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Report on species/country combinations selected for review by the Plants Committee following CoP16

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Executive Summary

This report provides accounts for taxa that were selected in the CITES Review of Significant Trade (RST) process following CoP16 and were retained in the review following PC22. It aims to assist the Plants Committee in categorising species based on the effects of international trade on selected species/country combinations and to highlight problems concerning the implementation of Article IV.

The UN Environment World Conservation Monitoring Centre (UNEP-WCMC) was asked by the CITES Secretariat to compile reviews for 11 plant species/country combinations that were selected within the RST following CoP16. All range States were consulted, and were asked to provide information on the distribution, population status and threats of the relevant species within their country, as well as trade information, legal protection, and detailed of management and monitoring actions.

Species-country combinations were divided into three provisional categorisations ('*action is needed*', '*unknown status'* and '*less concern'*), in accordance with paragraph 1e of Resolution Conf. 12.8 (Rev. CoP17) for review by the Plants Committee.

For the 11 species-country combinations included in the RST following CoP16:

- Six were provisionally categorised as '**Action is needed**' on the basis that available information suggests that the provisions of Article IV, paragraph 2 (a), 3 or 6 (a), are not being implemented;
- One was provisionally categorised as '**Unknown status**' on the basis that it could not be determined whether or not these provisions are being implemented;
- Four were provisionally categorised as '**Less concern**' on the basis that the available information appears to indicate that these provisions are being met. The category 'Less concern' was also used where wild-sourced trade (codes W, R, U and source unreported) was not anticipated.

Full details of the categorisations for the 11 species/country combinations under review are provided in Table 1 (p iii-vi).

Table 1: Recommended categorisations for plant species/country combinations that were selected within the Review of Significant Trade following CoP16 based on the effects of international trade and problems concerning the implementation of Article IV.

Species	Range State	IUCN	Summary	Recommendation
Amaryllidaceae				
Galanthus elwesii (Giant Snowdrop)	Turkey	DD	Assessed as Data Deficient by the IUCN on the basis that the exact distribution is uncertain and the population is decreasing and severely fragmented. Recent molecular studies indicate that the species is restricted to the south of Turkey. Reported to be common in the Taurus Mountains, where the largest populations occur, with densities of 40-60 individuals per m^2 reported. No evidence of declines in this region. Main threats are over-collection and international trade, but these threats were considered low risk (although they could be detrimental where not monitored). High levels of trade 2006-2015 in wild-sourced live plants (bulbs), with approximately 5 million bulbs exported annually. Wild-sourced trade is generally declining, and the export quota was reduced to 4 million bulbs in 2015, whilst exports of artificially propagated plants increased 2006-2015. Annual reports were submitted by Turkey for all years 2006-2015.Turkey responded to the consultation relating to the RST. Harvesting areas and quotas are determined following field inspections/monitoring of previous harvests (5-6 sites monitored annually) to assess the impact of collection on the population. A 3-year rotation period is in place. Available information indicates that a non-detriment finding in accordance with the provisions of Article IV is in place, therefore categorised as Less concern.	**Less concern**
Apocynaceae				
Hoodia gordonii (Bitter Ghaap)	Global status	-	Not assessed by the IUCN, with a widespread distribution across the arid regions of southern Africa. Global population size unknown, but declining locally.	
	Namibia		Occurs in the south east, south, west and north west. Population size unknown, but assumed to be stable. Widely used by indigenous groups, but not considered threatened by illegal harvesting or commercial exploitation. Exports 2006-2015 were mainly in the form of extracts reported without a unit specified (132 787) and powder (24 723 kg) and were primarily artificially-propagated, with low levels of wild-sourced trade. In 2015, Namibia reported wild-sourced exports of 20 kg of powder and 90 extracts reported without a unit specified; this was the first wild-sourced trade reported since 2010. Namibia has not yet submitted an annual report for 2007, but all other annual reports 2006-2015 were submitted. Namibia responded to the consultation relating to the RST. Resource management and monitoring programmes were reported to have ceased due to diminished commercial demand, with exports limited to herbarium specimens. However, the basis for a non-detriment finding for recent wild-sourced exports (2015) is unclear, and it is not known if future wild-sourced exports are anticipated, therefore categorised as Unknown status.	**Unknown status**
	South Africa		Occurs in at least three provinces in south west and central locations. Population size unknown, but reported to be in decline since 2001 due to indiscriminate harvesting. May be locally rare or common. Threatened primarily by illegal harvesting and habitat loss. Exports 2006-2015 were primarily in the form of wild-taken and artificially propagated seeds (totalling >92 million), artificially-propagated live plants (275 000), and wild-sourced powder (187 475 kg).Only powder continued to be traded at notable levels after 2010. Annual reports were submitted by South Africa for all years 2006-2015. South Africa responded to the consultation relating to the RST. All exports since 2010 can be traced to the Western Cape province only. Following decimation of these populations, wild-sourced harvest is no longer permitted, although wild-trade was reported in 2014 (none was reported in 2015). Permits are issued to harvest artificially propagated individuals only and on this basis, South Africa are encouraged to publish a zero export quota for wild-sourced specimens. On the basis that wild-sourced trade is not permitted or anticipated, categorised as Less concern.	**Less concern**

