the project, although transactions outside UHRC could not be measured.

HiU and UHRC also funded and supervised the planting of a large coffee plot at Wutate school, in order to provide extra income for the school (see Annex 7.9).

Our impact indicator A 25% increase in seasonal employment for household members of the Yayu cooperatives, by Year 2, was difficult to measure (see section 3.1, Output 2).

The projects impact on biodiversity conservation would be difficult to measure in the short-term, and this was the comment we provided in our original application, but it is clear from Output 3, that forest cover has been stable since 2001 and over the course of the project (Annex 7.5).

4 Contribution to Darwin Initiative Programme Objectives

4.1 Contribution to Global Goals for Sustainable Development (SDGs)

SDGs are highly relevant to our project, given that we are undertaking a project to mainstream livelihood income improvements, biodiversity conservation and climate resilience. The project covers several SDGs, including:

SDGs 1, 2 and **3**. By increasing HH income and profitability via coffee at Yayu.
SDG 5. By ensuring a gender balance for our 25 trainers. Seasonal work is highly biased towards female workers.
SDGs 8 and **9**. By increasing the quality and quantity of the key crop species (coffee) for the Yayu project area, providing access to market, increasing profitability, and improving and innovating value chain management.
SDG 12 By the effective marketing and sale of a supremely environmentally and socially responsible product, via sales of Yayu coffee in Waitrose, at Warwick University (where the Yayu coffee is served across campus as a model of environment sustainability), and within Kew Gardens (including a public information display based at the main entrance shop (Victoria Gate). There is good web presence, other outreach, scientific publications, and inclusion in the UK Government's 25 Year Environmental Action Plan (see below).
SDG 13. By undertaking ground-breaking research that looks at both the science and economics of (so-called) climate smart agriculture.
SDG 15. By showing that forest coffee production in Ethiopia is environmentally credible and that coffee is a critical factor in preserving humid forest cover, biodiversity, and the preservation of wild coffee genetic resources (*Coffea arabica*) in that country.

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

Through its focus and mainstreaming approach, the project covers numerous CBD Articles, including: 6 (b); 7 (c); 8 (e), (i), (j); 11; 12 (a), (b), (c); 13 (a), (b); 17 (1), (2); 18 (1), (2), (4), (5); 20 (7).

In particular the project demonstrated that is was able to:

"*Promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas*..." (Art. 8(e). Article 8. In-situ Conservation). See 3.2, Outcomes.

"...*adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity*." (Art 11. Incentive Measures). See 3.2, Outcomes.

"*Promote and encourage understanding of the importance of biodiversity, as well as its propagation through media, and the inclusion of these topics in educational programmes*" (Art. 13(a). Public Education and Awareness). See 4.1 (SDG 12), for example.

4.3 Project support to poverty alleviation

This is covered in Section 3.3, above, with details provided in Annex 7.0. It should be noted that pre-project the five Yayu cooperatives were in a dire situation, with little and/or fragile access to

market, low prices (with a bias towards the sale of lower value (and high risk) unprocessed fresh coffee fruits), loans to be re-paid (for the repayment of their washing station loans), and high secondary cooperative fees (30%). To recapitulate, the project provided direct access to market (for those that needed or wanted it), vastly improved coffee prices, an increase in the amount of coffee produced and sold, a stand-alone $0.20 per lb quality premium paid directly to farmers, and the successful transition to Sor Gaba Union (10% fees, rather than 30%). In particular, wet processed (washed) coffee was elevated from c. $1.50 per/lb to $2.80 per lb, excluding the direct $0.20 per/lb bonus). These interventions had a substantial impact on household income, although it is recognized that the increase in household income was not the same for each household, or across the five cooperatives (see Annex 7.8). On visiting the cooperatives over the course of the project, and especially during harvest time, there was a tangible uplift in wellbeing and mood, the number of people (especially women) working at the washing stations and drying beds, with farmers reporting tangible financial benefits. In Year 2 we were able to ascertain that all five Yayu cooperatives had paid back their original (pre-project) loans, thus removing all existing debt.

Note. The provision of materials and training enabled the cooperatives to sell higher amounts of better quality coffee, but much of this was sold to other buyers (i.e. not UHRC), and there was no mechanism for measuring this additional income. Thus, there are good grounds for assuming that our calculations for increase in HH income from the project are conservative; in reality HH income gains made via the project will be greater than our calculations.

4.4 Gender equality

We aimed at gender equality for the project, with a focus on “female-led management of crop sorting, dry mill management, and coffee evaluation” (see 19. Pathway to poverty alleviation), and stated that “Female employment will increase via seasonal work and an improved involvement in coffee production, at Yayu” [18. Legacy].

We had no logframe indicator for gender equality because of the lack of a clear baseline, but for Output 2 we stated “Training of 250 seasonal workers in coffee processing (90% female; 10% male) by Yr 1. (Activity 2.1), and “Re-fresher training for 250 seasonal workers in coffee processing (90% female; 10% male), by Yr 2.

