Darwin Initiative Main Annual Report

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

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

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Darwin Project Information

Project reference	25-023
Project title	Conserving Rosewood genetic diversity for resilient livelihoods in the Mekong
Country/ies	Cambodia, Lao PDR, Thailand, Vietnam
Lead organisation	University of Oxford
Partner institution(s)	Bioversity International (Malaysia) Institute of Forest & Wildlife Research & Development, Cambodia Forest Science Research Center, National Agriculture & Forestry Research Inst., Lao PDR Forest Genetics & Conservation Dept, Center for Biodiversity & Biosafety, Vietnam Academy of Agricultural Sciences University of Copenhagen, Denmark
Darwin grant value	GBP 409,897
Start/end dates of project	1/7/2018-31/12/2021
Reporting period (e.g. Apr 2020 – Mar 2021) and number (e.g. Annual Report 1, 2, 3)	April 2020 – March 2021 Annual Report 3
Project Leader name	Prof. John MacKay
Project website/blog/social media	http://www.apforgen.org/initiatives/conserving-dalbergia
Report author(s) and date	John MacKay, David Boshier, Riina Jalonen, with input from partners Dr So Thea, Mr Syneath Sreng (Cambodia), Mr Bansa Thammavong, Mr Chaloun Bounithiphonh (Lao PDR), Dr Tran Thi Hoa (Vietnam) 30/4/2021

1. Project summary

Rosewood (*Dalbergia* spp.) is an extremely valuable timber. Over-exploitation has significantly reduced most species in their natural range, with rapid depletion of Siamese (*Dalbergia cochinchinensis*) and Burmese (*D. oliveri*) rosewoods in Cambodia, Laos, Myanmar, Thailand and Vietnam. Trees are largely restricted to protected areas, but illegal harvesting, even of roots, continues. Associated forest degradation compromises rural livelihoods (60-80% of population, except Thailand). Problems related to rosewoods were identified by national organizations (forestry, conservation, police). CITES CoP17 placed the *Dalbergia* genus on Appendix 2, imposing restrictions on international trade. IUCN identified a need to better define and understand conservation status through research on population size, distribution and trends. Across the Greater Mekong Subregion, country-identified limits to conservation efforts include: 1) limited capacity to generate livelihood benefits for and by local communities from forest restoration, 2) lack of information about remaining populations and their conservation value; 3) limited capacity and lack of cross-country collaboration to establish a network of conservation units that effectively conserves genetic diversity; 4) acute lack of *Dalbergia* planting material.

Community nurseries are popular in restoration, but livelihood benefits for women and men are constrained by lack of attention to seed sources, germplasm quality and market linkages. Research shows community nurseries and restoration of endangered species are particularly susceptible to genetic bottlenecks through poor collection practices. Low genetic diversity can lead to low seed production, reduced survival and growth, compromising both current and future use, conservation and adaptation.

Our (gender-equitable) approach is complementary to legal structures (national/international), to ensure *Dalbergia* genetic resources are conserved for the future while available and used by the region's communities. Illegal logging is associated with violence against government officials and local people and cannot be addressed for security reasons, though cross-country action on species conservation may facilitate greater collaboration to combat illegal trade in rosewoods.

Strengthening community participation in biodiversity conservation is a stated policy goal of each country partner, however, limited progress has been made on this front, partly because of a lack of tangible incentives for local forest-dependent communities. The project is implemented within the framework of National Forest Policies and National Biodiversity Strategies and Action plans, to support existing efforts and targets in the project countries. The project is active through country partners and local communities within the natural distribution of three *Dalbergia* rosewood species (*Dalbergia cochinchinensis, D. cultrata, D. oliveri*) in three Greater Mekong Subregion countries (Cambodia, Lao PDR, Vietnam).

2. Project partnerships

The project arises from and contributes to the activities of an existing regional network APFORGEN (the Asia Pacific Forest Genetics Resources Program). National Coordinators of the member countries selected species conservation and seed production strategies as objectives in the network's new 5-year strategy (see www.apforgen.org). They selected *Dalbergia* as one of three priority genera to develop collaborative research and conservation strategies, identify synergies and address gaps for more effective conservation outcomes and use of threatened resources. The project was jointly developed by all partner institutions, with the University of Oxford and Bioversity International facilitating the process. All partners participated in the inception and further workshops in years 2 and 3, and were fully involved in shaping the detail of planned activities (see Year 3 workshop report Annex 4.1). Partners have identified and chosen the communities and areas to work in, as well as sites for collection and trial establishment.

In the present reporting year, we made administrative and financial changes to our partnership as outlined below (A-C). Change requests were submitted to and approved by the Darwin Initiative administration (see Annex 4.2). As a result of these changes new funding letters have been agreed between the University of Oxford and each of the partners receiving funds in Y3 and Y4 of the project.

A. (Administrative Change). Extend the project duration by 9 months (1 April to 31 December 2021) to complete activities delayed by the Covid-19 crisis.

We prepared an updated work plan indicating how and when we intend to complete the activities in our approved log frame. No new activities were added.

The main changes concern extending or postponing the following:

(1) Completion of the postponed fieldwork and administrative procedures for the establishment and monitoring of in situ and ex situ conservation units, and of provenance trials, in the project countries. Trials require active management for a minimum one year after planting to ensure good survival rates.
(2) Final household surveys, training activities, engagement activities with local communities that will be run in the project countries; the preparation of project outputs that need data and results from delayed activities.
(3) Public communication (including scientific presentations) and outreach activities, some of which are linked to international conferences that have been postponed to Y4 of the project.
(4) Final project workshop and local dissemination activities presenting the project outcomes and discussing further uptake.

B. (Administrative Change). Drop direct funding of the Thailand partner and reallocate funds to other partners.

Negotiation with the Thailand partner represented an ongoing challenge from the beginning of the project; therefore, we were unable to transfer any funds to them. In Y1 their funds were reallocated to Oxford and used to support the project leader's time on the project. In Y2 the funds were unused. The reallocation of the Y3 funds for the Thailand partner is included in the financial change below.

C. (Financial Change). Move funds from 2019-20 and 2020-21 to 2021-22 and make changes to their allocation due to the Covid-19 crisis.

We requested to reserve part of the Y3 funds for and use them in Y4. The revised work plans and the spread of funds across Y3 and Y4 have resulted in changes between budget lines. The funds planned for the Thailand partner were £[redacted] for Y2 and Y3, and have been reallocated to Y4 as follows: £[redacted] to support ongoing activities by partners in Cambodia, Lao PDR, and Vietnam, and £[redacted] for travel and consultancy for the Bioversity team, £[redacted] for travel for the Oxford team.

3. Project progress

3.1 Progress in carrying out project Activities

Output 1: Regional assessment of the conservation status of *Dalbergia cochinchinensis, D. oliveri* and *D. cultrata*

Activities 1.1 – 1.5 were completed during Years 1 and 2.

Activity 1.6 Populate database with collected data

- The database is now operational at www.tree-diversity.org. Users can view current and predicted future distributions of the project's target species under different climate scenarios, and compare the distributions e.g. with land cover, protected areas and forest plantations.

Activity 1.7: Identify conservation priorities through comparison of distribution, threat, and socioeconomic data, existing collections, strengths of past initiatives

- Species distribution modelling and threat assessments show that depending on the species between 27% and 40% of the species ranges are priority areas for restoration, due to overexploitation, fire, grazing and land use change. Although 11-18% of the species' predicted ranges fall within existing protected areas, only 6-9% of the ranges were identified as low threat areas, indicating that the species need additional conservation measures, including within protected areas. *Dalbergia oliveri* was found to be the single most vulnerable species to climate change, predicted to lose 32% of its

current habitats by 2050. *Ex situ* conservation is, therefore, particularly important for this species to prevent the loss of its genetic resources. A policy brief was prepared to summarise the findings of the regional conservation assessment (Annex 4.3).

Output 2: Filling gaps to conserve *Dalbergia* genetic resources through *in situ*, *ex situ* programmes and provenance testing

Activity 2.1: Identify locations for conservation units in collaboration with stakeholders & between countries, to ensure sustainability & complementarity

- In Lao PDR in consultation with District Agriculture and Forestry Offices, 4 sites were identified for establishing 5 *in situ* and 5 *ex situ* conservation units. In Nong district, consultation was on a 2 ha *ex-situ* site for 1,500 *D. cochinchinesis* and 300 *D. cultrata* seedlings and a 5-10 ha area for *in-situ* conservation in Labaokhok village (*D. cochinchinesis* and *D. cultrata*). In Thapangthong district, 1,500 seedlings of *D. cochinchinesis* and 250 of *D. oliveri* and *D. cultrata* were prepared for planting in 2-3 ha to establish *ex-situ* units, with an *in-situ* site proposed for 15-28 ha in Daensatueng village sanctuary forest (nearby project site with mature *D. cochinchinensis, D. oliveri and D. cultrata* trees).
- In Vietnam an *ex situ* conservation site for *D. cochinchinensis* with 600 seedlings was planted in the Chu Mom Ray National Park in August 2020 (5x5m spacing), protected with fencing and onsite publicity provided through a notice board.
- In Cambodia the project supplied equipment to facilitate patrols of the *in situ* unit (see Figure x, Section 13), while two of the three *ex situ* units were established.
- The China group finished a genome survey and assembly for *D. cultrata* and developed 24 microsatellite markers to assess genetic diversity and mating system in *D. cultrata* in Chinese populations. Papers based on this research are being prepared and have been submitted to peer review journals.

