



Darwin Initiative Capability & Capacity: Final Report

To be completed with reference to the “Project Reporting Information Note”:
(<https://www.darwininitiative.org.uk/resources-for-projects/information-notes-learning-notes-briefing-papers-and-reviews/>).

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

Submission Deadline: no later than 3 months after agreed end date.

Submit to: BCF-Reports@niras.com including your project ref in the subject line.

Darwin Initiative Project Information

Project reference	DARCC014
Project title	Enhancing the capacity and capability of orchid conservation in Armenia
Country(ies)	Armenia
Lead Partner	Royal Botanic Gardens Kew
Project partner(s)	Nature Heritage NGO
Darwin Initiative grant value	£131,418
Start/end dates of project	1st April 2022 to 31st March 2024
Project Leader's name	Dr Aisyah [REDACTED] Kew
Project website/blog/social media	Updates via @KewScience or @AisyahFaruk
Report author(s) and date	Dr Aisyah [REDACTED], Dr Anush [REDACTED], Dr Astghik [REDACTED]; 30/04/2024

1 Project Summary

The urgency of protecting our world’s biodiversity is now becoming apparent, with an estimated 39% of all vascular plants threatened with extinction. A cost-effective way of conserving plants is through long-term seed banking; however, some species have seeds that are unsuitable for conventional seed banking techniques. These are known as “exceptional species”, which include orchids, therefore the approach to conserve orchids requires an integration of in situ and ex situ conservation methods. Alongside the practical difficulties in conserving orchids, the trade of orchid tubers in the Central Asian region has raised concerns over its effects on wild populations. The collection and use of orchids in Armenia are undocumented, further threatening local populations from illegal collections that can contribute towards species loss, as seen in neighbouring countries (e.g., Turkey and Iran). Armenia currently lacks an ex-situ strategy for orchids due to limitations in the capability and capacity to store and duplicate seeds of “exceptional species”.

The project aims to enhance the conservation of temperate, terrestrial orchids and their associated habitats in the Caucasus Biodiversity Hotspot through increasing the capability and capacity of local communities, civil institutions, and NGOs in Armenia to identify and conserve orchids in situ and ex situ. The project team will work closely with the Yenokavan community (see Figure 1), situated within a high orchid diversity area situated within an area of high orchid diversity and increasing encroachment from farming and eco-tourism activities.

In situ conservation

The in-situ aspect of the project involves:

- 1) Raising awareness of orchid collecting and trade, and national and international legislation (e.g. CITES) via an in-country training workshop with members from the Armenian Ministry of Environment and the Institute of Botany of Armenia;
- 2) Enhancing the capability of in-country NGO on conducting community engagement for conservation through training and continued supervision;
- 3) Build empowerment towards rural communities through participatory mapping of key resources used by the communities and identifying mutually beneficial conservation management at the landscape level, indirectly contributing towards poverty alleviation through ensuring important areas for local livelihoods are not impacted by land-use planning;
- 4) Engagement of a local MSc student to enhance knowledge of orchid habitat quality, distribution, and population size, thereby simultaneously supporting biodiversity conservation and contribute towards increasing opportunity for potential employment at a higher salary; and
- 5) Sharing of project learning through a networking workshop, giving an opportunity for stakeholders to feedback proposed conservation strategies and discuss outcomes for local community. The results will also be reported to the CITES Authority in Armenia and the UK's CITES team.

Ex situ conservation

The ex-situ aspect of the project involves the following:

- 1) Ensuring the first viable seed collection of native Armenian orchids in cold storage in-country and at the Millennium Seed Bank through training of staff from the National Seed Bank and procurement of equipment for collecting, cleaning, drying and storing orchid seeds;
- 2) Development of a working protocol for temperate, terrestrial orchids of the Caucasus via storage experiments;
- 3) Global dissemination of project learning and outputs to an international seed banking community via the Millennium Seed Bank Partnership newsletter (e.g. Samara) and training programmes.

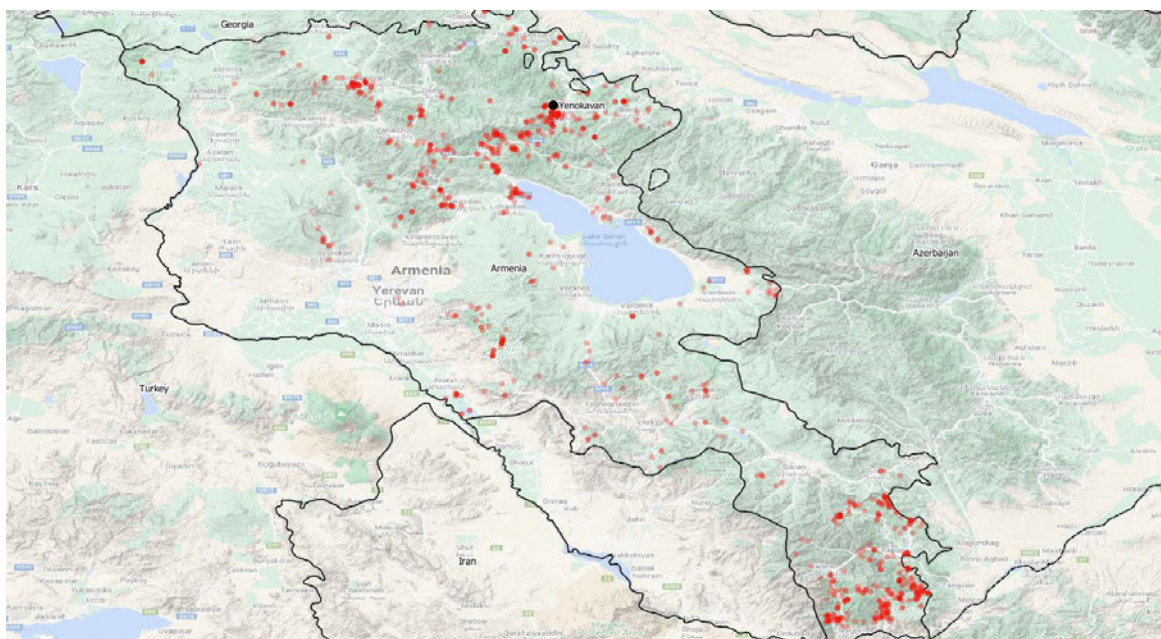


Figure 1 Map of the orchid localities (red dots) and target community (black dot) to the north of Armenia

2 Project stakeholders/partners

All formal partners and key stakeholders are actively engaged with the project. The in-country lead, Nature Heritage NGO members have been instrumental at developing the ongoing community engagement activities in Yenokavan and surveying orchid localities. In-country partners have led on the choice of target community, based on their extensive knowledge of the current threats and challenges of the area. Similarly, in-country partners determined the selection of orchid species for both the seed conservation and MSc student research aspects of the project. The project team (RBG Kew and Nature Heritage NGO) are also collaborating with the Herbarium and Seed Bank managed by the A. Takhtajyan Institute of Botany National Academy of Science of Armenia as a core part of the project activities. The Herbarium has been instrumental at providing access to herbarium collections and expertise to project team, enabling successful targeting of orchid populations and verifying the taxonomy of species. The Seed Bank have also given access to facilities for processing and storing seeds for experiments and long-term conservation. Staff from the Institute of Botany have also given their time to attend training led by the project team and utilising learning in orchid conservation.

Nature Heritage NGO submit written reports on their achievements and challenges against project objectives on a bi-annual basis to the project PI. These include photos and material for verification. All the reports and evidence have been incorporated into the annual reports and within this final report. Any issues raised are discussed via email and during regular online meetings between the project PI and in-country team. All members of the project team have been given a chance to review the final report and give feedback prior to submission. In April 2022, Nature Heritage NGO and RBG Kew agreed to continue ongoing collaborations through renewing the existing Access and Benefit Sharing Agreement until end of March 2025 (Figure 2). Since then, both parties have successfully received funds from the Garfield Weston Foundation to conduct further seed conservation activities until December 2026, highlighting the continued relationship between partners after this current project is completed.