We employed 13 were female and 12 male coffee production trainers over the three years, and these trainers went on to train an estimated 50 seasonal coffee workers per cooperative (c. 250 in total). The exact number of seasonal workers and their gender was extremely difficult to measure, as the 25 main trainers found it too complicated and too time-consuming to keep records, particularly given the casual and dynamic nature of seasonal labour. The project team observed increased seasonal labour during harvest and processing and noted that the work force was around 80% women for harvesting and 90% to 100% for processing. See photos in Annex 7.9.

4.5 Programme indicators

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

The UNESCO registered Yayu Biosphere Reserve, where the project is based, relies on the coffee production to secure forest cover in the transition and buffer zones. The Yayu community are thus represented in the management structure of the biosphere reserve, but there was no mechanisms in place to compensate or reward farmers for their involvement in biodiversity preservation and management. The project provided incentives for forest cover preservation and in this way dramatically increases the representation of local people.

- **Were any management plans for biodiversity developed?**

No, these were established before the project started as part of the Yayu Biosphere Reserve management plan.

- **Were these formally accepted?**

Not applicable to 22-006.

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

Not applicable to 22-006.

- **Were there any positive gains in household (HH) income as a result of this project?**

Yes, most definitely. Please see Sections 3.3, 4.3, and Annex 7.0.

- **How many HHs saw an increase in their HH income?**

A total of 950 (c. 5,200 individuals), although because not all households sold coffee to the project, some HH would have directly benefited more from the project (i.e. UHRC purchasing) more that others. Indirectly, the project would have benefited all 950 households (see Note, in Section 4.3.

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

We measured an increase of more than 30% in household income. Please see sections 3.3, 4.3 and Annexe 7.0.

4.6 Transfer of knowledge

There are two key areas were transfer of knowledge from the project is extremely important: (1) farm income and profitability and (2) climate resilience adaptation. Both of these project outputs break new ground, with worthwhile (and in some cases unexpected) and transferable results. We are finalizing the outputs from (1) and continuing research for (2) for one more year (with additional funding). We will disseminate these findings via peer reviewed journals (so that they have credibility and receive due diligence), and via symposia, meetings and short reports. We are working to secure collaboration with a senior academic [name withheld], who specializes in the rural economy of Ethiopia and has a proven track record of delivering research findings into Ethiopian government policy. A recent coffee sector report on farm profitability *SCA Coffee Production Costs and Farm Profitability: Strategic Literature Review*, identified the critical shortage of peer reviewed literature on coffee farm profitability and livelihoods, finding that there were only five peer-reviewed papers covering these subject areas. A Kew Science blog (part II) will be posted in July 2018). The outcomes of the project have already been shared at various meeting, in Ethiopia, the UK, El Salvador and Switzerland. Post project we have a meeting organized with Partnerships for Forest (P4F), who are upscaling what we have done in Yayu for sites across Ethiopia (a DFiD funded programme). We provided advice for this programme at the early, consulting stage.

4.7 Capacity building

Zeleke Challa (GIS analyst; male) secured a permanent post at the UN headquarters in Addis Ababa. Knowledge and experienced gained during the project no doubt helped him to secure this new position.

5 Sustainability and Legacy

UHRC will continue their involvement in Yayu, including the purchase of Yayu coffee. UHRC and RBG Kew are seeking funding to improve cooperative management practices, which was identified as a weak link in the Yayu coffee value chain. The Yayu project coffee will continue to be sold in Waitrose, Warwick University and via UHRC outlets. UHRC are continuing project evaluation and management, in terms of coffee purchasing and cooperative relationship (primary and secondary). On 2 July 2018, they will visit Yayu and Addis Ababa, for example.

RBG Kew will continue with the three climate resilience plots, using additional funding, until at least the end of 2019. All capital equipment will stay in Yayu; the Yayu trainers will no longer receive payment, but their knowledge is still held within the Yayu community. ECFF staff will continue working in Yayu; one staff member will be financed to assist with the three resilience plots.

6 Lessons learned

What worked well. The mainstreaming model we used to drive the project worked very well. There are many poverty alleviation projects that deliver no benefits (financially or otherwise) to farmers, and indeed, many waste a significant amount of their time; at worst, they increase risk and decrease profitability. The sale of the Yayu coffee in Waitrose, Warwick University and RBG Kew provided a key driver for sales (and therefore purchasing power from Yayu) and an excellent way of marketing what we are doing through the Darwin Initiative (i.e. with information on the packet (and leaflet attached) going into thousands of homes throughout the UK). UHRC were a supremely engaged and committed partner, who also brought more than two decades of Direct Trade and coffee purchasing expertise to the project. UHRC worked over and above their initial commitment to the project. Employing a coffee farmer (Graciano Cruz, HiU Coffee) as the harvesting and processing consultant was a great advantage, as Yayu farmers they could easily relate to another farmer, rather than a researcher or a poorly trained consultant. Having a socio-economist (Pascale Schuit) trained in coffee socio-economics was an essential element in understanding coffee farm income, and profitability. The climate resilience plots took longer to establish than expected, but the employment of hidden (buried) sensors, logging climate variables (every hour, of every day) are now showing new and important data, especially when used in combination with a unit/area, cost-benefit analysis.

