Darwin Initiative Main and Post Project Annual Report

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

Submission Deadline: 30th April 2020

Darwin Project Information

Project reference	25-023
Project title	Conserving Rosewood genetic diversity for resilient livelihoods in the Mekong
Host 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 Expert Office, Forest and Plant Conservation Research Office, Department of National Parks, Wildlife & Plant Conservation, Thailand University of Copenhagen, Denmark
Darwin grant value	GBP 409,897
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Reporting period (e.g., Apr 2018 – Mar 2019) and number (e.g., Annual Report 1, 2, 3)	April 2019 – March 2020 Annual Report 2
Project Leader name	Prof. John MacKay
Project website/blog/Twitter	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) 11/5/2020

1. Project rationale

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 four Greater Mekong Subregion countries (Cambodia, Lao PDR, Thailand, Vietnam – see Figures 1-8 in Annex 4.1 for maps).

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 second year workshops and were fully involved in shaping the detail of planned activities (see Year 2 workshop report Annex 4.2). Partners have identified and chosen the communities and areas to work in, as well as sites for collection and trial establishment.

We reported on challenges in initiating the project in the annual report of Year 1 and described the measures taken to redress the situation. As a result, the project has reached a full level of activity in Year 2, with 5 of 6 partners (Cambodia, Lao PDR, Vietnam, Bioversity International, University of Copenhagen) fully engaged in working on objectives a proposed. Negotiation of a funding letter has not been successful with the Thailand partner owing to restrictive national policies and long agreement processing times.

One of the challenges in forming the partnership was setting up the transfer of funds from Oxford to the partners. Delays and errors in the transfers occurred in the first half of 2019 because of inefficient procedures and major personnel changes at Oxford. This problem led the partners to send a letter to Oxford administration (dated 19 June 2019). A response was by the Head research services at Oxford (Dr Dan Blakey) who expressed his support for resolving the project problems in a letter to the partners (date 27 June 2019). The letters are attached (Annex 4.3). Measures were taken to redress the situation and expedite payments, but payments continued to be irregular in their time during Y2.

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*

Activity 1.1 Develop agreements on data sharing, database management and updating to ensure continuity and confidentiality where relevant (FPIC in communities)

Partly as a consequence of the protracted discussions with Thailand, the project collaborative agreement has not yet been agreed although comments have been received from the partners. Finalizing the agreement will be priority for the project leader (Prof MacKay, in Q1 of Y3).

Activity 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) (Y1 Q2-Q4)

Led by Bioversity, the work was largely completed and reported during Year 1 of the project, except for the strengths and weaknesses of past conservation initiatives, technical and institutional capacities which were completed in Year 2. The delay was due to funding constraints that led to the postponement of field work by country partners. A summary of the results of the Year 2 activities is given in Annex 4.4, including reports of interviews and a situational analysis of the role of protected areas in species conservation in Cambodia.

Activity 1.3 Prepare distribution and threat maps using database and ecological niche modelling

Completed and reported in Year 1.

Activity 1.4: Validate maps and models through expert consultation (Y2 Q1)

Although planned for Y2, this activity was largely conducted already in Y1 Q4 (Feb-March 2019) as reported in Year 1 annual report. Through the validation process, 31 additional high-quality occurrence points were obtained from project partners and other experts. The ecological niche models were re-run with the new occurrence data, and final distribution and threat maps presented at the project's second annual workshop in Vietnam in September, as well as at the National Training workshops on *In situ* and *ex situ* conservation options organised by country partners and University of Oxford in March 2020. Final maps can be found in Annex 4.1.

Activity 1.5 Develop database structure

Completed and reported in Year 1. Bioversity developed a database structure for species occurrence data in spreadsheet format and populated it with existing data.

Activity 1.6: Populate database with collected data (Y2 Q1)

In Year 2, additional occurrence data obtained during the validation stage was added to the database on species occurrences (31 new occurrence points, for a total of 511). As part of other species conservation projects, Bioversity is currently developing a global online database with distribution and threat maps of hundreds of tropical tree species. The occurrence data and spatial data layers of the three *Dalbergia* target species will be included in the global database. A key benefit of the inclusion is the opportunity to apply to *Dalbergia* species the advanced web mapping and priority setting tools being developed as part of the broader initiative. The global, widely publicized database will also enhance the visibility of the *Dalbergia* project's results. In

Year 2, Bioversity hired a web developer to create a restricted area on the website where only registered users can view detailed information about the *Dalbergia* species, given their sensitive status. The launch of the global database is expected in June 2020.

Activity 1.7: Identify conservation priorities through comparison of distribution, threat & socio-economic data, existing collections, strengths of past initiatives (Y2 Q2-3)

Potential regional *in situ* conservation priorities were identified based on spatial analysis results, using the following indicators by ecoregion:

- % of the species' potential distribution currently found in protected areas
- % of the species' potential distribution currently found in natural habitats
- % of the species' potential distribution predicted to become unsuitable for the species by 2050, due to climate change

The analysis was conducted for the entire distribution range of each of the 3 target species, which for some species also covers China, Myanmar or both. Five priority ecoregions were identified using this approach for *Dalbergia cochinchinensis* (mainly in Thailand and Vietnam), 6 priority ecoregions for *Dalbergia cultrata* (mainly in Myanmar, China and Lao) and 8 priority ecoregions for *Dalbergia oliveri* (mainly in Myanmar, Thailand and Vietnam). The detailed results by species, ecoregion and country can be found in Annex 4.5.

The results of the regional priority setting were communicated to the country partners during the annual project workshop in September 2019. Each partner then used this information and additional results about socio-economic considerations to identify priority locations for new *in situ* reserves and *ex situ* collections for Output 2. Project partners identified national and regional conservation priorities for the 3 species in the project's annual workshop on 9 September 2019 (see workshop report, Annex 4.2). During the trainings on *in situ/ex situ* conservation strategies for *Dalbergia* in partner countries (March 2020), presentations were made on the status of *Dalbergia* species in the region and more specifically for the country of that particular training. The presentations were based on the results from the project's analyses. Participants then worked in groups to discuss and then present options for *Dalbergia* conservation in their respective country. Details of the presentations are given in the training report (Annex 4.6).

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 (ending Y2 Q3)

Identification and prioritization of locations were discussed and validated with country partners. This work served to validate the output indicator on the number of conservation units to be developed, including both *in situ* and *ex situ* conservation (Table 1). This has been followed by field inventories of potential sites.

Table 1. Number of conservation units proposed for designation by each partner country

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

The Lao team worked with local staff (PAFO & DAFO) at project sites (Thapangthong & Nong districts, Savannakhet province) to identify populations of the 3 *Dalbergia* target species. According to the baseline survey in May 2019, there are 6 population sites of the 3 *Dalbergia* species with potential for establishing *in-situ* conservation units. The inventory included measuring dbh and height of the 3 *Dalbergia* species across the 6 population sites (Table 2).

Table 2. Lao PDR Inventory details of potential *in situ* conservation sites[1]

District	Population	Area	Species	No trees	Comments
Nong[2]	1	>10ha	*D. cochinchinensis*	485	90% <3.5cm dbh
Nong	2	>10ha	*D. cochinchinensis*	29	66% <3.5cm dbh
Nong	1	>10ha	*D. cochinchinensis*	23	65% <3.7cm dbh
			D. cultrata	40	78% < 5.8cm dbh
Thapangthong buffer zone Xebangnuan NBCA[3]	1	10-15ha	*D. cochinchinensis*	3	7-10cm dbh
			D. cultrata	55	5-29cm dbh
Thapangthong buffer zone Xebangnuan NBCA	2	10-15ha	*D. cochinchinensis*	42	48% <3cm dbh, range 0-9cm dbh
Thapangthong[3]	3	10-20ha	*D. cultrata*	6	dbh range 9-51 cm
			D. cochinchinensis	12	dbh range 9-45cm

Notes:
1. Village details excluded for security reasons
2. Nong district: only 1 potential site which was expected to have just one *Dalbergia* species. Inventory found 2 *Dalbergia* species, although numbers of each are very low.
3. Thapangthong district: dry dipterocarp forest, with shallow soil layer, risk of drought & fast flooding. Land and forest land allocation never implemented so villagers unaware of forest resources and forest land (excludes Xebangnouan NBCA area)
4. Daensatueng village, Thapangthong district: Forest Sanctuary. Villagers protected existing population of 2 Dalbergia species

The Vietnam team selected field coordinators for each project site: 3 CBB/AGI staffs acting as Coordinators; local staffs in national parks (NPs) consists of Department of Scientific Management and field staff including other local guides as needed; several experts and consultants have been consult to select for seed sources and other issues related on seeds.

