Darwin Initiative Main Project Annual Report

Important note: *To be completed with reference to the Reporting Guidance Notes for Project Leaders: it is expected that this report will be no more than 10 pages in length, excluding annexes*

Submission Deadline: 30th April 2017

Darwin Project Information

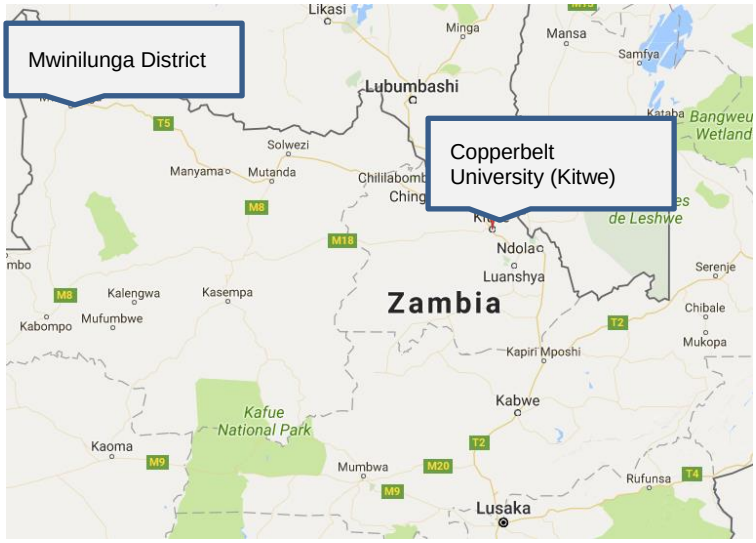
Project reference	23-034
Project title	Edible wild orchid trade: sustaining livelihoods and biodiversity in Zambia
Host country/ies	Zambia
Contract holder institution	RBG Kew
Partner institution(s)	Homegarden Landscape Consultants Ltd. (Zambia), Copperbelt University (Zambia), Sanga Research & Development (Zambia), Uppsala University (Sweden), Cape Institute of Micropropagation (South Africa), Orchid Seeds Stores of Scientific Use (UK).
Darwin grant value	£220,313
Start/end dates of project	1st June 2016 to 31st May 2019.
Reporting period (e.g., Apr 2016 – Mar 2017) and number (e.g., Annual Report 1, 2, 3)	June 2016 to March 2017.
Project Leader name	Dr. Ruth E. Bone
Project website/blog/Twitter	https://www.facebook.com/chikandaorchidconservation/
Report author(s) and date	Dr. Ruth E. Bone (PL), with contributions from Mr. Nicholas Wightman (Project Manager) and project colleagues: Prof. Royd Vinya; Dr. Sarina Veldman; Dr. Kazutomo Yokoya; Dr. Serene Hargreaves; Mr Jonathan Kendon; Ms. Hildegard Crous.

1. Project rationale

Increased demand for orchid cake (Chikanda) in Zambia currently depends on exploitation of wild orchids (ca. 85-140 species in ≥4 genera) threatening species with extinction or extirpation. Harvesting levels are unsustainable and undertaken by low income rural community members (mostly women and girls in Zambia and neighbouring countries) who increasingly travel great distances to access the resource, jeopardising their personal safety. We seek to stem biodiversity loss and support vulnerable rural livelihoods that depend on this scarce resource by establishing a) cultivation methods in-country, with enhanced facilities and expertise b) community based management plans in rural areas to encourage sustainable harvest, and c) alternative sustainable income streams to support rural livelihoods in orchid harvest areas. These problems have been identified by ecologists, biologists and social science and conservation practitioners in Zambia (including partners on this project). The majority of project activities are focused in North Western Province, Zambia, with some workshops, meetings and market research taking place in other towns and cities.

2. Project partnerships

The project is over-seen by the Project Leader (PL) Ruth Bone at the lead institution (RBG Kew), with day to day management by the in-country Project Manager (PM) Nicholas Wightman (Homegarden Landscape Consultants Ltd., Zambia). Regular communications are maintained between the PL and PM via email and weekly/ fortnightly video-conferencing meetings. The PL visited Zambia (January 2017) completing fieldwork with the PM and project post-doc and meeting project partners (CBU and Sanga R&D).



Project locations in Zambia: Mwinilunga District is the focus for livelihoods surveys and development of community based natural resource management plans led by Copperbelt University (Kitwe).

Other RBG Kew project staff have worked closely with in-country partners: Jonathan Kendon (*in vitro* biology technician) spent ~ 3 weeks at CBU working daily with the lab and nursery team; Serene Hargreaves (head of the RBG Kew Plant Assessment Unit) led a training and rapid Red List assessment workshop with partners in Lusaka in September. The South African partner institution, the Cape Institute of Micropropagation, led a specialist workshop in March 2017, hosted by CBU and focused primarily on provision of techniques training to the CBU technical team (lab and nursery). Seoljong Kim was enrolled at Uppsala University, Sweden, for the project MSc under the supervision of Sarina Veldman, and completed market surveys and sampling of traded tubers/ derivatives, working closely with the PM in Lusaka, and the CBU partners in Kitwe. Longer term partnerships have been formalised by Grant Agreements (e.g. RBG Kew, CBU and Uppsala University).

Demand for training in orchid conservation biotechnology (seed collection methods, post-harvest handling, storage, sowing, isolation and culture of fungal symbionts) was expressed by CBU to complement existing *in vitro* expertise, facilities and specialist equipment, and to enhance experimental methods of orchid cultivation with techniques training provided by specialists.

Some difficulties were experienced at project inception, due to availability of rural community members to engage in planned activities (otherwise occupied with seasonal harvest and crop-weeding tasks and the practice of shifting cultivation, when families relocate from their usual residencies into remote areas for cultivation). During pre-project planning and development, the PL had inadequate understanding of these aspects of the community based work that would be led by project partners CBU, and communication between the PL and CBU project partner were insufficient in the early stages of this new partnership. [Please refer to Section 10 “Lessons learnt” for more details]. The project partnership has been successfully established (vitally, including face to face meetings that have taken place in-country) enabling frank discussion of realistic and achievable work plans.

Largely due to the seasonal and grant-funded nature of environmental work, additional challenges include competing priorities of project partners due to the demands of their other work commitments. Notification of delays to project activities to the PL and PM has been hampered in some cases by overseas or remote travel undertaken by partners, and access to power and mobile phone reception.

3. Project progress

3.1 Progress in carrying out project Activities

1. Mitigation: CBU led many of the Output 1 Activities, bringing their expertise in community based natural resource management (CBNRM), and technical skills and facilities in their new nursery and established *in vitro* laboratory. Activities 1.1 (current wild orchid resource management, conducted across nine villages) and 1.3 (school attendance survey and compiled records from two schools in the area; cf. Annex 4 reports) have been completed by CBU, who report on challenges experienced by his

team in undertaking the baseline surveys and establishing community groups: "The project commenced at a time when communities were busy with preparations of agricultural activities. Agricultural activities in North-Western Zambia commence in August with field clearance and planting follows in November/ December. January through to end of February is dominated by weeding. Communities in this region practice shifting cultivation in which families completely relocate from their usual residencies into remote areas for cultivation, camping for more than three months. During this time majority of the villages are empty. Therefore, the best option was to first raise awareness and then form groups followed by management planning with a smaller number of elected community representatives [.....]." Due to foreign exchange loss and insufficient budgeting (*cf.* Section 10), "We had to scale back on time spent on the baseline and instead conduct what might be correctly called a rapid assessment."

Two meetings were held in London by the PL and cosmetics firm LUSH to discuss potential projects in support of sustainable honey production for supplementary income (Activity 1.2) - however project development was postponed following changes within the management of the Zambian honey company. Project partners Sanga R&D have suggested Community Markets for Conservation (COMACO, Zambia) as a business model for future trade of sustainably sourced Chikanda cake (linking supply of sustainably sourced produce from villages to urban consumers, supporting improved land management, food security and improved rural incomes). Following baseline surveys, CBU staff (Drs Gillian Kabwe and Jane Kwenye) visited local women's groups in the project target areas, towards establishment of focus groups and institutional structures that will support production and trade of cultivated edible orchids (Activity 1.4).

The specialist orchid culture skills acquired by the CBU team will enable the training needs for local communities for orchid management, storage of tubers, and cultivation to be assessed (Activity 1.5) during their planned site visits at the end of Project Year 1 (May 2017). The CBU team has planned a visit by the local Mwinilunga communities to the CBU orchid cultivation facility and urban markets of Kitwe by July 2017, to raise awareness of the entire orchid trade value chain. The team anticipates increased awareness, increasing participation in focus groups and enabling development of the orchid management plan (Activity 1.6) in September 2017.

2. Capacity: The project aims to enhance existing facilities and expertise at the partner organisation CBU, Zambia, to enable cultivation of traded terrestrial wild orchids to be achieved in-country, sustained by in-country expertise, and rolled out to household nurseries in rural communities. The year one activities (< March 31st 2017) included technical support and training, and provision of additional equipment to the CBU lab and nursery team, and two specialist skills workshops (Activity 2.1).

