

Report to the Arcadia Fund

The Rainforest Seed Conservation Project – Year 2 of 5

Reporting Period: November 2013 – October 2014

Year 2 Progress

The second year of this project has seen the expansion of activities to encompass the full range needed to reach our final goals. Collection of seeds of rainforest species has increased and a better season in some rainforest areas, especially due to increased rainfall, has enabled our scientists to focus on the most vulnerable species.

The Rainforest Seed Conservation Project (RSCP) continues to exceed our original expectations in terms of the species collected and the quality of the information generated. This has created great interest across a number of sectors, including the rainforest restoration industry and ecological researchers, and has firmly established the Royal Botanic Gardens & Domain Trust (the 'Trust') at the forefront of this research internationally.



Landcare Illawarra seedlings handed to Richard Scarborough - credit Karen Sommerville

Achieving Outcomes

Outcome 1:

The Trust aims to study 50 rainforest species from Eastern Australia each year in order to predict the optimal ex situ conservation options. The Trust will prioritise species that face imminent risk of extinction targeting a small number (around 3-5) each year for intensive study. The RSCP will ensure that species currently under threat in the wild are safeguarded in an ex situ collection or that they have the potential to be conserved ex situ should the need arise. The Trust's long-term target is to conserve 75% of threatened species from rainforest habitats in New South Wales ex situ by 2020.

Selecting key regions

While whole of the Australasian area is within the project's purview, we have chosen to concentrate on three specific 'hotspots' in order to understand how best to meet regional needs and set up conservation networks. The north-east coastal region of New South Wales contains some of the most vulnerable sub-tropical to tropical flora in Australia. We have made significant collections of species in this area and set up a collecting and information network for rainforest conservation.

The Illawarra region, south of Sydney, has also been a focus for its wealth of temperate to sub-tropical species and rainforest arrays which are under increasing pressure from development. We have partnered with local restoration practitioners during the year to ensure the success of a number of significant restoration projects in this region such as roadside revegetation by Landcare Illawarra.



Graeme Errington recording field

The third focal area is in south-east Asia where we are helping to establish Vietnam's first rainforest botanic garden. This year we have delivered extensive training to regional practitioners involved in rainforest conservation and utilisation, including forestry and ecotourism, as well as on-ground restoration and natural resources management. This work is also supported by HSBC.

Outcome 2:

The program will also include commonly occurring species, and it is anticipated the program will result in a total of 250 new rainforest seed collections held at the NSW Seedbank (including threatened species), which will be available for research purposes.

Collections continue to grow

The RSCP has contributed to continued growth of our collection of rainforest species in the national seedbank (see *Measuring Impact table* on page 6). All species collected from rainforest regions have been tested for their ability to withstand drying, the first prerequisite of traditional seedbanking. If they can withstand drying, they are then assessed for how long they might remain viable.

Seed species

A further 59 species were collected and studied this year, exceeding our target of 50, enabling the seedbanking of 35 species that would not otherwise have been collected nor stored. This year also saw a significant advance with the establishment of a large number of rainforest species into tissue culture, many of which are now growing well. Once established in culture, the plant material will be cold stored at 5 °C or cryogenically at -180°C.

Outcome 3:

The Rainforest Seed Conservation Project will enable significant advances in the area of rainforest biodiversity, conservation and collaborative ecological restoration.

Conservation utilising ultra-low temperate storage

The RSCP is the flagship conservation project of the Australian PlantBank. This architecturally lauded facility has quickly become recognised as the international model for integrated plant conservation on a local, regional and global scale by other botanic gardens and plant researchers in universities, as well as by government agencies responsible for conservation outcomes such as the Office of Environment and Heritage.

The facilities of Australian PlantBank are now onstream and our technician, Amanda Rollason, has developed significant tissue culture collections of rainforest species and begun contributing collections to the ultra-low temperature storage cryogenic facility.