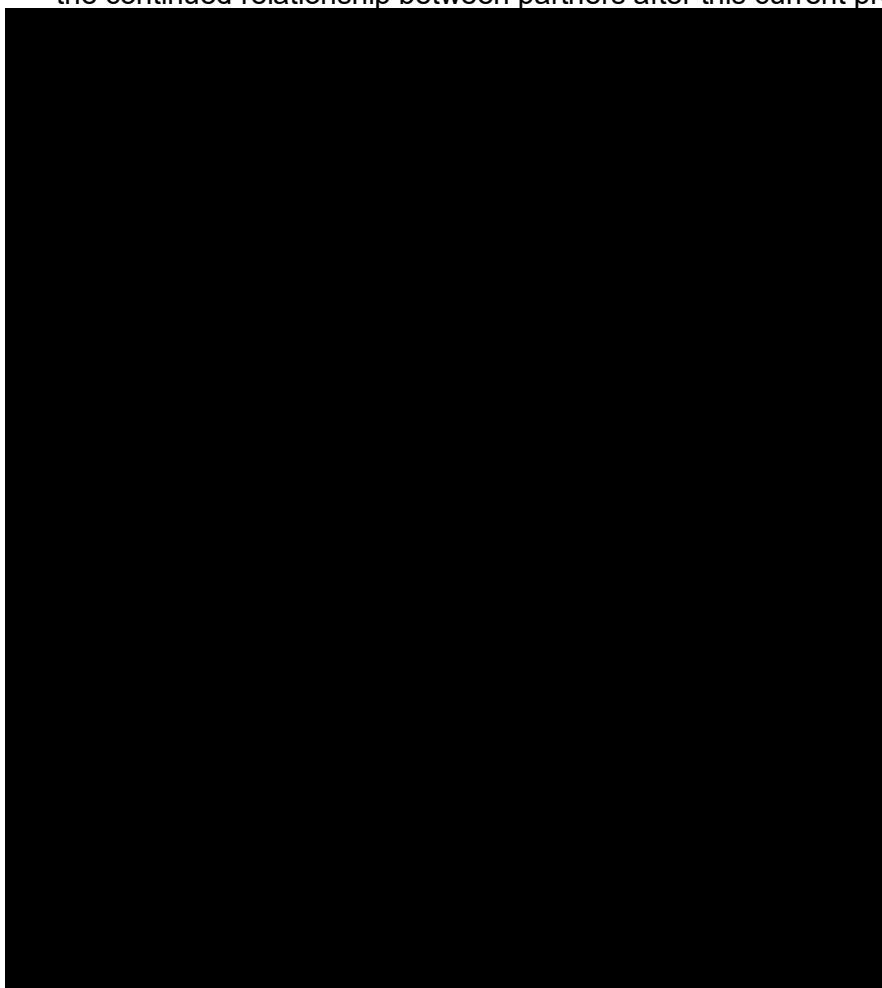


Figure 2. Copy of the Renewal and Extension of Access and Benefit Sharing Agreement between project partners. The original available upon request.

3 Project Achievements

3.1 Outputs

Output 1 Enhanced capability of local stakeholders within the Yenokavan community to protect orchid diversity in situ.

Baseline condition: Minimal capacity for sustainable orchid conservation action within the local community and wider Armenia.

The Yenokavan community sits within an area of high orchid diversity. Alongside its diverse landscape are growing pressures from the tourism industry, including building of hotels/bed and breakfast, development of walking trails and other adventure sports (e.g. 4x4 driving, zip-lining etc), which have the potential of bringing in work and funding to the community, but if not properly managed, can threaten the surrounding natural environment and local livelihoods. During the project development phase, we worked with the in-country partners to identify key stakeholders for the community, including current community members, the local school, hotel/Bed & Breakfast owners/workers, tour guides, those that work in the office of the municipality, local plant conservation practitioners and researchers (e.g. Institute of Botany). The project aims to look at enhancing the capability of these stakeholders within a high biodiverse landscape for orchids (i.e. Yenokavan).

During the project development stage, together with in-country partners, we identified a gap in knowledge and understanding of two key subject matters to enable effective protection of orchid diversity in situ: Convention of International Trade of Endangered Species (CITES) and community engagement/social science techniques. CITES is particularly relevant to the project as all orchids are CITES species, whilst effective community engagement/social science techniques will enable local conservation practitioners to gather important information of orchid use and threats from those that work within the landscape itself, enriching their understanding for overall conservation.

Project PI and a member of the RBG Kew Policy and CITES department travelled to Yerevan in July 2022 to lead on the first ever CITES course held in Armenia. The training exceeded the number of participants within the original log-frame (target: 10 people; actual:15) and proportion of women represented (target:~60%; actual: 87%) (Figure 3). A translation was provided throughout the training to make the material accessible to all participants. In the second year of the project, we reviewed the learnings from year 1 to ensure that the participants are confident in utilising the lessons learnt from their training. This was done via an online survey, which was sent out to the participants of the CITES training course held in July 2022. The survey was done in both English and Armenian. Out of the 15 participants that took part in the training, 13 responded to our survey. On average, most respondents felt comfortable describing the aims and functions of CITES (8.8 score out of 10) and would be confident in undertaking a Non-Detriment Finding for a species (8.6 score out of 10). Participants felt the least confident in participating in a Conference of the Parties, although this could be a language barrier issue rather than confidence in the subject matter itself. The second least confident score was related to analysing a proposal to amend the CITES appendices (for addition or removal of species).

Tackling the second knowledge gap (community engagement techniques) allows the team to gather important information related to land/resource use of areas within hotspots of orchid diversity. We aimed to close this gap in the second year with a 1-day lecture introducing the in-country team on the theory and methods of community engagement and participatory mapping, led by Dr Matthew Davies from the University of Cambridge (Figure 4). Alongside the basics and logistics of data capture and mapping, the group had open discussions around important ethical concepts, such as the importance of Prior Informed Consent and Safeguarding.

After the training and support given, the project team members were able to develop questionnaires and flyers that can gather relevant information from local community members in Yenokavan through door-to-door interviews (Figure 5). The in-country team managed to interview a total of 90 relevant stakeholders within the Yenokavan community, ranging from the age of 15 to 72 (77% of respondents were women), some working actively within the tourism sector (e.g. hotel manager/chef) to school-teachers and pensioners. Over 87% of respondents

said that they were already familiar with themes around nature conservation and majority (94%) were able to correctly identify native orchids through a series of photographs. Therefore, when respondents reported that they have not seen any significant orchid collecting for trade/use, we can be relatively confident with this claim, and incorporate this into the threat assessments for the area.

To review retention and learning related to the participatory mapping exercise, project PI and Dr Davies travelled to Yenokavan for the first participatory mapping workshop led by the newly trained Armenian project team. The in-country team successfully carried out the first participatory mapping workshop with local community members in the second year of the project using their new learning and managed to capture a range of different perspectives of the surrounding landscape (Figure 6). Coupled with the orchid identification training given to the MSc student recruited for the project, the project team managed to highlight important key species and areas of conservation concern that would be relevant to the members of the Yenokavan community. All the information has been collated in a guide-book distributed to the community (Figure 7, Annex 5.1, 5.2a and b).

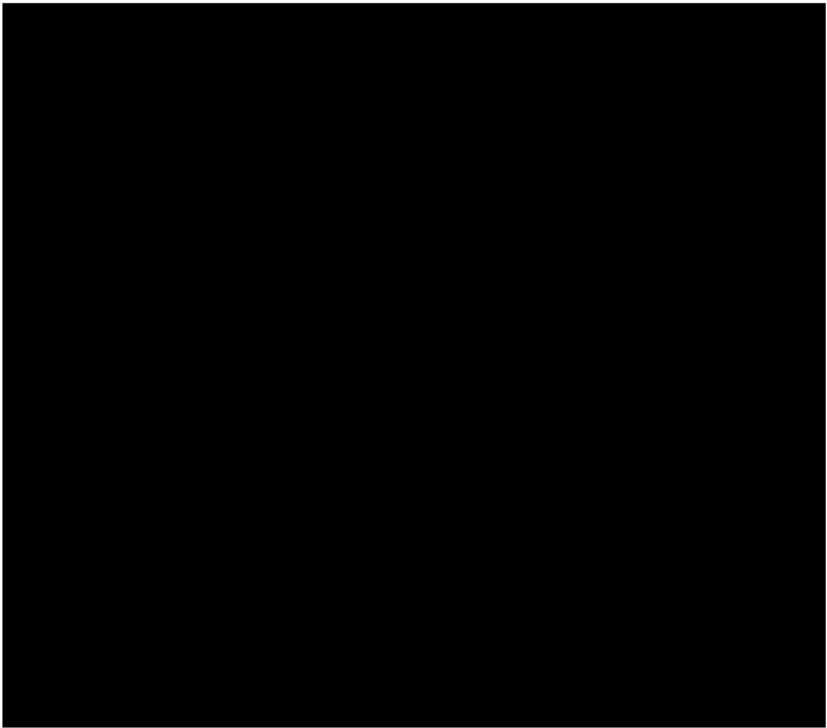
CITES Training Workshop – Ecoepicenter, A. Takhtajyan Institute of Botany, Armenia, 25 July 2022

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Figure 3: Attendance register for the CITES training workshop in Yerevan.



Figure 4: Project members trained by Dr Matthew Davies from University of Cambridge on community engagement and participatory mapping (left), participatory mapping done by participants showing different points of view of the same botanical garden (right).



ntry team

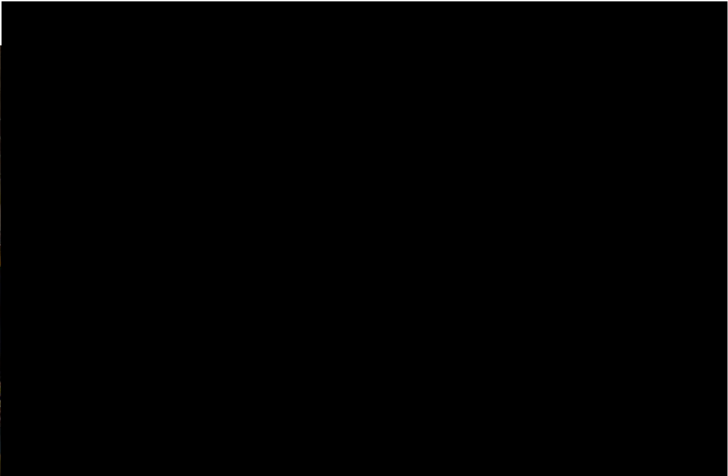


Figure 6: Trained project members utilising their new skills and knowledge conducting a participatory mapping exercise with the members of the Yenokavan community (left); one of the focus groups drawing their perspective of Yenokavan and surrounding areas.