Jonathan Kendon (RBG Kew) purchased supplies and organised shipping to CBU (July and August 2016). From 9th to 22nd of September 2016, Jonathan provided *in vitro* orchid culture training and installation of laboratory equipment and supplies. Given the advanced skills of *in vitro* culture already practiced by the CBU technician team, Jonathan provided additional specialist training on methods of isolation and culture of orchid fungal symbionts. The full report is provided in Annex 4. Under Activity 2.2, Hildegard Crous led an intense 5 day workshop at CBU (from 20th to 24th of March 2017), bringing her commercial and conservation horticulture expertise (delivering presentations on theory, case studies, and growing requirements of deciduous orchids). Methods and optimum timing for greenpod collection were demonstrated, sowing of fresh greenpods and re-plating of germinating seeds/ seedlings. Hardening off methods were addressed, as well as improving culture of mature plants in the greenhouse. Attendance of this Workshop was limited to six participants (3 CBU technicians, the PM, 2 colleagues from Forestry) due space constraints in the CBU *in vitro* lab (see Annex 1).

Serene Hargreaves led training in IUCN Red List and rapid assessment methods (Activity 2.4) at a Workshop held in Lusaka, Zambia (26th to 30th of September 2016), supported by the PM and the University of Zambia (Dr David Chuba). The twelve participants included the CBU team and PM, Forestry, NGOs and private reserve managers (Cf. Annexes 1 and 4 for details). Planning and execution of the Workshop emphasized to organisers and participants the paucity of resources currently available in Zambia for detailed botanical studies. The initial plan to lead a two week workshop was altered (following consultation with the DI office) to a one week workshop with one week of preparation in the RBG Kew herbarium, enabling collation of species distribution data in advance of the workshop, where participants developed draft Red List assessments for four species using these data. Despite these challenges, the Workshop leader and participants were pleased with progress made. All participants completed the course, qualifying as Assessors, and formed a new collaborative network of

conservationists and orchid specialists in Zambia. Towards this continued Red List effort, the PL and Workshop leader are advertising for a summer intern, who will be hosted by the RBG Kew Plant Assessment Unit and collate specimen data (georeferenced herbarium specimens, literature resources) to enable 20 species Red List assessments by the trained assessors in Zambia.

Towards Activity 2.5 (creation of an orchid reference collection and tissue bank for DNA extraction and identification of traded species using molecular markers), the PL led three weeks of in Zambia (January 15th to February 6th 2017) accompanied by the PM and project post-doc Kaz Yokoya (RBG Kew). Having completed extensive fieldwork in Zambia in 2013, the PL found a marked decrease in prevalence of terrestrial orchids in typical terrestrial orchid habitats (seasonally inundated grasslands). Anecdotal evidence suggested seasonal variations in rainfall among the causes, in addition to conspicuous evidence of wild orchid harvest (e.g. it was common for passers-by to make reference to Chikanda harvest; we frequently met harvesters in the field; visible evidence of digging for orchid tubers was common). Due to the scarcity of terrestrial orchids, estimates of local population extent were made in advance of specimen collection. A threshold was agreed, below which we would not collect due to rarity and the destructive sampling methods required for collection of full herbarium vouchers and roots/ tubers for isolation of fungal symbionts.

Many of the species present were leafless when in flower, bearing minute foliar bracts suitable for sampling for DNA extraction. Due to scarcity of leaf material and rarity of target taxa, the tissue bank collection was not made in duplicate. *In lieu* of duplicate tissue bank collections, project partners (Uppsala University) are assessing potential to undertake whole chloroplast genome sequencing of these samples- enabling creation of *in silico* DNA sequence data storage and additional research outputs. The collection and culture of 1500 fungal isolates (of which 450 are putative orchid mycorrhizal fungi; OMF) is key to delivering our target of symbiotic seedlings, cultivated at Kew and intended for repatriation to Zambia towards project close.

3. Knowledge: The rapid assessment and baseline survey (Activity 3.1) has been completed by CBU. The project area has 800 households with a total population of 4,363 people (2,155 males, 2,208 females). The study sample included 9 villages, 9 Focal Group Discussions (50 participants), and 15 village Key Informant Interviews, and includes documentation of traditional utilization practices of wild edible orchids in Zambia in rural communities. (Cf. Section 2, above, and the CBU reports in Annex 4).

Extensive market research was completed by the project's MSc student, Seoljong Kim, who completed fieldwork in Zambia from 19th June to 27th July 2016, carrying out 83 interviews (with 9 harvesters, 45 middlemen, 29 vendors) at 34 markets and collection sites in three Zambian provinces (Copperbelt Province, Central Province and Lusaka). Seoljong's fieldwork was supported by colleagues at CBU and the PM. His research is nearing completion and will be submitted as an MSc thesis (scheduled July 2017).

The ambitious target to complete rapid Red List assessments for 100 species in three orchid genera overestimated availability of essential botanical data and expertise. See comments on the IUCN Red List Workshop above, under Output 2. It is hoped that recruitment of a project intern in the RBG Kew herbarium (Summer 2017) will mobilise herbarium data and enable Red List assessment by the recently qualified Red List assessors.

Field sampling and lab work has been completed under Activity 3.3 (fungal symbionts of "top-ten" orchids sampled from the field, isolated, identified and cultured, with full voucher specimens). A "top-10" list of rare terrestrial orchids could not be delivered by the Red List workshop. Furthermore, terrestrial orchids were scarcer than anticipated during fieldwork and the fungal symbiont sampling strategy had to be modified to encompass a broad geographical area (four Provinces) in search of a range of fungal symbiont host species. Suitable habitat types for wild edible orchids were the focus, and areas known to be frequented by harvesters were targeted to ensure sampled orchid species (and their fungal symbionts) were relevant to the project's aims. Despite these limitations, 52 root collections were made, supported by voucher specimens and tissues for DNA extraction. This live material was successfully exported from Zambia and imported to the UK following strict quarantine procedures and in line with national and international legislation including CITES. Over 1500 fungal isolates are now in culture at RBG Kew (of which ~450 are considered probable orchid mycorrhizal fungi (OMF)).

Seed has been collected (Activity 3.4) from six locations in five provinces in Zambia[1], representing nine collection records of three target genera. Collection effort (led by the PM) is determined by availability of material in the locations visited (infructescences are collected when >5 mature individual plants are present, or a single seedpod for <5 individual plants). Specialist training in orchid seed viability testing (Activity 3.5) has been completed by key project participants.

Towards Activities 3.7 and 3.8, identity of traded edible orchids is underway by Uppsala University MSc student Seoljong Kim, employing molecular barcoding methods. Seoljong made 48 collections of fresh or dried tubers from urban markets, Chikanda cake and ground orchid flour, each containing 1 to >100 tubers. Molecular data has been obtained for >230 tubers. Thus far, 62 tubers have been identified, from four orchid genera.[2] DNA from Chikanda cakes and orchid flour was extracted and has been used for High-Throughput Sequencing using IonTorrent PGM (March 2017). Results are currently being analysed. Remaining lab work is due for completion by late May 2017 and the tentative thesis submission date is end of June 2017. Subsequently, a research paper will be prepared for submission.

4. Awareness: Correspondence with Biodiversity Convention national focal points was initiated by the PL during project development, and continued by the PM since project inception in June 2016 (Cf. Section 5). CBU's baseline studies included assessment of current levels of awareness of the destructive nature of orchid tuber harvesting practiced in the target rural communities. Quoting from the CBU report (cf. Annex 4): "Local communities are being driven mainly by market forces rather than environmental concerns. In the baseline […] 24% of the orchid harvesters are aware [… while] 62% of participating communities are not aware of the negative environmental implications of their orchid harvesting methods." Following the survey, CBU held awareness raising meetings in nine villages across the project area (in October 2016 and March 2017) to sensitize communities and local government officials on project activities and perceived benefits.

3.2 Progress towards project Outputs

Under Output 1 progress has been made towards establishment of "sustainable resource management, securing livelihoods for women in poor rural communities" by undertaking surveys to provide baseline household income levels, and school attendance. For results see the CBU report, Annex 4.

As per the Change Request (submitted), project partners Sanga R&D were unavailable to carry out the baseline survey for the market research in Year 1. Instead a survey will take place in project year 3 to measure change I supply chain trends, using an existing study (completed by the same authors in 2015) as the baseline for comparison. Their work is complemented by the comprehensive market research by the project's MSc student in 2016. The market survey by Sanga R&D will no longer be measure the impact of sensitisation work, but will instead measure changed attitudes towards Chikanda orchid (supply, demand, scarcity, value of the resource).

The capacity building targets of Output 2 are well advanced, contributing to enhanced "local level community capacity and conservation practitioner capacity" to "manage wild orchid populations; enhance delivery […] and facilitate implementation of […] legislation for plants." Specialist plant conservation skills have increased for ≥12 individuals (3xCBU staff and ≥ nine other conservation practitioners) [IUCN Red List, orchid conservation biotechnology methods and augmented with seed banking], alongside enhancement of existing partner lab facilities at CBU. The increase in "resources for classical and molecular identification of traded taxa" is well under way, with over 50 herbarium voucher collections (~30 species; with associated collection data, sprit collections and silica-dried tissues for DNA extraction), molecular data obtained from >230 tubers, and 1,500 fungal isolates (of which ~450 are putative OMF).

While the indicators are still relevant, some targets of Output 2 were over ambitious. For example, cultivation of 1,000 asymbiotic seedlings by end Yr 1 (rising to 5,000 by end Yr 2): Due to flowering times, availability of seeds, and timing of specialist training workshops on seed sowing methods, cultivation from seed at the CBU partner lab commenced towards the end of Year 1.

Progress towards achievement of Output 3 has been partially fulfilled in Year 1, contributing to improved "understanding of orchid identity, rarity, cultivation and traditional utilization practices."