Species	Range State	IUCN	Summary	Recommendation
Leguminosae				
Pterocarpus santalinus (Red Sandalwood)	India	EN	Assessed as Endangered by the IUCN in 1998, on the basis of severely fragmented distribution and declining populations. Endemic to hills in the Eastern Ghats of India. Overexploitation through illegal harvest for heartwood is the primary threat, with high levels of illegal harvest (in the region of 3000 tonnes annually) and illegal trade reported. Reported trade levels were highly variable during 2006-2015. No trade reported as wild-sourced by India during 2006-2015 or by the importers since 2008. Recent trade consisted of 213 tonnes of timber from plantations (source A) in 2014 only, and 2600 tonnes of seized timber (source I) in 2014-2015. Annual zero export quota set for wild-sourced trade since 2012, as well as a quota of 310 metric tonnes from artificial propagation. India have also published a quota for annual one-time exports of confiscated/seized wood since 2012 (source code 'I'); this quota has been 9090 metric tonnes since 2015. While trade has remained within quota levels, export of seized timber has been reported on several permits per year. India submitted annual reports for all years 2006-2015, except 2011. The harvest and export of wild-sourced *P. santalinus* is prohibited, management in the country focuses on controlling illegal harvest and other threats and on regeneration of natural populations. Stock from cultivated sources does not currently appear to be available to meet demand. The Plants Committee previously requested that India should clarify the level of artificial propagation of this species, and that a scientific monitoring system of harvested populations should be established; monitoring also appears relevant to plantations given the high demand for the species and the high level of exports reported from plantations (source A) in 2014. As India did not respond to the consultation relating to the RST, no update on the level of artificial propagation or management of timber from plantations is available for this endemic, Endangered species which is extremely slow-growing (reaching harvestable size at 80-100 years). The basis for robust non-detriment findings for export from populations claimed as plantations is unclear, as results of inventories have not yet been made available, therefore categorised as Action is needed. In addition, illegal trade and the continued export of large volumes of seized timber remain areas of concern not related to the implementation of Article IV, although these have an impact on the survival of populations of this speices in the wild.	**Action is needed**
Orchidaceae				
Dendrobium chrysotoxum (Fried-egg Orchid)	Lao PDR	-	Not assessed globally by the IUCN, and global population status and trend unknown. Occurs in central and southern Lao PDR. The main threats are unsustainable collection for the international trade in ornamental plants and traditional medicine, and habitat loss. Lao PDR has not published an export quota. High levels of trade in live plants 2006-2015 (730 000 kg), with all trade reported as artificially propagated since 2008. All annual reports were submitted by Lao PDR for the years 2006-2015. Lao PDR did not respond to the consultation relating to the RST. No information on monitoring or management measures were located. However, given the lack of anticipated wild-sourced trade (none has been reported since 2007), categorised as Less concern.	**Less concern**
Dendrobium moschatum	Lao PDR	-	Not assessed globally by the IUCN, and global population status and trend unknown. Occurs in the south and southeast of Lao PDR. The primary threats are collection for use in traditional medicines and habitat loss. No exports of D. moschatum were reported by Lao PDR for the period 2006-2015; importers reported 150 000 kg of wild-sourced plants in 2006-2007, but no reported trade since. All annual reports were submitted by Lao PDR for the years 2006-2015. Lao PDR did not respond to the consultation relating to the RST. No information on monitoring or management measures were located. However, given the lack of anticipated wild-sourced trade (none has been reported since 2007), categorised as Less concern.	**Less concern**
Rosaceae				
Prunus africana (African Cherry)	Global status	VU	Widespread across the Afromontane forests of mainland Africa and Madagascar. Categorised as globally Vulnerable (needs updating), with population declines throughout the range.	

