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# IMPLEMENTING ACCESS AND BENEFIT SHARING FOR SEED BANKING

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## ABSTRACT

A global study has shown that Australian crop wild relatives (CWRs) are a priority for ex situ conservation and future use. The majority of target species occur across various land tenures in northern Australia, including Indigenous Protected Areas. Work undertaken on Indigenous lands needs careful consideration, and until recently the planning of wild crop collections has taken a Western scientific approach. Awareness of potential cultural issues associated with access and use of traditional knowledge is increasing, and Indigenous community expectations associated with use of their knowledge can vary between individual traditional owners and within communities. The Council of Heads of Australian Botanic Gardens Incorporated, through its Australian Seed Bank Partnership, is collaborating with the University of New England to define clear processes and develop protocols for traditional knowledge stewardship, helping to minimize the risk of compromising the cultural integrity of data, while being practical for implementation by the nation's leading botanic gardens. This paper examines how scientific paradigms within botanic garden policy are being transformed in the context of working with Indigenous traditional owners. It will highlight how the Partnership is creating possibilities "on country" (i.e., on traditional lands) within its projects and consider benefits that Indigenous communities may receive from working with this alliance.

*Key words:* Access and benefit sharing, ex situ conservation, Indigenous peoples, science paradigms, seed banks, traditional knowledge.

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Australia's conservation seed banks, as part of various government agencies, have been actively contributing to targets 8, 9, and 16 of the Global Strategy for Plant Conservation (GSPC) under the Convention on Biological Diversity (CBD) since its inception. Australia has around 9100 species in its conservation seed banks, representing around half of its flowering plant species and around one third of its threatened species (Australian Seed Bank Partnership, 2016). More than one third of these collections were made from the year 2000 onwards, using international collecting and storage standards as part of the Millennium Seed Bank Partnership. The formation of the Australian Seed Bank Partnership (ASBP) in 2010, evolving from the Australian Seed Conservation and Research Network (2007–2010), has provided Australia with an alliance of government and nongovernment organizations that have a long-term view for plant conservation through a national effort of collaborative seed banking, research, and knowledge sharing.

The primary uses of these ex situ collections to date have been for noncommercial research, threatened species recovery programs, botanic garden living collections for education and awareness-raising, and safeguarding in seed banks for future

use. The recent international gap analysis on crop wild relatives (CWRs) by the Global Crop Diversity Trust will provide opportunities for the conservation seed banks in Australia to broaden their focus and collaborate with the Australian Grains Genebank on securing these wild crops for future use and safeguarding them through ex situ conservation. CWRs are poorly represented in ex situ collections; only 2%–6% of global gene bank collections comprise CWR accessions and these samples are about 6% of global CWR species (Maxted & Kell, 2009). The Trust's gap analysis identified 40 priority CWR species from Australia likely to contain unique genetic diversity of value to adapt agriculture to changing climates. The Global Crop Diversity Trust and the Royal Botanic Gardens, Kew sent the list of priority species to the ASBP and requested that the Partnership support the seed banking of these species. All the species listed are in annex I of the Food and Agriculture Organization (FAO) of the United Nations' *International Treaty on Plant Genetic Resources for Food and Agriculture* (FAO, 2001). These priority taxa include *Ipomoea* L. (sweet potato), *Cajanus* Adans. (pigeon pea), *Musa* L. (banana), *Oryza* L. (rice), *Sorghum* Moench (sorghum), and *Solanum* L. (eggplant).

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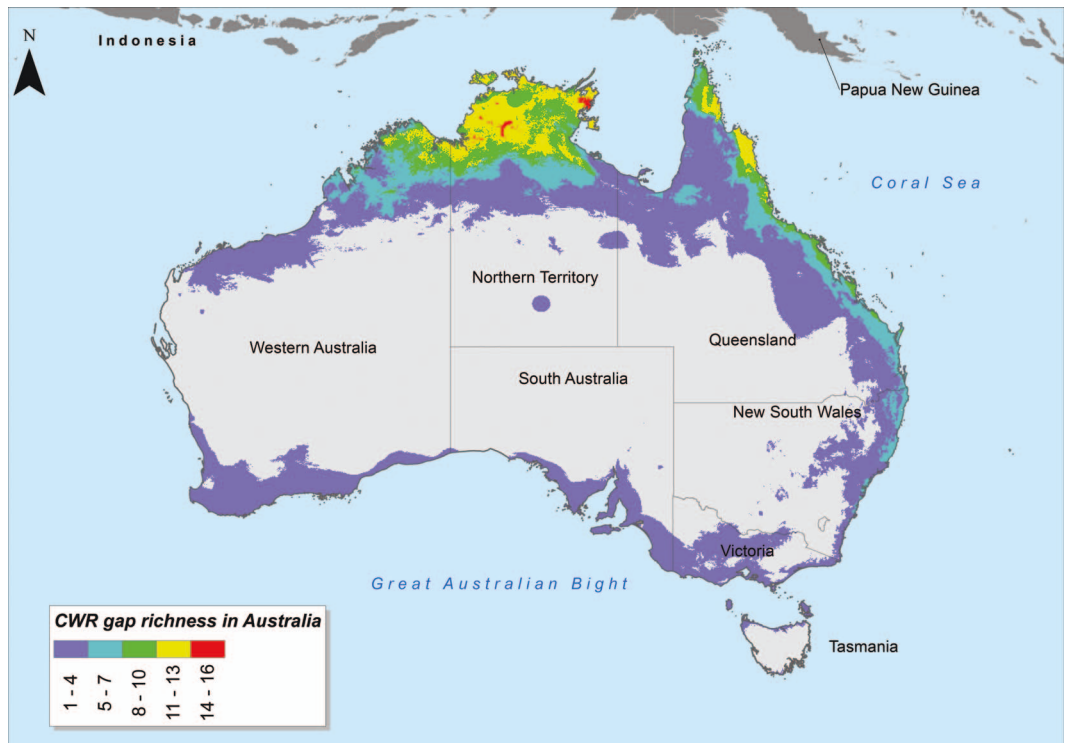