[1] Copperbelt, Lusaka, Central, Northern and Muchinga Provinces

[2] *Brachycorythis, Disa*, *Habenaria* and *Satyrium*

Collection, isolation and culture of putative orchid mycorrhizal fungi (OMF), are essential for "in-depth study of seed germination requirements completed for high risk species" [...] "enabling in-country *ex situ* conservation and species recovery." The expert workshop on greenpod seed harvest and sowing included training in viability testing, enabling "the first seed storage information and viability testing data available for Chikanda orchids of Zambia." Molecular data has been generated "for ≥200 samples of traded wild orchid tubers and derivatives, collected (by MSc student Seoljong Kim) from markets in ≥2 urban centres in Zambia for identification at Uppsala University."

The impact of constraints of data availability and orchid expertise on the Red List assessments is reported in section 3.1. Consequently the Red List target cannot be met within Year 1. A summer internship is currently advertised at RBG Kew to supplement this effort - by collating specimen data to support the newly formed network of qualified Red List assessors in Zambia to generate a "top-10 of the most endangered species identified for in-depth research and *ex situ* conservation."

Traditional, local utilization practices of commonly harvested Chikanda orchid species have been documented by the CBU team, who worked with community participants to group species into four types, based on appearance, fragrance, texture and other qualities of plants and tubers. Additional specimen data and photographs are required to apply scientific names to these orchid types and determine how many species are listed.

The "communication and environmental awareness strategy" development for Output 4 has been achieved by CBU through meetings in rural communities [See report, Annex 4]. Quoting from the CBU report: *"*The team made every effort to engage the local communities during the baseline survey. The local traditional chief (His Royal Highness Chief Kanyama) was made aware of the project aims and how it will benefit his subjects. The project was well received by the traditional authority. This was demonstrated by his assigning his young sister to officially open one of the Focus group discussions."

Evidence for the "strong communication channels established with CITES […] and CBD […] focal points is given in Sections 3.1 and 5. Over "20 senior conservation practitioners" have been made "aware of project activities and early outputs" within Year 1, through Workshop participation and informal meetings.

3.3 Progress towards the project Outcome

Indicator 0.1 Baseline data on household income has been gathered by the CBU team from nine villages in one District (Mwinilunga). The selected project area has 800 households with a total population of 4,363 people (2,208 female). Comparison to other sources of income indicates that agriculture is the main source (average annual income GBP 83.33) supplemented by Chikanda harvest (GBP 41.67 p.a.) which accounts for less than 20% of household income among those surveyed. The total annual average domestic incomes from all sources in the baseline stands at ZMW 1,500.00 (GBP125.00). Therefore, project activities aim at raising this figure to ZMW 1,950.00 (GBP162.50) per annum.

0.2 a) Our ability to achieve the Outcome is based on the CBU technical team's adaptation of their skills and facilities to *in vitro* orchid culture. The project has enabled mentoring, improved facilities (procurement and installation of specialist equipment, improved workflows), specialist training workshops (one completed within reporting period, March 2017, one scheduled April 2017), and advice on alternative (cheaper, more accessible) lab supplies from South Africa to ensure long-term sustainability.

0.2 b) The CBU technicians frequently train university students and junior technicians at CBU. Since the specialist training and workshops on orchid cultivation methods, they are well placed to cascade knowledge, skills and experience to others. In addition to the core CBU team, participants of workshops included Forestry Department, Peace Corps volunteers, NGO directors, and University of Zambia (Lusaka) technicians. The number of Workshop participants to date has ranged from 6 (greenpod orchid seed) to 12 (IUCN Red List).

0.3 Assessment of rarity (IUCN Red List methods) has been hampered by a paucity of contemporary geo-referenced specimen data (<40 years old) and availability of expertise on terrestrial orchids in Zambia. Rural community focus groups (convened by CBU) reported that the many species that communities are harvesting are categorized into four common Chikanda types, with different qualities and harvested at different times of the year. Traditional use has been documented for these four types

harvested in the project areas (Table 1, p. 17 of CBU report, Annex 4). Multi-disciplinary work to document identity of traded orchids, and cultivation requirements is underway. For identity these include: Collection of complete voucher specimens (herbarium specimens, spirit collections of flowers, dried tissues for DNA extraction) to enable expert identification using morphological and molecular methods; collection of orchid roots and tubers (in association with vouchers) for identification of OMF required for cultivation; collection of traded tubers and derivatives (orchid tuber flour and Chikanda cake) for identification by molecular barcoding. For cultivation: Viability testing of stored seeds, asymbiotic *in vitro* culture experiments, collection, isolation and culture of fungal symbionts that are putative orchid mycorrhizal fungi (OMF), experimental proliferation of tubers *in vitro* (vegetative techniques), collection of pollen for artificial pollination of nursery plants.

0.4 The survey by CBU provides baseline figures to measure changes to awareness. At inception, CBU report that "local communities are driven mainly by market forces rather than environmental concerns"… with "24% of interviewed orchid harvesters are aware of the negative environmental consequences of orchid extraction methods" and 62% not aware. Follow up visits to women's groups by CBU staff initiated focus groups and institutional structures that will support production and trade of cultivated edible orchids (See Annex 4 for their report).

3.4 Monitoring of assumptions[3]

1) No breakdown in communication or change of priorities between UK lead and collaborating institutes: Communications have improved as partnerships have developed since project inception (*Cf.* Sections 2 and 10). The in-country Project Manager has been proactive in his efforts to promote regular communications among partners. Competing priorities have led to some delays or postponement of some activities (market research led by Sanga R&D, as per submitted Change Request).

2) Edible orchids can be successfully cultivated and tubers obtained for harvest: Existing skills and facilities at the CBU lab and nursery enabled training of advanced techniques of symbiotic fungi collection and culture. Substantial investment of project funds and staff time from all project partners (a wide range of expertise from Kew, specialist growers and conservationists, using a diversity of methods) have been committed to adapting existing plant culture facilities and expertise. However scarcity of wild orchids is far greater than anticipated and has hampered seed collection efforts. We remain confident that orchids can be cultivated and tubers obtained for harvest.

3) Identifying communities/ individuals willing to participate, and gaining free, prior and informed consent from Chikanda harvester and trader communities/ individuals for all initiatives and activities: In Year 1 this has been achieved by CBU team in nine villages that participated in baseline studies, and two additional communities identified by a "familiarization" exercise led by CBU academics Drs. Kabwe and Kwenye. The Uppsala University MSc student completed 83 interviews in 34 markets.

4) Local communities willing to adopt new methods: While the CBU baseline survey revealed low awareness of the environmental impact of wild edible orchid harvest in rural communities, the results indicate economic pressures as the cause of demand, generating interest in gaining control over the resource. Positive responses from several stakeholders in the project area (Dept. of Agriculture, Forestry Department, World Vision, and two communities- documented in the familiarization report, Annex 4), suggest willingness to adopt new methods.

5) Infrastructure and need identified, enabling specialist methods/ skills from training workshops to be applied by participants: This has been the most successful aspect of Year 1 activities in partnership with the CBU team. Beyond CBU, identifying additional prospective participants to attend specialist workshops has proved challenging and highlights the lack of resources and facilities in Zambia dedicated to wild plant conservation and research. For the Red List workshop, additional support has been secured from RBG Kew (summer internship placement currently advertised) to database specimen data and facilitate Red Listing effort by Workshop participants.

6) Users (of planned interactive identification key) can access the internet: The key has not yet been developed but the mitigations noted in our application hold true.

[3] 1-3 are Outcome level assumptions. 4-10 are Output level assumptions.

7) Fungal symbionts can be found and host orchid species identified. Seeds of the target taxa are gathered and delivered to RBG Kew for culture: Fieldwork in early 2017 was successful and fungi isolated from orchid roots and tubers are in culture at RBG Kew. Identification pending (using molecular methods). Seed collection has been hampered by scarcity of orchids. The first shipment of seeds is anticipated in May 2017.

8) MSc student can be recruited and gain access to the markets: The MSc student completed over one month of successful fieldwork in Zambia in 2016. Research assistants were recruited from national universities (including the partner university CBU), and provided support with the surveys including translation and negotiation with market managers and stall holders in 34 markets.

9) Communities will want to engage: Prof. Vinya (CBU) reports that the traditional authority (His Royal Highness Chief Kanyama) was made aware of the project aims and how it will benefit his subjects. The CBU team were well received (quoting Prof. Vinya, "this was demonstrated by his assigning his young sister to officially open one of the Focus group discussions"). CBU were granted permission to conduct the baseline surveys, interviews and focus group meetings and have scheduled return visits. Drs Kabwe and Kwenye were also positively received (cf. Annex 4 report).

10) Schools will want to participate: Following initial meetings between the PL and a local high school (Helen Kaunde School for Girls, Kitwe) in 2013, staff changes at both the UK and Zambian schools have led to fragmentary communications. The PL is now in contact with the parents involved with the UK-Zambia exchange group. An additional in-country project partner has also been identified, that works to promote education opportunities for women and girls.

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

Conservation of biodiversity is dependent on knowledge of species occurrence, distribution and threats. The project generates new knowledge of the Zambian orchid flora (collection of vouchers, identified international orchid specialists). Mobilisation of RBG Kew collections data and expertise facilitate assessment of threat to biodiversity (IUCN Red List). The first reported collection and identification of orchid mycorrhizal fungi of Zambia contributes to practical conservation outputs (orchid seed germination and cultivation) while also contributing to national species inventory efforts.

CBU expertise facilitates development of culturally appropriate community-governed resource management practices in participating rural communities that will improve access to cultivated resources and income generation. Contributions to improved community well-being include: a) Empowerment of community members involved in harvest (including experienced women harvesters in key roles, providing specialist information) who share their knowledge and will have decision-making roles in development of community-based natural resource management plans to control their local resource; b) empowerment of community researchers who have received training (from CBU) in survey and interview techniques; c) recognition of the importance of traditional natural resource management practices; d) opportunities for knowledge exchange with other rural communities in the region who have expressed interest in the project.