What didn't work so well. Gathering base-line data (pre-project) was much more difficult than anticipated. In general, cooperative record keeping was inadequate, although this is partly due to the lack of computing equipment. Our HH income calculations had to be extremely conservative. With better base-line data and farm records HH income gains would have been easier to measure, and would have almost certainly shown higher increases.

Some difficulties. Measuring income from coffee farming, and understanding coffee farming profitability is extremely challenging, owing to the complexity of value chain dynamics, seasonal variation (harvests vary considerable from year-to-year, due to biennial baring (one year good; the next year poor), and weather, the variation in farm (one to five hectares) and family (three to eight children) size, global coffee prices (supply and demand), and poor record keeping by famers and cooperatives. Also, the management and business model was mixed across the five co-operatives.

If you had to do it again, what would you do differently? We discussed this at a recent meeting and it was suggested that we might have started with a single cooperative and measured the baseline and coffee transactions (from each farm, upwards to the purchaser) very carefully to understand the best models for farm profitability and cooperative management. In an ideal world we would have spent the first year gathering base-line data, before starting the project. This would not have worked in our situation, because the farmers were in a critical situation financially (low coffee sales, low coffee prices and loans to repay). We had to start the project as soon as possible, and build trust quickly across the five cooperatives.

What recommendations would you make to others doing similar projects? Make sure you have access-to-market and a sound, financially viable business model. Many projects fall over because the income model was poorly conceptualized. Engage with a socio-economist at the very earliest stage of your project, and collect the best base-line data you can. Carefully consider profitability; income may improve, but it's the profitability that's important. Focus on the main outcomes and impact, and don't hesitate to rework the log-frame in order achieve the best outcome for the project. Darwin personnel are there to help you succeed and make the best of your project.

What key lessons have been learnt? One must understand the precise drivers of biodiversity degradation and negative land-use change. Listen very carefully to your stakeholders (in our case the Yayu community), and incorporate their views, knowledge and expertise into the

management and direction of the project. Don't assume you know best, just because you're running the project.

6.1 Monitoring and evaluation

We had hoped to employ a UK scientist in Year 1, to assist with fieldwork studies in Yayu, but failed to do so. Via a Darwin Change Request (approved change) we were able to re-use this budget allocation (fieldwork assistant) to help fund the cupping lab at Wutate School.

We felt that the production of a climate resilient farming chapter (a Year 3 output) was inappropriate and premature, given that all the data collected suggested that farmers already understood the cost-benefit outcomes of their farming practices. Providing incorrect information may have increased income risk. For example, an intervention agency had previously (2011/12) provided poor advice to the Yayu community, on pruning coffee trees, which resulted in a loss of income. In this case we decided not to include a climate resilient farming chapter in the farming manuals, until we have the final results from the extended study plot experiments.

Section 2, Output 2, Indicator 2.3. Measuring seasonal labour was an extremely challenging indictor to measure, and by the end of the project we conceded that our baseline was not suitable for the purposes of the project.

The logframe was a useful tool throughout the project, in order to keep activities and indicators up to date. As the activities were divided between the partners, the logframe provided them with a tool for evaluation and record keeping. We internally evaluated the project, before each six month and annual review, either in person or via e-mail. We met in June 2018, to discuss final project outcomes with an external reviewer (informally). We are submitting an open access paper on the main outcomes of the project, as a further means of external evaluation.

6.2 Actions taken in response to annual report reviews

Feedback 2016. Comment 1. How could you improve Darwin and project identity? We addressed this in 2017 with increased website presence and the Yayu (Darwin) Project coffee.

Feedback Comments 2017. Comment 1. Clarify whether there were 3 or 2 study plots set up in Year 1. There seems to be some confusion about the total number of plots in place at the moment. Are there 3 or 4? We addressed this in Year 2. There were two plots set up in Year 1 and a third added in Year 2. We originally included the shade study undertaken by a student from Oxford University as the third plot (an activity undertaken on the back of our Darwin Scoping Award, but as we had not control over the activity we decided to add a third plot.

Comment 2. Provide ratio of male and female seasonal workers trained. Please see section 3.1. Output 2, Indicator 2.3.
Comment 3. Provide number of extra household members seasonally employed within the Yayu coffee sector. The report indicates 41% increase in seasonal labour with no definite numbers. Please see Section 2, Output 2, Indicator 2.3.

7 Darwin identity

Please see title page for project websites and bogs. Post project we will be adding more web content. Longer term, more web content and media articles will be based around the published outcomes of the project. We have published one high-impact journal article, submitted a second peer reviewed article, and will submit another one in 2019. Two of these three papers are based directly on project outcomes. We already have one media interviews scheduled for July 2018, to discuss the findings of the Darwin Project.

The Yayu Darwin project coffee has been on sale in Waitrose since 2016, and includes details of the project and the Darwin logo. This puts the Darwin identity into thousands of homes across the country, every day.

The project was included in the UK Government's 25 Year Environmental Action Plan. https://www.gov.uk/government/publications/25-year-environment-plan. Please see page 124 of the report.