Data sharing with other partners on species occurrence, seed zones based field surveys during 2003-2014 for *D. cochinchinensis* and *D. oliveri* including research publications; species occurrence of *D.cultrata* in Dong Nai and Gia Lai province. Field surveys in 2018-2019 found D. *cultrata* numbers in Chu Mom Ray National Park (CMR NP) as 240 seeding individuals. *In situ* and *ex situ* conservation sites have been identified (table 3) at Chu Mom Ray National Park with baseline data. Surveys have been completed including measurements and seedling counts. A new *ex situ* conservation unit will be designated. There is a lack of experiences on seed collections to NPs members; seed collected on demand.

Table 3. *Dalbergia* conservation units proposed for designation in Vietnam at Chu Mom Ray National Park

Species	Age (approx.):	Approx no trees	Size (ha)	*In situ*	*Ex situ*
D. cochinchinensis	15 years:	10 On going to count	20	x	
	16 years	150	3		x
D. oliveri	Proposal under discussion		3approx		x
	20 years:	20 On going to count	30	x	

Notes: stand names excluded for security reasons

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

A project collaborative draft agreement has been circulated with comments now received from the partners. The discussions with partners have indicated that transfer of materials for establishing provenance trials such as seeds or seedlings between countries is highly restricted. The regional provenance testing is being set up for several tests with materials from each country being tested within the same country.

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

A review failed to find suitable existing materials for the training planned under Activity 2.4. New materials were produced in the form of PowerPoint presentations which were translated into Khmer, Lao and Vietnamese and used in Activity 2.4. They will be placed on the project website and available as a long-term learning resource.

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

Trainings were carried out as follows: Lao PDR 5-6 March, Cambodia PDR 9-10 March, Vietnam 11 March). A profile of participants was agreed at the annual workshop in September 2019. Participants were surveyed on issues related to how they perceived their capacities on conservation of forest genetic resources both prior to and after the training. In each country participants expressed both increased knowledge and confidence in their knowledge as a result of the training. "*This training on in situ/ex situ conservation strategies for Dalbergia is very important*" "*Should have field trip. Please continue this project*" "*Add more training like this*" are examples of feedback from the participants. Results of the surveys and more details of the workshops are found in the training workshop report (Annex 4.6).

Activity 2.5: Design and conduct seed collections among country partners

Seed collections were planned by partners in Cambodia, Lao PDR and Vietnam; plan designs were discussed and validated at the Y2 annual workshop. Work was planned for Q3 and Q4 but has been delayed in Lao PDR and Vietnam owing to poor seeding and travel restrictions under COVID-19.

Five seed collections of *D. cochinchinensis* were carried out in Cambodia (in Siem Reap, Pursat, Kampong Thom, Kampong Speu and Koh Kong provinces) for DNA analysis and establishment in a provenance trial (Annexes 4.7 and 4.8). In Vietnam one seed collection of *D. oliveri* was secured from Chu Mom Ray National Park. 2019 was a poor seeding year in both Lao PDR and Vietnam, though some seed collection was carried under activity 3.8 (see report). Leaf tissues were collected more broadly for DNA analysis (*D. oliveri* (3 populations) and *D. cochinchinensis* (1 pop) in CMR NP, 108 samples). Seed collection will continue in the 2020 fruiting season. In Vietnam the collected seeds were also shared with the national seed bank unit at the Vietnam Academy of Forestry Sciences (Ministry of Agriculture and Rural Development) for *ex situ* conservation, community nurseries and 2 seed private companies.

Activity 2.6. Establish provenance trials

Seed collected under activity 2.5 is being raised in the nursery in Cambodia for establishing the provenance trial in yr 3 (Figure 1). Site preparation for establishment of the provenance trial in Cambodia was started but was put on hold because of the covid-19 crisis.

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

This is an on-going activity of feedback and reflection by project partners based on project activities and discussion amongst partners reflected in the annual workshop (Annex 4.2) and inputs to this report.

Figure 1. Young *D. cochinchinensis* plants grown in a forestry nursery for use in the establishment of provenance trials in Cambodia.

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

Activity 3.1: Develop D. cochinchinensis *vegetative propagation method (Cambodia) (ending Y2 Q3)*

The Cambodia partner conducted four tests evaluating different rooted cutting techniques, rooting substrate and watering system. A promising method was discovered with 69% of cuttings developing healthy roots and vegetative growth. Cuttings were treated with commercial rooting hormone, which is available in local markets, and raised in a mini-greenhouse with misting system for a two-month period. A good potting mix consisted of coarse river sand and river soil (1:1). The coarse sand ensures an optimal volume of air–filled pore space, while the river soil ensures water retention capacity and some nutrients required by the plants for root development. It is not recommended to use laboratory grade hormones, such as IBA, because they are too expensive and do not produce better results (Annex 4.9). Results were presented to the project partners at the annual workshop in September 2019. A protocol for grafting for *D. cochinchinensis* was also developed and used by a farmer run nursery to propagate *D. cochinchinensis* for establishment of a seed orchard and conservation unit (see Activity 3.8).

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

This has been postponed to year 3 as it requires a knowledge exchange visit from the Cambodian partner to the Lao partner and is currently not possible owing to COVID-19 travel restrictions.

Activity 3.3: Develop guidelines for appropriate use to multiply genetically diverse planting material

With the success of cutting propagation, a leaflet explaining the technique for *Dalbergia cochinchinensis* was produced (in Khmer language), with 500 copies printed for distribution (Figure 2). A similar leaflet covering the grafting technique for the same species was also printed (Figure 3). About 50 copies of both leaflets have been distributed to the local Forestry Administration in Phnom Penh and staff at IRD. Further distribution is planned via workshops, meetings and training events, but has been delayed owing to COVID-19 restrictions on travel and gatherings. The Head of the Forestry Administration Division in Phnom Penh who received the leaflet said that the technique is new for him, and he wanted to try it because it is a tree improvement method. He knew that cutting and grafting are applicable to fruit trees but did not realise that these techniques are also applicable to *D. cochinchinensis*.

Figure 2. Dissemination leaflet (A4) on cutting propagation techniques for *D. cochinchinensis*

Figure 3. Dissemination leaflet (A4) showing grafting techniques for *D. cochinchinensis*

Activity 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.

Actors in the seed value chains were interviewed as follows: 9 nursery operators (6 in Cambodia and 5 in Lao), 4 seed or seedling traders (Cambodia) and 3 restoration or tree planting programmes (Cambodia). List of interviewees is given in Annex 4.10 and a summary of the results in Annex 4.11.

Activity 3.5 Identify strengths & weaknesses in communities' current seed collection practices, seed exchange networks, market linkages, tree planting, community-level institutions & capacities (7 communities in 3 countries), including income generated from seed & seedling sales (Y1 Q3-4)

In July Bioversity International trained project staff from the Vietnamese Academy of Agricultural Sciences and Chu Mom Ray National Park in collecting socio-economic data for the project (report available in Annex 4.12). The training was originally planned for January 2019 but postponed due to severe illness of key Vietnamese collaborators. Partners in Cambodia and Lao were trained earlier in Year 1.

Socio-economic data across the 3 project countries was analysed and summarised to establish project baselines and to generate information on priorities for interventions (Annex 4.13). The results were presented to project partners at the second annual project workshop (September 2019).

Activity 3.6 In collaboration with stakeholders, formulate strategies for overcoming identified barriers, with recommendations & training materials for their implementation (Y1 Q4, Y2 Q1-2)

Identification of strategies was integrated into the trainings on germplasm quality and community-based seed supply (Activity 3.7), to involve stakeholders in the process and increase the likelihood of implementation. Training materials to guide the identification of solutions were developed based on the collected socio-economic data (Activities 3.4 and 3.5) by a senior socio-economic consultant, Lars Schmidt. The materials are available in Annex 4.14.

In one of the project villages in Kampong Thom (Cambodia), both men and women suggested to use Facebook in marketing seed and seedlings from the community nursery. Bioversity is developing a smartphone app "SeedIT" to help document the origin of seed and seedlings in restoration projects. Based on the villagers' familiarity with, and interest for, social media, it was

decided to add new features to the app to help seed collectors and nursery operators document and communicate about seed quality and origin (Annex 4.15). To help tailor the app for user needs and facilitate its uptake, a regional online survey was developed to better understand issues and good practices in documenting seed origins and in communication between the supply chain actors (Annex 4.16). The survey was translated to national languages and launched in April 2020. Modifications to the app will then be finalised based on the survey results. The app is expected to be available for testing in Q2 of Year 3, in time for the next *Dalbergia* fruiting season.

Activity 3.7 Conduct 2 trainings on improving germplasm quality and community-based seed sourcing approaches for government and private sector nurseries (Y2 Q1 – Y3 Q3)

The 'trainings of trainers' were jointly organised and carried out as follows:

- 11-12 November, Vientiane, Lao PDR: 22 participants (15 male, 7 female) (Annex 4.17)
- 14-15 November, Phnom Penh, Cambodia: 16 participants (14 male, 2 female) (Annex 4.18)

Trainings were delivered by Mr Lars Schmidt using training materials mentioned under Activity 3.6. Partners from Vietnam were invited to join the trainings but did not attend in the end. The training workshop in Cambodia had participants from relevant departments under the Forestry Administration and Provincial Forestry Administration. The training followed a 'standard' business model of improving profit by reducing production cost, increase production, increase potential income by product (seed and seedling) quality and improve market demand by diversifying distribution and marketing network. (Annex 4.18).

