CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Nineteenth meeting of the Conference of the Parties
Panama City (Panama), November 2022

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Inclusion of all African populations of *Pterocarpus* species in Appendix II of CITES with annotation #17, including already listed species *P. erinaceus* (CoP17, no annotation) and *P. tinctorius* (CoP18, annotation #6) in accordance with Article II, paragraph 2 (a) of the Convention.

Considering that:

- CITES Appendix II must include all African populations of *Pterocarpus* species, which although not necessarily now threatened with extinction may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with their survival, and
- Domestic and international experience has indicated that enforcement and customs officers who encounter specimens of the African *Pterocarpus* products are unlikely to be able to reliably distinguish between the various species of the African *Pterocarpus*,

it is important to include the African *Pterocarpus* species in CITES Appendix II, in accordance with:

a) Resolution Conf. 9.24 (Rev. CoP17), Annex 2 a, Criterion B, as it is known, or can be inferred or projected, that regulation of trade in some species of the genus is required to ensure that the harvest of specimens from the wild is not reducing the wild population to a level at which its survival might be threatened by continued harvesting or other influences.

b) Resolution 9.24 (Rev. CoP17) Annex 2 b Criterion A. “The specimens of the species in the form in which they are traded resemble specimens of a species included in Appendix II under the provisions of Article II, paragraph 2 (a), or in Appendix I, so that enforcement officers who encounter specimens of CITES-listed species are unlikely to be able to distinguish between them”.

Annotation

#17 Designates logs, sawn wood, veneer sheers, plywood and transformed wood.

B. Proponent

Côte d'Ivoire, European Union, Liberia, Senegal and Togo*

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* *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

C. Supporting statement

1. Taxonomy

1.1 Class: Magnoliopsida

1.2 Order: Fabales

1.3 Family: Leguminosae

1.4 Genus, species or subspecies, including author and year:

Twelve African species of the genus *Pterocarpus* and 6 subspecies are currently recognised according to the African Plant Database (CJBG, 2021):

Species

- *Pterocarpus angolensis* DC.
- *Pterocarpus brenanii* Barbosa & Torre
- *Pterocarpus erinaceus* Poir.
- *Pterocarpus lucens* Lepr. ex Guill. & Perr.
- *Pterocarpus mildbraedii* Harms
- *Pterocarpus officinalis* Jacq.
- *Pterocarpus osun* Craib
- *Pterocarpus rotundifolius* (Sond.) Druce
- *Pterocarpus santalinoides* L'Hér. ex DC.
- *Pterocarpus soyauxii* Taub.
- *Pterocarpus tessmannii* Harms
- *Pterocarpus tinctorius* Welw.

Subspecies

- *Pterocarpus lucens* Lepr. ex Guill. & Perr. subsp. *lucens*
- *Pterocarpus lucens* subsp. *antunesii* (Taub.) Rojo
- *Pterocarpus officinalis* subsp. *gilletii* (De Wild.) Rojo
- *Pterocarpus rotundifolius* (Sond.) Druce subsp. *rotundifolius*
- *Pterocarpus rotundifolius* subsp. *martinii* (Dunkley) Lock
- *Pterocarpus rotundifolius* subsp. *polyanthus* (Harms) Mendonça & E.C. Sousa

Note: the taxon *Pterocarpus zenkeri* Harms, although considered Endangered B2ab(iii) by IUCN ([1]), is still uncertain for most taxonomists according to the African Plant Database. "*P. zenkeri* is a doubtful species very similar to *P. osun* […]" (CJBG, 2021).

1.5 Scientific synonyms: see 1.6

1.6 Common names:

Scientific name & IUCN status	**Synonyms (CJBG, 2021)([2])**	**Common names**
P. angolensis LC (2018)	*Pterocarpus bussei* Harms (1904), *Pterocarpus dekindtianus* Harms (1902)	English: African bloodwood, mukwa, kiaat, muninga Portuguese: Ambila, umbila, njila sonde Swahili: Mninga, mdamudamu, mtumbati
P. brenanii LC (2020)	/	English: Eared bloodwood
P. erinaceus EN (2017)	*Pterocarpus adansonii* DC. (1825)	English: African rosewood, Senegal rosewood, African barwood, African teak, African kino tree, madobia; French: Vène, ven, palissandre du Sénégal, kino de Gambie, santal rouge d'Afrique, hérissé; Portuguese: Pau sangue
P. lucens LC (2010)	*Pterocarpus lucens* Lepr. ex Guill. & Perr. subsp. lucens (1832) *Pterocarpus abyssinicus* Hochst. ex A. Rich.	English: small-leaved bloodwood, barwood Portuguese: Muvilu

([1]) Assessment done in 2015, https://www.iucnredlist.org/species/202766/2751978

([2]) For more synonyms, consult https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:516454-1#synonyms

	Pterocarpus simplicifolius Baker (1871)	
P. mildbraedii VU (1998)	*Pterocarpus mildbraedii subsp. usambarensis (Verdc.) Polhill* *Pterocarpus usambarensis Verdc. (1954)*	French: Padouk blanc Swahili: Mkula
P. officinalis NT (2018)	/	/
P. osun LC (2020)	/	/
P. rotundifolius LC (2018)	*Dalbergia rotundifolia Sond. (1850)* *Pterocarpus buchananii Schinz (1891)* *Pterocarpus claessensii De Wild. (1924)* *Pterocarpus homblei De Wild. (1914)* *Pterocarpus melliferus Welw. ex Baker (1871)* *Pterocarpus mutondo De Wild. (1902)* *Pterocarpus rotundifolius (Sond.) Druce subsp. rotundifolius* *Pterocarpus sericeus Benth. (1932)*	English: round-leaved bloodwood, round-leaved teak
P. santalinoides LC (2018)	*Pterocarpus amazonicus Huber* *Pterocarpus grandis Cowan* *Pterocarpus michelii Britton* *Pterocarpus esculentus Schumach. & Thonn. (1827)*	/
P. soyauxii -	*Pterocarpus casteelsii* var. ealaensis Hauman *Pterocarpus casteelsii* De Wild. (1924)	English: African padauk, African padouk, barwood. African coral wood; French: Padouk d'Afrique, pudauk d'Afrique, bois corail; Portuguese: Ndimbu, nkula
P. tessmannii NT (2020)	/	English: African padauk, African padouk,; French: Padouk d'Afrique, padauk d'Afrique
P. tinctorius LC (2017)	*Pterocarpus tinctorius* var. *chrysothrix* (Taub.) Hauman *Pterocarpus chrysothrix* Taub. (1895) *Pterocarpus albopubescens* Hauman (1954) *Pterocarpus hockii* De Wild. (1913) *Pterocarpus tinctorius* var. *odoratus* (De Wild.) Hauman *Pterocarpus odoratus* De Wild. (1902) *Pterocarpus velutinus* De Wild. (1914) *Pterocarpus cabrae* De Wild. *Pterocarpus delevoyi* De Wild. (1924) *Pterocarpus kaessneri* Harms (1915) *Pterocarpus holtzii* Harms (1915) *Pterocarpus megalocarpus* Harms (1915) *Pterocarpus stolzii* Harms (1915) *Pterocarpus zimmermannii* Harms (1915)	Mukula (Democratic Republic of the Congo([3]), Zambia), Nkula/Mkula (Zambia, Malawi), Mlombwa (Malawi), Mkurungu or Mkulungu (Kitongwe, United Republic of Tanzania([4])), Tacula (Po), Mninga maji (Sw), bloodwood. Sometimes called Padouk d'Afrique or Padauk d´Afrique (DRC), although this name is more commonly used for ***P. soyauxii.*** Sometimes called Mukwa, although this name is more commonly used for ***P. angolensis***