Species	Range State	IUCN	Summary	Recommendation
Prunus africana (cont.)	Cameroon		Occurs in the volcanic line of Cameroon's mountain chain, with the majority of the population reported in three areas (Mt. Cameroon in the southwest, Kilum-Ijim in the northwest and Adamoua in central Cameroon). Wild populations reported to be in 'major decline'. Primarily threatened by unstainable harvest levels. All exports since 2009 comprised dried bark; quotas have been published annually since 2010 and have exceeded 1 million kg since 2015. High levels of exports 2006-2015 comprising 4.8 million kg of dried wild-sourced bark, with exports apparently exceeding the quota in 2013 (all according to importers) and with highest trade levels reported in 2014. Cameroon has not yet submitted annual reports for 2008, 2010, 2012, 2013 and 2015. Cameroon responded to the consultation relating to the RST. '*Prunus* Allocation Units' allow harvest subject to management plans and inventory. Inventories indicated that 185 000 trees could be exploited over five regions; however, it was reported that in some locations harvesting had not been suitably controlled resulting in negative effects on the species and habitat. It was reported by one expert that although inventories and minimum diameter requirements were in place, they were not being correctly implemented and good harvesting techniques were not being used. The basis for robust non-detriment findings for exports is unclear, concerns relating to harvest management have been expressed, and international trade may be impacting this globally threatened species, therefore categorised as Action is needed.	**Action is needed**
	DRC		Occurs in four provinces: Orientale, Katanga, North Kivu and South Kivu. Total population estimated to be 109 000 trees, of which 80 000 were believed to be exploitable. Main threats considered to be habitat reduction, illegal harvest and improper implementation of legal harvest guidelines. Quotas published for dry bark (232 000 kg in 2015 and 2016). Exports 2006-2015 comprised 1 667 000 kg of dried wild-sourced bark, with exports apparently exceeding the quota in 2013. Annual reports were submitted by the DRC for all years 2006-2015. DRC responded to the consultation relating to the RST. One expert noted that although various management measures were in place (annual inventories, detailed mapping of harvest areas, quotas established, trees only >30 cm felled), they were not all being correctly implemented and good harvesting techniques were not being used. The basis for robust non-detriment findings for exports is unclear and there are concerns relating to harvest management effectiveness in DRC which may be impacting on this globally threatened species, therefore categorised as Action is needed.	**Action is needed**
Valerianaceae				
Nardostachys grandiflora	Nepal	CR	Critically Endangered globally according to the IUCN Red List, with a population that is declining continuously and very rapidly. Widespread in Nepal, occurring mainly in west and central districts, but with higher densities in the west and a declining population in the east. Considered nationally 'threatened' in 2005. Main threats reported to be over-collection for domestic and international trade, as well as overgrazing. High and increasing levels of trade 2006-2015 in wild-sourced derivatives (870 746 kg) and oil (111 147 kg) as reported by Nepal only; 2016 exports were reported to be higher still based on Nepal's response to the consultation relating to the RST. Annual reports were submitted by Nepal for all years 2006-2015.District management plans are in place, allowing an annual harvest of 55 per cent of the growing stock, with harvest restricted to two months of the year, and inventories undertaken every 5 years. However, no details of comprehensive surveys were provided; it is unclear how harvest rates per district are calculated, and information on other management measures, such as length of rotation periods, is lacking. The basis for a robust non-detriment finding for this Critically Endangered species is unclear, and trade levels are likely to be impacting the species; therefore categorised as Action is needed.	**Action is needed**
Zygophyllaceae				
Bulnesia sarmientoi	Global status	LR/cd	Endemic to the Chaco region of South America. Globally assessed by the IUCN as Lower Risk/conservation dependent (needs updating).	