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) (Y2 Q1-Q4)

This activity is carried out by Forest Research Centre, Lao PDR, Institute of Forest and Wildlife Research and Development, Cambodia, and the Vietnamese Academy of Agricultural Sciences, in consultation with Bioversity. The partners organised a total of 4 trainings in project communities between January and March 2020, based on the training-of-trainers workshops (Activity 3.7)

Cambodia: The training course on "*Marketing of Tree Seeds and Seedlings*" was run for community-based seed suppliers (8-9 January 2020, Kampong Thom province), with 24 participants (7 women, 17 men) from 6 communities involved in managing community forests across the country. The overall objective was to increase the supply of quality seeds of the three *Dalbergia* species *D. cochinchinensis, D. oliveri,* and *D. cultrata* and improve income from sales of seeds and seedlings with a prime focus on collectors. The course was delivered by Dr So Thea, Mr Sreng Syneath, and Mr Sing Kosal of the Institute of Forest and Wildlife Research and Development who were trained in the first training of trainers (Annex 4.19).

Project team at the Institute of Research and Development also assisted a pioneer farmer in Pursat province in the establishment of a tree nursery and seed source of *D. cochinchinensis* on his farmland. The farmer had previously constructed a small tree nursery (capacity 40,000 seedlings per year) producing *D. cochinchinensis, D. oliveri,* and *Pterocarpus macrocarpus*. In late 2019, he secured four large contracts from public and private nurseries to supply a total of 90,000 seedlings of *D. cochinchinensis* and *P. macrocarpus* by 2020, requiring a new, larger nursery to meet the demand (Figure 4). With renovation of the existing nursery not an effective way, he decided to invest in building a more stable, long term nursery (Annex 4.20). In addition, he produced 350 plants of *D. cochinchinensis* using the grafting method (activities 3.1/3.3) which are ready for planting to establish as a seed source and *ex situ* conservation unit on his farmland. Using this method it is expected that the grafted seed source will produce viable seed more quickly, within four to five years providing a reliable, easily collected source of seed (Annex 4.21).

Figure 4. The Pursat (Cambodia) farmer's old nursery in 2019 (left) and new nursery in February 2020 (right)

Lao PDR: Training on nursery establishment, seed collection and seedling production for 3 communities in Savannakhet province (16-29 February 2020). The objectives were to:

1) Enhance the capacity and knowledge of seed collection, seed propagation and nursery establishment to interested villagers in 3 communities.
2) Engage local people to participate in the restoration of endangered species (3 Dalbergia species) through encouraging additional income for communities from sales of seed and seedling production.

Two trainings were held (1 in Xekue village, 1 in centre of Nong district), with the establishment of community nurseries in Xekue and Nong (District Livelihood Development Center). Site selection for nurseries was related to availability of resources (e.g. water, land, labour) as well as for ease of maintenance and ensuring high survival rate for seedlings. In some cases the villages are in mountainous areas without these resources, but setting up the nursery at a village cluster station allows villagers access for seedling care and knowledge transfer.

Six topics were covered in the training of villagers: 1) general importance of seedling production; 2) nursery establishment and maintenance; 3) soil preparation and soil improvement; 4) seed collection and seed germination; 5) seedling maintenance and nursery management; 6) seedling panting and forest planting.

The training also resulted in the establishment of a nursery and seedling production (about 14,108) at the same time, with theory sessions held over 1 day and 4-5 days for hands-on practice (Figure 5). There were 30 households (30 people representing 30 households; 10 females, 20 males) were trained in Nong district (Savue and Labaokhok villages) and 11 households (11 people representing 11 households, 1 female, 10 males) were trained in Xekue village, Thapangthong district.

Activity 3.9 Evaluate changes in seed production and value chains between communities and government and private sector nurseries, communicating lessons learned (Y2Q2, Y3Q1, Q4)

This activity follows sequentially the trainings for local communities (Activity 3.8) carried out in January-March 2020 (Y2Q4) and were delayed due to overall delays in project start up (Y1). A socio-economist researcher, Mr Remy Chhem, was hired from March 2020 to assess gender and social inclusion in the emerging seed production and marketing opportunities in Cambodia and the role of local institutions in mediating these. Cambodia was selected as the focus) of the study because among the project countries, community participation in tree seed markets is most advanced there. However, the field work had to be postponed because of the Covid-19 pandemic.

1. Equipment and tool preparation
2. Substrate preparation
3. Seedling bag filling
4. Seed bed preparation
5. Disposition of seedling bags
6. Seedling transfer
7. Seed cleaning and sorting
8. Nursery establishment
9. Seedling Growth
10. Nursery set up and team

Figure 5. Training on nursery establishment, seed collection and seedling production, Loa PDR.

Other Project Activities

An annual project workshop was held in Buon Ma Thuot, Vietnam, 9-13 September 2019. The objective of the workshop was to ensure the project makes progress on fulfilling the planned outputs by; working on specific activities, discussing and agreeing detailed work plans to fulfil its activities by the end of Year 2 and addressing issues identified by project partners and the review of the project's annual report by the Darwin Initiative. In addition to the project team, the workshop was attended by the Chair of the Project's M&E Advisory Group, Dr Christopher Kettle (Team Leader on Forest Genetic Resources and Restoration at Bioversity International). Also, Mr Hannes Gaisberger, GIS Specialist at Bioversity International who was in charge of species distribution modelling, and Mr Lars Schmidt, consultant hired to deliver trainings on seed marketing (Activity 3.7), attended related sessions remotely. A shared folder was established for the workshop where the workshop presentations and materials can be found.

3.2 Progress towards project Outputs

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

Before the project inception, the distribution and conservation status of the three Rosewood species across their ranges in the Greater Mekong region was uncertain. The most recent published IUCN Red List status assessments are from 1998 for *Dalbergia cochinchinensis* and *D. oliveri, and from 2012* for *D. cultrata*. As a result of the project, updated and expert-validated distribution and threat maps now exist (Indicators 1.1, Annex 4.1).The maps indicate habitat suitability for each of the species across their confirmed range, changes due to forest cover loss, areas where the species are predicted to be most vulnerable to climate change, and protected area coverage. Global ecoregions map were used as a proxy for tree seed zones, each of which is expected to harbour unique genetic adaptations and, therefore, warrant conservation measures for the target species. A database of the species occurrence data and the environmental data layers used in the analysis exists and is being developed into an online database (available for registered users) to help stakeholders access and update the data (Indicator 1.2, site under construction at www.tree-diversity.org). The results are being developed into a scientific journal article. Based on the results, national partners identified priority areas and methodologies for *in situ* and *ex situ* conservation (see Annexes 4.2 for Annual workshop report and Annex 4.6 on conservation strategies; Indicator 1.4). Moreover, genetic and genomic studies for *D. cochinchinensis* and *D. oliveri* are now underway by University of Oxford to correlate the genetic diversity with the climatic data to detect signals of adaptation (Indicator 1.3) and to help further refine conservation priorities. Policy papers on this work will be developed once the results are published (Indicators 1.3/1.4).

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)***

The indicator was originally set as 25 new conservation units; however, the annual report had stated the indicator differently as a 50% increase (see annual report and response to the report). A change request was prepared and submitted with the report. Based on the results of surveys (see activity 2.1 this report) and discussions at the annual workshop (Annex 4.2), the approved revised figure of 23 new conservation units in total, across the three target species and four countries appears achievable. However, the inability of the project to operate on the ground in Thailand (see section this report) means that it is likely that the figure will be achieved across 3 countries.

For example based on the inventory (see activity 2.1 report) possible sites for new *in situ* conservation were identified. Over quarters 1 to 3 of year 3, it is proposed to establish 3 *in situ* conservation sites (7 units) as per table 2 (see activity 2.1), covering approximately 25-30 ha. Two *ex-situ* conservation sites (Nong District), about 5 ha in total, and 1 ex-situ conservation site at the Forest Research Center, about 2 ha. It is expected to establish *in-situ* and *ex-situ* conservation sites for 2 species (*D. conchinchinesis and D. cultrata*), but not for *D. oliveri* as no viable populations have been found on which to base either an *in situ* unit of to make collections for an *ex situ* unit.

Indicator 2.3 At least 15 new, coordinated seed collections for 3 Dalbergia spp. across 4 countries ***(end Q3, yr 3)***

The project is currently behind schedule for this indicator (see discussion in activity 2.5). Seed collections of *Dalbergia cochinchinensis* were carried out in Cambodia and are on target. Only 1 collection has been possible in Vietnam and Lao PDR (See activity 2.5). Links have been made with (Dr Voradol of the Botanical Garden of Thailand_ for accessing seed collections in Thailand in conjunction with Kew, allowing analysis for assessment of conservation gaps.

