THE SECOND REPORT ON THE STATE OF THE WORLD'S FOREST GENETIC RESOURCES

SUBMISSION BY

BGCI

This report was prepared as a contribution to the FAO publication, *The Second Report on the State of the World's Forest Genetic Resources*.

Regional networks and international organizations were invited to submit written reports structured around the four strategic priorities of the Global Plan of Action for the Conservation, Sustainable Use and Development of Forest Genetic Resources (FGR)– (1) improving the availability of, and access to, information on FGR; (2) conservation of FGR (*in situ* and *ex situ*); (3) sustainable use, development and management of FGR; and (4) policies, institutions and capacity building.

CONTRIBUTIONS OF BGCI TO THE IMPLEMENTATION OF THE GLOBAL PLAN OF ACTION FOR THE CONSERVATION, SUSTAINABLE USE AND DEVELOPMENT OF FOREST GENETIC RESOURCES

2013 - 2020

Dr Paul Smith, Secretary General (CEO) paul.smith@bgci.org

Alternative contact person. Dr Malin Rivers, Head of Species Prioritisation malin.rivers@bgci.org

Introduction

There are an estimated 3000 botanic gardens and arboreta in the world attracting 750 million visitors each year. Collectively, the botanical community grows a third of known plant diversity in its collections, and is at the forefront of in situ conservation and ecological retoration efforts. Botanic Gardens Conservation International (BGCI) is the membership organisation at the centre of this network. Our members include the largest, most renowned botanical institutions on the planet – Kew, New York, Missouri, Singapore, Sydney and Shanghai – but they also include many smaller gardens with regional and local impact. BGCI's mission is *to mobilise botanic gardens and engage partners in securing plant diversity for the well-being of people and the planet*. It achieves this mission by saving plant species from extinction, leading and influencing, sharing knowledge and resources, and addressing global challenges through public engagement and education. All of our member gardens share this commitment, and a combined workforce of tens of thousands of educators, horticulturalists and scientists is working towards that end. In short, we are the largest plant conservation network in the world. To find out more visit www.bgci.org

Priority Area 1: Improving the availability of, and access to, information on forest genetic resources

Since 2018, BGCI has led the Global Tree Assessment, which aims to assess the conservation status of all of the world's known tree species by 2023. In order to coordinate and prioritise the work of the Global Tree Assessment, BGCI maintains several databases:

GlobalTreeSearch (www.bgci.org/globaltreesearch) **is the most comprehensive list of tree species and their country-level distributions**. It was first published in 2017 following over two years of work gathering both tree species names and their country level distributions. This database is not static and is being continuously updated as new information becomes available. Our intention is for GlobalTreeSearch to be used as a tool for monitoring and managing tree species diversity, forests and carbon stocks on a global, regional or national level. GlobalTreeSearch now includes **58,076** tree species (31/12/2021) with over 6,700 geographic updates made in 2021, reflecting feedback from our partners and taxonomic progress.