Species	Range State	IUCN	Summary	Recommendation
Bulnesia sarmientoi (cont.)	Argentina		Occurs in three provinces in the north of the country. Commercially usable timber volume in Formosa province (where three quarters of all exports originate) was on average 5.3 m^3 / ha in sample plots with presence of the species, although trees of a harvestable size were only present in a small proportion of plots surveyed. Over-exploitation is a threat. No export quotas have been published. High volume of exports 2008-2015 comprising >52 million kg of wild-sourced timber, plus additional trade reported by volume (converted to ~ 6 million kg) as reported by Argentina. Trade peaked in 2011 and has subsequently declined. Argentina has not yet submitted an annual report for 2014, but all other annual reports 2006-2015 were submitted. Argentina responded to the consultation relating to the RST. Management plans are a requirement of harvest; felled trees must be >35 cm DBH in Formosa. Some studies suggest that harvesting had not been suitably controlled, resulting in negative effects on the species and its habitat. Whilst some management measures are in place, the locations of permitted harvests and the volume of harvest in these areas was not provided. The basis for robust non-detriment findings for export in these locations is unclear and concerns relating to harvest management have been expressed, therefore categorised as Action is needed.	**Action is needed**
	Paraguay		Occurs in the west of the country in three departments. Considered an 'endangered' species in the country due to a number of factors, including rarity. Average abundance reported to be 23 individuals/ha for trees > 9.9 cm DBH, and 9 individuals/ha for trees > 30 cm DBH (minimum harvestable diameter), with an estimated average harvestable volume (trees > 30 cm DBH) of 7.1 m^3/ha, although this harvestable volume is lower when considering trunks alone (1.73 m^3/ha). Can be a dominant species where it occurs. Habitat loss, degradation, fire and over-exploitation are threats to the species. Export quotas of 250 000 kg of extract and 1.4 million kg of wood in 2014 only; trade in extract reported by Paraguay appears to have exceeded the quota. Exports 2008-2015 comprised > 2 million kg of wild-sourced timber, plus additional trade reported by volume (converted to ~ 900 000 kg). Notable levels of trade in extract and oil were also reported. Trade peaked in 2011/2012 and has subsequently declined. Paraguay has not yet submitted an annual report for 2008, but all other annual reports 2006-2015 were submitted. Paraguay did not respond to the consultation relating to the RST. However, Paraguay submitted an NDF for this species to the European Commission in 2017, and this has been used extensively for this report. Management measures are in place, including a requirement for management plans in the location of harvest; felled trees must be >30 cm DBH. Quotas are calculated on the basis of a sustainable harvest level of 0.25 m^3/ha/year, although it is unclear whether this is the most appropriate estimate to use when 0.1 m^3/ha/year was derived from available tree growth rate information. The basis for the sustainability of this harvest rate, the locations where harvests are permitted and the volumes harvested in these areas are unclear. The basis for robust non-detriment findings for export in these locations is not clear; therefore, categorised as Action is needed.	**Action is needed**

Introduction

The Review of Significant Trade (hereafter abbreviated to RST) was established to ensure that the provisions of the Convention (specifically Article IV, relating to non-detriment findings) are properly applied for Appendix II species in order to ensure that international trade in CITES-listed species is maintained within biologically sustainable levels. The procedure for the RST is set out in Resolution Conf. 12.8 (Rev. CoP17). The resolution "Directs the Animals and Plants Committees, in cooperation with the Secretariat and experts, and in consultation with range States, to review the biological, trade and other relevant information on Appendix-II species subject to significant levels of trade, to identify problems and solutions concerning the implementation of Article IV, paragraphs 2 (a), 3 and 6 (a)."