8 Finance and administration

8.1 Project expenditure

Project spend (indicative) since last annual report	2017/18 Grant (£)	2017/18 Total actual Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)			0.87	
Consultancy costs			0	
Overhead Costs			0.78	
Travel and subsistence			-9.14%	Extra fieldwork necessary
Operating Costs			7.65	
Capital items (see below)			0	
Others (see below)			100	Large variance but small cash difference
TOTAL			**-0.13**	

Staff employed (Name and position)	Cost (£)
Aaron Davis / Project Leader	
Justin Moat	
Field Researcher (J. Moat)	
Tadesse W Gole	
Zeleke Challa	
TOTAL	

Capital items – description	Capital items – cost (£)
TOTAL	

Other items – description	Other items – cost (£)
TOTAL	

8.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
Datalogging equipment (Amar-Frances Foster-Jenkins Trust)	
Datalogging equipment (Amar-Frances Foster-Jenkins Trust)	
Field work 2017 (Amar-Frances Foster-Jenkins Trust)	
Field work 2018 2017 (Amar-Frances Foster-Jenkins Trust)	
Cupping lab and building work (funding from UHRC)	
TOTAL	

Source of funding for additional work after project lifetime	Total (£)
Continuation of research plots ((Amar-Frances Foster-Jenkins Trust), until end 2019	
UHRC site visits (scheduled for 2018).	
25p project donation on sale packs of Yayu Coffee (2016 & 2017)	
TOTAL	

8.3 Value for Money

We purchased high quality materials by using contacts within Ethiopia that already import most of the necessary equipment (e.g. drying bed materials) we needed for the project.

In more general terms, we applied a strict general measure for value for money: did the cost of project provide an appropriate return on income, and tangible biodiversity benefit? Media sources often ask to the question: "wouldn't the community have benefited more if you had given them the money?" We can say that the project achieved excellent value for money. For a Darwin investment of £315,000 the project placed at least £924,750 extra revenue into the community. The exact return is probably much higher, but we were not able to record all extra coffee purchased as a result of the project. UHRC could not buy all the extra coffee leveraged by the investment in materials (e.g. drying beds) and training, for example. In addition, profitability will be higher owing to lower operating costs (due to the change in secondary cooperative). If we were to divide the Darwin project investment of £315,000 by the number of individuals (5,200) in the project community they would receive £60.57, via the project they received £177, plus the value of the infrastructure (cupping lab, drying beds, evaluation equipment). Even if the total project costs are considered (i.e. partner match funding), the net income would still be higher via the project. Moreover, post-project additional income for the Yayu project income is estimated at a value of at least $250, 000 (£188,630) per year from UHRC purchasing alone.

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

	Project Summary	Measurable Indicators	Means of verification	Important Assumptions
Impact	Reduce poverty and provide short- to long-term resilience for coffee farming communities and their environment at the UNESCO registered Coffee Forest Biosphere Reserve, through self-sustaining financial mechanisms.			
Outcome	Five coffee cooperatives in the UNESCO registered Yayu Coffee Forest Biosphere Reserve, move to sustainable and resilient livelihoods, whilst conserving local biodiversity.	1. A 30% increase in cash income for the 950 Yayu coffee cooperative members (5 cooperatives), by Year 3.	Invoices and accounts detailing the volume and value of exported coffee for each of the 950 cooperative members. See Annex 7.1.	Coffee quality improvements can only be achieved by having suitable resources: (1) essential equipment; (2) properly trained and dedicated staff. Farmers require an easy source of reference in order to maintain coffee quality standards, and that a hard-copy resource in the local language is the medium most suited to this situation.
		2. A 25% increase in seasonal employment for household members of the Yayu cooperatives, by Year 2.	Accounts showing the number of extra coffee sector workers. See Annex 7.4.	It will be necessary to train 250 extra seasonal workers, due to the increase in human resources required for extra processing. This is because: (1) The demand for better quality coffee requires more labour; (2) an increase in processing at Yayu (as opposed to selling unprocessed cherry) will require more labour.
		3. A 100% increase in the number of forest-cover surveys for Yayu Reserve, by Year 3.	Land-use change maps. A land-use change survey. See Annex 7.5.	High resolution vegetation mapping, with ground-survey, is the best means of measuring and monitoring of land-use change. Our evaluation of vegetation cover and vegetation land-use change will provide a bench-marking and monitoring resource for decision-makers.