LC: Least Concern - NT: Near Threatened - VU: Vulnerable - EN: Endangered

1.7 Code numbers: /

2. Overview

It is proposed that all African species of the tree genus *Pterocarpus* meet the criteria for listing in CITES Appendix II in compliance with Article II, paragraph 2(a) of the Convention and in compliance with Annex 2 a, Criteria A and B, and Annex 2 b Criterion A of Resolution Conf. 9.24 (Rev. CoP17).

Africa has 12 *Pterocarpus* species and 6 subspecies (CJBG, 2021), with at least five that produce rosewood or other precious hardwoods, such as ***P. angolensis, P. soyauxii*** and ***P. tinctorius***. Several species are

([3]) Hereafter, DRC
([4]) Hereafter, Tanzania

traded under the same common name “Padouk” (*P. mildbraedii, P. soyauxii, P. tessmanii and P. tinctorius).* Currently two African *Pterocarpus* species (***P. erinaceus*** and ***P. tinctorius***) are listed in CITES Appendix II.

Between 2010 and 2014, People's Republic of China[5] registered a 700% increase in the import of African rosewood logs and sawnwood (Treanor, 2015). Rosewood is a commercial term encompassing hardwood species harvested to produce Chinese traditional Hongmu furniture. Trade in rosewood has been characterized by a shifting supply between different countries and species (Winfield et al., 2016). African rosewood imports comprised nearly half of these rosewood imports (Treanor, 2015). High-value rosewood was traditionally produced from *Dalbergia* species, but the overwhelming demand from China and the increasing rarity of Asia’s Hongmu species combined with stricter conservation measures and enforcement of logging regulations forced the trade to progressively turn towards similar alternative species and in particular, the *Pterocarpus* genus.

“Padouk” was ranked as 7th on a list of the most commercialized species in the Congo Basin in 2016 (ATIBT, 2017), and information available indicates that international trade has reduced some African *Pterocarpus* populations significantly. For example, the extensive use of ***P. angolensis*** on national and international timber markets has caused it to become depleted from some areas, leading to a decline in mature individuals and poor seedling recruitment. There is evidence that the species is being harvested at a rate that could reach “economic extinction” in some range States. It is classified as nationally vulnerable in Malawi, and commercially vulnerable in Namibia and Zimbabwe.

For wide ranging and highly exploited species such as ***P. erinaceus*** (Appendix II), ***P. angolensis*** and ***P. lucens*** (non-CITES), a significant number of range countries have conducted size class distribution and other growth rate qualifying studies, particularly over the past 15 years. Almost all of these surveys have shown a size class distribution typical of an unstable population, which is a key indicator of unsustainable harvesting practices. This is consistent with studies across both the rosewood genera of *Pterocarpus* and *Dalbergia*, which show (where data exist), declining or unstable population dynamics.

Generally, information is sparse for many *Pterocarpus* species regarding current range and distribution. Moreover, there does not appear to be many taxonomic references or studies for *Pterocarpus* in Africa. The African *Pterocarpus* species were assessed by the IUCN Red List mostly within the last 5 years (*cf*. table at § 1.6), with categorisations ranging from “Least Concern” (e.g., ***P. brenanii***) to “Endangered A3d” (e.g., ***P. erinaceus***).

Besides the high and increasing volumes of legal and illegal international trade (see e.g., Kansanga et al., 2021 and Xuan et al., 2020 for exporting and importing States’ perspectives), it is clear that *Pterocarpus* species in Africa face a variety of threats including deforestation, forest degradation, land-use change, climate change, induced aridification and encroachment of peri-urbanisation.

While the majority of range States in Africa do appear to have legislation in place requiring robust forest management, this has not translated into adequate forestry management on the ground; all range States have lost substantial levels of forest cover over the last 15-25 years. In the last decade, international efforts to regulate rosewood species trade led to the inclusion of two African *Pterocarpus* species in Appendix II.

It is established, or at least possible to deduce, that regulation of trade in the African populations of *Pterocarpus* species is required to ensure that the harvest of their specimens from the wild is not reducing those populations to a level at which their survival might be threatened. Since some of the *Pterocarpus* species are not clearly distinguishable, and there is evidence that two currently CITES-listed *Pterocarpus* species might be traded under the label of non-CITES listed species (see e.g., Kansanga et al., 2021), it is also proposed that the entire genus is included under Appendix II under Criterion A of Annex 2 b of Resolution Con. 9.24 (Rev. CoP17), or the lookalike provisions.

3. Species characteristics

3.1 Distribution

Pterocarpus species are widely distributed across Africa (Table 1 and Fig. 1 in Annex 1).

[5] Hereafter, China

3.2 Habitat

African *Pterocarpus* are found in a variety of habitat types, as summarised in Table 2.

Table 2. African *Pterocarpus* species habitat types.

Species	Habitat type
P. angolensis	Grows widely across the Miombo woodlands (mostly classifies as deciduous). Miombo woodland habitat covers 2.7 million km² from Tanzania/DRC to northern regions of South Africa, and from Angola to Mozambique (Munyanziza & Oldeman, 1995; Schwartz et al., 2002). It is adapted to red loams and deep sandy soil and can be found at an elevation up to 1650 m (Hines & Echman, 1993).
P. brenanii	Found in open mopane and miombo woodland; grassland; thickets; also in association with *Acacia* spp., *Combretum* spp., *Kirkia* spp., *Pterocarpus angolensis*, *Sterculia quinqueloba*; on shallow soil on dry limestone hills and ridges; Karroo sandstone ridges; 300-700 m alt. (CJBG, 2021).
P. erinaceus	Found across semi-arid and sub-humid Africa, mainly in open forest and wood savannahs that have moderate to long dry seasons up to 9 months. It can tolerate a range of climatic and soil conditions (Duvall, 2008; Coleman, 2014; Senegal, 2017) at an altitude up to 600 m (Senegal, 2017).
P. lucens	Found across semi-arid regions in tropical Africa, in wooded grasslands, savannahs, low altitude woodlands and on rocky hills (Groom, 2012). This species prefers deep sandy soils and lateritic, between an elevation of 550 to 1520 m (Groom, 2012).
P. mildbraedii	Found in evergreen (dry) or semi-deciduous rainforests, riverine forest; cocoa farms (Ghana); 30-1270 m alt. (300-600 m in Africa) (CJBG, 2021).
P. officinalis	No information available.
P. osun	Found in mixed deciduous wet forest; 90-150 m alt. (CJBG, 2021).
P. rotundifolius	Found in Brachystegia woodland, open forest, wooded savanna; on (stony) hills and grassy slopes, plateaux, ridges, in alluvial valleys; fringing, forest; often on red clay loam or sandy loam soil; 60-1550 m alt.; common (CJBG, 2021).
P. santalinoides	Found in mixed deciduous forest and flooded savanna on lake and lagoon sides, riverbanks (CJBG, 2021).
P. soyauxii	Found in evergreen or deciduous forests on firm-ground, rainforest (CJBG, 2021). This species prefers deep and well-drained soil and grows at an elevation of up to 500 m.
P. tessmannii	Found in semi-evergreen forest dominated by *Scorodophleus zenkeri* and *Plagiostyles africana*; evergreen rainforest at foot of slopes with *Gilbertiodendron dewevrei*; riverine forest; often in depressions and near to wetter soils (CJBG, 2021).
P. tinctorius	Found in a range of habitats, including wooded savanna, dry evergreen thickets, riparian moist forests, and miombo woodland where it can form part of Acacia and Brachystegia woodland associations (Munishi et al., 2011; Barstow, 2018). The species thrives in poor and rocky soils, and is found between an altitude of approximately 50 and 1800 m above sea level (Phiri et al., 2015; Barstow, 2018)