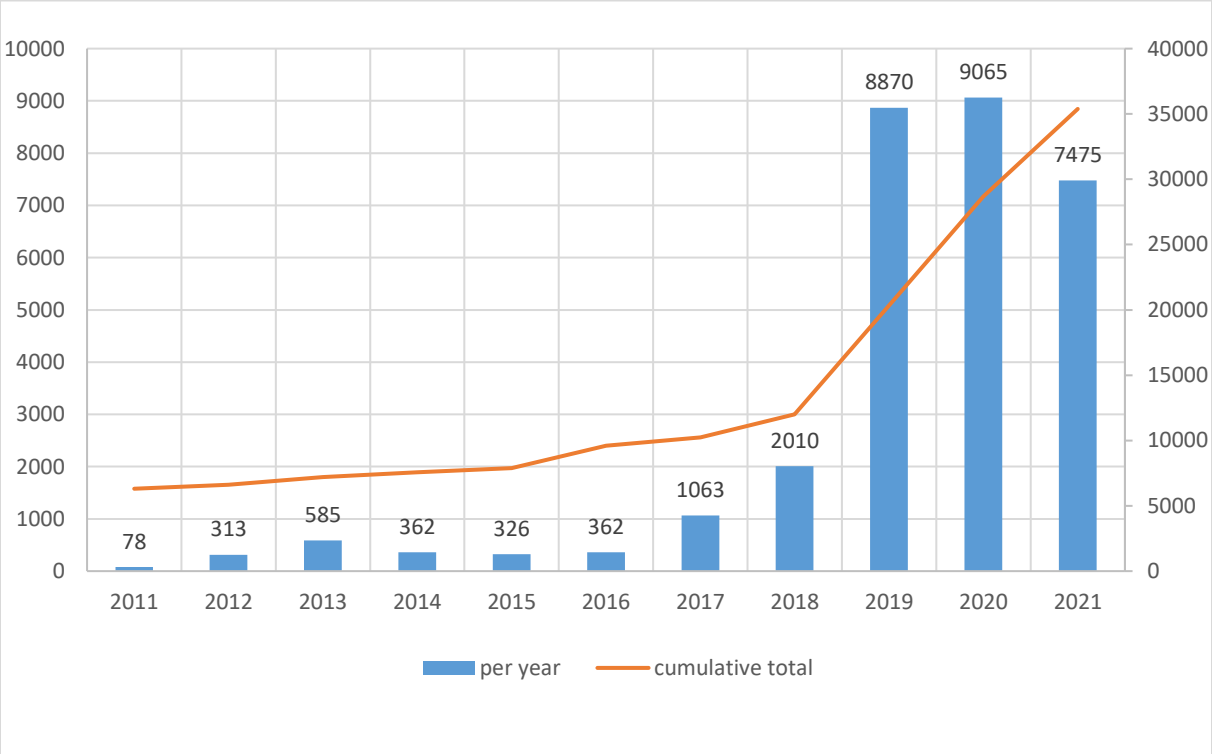
ThreatSearch (www.bgci.org/threat_search.php) is the **most comprehensive database of conservation assessments of plants, comprising** over 300,000 conservation assessments, representing over 180,000 taxa. ThreatSearch includes global, regional and national conservation assessments. ThreatSearch contains **75,933** tree assessments (national, regional, global), covering **44,718** tree species (31/12/2021).

PlantSearch (www.bgci.org/plant_search.php) is the **only global database of living plant, seed and tissue collections held in the world's botanic gardens and arboreta. It currently comprises** 1,580,913 collection records, representing 642,141 taxa, at 1,194 contributing institutions. PlantSearch currently includes **17,691** tree species cultivated in the living collections of botanic gardens and arboreta.

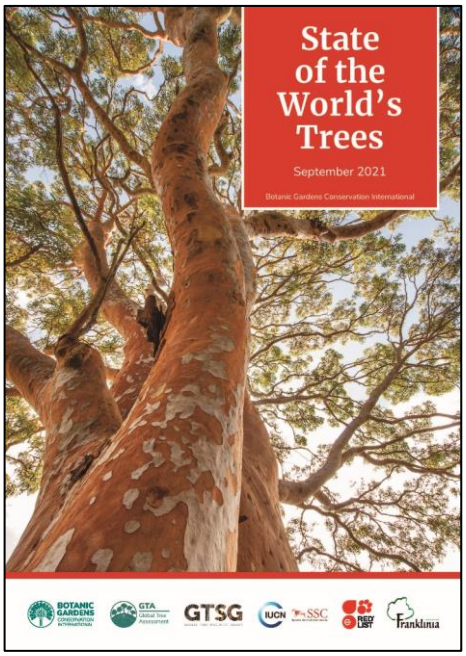
In addition, in September 2021, BGCI launched the GlobalTree Portal (see below).

As of February 2022, the total number of tree Red List assessments on the IUCN website is now **35,382** tree species (see graph below). In addition, there are 2,427 submitted assessments that are yet to be processed by the IUCN Red List Unit. The remaining species are either in draft (13,735 species) or unassessed but assigned to experts (6,534). Only 3% of tree species (1,819) are still to be assigned.

Figure 1: Tree Red List assessments published on IUCN Red List 2011-2021. The line represents all published tree assessments and the blue bars the annual additions to the list.



Priority area 2: Conservation of forest genetic resources (*in situ* and *ex situ*)