Long-term, we aim to support rural livelihoods through establishment of sustainable, reliable sources of orchid tubers (currently over exploited, and increasingly scarce) in household nurseries and for supplementary planting to support income generation. Due to the complex nature of orchid establishment (dependence on nutrient supply via fungal symbionts), specialist training is required to adapt existing skills and facilities at CBU to orchid conservation biotechnology methods.

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

The long-term outcomes of our project contribute to numerous SDGs, including 1. No Poverty; 2. Zero Hunger; 3. Good Health and Well Being; 8. Decent work and economic growth; 11. Sustainable Cities and Communities; 15. Life on Land. In the 2016-17 financial year, the greatest achievement of our project has been SDG 17. "Partnerships for the goals" – establishing partnerships among project partners and stakeholders, including rural communities, mobilising skills and resources, adapting and acquiring expertise to address threats to biodiversity and rural livelihoods in Zambia associated with the wild edible orchid trade.

5. Project support to the Conventions, Treaties or Agreements

Project stakeholders include public (rural communities, urban traders and consumers, school groups), and government agencies, (e.g. British High Commission, FCO, Zambian District Commissioners, Forestry Department, Ministry of Agriculture, Dept. of National Parks and Wildlife). Our planned project outcomes (improved mitigation, capacity, knowledge and awareness) are based on Aichi Biodiversity Goals and Targets. By raising awareness and seeking engagement, we contribute to "mainstreaming biodiversity" (Goal A). CBNRM of wild orchids, access to cultivated stock and alternative sources of income should reduce pressure on biodiversity and promote sustainable use (Goal B). Efforts to measure extinction risk (IUCN Red List) alongside *ex situ* conservation (orchid plants and seeds), increases potential to safeguard ecosystems, species and genetic diversity (Goal C). Participation in the project brings opportunities to secure a scarce resource (wild orchids) while contributing to improved well-being (Goal D). Participatory planning, knowledge management and capacity building (Goal E) are integral to our project.

All project Outputs contribute to the Global Strategy for Plant Conservation Objectives and are in direct response to gaps identified in the Zambia National Biodiversity Strategy and Action Plan. Increased in-country capacity for plant conservation includes lab improvement and technical skills training at CBU to facilitate cultivation of wild edible orchids, and two specialist training Workshops completed in Year 1. The Zambia Nagoya Protocol ABS authority acknowledges that CBNRM schemes have been successful mechanisms for ABS implementation. The CBU team has thus far completed baseline studies as a first step towards establishing CBNRM schemes.

In support of implementation of CITES legislation, we are collating baseline information on traded orchids in Zambia and the region. On completion of the molecular barcoding work, the Uppsala University team will deliver a summary report to inform CITES officers and legislators (~ late July 2017).

The PM maintains regular communications with Mr Allan Dauchi, national Focal Point for the Nagoya Protocol, Forestry Dept. officials responsible for its enforcement, and Ms. Matimba Changala, Senior Prosperity Officer at the British High Commission (BHC). The PL and project post-doc met Ms. Changala with the Deputy Commissioner Mr. Andy Hamilton at the BHC in Lusaka (3rd of February, 2017) to discuss project objectives and raise awareness of the livelihoods and conservation issues around Zambia's edible wild orchid trade. Ms. Changala has been a proactive advocate for our project, circulating project updates among the BHC's environment Cooperating Group with other embassies and international organisations.

6. Project support to poverty alleviation

Baseline studies of household income and utilisation of the natural resource (wild orchids) are complete. Please refer to Section 3.5 for examples of how the project seeks to contribute to poverty alleviation. It is too early to report evidence of the project's contribution. Community members in nine villages in Mwinilunga District (North-Western Province, Zambia) are the expected beneficiaries of this work. The CBU survey reported 800 households with a total population of 4,363 people (2,208 females) in the project area. 73% of surveyed orchid collectors are female, >60% of have not completed primary school education and >60% of are in the youth group (20-40 years) category.

Through improving access to the increasingly scarce orchid tuber resource (through supply of material to household nurseries), the project aims to reduce poverty and improve personal safety of harvesters (mostly women and girls), by reducing the need to travel long distances (including across high risk national borders with Angola and DRC). We anticipate a reduction in school absenteeism that is directly linked to the orchid harvest and trade (reported by Ministry of Agriculture officers[4]).

7. Project support to gender equality issues

Our project does not directly seek to address gender equality. It is anticipated that through participation in surveys and interviews as "Key Informants", women in rural communities and urban markets in the project areas will benefit through recognition of their knowledge and experience as the primary harvesters of wild edible orchids and producers of Chikanda orchid cake, and their involvement with decision making processes as CBNRM plans are developed with their participation. Reduced risks

[4] See report by Drs. Kabwe and Kwenye, CBU, Annex 4.

to their personal safety, and improved school attendance, also contribute positively to gender equality in the project areas.

Every effort has been made to record gender of project participants (e.g. survey respondents and workshop participants). The project Facebook page has attracted a diverse audience in Year 1. The greater proportion of followers, by location, age and gender, are from Zambia, women, and in the 25-24 year old age category (22%), followed by women in the 35-44 age category (14%) and then men in the same category (35-44 yrs; 13%).

8. Monitoring and evaluation

As described in our Application, monitoring and evaluation of achievements are built into the structure of the project. In rural communities, Year 1 activities included completion of baseline studies to assess household income and school attendance, allowing comparison and measures of project impact in later years. On-going project progress is monitored by the PL and PM, through regular video conferencing (Skype calls) and discussion with project partners, and the CBU management team regularly monitors project implementation through its monitoring and evaluation system. We are grateful for recommendations on project implementation and opportunities for enhancement from our Workshop leaders.

9. Lessons learnt

The project is founded on an entirely new partnership network, spanning seven institutions in four countries in Europe and Africa. With the exception of one Workshop leader and the PL's work in Zambia (in 2013) with the co-director of Sanga R&D Mr Mike Bingham, none of the partners had worked together previously. The project development was led by the PL, following her the visit to Zambia in 2013, and introduction (by email via BGCI's Secretary General Dr. Paul Smith) to colleagues at CBU, where a demand for support with orchid culture techniques had been identified.

Communications during project development depended upon phone calls, Skype meetings and email correspondence. While successful, the urgency and complexity of the problems we seek to address culminated in an ambitious, complex project, and development of partnerships and communication channels took place during the very demanding schedule of Year 1.

Had it been achievable in the timeframe - pilot funding should have been secured by the PL at the earliest stages of communication with prospective partners, to support a) initial face to face meetings and b) partner participation in the Darwin Initiative Stage 2 workshop in London. This additional step would have enabled a more efficient and effective project development process, delivering a more focused project, with stronger partnerships in place from the outset.

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

This is our first annual report.

11. Other comments on progress not covered elsewhere

Planning project activities around peak flowering and seed production times has been challenging. Widespread harvesting has compounded the difficulty of finding specimens for documentation of fungal and orchid species diversity, and seed collection.

12. Sustainability and legacy

Early indicators of the increased awareness and broader legacy of our project in Zambia, and its positive contribution to future biodiversity initiatives in the Zambian environmental sector, include: a) Expressions of interest from other rural communities (e.g. villagers at the Chimfunsi Sanctuary; members of Nyaminkanda and Munwa communities); b) Invited contributions to a Zambian bid to host the international African botanical Congress (AETFAT 2020) and invitation to present at the AETFAT Congress 2017 (in Kenya); c) the national, continental and international audience of the project Facebook page and broad reach (up to 1,400 audience members[5]); d) interest expressed by Peace Corps Zambia and iNaturalist (USA) in citizen science associated with our project.

[5] There have been exceptional levels of interest in our practical workshops, e.g. the PM's photo essay documenting the orchid greenpod (seed harvest and sowing) workshop in March 2017 had a "reach" of 676 people, 114 reactions (comments, likes, shares), 1,433 post clicks and 1,346 photo views.

Increasing interaction with the project Facebook page suggests burgeoning interest in the project topic, internationally and within Zambia. Of the 131 page followers 31 are based in Zambia (28 in the UK, in addition to followers from 36 other countries across Asia, the Pacific region and Africa). In terms of Page reach (i.e. the wider audience of shared/ promoted posts), our project partner country South Africa is our biggest audience (346 audience members), closely followed by the project lead country (UK, 311 audience members), the project host country, Zambia (153), and the home country of the project's MSc student (South Korea, 145 audience members).

In addition to project promotion already reported: During fieldwork (early 2017), the PL, PM and project post-doc were interviewed for a film, commissioned as part of a bid for Zambia to host AETFAT in 2020. At our request, the film makers visited our CBU partners for additional interviews. If the bid is successful, this would be the first time that Zambia has hosted AETFAT and is indicative of growing optimism among Zambians for increased commitment and capacity for botanical research and conservation.

13. Darwin identity

The PL and PM have proactively sought opportunities to promote the project and funder to wider audiences. The PL's article in the RHS *Orchid Review* was used to generate media interest (subsequently featuring in *BBC Earth* online and the Spring 2017 issue of *Kew Magazine*). The DI logo is used in presentations (e.g. Powerpoint slides) and the project's bi-annual newsletter, and DI is cited as the funder on the project Facebook page (with promotion via Twitter to DI social media channels).

