BGCI

Plants for the Planet

Botanic gardens, endangered trees and reforestation in Africa

Project report for the Rufford Foundation

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Section 1. Overview

1.1 Introduction

The global loss of forests is a major environmental problem that requires a complex range of solutions. Deforestation is a leading cause both of biodiversity loss and of climate change, contributing almost 20 percent of global greenhouse gas emissions annually. Deforestation is driven by at least three factors: demands from industrialised countries for forest products or for commodities that compete with forests for use of land; changes in land use from forest to subsistence agriculture; fuel wood collection and charcoal production as a result of demands for cooking fuel where electricity supply is either unavailable or too expensive. Reducing terrestrial carbon emissions and increasing sequestration is now central to the climate change agenda. Dangerous climate change will not be avoided without improved management of the world's terrestrial carbon, especially that which is stored in old-growth forest ecosystems. At the same time forests should be managed for the full range of other ecological services and goods that they provide.

Africa's forests are essential stores of carbon – over 20 percent of the world's terrestrial carbon is sequestered in the African tropical and sub-tropical area, in forests, wetlands and savannahs. Degradation, deforestation, over-exploitation, and agricultural expansion are steadily converting African forests into greenhouse gases. Six of the 21 countries with the highest greenhouse gas emissions associated with deforestation and related land use are in Africa including the Democratic Republic of Congo (DRC). The factors impacting on Africa's forests are also impacting negatively on the valuable tree species that are of immense importance for local and national livelihoods.

Forest restoration, reforestation and afforestation are now generally recognised as valuable components of climate change mitigation with tree planting widely undertaken as a carbon offsetting mechanism. There are two main sectors in the market for carbon as a traded commodity both of which involve forestry initiatives. Regulated or compliance carbon markets, governed by rules in the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) include Clean Development Mechanism (CDM) projects of which a number are forestry related. Reducing Emissions from Deforestation and Degradation in Developing Countries (REDD) is another very important mechanism being developed under UNFCCC as discussed in Section 1.7 below. Voluntary carbon markets are unregulated and have voluntary project standards such as the Climate, Community and Biodiversity Project Design Standard (CCB) and Voluntary Carbon Standard (VCS). They include a wide range of conservation and forestry schemes operated for example by NGOs. Unfortunately many tree-planting schemes associated with carbon offsetting have been criticised for planting non-native fast growing tree species that are inappropriate to a particular region and may actually cause environmental harm. Opportunities are being overlooked on a global scale to develop more imaginative tree planting solutions that could incorporate the restoration of threatened tree species and improve livelihood options for local communities.

Ecological restoration, including forest restotation, is recognised as an important objective for the Convention on Biological Diversity (CBD). The revised and updated Strategic Plan for Biodiversity agreed at the Tenth Meeting of the Conference of the Parties (COP10) provides an overarching framework on

action for biodiversity, not only for the biodiversity-related conventions (including UNFCCC), but for the entire United Nations system. The Strategic Plan includes the following targets in the so-called Aichi Biodiversity Targets, for the 2011-2020 period.

- At least halve and, where feasible, bring close to zero the rate of loss of natural habitats including forests;
- Restore at least 15 percent of degraded areas through conservation and restoration activities.

Many different agencies and individuals working together will need to be involved in reaching these targets. This report considers the current and potential roles that African botanic gardens can play in the restoration of forests and other forms of tree planting using the material maintained in their living collections and the skills and expertise of their staff. A particular emphasis has been placed on the potential to use tree species that are under threat of extinction in the wild. Africa has over 150 botanic gardens (see figure 1). This report focuses specifically on the work of botanic gardens in three countries DRC, Kenya and Uganda. Initial contacts have also been made with gardens in Cameroon and Ghana and further consultation is anticipated.

Information for the report has been collected on the threatened trees grown by botanic gardens in DRC, Kenya and Uganda for addition to the PlantSearch database maintained by BGCI. An initial review of the work carried out by the botanic gardens has been undertaken through consultation with the gardens and discussions at the 4th Global Botanic Gardens Congress held in Dublin in June, 2010. Furthermore the project was discussed at a workshop on international partnerships for botanic gardens held at the National Botanic Garden of Belgium in December 2010. The policy context provided by REDD+ negotiations has been considered based on a review of current literature and participation in workshops held during the 10th Conference of the Parties (COP) to the Convention on Biological Diversity (CBD) in Nagoya, Japan in October 2010. In parallel to this report, a manual on REDD+ for botanic gardens has been prepared. It is intended that the information collected for the report and the manual will form the basis for BGCI to develop future work on tree conservation and forest restoration in Africa working with local botanic gardens.

1.2 The loss of African forests

According to UNEP, 2006 Africa suffered the fastest rate of deforestation in the world between the years 1990 and 2000. The main causes of forest decline are cited as increased collection of fuel wood, clearing of forests for agriculture, illegal and poorly regulated timber extraction, conflicts, increasing urbanization and industrialization. It is noted that policy, legal, institutional, technical and economic constraints have undermined wider adoption of sustainable forest management (SFM) in Africa. SFM has been the major goal over the past twenty years in maintaining forests worldwide. Despite the intentions of SFM however, commercial logging of valuable timbers frequently remains essentially mining of the resource with direct impact on both the forest habitat and target tree species.

Africa's production of timber for international markets increased from 2007-2009 whereas production in Asia and Latin America declined. China and increasingly India are major markets for African timber. DRC and Gabon are two of China's main sources of tropical logs. The commercial demand for hardwood species in Africa is both for national and international markets. A wider range of species is generally used to supply fuel wood for domestic use – the major source of household energy in countries such as DRC, Kenya and Uganda.

1.3 African trees under threat

A number of Africa's valuable hardwoods are included as threatened on the IUCN Red List (see Annex 1 of this report for examples). Information on globally threatened trees of Africa as represented in the IUCN Red List mainly derives from the publication of the World List of Threatened Trees (Oldfield *et al,* 1998). Progress in Red Listing for trees has subsequently been limited (Newton & Oldfield, 2008) as it has been generally for plant species (Vie et al, 2009). There is an urgent need to re-assess the status of African tree species that are included in the IUCN Red List based on the 1998 publication and to ensure that assessments are undertaken for the species not previously assessed. The World List of Threatened Trees included 58 globally threatened tree species for the DRC, 125 for Kenya and 32 for Uganda. This information together with the main threat types recorded is shown in Table 1 below. The IUCN Red List currently records 62 globally threatened tree species for DRC, 124 for Kenya and 34 for Uganda.

Table 1. Threatened tree species by IUCN Red List Category and Threat Type

Country	Threat	EX	EW	CR	EN	VU
DR Congo		0	0	0	8	50
	clear-felling/logging of the habitat	0	0	0	7	37
	extensive agriculture	0	0	0	2	20
Kenya		0	0	5	15	105
	clear-felling/logging of the habitat	0	0	2	6	16
	expansion of human settlement	0	0	0	4	15
	extensive agriculture	0	0	1	6	21
Uganda		0	0	1	4	27
	clear-felling/logging of the habitat	0	0	1	2	19
	extensive agriculture	0	0	0	2	6

Since 1998, some new tree Red List assessments have been undertaken for these three African countries but the information has not yet been incorporated into the IUCN Red List. Assessments for Kenya have been made through a project coordinated by Missouri Botanic Garden, *Plant Conservation Assessment in the Eastern Arc Mountains and Coastal Forests Biodiversity Hotspot of Tanzania and Kenya.* In Uganda work has been underway to produce a national Red List for trees and a publication is expected in 2011 (Kalema in litt. 2010). The assessments made for Ugandan trees are either full or preliminary (according to IUCN) at global level taking into account the full geographical distribution of the taxa. Additional notes have been made for those taxa not threatened at global level but which have local/national threats and conservation issues, for example the timber species *Entandrophragma* and *Khaya* spp. In this Ugandan assessment the endemic *Diospyros katendei* is considered to be Critically Endangered. *Uvariodendron magnificum*, *Gomphia mildbraedii* and *Ochna leucophloeos* subsp. *ugandensis* are considered to be Endangered. *Vepris eggelingii*, *Dicranolepis incisa* and *Desplatsia mildbraedii* are considered to be Vulnerable. Species considered to be Near Threatened include five that are restricted in range: *Cnestis mildbraedii*, *Cordyla richardii*, *Pandanus chiliocarpus*, *Afrocarpus dawei* and *Tricalysia bagshawei* subsp. *bagshawei* while others are widespread: *Dalbergia melanoxylon*, *Prunus africana*, *Vitellaria paradoxa* and *Lychnodiscus cerospermus*. Over 800 Ugandan species are recorded as Least Concern in the study (Kalema in litt. 2010).

BGCI has worked to support Red Listing in Kenya, Uganda and Tanzania, through a project that concentrated on building capacity in conservation assessments and bioinformatics. The outputs of this project include Red Data assessments for medicinal plant species. BGCI has also initiated work on a red List assessment of African ebony species. This initially focussed on species of Madagascar and the Mascarenes through a workshop held in Madagascar in May 2010. There are around 90 species of *Diospyros* in mainland Africa. Initial preparatory notes for species in DRC, Kenya and Uganda are included in Annex 3 to this report.

Tree Red Listing for DRC is currently planned with a specific focus on commercial timber species. A workshop organised by IUCN and involving BGCI will be held in February 2011. This will focus amongst other species on the endemic species of ebonies as listed in Annex 3 – for which information is currently lacking. The National Botanic Garden of Belgium is also supporting Red List training. The focus for their work will be on taxa of Orchidaceae, Balsaminaceae, Ericaeae & Rubiaceae endemic to the Congo Basin and the Albertine Rift and the endemic species in the copper mining areas of Katanga.

The Royal Botanic Gardens, Kew has supported the production of a Plant Red List for Cameroon that includes a number of tree species that extend across the border into DRC. This Red List will be published in 2011. Again this information will utilised at the DRC Tree Red Listing Workshop.

Annex I of this report provides a list of the threatened tree species of DRC, Kenya and Uganda that are in cultivation in botanic gardens as recorded in BGCI's PlantSearch database. The threat categories are as currently recorded in the IUCN Red List.