Activity 2.2: Develop institutional arrangements and management guidelines, including material transfer agreements for regional trials

- Revised funding letters are in preparation by Oxford to capture the extended timeframe, budget and workplan changes approved by the Darwin Initiative administration.
- Ad-hoc communication between project partners has been faciliated through the establishment of a chat group using the Telegram app.

Activity 2.3: Develop and translate training materials, based on assessment of capacities (1.2) and new conservation strategies (2.2) (ending Y2 Q3) - completed in Y2 (see Y2 Annual Report)

Activity 2.4: Organise and run trainings (ending Y2 Q4)

- All planned trainings were completed in Y2 (see Y2 Annual Report). However, with the project changes, approved by DI administration, we aim to utilize these and other materials to develop online training. An online project meeting in Q1 yr 4 will discuss and agree the nature of the training opportunity, which will be implemented in Q2-3 of yr4.

Activity 2.5: Design and conduct seed collections among country partners

- This work planned for Y2 Q3/Q4 was completed on time in Cambodia, but delayed in Lao PDR and Vietnam owing to poor seeding and travel restrictions under COVID-19.
- In Vietnam although seed production was again low, collections were made in Q4/Y3 in Chu Mom Ray National Park from 5 *D. cochinchinensis* trees (200 seed) and *7 D. oliveri* trees (500 seed), with the quality of *D. cochinchinensis* seeds poor due to disease. 30 good seeds of both *D. cochinchinensis* and *D. oliveri* were shared with the Station for Biodiversity Research at the Institute of Ecology and Biological Resources (IEBR) for a new nursery and the Institute of Biotechnology (IBT) for development of a tissue culture technique for *ex situ* conservation (Vietnam Academy of Sciences and Technology) and other research on seed. The remaining seeds are kept at CMR for; i) on-site training for farmers on seed collection techniques, ii) sharing information to private nursey companies for future seed marketing, and iii) conservation at the Center for Biodiversity and Biosafety, Institute of Agricultural Genetics (VAAS). Populations will be monitored again in Y4, with new collections made if there is healthy seed production.
- Five populations (project and other potential sites) in the central and southern part of Lao PDR were monitored, with successful seed collections made for *D. cochinchinensis* in 3

of the populations in Y3 Q3. Monitoring of the 5 populations will continue in Y4 and if seed production is adequate, new collections will be made.

Figure1: Seed collection in Lao PDR

- Chinese partners implemented the following activities: monitoring growth in a half-sib progeny trial (33 half-sib families from Yunnan) of *D. cultrata* established in Fujian in spring 2019, with the aim of identifying superior individuals. A field trip revealed good conditions for *D. cultrata* fruiting, allowing increased seed collection in the spring 2021.

Activity 2.6. Establish provenance trials

- A *D. cochinchinensis* provenance trial (1ha, 3x3 m spacing) was established in July 2020 in Khun Ream commune (Siem Reap province, Cambodia) with 1024 seedlings planted from five provinces (Siem Reap, Kampong Thom, Pursat, Koh Kong, and Kampong Speu). Survival was 90% two months after planting, with hand weeding four times since planting. A barbwire fence was installed to protect the trial, with onsite publicity through a noticeboard (see photos below).

Figure 2: Cambodia provenance trial established in year 3

- In Lao, due to the pandemic, the trial could not be established as planned. However, the seedlings were being raised in a nursery (Q4,Y3) and planting has been rescheduled for March-June 2021 at FRC's research site of about 2 ha.

Activity 2.7: Evaluate progress and changes in knowledge and practices and communicate lessons learned

- There is an on-going activity of feedback and reflection by project partners. Monthly project meetings since May 2020 foster exchange of experiences between partners. An M&E Advisory Committee meeting (Y3 Q2) produced several recommendations on impact mapping and means to assess changes in knowledge and practice which have been discussed for implementation in the monthly project meeting.

Output 3: Multiplication to support use, income generation and reduced pressure on natural populations (propagation strategies, community nurseries etc)

Activities 3.1 and 3.3 – 3.7 were completed during Years 1 and 2.

Activity 3.2 Test D. cochinchinensis vegetative propagation method in other countries and Dalbergia spp. Test D. cochinchinensis vegetative propagation method in other countries and Dalbergia spp.

• Work on vegetative propagation was completed in Cambodia in Y2, however testing of these methods in Lao PDR planned for Y3 was postponed to Y4 due to Covid-19 travel restrictions.

Activity 3.8 Train & mentor community members in good seed collection practices, propagation (including vegetative propagation), tree nursery management, developing business plans & pursuing market linkages

- In Vietnam, a new nursery was established in Chu Mom Ray National Park by the Park staff and members of the local community, producing 600 *D. cochinchinensis* seedlings and some *D. oliveri* seedlings. Nine members of the local community, including 4 women, were trained in seed and seedling selection during the process.

Figure 3: Establishment of a community nursery in buffer zone of Chu Mom Ray National Park. Collection of *D. cochinchinensis* seed from Chu Mom Ray National Park conservation unit.

- In Cambodia, a farmer seed source was established on a local farmer's land in Pursat province, covering 0.45 ha. In total 195 grafted *D. cochinchinensis* seedlings were planted in July 2020, with a fence and noticeboard erected. The site has been regularly weeded with a survival rate of approximately 85% 2 months after planting[1]. Dead seedlings were replaced through on site-grafting, but this was not successful due to high dry season temperatures. The farmer also decided to establish a *D. oliveri* seed source and secured land and 150 seedlings to plant the seed source in the 2021 wet season (Q2/Yr4). Establishment is dependent on easing of Covid travel restrictions allowing seedling transport from Siem Reap to Pursat province.
- In Lao PDR, seed supply network were investigated and established in Q3 Y3 for 2 villages in Nong district and 2 villages in Thapangthong district, as well as 2 communities in Khamkuet district, Bolirkhamsay province (outside of target communities), through consultations with the District and Provincial Agriculture and Forestry Offices. An additional network was established outside the project site in Khamkuet district, Borlikhamsay province. In total 7 families were selected and trained in seed supply and collection.
- A pilot study to identify genetic bottlenecks in the seed supply for *D. cochinchinensis* in Lao PDR is being carried out by Bioversity International and the Forest Research Centre

[1] Current survival rate at the time of writing could not be accurately estimated by the project team because of Covid-19 related travel restrictions

of Lao (FRC). Seed was collected in October 2020 by FRC team from 6 populations in 4 provinces. Germination trials under nursery conditions showed low germination rate which was attributed to small population sizes at seed sources and likely impacts of inbreeding. The results underline the precarious situation for the species in Lao. A research paper will be prepared about the results in Y4.

Activity 3.9 Evaluate changes in seed production & value chains between communities & government & private sector nurseries, communicating lessons learned (Y2Q2 onwards)

- Research by a socio-economist, contracted at the end of Y2, to evaluate gender and social inclusion in seed supply chains had to be cancelled due to Covid-19 related travel restrictions. Questions to understand men's and women's participation in the project activities and the related benefits and constraints they experienced were integrated in the end-of-project household surveys. The surveys were designed in January 2021 and translated to national languages in each country. Data collection was started in Cambodia in March 2021 but had to be suspended due to a Covid-19 outbreak. Data collection in Lao PDR and Vietnam will be carried out in Y4, depending on Covid-19 restrictions.

Figure 4: Seed germination test for *D. cochincinensis* at Forest Research Centre, Lao PDR.

3.2 Progress towards project Outputs

Output 1: Regional assessment of the conservation status of *Dalbergia cochinchinensis, D. oliveri* and *D. cultrata*

Output 1 is completed with all indicators achieved. Expert-validated distribution and threat maps (Indicator 1.1) are freely available at the online database (www.tree-diversity.org, Indicator 1.2). Users can display and download data layers for analysis. A policy brief was prepared to communicate the results of the regional conservation assessment (Indicator 1.3/1.4) (Annex 4.3). Genomics research at Oxford to fill knowledge gaps of adaptation in *Dalbergia* produced two peer-reviewed articles (on stress response and transcriptome analysis, respectively), which are published and highlighted on the project website. A landscape genomic study with 800 samples from the Mekong sub-region is being processed for DNA analysis, and a high-quality genome assembly has been developed for *Dalbergia cochinchinensis* (Indicator 1.3/1.4), with further work planned to compare growth and stress responses across populations.

Output 2: Filling gaps to conserve *Dalbergia* genetic resources through *in situ*, *ex situ* programmes and provenance testing

Indicator 2.1 At least 23 new in situ/ex situ conservation units for 3 Dalbergia spp across 4 countries (units may overlap between species) ***(end Q3, yr 3)***

Based on the results of surveys (see activity 2.1 yr2 report) and discussions at the yr2 annual workshop, the figure of 23 new conservation units in total, across the three target species and four countries appeared achievable. However, the inability of the project to operate on the ground in Thailand (see yr 2 report) meant that the figure would have to be achieved across 3 countries.

The Covid-19 pandemic has delayed work on some conservation units and evidence from the field of low/no seed production in Lao and Vietnam (see activity 2.5) has meant that some *ex situ* units will not be established till Y4 and the target may not be met. Some populations have been more degraded than expected restricting the options for establishing *in situ* units.