3.3 Biological characteristics

Pterocarpus species, like most legumes, form symbiotic associations with certain soil bacteria to fix atmospheric nitrogen. Trees possess bisexual flowers, pollinated by insects, and seeds are wind dispersed. It is reported that some species can be propagated via seeds, cuttings or coppice (Phiri et al., 2015). Species are mostly slow-growing and could take over 90 years to reach a harvestable size (Burkhill, 1995; Therrell et al., 2002). Species-specific life-history characteristics are summarised in Table 3.

Table 3. Species-specific life-history characteristics.

Scientific name	Reproduction, growth, development and other biological factors
P. angolensis	Large tree species, growing to over 20 m in height, light demanding (Hines & Eckman, 1993) and fire resistant (Chidumayo & Gumbo, 2010). Fruiting starts at 20 years of age. However, it is estimated that only 50% of *Pterocarpus* fruits contain seeds and the rest

	are barren (Hines & Eckman, 1993). The species is pollinated by insects and its fruits are wind dispersed. Trees can live more than 100 years under ideal growth conditions (Takawira-Nyenya, 2005) and in some sites this is the time taken to reach a harvestable diameter (Therrell et al., 2002).
P. brenanii	No information available.
P. erinaceus	Flowering season December-February (Senegal, 2017). The regeneration potential has been stated as being "often abundant" in the CoP17 proposal, based on Duvall (2008). Growth rates available in several countries of the distribution range.
P. lucens	No growth rate available. Flowering only lasts a few days (Sacande & Sanon, 2007). Wind dispersed fruits remain on the tree for a long time after maturity. Pollinated by bees that are attracted to yellow flowers. Wind dispersal occurs during the rainy season. (Kew Botanical Gardens, 2016)
P. mildbraedii	Grows fast and coppices well. Its root system is superficial: most roots are in the top 30 cm of the soil. It has an intermittent pattern of leaf flushes. Flushes appear in the dry season when other leafy vegetables are scarce. (Bosch, 2004) Variable in size of flowers (smaller in East Africa) (CJBG, 2021).
P. officinalis	No information available.
P. osun	In Nigeria trees flower in August–November when they are in full leaf. Bees commonly visit the flowers and probably act as pollinators (Lemmens, 2008).
P. rotundifolius	Seedlings grow fairly fast and may reach 1 m tall after one year. In southern Africa trees are often completely leafless from June to October. They usually flower in the rainy season, but during hot and dry weather the flower buds remain closed. Flowering is often very profuse. The strongly fragrant flowers last 2–3 days and are commonly visited by bees, which probably act as pollinators. Fruits take about 3 months to mature. They are dispersed by wind. (Lemmens, 2008)
P. santalinoides	Fast growing tree. In trials in southern Cameroon the fastest growing trees reached a height of 6.4 m and a diameter of 10.3 cm 20 months after planting. Trees flower towards the end of the dry season. Bees commonly visit the flowers and probably act as pollinators. Fruits mature 2–3 months after flowering in the rainy season. (Lemmens, 2008)
P. soyauxii	Seeds are flat, circular (diameter about 1.5 - 2 cm) and papery (0.1 g) (Onguene et al., 2011) and are wind dispersed (Bongjoh & Nsangou, 2001; Medjibe et al., 2011) and animal dispersed (Jansen, 2005). Average wood density between 675-815 kg/m^3 at 12% moisture (upper and lower limits of 650 and 900).
P. tessmannii	No information available.
P. tinctorius	The tree can be evergreen or deciduous (Storrs 1995; Lemmens 2008). In DRC – flowering season is from March to May (Lemmens, 2008). At 12% moisture content the wood density is between 450 (Congo forest) – 900 (Burundi savannah) kg/m³.

3.4 Morphological characteristics

The main morphological characteristics are summarised in Annex 2 (Table 4).

3.5 Role of the species in its ecosystem

Pterocarpus species are nitrogen-fixing species that augment the availability of soil nitrogen for other plants in the ecosystem. As such, these species can play a role in soil fertility in degraded habitats (Sylla et al., 2002). While little formal information exists documenting the ecosystem services of those species, they can be an important pollen source for insects, and primates including colobus monkeys and chimpanzees commonly consume their leaves (Lemmens, 2008). Almost every part of the tree can be valued for medicinal purposes (Saslis-Lagoudakis et al., 2011).

4. Status and trends

4.1 Habitat trends (see also section 4.5)

It appears to be generally accepted that the ranges and distributions of many *Pterocarpus* species have become reduced and fragmented due to heavy deforestation and targeting for selective felling throughout much of their historical ranges. However, there has been little scientific research to understand the current distribution and ranges of most of these species in Africa. Most of the information available for African species is from IUCN Red List assessments. In other parts of Africa, particularly West Africa, logging intensity has increased in recent years as well. The use of GIS distribution

modelling shows that much of the habitat included for most of these species is already degraded. The underlying GIS layers for “intact" forests are not well developed for Africa, and we were not able to accurately map the current predicted habitat in intact forest. Only ***P. soyauxii*** was in a region with sufficient information (Mousset Moumbolou, 2019; Kahindo, 2020).

In 2000, 87% of the DRC had 30% tree canopy cover. From 2001-2014, 7 977 009 ha of this was lost (Global Forest Watch). Annual forest loss rate of 0.2% at 311 400 ha per year from 1990-2015 (FAO, 2016); however, in 2014 alone over 1.1 million ha was lost (Global Forest Watch). While a number of protected areas do exist across the range of those species, these are not always well-protected in practice and can be subject to several threats such as fire, encroachment and illegal logging.