State of the World's Trees

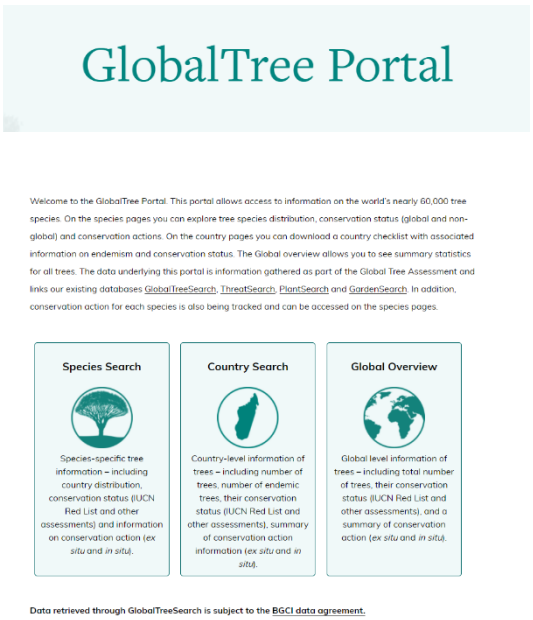
On September 1st 2021, BGCI published the State of the World's Trees report, which shows that 30% of all tree species – more than 17,500 species – are threatened with extinction. That is more than double the total number of globally threatened mammals, birds, reptiles and amphibians combined.

The main threats to tree species are forest clearance and other forms of habitat loss, direct exploitation for timber and other products and the spread of invasive pests and diseases. Climate change is also having a clearly measurable impact.

This report summarises the conservation measures already in place for tree species: over two-thirds of tree species are recorded in at least one protected area and about a third of tree species are found in botanic gardens or seed banks. Nevertheless, it calls for a new focus in planning and carrying out biodiversity conservation and ecosystem restoration that recognises the global importance of tree species. It identifies the regions where further action is needed. It provides recommendations for urgent action and calls for a new coalition to facilitate the resourcing and expertise required.

BGCI's GlobalTree Portal (https://www.bgci.org/resources/bgci-databases/globaltree-portal/) provides synthesis information of the results of the Global Tree Assessment on a global, country and species level. The portal contains information on tree distributions, endemicity, conservation status (IUCN Red List and others) and **conservation action status** (ex situ and in situ). It also produces **checklists** and summary information on a **country** and **global** level. At the species level, the GlobalTree Portal also includes a 'conservation tracker' component that tracks more in-depth conservation information, and who is working on which species.

The GlobalTree Portal was launched 1 Sept 2021 (https://www.bgci.org/resources/bgci-databases/globaltree-portal/) to visualise the data gathered in the Global Tree Assessment project and give practitioners and policymakers access to the most comprehensive data to inform targeted conservation action.



The GlobalTree Portal displays tree conservation information on species, country and global levels. The global statistics show the world status of tree species. On a country level, summary information and checklists of tree species and information on their endemism and conservation status are available.

On a species level, the Conservation Action Tracker (Figure 3) contains information on active conservation actions known for trees (i.e. *in situ* conservation, *ex situ* conservation, species recovery plans etc.), allowing practitioners to see current conservation action. There are currently over 2,000 species with data recorded on conservation actions. Data continues to be compiled on current conservation action and individuals are able to share data to be added to the Tracker through a form.