		4. 20% of the 950 Yayu coffee cooperative members provided with a clear understanding of climate resilience/adaptation methodologies, by Year 3.	A mutually constructed climate resilience report for Yayu. See Section 3.1, Output 4.	Both farmers and scientists are aware that adaptation is required to improve resilience and coffee plant health, but are unsure of the best approaches and exact benefits (and disadvantages) of different on-farm adaptation methodologies.
Output 1	Five Yayu coffee cooperatives provided with the equipment, training, supervision, and information resources, needed to improve (and sustain) coffee quality.			
1.1	Installation of coffee processing and evaluation (tasting and grading) equipment, for 5 cooperatives.	Five Yayu cooperatives are provided with the equipment required to correctly process and evaluate their coffee, in order to attain (and sustain) high quality, by Year 1	A signed receipt from each cooperative showing that they have received the coffee processing and evaluation equipment. See Annexes 7.2, 7.3).	
1.2	Training of 950 cooperative members (5 cooperatives) in coffee harvest, post-harvest, and evaluation techniques.	950 cooperative members (for the 5 cooperatives) provided with the training, supervision, and information resources (including coffee processing handbook), needed to improve (and sustain) coffee quality. Training by project consultant, in the following modules: (1) Harvesting Techniques, (2) Processing Techniques, (3) Honey Coffee, (4) Processing Techniques, (5) Natural Coffee, (6) Drying Beds Management and Quality Control, (7) Storage and Packaging Techniques, (8) Drying, (9) Mill Selection and Grading Standards, (10) Quality Control, (11) Laboratory Management, (12) Coffee Cupping Training. By Year 2 and 3.	A signed list of the producers/ cooperative members that have received the benefits of training. Evaluation of coffee quality by UHRC at Yayu and in UK; quality report produced. See Annex 7.4.	
1.3	Training of 950 cooperative members (5 cooperatives) in post harvesting	950 cooperative members (households), c. 5220 individuals,	Invoices detailing the volume, type (processed vs. unprocessed; type of	

	techniques (washing and drying) and its evaluation.	with an annual increase in income of 30% (collectively £700,000; each household with an average increase of c. £735 p.a.), by Year 3	processing) and price of exported coffee for each cooperative, showing the cash value increase against commodity prices and pre-project prices. Audit report/evaluation by socio-economist (Pascale Schuit), Part 1. See Annex 7.8.	
1.4	Production of draft reference and training manual for harvest and post-harvest coffee farming techniques.	As output.	As Output. Production of draft (laser-printed) reference and training manual for harvest and post-harvest coffee farming techniques. See Annex 7.7.	
1.5	Each cooperative member (950 in total) in possession of the Coffee Farming and Processing Manual.	As output.	As Output. Each cooperative member (950 in total) in possession of the Coffee Farming and Processing Manual, including a chapter on on-farm adaptation methodologies, by Yr 3. See Annex 7.1.	
1.6	Evaluation of coffee processing and coffee quality improvements.	As output.	As Output. Undertaken over project-life by consultant (HiU Coffee) and UHRC. See Annexes 7.3, 7.4.	
1.7	Socio-economic and livelihood monitoring and evaluation.	As output	As Output. Undertaken by socio-economist. Audit reports/evaluations by socio-economist (Pascale Schuit). See Annex 7.8.	
Output 2	Yayu household members (particularly women) are provided with access to training, and then employment within the local coffee sector.			
2.1	Training for 250 seasonal workers in coffee processing (90% female; 10% male).	12,000 square meters of drying bed equipment (Africans Beds) installed for five cooperatives, by Year 1.	Invoices for purchase of materials and construction (labour hours) of drying beds. See Annex 7.2.	
2.2	Re-fresher training for 250 seasonal workers in coffee processing (90% female; 10% male).	250 (extra) household members trained in coffee harvesting and processing techniques, by Year 2.	Signed receipts for wages received by seasonal workers. Report and account for householders (disaggregated by gender) seasonally employed within the five Yayu cooperatives, during the course of the	

			project (2015–2018) compared to pre-project (2010–2014). See Section 3.3, Output 2.	
2.3	250 (extra) household members seasonally employed within the Yayu coffee sector, by Year 2.	250 (extra) household members seasonally employed within the Yayu coffee sector, by Year 2.	As above.	
Output 3	An area (land-use) analysis of forest and forest-based household income areas for the Yayu UNESCO MAB Reserve.			
3.1	Construction of land-use vegetation map for the Yayu area using Rapid Eye data (5 m resolution).	One Ethiopian GIS technician trained/supported in advanced land-use change technology and methodologies, by Year 1.	Maps showing forest change over a six-year period (2012–2018) at 5m resolution, and 18-year period (2000–2018) at 30 m resolution. See Annex 7.5.	
3.2	Construction of land-use vegetation map for the Yayu area using Landsat and Modis data (30 m resolution).	Three Land-use change maps produced for Yayu Reserve, by Year 2.	As above.	.
3.3	Construction of narrative report to accompany map, and production of final report disseminated to stakeholders.	One New forest-cover survey produced for Yayu UNESCO MAB Reserve, for bench-marking and assessing forest-cover (vegetation) change, by Year 3.	Accompanying land-use change survey. See Annex 7.5.	
Output 4	Yayu coffee cooperative members are provided with the training and information resources required for on-farm climatic resilience**.**			
4.1	Set-up of study plots on 3 Yayu farms to measure the influence of different shade and mulching regimes, and other feasible on-farm adaptation methods, using environmental monitoring equipment.	Three Yayu farm plots (1 ha) provided with, and participating in, on-farm climate adaptation trials, by Year 1.	A signed list of the producers/cooperative members that have received the benefits of resilience training and field trials. [Incorporated within the accounts for RBG Kew as signed receipts]	
4.2	Evaluation of study plot data using statistical and other analytical methods, to assess the precise	On-farm adaptation evaluation provided for three Yayu farm plots, and this broadened to provide an overview of climate resilience at	On-farm, climate adaptation report/survey for Yayu, plus one open access, peer-reviewed scientific	