Figure 1. Collecting gaps of crop wild relatives (CWR) in Australia and location where diversity (i.e., richness) is greatest.

The ASBP, in collaboration with the Australian Grains Genebank, has prepared a five-year business case to deliver 755 collections of these 40 priority taxa. The majority of the target Australian taxa have the highest diversity across northern Australia (Fig. 1). Many of the populations of the target species are in remote localities with complex land tenures, including Indigenous Protected Areas (IPAs) and areas of land under the Native Title Act or with current unresolved native title claims in the courts. Furthermore, it is anticipated that some of the target taxa will have a geographic distribution limited to Indigenous lands.

This adds new complexities and considerations in terms of access and benefit sharing in relation to the work of the conservation seed banks. Therefore, to enable Australia to continue to safeguard its endemic flora and contribute to the international program on the ex situ conservation of CWRs, the ASBP and the Australian Grains Genebank need to consider the CWR project not only in terms of the CBD's GSPC and the FAO's Treaty, but also in terms of the rights of Indigenous people and access to Indigenous lands.

Indigenous groups voluntarily dedicate Indigenous Protected Areas (IPAs) on Indigenous-owned or Indigenous-managed land or sea country. The aim

of the IPAs is to protect biodiversity and cultural heritage, as well as provide employment and opportunities for education and training for Indigenous people in remote areas. To date, there are 72 dedicated IPAs across 64 million ha, accounting for more than 40% of Australia's National Reserve System (Australian Government, 2015).

The Australian Government passed the Native Title Act 1993 to manage applications for recognition of native title and any future access to lands claimed as native title lands. Over 27% of the country has been successfully determined, with 249 native title determinations and thousands of negotiated agreements (including 949 Indigenous Land Use Agreements) to facilitate future development. The Native Title Act 1993 also established the Aboriginal and Torres Strait Islander Land Fund and the Indigenous Land Corporation to assist Indigenous people in buying and maintaining land. The Indigenous Land Corporation has purchased 250 properties within Australia with a total land area of over 6.1 million ha (Australian Institute of Aboriginal and Torres Strait Islander Studies, 2016).

It is critical for the CWR project to implement processes for effective collaboration and benefit sharing. Such processes will likely include discus-

sions to determine the interest and contribution of Indigenous communities and their lands to the conservation and development of these plant genetic resources. Discussions are also likely to include the appropriate management of Indigenous traditional knowledge and the right of Indigenous people to equitable participation in sharing benefits arising from utilization into the future.

This paper presents a case study in progress on seed banking of CWRs and determining access and benefit sharing with Indigenous Australians.

#### CONSIDERATIONS FOR EFFECTIVE BENEFIT SHARING

A challenge with this project is realizing the conservation, equitable, and sustainable use of CWRs. Since the seed collections are being divided for different uses, complexities arise due to the different approaches to access and benefit sharing under the CBD and the Treaty. This has been a key part of high-level international discussions and negotiations for several years, but when the policy framework is being applied to a specific project in a specific cultural context, then the problems become real and meaningful.

The national and international importance of the proposed *ex situ* conservation of CWRs in Australia in terms of global food security is clearly evident. There are significant anticipated risks to food and biosecurity from climate-related changes, including long-term changes in rainfall and temperature patterns, rising sea levels, and the changing frequency and severity of extreme events (Natural Resource Management Ministerial Council, 2010). This places a stronger emphasis on the adaptive capacity of native plant genetic resources to help meet food and biosecurity concerns. Both the *National Approach to Access and Use of Australia's Genetic Resources* and the *Biodiversity Conservation Strategy 2010–2030* emphasize the importance and potential of biogenetic resources in helping to innovate in the face of climate-related risks (Natural Resource Management Ministerial Council, 2002, 2010). The work of the CWR project has long-term implications for Australia, so it is critical to clearly define where responsibilities lie and implement processes for effective collaboration and benefit sharing. Considerations include the contribution of Indigenous communities and their lands to the conservation and development of these plant genetic resources; the appropriate management of Indigenous traditional knowledge; and the rights of Indigenous Australians to equitable participation in sharing benefits arising from utilization of plant genetic resources into the future.