Figure 2: Country level synthesis data in GlobalTree Portal

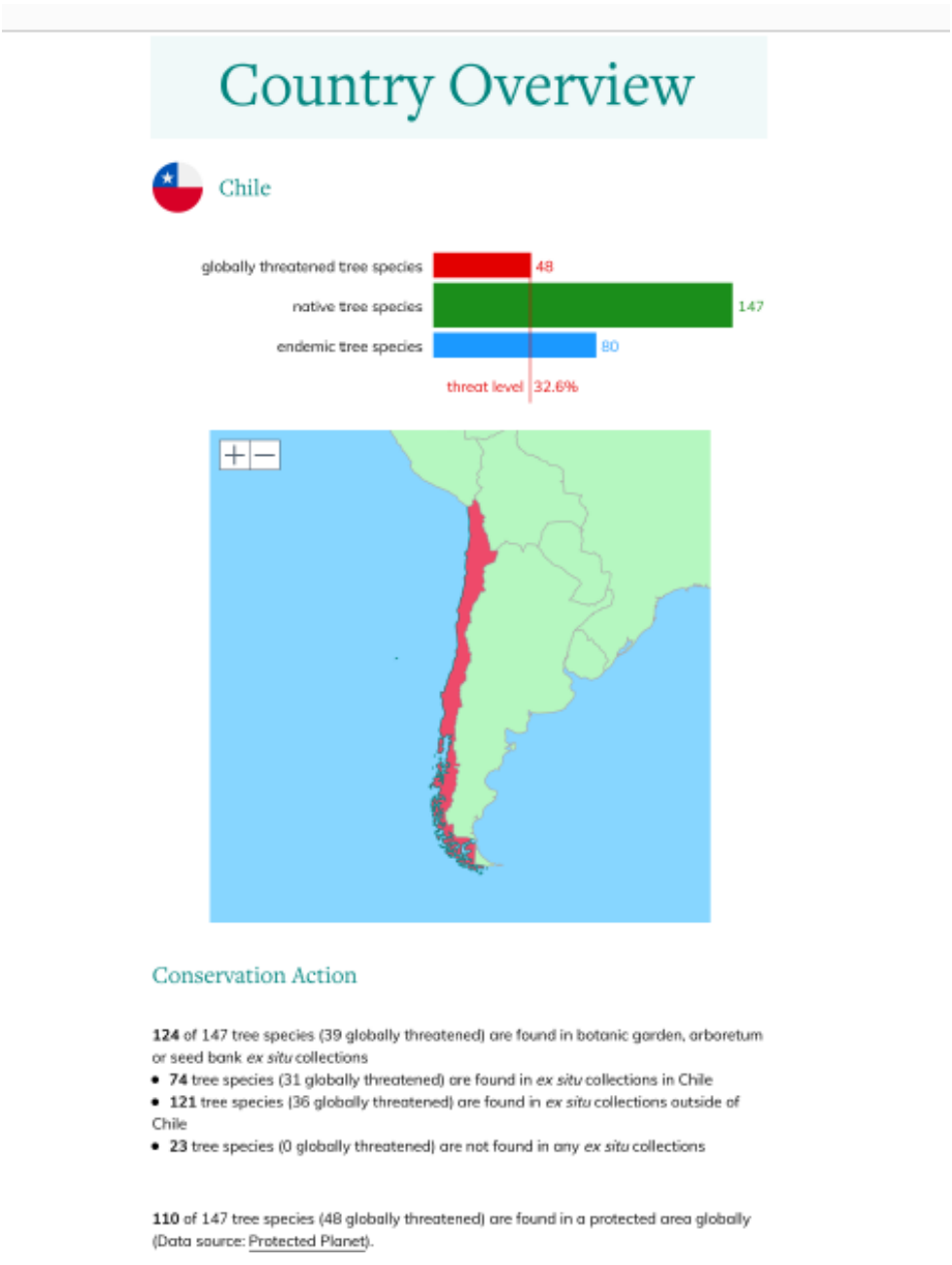
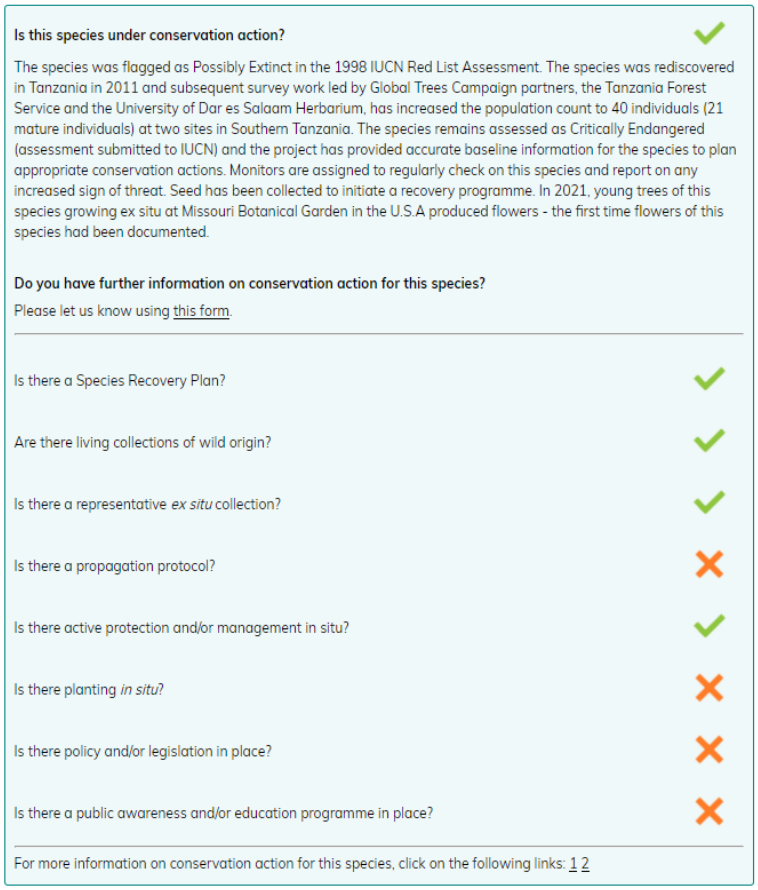
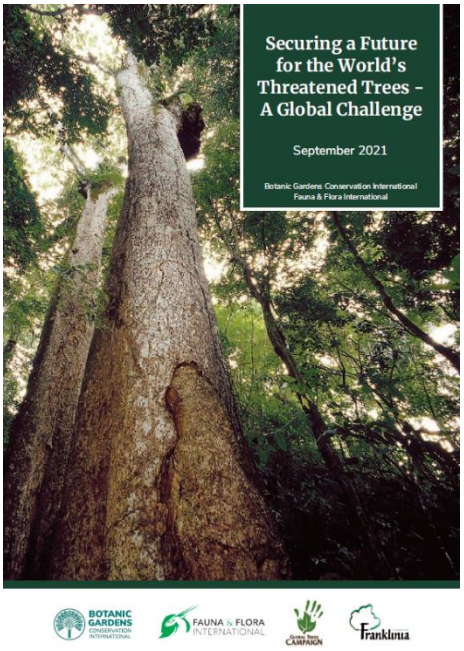