Our work is referred to among our partners as "the Darwin project" and every opportunity has been taken to promote the DI, its links to DfID, and its aims to address both biodiversity conservation and its relationship with poverty among stakeholders (Zambian government agencies including the Forestry Department, national herbaria, universities, livelihood and conservation NGOs, eco-tourism businesses, environmental consultants).

14. Project expenditure

Table 1: Project expenditure <u>during the reporting period</u> (1 April 2016 – 31 March 2017)

Project spend (indicative) since last annual report	2016/17 Grant (£)	2016/17 Total actual Darwin Costs (£)	Variance %	Comments (please explain any variance)
Staff costs			27	Related to unavailable Sanga R&D staff in Yr 1, who have requested postponement of activities to Yr 3 as per Change Request (submitted)
Consultancy Costs				
Overhead Costs			9	Related staff costs variance (above) for Sanga R&D staff in Yr 1, who have requested postponement of activities to Yr 3 as per Change Request (submitted).
Travel and subsistence			24	Related to curtailment of major fieldwork due to Paternity Leave I have requested retention of funds for Yrs 2 & 3 as per Change Request (submitted).
Operating Costs			25	Variance due to postponed processing of herbarium specimens into Yr 2, as per Change Request (submitted).
Capital items			18	Secured lower price for laptop purchase.
Others			62	Related to delayed lab work due to Paternity Leave of post-doc researcher. I have requested retention of funds for Yr 2 as per Change Request (submitted).
TOTAL				

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2016-2017

Project summary	Measurable Indicators	Progress and Achievements April 2016 - March 2017	Actions required/planned for next period
Impact Vulnerable rural livelihoods enhanced, and threatened wildlife resources protected, by community-governed resource management practices, supported by in-country conservation biotechnology expertise and demand for sustainable products from environmentally aware populations.		RV: One step towards gene conservation is changing people's perceptions and attitudes. Unless people are aware of their actions it is quite difficulty for them to participate in any initiative directed at conservation. Therefore, one of the key activities that has already been undertaken in this project has been awareness raising among the local communities and their traditional leadership on how project activities link into their livelihoods. As expected, the project has been endorsed by His Royal Highness Chief Kanyama of Mwinilunga.	[redacted]
Outcome Sustainable orchid harvest, cultivation and conservation adopted in poor Zambian communities, providing improved livelihoods and security for women, and enhanced local and national governance of wetland genetic/species diversity.	0.1 Women from ≥600 participating households in 2 Districts engaged in CBNRM scheme, reporting 30% increase in household income from sustainable natural-resource products, and 40% reduction in school absenteeism by end Yr 3. 0.2 a) ≥40% of participating CBNRM households gaining access to	Baseline data on household income has been gathered by the CBU team from nine villages in one District (Mwinilunga). The selected project area has 800 households with a total population of 4,363 people (2,208 female). Total annual average domestic incomes from all sources in the baseline stands at ZMW 1,500.00 (GBP125.00). Therefore, project activities aim at raising this figure to ZMW 1,950.00 (GBP162.50) per annum. *0.2 a)* Our ability to achieve the Outcome is based on the CBU technical	RV[6]: Group formation Capacity building for women groups Study visit to CBU orchid production lab facility.

[6]Initials used in the log frame text are RV: Prof. Royd Vinya (CBU), RB: Dr. Ruth Bone, RBG Kew and Project Leader, JK: Jonathan Kendon (RBG Kew), KY: Dr. Kaz Yokoya, project post-doc; SH: Dr. Serene Hargreaves (RBG Kew); HC: Hildegard Crous, Cape Institute of Micropropagation; SV: Dr. Sarina Veldman (Uppsala University).

	cultivated orchid stock and techniques training for household nurseries by end Yr 3. 0.2 b) Resources and skills increased for ≥12 conservation practitioners, cascading to ≥40 by end Yr 3 enabling ex situ conservation and cultivation of orchids (implementation of GSPC). 0.3 For 20 of the most commonly traded Chikanda orchid species, and 10 of the rarest: understanding of identity, traditional use and cultivation requirements documented by end Yr 3. 0.4 Communication and environmental awareness strategy implemented providing increased awareness of environmental implications of orchid harvesting: Among ≥600 rural households in participating communities; ≥40 conservation practitioners; ≥60 urban school children (and their families).	team's adaptation of their skills and facilities to *in vitro* orchid culture. Since the specialist training and workshops on orchid cultivation methods, the CBU technicians are well placed to cascade knowledge, skills and experience to others. The number of Workshop participants to date has ranged from 6 (greenpod orchid seed) to 12 (IUCN Red List). Traditional use has been documented for 4 categories of commonly harvested orchids in the project areas. Identification is underway (morphological and molecular methods), and characterisation of OMF essential to cultivation. The CBU baseline survey recorded levels of awareness at project inception.	
Output 1. **1**. **Mitigation:** Sustainable resource management practiced, securing livelihoods for women in poor rural communities.	1.1 Number of households practising destructive harvest methods reduced (from baseline measured in Yr 1) by 60% by Yr 2, and gaining access to supplementary cultivated Chikanda plants for household nurseries by Yr 2.	RV: So far only a basely survey has been completed which has established the number of households involved in destructive extraction as well as the domestic income levels from orchid trade. Attainment of these targets is directly linked into production and supply of chikanda germplasm. RV: Focus group discussions with the participating local communities during the	

	1.2 a) Household income increased (from baseline measured in Yr 1) by 30% in Yr 3 through adoption of supplementary sustainable income streams (cultivated Chikanda and other sources). 1.2 b) School absenteeism reduced (from baseline measured in Yr 1) by 40% in Yr 3 due to increased household income, and reduced pressure on school-age children to participate in Chikanda harvest.	baseline survey confirmed that these indicators are relevant, achievable, and measurable.
Activity 1.1 Baseline study completed on current wild resource management of Chikanda orchid tubers (harvesting practice, handling and storage).		RV: A baseline study was conducted in the project area. It covered nine villages in the areas where there is active orchid collection. The results of this baseline study have been utilized in the follow up activities involving group formation. RV: Group formation is central to the entire implementation of the project in as far as attaining a number of set targets. It was during the baseline study that awareness raising about the project was conducted. The traditional leadership in the project area was sensitized about planned project activities. Government officials were also made aware of the orchid conservation initiatives under the Darwin Initiative.
Activity 1.2 Local supplementary sustainable income streams identified [in partnership with RBG Kew staff].		RV: CBU team comprising Dr Gillian Kabwe and Dr Jane Kwenye re-visited the local women groups in the target villages as part of the wider community engagement. The main aim of the visit was to initiate group formations. The actual group formation will take place by end of May. However, the team was able to identify key players in orchid extraction in the project area.
Activity 1.3 Baseline & repeat studies of household income and school attendance (Yrs 1 and 3).		RV: A re-evaluation of the baseline studies on household incomes and school attendance is scheduled to take place following the supply of germplasm by end of 2017 and mid-2018.
Activity 1.4 Local-level enterprises and institutional structures established (to support production and trade of cultivated orchids).		RV: Steps towards group formation have been initiated on the ground. The expectations are that once the orchid resource base has been enhanced through supplies from CBU and Kew, then communities will be linked into major value chains. Also, CBU team has planned a field day by the local Mwinilunga communities to CBU orchid cultivation facility by July 2017. During this visit, the communities will also be taken around the markets in Kitwe involved in orchid trade. The idea is for the communities to have a clear idea of the entire orchid trade value chain.

Activity 1.5 Training needs for local communities for orchid management, storage of tubers, and cultivation assessed.		RV: Following group formation in May, 2017, the CBU team will facilitate a field tour of the University orchid cultivation centre. Twenty women will be brought to CBU to see and experience orchid cultivation. Additionally, the group will be given a short presentation on methods of orchid cultivation.
Activity 1.6 Participatory orchid management plan (including handling and storage of harvested tubers) formulated and implemented.		RV: This activity is yet to take place as the groups are not yet formed. The activity is planned to take place in by September 2017 once we have formed the groups and they have been taken through some basic participatory management planning process.
Output 2. **2. Capacity:** Both local level community capacity AND conservation practitioner capacity increased to: Manage wild orchid populations; enhance delivery of CBD (GSPC Objectives); and facilitate implementation of CITES legislation for plants.	2.1 1,000 asymbiotic seedlings cultivated for supplementary plantings or household nurseries, by end Yr 1, rising to 5,000 by end Yr 2. 2.2 By end Yr 2, 40% of the participating community households are cultivating orchid germplasm supplied by the CBU laboratory. 2.3 By end Yr 1, specialist plant conservation skills base increased to ≥12 individuals (3xCBU staff and ≥ nine other conservation practitioners) [IUCN Red List, orchid conservation biotechnology methods and augmented with seed banking]. 2.4 Increased resources for classical and molecular identification of traded taxa, from 0 specimens to ≥ 150, by end Yr 2 (two field collection seasons). 2.5 Increased accessibility to orchid identification tools by end Yr 2, to support implementation of CITES for plants [target for ≥20 species of the most commonly traded Chikanda orchid species, and ≥5 species from the "Top-10" rarity list].	RV: This activity is highly linked to Technician training. So far the Technicians have been taken through two key steps involving micro-propagation of orchids, and seed collection. I am sure following the completion of the third training, the Technicians should be ready to mass propagate the orchids. JK: 3xCBU technicians trained in orchid in vitro techniques. 9th – 22nd Sept. Topics as follows: Lab and greenhouse set-up; in vitro technique; media preparation; seed sowing and germination; mycorrhizal fungus extraction and isolation; culture maintenance; de-flasking; troubleshooting. RV: This activity is linked to completion of Technician training. Once training is done the Technicians will be able to achieve this target by mid 2018. RV: Orchid conservation capacity for three members of staff at CBU has been increased. I can rate this target as having been in full especially that additional three members of staff from Forestry Department have been involved in methods of plant conservation. RB: Field work completed in 2017 yielded 50 voucher specimens, with associated spirit collection, tissue bank samples (for DNA extraction), and roots/ tubers for isolation of fungal symbionts. RB: Laptop and interactive key software purchased. KY: As of 31st March 2017, >1500 fungal isolates in culture from orchid roots,