Figure 7: Project members distributing orchid booklets to local communities

Output 2 In-country Armenian institutions have the capacity and capability to conserve native orchid species ex situ and are able to duplicate to the Millennium Seed Bank's cryopreservation unit.

Baseline: No current capacity to conserve seeds of native orchids in Armenia and duplicate viable seeds to the MSB cryopreservation unit.

There has been a significant increase in the capacity and capability of in-country institutions to conserve seeds of orchids and safely duplicate to the MSB. At the start of the project, no viable seeds of native Armenian orchids had ever been banked. By the end of the project, a total of 45 seed collections from 18 species of orchids native to Armenia are in long-term ex situ conservation both in Armenia and duplicates sent to the Millennium Seed Bank. The collection and species numbers exceeded the proposed target for the project (i.e. 10 species and 20 collections).

We conducted an initial assessment of the capacity of partners to conserve orchid seeds through a visit to the facilities and joint field excursions in year 1. The in-country partners were able to collect a total of 7 species and 11 seed collections. Only a third of the seed collections sent showed high viability (above 80%), and collecting teams communicated significant challenges with unripe seeds.

Training was then conducted in-country by project PI (Figure 8a) and Co-PI (Anush Nersesyan) travelled to the MSB to attend a Technical Attachment in short-lived seed banking and cryopreservation in Year 2 (Figure 8b). Quote from Training Needs Assessment by Anush Nersesyan (Co-PI): *"All elements were very useful concerning our project on conservation of Armenian orchids. Most applicable are exceptional species seed processing"*. The Co-PI conducted further training with the members of the National Seed Bank of Armenia, consisting of ~95% women (Figure 9). Additionally, the project has allowed us to equip the National Seed Bank with key equipment for orchid seed processing and banking, including fine sieves, drying chambers and an ultra-cold -80°C freezer (Figure 10).

After the training and equipment enhancements, we saw a significant increase in the number of collections and overall seed viability. In Year 2, partners were able to collect a further 11 species (Figure 11) and a total of 34 collections were duplicated to the MSB, with an increase (from 30% to 65%) in the proportion of collections showing viability above 80%. Members of the National Seed Bank were able to set up viability tests prior to drying and storing to be compared with those after treatment. We found no significant differences between the pre- and post-storage viability tests (Paired two sampled t-test: t Critical Value = 2.037, p-value = 0.08).

All the orchid seeds sent to the MSB are now safely in the cryopreservation units (Figure 12, Annex 5.3 and Annex 5.4).



Figure 8: a) In-country training by PI in Yerevan (left); b) Co-PI (Anush Nersesyan) being trained at the Millennium Seed Bank by Dr Daniel Ballesteros (right)



Figure 9: Co-PI giving training to staff of National Seed Bank on orchid conservation techniques (left); attendance register for the training (right).



Figure 10: Drying chamber (left) and new fine sieves (right) for orchid processing and precision drying.



Figure 11: In-country team collecting (left) and processing (right) orchids for the first time after receiving training.

Collection Object	Store	Legal Status	Availability Status	Occurrence Id	Taxonomic Name	Parent Taxonomic Name	Type	Kewid	Country ISO	Collected By	Collection Date	Created By Import
K:MSB-001105348		Acquisition	In collection	K:OCC-0018	Dactylorhiza euxina	Dactylorhiza euxina		984742-1	Armenia	Papikyan, A	14-08-2022	
K:MSB-001114940		Acquisition	In collection	K:OCC-0018	Dactylorhiza urvilleana	Dactylorhiza urvillea		908659-1	Armenia	Nersesyan, A	22-07-2022	
K:MSB-001114951		Acquisition	In collection	K:OCC-0018	Orchis coriophora	Orchis coriophora L.		648518-1	Armenia	Nersesyan, A	22-07-2022	
K:MSB-001114962		Acquisition	In collection	K:OCC-0018	Orchis coriophora	Orchis coriophora L.		648518-1	Armenia	Nersesyan, A	22-07-2022	
K:MSB-001114973		Acquisition	In collection	K:OCC-0018	Dactylorhiza urvilleana	Dactylorhiza urvillea		908659-1	Armenia	Nersesyan, A	23-07-2022	
K:MSB-001114984		Acquisition	Being proce	K:OCC-0018	Dactylorhiza urvilleana	Dactylorhiza urvillea		908659-1	Armenia	Nersesyan, A	23-07-2022	
K:MSB-001114995		Acquisition	In collection	K:OCC-0018	Epipactis helleborine	Epipactis helleborin		633228-1	Armenia	Nersesyan, A	23-07-2022	
K:MSB-001115006		Acquisition	Being proce	K:OCC-0018	Gymnadenia conopsea	Gymnadenia conops		636509-1	Armenia	Nersesyan, A	23-07-2022	
K:MSB-001115017		Acquisition	In collection	K:OCC-0018	Cephalanthera damasoni	Cephalanthera dam		622369-1	Armenia	Nersesyan, A	23-07-2022	
K:MSB-001115028		Acquisition	In collection	K:OCC-0018	Limodorum abortivum	Limodorum abortivu		640520-1	Armenia	Nersesyan, A	23-07-2022	
K:MSB-001118841		Acquisition	In collection	K:OCC-0019	Orchis palustris			648956-1	Armenia	Papikyan, A	06-06-2023	
K:MSB-001119214		Acquisition	Being proce	K:OCC-0019	Orchis palustris			648956-1	Armenia	Papikyan, A	06-06-2023	
K:MSB-001118842		Acquisition	In collection	K:OCC-0019	Dactylorhiza merovensis			912356-1	Armenia	Papikyan, A	06-06-2023	
K:MSB-001119215		Acquisition	Being proce	K:OCC-0019	Dactylorhiza merovensis			912356-1	Armenia	Papikyan, A	06-06-2023	
K:MSB-001118843		Acquisition	In collection	K:OCC-0019	Dactylorhiza salina			626669-1	Armenia	Papikyan, A	23-06-2023	
K:MSB-001119217		Acquisition	Being proce	K:OCC-0019	Dactylorhiza salina			626669-1	Armenia	Papikyan, A	23-06-2023	
K:MSB-001118844		Acquisition	In collection	K:OCC-0019	Dactylorhiza euxina			984742-1	Armenia	Papikyan, A	23-06-2023	
K:MSB-001119216		Acquisition	Being proce	K:OCC-0019	Dactylorhiza euxina			984742-1	Armenia	Papikyan, A	23-06-2023	
K:MSB-001118845		Acquisition	In collection	K:OCC-0019	Dactylorhiza cataonica			626584-1	Armenia	Papikyan, A	23-06-2023	
K:MSB-001119220		Acquisition	Being proce	K:OCC-0019	Dactylorhiza cataonica			626584-1	Armenia	Papikyan, A	23-06-2023	
K:MSB-001118846		Acquisition	In collection	K:OCC-0019	Platanthera chlorantha			651693-1	Armenia	Papikyan, A	23-06-2023	
K:MSB-001119219		Acquisition	Being proce	K:OCC-0019	Platanthera chlorantha			651693-1	Armenia	Papikyan, A	23-06-2023	
K:MSB-001118847		Acquisition	In collection	K:OCC-0019	Orchis coriophora			648518-1	Armenia	Papikyan, A	23-06-2023	
K:MSB-001119218		Acquisition	Being proce	K:OCC-0019	Orchis coriophora			648518-1	Armenia	Papikyan, A	23-06-2023	
K:MSB-001118848		Acquisition	In collection	K:OCC-0019	Orchis coriophora			648518-1	Armenia	Papikyan, A	23-06-2023	

Figure 12: Screenshot of collections conserved in Armenia and proportion duplicated to the Millennium Seed Bank.

3.2 Outcome

Outcome: Increase in capability and capacity of local communities, research institutions and private sector stakeholders to identify and conserve orchids in situ and ex situ

Indicator 1: By March 2023, 21 individuals working in conservation have an increased understanding on challenges and solutions for orchid conservation. **Baseline:** 0 individuals have insights over conservation solutions for orchids.

The project has met this indicator. In the first year, 19 individuals have received training in the challenges and solutions of orchid conservation, including the objectives and procedures of CITES, and five seed bank staff members received further training on proper conservation techniques for orchid seeds. In the second year of the project, the trained staff passed on their learning to a further 11 staff members from the National Seed Bank and Institute of Botany.

Various methods were employed to assess retention of knowledge, which were employed in the second year of the project. A survey of learnings on orchid trade and use highlighted that majority of the participants still retained their knowledge and are confident in terms related to orchid trade and their conservation (see Section 3.1 for details). For the seed conservation

training, we used a training needs assessment form before and after training commenced. We found a ~70% increase in confidence and understanding of tools for long-term orchid conservation (Figure 13 and Annex 5.5 and 5.6). Finally, we identified an increase in skills related to orchid seed collecting, processing and banking through assessing the number and viability of collections sent to the Millennium Seed Bank in Year 1 (before training) and Year 2 (after training).