Table 1: Number of conservation units proposed (established) by each partner country by end of year 3

		Cambodia	Lao PDR	Vietnam	Total
Dalbergia cochinchinensis	*In situ*	2 (1)	3 (2)	1 (1)	6 (4)
	Ex situ	1 (2)	2 (2)	1 (1)	4 (5)
Dalbergia oliveri	*In situ*	1 (0)	3 (1)	1 (1)	5 (2)
	Ex situ	0 (1)	2 (1)	1 (1)	3 (3)
Dalbergia cultrata	*In situ*	0	3 (2)	0	3 (2)
	Ex situ	0	2 (2)	0	2 (2)
Grand Total		**4 (4)**	**15 (10)**	**4 (4)**	**23 (18)**

Indicator 2.2. 60 forestry and conservation officers across 4 countries trained in *in situ/ex situ* conservation strategies for *Dalbergia*
58 forestry officers were trained on *in situ/ex situ* conservation in Y2 in Cambodia, Lao PDR and Vietnam, almost completing the project target of 60 trainees. The training in Vietnam was restricted at late notice because of COVID meaning >half expected people could not participate. However, those who couldn't attend online studied the course materials, indicating that they found the materials useful for their work in forestry, with the training on *in situ/ex situ* conservation strategies for *Dalbergia* being very important. This means that the indicator target has already been met, but the new online training initiative in Y4 will also take the project well past the indicator target.
Indicator 2.3 At least 15 new, coordinated seed collections for 3 Dalbergia spp. across 4 countries ***(end Q3, yr 3)***
The project was behind schedule for this indicator (see discussion in activity 2.5, Y2 report), but new collections have been successfully made in Y3 as follows (Lao PDR 3, Vietnam 2) to complement the 5 made in Cambodia in Y2. With further seed collections planned for Q3/Y4 in Lao and Vietnam the project now expects to achieve at least 12 new collections by the project end. Links have been made with Dr Voradol (Botanical Garden of Thailand) for accessing seed collections in Thailand in conjunction with Kew, which has given access to both foliage and seed samples for assessment of conservation gaps (landscape genomics and growth study).

Indicator 2.4 Regional/national provenance trials established to study adaptation of D. cochinchinensis *(4 sites, 8 provenances across 4 countries)* ***(end Q3, yr 3)***
Cambodia established a *D. cochinchinensis* provenance trial (five provenances) in Q1 of Y3, with ongoing monitoring and maintenance (Activities 2.5, 2.6). The plants for the Lao PDR provenance trial are being raised in the nursery and will be planted in the field in Q2,Y4 assuming that COVID restrictions allow staff access to the field. Problems with seed collection already mentioned have limited achieving the target for this indicator. Extensive leaf collections from populations throughout the partner countries have, however, been made and are being analysed as part of a genomic study of *D. cochinchinensis* and *D. oliveri* (see Output 1) and will provide an understanding of adaptive genetic variation across the ranges of both species and fill the gap from the reduced number of field trials.

Output 3: Multiplication to support use, income generation and reduced pressure on natural populations (propagation strategies, community nurseries etc)

Output indicators 3.1 (vegetative propagation protocol) and 3.3 (training of government and private sector stakeholders on seed quality and seed sourcing) were reported complete in Year 2. In Year 3, one additional nursery (Vietnam), and one farmer seed source (Cambodia) were successfully established, completing the project target of 4 nurseries with a mean capacity of 10,000 seedlings per year (Indicator 3.5). Surveys and other data collection for indicators 3.2 (recommendations for overcoming barriers in seed supply), 3.4 (households trained in good

practices), and 3.6 (households planting trees on their land) were also previously reported completed in Years 1 and 2.

Output indicators still in progress are as follows:

- 3.2 Policy paper on project recommendations for seed sourcing. The key recommendations have been identified in collaboration with project stakeholders during training events. The policy paper will be finalised once the end-of-project surveys have been completed in Q1 and Q2 of Y4.
- 3.4 Trainings for community members on seed sourcing and seed markets were organised in Y2 but did not yet meet target numbers for beneficiaries. The process to establish a seed supply network in Lao PDR project sites was designed, with identification of participants and potential seed sources as well as development of joint agreements for seed source management. Trainings were then organised in 2020 for 7 households on seed supply and seed collection.
- 3.6 The project continues to support tree planting by farmers, through making available seedlings from the newly established project nurseries. Lack of seedlings was identified as a barrier to planting during baseline surveys. The project team is also evaluating incentives to encourage tree planting, including growing annual crops such as ginger with *Dalbergia* to generate short-term income benefits.

3.3 Progress towards the project Outcome

Indicator 0.1: At least 50% increase in number of designated in situ/ex situ Dalbergia conservation units across 4 countries (new for some countries or species)

The project is likely to not meet its target for 23 new conservation units, even within the newly extended timeframe. As discussed earlier, low/diseased seed production in highly degraded populations have reduced options for establishment of both *in situ* and *ex situ* conservation units.

Indicator 0.2: At least 20% increase in forest-related income of 175 rural households in 3 countries (end year 3), through Dalbergia *seed/seedling production and planting*.

From the baseline surveys, income generation targets were defined as £1,093-1,755 per community per year, which is considered realistic at the targeted production capacity of 10,000 seedlings per nursery by the end of project and the prevailing seedling prices of £0.36-0.73. However, the target number of affected households will likely not be reached because of fewer than planned people could be trained so far. Lack of remaining seed sources to ensure income generation and lack of interest among households likely contributed to limited participation. Nevertheless, the seedling production targets have already been exceeded in Cambodia, while in Lao PDR production capacity of the established nurseries is 14,000 seedlings. In addition to incomes from seed and seedling sales, we will also assess community members' income from employment at nurseries or as seed collectors. Such employment opportunities are emerging especially in Pursat, Cambodia. When a local farmer's nursery was upgraded, employment opportunities for community members in seedling production almost tripled between 2018 and 2020, from 20 person months (40% women) to 57 person months (42% women).

Indicator 0.3: Methods and training materials for conservation, multiplication and value chain development exist and >100 professionals and 175 rural households trained to use and adapt them to enable scaling out.

Training targets for professionals were met in Year 2. Targets for rural households are at 57% and will likely not be fully met for reasons stated above.

3.4 Monitoring of assumptions

Assumptions for project Outcome: (i) Records, baselines and surveys available and accurate; (ii) Forestry authorities implement the recommendations they co-developed through the project; (iii) No major socio-economic changes (policy, tenure, outmigration rates etc) or natural catastrophes in project sites that would limit community-based conservation activities, (iv) Regular fruiting of *Dalbergia* in target communities during project period; (v) More trained people and enhanced collective action will help safeguard threatened *Dalbergia* spp. long-term; (vi) More comprehensive conservation leads to wider use and improved rural/forest-related livelihoods.

Comments: (i) The assumption on information has held true. (ii) It is too early to fully assess whether this assumption will hold true; however, the level of engagement and participation of local forestry teams in training activities indicates an adequate level of interest among forestry authorities. (iii) Community-based activities continue to be limited by the Covid19 crisis which is delaying the establishment of conservation units and mentoring. (vi) Fruiting has been more variable than expected and has slightly decreased the number of trees that could be included for seed collection in and the timing of the establishment of provenance trials. Additional evidence was obtained in Year 3 to suggest that this assumption was too optimistic, as seed collection efforts in several provinces in Lao PDR yielded less seed and with poorer germination rates than expected, due to small remaining population sizes and also partly due to adverse weather. (v, vi) It is too early to adequately assess whether these assumptions will hold true but we have no indication that they will not.

Assumptions for Output 1: Output 1 is complete and assumptions are no longer monitored.

Assumptions for Output 2: (2.1) Willingness to set up *in situ* units; (2.3-2.4) Sufficient seed production and availability of sites.

Comments: (2.1) The willingness to set up conservation units in each partner country is shown in this report for activity 2.1 in Section 3.1. Cambodia has decided to focus it work on one *in situ* conservation unit (O Soam Community Forest) and three *ex situ* conservation units, two of which are now established with the third in year 4. Similarly, Lao and Vietnam have advanced on the designation of units. The designation for *Dalbergia* protection has already given new recognition to the importance of conservation activities and changed awareness, for example with the development of new tree nursery production at CMR National Park in Vietnam and seed collection permitted in the park for the first time (2.3-2.4). In Cambodia, a provenance trial was established with plans being developed for its long-term maintenance. The process is on-going in Lao PDR and Vietnam, but the assumptions are still valid.

Assumptions for Output 3: (3.1) Availability of seed/plants to develop vegetative propagation; (3.2) Interest and active collaboration from programme staff and community members; (3.3-3.6) community interest and uptake; participation of households; tenure stability.

Comments: As reported in Year 2, assumptions have generally held, expect for the availability of seed for establishing community nurseries (Assumption 3.5). In response, project activities have been adjusted to include establishment of seed sources (see section 3.1).

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

The impact statement in the original application was as follows: “Enhanced conservation and sustainable use of Rosewood genetic resources, for improved livelihoods and ecosystem services for thousands of rural people across ≥5 Mha of forest landscapes in the Mekong Subregion”.