	2.6 First symbiotic seedlings (5,000) of Zambia's 10 rarest Chikanda orchid species made available for in-country ex situ conservation and species recovery plans by end Yr 3. [A foundation towards future work by CBU staff to begin symbiotic seed culture in-house].	ca.450 isolates of potential mycorrhizal fungi from 24 species (see 3.3)
Activity 2.1 CBU lab equipped for orchid culture; 3xCBU technical staff trained in asymbiotic orchid seed germination and culture methods.		RV: The project has purchased numerous chemicals and equipment for the CBU lab. These laboratory supplies have added to the existing equipment at CBU and has thus smoothened most of the lab operations that may not have taken place in the absence of project support. JK: Procurement of lab appliances, chemicals and consumables. Supplies ordered in UK for export to Zambia. Supplies ordered in Zambia during first training meeting. Further supplies ordered from UK on return to UK following discussion with CBU lab users and Dean of Natural Resources. CBU lab now equipped to conduct all aspects of orchid propagation from seed in vitro. Also equipped for orchid seed cleaning and storage, plus handling de-flasked orchid seedlings in the CBU greenhouse.
Activity 2.2 3xCBU technical staff (≥9 other conservation practitioners) trained in greenpod orchid seed harvest and sowing, and general orchid cultivation (Workshop 2) for dissemination to rural communities (in Activity 1.5).		HC: An intense 5 day course given, designed to enable the attendees to prepare suitable tissue culture media starting ground up with basic ingredients to formulate stock solutions, which were then used to prepare sowing media. Items that were not obtainable timeously for the course was supplied by myself. These included all the stock solution salts, agar, culture vessels, working paper, capsules for storing pollen and stainless steel rack for cooling of flamed-off tools. Four separate PowerPoint presentations were given to expound on methods to be taught, as well as looking at other laboratories and their techniques. Deciduous orchid habitats were also presented, in order to obtain a clearer understanding of growing requirements of these orchids. Practical skills on lab management, record keeping, culture vessel maintenance and general lab hygiene were also addressed. Sources of fungal and bacterial contamination and how to address such outbreaks were also addressed. Skills for working at a laminar flow bench were taught individually to obtain minimum contamination with any future planned in vitro work. Specifically greenpod sowing was taught with fresh greenpods obtained, - 42 seedpods were sown on prepared culture vessels of which 2 species are chikanda species. Material was accessioned and given CBU lab codes. General re-plating of orchid material at the laminar flow bench was also taught for future re-plating once seed starts germinating. Optimum timing for harvesting greenpods as well as collecting and storing pollen was taught. Hardening off methods were addressed, as well as

		improving culture of mature plants in the greenhouse. The next stage is the re-plating of young seedlings after germination has taken place. If germination happens as wished for barring any unknown dormancy factors, first re-plating should happen within the 8-12 weeks after germination. As general re-plating was demonstrated, this should be able to be done with communication via email, etc. For deciduous orchids such as chikanda orchids, re-plating every 8-12 weeks till such time that the tubers are of a large enough size will need to be done. Once a suitable size for hardening off has been achieved, the actual hardening off is the next critical stage where great losses (plant deaths), can be incurred if done incorrectly, risking the collapse of the whole project.
Activity 2.3 3xCBU technical staff (≥9 other conservation practitioners) trained orchid seed banking and viability testing, and orchid seed bank established at CBU (Workshop 3).		*[Activity scheduled for April 2017].*
Activity 2.4 3xCBU technical staff (≥9 other conservation practitioners) trained in IUCN Red List and rapid conservation assessment methods (Workshop 1; see 3.1).		RB and SH: Assessment of species extinction risk was hampered by the paucity of distribution data (from herbarium specimens). This information is not readily available for Zambian orchids and there are no experts available to define species ranges with certainty. While the network was trained (and participants are qualified Assessors) there was no agreement for those on the course to assess species post workshop. An internship position is being advertised at RBG Kew – if a candidate is hired, the intern will mobilize RBG Kew specimen data to support continued Red List effort in Zambia.
Output 3. **3. Knowledge:** Understanding of orchid identity, rarity, cultivation and traditional utilization practices incorporated into Chikanda orchid conservation plan.	3.1 Traditional, local utilization practices of the 20 most commonly harvested Chikanda orchid species documented by end Yr 1. *[Please refer to Ethics Statement].* 3.3 In-depth study of seed germination requirements completed for high risk species (from "top-10" list), enabling in-country ex situ conservation and species recovery (contributing to GSPC Targets 3 and 8), by end Yr 2. Includes collection of 250 root samples 3.5 Molecular data gathered for ≥200	RB: Traditional use was recorded during the baseline survey by CBU (see Annex 4 for full report and documented use of four categories of Chikanda orchids). KY: Putative mycorrhizal fungi isolated from live orchid root collections. SV: A total of 83 interviews (9 harvesters, 45 middlemen, 29 vendors) have been

	samples of traded wild orchid tubers and derivatives, collected (by MSc student) from markets in ≥2 urban centres in Zambia for identification at Uppsala University, Sweden, by end Yr 1.	performed at 34 markets and collection sites in 3 Zambian provinces (Copperbelt Province, Central Province and Lusaka). 48 collections of fresh or dried tubers, chikanda cake and ground orchid flour have been made, each containing 1 to >100 tubers. Molecular data has been obtained for >230 tubers.
Activity 3.1 Participatory orchid management plan (Activity 1.6) agreed for rural, community-managed resources, incorporating local traditional knowledge.		RV: This activity is yet to take place. This activity will only take place by end of 2017 once the communities have been trained.
Activity 3.3 Fungal symbionts of "10-ten" orchids sampled from the field, isolated, identified and cultured (with full voucher specimens).		KY: Field collection (Jan-Feb 2017): 52 collections of root material, including 30 orchid species/ 9 genera from 11 localities (Excel spreadsheet) Fungus isolation (Feb-March 2017): >1500 fungal isolates cultured from orchid roots, of which ca.450 isolates of putative orchid mycorrhizal fungi (OMF) by morphology, from 30 collections/24 species (Excel spreadsheet)(photo of mycelium) (Onwards) Putative OMF to be identified by DNA sequencing. Confirmed OMF to be used for germination and growth tests with Chikanda orchid seeds.
Activity 3.7 Chikanda orchid tubers and processed Chikanda cake sampled from urban markets for identification using molecular barcodes.		SV: 62 tubers have been identified. Results so far show the presence of orchids from 4 genera: *Disa*, *Satyrium*, *Habenaria* and *Brachycorythis*. All lab work is expected to be finished by the end of May 2017. DNA from chikanda cakes and orchid flour was extracted and has been used for High-Throughput Sequencing using IonTorrent PGM in March 2017. Results are currently being analysed.
Activity 3.8 Four molecular markers sequenced for ≥200 samples of traded wild orchid tubers and derivatives.		SV: So far sequences have been obtained for 3 out of 4 molecular markers: ITS, rbcL and matK. Mixtures (chikanda cake and orchid flour) was analysed using ITS1 and ITS2.
Activity 3.9 MSc thesis and paper(s) prepared.		SV: The MSc thesis is expected to be finished by the end of June 2017. Subsequently, a research paper will be prepared for submission. So far an article about the ongoing chikanda research has been written by the BBC: http://www.bbc.com/earth/story/20161123-there-is-a-snack-food-that-is-mostly-made-out-of-orchid
Output 4. **4. Awareness:** Communication and environmental awareness strategy developed and implemented.	4.1 a) All participating local communities (traditional leadership, headmen, households, government agencies) are aware of the project purpose. 4.1 b) Environmental awareness strategy leading to 60% of	RB & RV: The CBU team have consulted traditional leaders, completed baseline studies and convened focus groups in the project area. Additional activities are planned for August 2017.

	the commodity groups aware of the negative environmental implications of their orchid harvesting methods by 2nd Quarter of Yr 2. 4.3 a) Strong communication channels established with CITES (Zambian Wildlife Authority) and CBD (Director of Environment) focal points by mid- Yr 1; 4.3 b) >20 senior conservation practitioners aware of project activities and early outputs by end Y1; 4.3 c) >40 conservation practitioners aware of project activities by project end (in addition to workshop participants).	RB: Dr. Rhoda Kachali, Senior Ecologist at the Department of National Parks and Wildlife (the CITES authority for Zambia) invited the PL to give a departmental presentation during fieldwork (3rd of February 2017), attended by ten ecologists and national park rangers. Communication channels have been established with a range of other stakeholders. The bi-annual project newsletter (Annex 4) is circulated to Workshop participants, Biodiversity Convention focal points (see Section 5), and made available via our project Facebook page, where it is promoted by others (e.g. the IUCN Orchid Specialist Group).
Activity 4.1 Communication and environmental awareness strategy developed and implemented in rural communities through participatory meetings (required for all Output 1 activities).		RV: Awareness raising meetings were conducted in nine villages across the project area in October 2016 and March 2017. Communities were sensitized on project activities and their roles in the benefit. Government officials were also made aware of the project.
Activity 4.6. First results of wildlife "forensics" study (DNA bar-coding) communicated in a report/ article written, directed at CITES officer and legislators		SV: Once the analyses of the chikanda mixtures and the identifications of the remainder of the chikanda tubers have been performed a summary report will be written to inform CITES officers and legislators. Presumably by the end of July 2017.