Figure 13 Anush Nersesyan giving a lecture to participants of the Institute of Botany on orchids native to Armenia and her learning in conserving their seeds.

Indicator 2: By December 2023, 20 households will have contributed to identifying key areas for conservation and orchid collection/use, imparting this knowledge to environmental ministry, local NGOs, private sector stakeholders and 100 households within the Yenokavan community by March 2024. Baseline: 0 households contribute towards identifying orchid use and key conservation areas.

The project has not met the intended target but has gathered relevant information from 90 people/households within the Yenokavan community (gender split: Female = 69; Male = 21). We therefore included information from the members of the community during the participatory mapping exercise (~10 people, 9 female and 1 male). The data gathered from the local community, orchid locality data from the MSc student study and potential threats gathered through participatory mapping exercise have been combined and disseminated to the Institute of Botany (Annex 5.7) and a project booklet to the local community (Annex 5.1, 5.2a and 5.2b).

Indicator 3: By January 2024, 10 species of orchids are conserved ex situ in their country of origin. Baseline: 0 species of orchid seeds conserved ex situ in Armenia.

The project has exceeded this target by the end of its lifetime. A total of 18 species of native orchids are now collected and conserved in their country of origin (Figures 14a and 14b).

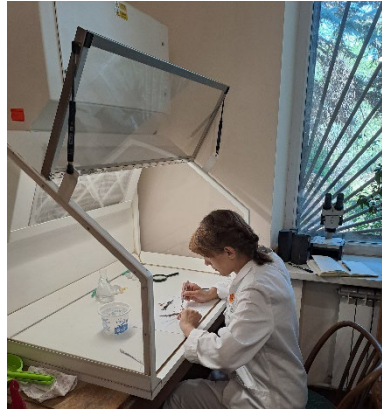


Figure 14 a) Armenian team (Anush and Astghik) collecting seeds of orchids (left); b) Armenian team member (Astghik) processing seeds collected ready for banking (right).

Indicator 4: By March 2024, an MSc thesis on key orchid habitats and their threats are made available to all relevant stakeholders. **Baseline:** No comprehensive study on orchid habitat and threats distributed to relevant stakeholders.

Throughout the project we have seen various examples where this indicator has been reached. Key habitats related to native orchid species were gathered through surveys from MSc student related to the project and in-country project team via seed collecting aspects of the project (Annex 5.7 and 5.8). The land use and potential threats were gathered through community engagement participatory mapping activities (see Section 3.1 for more detail and Annex 5.7). All this information has been gathered and presented to the local governmental organisation (Institute of Botany) and the community through the orchid booklet (Figure 7).

Indicator 5: By March 2024, a working protocol for safe duplication of orchids to MSB, leading to their long-term conservation is adopted by staff members of the National Seed Bank. **Baseline:** No working protocol for safe duplication of orchids to the MSB.

In the second year of the project, partners have drafted a working protocol for orchid seed conservation and sent this to the project PI for comment and suggestions (see full draft in Annex 5). This will serve as a working document that will be reviewed and refined over the years by the team and in collaboration with the MSBP. As seed conservation of exceptional species is an active research theme globally, the partners will be able to adapt their protocol according to the most recent findings through our ongoing collaborations beyond this project (see Section 2 for details of ongoing partnership).

3.3 Monitoring of assumptions

Assumptions were monitored throughout the course of the project:

Assumption 1: Community members, rangers and private company staff are willing to take part in project activities and share information with project staff.

Comments: Assumption was monitored through project reports and discussions with all stakeholders during PI's visit to Armenia. The assumption holds true. We have received favourable engagement with the members of the Institute of Botany (leads the management of the National Herbarium and Seed Bank), Governmental Officials (issuing permits for collecting and leads on CITES related matters) and local community members (some of which are part of the hospitality industry within the Yenokavan area). As farming and tourism are key industries for the area engagement is crucial to ensure project outputs and overall outcome is achieved.

Assumption 2: Suitable MSc student candidates can start by the proposed time, enabling key data collection to take place during the flowering season for orchids and complete a thesis within the time-frame of the project.

Comments: Assumption held true for the project. A suitable MSc student has been recruited and has retained interest in the project throughout. She has collected the necessary data and

information required for the project outputs and successfully submitted and defended her MSc thesis.

Assumption 3: Travel to and between the UK and Armenia is permitted to enable continuing training and project activities to take place. The ongoing dispute with Azerbaijan made travel to Armenia slightly riskier than usual. Stricter visa controls with the UK have also made travelling to the UK for Armenian nationals difficult.

Comments: The first part (i.e. UK to Armenia travel) held true. All travel to Armenia by UK staff were realised. Visa restrictions hampered travel from Armenia to the UK, leaving only one member of staff (rather than two) travel to the UK for training. There were no issues relating to scheduled community and seed collecting trips.

Assumption 4: Sufficient number of mature seeds available for collection, duplication and multiple storage facilities. Getting the timing right for seed collection is always difficult, particularly with a changing climate. We have mitigated this by setting up a ripening chamber in-country for unripe seed pods to ripen.

Comments: Assumption was held until project end and target collections reached.

Assumption 5: Methods for viability assessment equally applicable across species. Staining techniques can vary across different species and interpreted differently depending on the member of staff. We are mitigating this by ensuring the same team member conducts the viability assessment at the MSB.

Comments: Assumption held true. Additional checks comparing results from different team members showed no significant difference in viability assessment results.

Assumption 6: National Seed Bank staff agree to accept working protocol and use equipment procured throughout the project's timeline.

Comments: Assumption held true. Equipment related to long-term conservation of orchid seeds have started to be used by staff in-country (see Section 3.1 and 3.2 for photos of use). Team have used training and ongoing support to develop their own protocol for seed conservation banking (see Annex 5.9).

4 Contribution to Darwin Initiative Programme Objectives

4.1 Project support to the Conventions or Treaties (e.g. CBD, Nagoya Protocol, ITPGRFA, CITES, Ramsar, CMS, UNFCCC)

Training in exceptional species at the Millennium Seed Bank and in Armenian institutions in Year 1 by RBG Kew staff members contribute towards Armenia's National legislation on Red List Species, and its Development Strategy 2014-2025, particularly Strategic Directions 2.6.1.b, to enhance training of specialists in biodiversity studies. The project activity aligns with the IUCN/SSC Orchid Specialist Group Conservation Action Plan

([REDACTED])
orchid seeds within the country of origin.

Armenia is a signatory of the CBD since 1992 and a party since 1993. The project has supported the contribution of the following strategic goals A-E:

Aichi Targets (AT) 1, 4 and 5 by identifying key stakeholders within important biodiversity areas and raising awareness of the biodiversity and threats to orchid diversity through the various training courses to governmental and non-governmental institutions and distribution of project booklets to local communities. The participatory mapping and orchid habitat identification can ensure landscape level conservation.

AT 12 through ex situ conservation activities of the project, which will contribute towards halting the extinction of threatened species.

AT 18 through open consultative process with a local community ensuring the project outputs respect the knowledge and practices of local communities.

ABS: Kew's Access to Genetic Resources and Benefit Sharing policy

has been in place since 2001 and ensures project material is legally acquired and any benefits are shared fairly as agreed with partners in Access and Benefit Sharing Agreements. These are currently in place with proposed project partner.

CITES: All orchids are covered under Appendix II or I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (n.d.), <http://www.cites.org>. CITES training was delivered by RBG Kew's Policy team during the project's lifetime, attended by members of the CITES focal point for Armenia within the Ministry of Environment. Subsequent survey has shown an increase in knowledge and confidence in the CITES process.

SDGs 15: The project aims to halt the degradation of natural habitats, and to integrate ecosystem and biodiversity values into local planning and development processes, particularly land-use such as agriculture and tourism. Community participation mapping workshop took place in June 2023, highlighting areas of concerns and opportunities for conservation.

4.2 Project support to biodiversity conservation and poverty reduction

Training, equipment procurement and funding has resulted in the long-term conservation of ~40% of Armenia's native orchid species. The seed collections of these species are stored in Armenian institutions and duplicates are also safely stored at the Millennium Seed Bank (MSB), split between -20C freezer and the MSB's cryopreservation unit. These conservation collections have increased the percentage of orchids for future research, restoration, and species recovery.

Viability results from collections stored at different temperatures will generate novel data crucial for the development of working protocols. Viability assessments are ongoing and will be used to inform future protocols for temperate terrestrial orchids. The results from the work will be disseminated in the Millennium Seed Bank Partnership Newsletter by December 2024, extending the reach of project impact beyond current partners and region.

Key ecosystem services will be highlighted to stakeholders that utilise the local landscape and information on threats and orchid populations will contribute towards the Red Book of Armenia.

10 people from government, non-government and research institutions have shown an increased confidence and understanding of national and international legislation on orchid collection and trade (70% of whom were women), contributing towards enhanced gender equality. The project has exceeded this target with relation to available training (see Section 3.1 and 3.2).

Procurement will improve facilities and conservation outcomes, thereby attracting additional funds relating to biodiversity conservation and scientific research grants in-country. A significant change in the first year was the procurement and successful delivery of the -80C freezer, a first and only for the National Seed Bank (see Section 3). This will allow the team to store species with potentially short-lived seeds and develop further projects for long-term seed conservation and research.