This project contributes to the enhanced conservation and sustainable use of Rosewoods through; (1) preparing a regional assessment of the conservation status and identifying conservation and restoration priorities, (2) establishing *in situ* and *ex situ* conservation units for the species, and (3) promoting the multiplication and planting of quality germplasm that contributes to species conservation.

The regional assessment (Output 1) is the first detailed assessment of the conservation status of the three threatened *Dalbergia* species across their entire distribution range in the Greater Mekong subregion (Annex 4.3). The results include information about the species current and future distributions in the context of the threats they are facing from overexploitation, land use change, fire, grazing and climate change. In March 2021, the results were presented at a virtual expert workshop organised by FAO and the CGIAR Research Programme on Forests, Trees and Agroforestry. The results generated wide interest among the participants, in particular as they illustrated the significant impacts of climate change on the species distributions which are difficult to assess otherwise. The results are expected to influence FAO’s recommendations for primary forest conservation arising from the workshop.

The availability of quality germplasm to support planting and restoration of the species (Output 3) has turned out to be even more limited than estimated during the project preparation stage. Seed sources are quickly disappearing, changes in weather patterns affect species' phenology (timing of flowering and fruiting) making seed collection difficult, while seed from the remaining trees often germinates poorly as a result of inbreeding. Here the main outcome of the project contributing to the impacts will likely be heightened awareness among forest departments, local government units and other land managers of the severity of the situation, and the demonstration of models that support seedling production, including vegetative propagation and seed orchard establishment. In Cambodia, the establishment of nurseries and seed orchards will make a significant and increasing impact on the availability of both seed and planting material during and beyond the project's life.

In Cambodia Forestry Administration staff have expressed interest to apply the project's approaches to other highly threatened and valuable native tree species (See Section 8 and Annex 4.4). In Lao PDR the project has similarly brought attention to the need for wider action on endangered species in the National Forest Strategy (see detail in Section 12).

The project seeks to contribute to improving local livelihoods by developing methods, approaches and capacities for farmers to participate in Dalbergia seed value chains. Based on the baseline survey, we estimate that the project's interventions in this area can realistically increase forest-related incomes in the project communities or similar communities by 20%. Lack of seed sources may slow down the development of local seed enterprises, but establishment of grafted seed sources can alleviate the shortage relatively quickly as grafted seedlings start to produce seed within a couple of years of establishment. Seed orchards also make seed collection considerably easier, safer and less costly than in natural forest and, therefore help women get involved in seedling production. In Pursat, Cambodia, the project's investments in local seedling production capacities resulted in a nearly three-fold increase in employment opportunities for men and women from the community (see section 3.3). The farmer whom the project assisted in establishing a grafted seed source of *D. cochinchinensis* is already preparing to establish another seed source, this time for *D. oliveri*. Such concrete examples that demonstrate the job and income opportunities from seed value chains are important in supporting wider adoption of the project's approaches.

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

The project's actions directly contribute to three SDGs

SDG 15 *Life on Land - Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss* and specifically its target *Take urgent and significant action to …, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species*. The project's *in situ/ex situ* activities will conserve threatened *Dalbergia* species and their genetic diversity, ensuring adaptability to climate change and human use. Increased local community capacity will also contribute to conservation of other native species through seed collection, nurseries and community planting across diverse land-use systems.

SDG 8 *Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.* Research and training activities under output 3 will provide the basis for improving business models of community based seed collection and nurseries, allowing for increased income and wider benefit-sharing within communities. Project outputs are expected to result in 20% increases in the communities' forest related income, while wider uptake will spread these benefits to larger numbers of communities (project outcome). This links to ***SDG 1*** target of ensuring *all men and women, in particular the poor and vulnerable, have equal rights to economic resources*

SDG 4 *Quality Education* - Specifically its target *By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development,* A range of capacity building activities during the project will provide learning opportunities for rural households, government officials, students (outputs 2&3).

During 2020-21 the project contributed to all of the above SDGs within the project partner countries. To *SDG15* through the selection, designation and establishment of 18 *Dalbergia* populations as *in situ* or *ex situ* conservation units, through collection and use of *Dalbergia* genetic resources, through development of techniques to make propagation easier. To *SDG4* through capacity building activities (see section 3 and Annex 3 Standard Measures). To *SDG8*

through increasing employment and income through use of *Dalbergia* genetic resources (seed collection, sale, nursery work; see section 3).

Project support to the Conventions, Treaties or Agreements

The project proposal shows the project's expected contribution to the CBD and CITES. Our *in situ/ex situ*, research and community-based activities (section 13), directly support CBD objectives at inter- and intra-species levels (CBD article 1): *conservation of biological diversity; the sustainable use of its components;* and (also Nagoya) *fair and equitable sharing of benefits arising out of the utilization of genetic resources,* through access to relevant technologies and funding. It follows CBD/COPs guidance: ... *make use of native site-adapted species, giving attention to genetic variation within and among native species*…" (Decision XIII/5, Appendix I). Planting material choice is commonly driven by cost and availability, resulting in genetically limited germplasm, low native species diversity, and restored populations of compromised viability that neither contribute to species conservation nor genetic diversity. Consequently, forecast returns on restoration investments are often unrealised. The project implements guidance through practical solutions for diversity in endangered tree species community planting (Aichi targets 1,12,13,15,19). Project contributions are in line with partner country latest CBD National Biodiversity Strategy and Action Plans (NBSAP) as follows.

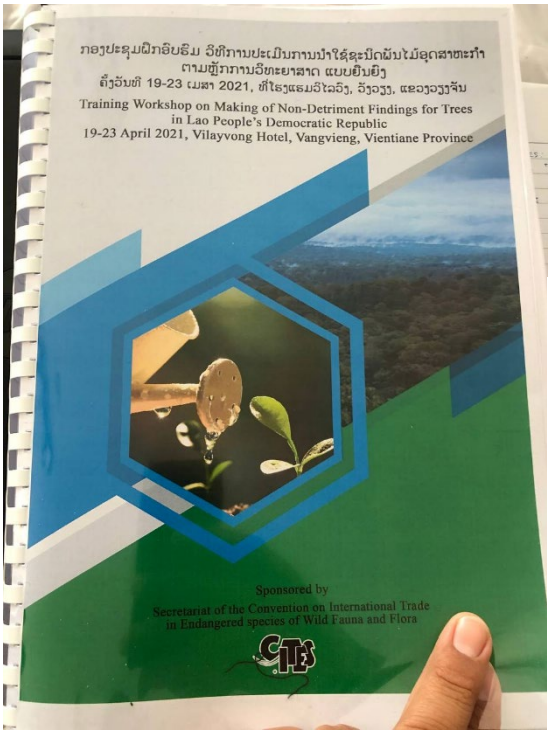
Cambodia: protect and recover threatened species (including tree genetic diversity) through *in situ and ex situ conservation*, needing to *identify and collect plant species … requiring protection, reproduction and propagation* (our outputs 1&2) with the status *of all threatened fauna and flora improved significantly by 2020*. Actions for Aichi Targets include community-based sustainable forest management *for biodiversity conservation, environmental protection, … more employment and supporting incomes of local communities* (our output 3).

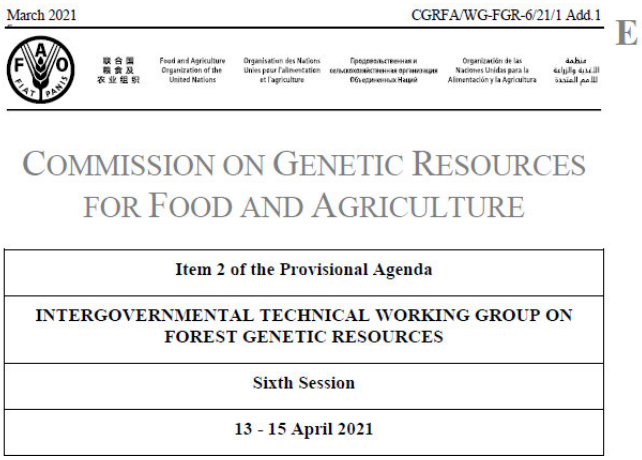
Lao PDR: *implement priority protection measures for seed sources of indigenous tree species*, with the *extinction of at least 5 priority species effectively prevented through better law enforcement and in situ/ex situ conservation* (our outputs 1&2).

Vietnam: *improve the quality and populations of endangered, rare and precious species* (our outputs 1&2), promoting *use of native species for forest enrichment and restoration within REDD+*, developing *long-term investment plans in protected area buffer zones* and implementing *a sustainable economic development model for households* (our output 3). Priorities include *enhancing the rights and capacity of local communities so that they actively participate in biodiversity conservation*.

CITES has no stated objective, but recognizes "*peoples and States are and should be the best protectors of their own wild fauna and flora; … that international co-operation is essential for the protection of certain species of wild fauna and flora against over-exploitation ...*" So the project complements enforcement of *Dalbergia* CITES restrictions. Target species are naturally distributed across the region and project activities will benefit from: collaboration between countries, local community involvement in conserving the resources, researchers' experience from elsewhere in the world. Promotion of international cooperation in conservation and sustainable use of biodiversity are identified as solutions for implementation of NBSAPs and ASEAN's regional action plan on CITES (2011-15).