While ultralow storage of rainforest plants in liquid nitrogen might once have seemed science fiction, Dr Karen Sommerville has had significant success towards making this possibility a reality for some of our most threatened species. We are now working at the cutting-edge of this technology and are networked with the most



Cryogenic storage of rainforest seeds -
Karen Sommerville

preeminent practitioners in this specialised conservation technique, assisted by Karen's scholarship to attend the International Cryogenic Symposium in Colorado in 2012-2013.

Rainforest seed germination knowledge

A major challenge with rainforest species is they are often dormant and are slow or almost impossible to germinate. In 2015 our rainforest collector, Graeme Errington, will attend a specialised workshop in Germany led by the foremost international experts in this area with the support of a 2014-2015 Foundation & Friends of the Royal Botanic Gardens Scholarship.

Outcome 4:

Ongoing and new collaborations with organisations will be developed in the Asia- Pacific region including training and upskilling opportunities for the Trust's counterparts.

Asia-Pacific Capacity Building

This year we continued to share and develop knowledge in the Asia-Pacific region by build linkages with and assisting to enhance the capacity of our partner organisations in Vietnam and Laos. Training was held for rainforest collectors in Vietnam: 3 people over 31 days and in Laos 2 key botanic gardens staff attended one-day training events.



Potting rainforest species Vietnam

Outcome 5:

Throughout the project, scientific findings will be collated and synthesised to achieve greatest impact and practical application. These findings will be made available free of charge to the widest audience.

Communication

We have published many articles about this project and its initial findings across a wide range of publications and platforms (see list below). Our stories about rainforest work attract the largest number of interactions on our Facebook and Twitter accounts. We have updated how we store our information and have made significant contributions to the world-famous data-sharing Atlas of Living Australia (ALA).

Publications include:

- Pha Tad Ke Botanical Garden Newsletter, No 13, June 2013
- Camden Narellan Advertiser, *Australian Plantbank: New Research and Seed Storage Facility in the Australian Botanic Garden Mount Annan*, 11 March 2014
- The Garden Magazine, *Foundation & Friends Funding Scholarships*, Issue 203, Summer 2014
- Australian Plants, *The Rainforest Seed Conservation Project*, Vol 27, No 219, Winter 2014



Cross-section of *Eidothea hardeniana* seed

Measuring Impact

Collection	Target	Outputs	Outcomes
Prioritisation of species to collect by consultation with relevant authorities.	2013*	Achieved	Working list of species to collect.
Total number of species to collect.	50	59	Contributions to the Trust's 2025 target.
Number of threatened species collected.	20	6**	Contribute to the Trust's 2025 target **lower than expected as emphasis on Myrtle rust-affected Myrtaceae.
Data collection on public databases.	50	59	Information was uploaded to PlantNET, ALA and eventually the Seed Information Database.
Collect herbarium vouchers.	50	59	Contributions to the National Herbarium of NSW.
Research			
Diagnostic evaluation of species for orthodox seed storage. Number of species.	50	59	List of orthodox species to seedbank; improvements to storage protocols.
Investigate alternative conservation options for recalcitrant species.	15	15.	Alternative protocols for storage are being developed.
Priority species targeted for intensive study resulting in effective conservation ex situ.	4	4	Enable ex situ conservation of 'exceptional species' i.e. threatened species that are difficult to seedbank.
Enable collaboration on ecology, genetics and other biological research.	4	2 PhD studies 1 honours project 2 collaborations Dr Maurizio Rossetto, the Trust and Dr Frank van der Kooy, University of Western Sydney (screening rainforest species for pharmaceutical compounds).	Maximise the potential uses of the collections.
Germplasm Storage			
Store orthodox seeds.	35*	34	Contribute to target outlined in the 'collection section'. *The actual number was expected be quite variable due to results of the research outlined above.