#### INTERNATIONAL INSTRUMENTS FOR CONSERVATION OF PLANT GENETIC RESOURCES AND THEIR AGRICULTURAL USE

The collections of CWRs will be divided for inclusion in the conservation seed banks of the ASBP member institutions and the Australian Grains Genebank. In the conservation seed banks they will be used for noncommercial research on native flora and also be available to support *in situ* conservation and restoration if and when required. The collections going to agricultural gene banks will be made available through the international agricultural breeding centers for pre-breeding trials.

Complexities arise due to the different approach to access and benefit sharing taken by the CBD and the Treaty. The conservation seed banks are more experienced working with the CBD—its Nagoya Protocol relies on bilateral (one-to-one) access and benefit-sharing arrangements between a provider (e.g., Indigenous communities) and the receiver of plant genetic resources (e.g., botanic gardens and associated conservation seed banks). In contrast, the agricultural gene banks work with the Treaty, which introduces a multilateral system of access and benefit sharing around a common pool of listed plant species. These are listed in annex 1 of the Treaty and are agreed as important for food and agriculture. There is a degree of harmony between the separate international arrangements for plant genetic resources by virtue of the Treaty and its system of access and benefit sharing being recognized as consistent with the CBD and the Nagoya Protocol (Dierig et al., 2014). In particular, Article 4 and Article 8 of the Nagoya Protocol support development of distinct domestic arrangements for plant genetic resources identified as important to food and agriculture (the annex 1 common pool of species) (Morgera et al., 2014). What this means for the collection of CWRs is that species listed in annex 1 of the Treaty are covered by multilateral access and benefit-sharing arrangements when access is for the purpose of research, breeding, or training for food and agriculture (Morgera et al., 2014); the Indigenous communities in Australia do not directly receive benefits from any commercialization of these plant resources.

The Treaty raises challenges in Australia because of the large and increasing area of land managed by traditional owners (see United Nations, 2008). Permission to access plant genetic resources on these lands requires lengthy negotiation and relationship-building and careful consideration of the sociocultural perspectives of this project. In particular, there are recognized differences between the indicators of quality of life for Indigenous and non-

Indigenous Australians. Indigenous people generally experience lower standards of life expectancy, health, education, employment, and housing; they are also overrepresented in the criminal justice and the care and protection systems nationally (Australian Bureau of Statistics, 2011; Close the Gap Campaign Steering Committee for Indigenous Health Equality, 2016). The United Nations has ranked Australia second behind Norway in its annual Human Development Index—for public health, social wealth, education, even happiness; however, if only Aboriginal peoples were considered, Australia would be ranked 132nd (Georgatos, 2015). Closing the gap in the quality of life between Indigenous and non-Indigenous people in Australia is an important factor for consideration when designing pathways and negotiating benefit sharing from this securing CWR project.

This project requires integrated domestic policy mechanisms from both the conservation and agricultural production sides of plant genetic resource use (Halewood et al., 2013). The domestic policy formulation in Australia is divided between environment agencies (for CBD) and agriculture agencies (for the Treaty), and this CWR project will test the integration of the policies and processes.

#### SOCIOCULTURAL PERSPECTIVE

In terms of managing the sociocultural aspects of this project, it is acknowledged that to date a traditional Western scientific approach to planning this project has been taken; the approach is driven by Western policy and strategy models, and the science paradigms contained within botanic gardens have supported this process. To date, negotiations have been undertaken with government departments and state and territory environmental and agriculture agencies, as well as the Global Crop Diversity Trust, to develop pathways to be able to deliver Australia's contribution to this global CWR work, with a particular emphasis on securing resources (AUD 2.7 million) to enable this work.

As the Treaty does not allow for direct financial benefits to be shared with traditional owners, a fundamental question is whether the collecting of CWRs needs to be undertaken on Indigenous lands. From a scientific perspective, the provenance of the collections is of paramount importance to this work in the long term, and the aim is to capture genetic diversity in the multiple collections made from each species. That being the case, mapping of the CWRs was undertaken to determine their known occurrence

in Indigenous lands. The mapping exercise highlighted the following information:

- (1) Of target *Sorghum* species, 6.5% of populations occur on Indigenous lands; therefore, there are options for making provenance collections on non-Indigenous lands.
- (2) Of target *Cajanus* species, 72.2% of populations occur on Indigenous lands; it may be challenging to deliver diverse collections without working on Indigenous lands with communities.
- (3) Of target *Oryza*, *Vigna* Savi, and other taxa, 55.7% of populations occur on Indigenous lands; further investigation is needed to see if diverse provenance can be captured without working on Indigenous lands with communities.

The next step, after defining priority populations for collection and examining land ownership, is to have discussions with traditional owners to determine their perspective on the use of their resources for pre-breeding, which in the future could be used in global food security efforts, and also to determine their view on benefit sharing for the global good that may not directly benefit their community.

These growing opportunities for members of the ASBP to collaborate with traditional owners means that botanic garden institutions will need to evaluate their policies, practices, and existing scientific paradigms, in terms of working collaboratively with Indigenous communities, making collections and managing traditional knowledge associated with seed collections that would be managed under the CBD and the Treaty.