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)*

In Cambodia a trial site (1 ha) has been identified and seedlings of *D. cochinchinensis* from five provenances have been secured for planting in Q2, yr 3 (Activities 2.5, 2.6; Annex 4.22). Trial sites are being identified and secured in Lao PDR and Vietnam, but trial planting will be delayed owing to seed collections not being possible till 2020.

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

Before the project, a vegetative propagation method for *D. cochinchinensis* was not publicly available in the project countries, although attempts to propagate it vegetatively had been made by individual institutions due to the high demand for planting and irregular seed production. As a result of the project, vegetative propagation methods are now available for both rooted cuttings and grafting. The protocols have been published in the local Khmer language (Indicator 3.1) and the grafting technique has already been used in a private nursery to secure genetic resources of *D. cochinchinensis* and establish a seed orchard (Activities 3.3, 3.8 in this report).

The baseline household survey of the project showed that in Cambodia, 21% of interviewed households had received income from tree seed sales over the past year, in average US$297 per household. No tree seed sales or seed exchange from the past year were recorded in the project communities in Lao PDR and Vietnam, with one exception where a farmer had sold seeds of plantation tree species (Annex 4.13).

In Year 2, barriers to seed supply chains were identified through focus groups in the project communities and interviews with supply chain actors (Annexes 4.10, 4.11, 4.23). Two trainings for in total 38 government and private sector staff were subsequently organised in Lao and Cambodia to identify actions for strengthening seed supply chains and related capacities (Indicators 3.2, 3.3, Annexes 4.17 and 4.18), followed by two community trainings in each country (Indicator 3.4, Annex 4.19).

Two trainings on establishing community nurseries were carried out in Lao PDR, involving in total 41 households and resulting in a model nursery with the capacity of approx. 14,000 seedlings per year (Figures 5). In Cambodia, a pioneer farmer's nursery was upgraded to increase its capacity to produce an additional 50,000 seedlings per year (Annex 4.20), and grafted plants were produced for the establishment of a farmer seed source to help alleviate lack of seed trees (Annex 4.21). (Indicator 3.5). In Vietnam, a community training on germinating and planting Dalbergia species had been organised in Year 1 in March 2019.

The project baseline indicated only 4% of interviewed households in the project communities in Lao PDR, and up to 25% households in Vietnam had planted Dalbergia trees over the past 3 years (Annex 4.13). The community trainings on establishing tree nurseries in Year 1 (Vietnam) and Year 2 (Lao) will help alleviate the lack of capacities in planting and lack of seedlings for planting which were identified during the baseline as main barriers to tree planting by farmers. (Indicator 3.6)

The indicators for output 3 continue to remain relevant. The extent of farmers' participation in project activities, seed and seedling production, seed markets and tree planting, and their perceived capacity changes as a result of the project will be assessed through household surveys at the end of the project. In addition, a socio-economic consultant has been hired to assess gender roles and social inclusion in seed supply chains in Cambodia.

3.3 Progress towards the project Outcome

The project Outcome was validated at the project inception workshop (yr 1 report) and specific progress has been made during year 2 on: identifying sites for designation/establishment as conservation units, household surveys in support of the poverty alleviation indicator and capacity building for professionals and communities as follows by outcome indicator.

By 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 baseline was established during year 1 (see Yr1 Annual report), with the Outcome indicator determined to be adequate at the yr 2 project workshop and likely to be achieved based on revision of the related Output indicator (2.1). Output indicator 2.1 was revised based on feedback from the yr1 review (see section 10, this report) and discussion at the year 2 workshop (see Annex 4.2) which was approved in the revised log-frame. Technical capacity with respect to *in situ/ex situ Dalbergia* conservation was assessed during trainings (see this report section 3.1, activities 2.3, 2.4)

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*

Activities for this indicator are ongoing with completion early in yr 2 of work to establish the baseline and income generation targets (Annex 4.13). Achieving the indicator is feasible range, although this will depend on the extent to which field activities are impacted by Covid-19. The project baseline is now established for impact assessment by country, years (sex-disaggregated).

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.

The Outcome indicator is ongoing and scheduled to be completed in Year 3; it is assessed as still adequate and the project is on track to achieve the target. Plans for its delivery were reviewed at the Year 2 annual meeting (September 2019, Vietnam; Annex 4.2) with methods and training materials now available (Annex 4.14: Seed marketing – training materials, training reports, Seed marketing training – Lao PDR, Annex 4.17; Cambodia, Annex 4.18. This has set the basis for the evaluation of changes in technical and institutional capacities (Annex 4.6 Conservation strategies training, pre- and post-training survey assessment)

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 conservation activities are temporarily 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. (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: (i) Access to existing information and records; (ii) Available information relates to actual status on the ground, or status can be estimated based on available data and trends; (iii) Participants in past initiatives willing to share experiences, including areas for improvement**;** (iv) DNA methodology developed for *D. cochinchinensis/D. oliveri* transferable to *D. cultrata*.

Comments: (i-iii) As reported last year, assumptions on accessibility of reliable information held well. We were able to access occurrence data for the species well beyond what is available in global open access datasets such as the Global Biodiversity Information Facility (GBIF, www.gbif.org) (Assumption 1.1). Validation processes through this year suggest that the available information corresponds well with the situation on the ground (1.2). Data gathering was

facilitated via coordination with the APFORGIS project lead by Bioversity International and the involvement of past projects and current partners in sharing materials and field data.

(iv) A paper submitted for publication by the project (Hung et al in review, Annex 3 table 2) has validated this assumption.

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) There is a general willingness to set up in situ conservation units in each partner country, as shown in this report by country partners for activity 2.1 in Section 3.1. Cambodia is now working with four in situ conservation units (four Community Forests) and an ex situ conservation unit (seed source from grafted seedlings) to be established in 2020. Similarly, Lao and Vietnam have identified suitable areas for the designation of units. Although some units will be in existing protected areas, the designation for Dalbergia protection will give new recognition of the importance of some sites and change awareness of the importance of protected areas for conservation other than threatened fauna. (2.3-2.4) In Cambodia, both site and seedlings for establishment of a provenance trial have been secured. 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: Work by the Cambodian partner indicates Assumption 3.1 holds true (see progress on Activities 3.1, 3.3). The remaining assumptions for Output 3 relate mainly to the interest and active participation of stakeholders and community members in project communities, which are facilitated by country partners. Stakeholders were generally willing to share information and experiences for the project to allow assessing existing seed sourcing practices (Assumption 3.2). Trainings attracted a wide variety of participants interested in collaborating with local communities for seed supply, as evidenced in the training reports (Assumption 3.3). However, the assumption on the availability of seed for establishing community nurseries (Assumption 3.5) has not held, as already reported earlier. *Dalbergia* seed trees have largely disappeared in many areas due to high demand for the wood and illegal logging, especially in project communities in Lao. To accommodate this, project activities have shifted more towards establishing seed orchards with less work on nurseries.

The main reasons for rural households not to plant trees were reported to be lack of knowledge on planting techniques, lack of interest, and lack of seed or seedlings in Lao PDR, and lack of money to buy inputs, lack of seed or seedlings, and lack of knowledge on planting techniques in Vietnam. As per these household surveys. Tenure security and socio-economic stability (Assumption 3.6) were not commonly reported as concerns (Annex 4.13).

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

The project's focus on combining conservation measures for CITES priority species with legal income generating uses for local communities from these species demonstrates the possibilities for alternatives to a strict, no access approach to conservation of endangered tree species. Achieving higher impact for both areas (biodiversity conservation and poverty alleviation) depends on the ability to demonstrate success in this approach during the project's lifetime (see also sections 5 and 6).

The project provides the first detailed assessment of the conservation status of three threatened *Dalbergia* species across their entire distribution range in the Greater Mekong subregion. In ddition to the current conservation status at population level, the project will also provide information about genetic variation and conservation status at an intra-specific level through both molecular and eco-geographic analysis, in the context of threats and adaptability related to deforestation, habitat degradation and climate change (indicators 1.2, 1.3). Commitment of partners and interest by stakeholders shows that the information generated by the project is making an important contribution to conservation planning for these *Dalbergia* species (see section 3.1 on Output 1 for evidence) as well as to setting up new and conserving existing conservation units (see section 3.1, Output 2 for evidence).

For example, the Cambodian team conducted tree counting and mapping of *Dalbergia* species in four community forests and adjacent private farm land (Annex 4.24) in three provinces. These activities give local communities knowledge of the number of trees and locations in their forests and enable them to better plan for seed collection and prepare for protection/patrolling of the areas and crack down on any illegal activity. Inclusion of *Dalbergia* assessment outside forests shows recognition of the potential importance of conserving threatened species through use on farms and their role in maintaing viable population sizes. The project also provided assistance to O Soam and Por CFs to enable regular patrolling of their CFs (Annex 4.25). The largest stand of *D. cochinchinensis* in O Soam CF is located in a remote area and illegal cutting was evident recently. By contrast Por CF holds one of the few remaining stands of *Dalbergia oliveri* in the country, with the area threatened by illegal cutting, forest fire and potential land conversion. Patrolling will not eliminate these threats, but slow the process, allowing time for action to use and conserve the genetic resources from these areas.