Figure 3. Data displayed for *Karomia gigas* in GlobalTree Portal.



In September 2021, following the SOW Trees report, BGCI and FFI published a report entitled *Securing a Future for the World's Threatened Trees – A Global Challenge*, which sets out tried-and-tested approaches from across the Global Trees Campaign partnership. In this report, GTC aims to share examples of effective tree conservation with land managers, the corporate sector, governments, conservation organisations, tree planting and restoration practitioners and the research community in order to grow the global tree conservation taskforce.



The GTC has been focused on *in situ* conservation of threatened trees over the past two decades, working to conserve over 400 threatened tree species in more than 50 countries with a wide range of partner organisations. Our work shows that we *can* reduce threats to trees and effectively conserve them.

Included in the report are case studies from across the world to demonstrate the success of a range of practical approaches. These include: on-the-ground survey work that led to the rediscovery of species previously thought to be extinct in Peru and East Africa; threat-reduction actions to protect wild trees and promote natural regeneration in Vietnam and Kyrgyzstan; targeted capacity building that enabled the development of community nurseries in Bhutan and more effective conservation action in China; and mobilisation of groups to catalyse new action across the world.

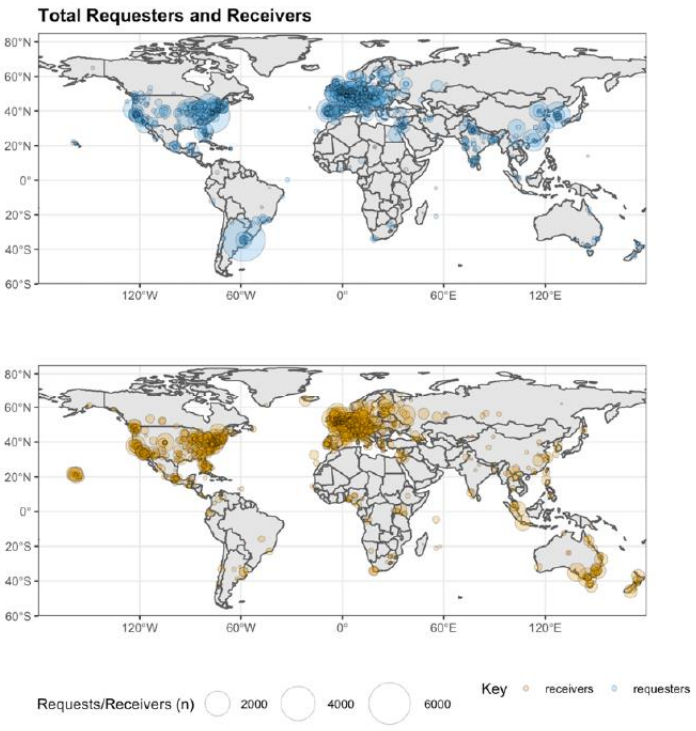
Priority area 3: Sustainable use, development and management of forest genetic resources

[Description of contributions to the strategic priorities of this Priority Area, with special emphasis on possible activities on forest reproductive material, germplasm exchange, tree breeding, biotechnology, and promotion of regional/international cooperation in this area]

BGCI is currently leading a project entitled **Responsible exchange of plant genetic resources for research and development.** The project is reponding to evidence that exchange of plant material is becoming much more difficult due to ABS and biosecurity regulations, and that non-Treaty PGR exchange is declining. The project has four main outputs:

1. Levels of plant material/data exchange between European and African PGR organisations characterized and quantified
2. Constraints to germplasm/data exchange identified and mutually agreed mechanisms for efficient and responsible exchange of plant data and material agreed by African and European PGR institutions
3. Digital platform for efficient and responsible exchange and tracking of plant data and material designed, developed, launched and used by the global research community.
4. A mutually agreed, peer-reviewed global mechanism for recognising botanical research institutions that apply best practice ABS and biosafety procedures is developed and launched

Levels of plant material/data exchange between European and African PGR organisations characterized and quantified



Analysis based on 17,000 requests for material made through PlantSearch

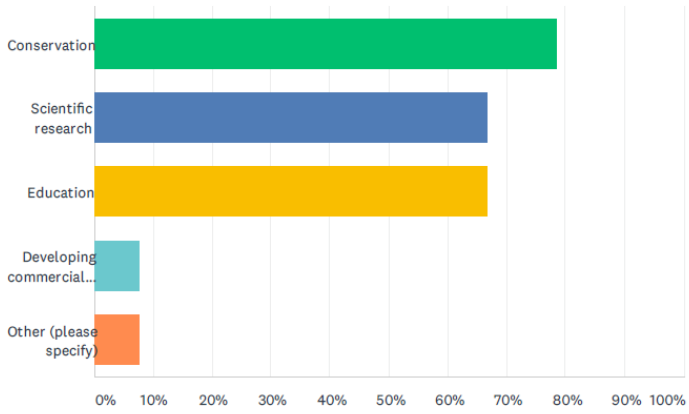
Overwhelming majority of exchange N to N, and focused on temperate species.

Further analysis based 29 Index Seminum data sets (2015-2020)

0.6% material sent to Africa (Algeria, Egypt and South Africa)

Q23 What is the purpose of the plant material exchanged between you and foreign organizations? (please select all answers that apply)

Answered: 51 Skipped: 15



ANSWER CHOICES	RESPONSES	
Conservation	78.43%	40
Scientific research	66.67%	34
Education	66.67%	34
Developing commercial products	7.84%	4
Other (please specify)	7.84%	4
Total Respondents: 51		

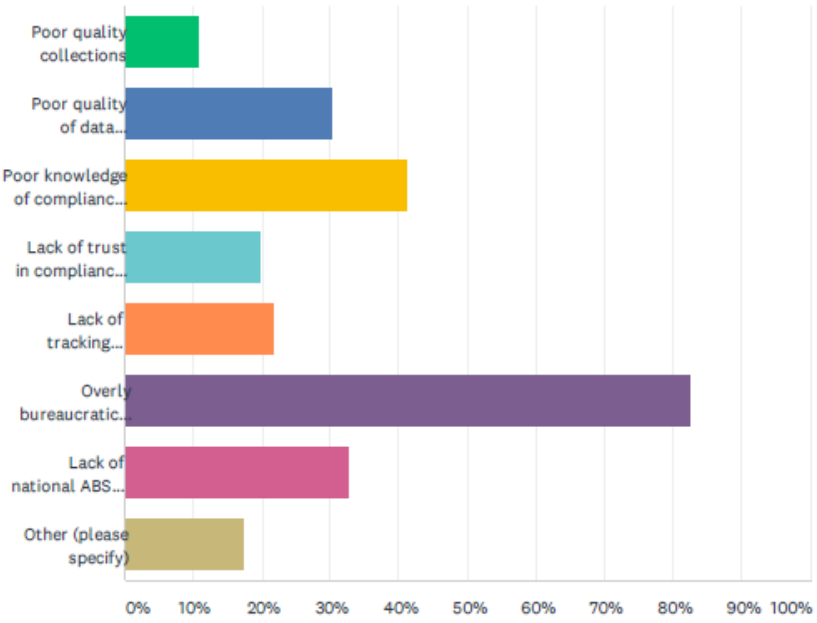
Constraints to germplasm/data exchange identified and mutually agreed mechanisms for efficient and responsible exchange of plant data and material agreed by African and European PGR institutions

Bureaucracy was the main reason cited for the decline in exchange of PGR (see below). See also:

Kiehn, M., Fischer, F. & Smith, P. (2021). The Nagoya Protocol and Access and Benefit Sharing regulations of the Convention on Biological Diversity (CBD) and its impacts on botanic gardens' collections and research. *CAB Reviews* 2021 16, No. 034

Q41 If yes, which of the following do you consider to be major constraints to the international exchange of plant material? (select all that apply)