Store species in seedbank, tissue culture, cryogenics or living collection.	Up to 15	19 new species initiated in 2014	Contribute to target outlined in the 'collection section'. **The actual number was expected be quite variable due to results of the research outlined above.
Contribute duplicate orthodox seed collections to the MSB. Number of species.	35	24*	Contribute to the global seedbank partnership. *more to go in next shipment.
Explore Trusts potential to duplicate collections from other parts of Australia.	Strategy in place by 2016/17	Initiated discussions with the Australian National Tropical Seedbank (Agricultural species and crop wild relatives), and two other botanic gardens at Bidoup Nuba (Dalat - Vietnam) and Pha Tad Ke (Luang Prabang – Laos).	Increased ex situ conservation.
Training			
Deliver intensive training as part of the Trust's Asia-Pacific Capacity Building program.	2 trainees for one month	Training held for rainforest collectors in Vietnam (3 people x 31days) Laos (2 people x 1 day). One tissue culture trainee – 2 days per week on-going.	Share and develop knowledge in Asia- Pacific; build linkages with and assist capacity of like organisations.
Deliver undergraduate training and work experience (days).	10	77	Raise awareness of issues with conservation.
Deliver training to post-graduate students and academics.	4	4	Raise awareness of issues with conservation.
Integrate rainforest conservation issues into post-graduate thesis projects.	3	3	Conduct rainforest species research.
Communication			
Conference presentations.	1	3	Communicate and exchange ideas and knowledge to peers.
General publications.	2	3	Gain recognition of the value of research and communicate scientific findings.

Interpretation.		Australian PlantBank rainforest interpretation successfully delivered.	Raise public awareness and buy-in.
Electronic media articles.	1	1	Raise awareness of conservation issues.
Website on the RSCP.	Construct.	Constructed Oct 2013.	Information delivery.
Social media.		26 Facebook stories on the Australian Botanic Gardens group page – viewed by over 19 361 people.	Raise public awareness.
Partnerships and collaborations			
Support the Australian Seedbanking partnership.	Represent on the National committee.	Representation continued.	Establish the Trust as the centre of excellence for rainforest germplasm.
Maintain seedbanking partnerships with the Millennium Seed Bank (MSB).		Continued engagement Funding received from MSB for the Global Tree Project (See impacts) focusing on rainforest species.	Build and maintain linkages with the global native seed repository; capacity building for both organisations.

Impact Highlights

Impact 1:

Having mapped storage potential of all NSW rainforest species by 2018, predictions for conservation actions can be shared with seed banking institutions worldwide.

An important development this year was our partnering with other Australian seedbanks to participate in the Global Trees Programme funded through the Millennium Seed Bank. The Australian Seed Bank Partnership (ASBP) will be one of Kew's partners in the Global Tree Programme. Australia's role in this project will involve establishing *ex situ* seed collections for tree species. The Australian collections will contribute to Kew's collection targets and contribute to ASBP's collection targets as part of the 1,000 Species Project.

Due to our focus on rainforest species, and the influence that this project provides, the Australian partners decided to concentrate on these species as well as species affected by the recently introduced Myrtle Rust disease. The ASBP members have agreed to place priority on collections of eucalypt and rainforest trees and the project will involve the nine conservation seed banks.

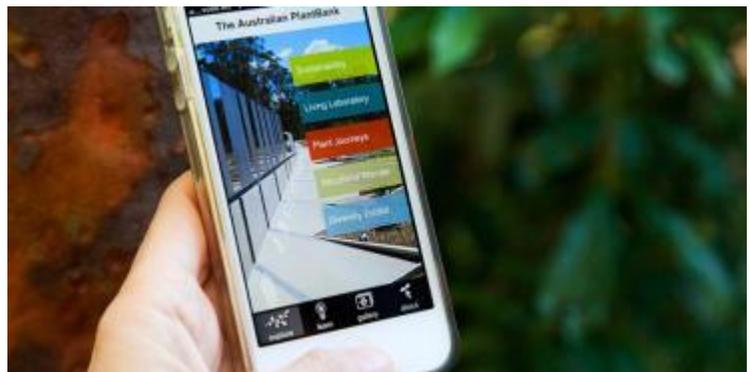
This project has provided funding for the Australian partners to collect a further 380 species for seedbanking.