1.4 The role of botanic gardens

Botanic gardens, in Africa, as elsewhere in the world, fulfil a variety of roles primary amongst which are species conservation, horticultural display, formal and informal education, improving livelihoods and providing public spaces for relaxation and recreation. The importance of differing roles of individual gardens reflects historical development, institutional affiliations and current management priorities. Activities in support of plant conservation include assessment of the status of species in the wild, maintenance of *ex situ* collections of threatened species in living collections, research into propagation techniques and species reintroductions. Many botanic gardens are also involved in the management of natural areas and *in situ* plant conservation, working with local communities. The Global Strategy for Plant Conservation (GSPC) of the CBD has been widely embraced by the botanic garden community and provides a broad framework for determining botanic garden policy. With support from BGCI, the GSPC has recently been revised with plant conservation targets set for 2020. The updated version of the GSPC was adopted CBD COP10 in Nagoya, Japan in October 2010. Targets of particular relevance to the conservation of trees and forests include the following:

- *Target 6*: At least 75 per cent of production lands in each sector managed sustainably, consistent with the conservation of plant diversity.
- *Target 7*: At least 75 per cent of known threatened plant species conserved *in situ.*
- *Target 8*: At least 75 per cent of threatened plant species in *ex situ* collections, preferably in the country of origin, and at least 20 per cent available for recovery and restoration programmes.
- *Target 9*: 70 per cent of the genetic diversity of crops including their wild relatives and other socio-economically valuable plant species conserved, while respecting, preserving and maintaining associated indigenous and local knowledge.

- *Target 11*: No species of wild flora endangered by international trade.
- *Target 12*: All wild harvested plant-based products sourced sustainably.
- *Target 13*: Indigenous and local knowledge innovations and practices associated with plant resources maintained or increased, as appropriate, to support customary use, sustainable livelihoods, local food security and health care.

Implementing Target 8 is a particular focus of the work of botanic gardens and this target is facilitated by BGCI. The PlantSearch database has been used to monitor global progress on this target since the GSPC was agreed in 2002. Relatively good progress has been made in recording threatened species in *ex situ* collections, but recovery and restoration components of the target need to receive considerably more attention (Sharrock et al, 2010).

As noted by a recent review, scaling up of single species work by botanic gardens has the potential to be very important in ecological restoration efforts. The science and practices associated with ecological restoration are developing rapidly to address the challenges presented by increasingly degraded ecosystems and landscapes. Many of the skills and resources associated with botanic gardens and arboreta, including plant taxonomy, horticulture, and seed bank management, are fundamental to providing support for restoration. However, based on analysis of BGCI's GardenSearch database, as few as seven percent of the world's botanic gardens are currently involved in restoration ecology and only six percent are involved in land restoration. It is suggested that, *a reorientation of existing institutional strengths and a strategic increase in research capacity would enable many more gardens worldwide to provide effective science-based support to restoration*. (Hardwick *et al.*, in press).

Ex situ conservation of tree species presents particular challenges. Many tropical trees have 'recalcitrant'seeds that cannot be stored in conventional seed banks. The sheer size of living trees restricts the number of individuals of a particular species that can be grown in a botanic garden whereas for conservation purposes, it is generally accepted that 50 populations per species should be sampled, with 50 individuals per population, to establish a genetically representative *ex situ* collection (Oldfield, 2009). This number may not be practically possible for the most endangered trees reduced to a handful of individuals in the wild. Despite the challenges, many botanic gardens do maintain well-documented tree collections and thus manage material of great current or potential value for forest restoration.

1.5 African botanic gardens and tree conservation

The extent to which individual botanic gardens in Africa are involved in the cultivation and conservation of tree species varies considerably. Some of the gardens established in European colonial times such as Entebbe Botanical Garden in Uganda, established in 1898, had an initial remit to trial tree species for forestry purposes. The garden, now an entity of the Plant Genetic Resources Centre of the National Agricultural Research Laboratories, retains a role in introducing new plants as well as working on the conservation and sustainable use of plants and their genetic resources more widely. The Nairobi Arboretum was established in 1907 by the Deputy Conservator of Forests, to try out introduced forestry trees for Kenya. It was gazetted as a national reserve in 1932 and in 1996 became a publically owned reserve. Following a period of neglect in the 1970s and 1980s, the Arboretum has enjoyed a new lease of life since the establishment of the Friends of Nairobi Arboretum in 1993 as a project of the East Africa Natural History Society. The Arboretum has over 350 species of indigenous and exotic trees.

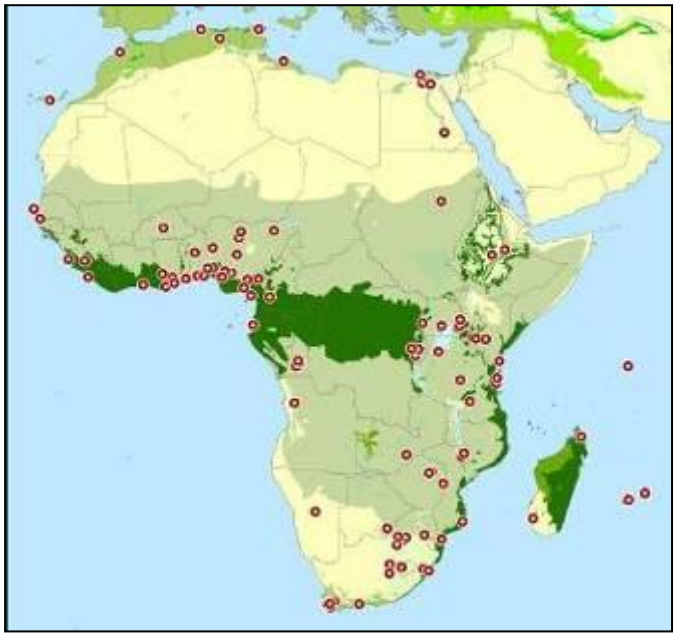

Fig 1. Map of botanic gardens and eco regions in Africa (BGCI)

More recently-established botanic gardens in East Africa have concentrated on plant conservation and community engagement from the outset. In Uganda, the Tooro Botanical Garden, near Fort Portal and Nature Palace Botanic Garden close to Kampala were both established in the last decade on former forest reserves. Areas of Tooro Botanic Garden are being cleared to restore natural forest vegetation whilst retaining at the core a collection of *Eucalyptus* for seed production.

Tooro's work with native trees involves locating and documenting the trees within Kibale National Park and collecting material for cultivation in the garden. So far over 60 species have been established in a 20 acre arboretum within the garden. Many of the species are not known to be in cultivation elsewhere. An example of a tree being grown at Tooro is *Beilschmiedia ugandensis* an uncommon species in western Uganda that is restricted to areas deep within the reserves and inaccessible to rural communities. Recent domestication trials have shown that this species could be important in farmed landscapes for provision of fuelwood, charcoal and edible fruit. On a larger scale, cultivation of *Prunus africana* is very promising. Tooro has a small plantation of this globally threatened tree, the bark of which is collected for the commercial production of a drug used to treat benign prostatic hyperplasia. Overall the Garden's research programme from 2005 to 2010, managed to propagate 95 percent of the species worked on and their domestication is very promising. More time is needed to see if they will grow as well as in natural areas but Tooro is an example of a botanic gardens that works with simple tools adapted to the African socio-economic context to conserve native species.

The Brackenhurst Botanic Garden, another recently developed botanic garden located about 40 km from Nairobi in the highlands of Kenya, was established in 2004. It was started by planting indigenous trees on land previously used exclusively for exotic species such as *Cupressus*, *Eucalyptus* and *Acacia*. It now

covers 20ha of 'natural' forest and also has a small indigenous garden for herbaceous species. The natural vegetation type of the area is tropical montane forest but 99.9 percent of this in the district has been replaced by agriculture (coffee, tea, flowers and smallholder farming), exotic tree plantations (*Eucalyptus*, *Acacia*, and *Cupressus)*, and residential land (Nicholson, 2010). The Brackenhurst Botanic Garden is very important as a practical example of forest restoration, demonstrating what can be achieved in a relatively short space of time and with limited resources. Removal of invasive species absorbs a major part of the restoration costs. Over 1,100 plant species have been catalogued in the garden's living collection with over 300 species of indigenous trees and shrubs. The garden has the only cultivated specimens of two species of tree and climber (*Cylicomorpha parviflora* & *Embelia keniensis*), the latter endemic having only five known adult specimens (and yet not on the IUCN Red List).

Two of the botanic gardens of DRC, those at Kisantu and Kinshasa, were created in 1900. Both gardens have herbaria and libraries and have the potential to be centres of research, education and conservation. At present the Kisantu Botanic Garden, situated in the lower Zaire region, 120 km away from Kinshasa, undertakes research in arboriculture and is involved in trials for useful plant species. It has an area of 225 ha and has about 3,000 species in cultivation. Included in the grounds of Kisantu is an arboretum with around 200 native tree species and collections of medicinal, fruit and other useful plants.

More information on botanic gardens in DRC, Kenya and Uganda is provided in Section 2.

Common constraints experienced by botanic gardens in the three countries include severely limited financial resources, challenges in infrastructure maintenance and limited capacity for species identification and record keeping.

Annex 1 provides a list of globally threatened African species that are in cultivation in botanic gardens of DRC, Kenya and Uganda.

1.6 Tree planting and carbon sequestration

Tree planting is a basic element of forest restoration, reforestation, afforestation and agroforestry, all of which have relevance to carbon sequestration and offsetting. From an ecological and biodiversity perspective, forest restoration is clearly the preferred form of intervention, whereas afforestation (planting trees on areas that were not formerly forested) may have negative impacts.

According to FAO, 2010 there are different approaches to offset carbon emissions. Fast growing tree species (such as eucalyptus) have the potential to absorb carbon very quickly; they could be applied to offset CO_2 emissions quickly, but total amounts of carbon storage will tend to remain limited. Long-term sustainable forest management with native species, on the other hand, may sequester and store less carbon per year but may eventually offset more carbon emissions over a much longer time and in principle in perpetuity. (FAO, 2010) Furthermore, Eucalyptus is generally cut down after decade or so and is often burnt, for example, for tea and tobacco growing so the CO2 is released again (Nicholson, in litt. 2011).

As discussed by Lemenih and Bongers, 2010, plantation forests established on degraded lands can have a catalytic effect in fostering natural succession and restoring ecosystem functions. A characteristic feature of plantation forest in east Africa is the dominance by a few exotic species selected for their fast

growth, high adaptability and production of good quality wood. Eucalyptus is the most widely planted genus, followed by *Cupressus*, *Pinus*, *Acacia* and *Tectona*. In Kenya, *Cupressus lusitanica* accounts for 46 percent of plantation forests. In the traditionally managed plantations there has been a single emphasis on wood production with native forest vegetation under plantation canopies removed as weeds and management to optimise wood quantity and quality. The disadvantages of large scale monocultures include impoverishment of soil and water resources and biodiversity degradation. Plantation management aimed at promoting biodiversity restoration and broader ecological and socioeconomic values needs to be based on different considerations.