#### *Evaluating practices and policies and transforming scientific paradigms*

Botanic gardens are typically well established within many societies as centers of scientific endeavor and plant collection. In contrast to museums that are collecting-institutions with well-established institutional policies and ethical guidelines around collaborating with Indigenous communities, this is not the case with Australia's botanic gardens. A scoping survey of Australian capital city botanic gardens in 2015 highlighted the lack of institutional policies for scientific work involving collaborations with Indigenous communities (Shephard, 2017). One particular area requiring attention was the development of institutional seed bank protocols on the collection of Indigenous knowledge in the field or the storage of this knowledge if and when collected.

Current approaches to data collection in Australian botanic gardens reflect the disciplinary practice of botany where information is a biophysical input to classifying botanical collections (Shephard, 2017). This practice involves standardized field recording of such fields as taxonomy, date of collection, locality,

distribution, abundance, plant description, site description, phenology of population, and population health (Offord & Meagher, 2009: 58–59). Traditional knowledge is not a standard data field, though it may be included in a record as “additional information.” This ancillary approach to cultural information effectively strips the knowledge from its environmental, social, and cultural context and foreshadows a problem of social performance accountability for botanical institutions (Shepherd et al., 2014). Discussions during a seed colloquium held in Australia in 2014 highlighted concerns of Indigenous leaders around the management and use of traditional knowledge and the risks of it being made publicly available without permissions.

The social, legal, and environmental context in which these botanic gardens operate is changing. In the context of this paper, the drivers that challenge historical scientific paradigms associated with botanical collections management include: (1) increasing awareness and understanding of potential cultural issues with access and use of traditional knowledge; (2) changing legal and social status of Indigenous people and their culture; (3) increasing political assertiveness of Indigenous interests in relation to matters of culture; (4) expectations of funding bodies surrounding the ethics associated with Indigenous issues; and (5) changes in Indigenous community expectations associated with use of their knowledge (Dierig et al., 2014).

There is now a greater need for Australian botanic gardens to focus attention on developing a deeper understanding of a full range of expectations likely to impact seed collection strategies and performance (Shepherd & Martin, 2009). Realistic measures of performance and processes to demonstrate accountability need to be developed (Shepherd, 2017), as well as providing a clear and agreed formulation of responsibilities. Collaboration in defining responsibilities can foster partnerships underpinned with trust and confidence (Shepherd, 2017), a central element to realizing social and environmental resilience (Organisation for Economic Cooperation and Development, 2013). A collaborative approach also has the advantage of shifting debate from who ought to be accountable for what, to concern about the different interests that need to be protected (Shepherd, 2010), and this has particular relevance when working with Indigenous communities.

In view of this, there are key institutional actions required to transform scientific paradigms before the Partnership can have meaningful partnerships with Indigenous communities around CWRs. Firstly, institutional policy and protocols for working with Indige-

nous communities and managing relationships and associated traditional knowledge need to be developed and implemented. Secondly, there needs to be a focus on the growth of institutional values and expectations and the development of institutional behavior in terms of working with Indigenous communities and ensuring they are at the core of strategies that form the basis for relevant operations. Thirdly, data management systems need modifying to assist with the management and protection of traditional knowledge. For the second action, this cultural shift and getting this into the forefront of thinking for relevant projects will require leadership and training for staff in negotiating fair access and benefit sharing; protocols for social and cultural data collection, handling, and access (including ethics approval requirements); and the development of Indigenous engagement and knowledge stewardship management plans. It is worth noting that the negotiation of the access and benefit sharing for seed banking is not necessarily done at an executive level in botanic gardens but is likely to be done by a technical officer, seed bank manager, research assistant, etc.

The Council of Heads of Australian Botanic Gardens Incorporated, through the ASBP program, is collaborating with the University of New England to foster Indigenous knowledge stewardship in botanical collections management systems and establish a clearer approach to managing the social and cultural complexities of collection, cataloguing, storage, and use of Indigenous knowledge associated with plant genetic resources. This emphasizes the importance of Indigenous ecological knowledge and, where appropriate, places plants in the proper ecological and social context of Indigenous people, their traditions, and ideas. Integrating such approaches into partner institution operations will not only help this CWR project but also future national seed banking strategies and performance. A collaborative commitment to this approach will enable a focus on different interests to be nurtured and protected, instead of just managing accountability.