In the last quarter of year 2 the project had exploratory discussions with the Knowledge Management and Outreach Services of the CITES Secretariat to provide input to their work on reviewing and developing management plans that aim to combine sustainable use with enforcement to prevent illegal rosewood trade. The project's initial input is to a workshop in Lao PDR run by the Secretariat and Lao CITES focal point. Delayed from 2020 due to COVID, the workshop will now run from 19-23rd April, 2021, with Mr Chaloun Boounithiphonh presenting for the project (Fig. 5). Lao and Chinese partners (Mr Vongvilay, Mr Boounithiphonh, Prof Zheng Yongqi) and member of the project's M&E advisory board (Dr Chanhsamone) will also contribute to 6th Session of the Intergovernmental Technical Working Group on Forest Genetic Resources (13-15th April, 2021).





March 2021 CGRFA/WG-FGR-6/21/1 Add.1 E

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Item 2 of the Provisional Agenda
INTERGOVERNMENTAL TECHNICAL WORKING GROUP ON FOREST GENETIC RESOURCES
Sixth Session
13 - 15 April 2021

Figure 5: Workshop details for CITES event and Intergovernmental Technical Working Group on Forest Genetic Resources

5. Project support to poverty alleviation

The project's expected beneficiaries are forest-dependent men and women in the project's seven rural target communities. The project seeks to directly reduce poverty among 175 households in these communities by increasing the beneficiaries' forest-related incomes by 20% by the end of the project, through creating income and employment opportunities in *Dalbergia* seed collection and seedling production. Compared to daily rural cash incomes of generally less than £5, seed and seedlings of *Dalbergia* species fetch high prices, ranging from approx. £70-180 per kg of seed and £0.36-0.73 per seedling in the project's target provinces. However, income opportunities from seed and seedling sales are currently constrained by the lack of market linkages, as well as seed availability and lack of knowledge of seed quality and seedling production. The most notable achievement of the project in the past year was the significant increase in employment opportunities in seedling production for both men and women in Pursat, Cambodia (detailed in section 3.3). The project also provided training to farmers in marketing seed and seedlings e.g. through Facebook and radio. These marketing strategies allow farmers to connect with clients directly and reduce their reliance on middlemen, thereby increasing their financial share from seed/seedling sales (e.g. a 25% increase of annual income due to the marketing strategy; pers.com. with farmer, Mr Sok EM, Pursat)

6. Consideration of gender equality issues

Household surveys in Year 2 revealed that very few women in the project communities are involved in collecting forest products for sale. Establishment of nurseries (a project activity) provides income opportunities that are accessible for both men and women. In Pursat, Cambodia, women made up 42% of employees at the local nursery after it was upgraded with project support. Additionally, seed orchards, that are easily accessible from villages and where trees are kept short through pruning, make seed collection a more feasible activity for women. To date in Cambodia and Lao, the project has supported the establishment of one seed source in each country, with others to be planted in year 4. As these do not yet yield seed it is too early to verify their impact on women's employment opportunities.

A socio-economic's research fellow was hired in March 2020 to better understand factors that affect gendered participation and social inclusion in seed and seedling value chains in Cambodia to coincide with the development of project activities, and develop related recommendations.

However, this contract had to be cancelled due to the Covid-19 pandemic that made international travel and field work impossible throughout Year 3. Questions on women's involvement in project activities and factors that supported or hindered their active participation were included in end-of-project surveys which will be conducted in Year 4.

7. Monitoring and evaluation

There were two meetings of project's M & E Advisory Committee, chaired by Dr Christopher Kettle (September 2020, March 2021; see meeting minutes in Annex 4.4 and 4.5, respectively). The discussions and recommendations focused on the impact pathway as the means to achieve the project outcomes. As a result, we held a session on impact pathways during our annual workshop, where we worked to clarify the recipients of the project outputs and the means to reach them. The result was a more detailed mapping of impact pathways. The recommendations also led us to strengthen links with potential collaborators including impact experts within the Bioversity-CIAT Alliance. The recommendations aiming to strengthen outcomes also included plans for scaling up project outputs through future funding, gathering information on perceptions of future users of project results, communicating about the project's impact pathway and potentially developing similar projects on other endangered species in the Mekong. The next M & E Advisory Committee meeting is expected to occur in conjunction with the project's final workshop in Q3 of year 4.

8. Lessons learnt

The lessons learnt in the past financial year are as follows:

A. **Monthly meetings with project partners from beginning of the pandemic.** These have been crucial to be able to monitor unforeseen situations and adjust plans accordingly; they have helped to maintain a good level of communication. Use of Zoom instead of Skype has greatly improved meetings. As well a dealing with administrative issues, this also allowed the identification of technical topics which are addressed as single topic meetings every two months.
B. **Development of online meetings increases project impacts.** We decided to run a session of our 3rd annual workshop as an online Outreach Event and this facilitated wider participation of potential end-users and collaborators. We have made plans to make teaching materials available as online modules and this is expected to increase impacts through increased accessibility (see Section 11 for details).
C. **Administration of Darwin Initiative project has proven time consuming and complex.** The complexity arises because of working in a multilateral context, with variability in seasonality, ways of working, policies for material exchange, fund transfers. Future projects should plan for more support staff / project manager time to help with planning, administration and reporting.
D. **Choice of people/groups to work with.** Identifying and choosing to work with groups/individuals who are already active on the ground or identify with the project's aims/activities will ensure the success and efficiency of the project's activity. In Cambodia Mr Suth Sok Em (Pursat province) had already started a seed business and nursery, but technical and financial assistance from the project significantly improved the business and its employment opportunities in the community.

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

The actions taken in response to the last review are summarized below; some of them have been described elsewhere in the report as indicated. The full response to the Annual Report review is in Annex 4.6.

No	Comment from Review of Annual Report (Y2)	Actions taken / response

1	Check that fund transfers from Oxford University are now working smoothly and if not, work to resolve them	*Payments worked better during Y2 but new delays occurred due to the covid19 pandemic and personnel turnover at Oxford. Prof J. MacKay had been able to resolve the issues by the end of Y3.*
2	Continue preparation of more funding proposals to support activities post-project proposals (eg; RECOFTC, Thailand).	*No new funding requests were made during this last year. It will remain a focus in Y4 of the extended project.*
3	Take a final decision on whether it is possible to include Thailand or not and realign the budget accordingly	*See section 2. Partnership. This issue has been addressed via a change request and is now resolved.*
4	Conduct a virtual Project Review Meeting with partner countries as soon as possible to discuss which activities are working, draw lessons and focus on field activities likely to contribute to community involvement in nursery production and planting of Dalbergia	*See sections 11 and 14. We held an annual Virtual Annual workshop and Outreach Event in December 2020. We have also held monthly project update meetings since March 2020 of ca 90 min each to address these points. This format is dynamic and allows for continuous updating.*
5	Consider exchange site visits between partner countries if surplus funds are available (Thai portion)	*Engagement with the Thai partner is planned primarily through the online training we proposed (in change request) as a measure to counter uncertainty for travel due to Covid-19. The Thai partners will also be informed of events they may attend in neighbouring countries.*

10. Other comments on progress not covered elsewhere

A. Dr David Boshier finished working for the Department of Plant Sciences on 31st January 2021, but continues to work with the project for 40% of his time on a *pro bono* basis.

B. We held a Virtual Outreach Event and Annual Workshop over three days in December 2021. The themes and objectives of the different sessions are outlined below. The report is available in Annex 4.1.

Conserving Rosewood genetic diversity for resilient livelihoods in the Mekong
Annual Workshop (Virtual Event) – 9, 10, 15 December 2020

Session 1: Virtual Outreach Event – 9 December 2020
This session was attended by 22 participants (See Annex 4.1)
Session objectives:
- Create an opportunity for project partners and collaborators to share their work in Dalbergia conservation and genetics research
- Highlight successes and reflect on accomplishments, results, challenges as we move the project forward

Session 2: Impact pathway – 10 December 2020
Session Objectives:
- Develop a common understanding of the project's intended impact pathway (IP)
- Identify activities from local to regional level that support achieving project outcomes

Session 3: Work plans and future developments – 15 December 2020
Session objectives:
- Discuss and agree work plans for the remainder of the project for each partner against logframe, taking account of issues identified in sessions 1 & 2
- Identify post project continuity/development priorities and funding opportunities

11. Sustainability and legacy

Initiatives to promote the project's activities have varied across partner countries, but have centred on efforts to ensure sustainability of the project's varied initiatives beyond the project life (e.g. maps and information on threats to Dalbergia, CUs, provenance trials, seed production stands, nursery activities, training materials). Long-term availability of project information and outputs is covered in Section 13 below. Lao PDR is revising its National Forest Strategy, with Mr Chaloun Boounithiphonh from our Darwin project a member of the revision team. He argued for

the strategy to highlight the need for specific conservation strategies for key species and although not currently publicly available, this is now incorporated in the draft revised strategy.

In Cambodia the farmer nursery and seed sources will be sustainable beyond the project, given the income stream from seed and seedling sales. Both the nursery and seed sources are established on the farmer's land such that there is no issue of land tenure, which has been identified as a critical factor in the loss or maintenance of conservation units established under previous initiatives. Likewise, the *D. cochinchinensis in situ* conservation unit in Kampong Thom province, is located in a well-established community forest with secure land tenure. The project provided basic tools and financial assistance to the community to increase the frequency of patrols, resulting in a significant reduction in illegal cutting of *D. cochinchinensis* in the past year. A project meeting in April 2021 (Q1, Y4) is focussed on considering factors and actions to ensure sustainability of all the project's new conservation units.