	outcomes for individual and combined adaptation methods.	Yayu. Results incorporated into a peer-reviewed publication, by Year 3.	paper in draft. See Section 3.1, output 4.3.	
4.3	Demonstration workshops to each of the 5 Yayu cooperatives on on-farm adaptation methodologies.	5 Yayu cooperatives provided with training in, and information resources for, on-farm adaptation, by Year 3.	As Output. [Incorporated within the accounts for RBG Kew as signed receipts]	
4.4	Construction of first draft (laser-printed) of on-farm climate adaptation chapter.	As output.	As Output. See Section 3.1, output 4.3.	
4.5	Construction of first draft of scientific paper, concerning on-farm adaptation.	As output.	As Output. See Annex 7.6.	

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: Reduce poverty and provide short- to long-term resilience for coffee farming communities and their environment at the UNESCO registered Coffee Forest Biosphere Reserve, through self-sustaining financial mechanisms.		The project has been transformative in terms of increasing income and sustainability for the five Yayu coffee cooperatives, through improvements in coffee quality, cooperative management, value chain improvements, and access to market. Satellite mapping analysis shows that land-use change is stable at Yayu, i.e. forest and agroforestry is not converted to non-forest farming systems, supporting the assumption that profitable coffee production conservers forest cover and hence biodiversity.
Outcome Five coffee cooperatives in the UNESCO registered Yayu Coffee Forest Biosphere Reserve, move to sustainable and resilient livelihoods, whilst conserving local biodiversity.		Using various metrics, we show that cash income for Yayu coffee cooperative members (5 cooperatives) has improved by at least 30%. The level of income improvement is not equal across each household, or between cooperatives, and this would not be expected given the numerous variables involved.
Output 1. Five Yayu coffee cooperatives provided with the equipment, training, supervision, and information resources, needed to improve (and sustain) coffee quality.	A 30% increase in cash income for the 950 Yayu coffee cooperative members (5 cooperatives), by Year 3.	The substantial increase in household income was achieved, (via extra sales and a dramatic improvement in price). Moreover, all five cooperatives paid of their outstanding loans; there was an increase in profitability due to the switch in secondary cooperative (se above); and UHRC implemented a $0.20 per lb quality premium (see above). Income benefits, and increases in coffee prices and volumes were measurable, but labour was a difficult indicator to measure due to the casual and dynamic nature of hiring casual labour. Evidence: see Annexes 7.0, 7.1
Activity 1.1 Installation of coffee processing [post-harvest] and evaluation (tasting and grading) equipment, for 5 cooperatives, by Yr 1.		Most of the equipment was purchased and installed by Year 2, with all equipment in place by Year 3. Evidence: see Annexes 7.1, 7.3., 7.9.
Activity 1.2. Training of 950 cooperative members (for the 5 cooperatives) in coffee harvest, post-harvest, and tasting and grading techniques, by Yr 2.		Most of the training was completed by Year 2, with additional training in Year 3. The majority of training was undertaken by the trainers trained by the project consultant. Evidence: see Annexes 7.3, 7.4, 7.9.
Activity 1.3. Training of 950 cooperative members (for the 5 cooperatives) on post harvesting techniques (washing and drying) and its evaluation (tasting and grading), by Yr 2.		Training on evaluation mostly delayed to Year 2 and Year 3, due to poor facilities for evaluation and cupping. A dedicated cupping lab, and part time school science lab, was built at Wutate school (as an additional project outcome). Evidence: see Annexes 7.2, 7.9.
Activity 1.4. Production of draft (laser-printed) reference and training manual for harvest and post-harvest coffee farming techniques. Given to 20 representatives of each of the 5 cooperatives, by Yr 1		Draft versions (in Oromo and Amharic) delivered to cooperative by the end of Year 1. Evidence: see Annex 7.3, 7.7