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

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: (Max 30 words) Vulnerable rural livelihoods enhanced, and threatened wildlife resources protected, by community-governed resource management practices, supported by in-country conservation biotechnology expertise and demand for sustainable products from environmentally aware populations.			
Outcome: (Max 30 words) Sustainable orchid harvest, cultivation and conservation adopted in poor Zambian communities, providing improved livelihoods and security for women, and enhanced local and national governance of wetland genetic/species diversity.	0.1 Women from ≥600 participating households in 2 Districts engaged in CBNRM scheme, reporting 30% increase in household income from sustainable natural-resource products, and 40% reduction in school absenteeism by end Yr 3. 0.2 a) ≥40% of participating CBNRM households gaining access to cultivated orchid stock and techniques training for household nurseries by end Yr 3. 0.2 b) Resources and skills increased for ≥12 conservation practitioners, cascading to ≥40 by end Yr 3 enabling ex situ conservation and cultivation of orchids (implementation of GSPC). 0.3 For 20 of the most commonly traded Chikanda orchid species, and 10 of the rarest: understanding of identity, traditional use and cultivation requirements documented by end Yr 3. 0.4 Communication and environmental awareness strategy implemented providing increased awareness of	0.1 Orchid conservation action plan (incorporating traditional utilization, agreed sustainable harvest measures and identified supplementary income streams); community surveys to record average income at project start (Yr 1) and close (Yr 3); local school attendance registers (comparison between Yrs 1 and 3). 0.2 Community surveys (Yrs 1 and 3) and project reports; workshop attendance application forms and certificates; photo essay of CBU lab facility development; collections database of CBU seedlings/ plants. 0.3 Orchid conservation plan; community surveys and meeting minutes; scientific papers and presentations; collections databases. 0.4 Community surveys and interviews;	No breakdown in communication or change of priorities between UK lead and collaborating institutes. *Mitigation for this IA*: Strong foundation for all project partnerships from outset with regular communication (email/ Skype/ meetings). Strong individual and institutional commitment to project aims from main partners. Edible orchids can be successfully cultivated and tubers obtained for harvest. *Mitigation for this IA:* We have access to a wide range of expertise at Kew and from a specialist growers and conservationists, using a range of methods. The genus *Disa* will be our first priority due to ease of seed germination and some taxa growing from stolons (that rapidly give rise to new tubers). [Please refer to cover letter, and supporting documents from Hildegard Crous for "Proof of Concept"].

	environmental implications of orchid harvesting: Among ≥600 rural households in participating communities; ≥40 conservation practitioners; ≥60 urban school children (and their families).	qualitative data from interviews and social media entries; bi-annual newsletter and Darwin reports; correspondence with focal points; updated of plant conservation capacity (skills and resources) reported to Contact Officer for CBD and NBSAP, for incorporation in national reports.	
Outputs: **1**. **Mitigation:** Sustainable resource management practiced, securing livelihoods for women in poor rural communities.	1.1 Number of households practising destructive harvest methods reduced (from baseline measured in Yr 1) by 60% by Yr 2, and gaining access to supplementary cultivated Chikanda plants for household nurseries by Yr 2. 1.2 a) Household income increased (from baseline measured in Yr 1) by 30% in Yr 3 through adoption of supplementary sustainable income streams (cultivated Chikanda and other sources). 1.2 b) School absenteeism reduced (from baseline measured in Yr 1) by 40% in Yr 3 due to increased household income, and reduced pressure on school-age children to participate in Chikanda harvest. 1.3 Orchid tuber waste reduced at entry to supply chain (due to reduced harvest of juvenile material) from baseline in Yr 1, by 30% in Yr 3.	1.1 a) Community surveys and participatory meetings* (comparison between Yrs 1 and 3). 1.1 b) Minutes of Commodity groups and village conservation clubs* 1.1 c) Illustrated manual describing best practice, following consultation with harvesters/ the community.* 1.2 a) Community surveys* to record household income (comparison between Yrs 1 and 3); recorded interviews* for qualitative data; newspaper article or newsletter entry. 1.2 b) School attendance registers, and community surveys* (comparison between Yrs 1 and 3). 1.3 Qualitative data (interviews*) reporting positive/ negative trends. *<u>For all Outputs: all meeting attendance records, survey data and interview</u>	Identifying communities/ individuals willing to participate, and gaining free, prior and informed consent from Chikanda harvester and trader communities/ individuals for all initiatives and activities. *Mitigation for this IA*: Project partners (Dr. Royd Vinya's team and Sanga R&D) have considerable experience in participatory community based natural resource management in Zambia, in both rural settings, and urban market places. This includes (in rural settings) sensitivity to traditional community hierarchies and language skills.

		participation aggregated by gender, and data gathered and shared in line with our Ethics Statement.	
2. Capacity: Both local level community capacity AND conservation practitioner capacity increased to: Manage wild orchid populations; enhance delivery of CBD (GSPC Objectives); and facilitate implementation of CITES legislation for plants.	2.1 1,000 asymbiotic seedlings cultivated for supplementary plantings or household nurseries, by end Yr 1, rising to 5,000 by end Yr 2. 2.2 By end Yr 2, 40% of the participating community households are cultivating orchid germplasm supplied by the CBU laboratory. 2.3 By end Yr 1, specialist plant conservation skills base increased to ≥12 individuals (3xCBU staff and ≥ nine other conservation practitioners) [IUCN Red List, orchid conservation biotechnology methods and augmented with seed banking]. 2.4 Increased resources for classical and molecular identification of traded taxa, from 0 specimens to ≥ 150, by end Yr 2 (two field collection seasons). 2.5 Increased accessibility to orchid identification tools by end Yr 2, to support implementation of CITES for plants [target for ≥20 species of the most commonly traded Chikanda orchid species, and ≥5 species from the "Top-	2.1 CBU collections database (available online); laboratory reports; blog posts and photographs to project website. 2.2 Training workshop reports, local level community meeting minutes, work plans, and quarterly reports. 2.3 Attendance certificates, attendance lists and workshop reports. 2.4 Collections data retrievable via free, online* data repositories; project reports; scientific publications and/ or conference proceedings. [When sufficient material is available, collections will be duplicated at RBG Kew and University of Uppsala]. **Detailed specimen locality data will be obscured to protect rare species from exploitation. Ethnobotanical & traditional knowledge data will be safeguarded in line with our Ethics Statement.* 2.5 Interactive key made available online and number of views/ downloads tracked by Google analytics. Informal	Local communities willing to adopt new methods. *Mitigation for this IA:* There is an identified need from communities seeking to gain control over the resource in household nurseries. The communities will be involved from the outset, and will inform the conservation plan to ensure that traditional use is respected alongside new cultivation methods. The real potential for increased income (both from sustainable management and cultivation, and additional income streams) are strong incentives for participation and willingness to adopt methods. Infrastructure and need identified, enabling specialist methods/ skills from training workshops to be applied by participants. *Mitigation for this IA:* Attendance of specialist training workshops is prioritised for 3 core staff at CBU who have been assigned to the project (CBU that has pledged institutional commitment to the project). Additional places at workshops will be assigned

	10" rarity list]. 2.6 First symbiotic seedlings (5,000) of Zambia's 10 rarest Chikanda orchid species made available for in-country ex situ conservation and species recovery plans by end Yr 3. [A foundation towards future work by CBU staff to begin symbiotic seed culture in-house].	interviews with users of key reported (annual DI report). 2.6 RBG Kew and CBU collections databases (available online); blog posts and photographs to project website; Darwin Project report.	competitively, based on the capacity (existing resources, skills and institutional remit) available that enable the prospective participants to make immediate use of the methods/ skills and who have potential to cascade to their teams. Users can access the internet. *Mitigation of this IA:* Mobile internet connections are widely used in Zambia (via portable USB "dongles", e.g. MTN Fastlink). The interactive key can also be downloaded for use offline. The illustrations from the key, and described spot ID characters, can be re-purposed for hard-copy pamphlets/ posters. Fungal symbionts can be found and host orchid species identified (see mitigation for IA 3.2). Seeds of the target taxa are gathered and delivered to RBG Kew for culture. *Mitigation for this IA:* At least one in-country project partner will participate in fieldwork for collection of target taxa fungal symbionts, ensuring follow-up seed collection is accurate and timely.
3. **Knowledge:** Understanding of orchid identity, rarity, cultivation and traditional utilization practices incorporated into Chikanda orchid	3.1 Traditional, local utilization practices of the 20 most commonly harvested Chikanda orchid species documented by end Yr 1. *[Please refer to Ethics*	3.1 Survey reports. Orchid conservation plan (incorporating local utilization practices).	Electricity "load shedding" causing disruption to power supply in Zambia and reduces computing and internet access.