12. Darwin identity

The Darwin Initiative logo is always used/displayed in the banners/backdrops of trainings and workshops, as well as in report covers and printed dissemination materials (see Annexes). New nurseries established by the project in Cambodia, Lao and Vietnam display the Darwin Initiative logo on their entry sign, as does the information board for the new provenance trial in Cambodia (see example photos in section 3.1).

Bioversity International developed a website for the project which was launched in June 2019: www.apforgen.org/activities/conserving-dalbergia/. The website sits within the website of the Asia-Pacific Forest Genetic Resources Programme, through which the project was developed and which ensures continuity for communications beyond the duration of the project. As mentioned in section 12, the genesis of the project was through APFORGEN, but at the same time the Darwin project is seen as a distinct entity. The site includes the Darwin Initiative logo and a link to its website. Reports of project workshops and trainings, also with the relevant logos, are published on the same website.

Project activities were also publicised through numerous tweets by APFORGEN (@APFORGEN), the Alliance of Bioversity International and CIAT (@BiovIntCIAT_eng) and Bioversity researchers Christopher Kettle (@[redacted] and Tania Kancharanak (@[redacted]

Figure 6: Handover of equipment for patrolling of O Soam Community Forest (Cambodia), including *D. cochinchinensis in situ* conservation unit. Darwin logo features in publicity banner.

13. Impact of COVID-19 on project delivery

The COVID-19 pandemic has caused delays to our field activities in the Mekong and postponed events involving international travel. We revised our project timelines including a continuation of activities into a fourth year, postponing participation in international symposia, with budgets adjusted accordingly (see Change request, Annex 4.2). The level of COVID-19 infection in the Mekong has been low and delays to field work encountered by project partners in Cambodia, Lao PDR, and Vietnam were limited to 3-4 months. Partners were able to resume activities in Q2 and Q3 but some activities were postponed to year 4 due to their seasonal nature related to rainfall. By contrast, longer term restrictions on international travel have postponed some events by 12 months or more and prohibited travel into or from the Mekong region for workshops or to support household surveys, among others.

To date, the changes we implemented had been adequate given the impact of COVID-19 on our project. However, COVID-19 infection began to worsen in the Mekong, in Q4 of year 3 with new lockdowns in each country. Restrictions have caused new delays to field activities, mostly with short-term or localized impacts but this may change. In addition, the level of uncertainty surrounding international travel has remained high or has increased. Therefore, we continue to monitor the situation and track impacts on project outputs. We will consider submitting a Change Request in Q1 of year 4 depending on the significance of impacts on the log frame or the budget.

We have ensured the health and safety of project staff by strongly encouraging project partners to respect local restrictions as applicable, which includes avoiding face-to-face project meetings. To the best of our knowledge, the project will not directly assist with the response to the pandemic nor reduce future risks of pandemics, due to its focus on the conservation of forest genetic resources.

From the beginning of the pandemic, we have held monthly meetings with project partners to monitor issues and address challenges as they arise. The meetings doubled in frequency compared to before the pandemic and the use of Zoom has improved the quality of communications. We ran our annual workshop as an online meeting with three sessions including an online outreach event with 22 participants (for details see Sections 3 and 11). We expect that these new ways of working will continue in the future and reduce the need of international travel for symposia and workshops.

14. Safeguarding

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

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

We have no safeguarding or human rights violations to report in this financial year. We have made progress on the development of a policy and plan for safeguarding of vulnerable people, but the task is not yet complete as we have focused our attention on managing impacts of the COVID-19 pandemic, which has reduced person to person interactions as relevant to safeguarding. We anticipate no or very little face-to-face activities involving project partners from different countries in the coming year.

To date we have taken the following actions:

1. The safeguarding policy at the University of Oxford and Bioversity's whistle-blowing process (including a hotline), were given in the previous annual report and have not changed in the last year. We have not identified any safeguarding-specific policies and mechanisms in place in the project country partner organisations.
2. We have developed a template form and process for each partner to have their own register of safeguarding issues raised and how they were dealt with (Annex 4.7).
3. We have considered procedures for investigation of allegations and complaints, for disciplinary action; however, we acknowledge that the project's legal position for international action is limited and we rely on existing policies and enforcement frameworks that apply in partner institutions. We will also address sharing of the policy, whistle-blowing, codes of conduct.

The proposed actions for the coming year are:

- Designation of safeguarding leads in each partner organisation when planning activities and training
- Identification of actions to be taken to assess and minimize risks, and relevant guidelines
- Collect more information on how to deal with suspicions or allegations of abuse, including reporting and other relevant actions to be taken, such as sharing of information with appropriate authorities.

15. Project expenditure

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

Project spend (indicative) since las annual report	2020/21 Grant (£) [1]	2020/21 Total Darwin Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs	[redacted]			
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Monitoring & Evaluation (M&E)				
Others (see below)				
TOTAL				

[1]These are the budget amount as approved in the change request discussed at the beginning of the present report.

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

Project summary	Measurable Indicators	Progress and Achievements April 2020 - March 2021	Actions required/planned for next period
Impact Enhanced conservation and sustainable use of Rosewood genetic resources, for improved livelihoods and ecosystem services for thousands of rural people across ≥5 Mha of forest landscapes in the Mekong Subregion		Successes in data collection on species occurrence, training and activities with partners and engagement with stakeholders validate the pathway to impact and exit strategy for enhancing Rosewood genetic resources.	
Outcome Forest authorities in four countries collaborate to conserve genetic resources of endangered *Dalbergia* species *in situ* and *ex situ*, while rural households increase their capacities to generate livelihood benefits from these resources	0.1 At least 50% increase in number of designated *in situ/ex situ Dalbergia* conservation units across 4 countries (new for some countries or species) 0.2 At least 20% increase in forest-related income of 175 rural households in 3 countries (end year 3), through *Dalbergia* seed/seedling production and planting 0.3 Methods and training materials for conservation, multiplication and value chain development exist and >100 professionals and 175 rural households trained to use and adapt them to enable scaling out	0.1 Baseline established with revised targets of number of conservation units. Surveys conducted and target i*n situ/ex situ* sites identified (this report) 0.2 End-of-project surveys designed to assess socio-economic benefits. Evidence of 25% increase in incomes and three-fold increase in employment at a farmer's nursery in one of the project sites, Cambodia. 0.3 Training materials completed; target for training professionals met. Training of rural households at 57% of target	0.1 Maps will be developed and database populated, conservation units will be identified in 4 countries. 0.2 Technical support to existing nurseries and seed supply networks. Conduct end-of-project surveys. 0.3 Additional trainings for community members where target not met, depending on Covid-19 situation
Output 1. Regional assessment of the conservation status of *Dalbergia cochinchinensis, D. oliveri* and *D. cultrata*	1.1 Subregion distribution & threat maps for 3 *Dalbergia* spp. overlaid with existing seed zones, forest cover, climate predictions, threats, etc 1.2 Subregion database of existing *in situ* reserves and *ex situ* collections for 3 *Dalbergia* spp. species (incl. seed sources, molecular data, environmental data, threats) 1.3 Identified population genetics gaps in seed collections and existing materials	Output is completed with all indicators achieved. For details please see text.	

	1.4 Identified *in situ/ex situ* conservation priorities for 3 *Dalbergia* spp. at national and Subregion levels across 4 countries.		
Activity 1.1 Develop agreements on data sharing, database management and updating to ensure continuity and confidentiality where relevant (FPIC in communities)		1.1 Achieved and reported in Y1	
1.2 Collect georeferenced data on species occurrence, seed zones, forest cover, climate predictions, existing *in situ* reserves and *ex situ* collections, strengths and weaknesses of past conservation initiatives, technical and institutional capacities (review, key informant interviews, incl. community actors, gender representation)		1.2 Achieved and reported in Y2	
1.3 Prepare distribution and threat maps using database and ecological niche modelling		1.3 Achieved and reported in Y2	N/A
1.4 Validate maps and models through expert consultation		1.4 Achieved and reported in Y2	N/A
1.5 Develop database structure		1.5 Achieved and reported in Y1	Finalise development of an online database to host data over long term
1.6 Populate database with collected data		1.6 Database is operational at www.tree-diversity.org	Adding information about seed collections and new conservation sites as it becomes available
1.7 Identify conservation priorities through comparison of distribution, threat & socio-economic data, existing collections, strengths of past initiatives		1.7 Conservation priorities by species, country and ecoregion identified (Annex 4.3) and communicated to national partners	Support refinement of identified regional-level priorities based on field data and partners' experience. Communicate results to regional stakeholders
Output 2. Filling gaps to conserve *Dalbergia* genetic resources through *in situ*, *ex situ* programmes and provenance testing	2.1 At least 23 new *in situ/ex situ* conservation units for 3 *Dalbergia* spp across 4 countries (units may overlap between species) 2.2 60 forestry and conservation officers across 4 countries trained in *in situ/ex situ* conservation strategies for *Dalbergia* 2.3 At least 15 new, coordinated seed collections for 3 *Dalbergia* spp. across 4 countries 2.4 Regional/national provenance trials established to study adaptation of *D. cochinchinensis* (4 sites, 8 provenances across 4 countries)	2.1 The indicator has been modified slightly (Change request approved). Sites identified and survey in 3 participating countries, designation of conservation units is in negotiation with authorities and seeds have been collected (seed banking). 2.2 Achieved at end of year 2 across 3 countries. Online training made available in Y4 for the APFORGEN region to increase numbers trained and countries covered 2.3 Five seed collections made in Cambodia in Y2, 3 new collections made in Lao PDR and 2 in Vietnam in Y3 (see activity 2.5, section 3.1) 2.4 Trial planted in Cambodia, Site selected and seedlings raised in Lao. Planting delayed till Y4 due to Covid-19 restrictions	
Activity 2.1 Identify locations for conservation units in collaboration with stakeholders and between countries, to ensure sustainability and complementarity		2.1 Baseline established, p.11. Some new sites identified (see section 3.1, activity 2.1)	Use findings to support work in 2.2