There is ongoing debate about the relative merits of the use of indigenous and exotic tree species in tree planting schemes. In reality there is a huge reliance on a narrow range of commercially available species with remarkably little thought given to the potential to include threatened or even widespread indigenous tree species in planting schemes. Alternative trees are available. As pointed out for example by Meunier *et al*, 2010, many of the 450 Ugandan forest tree species can offer the same advantages as exotic species without disturbing the ecological balance and can positively contribute to its conservation. Their publication includes information on the use and propagation of 85 East African trees and shrubs including species that provide wood products in 5-10 years and species that perform well on degraded land. The local uses of Ugandan trees that can be regenerated to help promote food security, local health care and provide a source of income for local people are outlined by Meunier *et al*, 2008.

Despite apparent advantages, practice of mixed species plantations is extremely limited in East Africa. Nevertheless, various factors are driving increased interest in plantation forest development regionally including opportunities for Carbon trading. Jindal, 2006, points out that in Africa, East Africa is currently the preferred region for international carbon investors. Nevertheless, Africa's share of the international carbon business is much lower than many other developing regions because of the following constraints:

- **Tenure Insecurity:** Crucial for carbon sequestration projects because without clear land rights, suppliers cannot make credible commitments to supply carbon offsets. Most African tenure systems are characterized by multiple tenures where several users may have access to different resources on the same piece of land.
- **Transaction Costs:** The transaction costs associated with negotiating, implementing, and monitoring small-scale carbon sequestration projects are usually high, and increase when multiple parties are involved – as would typically be the case in Africa.
- **Governance:** a stable and well-defined regulatory environment at national and local levels is necessary to promote international carbon investments. Carbon sequestration investments are unlikely in areas that face political volatility and unpredictable governance systems.
- **Institutional Capacity:** The Kyoto Protocol requires each developing country to establish a Designated National Authority (DNA) to promote carbon projects that are aligned with national development priorities, beneficial for local communities and support general sustainable development goals.

1.7 REDD

Tree planting for carbon offsetting has been underway for over twenty years in a variety of schemes. A policy framework developed through the UNFCC is now provided by REDD, a broad initiative that provides incentives and rewards for a reduction in deforestation and forest degradation activities as a

means to reduce GHG emissions. The concept of reducing emissions from forests has evolved from Reducing Emission from Deforestation in Developing Countries (RED) and now includes Forest Degradation (REDD). More recently REDD has been expanded to REDD+ to include "the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" (UNFCCC, 2008). The 2007 Bali Action Plan, which detailed negotiations for a post-2012 climate change agreement, recognised that enhancing the REDD mechanism to REDD+ had the potential to "promote co-benefits and complement the aims and objectives of other relevant international conventions and agreements" (UNFCCC, 2008). REDD+ therefore provides opportunities for the conservation of biological diversity and the protection of local livelihoods and the rights of indigenous people (Vatn and Angelsen, 2009).

The outcome of UNFCC COP 15 in 2009, the Copenhagen Accord, reiterated the important role of forests in the global fight against climate change:

"We recognize the crucial role of reducing emissions from deforestation and forest degradation and the need to enhance removals of greenhouse gas emissions by forests and agree on the need to provide positive incentives to such actions through the immediate establishment of a mechanism including REDD-plus…" (UNFCCC, 2009).

However, the Copenhagen Accord was only "noted" by governments and failed to provide any legally binding mechanism for REDD+. Instead, governments who associated themselves to the Accord pledged their support for a future REDD+ mechanism. Parties have been discussing the following activities to be included in REDD+: Reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests and the enhancement of forest carbon stocks (Miles, 2010).

While these concepts have not yet been fully defined in the REDD+ context, conservation generally refers to the protection of forests that have not historically been under threat of deforestation, sustainable management referring to activities which increase carbon stocks and/or reduce carbon emissions by changing the way they are managed, enhancement of forest carbon stocks can include forest restoration, reforestation and/or afforestation. This opens an opportunity for carbon-focused forest restoration efforts.

At UNFCCC COP16 (December 2010 in Cancun, Mexico), Parties agreed that the REDD+ mechanism should not only consider reduce emissions, but also maintain existing forests and carbon stocks. The "Cancun Agreements" also encourage developing countries to contribute to mitigation actions by: reducing emissions from deforestation and degradation; conserving forest carbon stocks; sustainable forest management; and enhancing forest carbon stocks.

Clarification of the REDD+ mechanism is still needed, through definitions of technical terms, developing methods to measure emissions levels, and a finance mechanism. In an effort to resolve some of the outstanding issues, the Parties at Cancun agreed that the Subsidiary Body for Scientific and Technological Advice (SBSTA) to the Convention should develop a programme to identify certain issues, such as drivers of deforestation and degradation and methodologies for estimating emissions.

At present mechanisms for incorporation of REDD+ into a post 2012 climate regime consist of three mechanisms at national level. In the first 'preparatory' or readiness phase, countries prepare a national strategy based on consultation with interested parties, start building capacity in monitoring, reporting

and verification (MRV) of changes in forest carbon stocks and initiate demonstration projects. Building capacity in MRV is considered in itself to be very challenging for the majority of tropical forest countries that stand to benefit from REDD+. Building capacity and fostering dialogue are currently the main components of the official UNFCCC process.

REDD+ funds are being made available through a variety of sources. The Forest Carbon Partnership Facility (FCPF) is a global partnership governed by a 28-member Participants Committee elected by the REDD Country Participants and the financial contributors, six Observers nominated by forest-dependent indigenous peoples and other forest dwellers, NGOs and international organizations, and the World Bank. The UN-REDD Programme launched in 2008 is another source of support. These funds are initially intended to foster 'REDD-readiness': that is, to support the development of national strategies for REDD+ implementation and forest cover and carbon monitoring systems. The readiness strategies cover the appropriate use of carbon finance to achieve emissions reductions, and sometimes the attainment of co-benefits such as biodiversity. Since 2008, the UN-REDD Programme has supported development of appropriate "readiness" in 12 pilot countries including in Africa, DRC, Tanzania and Zambia. In addition, partner countries are observing in a bid to build networks, share knowledge and supplement existing national initiatives (UN-REDD, 2011).

At the same time actual REDD+ projects are underway or planned in a number of countries. DRC, for example has four projects planned including support for community managed reserves in the eastern part of the country. Profiles of REDD+ pilot projects are being compiled by the Institute for Global Environmental Strategies in a database using a common template (http://redd-database.iges.or.jp/).

Box 1 Some common elements of REDD+ projects:

- **Site identification, measurement and monitoring:**

Collection and recording of information on forest area, forest type, management and use context, carbon stocks and rates and drivers of deforestation and degradation. Measurement of carbon stocks, based on satellite data and/or field inventories, to establish the carbon emissions reference level.

- **Goals related to:**

The amount of CO_2 emissions prevented or the amount of CO_2 sequestered over the project life-span as compared to the reference level; Maintenance of ecosystem services, such as watershed protection; Local community development and income generation; Biodiversity conservation, with a focus on protecting/restoring threatened species;

- I**mplementation activities to**:

Address the drivers of deforestation or degradation; Credibly and verifiably reduce emissions or increase sequestration; Be additional to actions that would happen anyway in the absence of REDD+ financing; Provide for permanent forest protection

- **Monitoring, reporting and verification (MRV)**

Monitoring systems that allow for credible measurement, reporting and verification of REDD+ activities are among the most critical elements for the successful implementation of any REDD+ mechanism. Remote sensing and ground based data can be used to monitor forest carbon emissions, but MRV must also cover monitoring the performance of a country's capacity and governance and the additional benefits that REDD+ can harness, in addition to carbon.

Source: Probert, *et al*., 2011

As noted by Miles, 2010, the challenges for conservation and forest restoration as national REDD+ policy develops include ensuring that the afforestation and reforestation efforts prioritise forest restoration over development of commercial plantations, ensuring that the selection of new forest areas meet conservation as well as carbon objectives and ensuring that reforestation methodologies, including species selection and ongoing site management, meet (or do not harm) local conservation objectives.

REDD+ is gaining momentum and may provide a vehicle for botanic gardens to become more involved in forest restoration using the stocks of rare and threatened trees that they maintain and the horticultural skills needed for their propagation and establishment in the wild. Miles, 2010, however notes that substantial preparation work is required by programme or project managers to access REDD+ resources. Current and potential roles of botanic gardens more generally in relation to the REDD+ process are set out in Probert *et al*., 2011.

Section 2. Country information

2.1. Democratic Republic of Congo

2.1.1 Forests

Over half the land area of DRC is covered by rainforest. This accounts for half the tropical forest in Africa, and six percent of the remaining tropical forest in the world. In the REDD preparatory documentation (Ministry of Environment, Conservation of Nature and Tourism, 2010) the main direct causes of deforestation in DRC are considered to be:

- Subsistence farming and firewood harvesting particularly around the main cities with firewood accounting for nearly 80 percent of national energy needs.
- Industrial logging which currently covers about 9 million ha and could be expanded in the future if the sector is relaunched. Indirect impacts include road construction.
- Informal logging carried out along major rivers and main roads in the east of the country to provide the principal source of the national timber market primarily for carpenters in the urban centers. Part of this production also sustains the cross-border markets (Angola, Zambia, Burundi, Rwanda, Kenya via Uganda, Sudan).
- Mining - DRC has the world's second largest reserves of copper and cobalt. This factor of deforestation has local impact for example in Katanga, the two Kasaï, the two Kivu, Maniema, the Oriental Province and in Bas-Congo. Restructuring of the mining sector begun in 2004 and may come to increase its impact.

The forests near the coast, being relatively accessible, have been logged heavily since colonial times; more recent harvesting has moved into the central basin, where subsistence agriculture is now also affecting some of the swamp forests. Farther inland, outside concession areas, forest harvesting mainly consists of the removal of trees of the most profitable species. Out of over 700 tree species in DRC,

about 200 are considered to be commercial timbers and about 25 species are currently traded internationally (ITT0, 2005).

Table 2 Timber species commonly harvested for log exports from DRC

Species	Importance in trade
Gossweilerodendron balsamiferum (tola)	16 percent of export value in 2002
Millettia laurentii (wengé)	45 percent of the export value, mainly from Bandundu region
Chlorophora excelsa (kambala/iroko)	11 percent of the export value in 2002
Entandrophragma cylindricum (sapelli)	6 percent of the export value in 2002
Terminalia superba (limba)	3 percent of the export value in 2002

Source: ITTO, 2005

Other important timbers include *Gambeya africana* (longhi), *Guarea cedrata* (bossé), *Guibourtia* spp (benge), *Lovoa trichilioides* (dibetou), *Entandrophragma angolense* (tiama), *Entandrophragma utile* (sipo or lifaki), *Entandrophragma candollei* (kosipo), *Pericopsis elata* (afrormosia) and *Nauclea diderrichii* (bilinga).