4.2 Population size

The total population of the different *Pterocarpus* species are not known, nor is quantitative data available on the total area of relevant habitat or average density of stems per hectare (Groom, 2012; Barstow, 2018; Barstow & Timberlake, 2018). Only ***P. soyauxii*** populations are quite well described thanks to large scale inventories carried out in central African countries (Fig. 2).

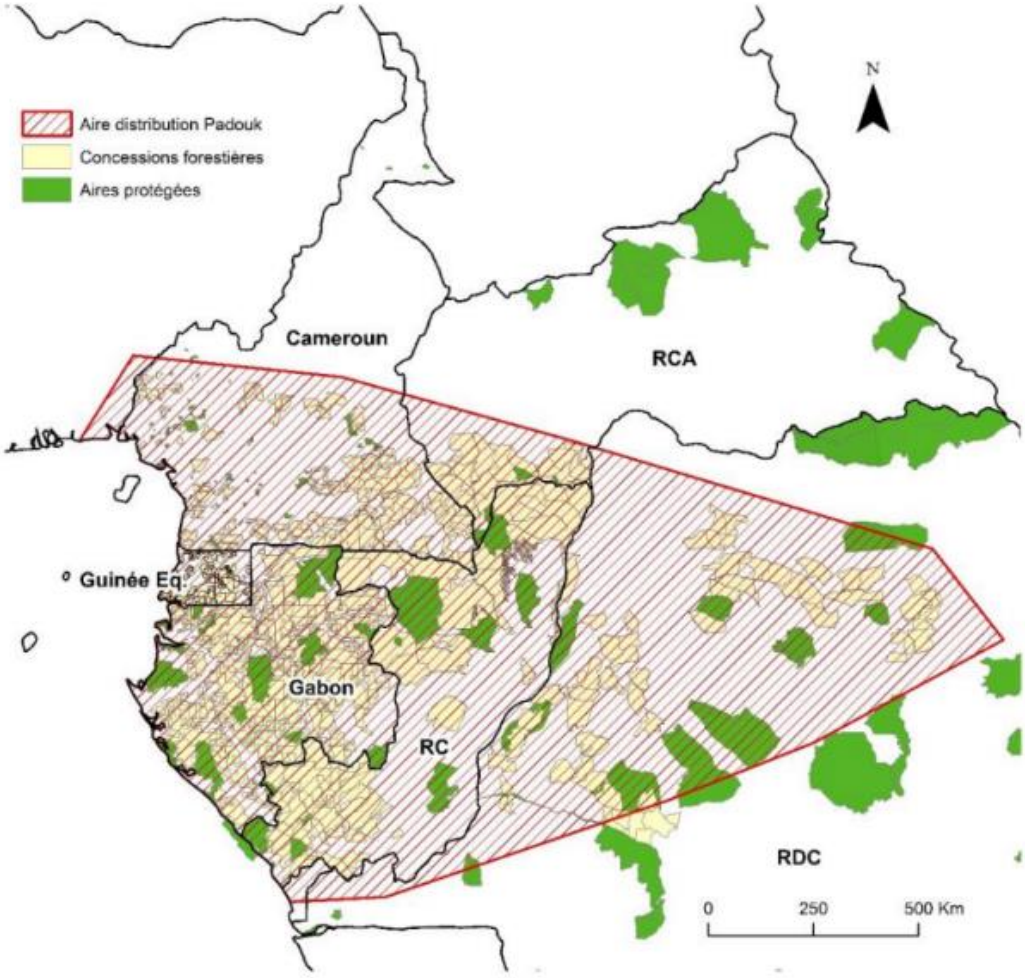

Fig. 2- Geographical extent of ***P. soyauxii*** populations in Central African rainforests (Mousset Moumbolou, 2019).

P. osun has a small population size in a limited area of distribution where it seems to occur scattered, and consequently may be easily liable to genetic erosion (Lemmens, 2008).

4.3 Population structure

Little information is available on the population structure of African *Pterocarpus* species, except for ***P. soyauxii*** (see hereafter). However, in general, given that the largest specimens of harvested species are disproportionately targeted for timber production, it can be expected that the recent boom in illegal and unsustainable harvesting has led to a skewing of the population structure towards immature specimens.

For wide ranging and highly exploited species such as ***P. erinaceus***, ***P. angolensis*** and ***P. lucens,*** range countries have conducted size class distribution and other growth rate qualifying studies,

particularly over the past 15 years. Almost every one of these surveys has shown a size class distribution typical of an unstable population, which is a key indicator of unsustainable harvesting practices. Many of these studies also cited poor recruitment into the populations, both within and outside protected areas. It is often thought that protected areas can act as source meta/populations for species genetics where larger, more mature trees contribute to survival of the population. However, the recruitment failure noted in a number of national parks for several rosewood producing species is of serious concern to the long-term viability of many populations.

In Zambia, the minimum cutting diameter of ***P. tinctorius*** was decreased to 30 cm in 2015 in response to commercial pressures affecting population structure (Cerutti et al., 2018). Rosewoods as a group exhibit poor recruitment, even in protected areas where large numbers of mature trees exist (Augustino & Hall, 2008; Phiri et al., 2015). While some local loggers in Zambia claimed to observe large numbers of seedlings in areas where they worked (Cerutti et al., 2018), this may mean little in terms of survivorship. Other *Pterocarpus* species in this region demonstrate troublingly low regeneration patterns (Mojeremane & Lumbile, 2016).

Conversely, Mousset Moumbolou (2019) stated that 88% of the studied population structures for ***P. soyauxii*** were considered very good (no major regeneration problem was noticed throughout its natural distribution area). This species occurs in many forests where logging companies operate, meaning that pre-harvest inventories data are available and consequently population structures are incorporated into the management plans.

4.4 Population trends

At the genus level, 90% of the *Pterocarpus* and *Dalbergia* (rosewood) populations for which studies exist, show declining or unstable population trends (Senegal, 2016).

P. angolensis is currently experiencing population decline in some parts of its range. Some subpopulations are in decline due to over-exploitation of commercially viable trees for timber. There is a decline in mature individuals and in some areas small trees are also being opportunistically logged (Schwartz et al., 2002; Shackleton, 2002; Therrell et al., 2002; Graz, 2004; Caro et al., 2005; Mojeremane & Lumbile, 2016). In areas of timber harvest, the recruitment of seedlings can be poor (Schwartz et al., 2002, Mojeremane & Lumbile, 2016). Commercially utilisable stands of ***P. angolensis*** are now scarce across much of its range. The extraction of ***P. angolensis*** for timber has created a truncated diameter-size class profile in some subpopulations. In these sites there are very few trees exceeding the minimum harvestable diameter (MHD), which varies from country to country. Therefore, in Tanzania where the MHD is 60 cm there are few trees larger than this (Caro et al., 2005) and in South Africa and Namibia trees exceeding 35 to 40 cm Diameter at Breast Height (DBH) (Shackleton, 2002; Graz, 2004, De Cauwer, 2015) are increasingly uncommon as this is the MHD here. This is reducing the number of seed bearing individuals (Schwartz et al., 2002; Therrell et al., 2002; Caro et al., 2005). It can take a tree from 85 to 100 years to reach a minimum harvestable diameter (Therrell et al., 2002). In Msaginia Forest Reserve, Tanzania, where ***P. angolensis*** is logged in a 15ha survey site, there was an estimated 3.67 mature individuals/ha (Schwartz et al., 2002). This represented a decline from an estimated density of 11.4 trees/ha prior to logging. The study also predicted that over the next 100 years only 2.1 trees/ha would reach MHD and population density would decline to 0.3 trees/ha, leading to economic extinction of the species (Schwartz et al., 2002). This represents an observed decline of 67.6% in the commercially exploitable trees in the survey site and a potential decline of 97.37% of commercially exploitable trees within the region.