Answered: 46 Skipped: 20



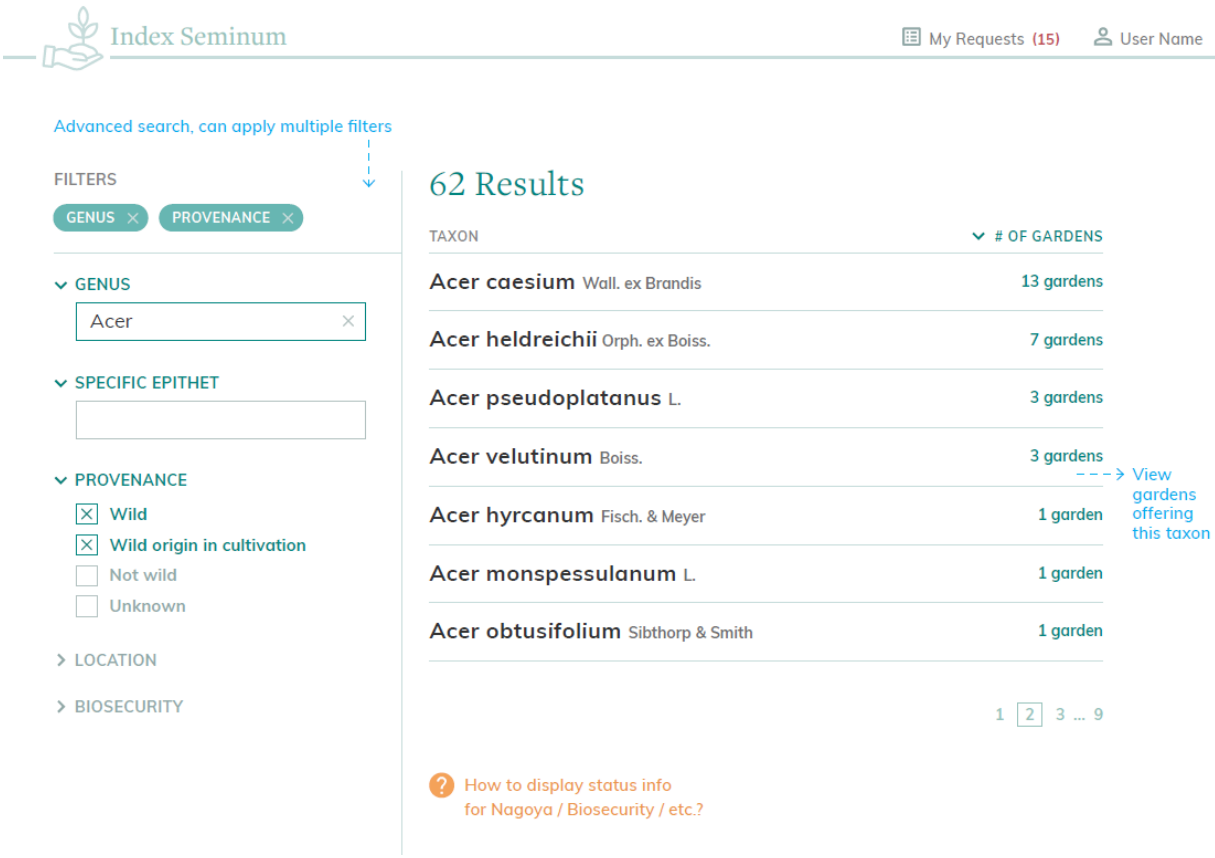
ANSWER CHOICES	RESPONSES	
Poor quality collections	10.87%	5
Poor quality of data associated with collections	30.43%	14
Poor knowledge of compliance requirements (ABS, biosafety, CITES etc.)	41.30%	19
Lack of trust in compliance regulations in recipient countries/organizations	19.57%	9
Lack of tracking mechanisms for shared material	21.74%	10
Overly bureaucratic national or institutional regulations, permits etc.	82.61%	38
Lack of national ABS regulations and permitting systems	32.61%	15
Other (please specify)	17.39%	8
Total Respondents: 46		

Digital platform for efficient and responsible exchange and tracking of plant data and material designed, developed, launched and used by the global research community.

BGCI Digital exchange platform comprising three modules is currently under development.

- Index Seminum module
- BGCI plant material exchange module
- Pedigree module

Prototype due by March 31st 2022. Platform will be compatible with EUFORGEN, GENESYS etc. ABS, biosecurity and CITES compliance requirements will be flagged for all materail exchanged throught the platform.