Activity 1.5. Each cooperative member (950 in total) in possession of the Coffee Farming and Processing Manual, including a chapter on on-farm adaptation methodologies, by Yr 3.		Manuals delivered to cooperative members by the end of Year 2. On farm adaptation chapter was not added as there was uncertainty over advice to be given to farmers (see main report text). Evidence: see Annex 7.3, 7.7
Activity 1.6. Evaluation of coffee processing and coffee quality improvements, Yrs 2, 3.		Undertaken by UHRC and HiU coffee in Ethiopia and London. Evidence: cupping score of 84 + (Quality Grade 1) shows that huge volumes of coffee purchased by Union Coffee and other companies has been converted from low (commodity grade) to high (speciality grade). Evidence: see Annex 7.1, 7.2, 7.3, 7.8.
Activity 1.7. Socio-economic and livelihood monitoring and evaluation.		A huge amount of work was undertaken by coffee socio-economist Pascale Schuit over the course of the project. Including 7 workshops 10 cooperative financial management checks/audits and farmer 272 interviews. Evidence: see Annex 7.8, 7.9.
Output 2. Yayu household members (particularly women) are provided with access to training, and then employment within the local coffee sector.	A 25% increase in seasonal employment for household members of the Yayu cooperatives, by Year 2.	HiU Coffee and UHRC trained 25 trainers (12 male, 13 female), who then went on to train coffee workers (in harvesting and post-harvesting) across the five cooperatives. Seasonal labour was a difficult indicator to measure due to the casual and dynamic nature of hiring workers. Evidence: see Annex 7.3, 7.4, 7.9.
Activity 2.1. Training of 250 seasonal workers in coffee processing (90% female; 10% male) by Yr 1.		The Yayu project trainers trained seasonal cooperatives across the five cooperatives, in coffee processing (harvest and post-harvest). The trainers were supposed to keep records/receipts of numbers trained but were not able to do this; as they occupied with the training activity itself. Evidence: see Annex 7.4, 7.9.
Activity 2.2. Re-fresher training for 250 seasonal workers in coffee processing (90% female; 10% male), by Yr 2.		As above. Training continued in into Year 3. With additional training provided at harvest time during at least two visits to Yayu per year, by HiU and UHRC staff). Evidence: see Annex 7.4, 7.9.
Output 3. An area (land-use) analysis of forest and forest-based household income areas for the Yayu UNESCO MAB Reserve.	A 100% increase in the number of forest-cover surveys for Yayu Reserve, by Year 3.	We were able to provide a land-use change assessment and a fine-scale baseline survey for the project area. In addition (to the original project activities) we geolocated (with a GPS) a random selection (30%) of farms across the five cooperatives to support the assumption that. Yayu coffee production is forest based. Indicators worked well and can be re-visited over various time-frames. Evidence: see Annex 7.5
Activity 3.1. Construction of land-use vegetation map for the Yayu area using Rapid Eye data (5 m resolution), by Yr 1.		Completed in Year 1, and serves to provide a high-quality land-use baseline. Evidence: see Annex 7.5
Activity 3.2. Construction of land-use vegetation map for the Yayu area using Landsat and Modis data (30 m resolution), by Yr 2.		Finalized in Year 3. Map shows that land-use change is stable, with negligible change in forest cover. Evidence: see Annex 7.5
Activity 3.3. Construction of narrative report to accompany map, and production of final report disseminated to stakeholders, by Yr 3.		A narrative report has been drafted and will from part of open-access publication (in Peer J) on speciality coffee and biodiversity conservation. Evidence: see Annex 7.10

Output 4. Yayu coffee cooperative members are provided with the training and information resources required for on-farm climatic resilience	20% of the 950 Yayu coffee cooperative members provided with a clear understanding of climate resilience/adaptation methodologies, by Year 3.	The three experimental plots were set up and are ongoing (funded until at least 2019), and include meetings and workshops with farmers at the three sites. ~~Results have not been disseminated to farmers as there is a risk that (at this stage) that we would be providing the wrong advice and increasing income risk. All indicators worked well, apart from those linked to Activity 4.4; indicators for Activity 4.5 could not be meet due to technical issues, although first six months of data show profound and important results, and have been shared at coffee science meetings~~.
Activity 4.1. Set-up of study plots on 3 Yayu farms (each 1 ha) to measure the influence of different shade and mulching regimes, and other feasible on-farm adaptation methods, using environmental monitoring equipment, by Yr 1.		All three plots were set up and running by Year 2. (1): pruning study; (2) mulch plot (1500 m); (3) mulch plot (1600 m). Shade studies were undertaken by Oxford University as a follow-on from our Darwin Scoping Award (awaiting publication). Evidence: see Annex 7.6.
Activity 4.2. Evaluation of study plot data using statistical and other analytical methods, to assess the precise outcomes for individual and combined adaptation methods, by Yr 3		There was no useful data from Plot 1, i.e. . pruned and unpruned trees did not produce any fruit during Years 1 to 3. In 2018/19 there should be a harvest and we will collect data in April 2019. Original environmental monitoring equipment was unsuitable for Plots 2 and 3 and so we had to custom-build our own system. The new system is working well is producing excellent data. Plots 2 and 3 will run until at least April 2019. Evidence: see Annex 7.6.
Activity 4.3. Demonstration workshops to each of the 5 Yayu cooperatives for on-farm adaptation methodologies, by Yr 3		We held two mini-workshop meetings per site (Plots 1, 2 and 3) per year, over the three years of the project, with the farmers directly involved in the plot experiments (paid outside the project). We learnt that the farmers know perfectly well how to make their plots more climate resilient, but that these interventions come down to investment vs. return. We added a cost-benefit analysis for each plot. Evidence: financial reporting (payment receipts to farmers). Evidence: Kew financial reporting (with receipts).
Activity 4.4. Construction of first draft (laser-printed) of on-farm climate adaptation chapter, by Yr 3		We decided not to complete this activity, as our plots required at least one more year before we could report resilience metrics in terms of cost.
Activity 4.5. Construction of first draft of scientific paper, concerning on-farm adaptation, by Yr 3.		The first six months (October 2017 to April 2018) results have been downloaded and analysed. The approach (buried data loggers and probes) and data are extremely valuable, and we believe represent the first study of its kind. Additional funding will support maintenance and data retrieval of plots at least until at least April 2019. Evidence: see Annexes 7.6, 7.10.