The decline estimates given above are not representative of the total decline in population size but instead describe the decline in the commercially valuable part of the ***P. angolensis*** population. Pressure on the species is variable but concentrated on trees that produce good quality planks and timber with straight trunks. This means a population of non-commercially valuable trees will always be retained. It is a secondary species that can grow in fallows or clearings and can be common in these areas. The ability for the species to persist in a suffrutex stage means regeneration in ideal conditions can be rapid. Therefore, across its range the population shows uneven population density and overall populations size is considered to be large, but in decline.

4.5 Geographic trends

Several African range States of *Pterocarpus* taxa have experienced significant deforestation in recent years (FAO, 2020; Vancutsem et al., 2021). According to the Global Forest Resources Assessment (FRA) for 2020, the ten countries with the highest average annual net loss of forest area 2010-2020 included Angola (annual net forest change of -0.8%), DRC (-0.83%), Mozambique (-0.56%) and Tanzania (-0.88%) (FAO, 2020), all range States of at least one *Pterocarpus* species. In 2018 approximately 4% of total global wood removals (that is, removal of roundwood and fuelwood from

forests, other wooded land and areas of trees outside forests) were split equally between DRC and Nigeria (FAO, 2020). Additionally, a long-term assessment of reduction in undisturbed tropical moist forest (that is, forest unaffected by deforestation or degradation) noted that the African countries with the greatest reduction 1990-2019 included Côte d'Ivoire (a reduction of 81.5%), Ghana (-70.8%), Angola (-67%), Nigeria (46.7%) and Liberia (36%) (Vancutsem et al., 2021). Cameroon (-12.7%) and Gabon (-2.9%) had comparatively lower levels of reduction; however, the study found that these two countries, alongside DRC, contain the largest areas of forest converted into tree plantations within Africa, at 0.07 million ha, 0.04 million ha, and 0.08 million ha respectively (Vancutsem et al., 2021).

5. Threats

Africa is a vast continent with an enormous range of habitats, therefore the specific threats facing those habitats are wide and varied. Over-harvesting for both the local domestic and international markets is prevalent in all range countries, with exponential increases in international trade of precious woods observed in the last 5 years (discussed further in the following sections). Overexploitation for timber in general has caused many local populations in Africa to become diminished. This exploitation endangers those large trees that are of harvestable size (Takawira-Nyenya, 2005). A study showed that if current rate of timber extraction (5.6% per annum) continued in Northern Province, South Africa, all exploitable timber would be gone within the next 30 years (Desmet et al., 1996). Big trees are now rarely seen and there are not thought to be enough small trees to replace these, immature trees are even being harvested to bridge the gap in some (but not all) places (Geldenhuys 2013). The reduction in large trees reduces the amount of seed being produced (Shackleton, 2002) but the impact this has on the potential viability of the tree in the future is not currently known. Other threats that are facing the region include wide-scale deforestation and forest conversion for agriculture and urbanisation, and large parts of Africa are also suffering from aridification as a result of macro and micro-level climate change and overgrazing by livestock, resulting in many countries adopting specific policies to deal with aridification. Changing fire-regimes are also affecting the recruitment potential of many woodland species. The wide-ranging species and broader habitat level threats exacerbate the threats faced from selective felling trees of reproductive size, and wholesale deforestation (FAO, 2001). It is essential to be able to understand the true status of populations and the actual level of threats faced by these species, and therefore their ability to recover from disturbance events; whether it be selective clearing, deforestation, fire, disease outbreaks or droughts.

6. Utilization and trade

6.1 National utilization

Pterocarpus species, like many members of the Fabaceae family, are a favoured shade tree and its foliage is a common grazing fodder for domestic wildlife. The flowers of some species are important for honey production in Congo (Kuo, 2017) and Zambia (Phiri et al., 2015). The reddish sap is used for fabric dyes and body colouring. Those species have a number of valuable antibacterial and medicinal qualities (Burkhill, 1995; Augustino et al., 2011). While historically, communities used those species for firewood, woodcarving and charcoal (Shackleton, 2002; Phiri et al., 2015), current prices and export-oriented trade patterns are likely to have reduced these local uses.

6.2 Legal trade

Separating legal trade from illegal trade is not a simple task given the spotty data, irregular enforcement and lack of clarity around national regulations in some countries. Official Chinese data shows skyrocketing imports of rosewood species from African nations – up 700% since 2010 (Phiri et al., 2015). Chinese buyers in Zambia reported to CIFOR interviewers that an early boom in ***P. tinctorius*** (beginning in 2010) was actually due to its being used as a false rosewood: shipments were sent through intermediary traders and nations to Vietnam and the Philippines, where it was mixed with *P. santalinus* (red sandalwood) and sold onto the Chinese furniture market. However, over time the species has become recognized in its own right and direct shipments to China are more common (Cerutti et al., 2018).

The extensive use of ***P. angolensis*** wood on national and international markets has caused it to become depleted from some areas. Schwartz et al. (2002) stated that the species was being harvested at a rate in Tanzania that could reach "economic extinction". The number of large harvestable trees was also reported to be declining rapidly due to harvest outside of protected areas (Caro et al., 2005). There is scarce trade data available for this species, it is reported that 5000 m³/yr are exported from Zambia. The biggest importers of the timber are Thailand and China.

P. soyauxii was among the first timber species to be exported from Gabon, one of the leaders in this species exportations within the Congo Basin (White & Abernethy, 1996). Between 2000 and 2003, Gabon exported annually 120 000 m³ of ***P. soyauxii* l**ogs (Jansen, 2005). However, since May 2010, the export of logs is now banned in Gabon to promote wood processing in the country (Makanga, 2011).

Moreover, the ATIBT 2016 report ranks the Padouk at 7th place on the list of the most commercialized species in the Congo Basin (ATIBT, 2017).

6.3 Parts and derivatives in trade

The products in international trade are primarily round and rough squared logs and rough sawn timber. The majority of the trade is destined for China, although Vietnam also imports significant volumes. In importing country markets, the main usage is for decorative furniture consumed in China (Wenbin & Xiufang, 2013).

P. soyauxii is an exception: the products in international trade are mainly logs and industrially processed wood (sawn wood). ***P. soyauxii*** specimens are traded over the world.