A new Forest Code was passed in 2002 but there has been limited logistical capacity to implement this. Logging companies are theoretically required to carry out a detailed forest inventory and develop a comprehensive management plan prior to exploitation. This management plan is supposed to take into consideration the natural resource potential and the regeneration capacity of the forest under exploitation. As the Forest Code pre-dates the 2006 Constitution of DRC, the forestry sector's governance system needs to be updated and refined.

In plantation forestry, *Terminalia superba* (limba) is the main species used. The first plantations of this species were established in 1905. Agroforestry plantations were introduced in the 1940s and are still widespread. Other species planted for industrial production before the 1960s included *Ceiba pentandra*, *Bombax flammeum*, *Entandrophragma* spp, *Lovoa trichilioides*, *Eucalyptus* spp, *Grevillea robusta*, *Casuarina equisetifolia* and *Cupressus* spp. Species of *Eucalyptus*, *Acacia*, *Pinus* and *Gmelina arborea* have been used for fuelwood and soil protection.

2.1.2. REDD policy

To ensure that the ambitious preliminary REDD+ objectives are met, DRC is committed to preparing for REDD+ over the period of 2010-2012. In DRC a legal structure has been created to provide for REDD implementation. This is mandated by *Decree No. 09140 of 26/11/2009 Providing for the creation, composition and organisation of the implementation structure of the process of reducing emissions from deforestation and degradation REDD*. A National Committee comprising 14 members with Government representation from various Ministries, NGOs, the private sector and forest communities is charged with defining and monitoring implementation of the REDD process. Three equivalent provincial bodies are also being established. The National Committee manages a national fund for REDD.

A REDD national strategy is being developed with a related market plan. The strategy aims to be ambitious, built in a participative and transparent manner, consistent with the international system, supported by an operational plan of action, and with detailed objectives and budget calculated in detail. In addition to the development of an institutional framework and strategy the third component of REDD readiness currently being developed is a comprehensive and operational MRV system for REDD (Ministry of Environment, Conservation of Nature and Tourism, 2010).

2.1.3 Botanic gardens

In DRC there are three botanic gardens included in the BGCI PlantSearch database as recorded in Table 3 below. One of these the Botanic Garden of Kinshasa is a member of BGCI sponsored by the National Botanic Garden of Belgium, an institution that actively supports botanic garden development throughout DRC. The previous project coordinator for National Botanic Garden of Belgium in DRC (Kisantu project and rehabilitation of existing botanical gardens), was recently appointed as Advisor to the DRC Minister of the Environment on Botanical and Zoological Gardens, mandated to work on the development of a national strategy for *ex situ* conservation. In addition to the four botanic gardens there is an important collection of trees at Yangambi, in the middle of natural forest, on the equator. The trees are documented and useful for growth studies dating back 50 years. The Yangambi herbarium is being developed as the national botanical biodiversity centre (Rameloo, in litt. September 2010).

Table 3. Botanic gardens in DRC

Botanic Garden	Tree collection
Jardin Zoologique et Botanique d'Eala; Eala Mbandaka	Good tree collection, tree inventory and mapping planned
Jardin Botanique de Kinshasa; Kinshasa	Inventory of trees undertaken but data not yet available to BGCI
Jardin Botanique de Kisantu; Inkisi-Kisantu	Good tree collection. Undated list currently in PlantSearch, awaiting current information.

There is currently good political support for botanic gardens in DRC. The botanic garden of Kinshasa has been restored and opened by the President on June 28, 2010.

The development of the Botanic Garden of Eala at Mbandaka, in the equatorial region of the Democratic Republic of Congo, was largely due to the Belgian Professor E. Laurent from Gembloux. The garden has an area of approximately 370 ha with special collections (125 ha), forest reserve (190 ha), marshland (50 ha) and savanna (7 ha). Sadly the garden has suffered from neglect with limited maintenance and unplanned felling of trees. Nevertheless this garden holds an estimated 5,000 plant species nearly all of which are native to the country. A rehabilitation program was recently launched with activities concentrated mainly on infrastructure rehabilitation and reopening of the access. In the near future an inventory with geographical mapping of trees will be performed as at Kisantu and Kinshasa.

Scientific and management training is the most important need for enforcing national capacity and in this field international support is strongly needed to achieve sustainability. Following the rehabilitation

activities of the last three years there is currently much interest in DRC for *ex situ* conservation activities, and it is a good time to build on this momentum (Lanata, in litt. August 2010).

2.2. Kenya

2.2.1 Forests

Forests cover only 2.4 percent (1,400,000 ha) of the area of Kenya of which 1,240,000 ha is indigenous forest and 160,000 ha is plantation forests. Kenya has a diverse range of forests, with lowland rainforest in the west, montane forest in the central and western highlands and along the southern border. There are also coastal mosaic forests and mangroves particularly at Lamu and at the mouth of the Tana River. The coastal forests have the highest proportion of endemic and rare trees. The Taita Hills which form part of the Eastern Arc mountains are also important habitats for endemic and rare tree species. The Mau forest block is the largest single forest block in East and Central Africa (Sayer *et al.,* 1992). It forms an extremely important water catchment area. All Kenyan forests are under pressure. Kenya's national forest cover has decreased dramatically from 140,922 km^2 in 1920 to 11,653km^2 in 2007. Reasons for this loss include rapid human population growth resulting in land use conversion to agriculture (UNEP-WCMC, 2010). Kenyan forests are generally located in areas with annual rainfall over 800mm, good soil fertility, productivity and high biodiversity but they are also located in parts of the country where over 70 percent of the national population is concentrated. The woodlands of the semi-arid areas are increasingly under threat from unsustainable charcoal production. The loss and degradation of the forest has severe implications for forest associated species as well as ecosystem services. Kenya still has a long way to go in achieving its Vision 2030 goal of achieving 10 percent forest cover by 2030 (UNEP-WCMC, 2010).

Forest policy is the responsibility of the Kenya Forest Service and is implemented through the Forests Act 2005. Since 1982, there has been a Presidential ban on the felling of indigenous trees in natural forests. However, the illegal felling of indigenous trees has continued both for the local and export markets. Before the ban, indigenous hardwoods accounted for about 20 percent of domestic timber use. For conservation purposes, Kenya's forested areas may be divided into Forest Reserves and those in the National Parks (mainly confined to the less densely populated dry areas). In total, there are164,000 hectares of gazetted Forest Reserves.

2.2.2. REDD policy

Kenya has formed a National REDD+ Steering committee with TOR developed for approval during the first Steering Committee Meeting in November 2010. The National REDD+ Technical Group was created in 2009 with three working groups (Policy, Methodology and Consultation) within the Technical Group. The Technical Group has an advisory role to the REDD+ Steering Committee. A National REDD + Coordination office is being established**.**

One Kenyan REDD+ project is included in the database maintained by the Institute for Global Environmental Strategies. This is the Kasigau Corridor REDD project that aims to prevent the emission of almost 3,000,000 tonnes of CO2e (carbon dioxide equivalent) over the 20-year crediting period of the project by preventing any further deforestation of the project area and surrounding area. It also sets out to add financial

sustainability to an existing conservation project that has been protecting biodiversity, avoiding deforestation on Rukinga Sanctuary and providing substantial community development benefits in the project zone for the past ten years.

2.2.3 Botanic gardens

In Kenya there are 13 botanic gardens included in the BGCI GardenSearch database of which four (and one nature reserve) are members of BGCI. These four gardens are included in the Table below together with Brackenhurst Botanic Garden with which BGCI works closely.

Table 4. Selected botanic gardens in Kenya

Botanic Garden	Tree collection
Brackenhurst Botanic Garden, Limuru	Emphasis is on plant diversity conservation, site restoration and watershed protection using indigenous trees. Tree list added to PlantSearch database September 2010
Moi University Botanic Garden	
Maseno University Botanic Garden	Established in 1995, supported by the German Biota programme in 2001; nor current information on collections
Friends of Nairobi Arboretum	Tree list (compiled in 2004 with subsequent updates, includes species uses) added to PlantSearch November 2010. The list builds on a DFID-funded tree inventory undertaken in 1979 covering some 5,000 trees
National Museums of Kenya, Nairobi Botanic Garden	A small area of natural woodland is maintained within the garden

2.3 Uganda

2.3.1 Forests

Uganda lies in the transition zone between east African savanna vegetation and tropical moist forests of the Congo basin. Tropical high forests cover about 4 percent of the country but a significant proportion of this has been degraded. Plantation forests account for around 0.14 percent with woodland and bushland account for an additional 16.7 and 5.9 percent respectively (Obua & Agea, 2010).

The National Forest Authority (NFA), established in 1998, is the lead agency for forest management in Uganda. The National Forest Plan of 2002 specifies the need to manage central forest reserves (CFRs) on a sustainable basis to optimize the economic, environmental and social functions of the forest estate and to reduce poverty through the active involvement of the private sector and local communities.

Forests outside the protected areas are privately owned or on customary lands. Community management of forest is institutionalised in national forest policy.

Main causes of forest degradation in Uganda include degazettement of reserves for commercial agriculture or industrial expansion; clearance of forest for subsistence agriculture to feed the rapidly expanding population; overexploitation of forest resources for firewood, charcoal and construction materials and weak capacity of the forest sector. A new threat is the discovery of oil in the Lake Albert and Western Rift areas.

Various initiatives have been developed for the restoration of forests. In 2004 the National Forestry and Tree Planting Act was enacted. The NFA has established a loan scheme for tree farmers and offers leases on CFR land to encourage private plantation development (Lemenih & Bongers, 2010). However, NFA continues to provide pines to farmers, which on a long term basis is not considered desirable for local ecosystems, especially as pines are found not only around, but also deep within CFRs (Meunier, in litt. 2011). Around protected forests, some projects have been implemented that take an integrated conservation and development project (ICDP) approach. Products derived from the natural forests are being grown by local communities on their own land. The Forests Absorbing Carbon Emissions (FACE) Project has been undertaken in Kibale and Mount Elgon National Parks with funding from the Governments of Netherlands and Norway (see Box 2).

A component of the 4 year EU funded *Forest Restoration in East Africa, Indian Ocean Islands and Magascar* project (also in Kenya and Madagascar) was implemented in the Mabira Forest Reserve. The potential of native species such as *Albizia coriaria* to increase incomes was evaluated and rehabilitation strategies based on trees that are ecologically important and/or produce valuable wood and non-wood products (Obua and Ogea, 2010). The national partner in this project was the University of Makerere.