Figure 6. Assessment of *Dalbergia* trees in Kampeng CF, Pursat province, February 2020

Dalbergia seed is highly valued at >200 US$ kg throughout the region. An additional focus on the establishment of seed orchards will provide medium-term income alternatives for rural communities, while helping to secure and develop seed supply for species whose populations have severely declined, and as a pre-condition for successful long-term nursery business. Seed orchards make seed collection considerably easier, safer and less costly than in natural forest, while at the same time ensuring the maintenance of genetic diversity in community and restoration planting.

Average rural household income in the project countries is estimated to be approx. 5 to 7 US$ per day, according to the national project partners. Due to the complexity of assessing total household income, only forest-related cash income was recorded in the project's baseline survey. The results showed that mean cash income from sales of forest products varied between US$0.85 and 1.32 US$ per household day, with households collecting in average 2 to 4 different forest products for sale (Annex 4.13). The results imply relatively low total incomes of project's beneficiaries, in line with the country level estimates, and an important role of forest products in supplementing other cash income. Therefore, additional income from seed and seedling sales can importantly contribute to the livelihoods of the rural households in the project's target communities, and beyond where successful models can be established.

These activities to scale out project successes have already started in Cambodia, where knowledge on marketing of tree seeds and seedlings was provided to local communities from six Community Forests across Cambodia through training (Annex 4.19). New knowledge such as advertisement of products (seed and seedlings), product diversification, approaching clients, and customer service are important for farmers. For example, farmers now advertise their products via Facebook and one farmer uses a local radio station. These enable farmers to increase their financial share from seed/seedling sales, as they can bypass middlemen and approach clients directly. This economic impact will last beyond the project time frame as it is based on knowledge transfer and the securing of seed sources (see below). Assistance to a farmer in Pursat province in establishing a tree nursery (Annex 4.20), resulted in the employment of an increased number of workers in the nursery and the larger amount of seed required contributing to an increased development of the rural economy.

Figure 7. Participants attending the training course on marketing of tree seed and seedling in Kampong Thom province. Group discussion (left) and general discussion (right), January 2020.

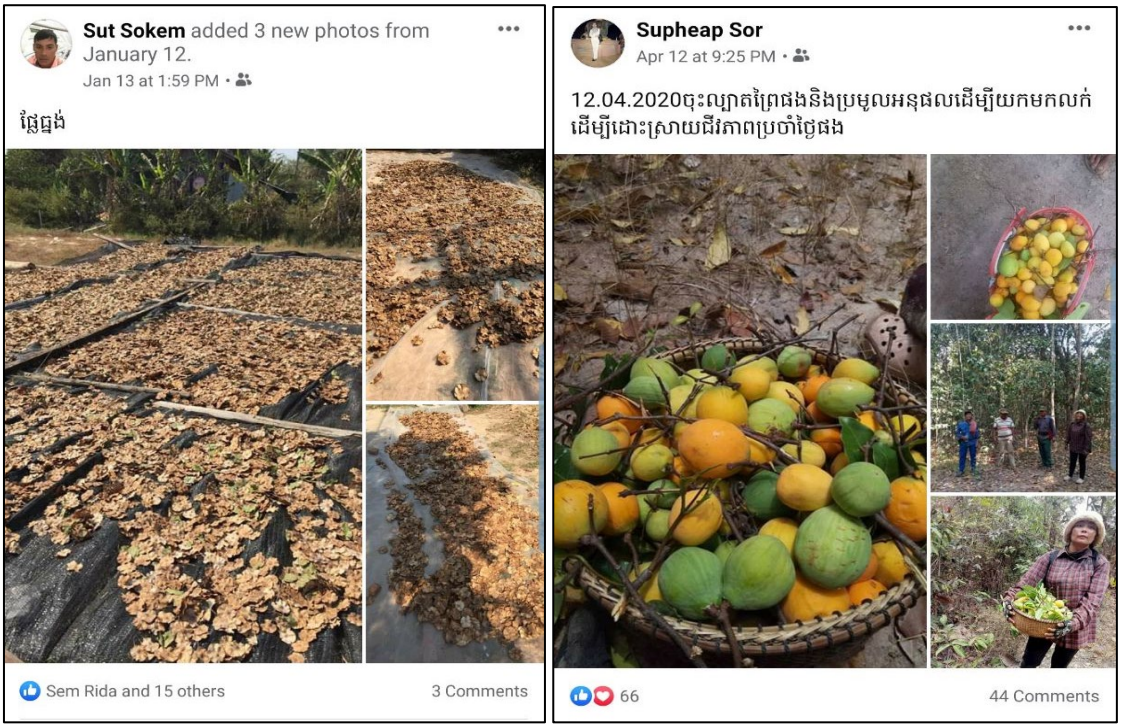

Figure 8. Screen shots from Facebook pages of Mr Sut Sok Em (farmer in Pursat province), advertising *Pterocarpus* seeds (left) and Ms Sorn Sopheap, a committee member of O Soam Community Forest, showing seasonal wild fruit collected from the forest for sale (right).

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* and *ex situ* activities will conserve threatened *Dalbergia* species and their genetic diversity, ensuring adaptability to climate change and human use. Increased capacity of local communities 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 2019-20 the project has contributed to all of the above SDGs within the project partner countries. To *SDG15* through identifying populations for designation as 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).

5. 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*.

Thailand: *sustainable conservation and restoration of natural resources focuses on promoting communities' participation in reducing threats to biodiversity, encouraging in situ and ex situ species conservation, research and database development, … promoting activities relevant to restoration and utilization of biodiversity.*

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 for providing input to their work on reviewing and developing management plans that aim to combine sustainable use with enforcement efforts to prevent illegal rosewood trade. The immediate focus will be input to a workshop in Lao PDR run by the Secretariat and Lao CITES focal point. Originally scheduled for 2020, the precise date is currently uncertain owing to restrictions related to COVID-19. Project input may extend to other countries within the Greater Mekong region.

6. Project support to poverty alleviation

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. The project is developing novel, and strengthen existing, capacity for seed collection, seed source and nursery management, and associated market chains. The project will build rural communities' capacity to generate livelihood benefits from long-term use of these resources. 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.*

Section 14 (Change Expected) of the project proposal identified a series of direct short term and long term benefits that are expected as a result of the project's implementation. In terms of poverty alleviation these are expected directly for women and men in the 175 households across 7 target local communities in Cambodia, Lao PDR and Vietnam. For example, in Cambodia, it is expected that active seed and seedling sales will contribute to poverty alleviation among the local communities at the second project site in the province of Pursat. In the Nong and Thapangthong districts in Savannakhet province in central Lao PDR the populations consist of diverse ethnic groups belonging to the Mon-Khmer-speaking Bru, Katnag, Souay, Mankhong, So and Trii groups. Both districts include National Biodiversity Conservation Areas (e.g. Dong Phou Vieng and Xebangnouan). Unexploded ordnance from the Indochina war remains, limiting local peoples' ability to develop their livelihoods and communities. The two districts are mountainous with unsustainable agriculture as the main activity (e.g. slash & burn, monospecific plantations of exotic species Eucalyptus and Acacia sp.). Additionally, forests house the main income generation and food resources for local people. *Dalbergia* trees are the main income source and are used for household construction. Furthermore, some local people, supported by a previous project, know how to collect tree seeds and produce seedlings for planting and selling as secondary income. So this is a great opportunity for these communities to learn and benefit from the Dalbergia Darwin project contributing to poverty alleviation.

Baseline data has been collected in yrs1 and 2 from which changes in economic status can be evaluated (Table 4). Examples of immediate impacts are seen in communities in Cambodia. The new and larger nursery in Pursat province employs up to 15 permanent and seasonal workers at various stages of seedling production (i.e. seed collection, processing, potting mix preparation, seedling maintenance, seed/seedling sales). These workers are local community members from the same area. Other community members that benefit from the nursery establishment include owners of the seed trees that are available in the area (*Dalbergia cochinchinensis, D. oliveri* and *Pterocarpus macrocarpus*) and seed collectors in other provinces supplying seeds to the nursery according to orders.

Table 4. Cash income related to forest products and seeds trade – project baseline[1]

Variable	Cambodia (n=39)	Lao (n=75)	Vietnam (n=44)	Mean (n=158)
% of households obtaining cash income from forest products (past 3 months)	61.5%	30.7%	20.5%	44.9%
Mean annual cash income from forest products (excluding households with no forest-related income), US$	483 ± 779	301 ± 611	353 ± 438	380 ± 621
Mean number of different types of forest products collected by households	1.7 ± 0.8	3.7 ± 1.5	2.4 ± 1.0	2.9 ± 1.6
% of households selling tree seed (past 12 months)	20.5%	1.3%	0.0%	5.7 %
Mean annual income from tree seed sales (excluding households not selling seeds), US$	297 ± 367	54 (n.a.) [2]	-	270 ± 352

[1] data is based on cash income over the 3 months before the survey in each country, and extrapolated to annual income. Seasonality in income will be addressed by aiming to collect end-of-project data during the same time of the year as the baseline survey, to compare % change in income during project.