6.4 Illegal trade

Pterocarpus species have begun to be targeted in order to meet the increasing demand for rosewood and other precious woods on the international market. As with the *Dalbergia* species, this has been well documented over the past 5 years, with a plethora of NGO reports, government reports and scientific papers documenting the increasing level of logging and trade emanating from the African continent, and particularly from West African nations in the wake of logging bans in other parts of the world (Lawson, 2014). What is apparent is that in Africa, the pattern of exports to China and the rest of the world is subject to very rapid change. Sun (2014) reported that prior to 2011, Nigeria only exported 0.1 million m³ RWE ("Round Wood Equivalent") and that "virtually none" was exported to China. However, only 4 years later Nigeria was reported in Lawson (2015) as exporting roughly 1/3 of the approximately 1 million m³ of logs from Africa to China. This is further supported by Treanor (2015), who indicated that Chinese imports of rosewood logs from Nigeria ranked the country second only to Lao People's Democratic Republic in 2014, although they only ranked 15th for sawn wood. Either traders do not know what species they are trading, which is highly unlikely, or there this is a deliberate measure to misreport species being exported to by-pass species-specific log bans for species such as ***P. erinaceus***. For instance, exports of specimens of ***P. erinaceus*** from the Gambia continued despite the log export ban promulgated in November 2012 (lifted in June 2014). According to Treanor (2015), it is estimated that "95 percent of Gambian rosewood exported to China is in fact sourced from Senegal" (see also a dedicated BBC documentary, as well as RST document PC 25 Doc. 15.5). Even if "logging and/or export bans are also in place in Benin, Burkina Faso, Côte d'Ivoire, Guinea-Bissau, Mali, Nigeria, Togo, and elsewhere", those bans are "consistently violated by smuggling log shipments or transforming raw logs into plywood, sawnwood, and other forms for easier cross-border transport" (Treanor, 2015). In Ghana, "while the ban was operative, exploitation has rather increased by 129%, and incidence of illegal trade has shot up by 120% in the CITES-designated period (2016–2018) compared with pre-CITES period (2010–2015)" (Dumenu, 2019; see also Dumenu and Bandoh, 2016 for detailed serious concerns about the export ban effectiveness). While in Nigeria, Abdul-Rahaman et al. (2016) mention that illegal logging of ***P. erinaceus*** is a major environmental problem, leading to large scale destruction of farmlands, as well as high rates of corruption. Regarding Austral Africa, Cerutti et al. (2018) thoroughly documented the series of short-lived export bans successively promulgated by Zambia, as well as their relative inefficiency to limit mukula illegal trade.

Illegal mukula export trade is fundamentally a regional issue, in part because the most significant extraction appears to be occurring in the landlocked forests of southeastern DRC (Katanga Plateau), Zambia and northeast Angola. Trucking routes are documented towards ports on both the Atlantic (Angola, Namibia, even South Africa [Yi, 2017]) and Pacific (Tanzania, Mozambique), though the key-routes change as range states have attempted to control trade in this and other precious wood species through log export bans.

6.5 Actual or potential trade impacts

Evidence from various countries suggests populations in sharp decline across *Pterocarpus* species native range due to the surge in international trade since 2010. If this trend is unabated, the impact will be not only on the ecosystems in which this unsustainable logging occurs but also on the local communities that rely on those species for livestock fodder, honey production, firewood or other traditional uses.

Local communities are also involved in the trade as they supply the majority of people engaged in Mukula trees harvest in Zambia (artisanal informal logging sector). Those low income populations are eventually the most affected by the removal of trees and the consequent damages to the forest ecosystem they depend on([6]) (Cerutti et al., 2018).

([6]) https://www.youtube.com/watch?v=UHuOJZvZHbg

7. Legal instruments

7.1 National

While the majority of range States in Africa do appear to have legislation in place requiring robust management of forests, this has not translated into adequate forestry management on the ground; all range States have lost substantial levels of forest cover over the last 15-25 years. In some countries, this rate of deforestation has rapidly increased in the last few years, which is alarming.

Range State governments have struggled to improve governance over timber resources (see e.g., PC 25 Doc. 15.5). For example, Zambia has imposed and lifted moratoriums on harvest and/or export of mukula three times since 2014, and an export ban on all logs is currently in place, although the Minister and Director of Forests may still issue export permits for timber if "deemed necessary in the interest of the Republic". Malawi banned export of all roundwood in 2008 but has faced many legal battles to impose the ban for ***P. tinctorius*** which is apparently transported to China originating from neighbouring countries (Cerutti et al., 2018). Chinese customs data, meanwhile, shows log imports from Zambia going from 35 000 m^3 in 2015, to 65 000 m^3 in just the first half of 2017; CIFOR research indicates that "the vast majority" of these logs are ***P. tinctorius***. EIA (2019) reported 50 000 and 100 000 m^3 exported from Zambia in 2015 and 2017, respectively.

Perhaps greater focus should be placed on seeking robust national and transnational governance of the rosewood resources, properly resourcing government departments to perform the tasks within their legislation and management plans, and removing incentives for corruption. There is little doubt that hardwood species in the genera *Pterocarpus* are over-exploited, and under current conditions unlikely to be managed in a way that ensures their long-term survival.

7.2 International

P. erinaceus and ***P. tinctorius*** are both listed in CITES Appendix II. However, for the other *Pterocarpus* species, there are no international controls specifically in place. Imports to the United States of America, European Union and Australia are subject to national legislation in those jurisdictions prohibiting the import and/or sale of wood which was illegally sourced in the country of origin (Hoare, 2015). However, little or no African rosewood is traded to these countries. Chinese companies may choose to operate under Voluntary Guidelines called the Guide on Sustainable Overseas Forest Management and Utilization by Chinese Enterprises. Several range states of *Pterocarpus* species are members of the South African Development Community, which has had a Protocol on Forestry since 2002 that "aims to promote the development, conservation, sustainable management and utilisation of all types of forest and trees; trade in forest products and achieve effective protection of the environment, and safeguard the interests of both the present and future generations" (SADC, 2018). Member states are required, in theory, to conduct and update national forest assessments, including data on uses of forest products, markets and commercial and industrial issues, to collaborate on a regional database and a market information system, and to exchange information concerning forest management and trade([7]).

P. erinaceus (no annotation) and ***P. tinctorius*** (annotation #6 which designates Logs, sawn wood, veneer sheets and plywood) are both listed on CITES Appendix II. For *P. tinctorius*, the change in annotation would mean that transformed wood would also come under CITES controls. A similar change for other species is already accepted, notably for *Pericopsis elata* to avoid timber with a very modest transformation falling outside the scope of CITES. *P. erinaceus* is currently listed without an annotation and adding an annotation now may seem to decrease the level of protection for this species. An analysis of trade data in this species for the years 2016-2020 however shows that virtually all trade in this species was reported by exporters in terms that are covered under #17. This illustrates that #17 would be relevant for monitoring direct exports of wood and timber commodities of this species without diminishing its protection under CITES. Moreover, it would be easier for enforcement authorities if all African *Pterocarpus* species would be covered by the same annotation.