2.3.2 REDD Policy

It is early days for REDD+ in Uganda. A Readiness Plan Idea Note (R-PIN) has been developed as part of the World Bank's support through the FCPF. It forms the initial basis for a more detailed plan that will include a plan for providing incentives that enhance forest conservation and address deforestation drivers; regulatory and institutional frameworks; and monitoring systems. REDD+ will be spearheaded by the Ministry of Water and Environment, related aspects will be undertaken by the Forestry Support Department and the implementation and reporting of REDD+ will be headed by the National Forestry Authority. The process will involve the establishment of a multi-stakeholder coordinator of REDD+ comprised of the heads of REDD+ institutions and representatives of civil society, private and donor organizations. The National Forestry Authority (NFA) will provide the secretariat for the coordination Group and will lead the preparation process of REDD+ strategy. The REDD+ strategy will then be part of the National Forest Plan and will be an appendage to it after formal approval by the Minister of Water and Environment. The budgetary component of the implementation of the REDD+ strategy shall be approved by the Ministry of Finance and Economic Planning. Current discussions are focusing on options for implementing REDD+ in the Albertine Rift, Montane Forests, Lowland Rainforests, Lake Victoria Mosaics, and some national parks such as Mt. Elgon National park, Kibale National Park and the cattle corridor. In these areas the rate of deforestation and forest degradation remain high.

Box 2: Carbon financing projects in Uganda

Kibale National Park is internationally renowned for its biodiversity. The Ugandan government invited Face the Future to carry out restoration work for the forests of the Park in area covering 10,000 ha. One of the intentions of the initiative is to enable the surrounding communities to gain employment and other forestry related benefit. Face the Future and Uganda Wildlife Authority experimented with new techniques to speed up the transformation of elephant grass stands into forest in a cost-effective way. To date over 3,500 hectares have been rehabilitated.

Rwoho Central Forest Reserve is an upper watershed of Lake Victoria. Deforestation and erosion result from fires set by hunters for honey and wild animals, by livestock grazers, and for slash and burn agriculture. In addition, illegal logging for timber and tree cutting by charcoal producers have destroyed more of the original forest. Reforestion is using a mix of pines and native trees. Called the Nile Basin Reforestation Project, the tree planting is being implemented by Uganda's National Forestry Authority in association with local community organizations, using funds provided by the World Bank's BioCarbon Fund. 75 percent of the project area will be planted with non-native *Pinus caribaea*, a quick-growing Caribbean pine. In addition, planting will include 20 percent *Maesopsis eminii*, a large African forest tree; and five percent *Prunus africana*, the species prized for its medicinal bark.

The Ugandan project is one of only eight reforestation projects worldwide that have been approved to date to count towards emissions reductions under the Kyoto Protocol's CDM and only the third land use change project to be registered in the BioCarbon Fund. The BioCarbon Fund purchases emission reductions from afforestation and reforestation projects under the Clean Development Mechanism of the Kyoto Protocol. Launched in 2002 with US$100 million, the BioCarbon Fund, a public/private partnership, provides finance for reducing greenhouse gas emissions. Farmers and rural communities can find new value in their agricultural lands and forests as they earn income from capturing and storing carbon dioxide.

2.3.3 Botanic gardens

There are four botanic gardens in Uganda as shown in Table 5 below. None of these are currently members of BGCI but there is a close association through project activities. BGCI has provided small grants to Tooro Botanical Garden and Nature Palace Botanic Garden, and has worked with Makerere University Botanical Garden on a bioinformatics project. Staff from the four botanic gardens met jointly for the first time at a workshop convened by BGCI in February 2009. The gardens subsequently undertook an analysis of their respective strengths and weaknesses. A report was produced as a basis for sharing their conservation resources and expertise and forming a new conservation partnership, working together to share skills and develop joint projects. The partnership will enable for example the botanical skills of Makerere University Botanical Garden to be shared with the Tooro Botanical Gardens and Nature Palace Botanical Gardens both of which have comprehensive engagement with local communities.

Table 5. Botanic gardens in Uganda

Botanic Garden	Tree Collection
Entebbe Botanic Gardens, National Agricultural Research Organization, Entebbe	2001 list updated for inclusion in PlantSearch
Tooro Botanical Gardens, Fort Portal	List uploaded August 2010
Makerere University Botanical Garden, Kampala	
Nature Palace Botanical Gardens Jandira/Luwule	List sent August 2010

Nature Palace Botanic Garden is working on a computerised list of the plant species growing at the garden with preliminary information available online. This work has been partially funded by BGCI through the *Wild Plants for Food and Medicine* project. (Nkwanga, in litt. August 2010) Botanists from Makerere University are helping to verify the species information.

Section 3: Conclusions and next steps

Botanic gardens in DRC, Kenya, and Uganda are collectively growing over 30 of the tree species that are included in the IUCN Red List as globally threatened. They are thus contributing significantly to the *ex situ* conservation of these species with both plant material and expertise currently or potentially available for reintroduction to the wild. In addition they grow a wide range of other indigenous tree species that have potential for use in forest restoration and other forms of tree planting schemes.

In order to take on a wider role in forest restoration, botanic gardens in Africa need to form or renew partnerships with forestry agencies, NGOs and the private sector. The new structures being developed for REDD implementation provide an opportunity to do so but the extent to which the institutional arrangements are available for participation are variable. The REDD debate is political and complex and botanic gardens may wish to consider the extent to which they get involved either in practical projects or in monitoring and capacity building. There is also great potential to get involved in projects of the voluntary carbon market.

BGCI will continue to promote the roles of African botanic gardens in tree conservation and reforestation. We will work particularly closely that those gardens that already have experience and expertise in conserving endangered trees and working with local communities. Further consultation is needed with the botanic gardens to discuss specific activities. It is intended to carry out a series of botanic garden visits including to DRC in February 2011 and Uganda in May 2011. We will also have further discussions with the National Botanic Garden of Belgium. Following from these consultations and further discussions with botanic garden in Cameroon, Ghana and Tanzania, BGCI intends to continue seeking funding for a regional workshop in Nairobi with partner gardens, African forestry departments, NGOs and other identified stakeholders. The workshop will also determine how tree-planting schemes can link into current forestry policy mechanisms whilst remaining community-led, and establish which species can be planted in identified areas. This work is designed with an emphasis to support practical conservation outputs in African botanic gardens.

In parallel with this, BGCI is working with botanic gardens from various countries around the world to develop a Botanic Garden Ecological Restoration Initiative that will focus on practical actions at selected sites. The activities of and outputs from this may involve or inform botanic gardens in Africa as the initiative develops.

Some of the specific needs identified in this study that BGCI will aim to address are:

- Supporting Red Listing of trees in Africa, improving information on the threats they face and awareness of their conservation needs.
- Enhancing the flow of information and support the general capacity of botanic gardens in Africa to become involved in policy and practical aspects of tree conservation and forest restoration.
- Supporting information management needs of African botanic gardens to maintain records for *ex situ* conservation and restoration of threatened trees.
- Supporting the development of *ex situ* collections of priority tree species not yet recorded in cultivation.
- Supporting, evaluating and learning from practical demonstration pilot projects for incorporating selected tree species into restoration schemes.
- Collecting information on nursery and field trials of single and mixed tree/shrub species for degraded land planting in Africa.
- Supporting community tree planting of species important for rural livelihoods including fruit trees and species that are valued for medical products.

BGCI will need to continue to develop its internal capacity to support tree conservation and forest restoration in Africa and to strengthen key partnerships in order to do so. BGCI will need to engage with specific forestry initiatives at an international level and develop strengthened partnerships with botanic gardens in Africa through specific projects. Organisations that we will strengthen engagement with include the World Agroforestry Centre (ICRAF) and International Tropical Timber Organisation (ITTO). At an international level, the development and testing of the GSPC Toolkit offers the potential to develop a framework for tree conservation and forest restoration linked to the main international policy framework provided by the Strategic Plan for the CBD.

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Annex 1 African threatened trees in cultivation in botanic gardens of DRC, Kenya and Uganda.

Species	IUCN Redlist Category	Use	Distribution	DRC	Kenya	Uganda	Global
Afrocarpus dawei (= Podocarpus falcatus)	NT	Timber	Kenya (possibly); Uganda; Tanzania	0	0	0	2
Afrocarpus usambarensis(= Podocarpus falcatus)	VU	Timber	Kenya; Tanzania	0	0	0	5
Afzelia africanaa	VU	Timber	DRC; Uganda & other African countries	0	0	0	8
Afzelia bipindensis	VU	Timber	DRC; Uganda & other African countries	1	0	0	2
Angylocalyx braunii	VU		Kenya; Tanzania	0	0	0	4
Bauhinia mombassae	EN		Kenya	0	0	0	1
Beilschmiedia ugandensis	VU	Timber, edible fruit	DRC; Uganda; Sudan; Tanzania;	0	0	1	1
Bottegoa insignis	LC/NT		Kenya; Ethiopia; Somalia	0	0	0	1
Brachylaena huillensis	LC/NT	Timber	Kenya; Uganda; other African countries	0	2	0	2
Brucea macrocarpa	EN		Kenya (endemic)	0	1	0	1
Canthium keniense	VU		Kenya (endemic)	0	1	0	2
Cephalosphaera usambarensis	VU		Kenya; Tanzania	0	0	0	1
Commiphora unilobata	LC/NT		Kenya; Ethiopia;Somalia	0	0	0	1
Croton alienus	EN		Kenya	0	1	0	1
Dalbergia bracteolata	LR/NT		Kenya; Madagascar; Mozambique; Tanzania	0	0	0	2
Dalbergia melanoxylon	LR/NT	Timber	Kenya; Uganda & other African countries	0	0	0	15

Delonix baccal	LR/NT		Kenya; Ethiopia; Somalia	0	0	0	1
Diospyros wajirensis	LR/NT		Kenya; Somalia	0	0	0	1
Ellipanthus hemandradenioides	LR/NT		Kenya; Tanzania	0	0	0	1
Entandrophragma angolense	VU	Timber; shade tree	DRC; Uganda & other African countries	1	0	1	4
Entandrophragma candollei	VU	Timber	DRC; other African countries	1	0	0	2
Entandrophragma cylindricum	VU	Timber; shade tree	DRC; Uganda; other African countries	1	0	1	2
Entandrophragma utile	VU	Timber; shade tree; medicinal	DRC; Uganda; other African countries	0	0	0	1
Erythrina sacleuxii	VU		Kenya; Tanzania	0	0	0	3
Euphorbia cussonioides	VU		Kenya	0	0	0	3
Euphorbia wakefieldii	EN		Kenya	0	0	0	17
Garcinia kola	VU	chewsticks	DRC; other African countries	1	0	0	3
Gigasiphon macrosiphon	EN	Potential ornamental	Kenya; Tanzania	0	0	0	1
Guarea cedrata	VU	Timber	DRC; Uganda; other African countries	0	0	0	1
Hallea stipulosa	VU	Timber, medicinal; water regulation	DRC; Uganda; other African countries	0	0	1	1
Irvingia gabonensis	LR/NT	Fruit	DRC; Uganda	1	0	0	4
Isolona congolana	LR/NT		Uganda; Congo	0	0	1	1
Juniperus procera	LR/NT	Fuelwood, timber	DRC; Kenya; Uganda, other African countries and Arabian Peninsula	1	2	0	23
Khaya anthotheca	VU	Timber; medicinal; shade tree	DRC; Uganda; other African countries	1	2	1	11
Khaya grandifoliola	VU	Timber	DRC; Uganda	0	0	0	2