conservation plan.	*Statement].* 3.2 a) Preliminary, rapid Red List assessments completed for the three target Chikanda genera (100 species) by end Yr 1. 3.1 b) A "top-10" of the most endangered species identified for in-depth research and ex situ conservation, by end Yr 1. 3.3 In-depth study of seed germination requirements completed for high risk species (from "top-10" list), enabling in-country ex situ conservation and species recovery (contributing to GSPC Targets 3 and 8), by end Yr 2. Includes collection of 250 root samples 3.4 First seed storage information and viability testing data available for Chikanda orchids of Zambia (completed for 30 species), by end Yr 3. 3.5 Molecular data gathered for ≥200 samples of traded wild orchid tubers and derivatives, collected (by MSc student) from markets in ≥2 urban centres in Zambia for identification at Uppsala University, Sweden, by end Yr 1.	3.2 List of "Top-10" most at risk orchid species included in Darwin Project Report, press releases, the project website and a short popular press article. 3.3 a) Species-specific seed germination protocols delivered to project partners towards development of Conservation Action Plans for the "Top-10" species most at risk. 3.3 b) Field records and associated herbarium vouchers, for number of root samples gathered. Laboratory records (reports/ database) for accessions of fungal isolates, cryopreserved specimens and symbiotic orchid seedlings cultured in vitro. 3.3 c) Results presented in an academic paper submitted for peer review and open access publication, and at least one scientific conference. 3.4 CBU collections database (available online). 3.5 MSc thesis, scientific paper and article in Traffic Bulletin (for Traffic, the wildlife trade monitoring network).	*Mitigation for this IA:* Conservation assessments will be completed during a rapid participatory workshop, reducing dependence on long-term use of online resources. Fungal symbionts can be found and host orchid species identified. *Mitigation for this IA:* The team member leading this work programme has considerable relevant experience, most recently working on the successful Madagascar Orchid Conservation Project (RBG Kew) in challenging field conditions. Herbarium vouchers and material for DNA extraction will be gathered to enable classical and molecular ID of host orchids. MSc student can be recruited and gain access to the markets. *Mitigation for this IA:* The MSc supervisors have recruited several past students and completed a complementary study (using similar methods) in Tanzania. The MSc student will be supported by in-country collaborators for the market surveys, who bring participatory meeting and local language skills.
4. Awareness: Communication and environmental awareness strategy developed and implemented.	4.1 a) All participating local communities (traditional leadership, headmen, households, government	4.1 Copperbelt University project quarterly reports (sensitization workshop report); Communication and	Communities will want to engage (Please see box 2 for mitigation).

	agencies) are aware of the project purpose. 4.1 b) Environmental awareness strategy leading to 60% of the commodity groups aware of the negative environmental implications of their orchid harvesting methods by 2nd Quarter of Yr 2. 4.2 Increased awareness of traded Chikanda waste management options among traders in 3 urban markets by mid- Yr 2. 4.3 a) Strong communication channels established with CITES (Zambian Wildlife Authority) and CBD (Director of Environment) focal points by mid- Yr 1; 4.3 b) >20 senior conservation practitioners aware of project activities and early outputs by end Y1; 4.3 c) >40 conservation practitioners aware of project activities by project end (in addition to workshop participants). 4.4 Public awareness increased (of vulnerable rural livelihoods, plant conservation and DI project) with minimum of 60 school children (+ families) participating in an education/ outreach exhibition in a major urban area, by end Yr 2.	environmental awareness strategy document. 4.2 Market survey results and value chain analyses report; recorded interviews for qualitative data; newspaper article or newsletter entry; pamphlets from Sanga R&D advising on best practice for Chikanda (available among traders and marketing associations). 4.3 a) Correspondence. 4,3 b) Meetings recorded in DI report(s). 4.3 c) Wildlife "forensics" article made available. 4.2 d) Outcomes regularly communicated throughout project cycle, Yrs 1-3, via bi-annual project newsletter. 4.3 e) Final report delivered to CBD and NBSAP focal point (Contact Officer). 4.4 Press releases and radio broadcasts; social media posts (e.g. Kingsmead-Zambia Link Facebook Page); promotional materials featuring project from Plantlife International; entry in bi-	Focal points will want to engage. *Mitigation for this IA:* The PI and other project partners (CBU) have worked with the focal points in the past and have made them aware of proposed project. In addition, we have contacted the FCO who are involved in lobbying on environmental issues in Zambia. Schools will want to participate. *Mitigation for this IA*: One high school (Helen Kaunde School, Kitwe) has already been approached by the PI (in 2013) and the idea was warmly received. In addition this is one of two schools in Kitwe that participate in a UK-Zambia cultural exchange programme (>15 exchanges completed). The PI has secured advisory support from the Rwandan Orchid Schools Project (led by Writhlington Orchid School, UK and Kitabi College for Conservation and Environmental Management, Rwanda), and Plantlife International.

		annual project newsletter.	

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

1.1 Baseline study completed on current wild resource management of Chikanda orchid tubers (harvesting practice, handling and storage).
1.2 Local supplementary sustainable income streams identified.
1.3 Baseline & repeat studies of household income and school attendance (Yrs 1 and 3).
1.4 Local-level enterprises and institutional structures established (to support production and trade of cultivated orchids).
1.5 Training needs for local communities for orchid management, storage of tubers, and cultivation assessed.
1.6 Participatory orchid management plan (including handling and storage of harvested tubers) formulated and implemented.
1.7 Cultivated orchid stock distributed to participating households.
1.8 Survey of changes in harvesting practice of Chikanda orchid tubers.

2.1 CBU lab equipped for orchid culture; 3xCBU technical staff trained in asymbiotic orchid seed germination and culture methods.
2.2 3xCBU technical staff (≥9 other conservation practitioners) trained in greenpod orchid seed harvest and sowing, and general orchid cultivation (Workshop 2) for dissemination to rural communities (in Activity 1.5).
2.3 3xCBU technical staff (≥9 other conservation practitioners) trained orchid seed banking and viability testing, and orchid seed bank established at CBU (Workshop 3).
2.4 3xCBU technical staff (≥9 other conservation practitioners) trained in IUCN Red List and rapid conservation assessment methods (Workshop 1; see 3.1).
2.5 Reference Collection & Tissue Bank (orchid specimens) established for DNA extraction and identification of traded species using molecular markers.
2.6 Multi-access illustrated orchid identification key created using Lucid software and made available for download in Google Play Store.
2.7 Symbiotic seedlings (5,000) of ten of the rarest Chikanda orchid species cultured at RBG Kew, for in-country ex situ conservation and species recovery plans.
2.8 Symbiotic seedlings repatriated to Zambia (CBU ex situ conservation facility).

3.1 Participatory orchid management plan (Activity 1.6) agreed for rural, community-managed resources, incorporating local traditional knowledge.
3.2 Workshop 1: Participatory IUCN Red List and rapid assessment workshop completed.
3.3 Fungal symbionts of "10-ten" orchids sampled from the field, isolated, identified and cultured, with full voucher specimens.
3.4 Follow-up seed collection completed for target taxa and seeds dispatched to RBG Kew for symbiotic culture.
3.5 Orchid seed viability testing undertaken during orchid seed collection phases.
3.6 Open access paper submitted for publication, and conference/ symposium presentation delivered.
3.7 Chikanda orchid tubers and processed Chikanda cake sampled from urban markets for identification using molecular barcodes.
3.8 Four molecular markers sequenced for ≥200 samples of traded wild orchid tubers and derivatives.

3.9 MSc thesis and paper(s) prepared.

4.1 Communication and environmental awareness strategy developed and implemented in rural communities through participatory meetings (required for all Output 1 activities).

4.2 Biodiversity Convention national focal points aware of project through correspondence and meetings with project leader and partners.

4.3 Market survey and supply chain analysis completed in 3 urban areas: Lusaka (Soweto market), Ndola (Masala) and Kitwe (Sokoine).

4.4 Pamphlets produced and made available to traders/ market associations with recommendations on improved Chikanda handling and storage.

4.5 Bi-annual project newsletter circulated.

4.6 First results of wildlife "forensics" study (DNA bar-coding) communicated in a report/ article written, directed at CITES officer and legislators.

4.7 Report delivered to CBD and NBSAP focal point (Contact Officer) detailing facilities, resources, and skills available for implementation of GSPC Objectives, in preparation for 6th CBD Report and updated 1999 NSBAP.

4.8 Public awareness programme completed: "Patchwork Meadow" programme integrated into existing UK-Zambia cultural-educational exchange programme, culminating in a public exhibition.

4.9 Field trip to orchid habitats with workshop on plant ID (using interactive key tool); visits by local school groups to CBU orchid conservation facility, to learn lab methods (with advice from the Rwandan Orchid Schools' Project).

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
4A	MSc internship	M	South-Korean	34				
4B	Orchid/fungal isolation/culture training workshop (Sept. 9-22, 2016)	3 male	Zambian	2				1
4B	IUCN Red List Assessor training workshop (Oct. 3-7, 2016)	4 female 8 male	7 Zambian; 1 South African; 2 British; 2 American (all Zambian residents)	1				1
4B	Greenpod orchid seed micropropagtion training workshop (Mar. 20-24, 2017)	1 female 5 male	Zambian	1				1
14A	Seminar at Dept. National Parks & Wildlife (Feb. 3, 2017)	4 female 7 male	Zambian	1				

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)
Chikanda Orchid Conservation Initiative Newsletter*	Newsletter	Nicholas Wightman (PM), Issue 1, 2016.	M	Zambian	Self-published	https://www.facebook.com/chikandaorchidconservation/
Orchid Hunters and Orchid Cake Eaters*	Magazine article	Ruth Bone (PL); 2016	F	British	Royal Hort. Soc.	
There is a snack food that is mostly made out of orchid	Magazine article (online)	Susanne Masters; 2016	F	British	BBC	http://www.bbc.com/earth/story/20161123-there-is-a-snack-food-that-is-mostly-made-out-of-orchid

An appetite for orchids*	Magazine article	Stephanie Pain; 2017	F	British	RBG Kew	RBG Kew

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

Please see separate folder for Annex 4 contents.

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.	NO
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.	