One local student gained their Master's degree during the project. The MSc student finished her master thesis "*Species list and the conservation issues of the seeds of the representatives of the Orchaceae family in the vicinity of Yenoqavan community, Tavush Marz, Armenia*" (Annex 5.8). She received a 92%, contributing towards increasing potential employment in the long-term.

Social science/community engagement was highlighted by the in-country project team as a significant gap in their collective knowledge, particularly in relation to highlighting resource use and conservation issues. The project resulted in 11 participants from local Armenian institutions attending participatory engagement training by Professor Matthew Davies from the University of Cambridge (see Section 3.1 and 3.2). The trained team members were then tasked to engage with the Yenokavan community and conduct participatory mapping with the members of the village, which gave the PI and Prof Davies a way of reviewing retention and learning. We

managed to capture data relating to landscape use and discussed current challenges with different community members (including the Head of the community and his office staff). The training has enhanced the skills of local conservation practitioners to successfully capture meaningful information from rural communities and see them as crucial stakeholders in biodiversity conservation planning.

4.3 Gender equality and social inclusion

We have proactively considered gender and social inclusion throughout the project. The development of questionnaires for community engagement was co-developed with the Armenian team, which is majority female. The questionnaire includes socio-demographic data of the participants (i.e. gender, age and income) to ensure that we are gathering the views and values of all facets of the community (see Section 3.1). The participatory mapping exercise with the community included both the men and women within the community and the age ranged from children to those above 50s (see Section 3.2). Training events so far have shown a higher proportion of women in attendance, thereby increasing the skills and knowledge for women within the workplace (see Section 3.1 for details).



Figure 15 Teacher of the Yenokavan community showing project members areas the community uses for provisions and farming and concerns over threats to some of these habitats (e.g. non-treated run-offs from nearby hotels into the forest and rivers, damming etc).

Please quantify the proportion of women on the Project Board ¹ .	100%
Please quantify the proportion of project partners that are led by women, or which have a senior leadership team consisting of at least 50% women ² .	100%

4.4 Transfer of knowledge

Knowledge transfer is the main aim of this project and all activities have incorporated elements of this throughout the project’s lifetime and beyond. The first year focused on transferring knowledge and understanding on global challenges in orchid conservation through the training and support of RBG Kew and University of Cambridge staff to non-governmental and governmental institutions in Armenia (see section 3.1 for details). This included international legislation and frameworks on the Convention of International Trade of Endangered Species (CITES) and new research in orchid seed conservation techniques.

¹ A Project Board has overall authority for the project, is accountable for its success or failure, and supports the senior project manager to successfully deliver the project.

² Partners that have formal governance role in the project, and a formal relationship with the project that may involve staff costs and/or budget management responsibilities.

At a more local level, knowledge gathered during the Darwin Initiative project from the team on orchid species, threats and localities have been shared with the Yenokavan community through distribution of leaflets and a guidebook.

At the international level, the project aims, objectives and activities have been shared through a blog co-written by the PI and project partners and published through Kew.org (see Section 10). The blog was highlighted through various social media postings (e.g. Kew Science LinkedIn and X) during the Kew Orchid Festival to encourage visitation. Finally, the initial results of the orchid seed storage experiments generated through the project's collections have been drafted as an article in the Samara newsletter (<http://brahmsonline.kew.org/msbp/Samara/ENewsletter>), an online newsletter distributed to the Millennium Seed Bank's global partnership, thereby increasing the transfer of knowledge on successful preservation of temperate terrestrial orchid seeds.

4.5 Capacity building

Although we have not seen an increase in the national, regional or international status of staff from developing country partners, there has been a positive outcome that can be attributed to the project's activities. The project enabled a member of the Armenian team, co-PI Anush Nersesyan (female) to attend the Millennium Seed Bank (MSB) Training Attachment course. The course brings together members from the MSB's global partnership to learn techniques in seed conservation, with the beforementioned course having a specific focus on conserving exceptional species. The course also gives an opportunity for members from different nations to network with each other and as a result, the co-PI was invited to be part of a project proposal on temperate orchid conservation alongside a MSBP partner from the University of Athens, Greece. To date, the proposal has been submitted to the relevant funder and the project leaders have been invited to an interview by the funding body to discuss their proposal in more detail.

5 Monitoring and evaluation

No major changes to the project design aside from a change in deadline for the seed conservation technical attachment training course (from August 2022 to January 2023). The project Monitoring and Evaluation was useful to use for project objective tracking, reporting templates for project partners and evidence gathering for final report.

6 Actions taken in response to Annual Report reviews

No.	Comment	Discuss with BCFs Admin	Next half year report	Next Annual Report	No response needed
1	The project report mentions other "in-country partners" but it is unclear who these partners are. It would be helpful to understand this collaboration(s) better.			X	
2	The report also claims that technical specialists based at the Institute of Botany and the National Seed Bank are actively engaged in providing access to key herbarium material to identify orchid populations and processing seeds post-collection. It is unclear for the reviewer if these institutions are governmental and if there is any signed agreement regarding their involvement in this project. Clarification would be very helpful.			X	
3	It is unclear how the logical framework will exactly measure "Enhanced capability to identify and protect orchid diversity in situ by local stakeholders within the Yenokavan community" (Output 1). Which indicator will measure the increase in capability of the local stakeholders including the households of the communities? What will be the evidence for such increase at project end? Please add some additional information.			X	
4	The project reporting under Section 6. Project support to poverty reduction focuses on training and facilities improvement with regard to orchid research, restoration and species recovery but could more clearly comment on the project's expected pathway from this work to poverty reduction.				X

Both comment 1 and 2 have been addressed in Section 2 of this report.

Comment 3:

The area within and surrounding Yenokavan community is high in plant diversity, in particular, native orchid diversity. Stakeholders therefore not only include the community members but also national institutions with a remit on biological resource use and conservation; i.e. Institute of Botany, Ministry of Environment and local municipality. Increase in capacity and capability for staff within these institutions is outlined in section 3.1 and 3.2 of this report. The participatory mapping and surveys from the ~90 people of the Yenokavan community would enable the voices of the local community to be heard. Additionally, the techniques used during the participatory mapping exercise included teaching local community members on how to utilise data gathering through mobile device (e.g. Google Forms), which increases the capability of local community members to gather their own data relevant for future needs/challenges.

7 Lessons learnt

Over the past year, the main lessons and recommendations for future similar projects are below:

Challenges due to financial market fluctuations: Fluctuations in the financial market impacting the GBP-ARM exchange rates has been a significant challenge in our project. When the project budget was agreed, the exchange rates were stable, however, due to on-going financial crises brought about by COVID and political instability between Azerbaijan and Armenia, the amount received by partners were significantly less than expected, which impacted the in-country partner salaries and fuel intended for field surveys. We had to monitor exchange rates closely to ensure disbursement is done during favourable times for key activities. Future projects should incorporate adequate contingency within their budget to account for significant fluctuations in exchange rates and gather this information during turbulent periods of time. On a similar topic, the prices of equipment and consumables have also rose, which led to more cost for both the project and the institutions to cover.

Challenges relating to travel for training: The MSB has been coordinating training events for over a decade and are aware of the challenges in getting participants to the UK for training due to visa requirements and restrictions. We mitigated this risk for the project by allocating more than one space for training in the UK and incorporating extra in-country training for seed collecting and processing. Recent years have seen tighter restrictions and increased requirements for UK visas for international and European visitors, so future projects will need to incorporate contingencies for specific objectives related to travel and training. For this project, active contact between the teams in UK and Armenia via emails, Facebook messenger and Whatsapp messages was crucial to continue the support and guidance for both the orchid collecting (i.e. maturity stages), processing (i.e. how to split collections) and community questionnaire development (i.e. what data to gather).

Importance of pre-project data gathering: Prior to the project starting the PI received a small pilot grant to digitise herbarium labels of orchids from various sources (herbaria in Armenia, UK and St Petersburg, and GBIF). Considering the limited seasons for seed collecting within this project (summers of 2022 and 2023), the digitised data became significantly instrumental to the success of the collecting aspect of the project. Without this data, the collecting team remarked that they would not have been able to locate many of the populations at the correct seed ripening time. Similar future projects will need to have access to detailed locality data of their intended species and/or populations if the objective of said project is to have collections as an objective. Alternatively, capability projects could include objectives relating to digitising herbarium labels and/or groundtruthing activities, as this would greatly enhance the capability of nations to conserve their biodiversity.

8 Risk Management

There have been no new risks to add to the Risk Register that were not previously accounted for either at the start of the project or reported at the Half Year report. The Risk Register has been updated with the following changes:

Risk: Unable to deliver large equipment to Yerevan. **Risk Status Change:** From Open to Closed – the risk didn't materialise. **Comment:** All equipment delivered to Yerevan and accessible by local staff members. **Mitigation:** None.

Risk: Restricted access to community. **Risk Status Change:** From Open to Closed – the risk didn't materialise. **Comment:** All community engagement activities objectives reached. **Mitigation:** None

Risk: Visa not issued for Armenian participants to attend training at the MSB. **Risk Status Change:** From New/Emerging to Closed - the risk materialised. **Comment:** Due to ongoing issues with the visa office, only one out of the two staff members was able to travel to the UK for training. **Mitigation:** We mitigated this risk by ensuring that continued support was given remotely to the seed bank staff in Yerevan. PI conducted an in-country training that included seed processing and viability staining. The additional training and support contributed towards successful duplication of seeds to the MSB. Long-term agreement with in-country partner will allow for a participant from Armenia to attend future Seed Conservation Training courses, enabling continued capability building.