[2] only one household identified selling seed

The project provided some basic tools and equipment to enable two community forestry members in O Soam (Kampong Thom province), and Por (Kampong Chhnang province), to conduct regular patrolling of their community forests (Annex 4.25). This is an indirect contribution to poverty alleviation because when the forests are well protected, local communities enjoy significant benefits from the forests. For example, every year more than 100 families from the O Soam Community come to the Community Forest to collect non-timber forest products (NTFPs) after they have finished planting and harvesting rice. This year, wild fruit collection from the community forest constituted the main income source, estimated at 20,000 US$/year (per. com. Ms Sorn Sopheap, CF committee member), followed by wild honey collection. O Soam is among a few CFs in the country with its own tree nursery (built by a previous project). This year the CF produced 2,000 seedlings of five species, of which 250 seedlings were *Dalbergia cochinchinensis*, for sale and planting in the CF. Community members also collected and sold 1 kg of *D. cochinchinensis* and 50 kg of four other tree species. Regular patrolling ensures that the *D. cochinchinensis* resource is conserved for sustained community economic benefits.

7. Project support to gender equality issues

In Year 2, the socio-economic data collection for the project baseline was completed in Lao PDR and Vietnam (it had already been completed in Cambodia in Year 1). Field teams included both men and women to make it easier and culturally more acceptable to conduct interviews and to help female respondents to feel comfortable and share information. All participatory group sessions were conducted in sex-disaggregated groups.

Results of the household survey revealed that women are only marginally involved in collecting forest products for sale, although in Lao and Vietnam they played an important role in collecting forest products for home consumption (Table 5, Annex 4.13). However, in forest user group meetings, member households were equally or more often represented by women than men. In light of these results and given that tree seed collection in the forest typically involves some climbing, it is unlikely that women would assume a major role in it. Establishment of seed orchards that are easily accessible from the villages and where trees are kept short through pruning makes seed collection more feasible activity for women. Through their widespread participation in forest user groups, women may also play an active role in managing communal seed orchards or nurseries.

Table 5. Gender roles in forest product collection and participation in forest user groups, according to the household survey (source: Annex 4.13).

Indicator	Cambodia (n=39)	Lao (n=75)	Vietnam (n=44)	Total (n=158)
% of households with only a female head	17.9%	6.7%	0.0%	7.6%
% of income generated from forest products that are collected mainly or only by women	5.1%	1.8%	6.8%	4.0%
% of households where women are involved in the collection of forest products	2.6%	44.0%	31.8%	21.4 %
% of households participating in a forest user group[1]	59.0%	9.3%	100.0%	46.5 %
% of households participating in a forest user group and where mainly women attend the group meetings	61.1%	50.0%	82.5%	70.7%

[1] Sample was drawn only among forest group members in one (very large) village in Cambodia and both villages in Vietnam.

Both men and women were encouraged to participate in all project activities, including trainings both at national and community levels. Most training participants to date have still been men and the target of having at least 30% of female participants in community trainings (Indicator 3.4) could not be achieved, except for the training held in Nong district, Lao PDR where 10 out of 30 participants were women (Annex 3 Standard measures). Trainings were typically held as joint trainings for two or more communities, to be able to train more people within the same time period and therefore longer and more in-depth training for each participant, as well as to allow exchange of experiences between communities. This may, however, limited women's opportunities to participate when the trainings were held outside of their own community, requiring travel and selection of one or few community representatives which may favour men.

Again, given their already active role in forest user groups, we expect women to become more engaged in seedling production and marketing over time. In Year 3, we will examine additional ways to support women's participation in project activities which may include community-level follow-up training events, small group trainings targeting specifically women, and identifying in each community women leaders who can serve as role models and mentors to other women in the community. In addition, a socio-economist 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 as project activities evolve. Cambodia was selected as the target country given that seed value chains there are the most developed among the project villages. However, field research for this work had to be postponed because of the Covid-19 pandemic and can likely only be carried out in Q2 or Q3 of Year 3.

Although quantitative targets for women's participation in trainings for government and private sector officers (Indicators 2.2, 3.3) were not set in the project logframe, women's participation in these trainings was encouraged and monitored. Again, most participants were men, although the situation varied and data from the trainings on Conservation methodologies for *Dalbergia* conducted in the three partner countries (Indicator 2.2) showed gender imbalances both ways at different events (Annex 4.6; Annex 3 Standard Measures). Forestry has traditionally been a male sector, and gender imbalances remain among staff of government and private sectors, making it more difficult to find female than male participants with relevant background for trainings. The women professionals who participated in the trainings were generally relatively young, indicating encouragingly that norms regarding both gender and seniority are changing and that being both

young and female does not have to be a constraint in accessing professional development opportunities in the project countries' forestry sector.

8. Monitoring and evaluation

The Monitoring and Evaluation Advisory Group convened for the first time on 3 March 2020 as a virtual meeting. We attempted to convene the board as early as September 2019 but delays were encountered due to the unavailability of and communication with members. The agreed recommendations are indicated below and the minutes of the meeting (Annex 4.26).

We will hold meetings every 6 months, with the next meeting agreed for September 2020, as outlined in the detailed M&E Plan developed in Year 1 (as previously reported). For recommendations 1-3 on impact pathway mapping, work will be done in Q1 of Y3. Recommendation 4 on Year 3 implementation is covered in the present report taking into account impacts of the Covid19 crisis and a Change Request will follow. For recommendation 5 on alternate representatives, the M&E Advisory Group will be asked to provide a substitute in Q1 of Year 3.

Agreed recommendations (from the minutes of the meeting)

1. The project team shall map the project's impact pathway to clarify how the project activities will result in the intended measurable indicators and the outcome.
2. After mapping the impact pathway (Recommendation 1), the project team shall identify important boundary partners for each outcome indicator and country as well as at regional level where relevant, and identify action plans to engage with them to help communicate and scale out the project results.
3. The team shall consult with Dr Gotor (Impact Assessment Specialist) for advice during the process above steps.
4. Project team shall revisit the Year 3 implementation plans during the preparation of the Year 2 annual report, and where relevant adjust the plans, so as to achieve the original project targets to the extent possible while considering the changing field realities. Proposed changes will be communicated to the donor [DI administration] as part of the annual reporting process.
5. In case an M&E Committee member is not able to attend the Committee's meeting, he/she shall appoint an alternate to ensure that the project team receives relevant insights and guidance from all partner organisations.

9. Lessons learnt

The transfer of funds from Oxford to international partners is one aspect that has continued to present some challenges. Delays have been encountered owing to the multi-level administration in the University, and the ever increasing compliance burden that applies to international transfers. Errors have also been made due to personnel turn-over. Advances are crucial for work to proceed and budget cycle to work within the Darwin funding use rules, and they have to be made correctly and on time. Unfortunately, the recommendation is to plan for more time for the project leader to liaise with and verify financial operations are as planned and on time.

One aspect of the project that has met variable success is the implementation of monitoring structures allow catching up with the timelines. Delays in Y1 have been partly been caught by virtual meetings and the addition of a Y2 workshop with project partners. Also we were able to have only one meeting of the S&E Advisory Board. For Y3, we will have more frequent meetings and systematic implementation of the agreed monitoring structures, including implementation of recommendations.

Project leader time was set at 20% in the budget but the actual time spent is closer to 50% given that there are partners in 4 developing countries and 2 others and the extent of reporting that is required by Darwin. Project leaders should be planned accordingly.

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

The review of our Y1 Annual report included comments and concerns, which were addressed in our response and actions were taken as described below. The actions include a change request to updates to the project logframe. The approved logframe is included in the present report.

- *Administration and partnership.*

The main actions taken to redress difficulties surrounding transfer of funds are described in section 2. The project lead team (Professor MacKay, Drs Jalonen and Dr Boshier) has worked to compensate for the delays caused by the administrative problems in setting up the project. The steps taken include holding an annual workshop in 2019 (9-13 September), which was not initially planned. During the workshop, work plans were updated and changes to logframe indicators were revised.

- *Variation to project outputs and outcomes (Change requests to clarify indicators)*

We addressed the concerns raised concerning the definition and number of conservation units in our response to the annual report review and by updating our logframe indicators. Based on the reviewer's comments, we reverted to our initial definition and made a small adjustment to the number of conservation units. This change was submitted to Darwin in a change request and was approved. The present report shows very positive progress toward meeting this indicator.

- *Outcomes supporting poverty alleviation (Change requests to clarify indicators)*

We responded to concerns concerning seed orchard establishment indicating their relevance given the lack of naturally occurring seed stands and the community nurseries and the high level of local interest, which is further substantiated in the present report. We submitted a change request to include seed orchards along with nurseries as means to support poverty alleviation and this change was approved by Darwin. Seed orchard development has begun in Cambodia in partnership with local businesses that own / manage nurseries as reported above. Long term maintenance of the seed orchards represents a challenge, which we plan to address in Y3 of the project by developing a plan to fund its support.