8. Species management

8.1 Management measures

There is in fact a considerable amount of information available on these species in Africa that can be utilised to develop sustainable and precautionary management measures in any range State that have stable stocks of these species. However, in the absence of sustainable management practices and adequate enforcement of current laws, these species can be extirpated from regions in a very short timeframe.

([7]) See e.g., China's revision of the forest law, which entered into force on 1st of July 2020.

Management measures are defined by each range State's forest legislation, which define aspects including minimum cutting diameters and areas off-limits from harvest activity such as parks and other protected areas, riparian corridors, steep slopes etc. In practice these measures are unevenly enforced. Cerutti et al. (2018) corroborate in Zambia that official monitoring of harvest activities appears to be non-existent.

8.2 Population monitoring

No information on specific population monitoring schemes was found.

8.3 Control measures

See sections 7.1 and 7.2 above.

8.4 Captive breeding and artificial propagation

Pterocarpus species can be propagated by either seed or cuttings, and wildlings can also be collected for planting (Lemmens, 2008). However, there is little to no information available regarding artificial propagation for commercial purposes. At present, almost all harvest of those slow-growing species appears to be from wild sources (see e.g., page 12 in PC25 Doc. 15.5 A1 for Nigeria).

8.5 Habitat conservation

There exist protected areas within the *Pterocarpus* species ranges, although the degree of protection in practice varies by country.

8.6 Safeguards

See sections 7.1 and 7.2 above.

9. Information on similar species

Misidentification issues can occur at two successive stages for timber species: (*i*) When trees are standing. Confusion in the identification of individuals from morphologically similar species deeply impacts the reliability of forest inventory data, thus consequently important management parameters like the population structure, density, distribution range, etc.; and (*ii*) When dealing with wood (logs, sawnwood, etc.). This identification deficiency directly impacts stockpile management, trade monitoring, the tackling of organized crime and corruption (Lavorgna et al., 2018), etc. Two examples provided by Treanor (2015) illustrate how the misuse of two non-CITES African timber species is detrimental to the sustainable trade of other listed rosewood *Pterocarpus* and *Dalbergia* species:
"The 2013 arrest in Guangzhou of 23 individuals smuggling over 14,000 tons (valued at CNY 1.05 billion [USD 163 million]) of rosewood listed as ***Pterocarpus angolensis***, but containing unreported *P. santalinus*, *D. cochinchinensis*, *D. retusa*, and others" (Guangzhou Customs District, 2014); "The February and May 2014 arrest in Qingdao of 10 individuals smuggling over 1,700 tons (valued at CNY 2.2 billion [USD 341 million]) of *P. santalinus* mislabeled as *Dalbergia latifolia* and ***Pterocarpus soyauxii***" (China Customs, 2014a). Price et al. (2021) showed that timber identification may be achieved for some species using complementary analysis of DART-TOFMS, microscopic anatomy and fluorescence spectrometry, which is hardly or not within reach of customs officers.

Table 5 in Annex 3 provides a summary of misidentification risks between some *Pterocarpus* species.

For all these reasons and those given in Annex 3, it is important that all populations of taxa of *Pterocarpus* occurring in Africa are included in Appendix II. In order to support and ease the task of custom and other law enforcement officers, a unique annotation #17 should be considered, allowing to prevent possible bypass of the Convention as described in COP18 PROP. 53. The annotation applicable to ***P. erinaceus*** and ***P. tinctorius*** should be amended to address this potential issue.

10. Consultations

A consultation was distributed by the European Union to all range States in December 2021 (see Annex 4).

11. Additional remarks

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12. References

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Annex 1

Table 1. *Pterocarpus* range States.

Species	Range countries
P. angolensis	Angola, Botswana, Congo, DRC, Eswatini, Malawi, Mozambique, Namibia, South Africa, Tanzania, Zambia, Zimbabwe
P. brenanii	Malawi, Mozambique, Zimbabwe, Zambia (CJBG, 2021)
P. erinaceus	Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Sierra Leone, Senegal, Togo
P. lucens	Distributed in two bands across Africa, in Angola, Botswana, Cameroon, Chad, Congo, DRC, Ethiopia, Ghana, Guinea, Guinea-Bissau, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Senegal, Sudan, Uganda, Zambia, Zimbabwe (Louppe et al., 2008; Groom, 2012)
P. mildbraedii	Benin, Cameroon, Côte d'Ivoire, Equatorial Guinea, Gabon, Ghana, Liberia, Nigeria, Sierra Leone and Tanzania. Records for DRC are based on misidentification. (Bosch, 2004)
P. officinalis	DRC (pantropical as POWO suggests "Mexico to tropical America")([8])
P. osun	Cameroon, Equatorial Guinea, Nigeria
P. rotundifolius	Angola, DRC, Malawi, Mozambique, Tanzania, Zimbabwe, Zambia (CJBG, 2021)
P. santalinoides	Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Nigeria, Senegal, Sierra Leone, Togo (CJBG, 2021). Also widespread in South America (Lemmens, 2008)
P. soyauxii	Angola, Cameroon, Central African Republic, Congo, DRC, Equatorial Guinea, Gabon and Nigeria
P. tessmannii	DRC, Equatorial Guinea, Gabon (CJBG, 2021)
P. tinctorius	Angola, Burundi, DRC, Malawi, Mozambique, Tanzania and Zambia (Campbell et al., 1996; Barstow, 2018)

Natural ranges of ***P. rotundifolius*** and ***P. lucens* subsp. *antunesii*** do partially overlap.

Fig. 1- Natural distribution map of all African *Pterocarpus* taxa (*Pterocarpus* Jacq.; CJBG, 2020).

Annex 2.

([8]) https://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:214060-2

Table 4. Main morphological characteristics of African *Pterocarpus* species.