The digital platform will also include a **Climate Risk Assessment Tool**, which will enable users to assess the risks of planting a particular tree species in their locality under different climate change scenarios. Uniquely, this tool uses botanic garden and stree tree data sets to assess temerature and precipitation resilience. A prototype of the tool is demonstrated here.

A mutually agreed, peer-reviewed global mechanism for recognising botanical research institutions that apply best practice ABS and biosafety procedures is developed and launched

An online, peer-reviewed accreditation scheme covering ABS, biosecurity and CITES compliance is under development. Prototype due by 31st March 2022.

Priority area 4: Policies, institutions and capacity-building

[Description of contributions to the strategic priorities of this Priority Area, with special emphasis on possible activities on supporting development of policies, strengthening of institutions, capacity-building, mobilizations of resources, including funding, for FGR conservation and use, promotion of regional/international cooperation in this area]

The global and country level syntheses of the GlobalTree Portal described above are aimed specifically at policymakers. **For every country in the world, it is possible to see the current ex situ and in situ**

conservation status of all native tree species. These data can also be used to identify gaps in conservation effort.

Training programmes and modules

BGCI and its partners have developed extensive training materials for tree red listing, seed conservation, integrated species recovery and ecological restoration in multiple languages and formats (see Annex below).

Concluding remarks

BGCI's aim is that no tree species becomes extinct. To this end, tools like the GlobalTree Portal and Tracker are being used to identify and address gaps in conservation effort in a systematic and cost effective way. Our aim for 2022 is to track and guide conservation action (in situ and ex situ) in real time for all CR tree species, and then expand this effort over the next few years to encompass all threatened tree species (see Smith, 2016 reference).

More details can be provided on any of the initiatives above if helpful.

Annexes

BGCI Training resources

Training resources for conservation prioritisation (red-listing)

Training resources for seed conservation

Training resources for tree species recovery

Training resources for ecological restoration

BGCI Databases

GlobalTreeSearch (www.bgci.org/globaltreesearch) **is the most comprehensive list of tree species and their country-level distributions**.

ThreatSearch (www.bgci.org/threat_search.php) is the **most comprehensive database of conservation assessments of plants**

PlantSearch (www.bgci.org/plant_search.php) is the **only global database of living plant, seed and tissue collections held in the world's botanic gardens and arboreta**

GardenSearch (https://tools.bgci.org/garden_search.php) **is the only global digital register of botanic gardens**. The database includes information on over 3,737 botanical institutions worldwide.

GlobalTree Portal (https://www.bgci.org/resources/bgci-databases/globaltree-portal/) provides synthesis information of the results of the Global Tree Assessment on a global, country and species level.

BGCI Selected references

Beech, E., Rivers, M., Oldfield, S. & Smith, P. (2017). GlobalTreeSearch: The first complete global database of tree species and country distributions. *Journal of Sustainable Forestry*. Doi.org/10.1080/10549811.2017.1310049.

Di Sacco A, Hardwick KA, Blakesley D, Brancalion, PHS, Breman E, Rebola LC, Chomba S, Dixon K, Elliott S, Ruyonga R, Shaw K, Smith P, Smith RJ & Antonelli A (2021). Ten golden rules for reforestation to optimize carbon sequestration, biodiversity recovery and livelihood benefits. *Glob Change Biol*. 2021;00:1–21. https://doi.org/10.1111/gcb.15498

Hudson, A., Smith, P., Gori, B. and Sharrock, S. (2021) Botanic Garden Collections—An Under-Utilised Resource. *American Journal of Plant Sciences*, **12**, 1436-1444. doi: 10.4236/ajps.2021.129101.

Kiehn, M., Fischer, F. & Smith, P. (2021). The Nagoya Protocol and Access and Benefit Sharing regulations of the Convention on Biological Diversity (CBD) and its impacts on botanic gardens' collections and research. *CAB Reviews* 2021 16, No. 034

Mounce, R., Smith, P. & Brockington, S. (2017). Ex situ conservation of plant diversity in the world's botanic gardens. Nature Plants DOI: 10.1038/s41477-017-0019-3

Securing a Future for the World's Threatened Trees – A Global Challenge (2021). Botanic Gardens Conservation International, Kew, London.

Smith, P.P. (2016). Building a Global System for the Conservation of all Plant Diversity: a Vision for Botanic Gardens and for Botanic Gardens Conservation International. *Sibbaldia* 14, 5-13.

State of the World's Trees Report (2021). Botanic Gardens Conservation International, Kew, London. https://www.bgci.org/wp/wp-content/uploads/2021/08/FINAL-GTAReportMedRes-1.pdf