11. Other comments on progress not covered elsewhere

Covid-19 crisis impacts on activities and change management

The covid-19 crisis has affected all project partners and the restrictions will continue to different degrees. The severity of the covid-19 disease has been relatively light in partner countries of South East Asia and restrictions are beginning to be lifted for internal travel and field work; however, some key activities have been delayed and remain to be completed while timelines remain uncertain, especially when training and community surveys are required. International travel remains problematic as project coordinators are external to the region.

The activities affected in Y2 and potential timelines in Y3 and potential longer-term contingencies extending past 31 March 2021

- Delayed the implementation of field work to assess gender and social inclusion in seed value chains. This is still planned for the fruiting season of Dalbergia species from October 2020 to January 2021, but implementation plans for this work need to be reassessed together with country partners.
- Site preparation of the provenance trial was delayed in Siem Reap (Cambodia) and is influenced by seasonal conditions; it must be completed by July 2020, which appears likely given the conditions in Cambodia, otherwise it will have to be postponed to 2021.
- Delayed the development of provenance trial and ex-situ conservation in Lao PDR. It is influenced by seasonal conditions, for completion by July 2020 or postponed to 2021.
- Delay in development of seed sources from national parks in Vietnam including setting up nurseries and links with seed companies. It is influenced by seasonal conditions and expected to resume in June 2020 for completion by October 2020 or postponed to 2021.
- The communication of project results at international events, as reported in other sections.
    i. A Side Event on endangered species conservation and restoration was planned at the Conference of Parties of the UN Convention on Biological Diversity in Kunming, China,

October 2020. However, the COP has been postponed and is likely to take place in 2021 only after the project has ended.

ii. We planned to attend an International Symposium on Genetic Conservation and Restoration of Endangered Forest Tree Species in Asia-Pacific (March 2020, 1 abstract accepted), and at the Australasian Seed Science Conference (ASSC, April 2020, 2 abstracts accepted). Permission was granted for the Cambodian partner to travel and present at the ASSC. The events were postponed to late 2021. Budget adjustments to a yr 4 are needed for the presentations to be made.

- Shipment of leaf and seed samples for DNA analyses at Oxford was planned for partners in Vietnam, Cambodia, and Lao PDR in March 2020. Only Vietnam were able to send their samples. The other partners expect to be able to ship their samples in Q1 of Y3.

Potential project extension and budget changes due to the covid-19 crisis.

We plan to submit a change request (by 30 June 2020) to extend the project beyond 31 March 2021 (end of the project), with an updated work plan and budget extending beyond 31 March 2021. We are having monthly project meetings to work on contingency plans. The main changes we are considering are: (1) Several of the communication and outreach activities that have been delayed and will not be completed by the end of the project. (2) Completion of the field work that is at risk of being postponed. (3) Final project workshop after the end of Year 3.

Thailand involvement and Y3 budget

The Thailand partner has not been able to engage in any of their proposed fieldwork owing to the inability to agree on a mechanism for transfer of funds. Their portion of the Y3 budget will unused unless a change is agreed. Potential changes to the funds use in Y3 include: 1) repeat the training sessions that we held in Y2, with people in Thailand; 2) cover costs uncured due to the impacts of the covid-19 crisis (e.g. some staff time beyond 31 March 2021). The details and costing will be worked out with project partners, and included in a Change Request in Q1 of Y2.

12. Sustainability and legacy

The project's legacy and exit strategy are secured through the involvement of APFORGEN in the genesis of the project. The past and on-going engagement of project partners in this network shows their commitment to the work and its sustainability post Darwin funding. As such the planned exit strategy is still valid. However, as recommended by the M&E Advisory Group (see section 8), the project's impact pathway in each partner country will be mapped out in detail at the beginning of Year 3.

Project results on species distribution and threats (Output 1) will be hosted in a global database and maintained by Bioversity over the long term. Project partners will have access to a restricted area on the website that will allow sharing information about *Dalbergia* conservation efforts across the species distribution ranges. Similarly partners and a wider community will have long-term access to training materials in a wider range of languages than previously (Outputs 2 & 3).

In Cambodia, the project strategy provides synergies to existing systems. Working with existing Community Forestry groups which already have organizational structure in place to manage their forest will ensure that newly designated conservation stands will be secured for the long term. The nursery in Pursat is the main income generator for the farmer-owner. He has developed from a small-scale supplier to a well-established in the seed/seedling business in Cambodia within a few years. With the new nursery and his own seed source, it is unlikely that the business will stop in the foreseeable future, while this will also secure certain *Dalbergia* genetic resources *ex situ*, as well as increasing the availability of *Dalbergia* germplasm for planting.

Two proposals were developed and submitted during Y2 to extend and scale out country-specific activities started in this project. Unfortunately, neither proposal was successful.

Project name	*Trees4seeds: Diversifying community-based systems*	*Seeds for trees: Recovering Asian Rosewoods through improving seed availability and quality*
Project partners and other organisations involved	Bioversity International, Institute of Forest and Wildlife Research and Development, Cambodia, International Center for Tropical Agriculture	Bioversity International and Forest Research Centre, Lao PDR
Donor	INSPIRE Challenge, CGIAR	Franklinia Foundation
Grant value	US$ 100,000	US$ 150,000

In Y3, we will continue the work to secure funding for maintenance of provenance trials and seed production areas, which will be established in coming months. There will be a need to fund maintenance and monitoring of the plots after project completion, including weeding and fire prevention, which are particularly important in the first three year after establishment. Some of the monitoring can be done by staff in partner organisations and budgets require will be small. Funding requests can be made to donors to include this work and other activities.

See also Section 13 “Darwin Identity” on the publicity and the development of the project website, which helps to develop project visibility and promote the work. See also Section 11 above on the impact of the Covid-19 pandemic on plans to communicate project results to national governments, the scientific and conservation community.

13. 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). The entry sign for the new nursery in Pursat province (Cambodia) also displays the Darwin Initiative logo (see photo in section 3.2).

Bioversity International developed a website for the project which was launched in June 2020: 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.

APFORGEN was invited to report on its activities to the Asia Pacific Forestry Commission; the highest regional forestry body of the UN Food and Agriculture Organisation. The Chair of APFORGEN, Prof Zheng Yongqi, Chinese Academy of Forestry, described the emerging results of the project in his presentation which included the Darwin Initiative and Defra logos. The following news articles were published on websites of APFORGEN and the Alliance of Bioversity International and CIAT during Year 2, with acknowledgements of the Darwin Initiative as the project donor.

- Why conserve Rosewood? (*13 June 2020)* http://www.apforgen.org/activities/news/detail-news/conversation-with-members-of-the-dalbergia-project-team
- Progressing with the strategy implementation – APFORGEN reports to the regional Forestry Commission (*19 June 2020)*

http://www.apforgen.org/activities/news/detail-news/progressing-with-the-strategy-implementation-apforgen-reports-to-the-regional-forestry-commission

- An Alliance for Trees: Why forest biodiversity is too precious to lose *(20 March 2020)* https://www.bioversityinternational.org/news/detail/an-alliance-for-trees-why-forest-biodiversity-is-too-precious-to-lose/

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 (@ChrisJKettle) and Tania Kancharanak (@TKanchanarak).

14. Safeguarding

As a first response to this new request to develop a policy and plan for safeguarding of vulnerable people, we have looked to the University of Oxford policy on safeguarding of adults at risk and children, which was adopted in 2015 and is provided in Annex 4.27 (p. 1-8).

The main points outlined in the UoO policy of relevance to this project include:

- Designation of safeguarding leads when planning activities and training
- Actions to be taken to assess and minimize risks, and relevant guidelines
- Guidelines on training including planning and ensure training is available
- Dealing with suspicions or allegations of abuse, including reporting and other relevant actions to be taken such as share of information with appropriate authorities

The key actions that are proposed to develop and implement a policy for this project through engagement with the partners are as follows:

1. The identification of relevant policies and mechanisms started at the end of April 2020. The UoO policy has been shared with the project partners on 08 May 2020.
2. Discussions on the development of a plan will be held with project partners in Q1, and a draft developed for adoption in Q2 of 2020-21. The project lead (Prof. MacKay) will be responsible for these steps.
3. The project lead (Prof. MacKay) will also set up a register of safeguarding issues raised and how they were dealt with by the end of Q1 2020-21.
4. We envision that the policy and plan will include procedures for investigation of allegations and complaints, for disciplinary action; this be developed by working with institutions and building on their existing policies. We will also address sharing of the policy, whistle-blowing, codes of conduct.

Among the mechanisms and procedures that are already in place in partner organization, there is a whistle blower hotline that is available to Bioversity International members and is relevant to safeguarding, among others (Annex 4.27, p.9).