#### CREATING POSSIBILITIES ON COUNTRY AND THE BENEFITS

Indigenous Australians are guardians of traditional ecological and cultural knowledge built around a deep understanding of country (i.e., traditional lands) and ecological and metaphysical processes (Clarke, 2013). Such knowledge may reflect a rich appreciation of plant survival, adaptation, and uses throughout time. Coupled with this is the large and increasing portion of the country under Indigenous ownership and/or management (Fig. 2). This reinforces the significance of Indigenous Australians as part of the knowledge system surrounding biodiver-

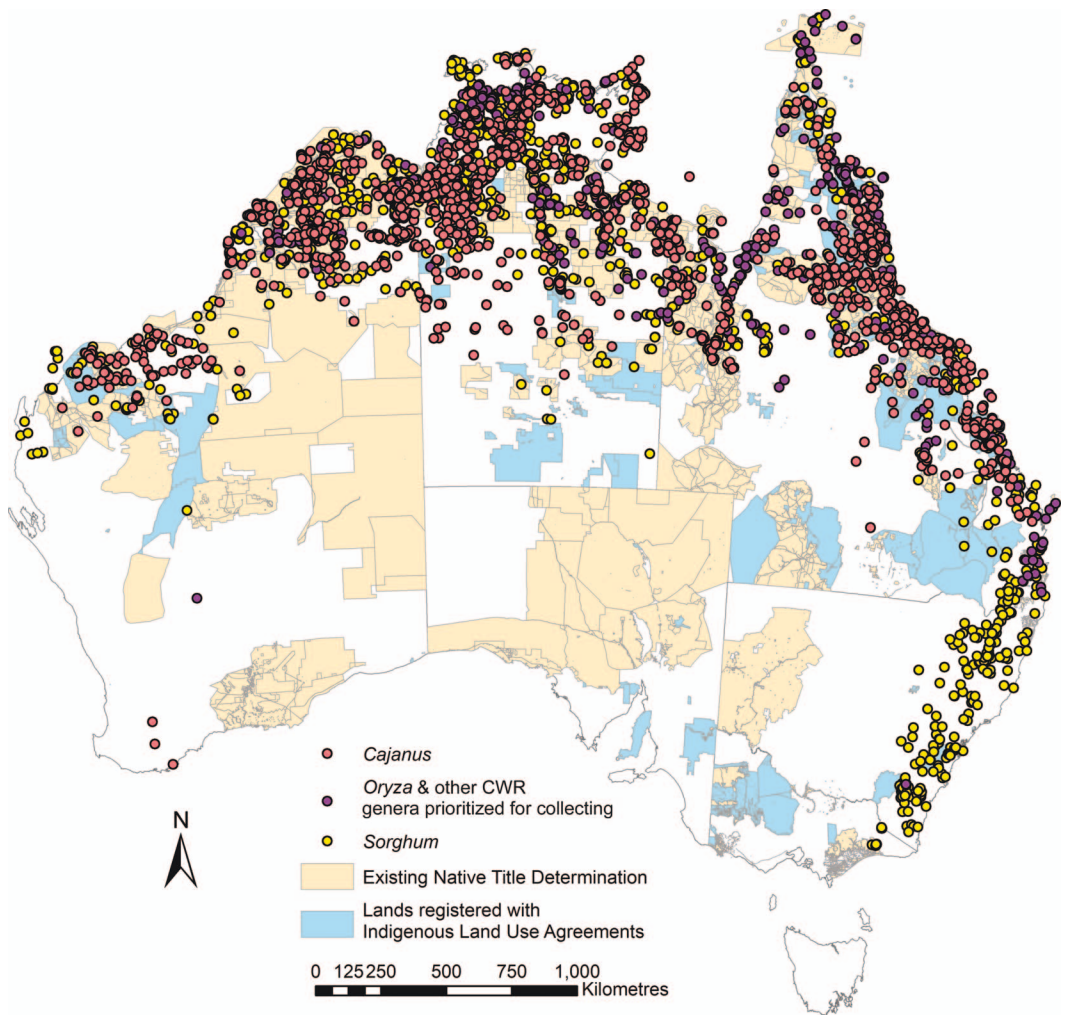


Figure 2. Map of priority crop wild relative (CWRs) distribution in Australia and Indigenous Protected Areas and areas of land under the Native Title Act or current unresolved native title claims.

sity access, use, and conservation. It highlights that botanic gardens grounded in Western scientific traditions need to transform to acknowledge and respect the culture, values, innovations, practices, and knowledge of Indigenous Australians.

The impact of shifting science paradigms and integrating a more social science approach within botanic gardens, combined with a strong commitment and leadership, will lead to a clearer path to working through access and benefit-sharing arrangements with Indigenous communities. In the context of the CWR project and other future projects, relationships need to evolve from the early tradition of collecting through negotiating access to lands and plant resources with landholders, or the more recent approach of contracting guide services from members

of Indigenous communities, to the development of meaningful relationships with mutual benefits that result in long-term collaborations beyond the initial CWR project (Fig. 3).