Dr Karen Sommerville, Dr Cathy Offord and Graeme Errington all made presentations at the Germplasm Conservation Symposium at the International Horticultural Congress in Brisbane in August 2014, the largest gathering of horticultural scientists in the world. The symposium highlighted the critical importance of conservation of rainforest resources and how appropriate exploitation is very high on the agenda of international science and sustainable industry.

Impact 2:

By making well-researched information and high quality documented plant material available, the Trust hopes to make a significant impact on plant conservation globally.

This year saw a focus on communication which capitalised on the interest from the opening of the Australian PlantBank in October 2013. Four articles were published in popular publications including *Australian Plants* and two papers were submitted to peer-reviewed journals.



We also witnessed a growth of our social media engagement. Our Facebook page saw an increase from 2 to 26 individual posts (from 2013 to 2014) with increased reach from 2,000 to nearly 20,000 views.

Our Australian PlantBank mobile app was launched in early 2014 along with a specially developed website which will host our RSCP information from early 2015. This development has been funded by the NSW Environmental Trust and enables visitors to delve deeper into specific conservation topics.

Impact 3:

By providing roadmap information and support, the Trust hopes to positively influence other biodiverse countries to invest in conservation initiatives.

Several individual research collaborations were consolidated or initiated. With evolutionary ecologist Dr Maurizio Rossetto of the Trust, we are exploring the biogeographical significance of rainforest seed characteristics to gain perspective on the effects of climate change and other species drivers. A new post-graduate student will begin work on rainforest seed biogeography in late 2014. Two PhD students continue to work with us on ecology of *Wollemia nobilis* – the iconic rainforest species Wollemi pine. An honours student submitted her work on the genetics of this species using the ex situ collection.



Interns working on rainforest species

As part of our testing regime we often produce excess plants. We seek to relocate these to appropriate homes in other botanic gardens or, where at all possible, return back to the areas that they came from - especially if that area is degraded or the species is endangered. An important new collaboration began with Landcare Illawarra to restore lost rainforest species in this region.

Impact 4:

By offering training and sharing expertise, the Trust hopes to provide strong leadership for plant conservation in the Asia-Pacific region.

Training focused on two key target groups – undergraduate students and capacity building in south-east Asia. Four undergraduate students from different universities were given intensive training on rainforest related project. Graeme Errington delivered training to staff at Bidoup Nuba National Park (BNNP) in Vietnam and Pha Tad Ke Botanical Garden in Laos.



Seed collection training in Vietnam

Financial Information

2013 – 2014: Projected Expenses vs Actual Expenses (in AU\$)

EXPENDITURE	PROJECTED	ACTUAL	COMMENTS
Salaries (including on-costs)	303,395	284,557	The reduction in figure is attributable to staff changes. The departure of the Rainforest Scientist (Training and Communications) on maternity leave meant a position was unfilled for several months. In addition, staffing on-costs were lower than originally projected.
Travel	15,600	14,072	
Laboratory & Other Fees	5,200	2,216	The Laboratory costs were slightly higher last year due to the equipment fit-out required for the newly opened Australian PlantBank.
Asia-Pacific Capacity Building	10,000	10,000	
Total	334,195	310,845	
INCOME			
Arcadia Fund	118,098	132,523	
Foundation & Friends and private donations	112,324	145,322	
Corporate Support (TransGrid & HSBC)	103,773	33,000	
Total	245,685	310,845	

2014 – 2015: Projected Budget (in AU\$)

INCOME SOURCE	BUDGET ITEM	Year 3
Arcadia Fund	Scientist	111,340
	ACB	10,000
	Subtotal	121,340 (approx.)
Foundation & Friends and Private Donations (including funds already pledged from donors)	Collector	82,713
	Travel	10,400
	Scientist	22,268
	Subtotal	115,381 (approx.)
Corporate Support (HSBC and TransGrid)	Technical Officer	96,174
	Laboratory	5,200
	Travel	5,200
	Subtotal	106,574 (approx.)
TOTAL PROJECT COSTS		343,295