2.2. Develop institutional arrangements and management guidelines, including material transfer agreements for regional trials		Project collaborative draft agreement circulated with comments received from partners	Signing of the project collaborative agreement by all partners
2.3 Develop and translate training materials, based on assessment of capacities (1.2) and new conservation strategies (2.2)		Completed in Y2	Finalize
2.4 Organise and run trainings		All developed and completed in Y2 (see Y2 report)	Online training made available in Y4 for APFORGEN region to increase numbers trained & countries covered
2.5 Design and conduct seed collections among country partners		Completed or partly completed depending on country	Finalize work delayed by low seed production or Covid-19
2.6 Establish provenance trials		Trial established in Cambodia, seedling production started in Lao PDR	Plant Lao PDR site
2.7 Evaluate progress and changes in knowledge and practices and communicate lessons learned		Ongoing evaluation and assessment during Y3	Continue in Y4
Output 3. Multiplication to support use, income generation and reduced pressure on natural populations (propagation strategies, community nurseries etc)	3.1 *D. cochinchinensis* vegetative propagation method available & successfully used in government-owned and community nurseries 3.2 Recommendations for overcoming the barriers to community-based seed and seedling supply for government-driven and private sector tree planting programmes, based on a review of at least 3 programmes in each sector (total for Lao and Cambodia) 3.3 50 staff of government-driven and private sector tree planting programmes trained on the importance of good quality diverse germplasm, and options to source germplasm from community-based enterprises (25 Lao, 25 Cambodia) 3.4 175 households in 7 communities (2 Cambodia, 3 Lao, 2 Vietnam) trained in good practices in seed collection, seed source management and/or propagation methods, incorporating documenting & sharing of traditional knowledge (at least 30% women) 3.5 175 households involved in community-based seed collection business (7 communities) and operating community nurseries (4	3.1 Methods developed, leaflet produced for rooted cuttings and grafting (Fig. 2 and 3), methods available for transfer and training 3.2 Completed except policy brief on results 3.3 Four professionals trained in the establishment of farmer seed source, Cambodia. Total number of people trained as of Y3 is now 42. *3.4* 16 household members were trained in Y3, of which 7 in Lao PDR and 9 in Vietnam, and including 5 women and 11 men. Total number of people trained as of Y3 is 99 (72% men, 28% women) *3.5* One additional nursery (Vietnam), and one farmer seed source (Cambodia) were successfully established, achieving the project target of 4 nurseries with a mean capacity of 10,000 seedlings per year	

	communities, capacity 10,000 seedlings per year from year 3 onwards) 3.6 Number of households planting *Dalbergia* on their farmland increased by 30% in 4 communities by year 3 (*indicator may be reviewed after baseline is established; lack of up-to-date data*)	3.6 End-of project surveys designed in Y3 to document change.	
Activity 3.1 Develop *D. cochinchinensis* vegetative propagation method (Cambodia)		Achieved and reported in Y2	Use findings for training in other countries
3.2 Test *D. cochinchinensis* vegetative propagation method in other countries and *Dalbergia* spp.		No activity planned in Y2	Testing in other countries will focus on Cambodia
3.3 Develop guidelines for appropriate use to multiply genetically diverse planting material		Achieved and reported in Y2	No activity planned in Y3
3.4 Analyse current practices for seed and seedling sourcing in ≥3 state-owned and ≥3 private sector nurseries, knowledge of seed quality and genetic diversity among programme staff, and their attitudes to community-based seed supply		Achieved and reported in Y2	
3.5 Identify strengths and weaknesses in communities' current seed collection practices, seed exchange networks, market linkages, tree planting, community-level institutions, capacities and traditional knowledge (7 communities in 3 countries), including income generated from seed and seedling sales		Achieved and reported in Y2	
3.6 In collaboration with stakeholders, formulate strategies for overcoming identified barriers, with recommendations and training materials for their implementation		A research paper was initiated on the results	Finalise research paper and develop a policy paper based on results
Activity 3.7 Conduct 2 trainings on improving germplasm quality and community-based seed sourcing approaches for government and private sector nurseries		Achieved and reported in Y2	
Activity 3.8 Train and mentor community members in good seed collection practices, propagation (including vegetative propagation), tree nursery management, developing business plans and pursuing market linkages (7 communities in 3 countries)		7 households in two different provinces in Lao were trained in seed supply and seed collection	Technical support to involved community members, including in seed supply and establishment of an additional farmer seed source in Cambodia
Activity 3.9 Evaluate changes in seed production and value chains between communities and government and private sector nurseries, communicating lessons learned		End of project surveys designed	End of project surveys to be conducted and analysed (Covid-19 has delayed activities)

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

The Updated Logframe was approved by DI in 2019 – Changes are in yellow highlights – and no further changes have been made in 2020-21.

Project summary	Measurable Indicators	Means of verification	Important Assumptions
Impact: Enhanced conservation and sustainable use of Rosewood genetic resources, for improved livelihoods and ecosystem services for thousands of rural people across ≥5 Mha of forest landscapes in the Mekong Subregion			
Outcome: Forest authorities in four countries collaborate to conserve genetic resources of endangered *Dalbergia* species *in situ* and *ex situ*, while rural households increase their capacities to generate livelihood benefits from these resources	0.1 At least 50% increase in number of designated *in situ/ex situ Dalbergia* conservation units across 4 countries (new for some countries or species) 0.2 At least 20% increase in forest-related income of 175 rural households in 3 countries (end year 3), through *Dalbergia* seed/seedling production and planting 0.3 Methods and training materials for conservation, multiplication and value chain development exist and >100 professionals and 175 rural households trained to use and adapt them to enable scaling out	0.1 *In situ/ex situ* conservation records and site visits 0.2 Project baseline and external impact assessment end year 3 (by country, years; sex-disaggregated) 0.3 Availability of methods and training materials; training reports; evaluation of changes in technical and institutional capacities (external impact assessment end year 3)	• Records, baselines and surveys available and accurate • Forestry authorities implement the recommendations they co-developed through the project • No major socio-economic changes (policy, tenure, outmigration rates etc) or natural catastrophes in project sites that would limit community-based conservation activities • Regular fruiting of *Dalbergia* in target communities during project period • More trained people and enhanced collective action will help safeguard threatened *Dalbergia* spp. long-term • More comprehensive conservation leads to wider use and improved rural/forest-related livelihoods
Output 1 Regional assessment of the conservation status of *Dalbergia cochinchinensis, D. oliveri* and *D. cultrata*	1.1 Subregion distribution & threat maps for 3 *Dalbergia* spp. overlaid with existing seed zones, forest cover, climate predictions, threats, etc **(end Q1, yr 2)**. 1.2 Subregion database of existing *in situ* reserves and *ex situ* collections for 3 *Dalbergia* spp. species (incl. seed sources, molecular data, environmental data, threats) **(end Q1, yr 2)** 1.3 Identified population genetics gaps in seed collections and existing materials **(end Q1, yr 2)** 1.4 Identified *in situ/ex situ* conservation priorities for 3 *Dalbergia* spp. at national	1.1 Availability of maps 1.2 Availability of database 1.3/1.4 Policy paper, 1 research paper	• Access to existing information, records • Available information relates to actual status on the ground, or status can be estimated based on available data and trends • Participants in past initiatives willing to share experiences, including areas for improvement • DNA methodology developed for *D. cochinchinensis/D. oliveri* transferable to *D. cultrata*