Khaya senegalensis	VU	Timber; fuel wood; medicnal	Uganda; other African countries	0	0	0	25
Lophira alata	VU	Timber	DRC; Uganda; other African countries	1	0	0	2
Lovoa swynnertonii	EN	Timber	DRC; Kenya; Uganda; other African countries	0	1	1	3
Lovoa trichilioides	VU	Timber; shade tree; medicinal	DRC; Uganda; other African countries	1	0	0	2
Milicia excelsa	LR/NT	Timber; shade tree; medicinal	DRC; Kenya; Uganda & other African countries	1	1	1	6
Millettia laurentii	EN	Timber	DRC; other African countries	1	0	0	1
Mkilua fragrans	VU		Kenya; Tanzania	0	0	0	2
Nauclea diderrichii	VU	Timber	DRC; Uganda; other African countries	1	0	0	3
Ocotea kenyensis	VU	Timber	DRC; Kenya; Uganda; other African countries	0	1	0	3
Pavetta tarennoides	VU		Kenya	0	0	0	1
Pericopsis elata	EN	Timber	DRC; other African countries	1	0	0	1
Pistacia aethiopica	LR/NT		Ethiopia; Kenya; Somalia; Tanzania; Uganda; Yemen	0	1	0	1
Polyscias kikuyuensis	VU		Kenya	0	1	0	1
Prunus africana	VU	Medicinal; Timber	DRC; Kenya; Uganda; other African countries	0	2	2	13
Psychotria pseudoplatyphylla	VU		Kenya; Tanzania	0	0	0	1
Pterocarpus angolensis	LR/NT	Timber	DRC; other African countries	0	0	0	8
Pterygota bequaertii	VU	Timber	DRC; other African countries	1	0	0	1
Strychnos mellodora	VU		Kenya; Mozambique; Tanzania; Zimbabwe	0	0	0	1

Turraeanthus africanus	VU	Timber	DRC; Uganda; other African countries	0	0	1	1
Turraeanthus africanus	VU	Timber	DRC; Uganda	0	0	1	1
Uvariodendron anisatum	VU		Kenya	0	1	0	1
Uvariodendron kirkii	VU		Kenya; Tanzania	0	0	0	1
Vepris glandulosa	EN		Kenya	0	1	0	1
Vitex keniensis	VU	Timber	Kenya	0	2	0	3

Annex 2 Threatened and endemic trees of DRC, Kenya and Uganda not represented in botanic garden collections

Species	IUCN Category	Distribution
Allophylus agbala	Vulnerable	DRC
Anthonotha lebrunii	Vulnerable	DRC
Baphia incerta ssp. *lebrunii*	Vulnerable	DRC
Baphia keniensis	Vulnerable	Kenya
Beilschmiedia ambigua	Vulnerable	DRC
Beilschmiedia bracteata	Vulnerable	DRC
Beilschmiedia giorgii	Vulnerable	DRC
Beilschmiedia mayumbensis	Vulnerable	DRC
Beilschmiedia vermoesenii	Vulnerable	DRC
Canthium kilifiensis	Vulnerable	Kenya
Cleistanthus evrardii	Vulnerable	DRC
Coffea fadenii	Vulnerable	Kenya
Cola bracteata	Vulnerable	Uganda
Cola octoloboides	Endangered	Kenya
Cola porphyrantha	Endangered	Kenya
Cordia mukuensis	Vulnerable	DRC
Diospyros katendei	Critically Endangered	Uganda
Diphasiopsis fadenii	Vulnerable	Kenya
Euphorbia tanaensis	Critically Endangered	Kenya
Hannoa kitombetombe	Vulnerable	DRC
Isolona dewevrei	Vulnerable	DRC
Maerua elegans	Vulnerable	DRC
Memecylon teitense	Vulnerable	Kenya
Moringa arborea	Vulnerable	Kenya
Ocotea argylei	Vulnerable	Kenya
Ophrypetalum odoratum	Vulnerable	Kenya
Placodiscus paniculatus	Vulnerable	DRC
Premna maxima	Vulnerable	Kenya
Psilotrichum axilliflorum	Vulnerable	DRC
Psychotria crassipetala	Vulnerable	Kenya
Psychotria petitii	Vulnerable	Kenya
Psychotria taitensis	Vulnerable	Kenya
Salacia lehmbachii var. uregaensis	Vulnerable	DRC
Sclerocarya gillettii	Vulnerable	Kenya
Vepris mandangoa	Vulnerable	DRC
Vepris samburuensis	Vulnerable	Kenya
Zimmermannia ovata	Vulnerable	Kenya

Annex 3 Notes on Ebony species of DRC, Kenya and Uganda

Diospyros abyssinica

Angola, Benin, Cameroon, CAR, Cote D'Ivoire, Eritrea, Ethiopia, Gabon, Ghana, Guinea, Kenya, Malawi, Mali, Mozambique, Nigeria, Sudan, DRC, Togo, Uganda, Tanzania, Zambia, Zimbabwe

LC Eastern Arc Mountains & Coastal Forests CEPF Plant Assessment Project

Rationale: A very widespread species, common and with no major threats.

Habitat: A tree found in rain forest and in Brachystegia woodland.

Population: Frequent to abundant.

Conservation: Occurs in many protected areas across its range.

Diospyros amaniensis

Kenya, Tanzania

VU B1ab(iii,v)+2ab(iii,v) Eastern Arc Mountains & Coastal Forests CEPF Plant Assessment Project

Rationale: The EOO and AOO are below the thresholds to qualify for VU, the population is severely fragmeneted and there are about 10 locations and there is continuing decline in parts if the range due to ongoing decline in quality and extant of the habitat plus it is directly exploited for making construction poles.

Habitat: A shrubby tree found in sub-montane forests. Makes very good long poles which are used in house construction, etc.

Population: Locally abundant.

Conservation: 3 localities in Shimba Hills NR; 1 locality in Manga FR; 2 localities in Looguza FR; 1 locality in Amani Sigi NR; 1 locality in Talagwe FR; 1 locality in Kimboza FR; 1 locality in Mwanihana FR; 1 locality in Udzungwa Mountain NP

Threats: The Shimba Hills site there was heavy exploitation for poles, but that has now stopped. But at Kimboza there is ongoing decline in the habitat due to expanding agriculture, logging, pole colecting, etc.

Diospyros batocana

Angola, Botswana, South Africa, DRC, Zambia, Zimbabwe

Habitat: Widespread within the northern, wetter half of the Zambezian Region, but extending into the drier southern half only on Kalahari sand. It is found growing within various types of woodland between 900-1525m (Flora Zambesiaca) (White, 1962).

Use/Trade: Edible fruit, most commonly eaten by children (Hiern, 1877) (White, 1962) & sometimes eaten by adults during periods of famine. The wood is hard and suitable for making spoons and small carvings. A cold water infusion of the leaves is used as an enema. Covering millet with the leaves in preparation for making beer reputedly improves the beer's flavour (Coates Palgrave, 2002).

PlantSearch: recorded in 1 botanic garden

Diospyros bipindensis

WC. Trop. Africa to Uganda and NE. Angola

Habitat: Evergreen rainforest (Hutchinson et al, 1927) and in proximity to semi-deciduous rainforest (Letouzey & White, 1970).

Use/Trade: The wood has some elasticity and is used in Cameroon and Gabon to make the bow of crossbows (Letouzey &White, 1970). The powdered root is used in the Congo as a poison antidote and expectorant in bronchial infections (Bouquet, 1972). A bark macerate is also used topically on localised pains (Burkill, 1985).

Diospyros boala

Cameroon, Gabon, DRC

Diospyros bussei

Kenya, Somalia, Tanzania

NT Eastern Arc Mountains & Coastal Forests CEPF Plant Assessment Project

Rationale: Almost meets the AOO threshold, is declining in places because of clearing for rangeland and cultivation, plus it is harvested for charcoal production, but the population is not severely fragmented and there are more than 20 locations. Hence is listed as NT as it almost qualifies for VU B2ab(ii,iii,v).

Habitat: Grows in dry bushland.

Population: Was an extremely common species on the coastal plain & is still very dominant in places.

Conservation: 1 locality in Tsavo East NP; 1 locality in Tana River Primate NR; 1 locality in Shimba Hills NR; Gonja FR

Range: Coastal plain in Kenya and Tanzania. The range is supposedly extends into Somalia according to Govaerts 2009.

Threats: Was once very common above the Tana River area, but large sections been removed through hacking and fires to create grassland for grazing and some maize fields. The species has hard timber and is used for making charcoal.

Diospyros canaliculata

Angola, Cameroon, CAR, Congo, Cote D'Ivoire, Gabon, Ghana, Liberia, Nigeria, DRC

Habitat: This species seems to avoid evergreen rainforest and in is sometimes found growing in proximity to water courses where the rainforest is periodically flooded. (Letouzey & White, 1970) (Hutchinson et al, 1927)

Use/Trade: The wood is used for making pit props in Ghana; In the Ubangi Region, the wood is used to make spear shafts owing to its resilience. An extract from the bark is a standard arrow poison ingredient in the Cote d'Ivoire and produces gangrene in the flesh around the wound facilitating penetration of other poisons. Freshly pulped bark is commonly used in the Cote d'Ivoire in treatment of leprosy. The bark is used in the Republic of Congo in a paste with rock salt and palm oil which is applied to points of pain over the ribs after scarification. In southern Nigeria, the fruit and sap are used as a fish poison and in the CAR, the bark and seeds are similarly used.

Diospyros chrysocarpa
DRC

Diospyros cinnabarina
Angola, Cameroon, Congo, Gabon, Nigeria, DRC
Habitat: Coastal evergreen rainforest (Letouzey & White, 1970) (Hutchinson et al, 1927).