Risk: MSc student unable to collect data. **Risk Status Change:** From Open to Closed – risk didn't materialise. **Comment:** MSc student recruited for the project and collected data for orchid habitats. **Mitigation:** None.

Risk: Landscape use not collected by community. **Risk Status Change:** From Open to Close – risk didn't materialise. **Comment:** Community engagement through semi-standard interviews and participatory mapping activities delivered during project timeframe. **Mitigation:** None.

9 Sustainability and legacy

Project partners, Nature Heritage NGO (NH) and the Institute of Botany of Armenia (leads of the national seed bank) continue to show increased interest in continuing collaboration with each other and RBG Kew. Discussions on how to enhance further capacity has included potential cryo-facilities. Partners have promoted the CITES training through the Botanic Garden's Facebook page (see Annex 5.10). Capacity build through the project is on track to being maintained through the state's commitment towards biodiversity conservation and the retention of staff through permanent contracts.

NH continues to be a long-term partner with the RBG Kew through the Access and Benefit Sharing agreement, and a view to seek further funding for projects related to banking difficult species. So far, funds have been secured from the Garfield Weston Foundation to collect, conserve, and utilise seeds of woody species under the Global Tree Seed Bank Unlocked project. Due to the enhancement in capacity and capability of the in-country institutions, we can incorporate target species that have short-lived seed storage behaviour as they will require the same/similar protocols as seeds of orchids (e.g. *Salix* and *Populus*). Therefore, the sustained legacy of this project is the long-term conservation of native seed collections both in the country of origin and at the MSB. Furthermore, the capacity built through this project will increase funder confidence and gain a stronger position for successful applications in the future. We intend to widen our impact and secure project legacy through dissemination of project learning through the Millennium Seed Bank Partnership newsletter, thereby benefiting orchid conservation action across the seed banking community.

10 Darwin Initiative identity

Efforts have been made throughout the duration of the project's lifetime to publicise the project and the Darwin Initiative, both online and in paper form. A project page on Kew.org is currently live, with the Darwin Initiative acknowledged as a funder: [REDACTED]

[REDACTED] In collaboration with Nature Heritage NGO staff, Astghik Papikyan, project PI published a blog highlighting key orchid species found in Armenia [REDACTED]. The blog received 928 views from 771 unique users, with an average engagement time of 41s (total 10.5 hours of reading

time). We scheduled the blog’s release to coincide with the annual RBG Kew Orchid Festival to utilise the interest around the festival itself as a source of bringing in readers. The blog generated an increase in visits to the project page, which previously only received 11 views by 8 users, but after publication had seen a tripling of visits and a 4% increase in click-throughs.

In terms of social media posts, majority are done through the PI’s Twitter account (@AisyahFaruk), with links to @Darwin_Defra or the newer handle @UKBCFs (Figure 16). The first introductory tweet was during the June fieldwork where the post received 555 impressions, 34 engagements, 17 likes and 4 retweets. The most recent received 180 impressions and 15 engagements. We also put out twitter posts through the @KewScience, which received 2,476 impressions and 115 engagements (a 4.6% engagement rate).

The Darwin logo was used on the leaflets for distribution to local community (Annex 5.11) and the final orchid guidebook (Annex 5.1) distributed to local institutions and community members.

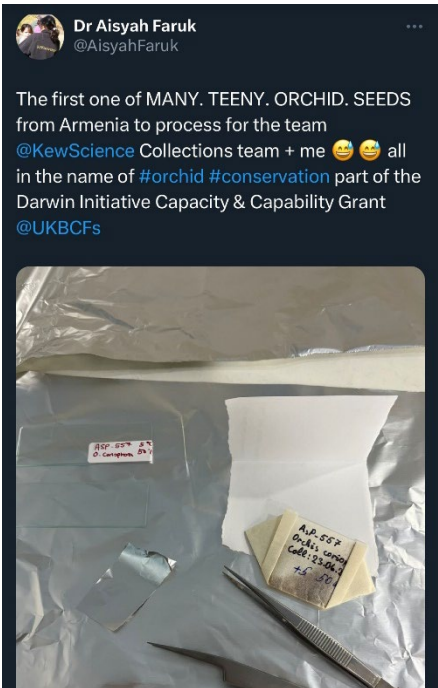


Figure 16 Example of social media post acknowledging the BCF funding.

11 Safeguarding

Has your Safeguarding Policy been updated in the past 12 months?	Yes
Have any concerns been investigated in the past 12 months	No
Does your project have a Safeguarding focal point?	Yes: PI (Aisyah [redacted]) and Co-PI (Anush [redacted])
Has the focal point attended any formal training in the last 12 months?	Yes
What proportion (and number) of project staff have received formal training on Safeguarding?	Past: 11% [1 out of 9] Planned: 56% [5 out of 9]
Has there been any lessons learnt or challenges on Safeguarding in the past 12 months?	
The main challenge was related to translating the training and protocols to fit the way things are done and/or reported in-country. We have made easy to use guidance on safeguarding, which were then translated to Armenian for the in-country team and a reporting structure that has been adapted to work within the project team. However, for any further reports that requires escalation past PI/Co-PI, the legal responsibilities were not so clear (i.e. the need to follow Armenian law rather than UK law). Further discussion with the Kew Safeguarding team on safeguarding issues outside of the UK still required.	

12 Finance and administration

12.1 Project expenditure

Project spend (indicative) since last Annual Report	2023/24 Grant (£)	2023/24 Total actual Darwin Initiative Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)				
Consultancy costs				
Overhead Costs				
Travel and subsistence				
Operating Costs				
Capital items (see below)				
Others (see below)				
TOTAL	£59,901.00	£61,908.41		

Staff employed (Name and position)	Cost (£)
Faruk, Aisyah / PI	
Nersesyan, Anush / Project Manager	
Papikyan, Astghik / Project Coordinator	
Mirakyan, Narine / Accountant	
Simonyan, Ruzan / MSc Supervisor	
Danielyan, Ashken / Seed Conservation Assistant	
Navasardyan, Yevgenya / Seed Bank Assistant	
TOTAL	£29,349.09

Other items – description	Other items – cost (£)
Collecting bags, foil bags, herbarium paper, viability and drying chemicals	
Printer cartridges	
Publications	
Herbarium press	
Stationary	
Shipping	
Audit costs	
TOTAL	£5,124.09

12.2 Additional funds or in-kind contributions secured

Source of funding for project lifetime	Total (£)
2022/23	
2023/24	
TOTAL	£25,804.00

12.3 Value for Money

We believe that the project has provided value for money. The project input has supported a range of employments that contributed directly towards successful tangible outputs. For example, seed collections made during the project were of sufficient size and quality to be considered a long-term conservation collection by international standards. The collections stored in multiple storage conditions will continue to be used in research projects by future students and/or researchers from the Millennium Seed Bank and/or Armenia, enabling further career development alongside refining existing protocols for orchid seed preservation. All the capital items purchased during the project's lifetime will continue to contribute towards enhanced conservation of the native flora beyond orchid seeds, for example, the -80 degrees freezer will be used to conserve other short-lived species such as willows (*Salix* sp.)

13 OPTIONAL: Outstanding achievements of your project (300-400 words maximum). This section may be used for publicity purposes

I agree for the Biodiversity Challenge Funds Secretariat to publish the content of this section (please leave this line in to indicate your agreement to use any material you provide here).

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

Note: Insert your full indicators of success. If your indicators of success have changed since your application and was approved by a Change Request the newest approved version should be inserted here, otherwise insert the indicators of success.

Project summary	SMART Indicators	Means of verification
<p>Outcome:</p> <p>Increase in capability and capacity of local communities, research institutions and private sector stakeholders to identify and conserve orchids in situ and ex situ</p>	<p>By March 2023, 21 individuals working in conservation have an increased understanding on challenges and solutions for orchid conservation.</p> <p>By December 2023, 20 households will have contributed to identifying key areas for conservation and orchid collection/use, imparting this knowledge to environmental ministry, local NGOs, private sector stakeholders and 100 households within the Yenokavan community by March 2024</p> <p>By January 2024, 10 species of orchids are conserved ex situ in their country of origin.</p> <p>By March 2024, an MSc thesis on key orchid habitats and their threats are made available to all relevant stakeholders.</p> <p>By March 2024, a working protocol for safe duplication of orchids to MSB, leading to their long-term conservation is adopted by staff members of the National Seed Bank.</p>	<p>Attendance register; Training assessment forms</p> <p>Attendance register; Final map; Photos; Distribution letter; Photos</p> <p>Data transfer forms</p> <p>Thesis</p> <p>Collection transfer forms; Viability assessment forms; Draft protocol</p>
<p>Output 1</p> <p>Enhanced capability to identify and protect orchid diversity in situ by local stakeholders within the Yenokavan community</p>	<p>1.1 10 in-country staff, including the environmental ministry, protected area rangers, eco-tourism operators and research institutions (>60% women) trained on challenges in orchid conservation and trade by July 2022.</p> <p>1.2 MSc student in place by December 2022, and capable of conducting orchid identification and habitat surveys by March 2023.</p>	<p>1.1 Attendance register; Training assessment forms</p> <p>1.1 Scan of MSc contract; Data from field surveys</p>