15. Project expenditure

Table 1: Project expenditure <u>during the reporting period</u> (1 April 2019 – 31 March 2020)

Project spend (indicative) since last annual report	**2019/20 Grant (£)**	**2019/20 Total Darwin Costs (£)**	**Variance %**	**Comments (please explain significant variances)**
Staff costs (see below)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Monitoring & Evaluation (M&E)				
Others (see below)				
TOTAL				

1. .

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2019-2020

Project summary	Measurable Indicators	Progress and Achievements April 2019 - March 2020	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.	[redacted]
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 Baseline established (Annex 4.13) 0.3 Trainings of trainers on seed marketing run by Bioversity & national partners in Cambodia & Lao PDR (36 participants, 27 male, 9 female) (Annex 4.17, 4.18) based on these trainings, national partners organised trainings for community members (reported separately by partners). Training of professionals on in situ/ex situ conservation (Annex 4.6)	0.1 Maps will be developed and database populated, conservation units will be identified in 4 countries. 0.2 Seeds will be collected in 3 Dalbergia species to set up provenance trials in 4 countries, and support the development of seed orchards in 4 countries; household surveys will be completed. 0.3 Tests on multiplication methods will be completed and outcomes used for training, value chains will be assessed and business plans developed.
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	1.1 Achieved and reported in Y1	

	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 1.4 Identified *in situ/ex situ* conservation priorities for 3 *Dalbergia* spp. at national and Subregion levels across 4 countries.	1.2 Database on species occurrence data completed; online version of database with species and environmental data and with restricted access being developed 1.3 This activity is led by University of Oxford 1.4 Conservation priorities by species, country and ecoregion identified (Annex 4.5) and communicated to national partners	
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 Partly completed and reported in Year 1; analysis of previous conservation strategies in Y2 available in Annex 4.4	
1.3 Prepare distribution and threat maps using database and ecological niche modelling		1.3 Achieved, see Annex 4.1	N/A
1.4 Validate maps and models through expert consultation		1.4 Achieved, see Annex 4.1	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 Occurrence data compiled	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 4.5) and communicated to national partners	Support refinement of identified regional-level priorities based on field data and partners' experience

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). 2.3 New seed collections accessed in Cambodia (see activity 2.5, section 3.1) 2.4 Site selected and secured for trial in Cambodia, site preparation has been stoped due to Covid-19 crisis	
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 were developed and most sessions were completed in Y2 (Annex 4.6, 4.14, 4.17-4.19)	Some training may be repeated
2.5 Design and conduct seed collections among country partners		Completed or partly completed depending on country (see Annex 4.8, 4.22)	Finalize work delayed by low seed production or Covid-19
2.6 Establish provenance trials		Seedling production started in Cambodia	Finalize seedling production and plant sites
2.7 Evaluate progress and changes in knowledge and practices and communicate lessons learned		Ongoing evaluation and assessment during Y2	Contine in Y3
Output 3. Multiplication to support use, income generation and reduced pressure on natural populations	3.1 *D. cochinchinensis* vegetative propagation method available &	3.1 Methods developed, leaflet produced for rooted cuttings and grafting (Fig. 2 and 3), methods available for transfer and training	

(propagation strategies, community nurseries etc)	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)	3.2 Data collection completed (Annex 4.11), recommendations identified at national training workshops (Annex 4.17, 4.18)
	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)	3.3 In total 36 stakeholders trained in Year 2 (Annex 4.17, 4.18)
	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)	*3.4 This activity is led by national partners*
	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)	*3.5 This activity is led by national partners.* Baseline was established (Annex 4.13) and strategies identified at trainings with stakeholders *(Annex 4.17, 4.*18) and with community members (Annex 4.19, 4.23)
	3.6 Number of households planting *Dalbergia* on their farmland	3.6 Baseline and reasons for not planting trees established (Annex 4.13)

	increased by 30% in 4 communities by year 3 (*indicator may be reviewed after baseline is established; lack of up-to-date data*)		
Activity 3.1 Develop *D. cochinchinensis* vegetative propagation method (Cambodia)		Research on methodology is completed Annex 4.9	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		Completed	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		19 stakeholders (13 Cambodia, 6 Lao) interviewed (Annex 4.10, 4.11)	Write a research paper and a policy paper based on results
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		Baseline (Annex 4.13) and priority activities established (Annex 4.17, 4.18, 4.19)	Write a research paper and a policy paper based on results
3.6 In collaboration with stakeholders, formulate strategies for overcoming identified barriers, with recommendations and training materials for their implementation		Baseline (Annex 4.13) and priority activities established (Annex 4.17, 4.18, 4.19)	Write a research paper and 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 (Annex 4.17, 4.18)	
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)		In progress, with >80 community members trained (Annex 4.19 and report section 3)	Implement strategies in the next Dalbergia fruiting season (Y3 Q3-Q4)
Activity 3.9 Evaluate changes in seed production and value chains between communities and government and private sector nurseries, communicating lessons learned		Postponed to Year 3	

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

Updated Logframe as approved by DI in 2019 – Changes are in yellow highlights.

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 ~~25~~ 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	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	3.1 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

	methods, incorporating documenting & 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*)	3.6 Survey reports (sex-disaggregated data at intra-household level); documentation of networks; strategies available	activities; women are allowed to participate in the activities and willing to 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 & E 1 Inception workshop: update logframe, clarify measurement and report methodology and its implementation; team building

2 M&E Steering Committee meetings

3 Final workshop

Exit 4 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	DPhil	1M, 1F	Hong Kong Swiss-Thai			2		2
4A	MSc student trained on spatial conservation analyses	1F	British		1		1	
4B	MSc student trained on spatial conservation analyses	1F	British		10		10	
6A	Cutting propagation	3M	Cambodia		3		3	
6A	Grafting propagation	2M	Cambodia		2		2	
6A	Leaf and seed sample collection	8M, 1F	Cambodia, Vietnam		9		9	
6A	No. of households trained in seed and seedling marketing	17M, 7F	Cambodia		24		24	175 (Ind. 3.4)
6A	No. of households trained in seed collection and propagation	45M, 14F	Vietnam, Lao	18	41		59	
6B	No. of training weeks in seed and seedling marketing		Cambodia		1			
6B	No. of trainings weeks on seed collection and propagation		Lao, Vietnam	1	1		2	
6A	Socio-economic data collection training for national project partners	16M, 7F	Cambodia, Lao (Year 1), Vietnam (Year 2)	12	11		23	
6B	Socio-economic data collection training for national project partners	7M, 4F	Cambodia, Lao, Vietnam	2	1		3	3
6A	Spatial approaches for assessing the status and trends of native tree species	1M	Lao	1			1	
6B	Spatial approaches for assessing the status and trends of native tree species	1M	Lao	1			1	
6A	Training of Trainers on Tree Seeds and Seedlings Marketing	29M, 9F	Cambodia, Lao		38		38	50 (Ind. 3.3)
6B	Training of Trainers on Tree Seeds and Seedlings Marketing: traing weeks		Cambodia, Lao		1		1	1
6A	Training on in situ/ex situ conservation strategies for	45M, 13F	Cambodia, Lao,		58		58	60 (Ind.2.2)

	Dalbergia for forestry and conservation officers		Thailand, Vietnam					
7	Seed and seedling marketing: materials for 2-day training of trainers		Cambodia, Lao		1		1	1
9	Number of species/habitat management plans to be produced for Governments, public authorities, or other implementing agencies in host countries		Cambodia, Lao, Thailand, Vietnam					4
12A	(1) Occurrence database and (2) conservation status by ecoregion, for 3 species across their entire range		Cambodia, China, Lao PDR, Myanmar, Thailand, Vietnam	1	1		2	2
14B	(1) International Congress on Conservation Biology, (2) Asia Pacific Forestry Commission, (3) Australasian Seed Science Conference*, (4) International Symposium on Endangered tree species* (* postponed due to Covid-19)	4M, 1F	Lao, Chinese, Cambodian, Lao, Finnish		2 (4)		2	3
22	Number of permanent field plots and sites to be established during project & continued after Darwin funding has ceased (6 *in situ* 8 *ex situ* +4 provenance trials)							18
23	Co-funding from Bioversity International for staff time	1F	Swiss-Thai					
23	Value of resources raised from other sources (i.e., in addition to Darwin funding) for project work							

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)

*Conserving Rosewood Genetic Resources for Resilient Livelihoods in Greater Mekong	Info sheet	Bioversity International and University of Oxford, 2019	F	Finland	Bioversity International, Serdang, Malaysia	
*Conserving Rosewood genetic resources for resilient livelihoods in the Mekong	Workshop report, inception workshop	Bioversity International and University of Oxford, 2019	F	Finland	Bioversity International, Serdang, Malaysia	

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

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.	
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 need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	✓
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. However, we would expect that most material will now be electronic.	
Have you involved your partners in preparation of the report and named the main contributors	✓
Have you completed the Project Expenditure table fully?	✓
Do not include claim forms or other communications with this report.	