Scientific name	Species description
P. angolensis	Deciduous tree 5-20(-30) m tall; crown open, rounded or spreading; sometimes a shrub (not in east Africa) 3-4 m tall; trunk single, straight, to 30 cm in diameter; bark dark grey or greyish brown, rough, fissured with ± rectangular scales; slash exuding red sap (CJBG, 2021). The maturity age is reached around 20 years (Hines & Eckman, 1993) or 13-15cm (Thunstrom, 2012).
P. brenanii	Deciduous tree, ± glabrous, (4-)6-12 m, or shrub 2-3 m tall; crown ascending or spreading; bark pale brown to dark grey, rough, shallowly longitudinally fissured, peeling off in thin rectangular flakes or narrow vertical strips (CJBG, 2021).
P. erinaceus	This species comes in two forms; 1. Low branching spreading form, associated with drier climate 2. Large tree specimens with straight trunks, associated with more favourable and wet conditions (Segla et al., 2015). Deciduous tree 12-15 m tall (Duvall, 2008; Coleman, 2014; Segla et al., 2015); bole slightly buttressed when old reaching 60 cm in diameter; bark rough, fissured, scaly, greyish brown to blackish; slash exuding red resin; crown high, few-branched, open, light; (CJBG, 2021).
P. lucens	This species comes in two forms; a low-branching deciduous shrub to a full tree (Sacande & Sanon 2007). This species is distributed in two bands across Africa, and as such, has two subspecies, *P. lucens* subsp. *lucens* and *P. lucens* subsp. *antunesii* (discussed in Taxonomy section) (Louppe et al., 2008; Groom, 2012). Deciduous tree 7,5-18 m; trunk generally straight reaching 20 cm in diameter, branching low down; crown spreading or irregular; sometimes shrubby and much-branched (CJBG, 2021).
P. mildbraedii	Evergreen or semi-deciduous tree 15-25 m; trunk straight, long, clean, to 1.7 m in girth, 60 cm in diameter; crown small, rounded; bark greyish or light brown, smooth; slash exuding red gum (CJBG, 2021).
P. officinalis	No information available.
P. osun	Tree 12-30 m; bole short, 2.5 m in girth and 80 cm in diameter, crooked sometimes with slight buttresses; crown spreading; bark dark brown, rough, flaking off in irregular patches; slash exuding copious water juice quickly turning red (CJBG, 2021).
P. rotundifolius	(Semi-) deciduous tree, 3-25 m, often multi-stemmed (S part of range), stems often crooked, rarely with a fall straight trunk branching high up (CJBG, 2021).
P. santalinoides	Evergreen (usually) tree 10-15 m; bole up to 30 cm in diameter; branching low down; bark greyish brown, smooth to scaly, thin; branches straggling; occasionally briefly deciduous; foliage shining, stipules late caducous; inflorescence short, hairy (CJBG, 2021).
P. soyauxii	Evergreen or deciduous tree (Nguémo et al., 2011) up to 30-50 m height (Jansen, 2005; Medjibe et al., 2011); bole reaching 140-200 cm in diameter (Jansen, 2005), straight, cylindrical, free to 32 m height, sometimes with sharp buttresses 3-4 m height and 2 m broad at base (CJBG, 2021).
P. tessmannii	Deciduous tree to 35 m; bole to 1.4 m in diameter, with buttresses 5 m high; bark dark brown, flaking off in long narrow vertical strips; slash exuding copious red juice; stipules early caducous; flowers yellow in short panicles.
P. tinctorius	Mid-sized tree that reaches 20-25 m in height and 70 cm in diameter (a large, tall tree in the miombo woodland), with a round, flattened and dense crown. Morphology varies across its range in complex ways, with distinct regional differences that had been subdivided into three infraspecific taxa; however subsequent revisions suggest these races are conspecific (Gillett et al., 1971). Leaves are compound, 10-30 cm long with 2-6 lateral leaflets on either side, glandular, and leaflets shine on the upper surface. Young twigs are brown and fulvous; bark is grey to dark reddish-brown and can be fairly smooth to conspicuously fissured. Inner bark is whitish and exudes a reddish sap when cut. Flowers are cream to golden-yellow or orange in colour and fragrant, in axillary or terminal panicles (8-22cm) from upper leaves. The seed pod is approximately circular, 6-10 cm in diameter with a thickened center, densely pilose with interspersed coarse hairs over the seed, and a broad, undulate papery wing (Zambia Flora; Gillett et al., 1971; Drummond and Moll, 2002)

Annex 3.

Table 5. Misidentification risks between some *Pterocarpus* species.

"ST": medium to high Standing Tree identification uncertainty
"W": high Wood (roundwood or processed) identification uncertainty

Misidentification risk	***P. angolensis***	***P. erinaceus***	***P. lucens***	***P. tinctorius*** **[small tree]**	***P. tinctorius*** **[tall tree]**	***P. soyauxii***	***P. tessmannii***
P. angolensis		W	ST, W	ST, W	W	W	W
P. erinaceus			W	W	W	W	W
P. lucens				ST, W	W	W	W
P. tinctorius [small tree]					W	W	W
P. tinctorius [tall tree]						ST, W	W
P. soyauxii							ST, W
P. tessmannii							

Even the most commonly logged species of African *Pterocarpus* are often not easily distinguishable from one another by loggers, local botanists and forest managers. Kahindo (2021) reported that there are confusions between ***P. soyauxii***, ***P. tessmannii*** and ***P. castelsii***. The latter, not accepted by taxonomists (CJBG, 2021) but anyway recorded on the field, refers to ***P. soyauxii*** or ***P. tessmannii***, adding even more confusion. Although a few of those species have recently been distinguished from one another thanks to a combination of chemical and anatomical approaches (Price et al., 2021), according to Dr. H. Beeckman (pers. Comm.) it is extremely difficult, if not impossible, to distinguish African *Pterocarpus* species based on the wood anatomical features alone. In addition, taxonomical works of this genus are still in progress.

Specifically regarding standing trees, several lookalike issues are raised as well because (Lemmens, 2008; CJBG, 2020; Dr. H. Beeckman, Royal Museum for Central Africa / Service of Wood Biology and Xylarium - pers. com.):

- ***P. Milbraedii*** is similar to ***P. officinalis*** **subsp.** ***gilletii*** in texture and shape of leaflets and in calyx;
- ***P. osun*** is similar to ***P. zenkeri*** (the latter being qualified as uncertain by taxonomists). ***P. osun***'s wood is traded in small quantities, but occasionally in mixed consignments with other *Pterocarpus* spp. as "African padauk";
- ***P. brenanii*** is generally closely related to ***P. rotundifolius*** apart from the leaf-like stipules, and similar to ***P. angolensis*** in fruit characters;
- ***P. tinctorius*** timber (tall tree form) has been over logged for decades under the commercial name "African padauk", reaching the same timber markets as ***P. soyauxii*** and ***P. tessmannii***. This tall tree form of ***P. tinctorius***, that used to occur in the Mayombe forest, is now said to be extremely scarce.

Annex 4.

Summary of results of the consultation distributed by the European Union to all African range States in December 2021.

Range state	Response
Angola	No response
Benin	No response
Botswana	No response
Burkina Faso	No response
Burundi	No response
Cameroon	No response
Central African Republic	No response
Chad	No response
Côte d'Ivoire	Supports listing under Appendix II
Congo	No response
Democratic Republic of the Congo	No response
Equatorial Guinea	No response
Eswatini	Undecisive
Gabon	No response
Gambia	No response
Ghana	No response
Guinea	Supports listing under Appendix II
Guinea-Bissau	No response
Liberia	Co-sponsorship for listing under Appendix II
Malawi	Co-sponsorship for listing under Appendix II
Mali	Unclear
Mozambique	No response
Namibia	Does not support listing under Appendix II
Niger	No response
Nigeria	Possible support for listing under Appendix II
Sierra Leone	No response
Senegal	Co-sponsorship for listing under Appendix II

South Africa	No response
Sudan	No response
Tanzania	No response
Togo	No response
Uganda	No response
Zambia	No response
Zimbabwe	No response