	<p>1.3 Semi-structured interviews with 90 community members (~25% of Yenokavan community) to identify socio-economic background, current knowledge of in situ plant conservation, perceived benefit from orchid protection and orchid use completed by February 2023 and analysed by March 2023.</p> <p>1.4 Key orchid populations and current threats (including land and species use) gathered through community participatory mapping with 20 households (~20 women and 20 men) identified by December 2023.</p> <p>1.5 Resources and information on orchid identification, botanical guides and conservation action developed and distributed to ~100 households, local guides, and protected area rangers.</p> <p>1.6 MSc and partner present project findings to local communities, local land managers, NGOs, and private eco-tourism companies in a networking workshop by March 2024</p>	<p>1.2 Interview register; Data collected</p> <p>1.3 Attendance register; Scan of map</p> <p>1.4 PDF copy of guide; Distribution declaration</p> <p>1.6 Attendance register; Copy of presentation; Minutes of meeting</p>
<p>Output 2</p> <p>In-country Armenian institution have the capacity to conserve native orchid species ex situ and able to duplicate to the MSB cryopreservation unit, and able to disseminate learning to other seed banks with similar capacity</p>	<p>2.1 Two Armenian seed bank team attend a 2-week orchid seed conservation technical attachment training programme at the MSB and capable of cleaning, banking, and evaluating viability by February 2023</p> <p>2.2 Trained staff members imparting learned knowledge and skill in seed banking and duplicating orchid seeds to another 8 in-country conservationists (60% women) by March 2023</p> <p>2.3 At least two populations of 10 orchid species identified through completed locality surveys, and partners ready for collecting activities by December 2022</p> <p>2.4 Seeds, herbarium, and associated data collected from two populations per species for 4 species by December 2022 and a further 6 species by September 2023</p> <p>2.5 100% of seed collections cleaned, dried, and stored using equipment available in-country and subset duplicated to the MSB showing no significant fall in viability for at least 70% of collections by March 2024</p>	<p>2.1 Attendance register; Training assessment forms</p> <p>2.2 Attendance register; Training assessment forms</p> <p>2.3 Field data form; Procurement receipts for collecting equipment</p> <p>2.4 Data transfer form</p> <p>2.5 Procurement receipt for processing equipment; Viability assessment sheet; Data transfer form; Collection transfer form</p>

	2.6 Project related results disseminated throughout the Millennium Seed Bank Partnership through articles and a blog	2.6 Link to online articles; Link to blog post; Email correspondence
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)		
<p>1.1 Challenges and perspectives to orchid conservation training taking place in Yerevan in July 2022</p> <p>1.2 Recruitment and training of MSc student by partner institution on orchid identification and habitat assessment</p> <p>1.3 Best-practice on semi-structured interviews and community participatory mapping developed</p> <p>1.4 Partners and MSc student engage with and conduct semi-structure interviews</p> <p>1.5 Partners participatory mapping exercise with community members</p> <p>1.6 MSc student conduct orchid and habitat surveys</p> <p>1.7 Orchid habitat and land use map finalised for final networking meeting</p> <p>1.8 Orchid guidebook developed and 100 copies printed for distribution</p> <p>1.9 Networking meeting delivered to key stakeholders within the area (community members, NGOs, private tourism companies and local land managers) for networking meeting</p> <p>2.1 Two Armenian seed bank team travel to MSB for 2-week training attachment programme</p> <p>2.2 Delivery of in-country training on orchid ex situ conservation</p> <p>2.4 Procurement of equipment for collecting, cleaning and banking</p> <p>2.3 Locality survey of orchid populations for seed collection activity</p> <p>2.5 Seeds, herbarium, and data of 10 orchid species collected from multiple populations</p> <p>2.6 Seeds are cleaned, dried and pre-storage viability determined in Armenia</p> <p>2.7 Seeds are stored in -20 degrees Celsius and -80 degrees Celsius in-country</p> <p>2.8 Subset of seeds are sent to the MSB</p> <p>2.9 Viability determined on arrival at the MSB</p> <p>2.1 Seeds at the MSB placed in -196 degrees Celsius</p> <p>2.11 Article written for and published for MSBP</p> <p>2.12 Blog post written and published for wider public</p>		
Important Assumptions		
<ul style="list-style-type: none"> • Community members, rangers and private company staff are willing to take part in project activities and share information with project staff • Suitable MSc student candidates can start by the proposed time • Travel to between the UK and Armenia is permitted • Sufficient number of mature seeds available for collection, duplication and multiple storage facilities • Methods for viability (in vitro, vital stain) assessment equally applicable across species 		

- National Seed Bank staff agree to accept working protocol and use equipment

Annex 2 Report of progress and achievements against final project indicators of success for the life of the project

Project summary	SMART Indicators	Progress and Achievements
<p>Outcome</p> <p>Increase in capability and capacity of local communities, research institutions and private sector stakeholders to identify and conserve orchids in situ and ex situ</p>	<p>By March 2023, 21 individuals working in conservation have an increased understanding on challenges and solutions for orchid conservation.</p> <p>By December 2023, 20 households will have contributed to identifying key areas for conservation and orchid collection/use, imparting this knowledge to environmental ministry, local NGOs, private sector stakeholders and 100 households within the Yenokavan community by March 2024</p> <p>By January 2024, 10 species of orchids are conserved ex situ in their country of origin.</p> <p>By March 2024, an MSc thesis on key orchid habitats and their threats are made available to all relevant stakeholders.</p> <p>By March 2024, a working protocol for safe duplication of orchids to MSB, leading to their long-term conservation is adopted by staff members of the National Seed Bank.</p>	<p>In the first year, 19 individuals have received training in the challenges and solutions of orchid conservation, including the objectives and procedures of CITES, and five seed bank staff members received further training on proper conservation techniques for orchid seeds. In the second year of the project, the trained staff passed on their learning to a further 11 staff members from the National Seed Bank and Institute of Botany. Various methods were employed to assess retention of knowledge, which were employed in the second year of the project. A survey of learnings on orchid trade and use highlighted that majority of the participants still retained their knowledge and are confident in terms related to orchid trade and their conservation (see Section 3.1 for details). For the seed conservation training, we used a training needs assessment form before and after training commenced. We found a ~70% increase in confidence and understanding of tools for long-term orchid conservation (Figure 13 and Annex 5.5 and 5.6). Finally, we identified an increase in skills related to orchid seed collecting, processing and banking through assessing the number and viability of collections sent to the Millennium Seed Bank in Year 1 (before training) and Year 2 (after training).</p> <p>The project has not met the intended target for Indicator 2 but has gathered relevant information from 90 people/households within the Yenokavan community (gender split: Female = 69; Male = 21). The data gathered from the local community, orchid locality data from the MSc student study and potential threats gathered through participatory mapping exercise have been combined and disseminated to the Institute of Botany (Annex 5.7) and a project booklet to the local community (Annex 5.1, 5.2a and 5.2b).</p> <p>The project has exceeded its seed conservation target. A total of 18 species of native orchids are now collected and conserved in their country of origin (Figures 14a and 14b).</p> <p>Key habitats related to native orchid species were gathered through surveys from MSc student related to the project and in-country project team via seed collecting aspects of the project (Annex 5.7 and 5.8). The land use and potential threats were gathered through community engagement</p>

Project summary	SMART Indicators	Progress and Achievements
		<p>participatory mapping activities (see Section 3.1 for more detail and Annex 5.7). All this information has been gathered and presented to the local governmental organisation (Institute of Botany) and the community through the orchid booklet (Figure 7).</p> <p>In the second year of the project, partners drafted a working protocol for orchid seed conservation and sent this to the project PI for comment and suggestions (Annex 5.9). This will serve as a working document that will be reviewed and refined over the years by the team and in collaboration with the MSBP. As seed conservation of exceptional species is an active research theme globally, the partners will be able to adapt their protocol according to the most recent findings through our ongoing collaborations beyond this project (see Section 2 for details of ongoing partnership).</p>
<p>Output 1. Enhanced capability to identify and protect orchid diversity in situ by local stakeholders within the Yenokavan community</p>	<p>1.1 10 in-country staff, including the environmental ministry, protected area rangers, eco-tourism operators and research institutions (>60% women) trained on challenges in orchid conservation and trade by July 2022.</p> <p>1.2 MSc student in place by December 2022, and capable of conducting orchid identification and habitat surveys by March 2023.</p> <p>1.3 Semi-structured interviews with 90 community members (~25% of Yenokavan community) to identify socio-economic background, current knowledge of in situ plant conservation, perceived benefit from orchid protection and orchid use completed by February 2023 and analysed by March 2023.</p> <p>1.4 Key orchid populations and current threats (including land and species use) gathered through community participatory mapping with 20 households (~20 women and 20 men) identified by December 2023.</p>	<p>1.1 Completed. Project PI and a member of the RBG Kew Policy and CITES department travelled to Yerevan in July 2022 to lead on the first ever CITES course held in Armenia. The training exceeded the number of participants within the original log-frame (target: 10 people; actual:15) and proportion of women represented (target:~60%; actual: 87%) (Figure 3). In the second year of the project, we reviewed the learnings from year 1 to ensure that the participants are confident in utilising the lessons learnt from their training.</p> <p>1.2 Completed. MSc student was recruited and trained during the project's lifetime. She successfully produced and defended her thesis (Annex 5.8).</p> <p>1.3 Completed. Screenshot of data shared with PI can be found in Annex 5.12 (note, sensitive data blanked out). Data collected has been incorporated into a final map of threats and landscape use (Annex 5.7) and the orchid booklet (Annex 5.1).</p> <p>1.4 Completed. ~10 people participated in participatory mapping and we also included information from 90 people during interviews to identify land and species use.</p>