Diospyros conocarpa
Angola, Cameroon, Congo, Equatorial Guinea, Gabon, Nigeria, DRC
Habitat: Forest (Hutchinson et al, 1927). It is found growing on the granite mountains of Chaillu and Mayombe in the Republic of Congo (Bouquet, 1972).

Diospyros consolatae
Kenya, Mozambique, Somalia, Tanzania
Habitat: It is found growing in coastal thicket, more rarely in dry woodlands further inland, with an altitudinal range of 0-100m (Flora Zambesiaca) (Lovett et al, 2006).
Use/Trade: The wood is used for firewood, building poles, charcoal, tool handles, wooden spoons, withies and pestles (Lovett et al, 2006).

Diospyros crassiflora
Cameroon, CAR, Congo, Gabon, Nigeria, DRC
EN A1d African Regional Workshop 1996
H**abitat:** Lowland evergreen rainforest (Burkill, 1985) (Hutchinson et al, 1927). However, it may also be found in islands of mature, semi-deciduous forest near the coast or also in islands of evergreen rainforest within semi-deciduousforest (Letouzey & White, 1970).
Threats: The wood is thought to have been overexploited in the regions of Yabassi, d'Edea and Libreville in Cameroon (Letouzey & White, 1970).
Use/Trade: The ebony heartwood is much in demand for export which has led to over-exploitation. In Congo it is applied to sores (Bouquet, 1972) and a bark decoction is taken in draught and by enema for ovarian troubles.

Diospyros dendo
Angola, Cameroon, CAR, Congo, Gabon, Nigeria, DRC
Habitat: Lowland evergreen forest (Burkill, 1985) (Hutchinson et al, 1927) in the northern area of its distribution range. In the southern area of its range, its habitat ecology is slightly different. It is found further inland as well as in the Sangha Valley in Cameroon (Letouzey & White, 1970).
Use/Trade: In Cameroon the bark yields a dye and a tanning material; the heartwood is used for timber and makes good firewood. The fruit is edible and used as a supplementary food (Burkill, 1985).

Diospyros gabunensis

Burundi, Cameroon, Congo, Cote D'Ivoire, Equatorial Guinea, Gabon, Ghana, Liberia, Nigeria, Rwanda, Sierra Leone, DRC, Tanzania, Zambia

Habitat: Lowland rainforest, often found growing in swamp/marshy areas (Burkill, 1985) (Hutchinson et al, 1927). In Rwanda is described as growing in mountain forests (Troupin, 1982).

Use/Trade: In Sierra Leone, the wood is used as a structural timber. In Liberia the tree is used for large house poles and is cut for wooden spoons, combs and other small household articles. The inner bark is also used here, prepared as a decoction for use as an antiseptic wash for sores and wounds. Leaves and/or bark are applied as a poultice to wounds (Burkill, 1985).

Diospyros gilletii

Cameroon, CAR, Congo, Gabon, DRC

Habitat: This species is most commonly found growing next to rivers (Bouquet, 1972), but can also be found in the high valleys of the Sanaga, Nyong and Dja in Cameroon and the high Ivindo in Gabon (Letouzey & White, 1970).

Diospyros greenwayi

Kenya, Tanzania

NT Eastern Arc Mountains & Coastal Forests CEPF Plant Assessment Project

Rationale: Almost qualifies for VU under the AOO, and there is continuing decline due to loss of habitat and exploitation of the species (B2b(ii,v), but is known from many locations and is not severely fragmented. Hence is listed as NT.

Habitat: In coastal forest.

Population: Is a dominant species in patches.

Conservation: Kaya Muhaka, Kaya Ribe, Witu FR, Shimba Hills NR, Gogoni FR, Buda Mafisina FR, Kimboza FR, Gendagenda South FR, Ruvu FR; Buda FR (sr).

Range: In Kenya recorded from the Shimba Hills, Buda and Witu. It is known from a number of forest reserves in coastal Tanzania and there is apparently a record from Somalia in the Jubbada Hoose region.

Threats: Highly sought after for use as building poles. The demand for agricultural land also exerts heavy pressure throughout the range.

Diospyros grex

DRC

Diospyros heterotricha

Angola, DRC

Use/Trade: The tree has been introduced into cultivation in some parts of the region for its edible fruit (Burkill, 1985).

PlantSearch: Recorded in 2 botanic gardens.

Diospyros hoyleana
Angola, Cameroon, Congo, Gabon, Nigeria, DRC, Zambia
Habitat: Grows in the understorey of dense evergreen rainforest (Burkill, 1985) as well as occasionally occurring in riverine forest in areas of fairly high rainfall (White, 1955). It can also be found growing in patches of relict vegetation (Letouzey & White, 1970). In Zambia it has been recorded growing on sandy islands in the Zambezi River (White, 1962).
Use/Trade: In the Congo, a powder made from the dry leaves or the leaf sap are sniffed for persistent headache. The pulped leaves are used for treating wounds and sores (Bouquet, 1972) and a leaf decoction is given to women during pregnancy with a history of miscarriage (Burkill, 1985).

Diospyros hoyleana *ssp.* ***angustifolia***
Mozambique, DRC, Zimbabwe

Diospyros iturensis
Angola, Cameroon, CAR, Congo, Gabon, Nigeria, DRC
Habitat: Grows on river banks or lower storey layer of the rainforest (Burkill, 1985) (Letouzey & White, 1970).
Use/Trade: The stems are used in the Congo to make paddles and spear shafts, pestles and mortars, carvings for masks and fetishes and tourist bric-a-brac. The roots and bark are used medicinally(Burkill, 1985).

Diospyros kabuyeana
Kenya, Mozambique, Tanzania
LC Eastern Arc Mountains & Coastal Forests CEPF Plant Assessment Project
Rationale: Has a very wide EOO, is common locally and there appear to be no major threats.
Habitat: In woodland and secondary bushland.
Population: Is locally very abundant.
Conservation: Gogoni FR, Shimba Hills NR, Mrima FR, Dzombo FR, Kwamgumi FR, Looguza FR, Mtibwa FR, Pugu FR, Kimboza FR, Udzungwa Mountain NP, Pindiro FR, Quirimba NP, Mtanza FR (sr), Selous GR (sr)
Range: Has a wide range along the coastal plain of Kenya, Tanzania and into northern Mozambique.
Threats: Appears not to be used for poles as some of the other species although the timber may be used.

Diospyros kanurii
Kenya

Diospyros katendei
Uganda
CR B1+2ce, C2b, D
Habitat: Upland evergreen rainforest.
Population: At present the species is known from a single population of about 20 trees.
Conservation: The area is designated as a forest reserve and timber is being extracted.
Range: Known only from central Kasyoha-Kitomi.

Diospyros kirkii
Angola, Malawi, Mozambique, DRC, Tanzania, Zambia, Zimbabwe
Rationale:
Habitat: Grows in various types of woodland, especially open woodland on stony soils and at the edges of bamboo. In Zimbabwe, it tolerates relatively low levels of copper in the soil. It occurs between 350-1370m (Flora Zambesiaca). In Zambia it is most commonly seen growing in poor miombo woodland, especially on escarpment slopes (White, 1962). It is usually seen growing in large stands (Flora of Zimbabwe).
Use/Trade: The fruit is eaten and the wood is used for making furniture (Flora Zambesiaca).
PlantSearch: Recorded in 2 botanic gardens.

Diospyros loureiriana
Kenya, Mozambique, South Africa, Tanzania, Zimbabwe
LC Eastern Arc Mountains & Coastal Forests CEPF Plant Assessment Project
2006-11-03 00:00:00
Rationale: Is widespread, common and under no major threat.

Diospyros lycioides *ssp.* ***sericea***
Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, DRC, Zambia, Zimbabwe
Habitat: Bushland and thicket, especially on riverbanks and termite mounds and in rock places. It is sometimes found growing at the margins of riparian forest or forming secondary thicket following overgrazing. (Flora Zambesiaca).
PlantSearch: Recorded in 5 botanic gardens.

Diospyros mafiensis
Kenya, Mozambique
NT Eastern Arc Mountains & Coastal Forests CEPF Plant Assessment Project
Rationale: Has an EOO and AOO that approach the thresholds for VU, there is continuing decline due to clearance of habitat and use as building poles. However, is not severely fragmented and the number of locations is more than 10. Hence is listed as NT.
Habitat: With Combretum spp. and numerous Rubiaceae in grassland on red gritty soil.
Population: Locally common.
Conservation: Zoraninge FR, Ruvu North FR, Kikoka FR, Bana FR, Vikindu FR, possibly Ruawa FR, Quirimbas NP.
Range: A coastal species in Tanzania and northern Mozambique. Also occurs on Maffia Island.
Threats: Used for small building poles, habitat clearance for agriculture.

Diospyros mannii

Angola, Cameroon, CAR, Congo, Cote D'Ivoire, Gabon, Ghana, Liberia, Nigeria, Sierra Leone, DRC

Habitat: Evergreen and semi-deciduousforest and rainforest (Letouzey & White, 1970) (Hutchinson et al, 1927).

Diospyros melocarpa

Cameroon, Congo, Gabon, Nigeria, Sao Tome and Principe, DRC

Habitat: Evergreen rainforest (Letouzey & White, 1970) (Hutchinson et al, 1927)

Diospyros mespiliformis

Angola, Benin, Botswana, Burundi, Cameroon, Cote D'Ivoire, Eritrea, Ethiopia, Gambia, Ghana, Guinea, Kenya, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Senegal, South Africa, Sudan, Swaziland, Uganda, Tanzania, Yemen, Zambia, Zimbabwe

Habitat: Most frequently in riparian forest (White, 1962) (Letouzey & White, 1970), but also more rarely on termite mounds or rocky outcrops or in dry semi-evergreen forest at 60-1370m (Flora Zambesiaca). It is a constituent species of sub-hygrophilous forest and grows on argillo-arenaceous soils (Figueiredo, 1951). As a riparian tree it extends from the forest margin into regions of very low rainfall (less than 500mm/year) (White, 1955) (Lovett et al, 2006).

Use/Trade: Trees are often left standing in cultivated lands in order to obtain the fruits. These are either eaten fresh or stored as a preserve and are also used to make beer. The wood is black and termite resistant – it is widely used for a variety of products and for making charcoal and for firewood. The leaves, twigs and bark are used as a medicine for stomach ache, ringworm, leprosy, fevers,dysentery and treating wounds (Coates Palgrave, 2002). The bark is used for dyeing mats with a red colour. In Tanzania, the roots are used as a medicine against Makua wizards (Lovett et al, 2006).

PlantSearch: Recorded in 14 botanic gardens.