Annex 3 Standard Measures

Code	Description	Total	Nationality	Gender	Title or Focus	Language	Comments
Training Measures							
1a	Number of people to submit PhD thesis	0					
1b	Number of PhD qualifications obtained	0					
2	Number of Masters qualifications obtained	0					
3	Number of other qualifications obtained	0					
4a	Number of undergraduate students receiving training	0					
4b	Number of training weeks provided to undergraduate students	0					
4c	Number of postgraduate students receiving training (not 1-3 above)	0					
4d	Number of training weeks for postgraduate students	0					
5	Number of people receiving other forms of long-term (>1yr) training not leading to formal qualification(e.g., not categories 1-4 above)	25 (Yayu trainers) 2 (ECFF staff)	Ethiopian	13 female/12 male	Coffee processing. Environmental monitoring/GIS.	Oromifa & Amharic	
6a	Number of people receiving other forms of short-term education/training (e.g., not categories 1-5 above)	c. 250 per year	Ethiopian	80% female; 20% male	Coffee harvesting and processing.	Oromifa & Amharic	Numbers represent best estimates
6b	Number of training weeks not leading to formal qualification	15	Ethiopian	80% female; 20% male	Coffee harvesting and processing.	Oromifa & Amharic	

7	Number of types of training materials produced for use by host country(s)(describe training materials)	950					Training manuals

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)	0					
10	Number of formal documents produced to assist work related to species identification, classification and recording.	0					
11a	Number of papers published or accepted for publication in peer reviewed journals	1 being submitted; 1 in draft	Ethiopian, British, Dutch, Panamanian	1 female (lead author); 5 male	TBC TBC	English	Open access publication
11b	Number of papers published or accepted for publication elsewhere	0					
12a	Number of computer-based databases established (containing species/generic information) and handed over to host country	0					
12b	Number of computer-based databases enhanced (containing species/genetic information) and handed over to host country	0					
13a	Number of species reference collections established and handed over to host country(s)	0					
13b	Number of species reference collections enhanced and handed over to host country(s)	0					

Dissemination Measures		Total	Nationality	Gender	Theme	Language	Comments
14a	Number of conferences/seminars/workshops organised to present/disseminate findings from Darwin project work	2	Mixed	Mixed	Coffee farm profitability On-farm climate resilience	English English	
14b	Number of conferences/seminars/ workshops attended at which findings from Darwin project work will be presented/ disseminated.	2	Mixed	Mixed	As above	English	

Physical Measures		Total	Comments
20	Estimated value (£s) of physical assets handed over to host country(s)	£50,000	Original project capital equipment.
21	Number of permanent educational, training, research facilities or organisation established	£9,200	Cupping lab/Science lab at Wutate school.
22	Number of permanent field plots established	3	See comments for research plots (Indicator 4.2)

Financial Measures		Total	Comments
23	Value of additional resources raised from other sources (e.g., in addition to Darwin funding) for project work	£14,885 £11,500 £5,500	Already added. See Section 8.2 To come in 2018/19. See Section 8.2. **Per year** (based on first year figures) from Yayu coffee sale donation (25p per pack).

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.	√
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.	√
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.	√
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.	N/A
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.	√
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.	N/A
7	Areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	√
8	Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	N/A
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.	N/A
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.	N/A
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.	N/A
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.	√
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.	√

14	Ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking 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.	√
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.	N/A
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.	N/A
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.	√
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.	N/A

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)
Journal *	Moat, J. Gole, T.W., Davis, A.P. 2018. Least Concern to Endangered: applying climate change projections profoundly influences the extinction risk assessment for wild Arabica coffee.	British	British	Male	Global Change Biology (GCB)	Open access via GCB * Ready for early view bur withheld to coincide with press release in Nov 2018.
Journal *	Schuit,)., Torz, J., Macatonia, S.. Cruz, G., Moat, J., & Davis, A.P. Mainstreaming forest conservation through coffee quality premiums: a case study from Ethiopia	Netherlands (Dutch	British	Female	Peer J	Open access. To come.

Annex 6 Darwin Contacts

Ref No	22-006
Project Title	Mainstreaming biodiversity conservation and climate resilience at Yayu Biosphere Reserve
Project Leader Details	
Name	Dr Aaron Davis
Role within Darwin Project	Project Leader. Manager of scientific activities.
Address	
Phone	
Fax/Skype	
Email	
Partner 1	
Name	Dr Tadesse Woldermariam Gole
Organisation	Environment and Coffee Forest Forum (ECFF)
Role within Darwin Project	In-country Project Manager
Address	
Fax/Skype/Phone	
Email	
Partner 2	
Name	Dr Steven Macatonia
Organisation	Union Hand Roasted Coffee (UHRC)
Role within Darwin Project	Commercial Partner. Manager of value chain activities.
Address	
Fax/Skype/Phone	
Email	
Partner 3	
Name	Graciano Cruz
Organisation	HiU Coffee
Role within Darwin Project	Commercial Partner. Consultant for coffee harvesting, processing and evaluation.
Address	
Fax/Skype/Phone	
Email	

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	Yes
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	Yes
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	Yes
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number.	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.	