	and Subregion levels across 4 countries. **(end Q3, yr 2)**		
Output 2. Filling gaps to conserve *Dalbergia* genetic resources through *in situ*, *ex situ* programmes and provenance testing	2.1 At least 23 new *in situ/ex situ* conservation units for 3 *Dalbergia* spp across 4 countries (units may overlap between species) **(end Q3, yr 3)** 2.2 60 forestry and conservation officers across 4 countries trained in *in situ/ex situ* conservation strategies for *Dalbergia* **(end Q4, yr 2)** 2.3 At least 15 new, coordinated seed collections for 3 *Dalbergia* spp. across 4 countries **(end Q3, yr 3)** 2.4 Regional/national provenance trials established to study adaptation of *D. cochinchinensis* (4 sites, 8 provenances across 4 countries) **(end Q3, yr 3)**	2.1 Records of units designated, site visits 2.2 Training reports/participant feedback (sex-disaggregated data) 2.3 Seed collections made and stored, report on populations/collections genetic diversity (1 publication) 2.4 Provenance trials, (design, plants grown in nurseries, sites prepared, actual establishment near or after project end)	2.1 Willingness of authorities to designate *in situ* conservation units 2.3 Sufficient trees produce enough seed for representative viable samples. Collecting permits granted by forest and other land owners. 2.4 Sites available for trials. Regional or national depending on seed exchange possibilities. Sites well managed and representative of conditions/contexts All: Gaps can be filled
Output 3. Multiplication to support use, income generation and reduced pressure on natural populations (propagation strategies, community nurseries etc)	3.1 *D. cochinchinensis* vegetative propagation method available & successfully used in government-owned and community nurseries **(end Q3, yr 3)** 3.2 Recommendations for overcoming the barriers to community-based seed and seedling supply for government-driven and private sector tree planting programmes, based on a review of at least 3 programmes in each sector (total for Lao and Cambodia) **(end Q2, yr 2)** 3.3 50 staff of government-driven and private sector tree planting programmes trained on the importance of good quality diverse germplasm, and options to source germplasm from community-based enterprises (25 Lao, 25 Cambodia) **(end Q3, yr 2)** 3.4 175 households in 7 communities (2 Cambodia, 3 Lao, 2 Vietnam) trained in good practices in seed collection, seed source management and/or propagation methods, incorporating documenting &	3.1 Availability of protocol; successful propagation of diverse genotypes (incl. rooted cuttings and grafting) 3.2. Policy paper on recommendations; records of surveys, interviews, focus group discussions with programme staff and community members (sex-disaggregated data) 3.3 Availability of survey results and training materials; reports of trainings; post-training survey/evaluation. 3.4 Records of surveys of current practices; availability of training materials and training reports (sex-disaggregated data); M&E report 3.5 Institutions in place; results of participatory assessments (sex-disaggregated data); training records (sex-disaggregated data); nursery reports; visits to facilities; availability of business plans; partnership or sales agreements; evidence of FPIC process 3.6 Survey reports (sex-disaggregated data at intra-household level);	3.1 Availability of seed/plants to develop vegetative propagation (incl. rooted cuttings and grafting); methods are learned by community members 3.2 Interest and active collaboration from programme staff (to be facilitated by project partners) and community members 3.3 Training participants from programmes are able to influence seed sourcing practices in their organisations; & are willing to try community-based seed sourcing approaches as long as any concerns they have are addressed 3.4 Community members show interest toward the training topics. Male household members persuaded to allow women participate in trainings 3.5 Interest and active collaboration of community-members; some prior experience in collective action to facilitate implementation of field activities; women are allowed to participate in the activities and willing to

	sharing of traditional knowledge (at least 30% women) **(end Q3, yr 3)** 3.5 175 households involved in community-based seed collection business (7 communities) and operating community nurseries (4 communities, capacity 10,000 seedlings per year from year 3 onwards) **(end Q4, yr 3)** 3.5 175 households involved in community-based seed collection or production from seed-orchards business (7 communities) and operating community nurseries (4 communities, capacity 10,000 seedlings per year from year 3 onwards) 3.6 Number of households planting *Dalbergia* on their farmland increased by 30% in 4 communities by year 3 **(end Q4, yr 3)** (*indicator may be reviewed after baseline is established; lack of up-to-date data*)	documentation of networks; strategies available	do so as long as they fit in their daily routines and workload stays manageable. Availability of seed 3.6 Tenure is secure and socio-economic and environmental conditions are relatively stable to enable investments in planting

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)
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 Develop agreements on data sharing, database management and updating to ensure continuity and confidentiality where relevant (FPIC in communities)
1.2 Collect georeferenced data on species occurrence, seed zones, forest cover, climate predictions, existing *in situ* reserves and *ex situ* collections, strengths and weaknesses of past conservation initiatives, technical and institutional capacities (review, key informant interviews, incl. community actors, gender representation)
1.3 Prepare distribution and threat maps using database and ecological niche modelling
1.4 Validate maps and models through expert consultation
1.5 Develop database structure
1.6 Populate database with collected data
1.7 Identify conservation priorities through comparison of distribution, threat & socio-economic data, existing collections, strengths of past initiatives

2.1 Identify locations for conservation units in collaboration with stakeholders and between countries, to ensure sustainability and complementarity
2.2 Develop institutional arrangements and management guidelines, including material transfer agreements for regional trials
2.3 Develop and translate training materials, based on assessment of capacities (1.2) and new conservation strategies (2.2)
2.4 Organise and run trainings
2.5 Design and conduct seed collections among country partners
2.6 Establish provenance trials
2.7 Evaluate progress and changes in knowledge and practices and communicate lessons learned

3.1 Develop *D. cochinchinensis* vegetative propagation method (Cambodia)
3.2 Test *D. cochinchinensis* vegetative propagation method in other countries and *Dalbergia* spp.
3.3 Develop guidelines for appropriate use to multiply genetically diverse planting material

3.4 Analyse current practices for seed and seedling sourcing in ≥3 state-owned and ≥3 private sector nurseries, knowledge of seed quality and genetic diversity among programme staff, and their attitudes to community-based seed supply
3.5 Identify strengths and weaknesses in communities' current seed collection practices, seed exchange networks, market linkages, tree planting, community-level institutions, capacities and traditional knowledge (7 communities in 3 countries), including income generated from seed and seedling sales
3.6 In collaboration with stakeholders, formulate strategies for overcoming identified barriers, with recommendations and training materials for their implementation
3.7 Conduct 2 trainings on improving germplasm quality and community-based seed sourcing approaches for government and private sector nurseries
3.8 Train and mentor community members in good seed collection practices, propagation (including vegetative propagation), tree nursery management, developing business plans and pursuing market linkages (7 communities in 3 countries)
3.9 Evaluate changes in seed production and value chains between communities and government and private sector nurseries, communicating lessons learned

The following activities are linked to the overall project outcome, covering all outputs
M & E1 Inception workshop: update logframe, clarify measurement and report methodology and its implementation; team building
2 M&E Steering Committee meetings
3 Final workshop
Exit4 Outreach and translation workshops in partner countries

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
1A	Number of people to submit thesis for PhD qualification *	1M, 1F	Hong Kong Swiss-Thai				0	2
6A	Number of professionals trained on conservation and sustainable use strategies	80M, 22W	Cambodia, Lao, Vietnam		96	6	102	100
6B	Number of training weeks for professionals		Cambodia, Lao, Vietnam		2		2	ND
6A	Number of household members trained in project communities	71M, 28W	Cambodia, Lao, Vietnam	18	65	16	99	175
6B	Number of training weeks for household members		Cambodia, Lao, Vietnam	1	2	3	6	ND
6A	Number of staff at partners organisations receiving on the job training	30M, 8W	Cambodia, Lao, Vietnam	13	25		38	ND
6B	Number of training weeks for partner organisations		Cambodia, Lao, Vietnam	3	1		4	
7	Number of types of training materials to be produced for use by host country		Cambodia, Lao, Vietnam		2		1	
9	Number of species/habitat management plans (or action plans) to be produced implementing agencies		Cambodia, Lao, Vietnam					
12A	Number of computer based databases to be **established** and handed over to the host country		Cambodia, China, Lao PDR, Myanmar, Thailand, Vietnam	1	1		2	2
14A	Number of conferences/seminars/ workshops to be **organised** to present/disseminate findings				2	1	3	ND

14B	Number of conferences/seminars/ workshops **attended** at which findings from Darwin project work will be presented/ disseminated.	4M, 1F	Lao, Chinese, Cambodia, Finnish		1	1	2	ND
22	Number of permanent field plots and sites to be established during the project and continued after Darwin funding has ceased							23
23	Value of resources raised from other sources (i.e., in addition to Darwin funding) for project work			[redacted]	[redacted]	[redacted]		[redacted]

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)
Spatially explicit threat vulnerability and conservation priorities for Asian Rosewoods	Info-brief	Jalonen & Gaisberger 2021	F	Finland	Bioversity International	www.apforgen.org/resources/apforgen-publications/publication/spatially-explicit-threat-vulnerability-and-conservation-priorities-for-asian-rosewoods
Physiological responses of rosewoods *Dalbergia cochinchinensis* and *D. oliveri* under drought and heat stresses	Journal	Tin Hang Hung, Thea So, Syneath Sreng, Bansa Thammavong, Chaloun Boounithiphonh, David H Boshier, John J MacKay	M	Canadian	Wiley	Ecology and Evolution https://onlinelibrary.wiley.com/doi/pdf/10.1002/ece3.6744
Reference transcriptomes and comparative analyses of six species in the threatened rosewood genus Dalbergia	Journal	Tin Hang Hung, Thea So, Syneath Sreng, Bansa Thammavong, Chaloun Boounithiphonh, David H Boshier, John J MacKay	M	Canadian	Nature	Scientific Reports https://www.nature.com/articles/s41598-020-74814-2

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.	7.8 Mb
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.	
Have you included means of verification? You should 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 need 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. However, we would expect that most material will now be electronic.	No
Have you involved your partners in preparation of the report and named the main contributors	Yes
Have you completed the Project Expenditure table fully?	Yes
Do not include claim forms or other communications with this report.	