Diospyros monbuttensis

Benin, Cameroon, CAR, Cote D'Ivoire, Ghana, Nigeria, DRC, Togo

Habitat: Semi-deciduous rainforest (White, 1955) It also grows in the galleried rainforest of the Adamaoua Plateau in Cameroon (Burkill, 1985) (Letouzey & White, 1970).

Use/Trade: The wood is used in Nigeria to make clubs, walking sticks and tool handles. Similar uses are reported in Togo. The branches are flexible and used to make traps. A decoction of the bark and twigs mixed with other spp. are used as a leprosy treatment. They also consider this to be good for fever pains, stomach ache and oedemas.

Diospyros mweroensis
DRC, Tanzania, Zambia
Habitat: Grows in miombo woodland in fire-protected areas and on termite mounds between 800-1,500m (Flora Zambesiaca) (White, 1962).
Use/Trade: The fruits are widely used as a fish poison. However, it is also toxic to molluscs, which have been found to be completely absent from rivers which are regularly fished in this way (Flora Zambesiaca) (White 1962).

Diospyros natalensis
Kenya, Madagascar, Malawi, Mozambique, South Africa, DRC, Uganda, Tanzania, Zambia, Zimbabwe
Habitat: Evergreen and semi-evergreen forest, bushland and thicket and on rocky outcrops, between sea level and 1600m (Flora Zambesiaca). It can also occasionally occur in riverine forest in areas of fairly high rainfall (White, 1955).
Use/Trade: The wood is used for firewood, building poles, charcoal and wooden spoons. The tree is also used for shade (Lovett et al, 2006).
PlantSearch: Recorded in 3 botanic gardens.

Diospyros occulta
Kenya, Tanzania
VU B2ab(iii) Eastern Arc Mountains & Coastal Forests CEPF Plant Assessment Project
Habitat: lowland forest
Population: Not common in the Shimba Hills.
Conservation: Gogoni FR, Buda FR, Shimba Hills NR, Amani NR (Kwamkoro FR), Magombera FR, Selous GR, Udzungwa NP, Ngindo/Northeast Undendeule FR.
Threats: Some of the reserves where it occurs are threatened by titanium mining. Some of the other localities are also under threat due to loss of habitat quality and extent ecause of agricultural expansion, logging, etc.

Diospyros piscatoria
Angola, Cameroon, Congo, Cote D'Ivoire, Gabon, Ghana, Guinea, Nigeria, Sierra Leone, DRC
Habitat: Evergreen lowland rainforest (Burkill, 1985) It is often found growing in patches of secondary forest (Letouzey & White, 1970).
Use/Trade: The fruit is used as a fish poison in Nigeria and Gabon. In Cameroon and Gabon, both the bark and fruit with persistent calyx are used (Burkill, 1985).

Diospyros polystemon
Angola, Cameroon, Congo, Gabon, DRC
Habitat: Evergreen rainforest (Hutchinson et al, 1963) (Letouzey & White, 1970).

Diospyros preussii
Cameroon, Congo, Gabon, Nigeria, DRC
Habitat: Evergreen rainforest (Hutchinson et al, 1927), often found in swampy areas (Burkill, 1985) (Letouzey & White, 1970)
Use/Trade: Chemicals present in the bark have both antibiotic and antiseptic effects (Burkill, 1985).

Diospyros pseudomespilus *ssp.* ***brevicalyx***
Angola, Cameroon, CAR, Congo, Gabon, DRC, Zambia
Habitat: Mainly confined to Kalahari sand where it is one of the most characteristic species of dry evergreen forest (mavunda) Altitudinal range 1000-1450m (Flora Zambesiaca).

Diospyros sankurensis
DRC

Diospyros scabra
Ethiopia, Kenya, Sudan, Uganda

Diospyros senensis
Malawi, Mozambique, DRC, Zambia, Zimbabwe
Habitat: Deciduous thicket woodland and thicket between 30-1000m (Flora Zambesiaca). It occurs in fire-climax vegetation in the dry lower reaches of the Zambesi Valley and its tributaries (White, 1955). It is usually found growing on coarse alluvium fringing seasonal watercourses (White, 1962).
Use/Trade: The wood is very tough and is used for making hoe handles and building (Flora Zambesiaca). An infusion of the roots is rubbed onto children's chests to ward off colds (Coates Palgrave, 2002).
PlantSearch: Recorded in 1 botanic garden.

Diospyros shimbaensis
Kenya, Tanzania
VU B2ab(iii) Eastern Arc Mountains & Coastal Forests CEPF Plant Assessment Project
Rationale: Has an AOO of <2,000 km², is severely fragmented and known from only five locations and there is continuing decline in both quality and extent of habitat at some of the localities in Kenya. Although it is secure now on Shimba Hills and there is better protection at Zaraninge and the Maffia Island subpopulation is secure, there is still continuing decline.
Habitat: Lowland moist decidous forest on steep rocky slope; Also semi-deciduous Mixed forest
Population: Locally abundant. On Maffia it is dominant in the understorey throughout the forest.
Conservation: Shimba Hills NR, Gogoni FR, Buda FR, Zoraninge FR, Ngarama North FR; Kaya Ribe (sr).
Range: In Kenya this small tree occurs in moist semi-deciduous forest in the Shimba Hills National Reserve, Gongoni Forest Reserve and Buda Mafisini Forest Reserve. In Tanzania is found in Zaraninge Forest at Bagamoyo and in Mrora forest on Mafia Island.
Threats: Is not cut for poles. Some of the coastal forests are under threat because of titanium mining, encroaching cultivation, etc. Habitat loss and degradation has caused population declines in the Kenyan subpopulations. On Maffia Island the forest will not be cleared for agriculture and there is no logging.

Diospyros squarrosa
*K*enya, Malawi, Mozambique, Somalia, DRC, Tanzania, Zambia, Zimbabwe
Habitat: Grows in dry mixed deciduous woodland and thicket in rain shadow areas (White, 1955) (Lovett et al, 2006). It is found at higher altitude only on termite mounds (Flora Zambesiaca); it is also found in riverine forest and below granite kopjes;Altitudinal range is from near sea level to 1200m (Flora of Zimbabwe);
Use/Trade: The wood is used for firewood, building poles, tool handles, animal yokes, spoons, charcoal and beams for carrying water (Lovett et al, 2006).
PlantSearch: Recorded in 2 botanic gardens.

Diospyros troupinii
DRC

Diospyros vera
Kenya, DRC, very widespread with pantropical distribution.

Diospyros vermoesenii
Angola, Congo, Gabon, DRC
Use/Trade: In Congo is is used in the treatment of wounds (Bouquet, 1972)

Diospyros virgata
Angola, Namibia, DRC, Zambia
Habitat: Grows in dry evergreen forest and various types of woodland at 900-1700m, persisting in fire-induced communities (Flora Zambesiaca). It grows most abundantly on Kalahari sand (White, 1962).

Diospyros viridicans
Angola, Cameroon, Congo, Cote D'Ivoire, Gabon, Ghana, Nigeria, Sierra Leone, DRC
Habitat: Evergreen and semi-deciduous rainforest (Burkill, 1985) (White, 1955) (Letouzey & White, 1970)
Use/Trade: A decoction of leafy twigs is taken in draught in the Cote d'Ivoire by the Tangwana for leprosy. The fruit is edible (Burkill, 1985).

Diospyros wagemansii
DRC

Diospyros wajirensis

Kenya, Somalia

LR/nt Thulin, M.

Habitat: Occurring in dry bushland.

Population: It is very common near Wajir.

Range: This small tree is restricted in range from north-eastern Kenya to neighbouring Somalia.

Threats: The habitat is threatened with degradation through grazing and overcutting for charcoal production.

Diospyros zenkeri

Angola, Cameroon, Gabon, Nigeria, DRC

Habitat: Evergreen rainforest (Hutchinson et al, 1927). It is often found growing in proximity to water-courses (Letouzey & White, 1970).

Diospyros zombensis

Kenya, Malawi, Mozambique, Tanzania, Zambia**:**

Habitat: Various types of forest, woodland, thicket and wooded grassland; 350-900m (Flora Zambesiaca). It is commonly found growing in riparian woodland along seasonal streams in Zambia (White, 1962).

Euclea divinorum

Angola, Botswana, Burundi, Ethiopia, Kenya, Malawi, Mozambique, Namibia, Rwanda, Somalia, South Africa, Sudan, Swaziland, DRC, Uganda, Tanzania, Yemen, Zambia, Zimbabwe

Habitat: This species is found in various types of woodland, bushland, thicket and grassland (Lovett et al, 2006), especially in rocky places, banks of rivers and on termite mounds between sea level and 1400m (White, 1962).

Use/Trade: This species is particularly common on arsenical soils and may have value as an indicator of the presence of gold. However, caution needs to be observed with this because it can be found growing in equal abundance elsewhere (Flora Zambesiaca). is also used to make medicine for diviners in the Batoka Region in southern Zambia (Flora of Zimbabwe. The wood is used for building poles, firewood, tool handles and spoons. The bark produces a brown dye. Small branches are used as toothbrushes (Lovett et al, 2006). In Socotra it is an important dry season fodder for livestock. Camel herders cut leafy stems to feed to their camels, and gather the fallen leaves to feed to their goats.

PlantSearch: Recorded in 8 botanic gardens.

Euclea natalensis *ssp.* ***acutifolia***

Malawi, Mozambique, DRC, Tanzania, Zambia, Zimbabwe

Habitat: In various types of scrub forest, bushland and thicket, especially on rocky outcrops and on termite mounds, and on the banks of rivers; Very local in miombo woodland; Occurs mostly between 915-1525m (Flora Zambesiaca).

PlantSearch: Recorded in 1 botanic garden.

Euclea natalensis *ssp.* ***obovata***

Kenya, Malawi, Mozambique, Somalia, South Africa, Tanzania

Habitat: A characteristic plant of bushland, thicket and lowland scrub forest; (Flora Zambesiaca) (Lovett et al, 2006).

Use/Trade: Roots yield a black dye (Lovett et al, 2006)

PlantSearch: Recorded in 1 botanic garden.

Euclea racemosa *ssp****. schimperi***

Djibouti, Egypt, Eritrea, Ethiopia, Kenya, Malawi, Mayotte, Mozambique, Oman, Rwanda, Somalia, South Africa, Sudan, DRC, Uganda, Tanzania, Yemen, Zambia, Zimbabwe

Habitat: Mostly in dry evergreen or semi-evergreen bushland, thicket or scrub forest, especially on termite mounds, on banks of watercourses and in rocky places; 90-1525m (Flora Zambesiaca) (Lovett et al, 2006).

Use/Trade: The wood is used for firewood and tool handles. Roots are purgative and produce a black dye (Lovett et al, 2006). It was also previously used for making wagon wheels (Coates Palgrave, 2002)