Transitioning collaborations in this way will assist in ensuring botanic gardens are taking responsibility and are accountable for Indigenous cultural well-being when working on country. These key responsibilities include: (1) identifying and meeting expectations of knowledge accountability and effectively countering biopiracy concerns; (2) providing certainty for Indigenous people and botanic gardens about the terms of access and use by documenting the links between genetic resources, knowledge, and product use and tracking traditional knowledge exchange; (3) ensuring that access and benefit sharing forms part of

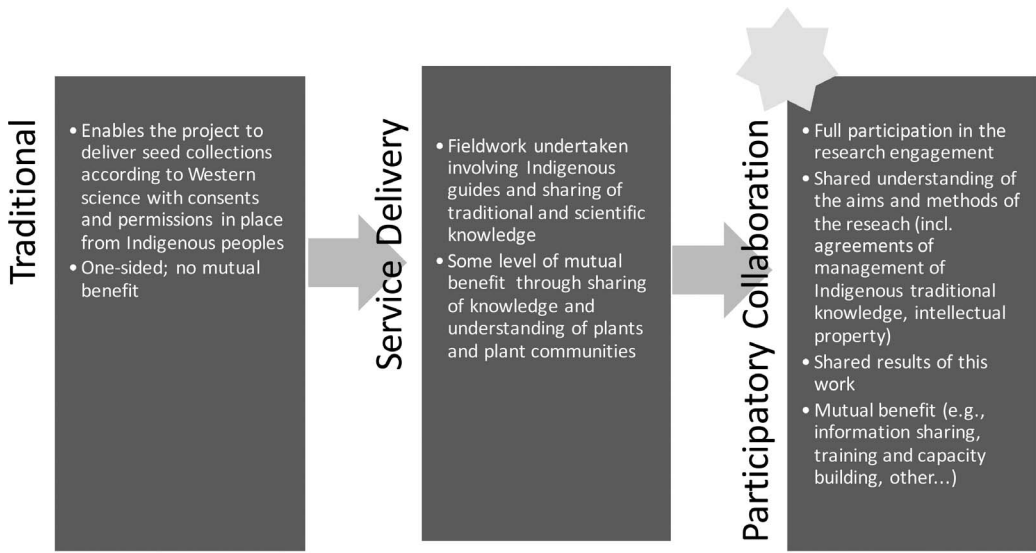


Figure 3. Transitioning collaborations with Indigenous peoples.

a long-term relationship, rather than a one-time access event; (4) building lasting partnerships that may include accreditation of a trusted institutional collection; and (5) demonstrating accountability for safe handling of knowledge, reduced risk of mismanaged or misused traditional knowledge in institutional collections, and demonstrating competence.

The status of Indigenous people in the community is growing; they are active participants and leaders in biodiversity management and are recognized for such leadership. Across Australia, there are between 80 and 90 programs where Indigenous rangers are employed on country, and there is a growing, highly skilled Indigenous management presence. These program leaders are working to conserve native title land, working with national parks, local councils, government agencies, and alongside world heritage areas, and they are reaching out to actively collaborate and partner on conservation and land management activities. The ASBP is being approached to collaborate with Indigenous organizations and is now in the early stages of development and negotiation. Several possibilities are being considered that would provide the initial basis for mutual benefit sharing through collaborative native seed-related activities (excluding CWRs), which would be guided by the CBD (Table 1).

Seed collections of CWRs made under the Treaty for pre-breeding and potential future use could involve the negotiation of similar mutual benefits, but the obvious difference, as mentioned previously, is that royalties and milestone payments arising from the commercialization of the genetic resources are

directed back into the multilateral system of benefit sharing and are not directed to the Indigenous communities from which the material originates. Australia is a signatory to the Treaty, which has important global benefits in terms of food security; however, the multilateral system of access and benefit sharing will arguably introduce equity issues by preventing Indigenous communities from receiving financial benefits from their land resources relevant to annex 1.

#### PROCESSES FOR TRADITIONAL INDIGENOUS KNOWLEDGE STEWARDSHIP

##### MINIMIZING THE RISK OF COMPROMISING CULTURAL INTEGRITY

Collaborations between botanic garden staff and Indigenous community members will involve knowledge exchange, and the botanic gardens will have responsibility for managing the cultural integrity of these data and will need to consider the risks. Risk is based on what people know, understand, and believe and is therefore socially constructed. Since risk is socially constructed it must also be socially resolved (Gerrard, 2000). The subjective and political nature of risk makes it a complex factor in defining the Indigenous knowledge stewardship performance of seed banks (Shepherd et al., 2014). To minimize the risk to traditional knowledge from institutional collecting operations, the relationship between institutions and Indigenous communities needs to be based on a shared vision with an understanding of expectations and responsibilities. Furthermore, the

Table 1. Mutual benefits of collaborating on (non-commercial) seed conservation in Australia.

	Benefit to Indigenous communities	Benefit to botanic gardens and their seed banks
Expert advice and capacity building	Increased knowledge about seed banking facilities that enhance storage and long-term viability of native seed for future use Knowledge and cultural expressions recognized, respected, protected, and maintained	Increased knowledge of phenology and impacts of natural events (e.g., fire) and Indigenous management practices on native plants and ecological systems Access to highly skilled land managers and different ways of viewing biodiversity management
Fieldwork	Increased access to information on scientific field collecting	Increased knowledge of land history, seasons, ecological systems, etc.
Research	Active participation in research to develop better understanding of the environment and enhance knowledge for managing country and cultural tradition Stronger Indigenous voice and presence in research	Work with people who know country and contribute knowledge and perspectives from their intimate understanding of country Enhanced outcomes for biodiversity management and conservation
Livelihood	Enhanced livelihood opportunities Access to ex situ plant resources if needed in future	Enhanced contributions to society

complexity of risk needs to be carefully managed to ensure that different interests and values of the parties are considered and the threats to these are carefully identified and evaluated relative to particular transactions (Martin & Williams, 2010). This is how risk provides the opportunity to effectively implement accountability for Indigenous knowledge stewardship by botanic gardens.