Project summary	SMART Indicators	Progress and Achievements
	<p>1.5 Resources and information on orchid identification, botanical guides and conservation action developed and distributed to ~100 households, local guides, and protected area rangers.</p> <p>1.6 MSc and partner present project findings to local communities, local land managers, NGOs, and private eco-tourism companies in a networking workshop by March 2024</p>	<p>1.5 Completed. See Section 3 for photo evidence of distribution and Annex 5.1, 5.2a and 5.2b for further evidence.</p> <p>1.6 Completed. See Section 3 for details and Annex 5.7 for further evidence.</p>
Activity 1.1 Challenges and perspectives to orchid conservation training taking place in Yerevan in July 2022		Completed
Activity 1.2. Recruitment and training of MSc student by partner institution on orchid identification and habitat assessment		Completed
Activity 1.3 Best-practice on semi-structured interviews and community participatory mapping developed		Completed
Activity 1.4 Partners and MSc student engage with and conduct semi-structure interviews		Completed
Activity 1.5 Partners participatory mapping exercise with community members		Completed
Activity 1.6 MSc student conduct orchid and habitat surveys		Completed
Activity 1.7 Orchid habitat and land use map finalised for final networking meeting		Completed
Activity 1.8 Orchid guidebook developed and 100 copies printed for distribution		Completed
Activity 1.9 Networking meeting delivered to key stakeholders within the area (community members, NGOs, private tourism companies and local land managers) for networking meeting.		Completed
<p>Output 2.</p> <p>In-country Armenian institution have the capacity to conserve native orchid species ex situ and able to duplicate to the MSB cryopreservation unit, and able to disseminate learning to other seed banks with similar capacity</p>	<p>2.1 Two Armenian seed bank team attend a 2-week orchid seed conservation technical attachment training programme at the MSB and capable of cleaning, banking, and evaluating viability by February 2023</p> <p>2.2 Trained staff members imparting learned knowledge and skill in seed banking and duplicating orchid seeds to</p>	<p>2.1 Partially complete. Due to visa rejection, only one staff member was able to attend the MSB training course. Both have shown their capability of cleaning and banking seeds through successful staining of seeds and duplicating collections to the MSB in September 2022 and January 2023. Evidence can be found in section 3.1 and Annex 5 of this report.</p> <p>2.2 Completed. The Co-PI and members of the team trained in-country conducted further training with the members of the National Seed Bank of Armenia, consisting of ~95% women (Figure 9).</p>

Project summary	SMART Indicators	Progress and Achievements
	<p>another 8 in-country conservationists (60% women) by March 2023</p> <p>2.3 At least two populations of 10 orchid species identified through completed locality surveys, and partners ready for collecting activities by December 2022</p> <p>2.4 Seeds, herbarium, and associated data collected from two populations per species for 4 species by December 2022 and a further 6 species by September 2023</p> <p>2.5 100% of seed collections cleaned, dried, and stored using equipment available in-country and subset duplicated to the MSB showing no significant fall in viability for at least 70% of collections by March 2024</p> <p>2.6 Project related results disseminated throughout the Millennium Seed Bank Partnership through articles and a blog</p>	<p>2.3 Completed. Extract of data on orchid can be found in section 3.1 of this report.</p> <p>2.4 Completed. Data extract of orchids collected can be found in Figure 12.</p> <p>2.5 Completed. In Year 2, partners were able to collect a further 11 species (Figure 11) and a total of 34 collections were duplicated to the MSB, with an increase (from 30% to 65%) in the proportion of collections showing viability above 80%. Members of the National Seed Bank were able to set up viability tests prior to drying and storing to be compared with those after treatment. We found no significant differences between the pre- and post-storage viability tests (Paired two sampled t-test: t Critical Value = 2.037, p-value = 0.08). All the orchid seeds sent to the MSB are now safely in the cryopreservation units (Figure 12, Annex 5.3 and Annex 5.4).</p> <p>2.6 Completed. Article written and submitted to Samara Newsletter. Blog written on Armenian orchids on Kew website and social media posts sent to wider audience through Kew Science X page. Evidence of which can be found in section 10 of this report.</p>
Activity 2.1. Two Armenian seed bank team travel to MSB for 2-week training attachment programme		Partially completed
Activity 2.2. Delivery of in-country training on orchid ex situ conservation		Completed
Activity 2.4 Procurement of equipment for collecting, cleaning and banking		Completed
Activity 2.3 Locality survey of orchid populations for seed collection activity		Completed
Activity 2.5 Seeds, herbarium, and data of 10 orchid species collected from multiple populations		Completed
Activity 2.6 Seeds are cleaned, dried and pre-storage viability determined in Armenia		Completed

Project summary	SMART Indicators	Progress and Achievements
Activity 2.7 in-country	Seeds are stored in -20 degrees Celsius and -80 degrees Celsius	Completed
Activity 2.8	Subset of seeds are sent to the MSB	Completed
Activity 2.9	Viability determined on arrival at the MSB	Completed
Activity 2.10	Seeds at the MSB placed in -196 degrees Celsius	Completed
Activity 2.11	Article written for and published for MSBP	Completed
Activity 2.12	Blog post written and published for wider public	Completed

Annex 3 Standard Indicators

Table 1 Project Standard Indicators

DI Indicator number	Name of indicator using original wording	Name of Indicator after adjusting wording to align with DI Standard Indicators	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DI-A01	10 in-country staff, including the environmental ministry, protected area rangers, eco-tourism operators and research institutions (>60% women) trained on challenges in orchid conservation and trade by July 2022.	[DI-A01] Number of people from key local stakeholders completing relevant training on orchid trade and conservation. Baseline: 0 people trained on orchid trade and conservation	People	Men/Women	15 (2 men /13women)			15	10 (4 men/6 women)
DI-A02	Two Armenian seed bank team attend a 2-week orchid seed conservation technical attachment training programme at the MSB and capable of cleaning, banking, and evaluating viability by August 2022	[DI-A02] Number of training placement at the MSB completed by individuals of key national stakeholders on banking exceptional species. Baseline: 0 people on training placements for conserving exceptional species.	People	Men/Women	1 (0 men/1 women)			1	2 (no gender target)
DI-A03	100% of seed collections cleaned, dried, and stored using equipment available in-country and subset duplicated to the MSB showing no significant fall in viability for at least 70% of collections by March 2024	[DI-A03] Number of local organisations with improved facilities and staff knowledge for seed banking short-lived species Baseline: 0 local organisation with capability and capacity to bank short-lived species.	Institutions	National Seed Bank of Armenia	1			1	1
DI-A05	Trained staff members imparting learned knowledge and skills in seed banking and duplicating orchid seed to another 8 in-country conservationists	[DI-A05] Number of project partners reporting to have delivered further training to other members of staff on orchid conservation by project end Baseline: 0 trainers trained staff	People; Number trained	Men/Women	1 trainer; 0 trained	0 trainer; 11 trained		1 trainer; 11 trained (10 women)	2 trainers; 8 trained (4 men /5 women)

DI Indicator number	Name of indicator using original wording	Name of Indicator after adjusting wording to align with DI Standard Indicators	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DI-C04	Key orchid populations and current threats (including land and species use) gathered through community participatory mapping with 20 households (~20 women and 20 men) identified by December 2023.	[DI-C04] New assessments of biodiversity resource use for the Yenokavan community published. Baseline: 0 assessment available	Number	Participatory mapping Semi-structure interviews	1	1		2	2

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)

Annex 5 Supplementary material (optional but encouraged as evidence of project achievement)

Annex 5.1 Orchid final guidebook

Annex 5.2a and 5.2b Declaration of orchid booklet distribution

Annex 5.3 NoT_September

Annex 5.4 NoT_January

Annex 5.5 Orchid training feedback_before

Annex 5.6 Orchid training feedback_after

Annex 5.7 Yenokavan - use conservation and threats maps

Annex 5.8 MSc student thesis

Annex 5.9 Orchid seed processing working protocol

Annex 5.10 Post in Facebook_eng

Annex 5.11 Orchid introduction flyer

Annex 5.12 Data on survey results

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to BCF-Reports@niras.com putting the project number in the Subject line.	
Is your report more than 10MB? If so, please discuss with BCF-Reports@niras.com about the best way to deliver the report, putting the project number in the Subject line.	X
If you are submitting photos for publicity purposes, do these meet the outlined requirements (see section 13)?	X
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	X
Do you have hard copies of material you need to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number. However, we would expect that most material will now be electronic.	
Have you involved your partners in preparation of the report and named the main contributors	X
Have you completed the Project Expenditure table fully?	X
Do not include claim forms or other communications with this report.	