The sources of risk to botanic gardens from traditional knowledge about plants include increasingly stringent international obligations about traditional knowledge for plant genetic resources; a growing emphasis on social performance of scientific institutions; and global food security, which demands a renewed interest in the genetic traits of traditionally useful plants and CWRs. Each of these sources is accompanied by expectations from a variety of interests about the level of responsibility an institution ought to hold. Sources of expectation are likely to anticipate ethical and moral relations, political exposure or criticism, media criticism, and current or potential legal or other types of institutional rules. Some examples include the following:

- (1) Accountability for sociocultural performance as a product of ongoing developments in international law related to prior informed consent and access and benefit-sharing arrangements associated with biological diversity. The latest iteration is the Nagoya Protocol. Such obligations are reflected in domestic law in various ways.
- (2) Other legal obligations based on principles of equity to enforce just behavior in transactions between people. Examples are the duty to honor confidences; the duty to honor assurances; the obligation not to mislead or

deceive; and the obligation not to engage in unjust enrichment.

- (3) Other institutional collectors of Indigenous-related material (e.g., museums, art galleries) have faced increased scrutiny over their management and use of Indigenous cultural material. Funding bodies and professional practice groups increasingly anticipate making grants and/or professional certification subject to compliance with ethical practice guides.
- (4) Seed banks are increasingly promoting their value as holders of wild-sourced native plants, and in the future, Australian CWRs. These CWR species are a potential source of traits for disease resistance in cultivated varieties and are likely to be associated with collection from Indigenous lands (where such species may be sourced with the aid of traditional knowledge). Some of these are relevant to the common pool plants for food and agriculture under the Treaty.
- (5) In a digital and networked world, there is emphasis on making data readily available. Typically, Indigenous knowledge may be part of the data set that is linked to any given sample. If not adequately identified and managed, there is a very high risk that under these circumstances, Indigenous knowledge may be exposed and misused.

These five challenges make Indigenous knowledge stewardship a potential issue of strategic importance to botanic gardens and their seed banks in Australia, with the increasing chance that the institutions are likely to be called to greater account for the risks and contingencies associated with Indigenous knowledge stewardship in collections management.

PRACTICAL IMPLEMENTATION

The importance of traditional knowledge about plants for biodiversity conservation, commercial



Table 2. Culturally sensitive stewardship of Indigenous knowledge.

Stage One: Conceptual foundations for best practice traditional knowledge stewardship in collections management systems involve the following:	Stage Two: Collaborative development of the process for traditional knowledge stewardship by botanical institutions involve the following:
(1) Identify risks, including the institutional challenges and opportunities, and the harmful consequences likely to impact botanical institutions. (2) Identify the instruments available to address the risks. (3) Identify where collections management systems are most likely to intersect with Indigenous knowledge stewardship concerns. (4) Identify institutional capacity to deal with these risks.	(1) Develop a risk preparedness and strategy workshop to collaboratively determine strategies for the management of risks identified in Stage One. (2) Prepare traditional knowledge operating protocol for botanical institutions. This will identify the operational steps to achieve traditional knowledge stewardship in botanical collections management systems.

biological prospecting, and sustainable access and use of plant genetic resources is increasingly recognized in botanic gardens (Raven, 2006). Concurrently it is well established in the context of sustainable performance that organizations carry significant accountability for ethical decision-making and governance. These combine to make traditional knowledge stewardship a critical accountability factor for Australian botanic gardens.

Any model for collections management that incorporates Indigenous knowledge should not be developed in disciplinary isolation, but incorporate the experiences of other disciplines in both sciences and the humanities (Pickering, 2011). The National Museum of Australia and Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) are at the forefront of developing protocols and policies for research engagement with Indigenous Australians. This expertise is relevant to developing botanical collections management protocols that articulate with wider practice in major Australian museums and collecting institutions.

The AIATSIS guidelines are directed to forming and maintaining a mutually beneficial and ethical relationship between researchers and Indigenous people. This commences with recognition and respect for Indigenous rights (legal, cultural, and ethical), through to reporting and compliance. The guidelines set out 14 principles founded on the rights of Indigenous peoples to determine their involvement and participation, and to have their knowledge and cultural expressions recognized, respected, protected, and maintained (Australian Institute of Aboriginal and Torres Strait Islander Studies, 2012).

Guidance like this provides a starting point for developing culturally sensitive institutions, where Indigenous customs and rights are identified and respected. They help an institution recognize the importance of operations that build relationships around access to plant resources and traditional knowledge. Achieving this is part of a two-stage

process to develop both the strategic basis and practical mechanism for culturally sensitive stewardship of Indigenous knowledge (Martin & Williams, 2010) as outlined in Table 2.

These steps equip botanic gardens with the means to identify emerging challenges and opportunities, how and where these are likely to impact institutional operations, and what institutional capacity exists to maintain the highest ethical and managerial standards associated with care of traditional Indigenous knowledge.

#### DISCUSSION AND CONCLUDING REMARKS

The ASBP is working on an integrated approach to realizing the *ex situ* conservation of Australia's CWRs, which supports national obligations under the CBD and the Treaty and will result in the effective safeguarding of these native species, their sustainable use, and efficiencies through collaboration and benefit sharing. The initial project planning and negotiation process between the conservation and agricultural sectors has highlighted key matters for Australia's botanic gardens and their associated conservation seed banks (Fig. 4).

Firstly, there are complexities to implementing access and benefit sharing for seed banking when there are few existing relationships and collaborations between botanic gardens and Indigenous communities. Nevertheless, the growing interest in seed banking by Indigenous land management organizations in Western Australia and Far North Queensland does suggest real possibilities for plant conservation and restoration-focused collaborations that will deliver mutual benefits. These benefits range from the sharing of existing knowledge, shared creation of knowledge, capacity building, livelihood opportunities, and enhanced biodiversity conservation and sustainable management (Table 1).

Secondly, a lack of institutional policies guiding such collaborations and variable experience within

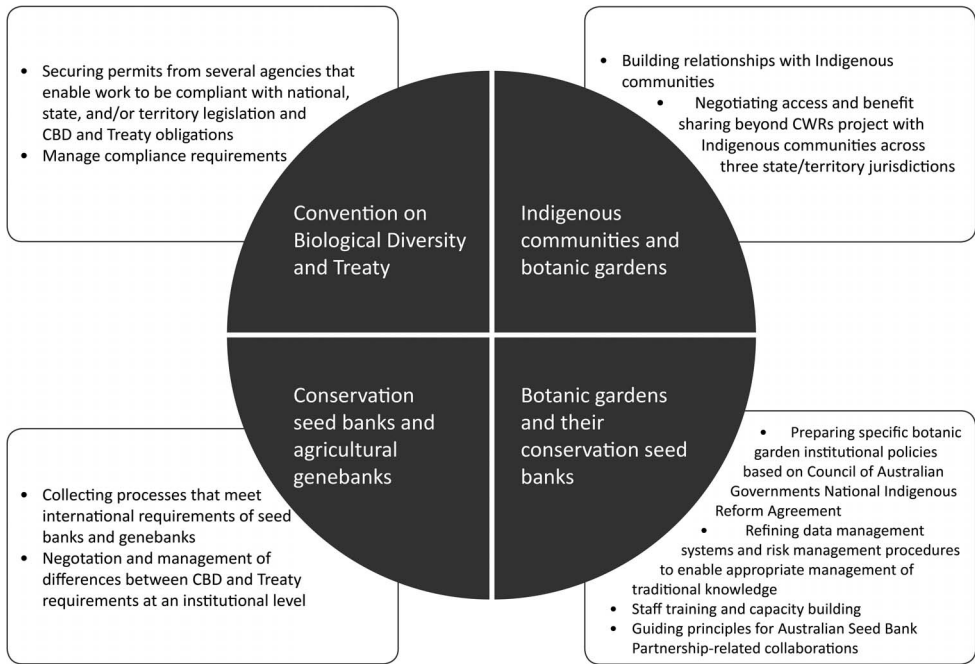


Figure 4. Key relationships for ex situ conservation of Australia's crop wild relatives (CWRs) through access and benefit sharing.

institutions threatens the ability to implement access and benefit sharing. Furthermore, transforming scientific paradigms to develop culturally sensitive botanic gardens is essential; however, this transformation will also introduce a significant time factor that needs to be incorporated into the project planning (e.g., scheduling of milestones and risk management).

Thirdly, in the future where ASBP faces the possibility of being refused permission to make seed collections of CWRs on Indigenous lands because benefit sharing is directed back to the multilateral system rather than the communities, botanic gardens may need to consider trying to negotiate access and benefit sharing for conservation seed banking and the use of the seeds for noncommercial research and ex situ conservation under the CBD.

In conclusion, this paper presents the early stages of a case study on securing Australian CWRs in ex situ conservation to contribute to the achievement of the Global Strategy for Plant Conservation's targets 9 and 13 and Aichi targets 13, 16, and 18. It provides a cultural context to these international conservation and sustainable-use targets and highlights the challenges in their implementation. In this Australian case study, there is anticipated tension around the Treaty's multilateral system in terms of working with Indigenous peoples and on their lands to access

associated CWR resources for global food security. Potential benefits arising from the use of these genetic resources will not directly be experienced by Indigenous communities. With the recognized differences in the quality of life for Indigenous and non-Indigenous Australians, this work raises ethical considerations that will require careful discussion with relevant Indigenous communities.

At this point, the ASBP is mapping pathways for securing these CWRs from populations outside Indigenous lands, while enabling time and resources to be allocated to growing and developing meaningful relationships with communities on country. The partnership is engaging in critical discussions on benefit sharing to determine perspectives on the use of community resources for the global good and what benefit sharing could be created beyond royalties and milestone payments.

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