Paragraph 1 (d) ii) directs the Secretariat to compile, or appoint consultants to compile, a report about the biology and management of trade in the species, including any relevant information from the range State. The UN Environment World Conservation Monitoring Centre (UNEP-WCMC) was asked by the CITES Secretariat to compile reviews for species/country combinations that were selected within the RST following CoP16 and retained in the review following PC22. This report provides an overview of conservation and trade status of 11 plant species-country combinations, provisionally classifying each into one of three categories defined in paragraph 1 (e) of Resolution Conf. 12.8 (Rev. CoP17) for review by the Plants Committee:

- '**action is needed**' shall include species/country combinations for which the available information suggests that the provisions of Article IV, paragraph 2 (a), 3 or 6 (a), are not being implemented;
- '**unknown status**' shall include species/country combinations for which the Secretariat (or consultants) could not determine whether or not these provisions are being implemented; and
- '**less concern**' shall include species/country combinations for which the available information appears to indicate that these provisions are being met.

The recommendations for the 11 species-country combinations assessed can be found in Table 1 (p. ii - vi).

Methods

Each taxon/country review provides the following information: history of the CITES Review of Significant Trade process; species characteristics, current distribution, conservation status, population trends and threats, recent trade (including CITES trade data and any available data on illegal trade), and management of the taxa in each range State, including any relevant legislation. The national legislation category as defined under the CITES National Legislation Project (CoP17 Doc. 22 Annex 3 (Rev.1)) for each range State is noted. Where there are multiple range States reviewed for a particular species, an overview of distribution, conservation status, threats, trade and management is also provided.

CITES trade data are provided for the period 2006-2015. Data were downloaded from the CITES Trade Database (trade.cites.org) on 21 March 2017, although some updates to the trade data were also included. Unless otherwise specified, trade tables include all direct trade (i.e. excluding re-export data) in the taxa under review and include all sources, terms and units reported in trade. Trade volumes are provided as reported by both exporters and importers. Re-export data are noted separately, where appropriate. A list of CITES annual reports received from each range State included in the process, along with the date each became a Party to CITES, is provided in Table 2.

Table 2: Overview of annual report submissions by range States under review, 2006-2015

Country name	Entry into force of CITES	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Argentina	08/04/1981	✓	✓	✓	✓	✓	✓	✓	✓	×	✓
Cameroon	03/09/1981	✓	✓	×	✓	×	✓	×	×	✓*	×
Democratic Republic of Congo	18/10/1976	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
India	18/10/1976	✓	✓	✓	✓	✓	×	✓	✓	✓	✓
Lao People's Democratic Republic	30/05/2004	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Namibia	18/03/1991	✓		✓	✓	✓	✓	✓	✓	✓	✓
Nepal	16/09/1975	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Paraguay	13/02/1977	✓	✓	×	✓	✓	✓	✓	✓	✓	✓
South Africa	13/10/1975	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Turkey	22/12/1996	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Key: ✓: annual report received. ×: annual report not received.

*Cameroon submitted an annual report for Flora only in 2014.

All available Biennial reports to CITES[1] from each range State (from 2003-2004 onwards, where available) were consulted for any information on confiscations/seizures. Only Argentina reported significant seizures of species subject to the RST post CoP16, with details of seizures of *Bulnesia sarmientoi* included with the species review.

The CITES Management and Scientific Authorities for each range State were contacted by post and email in February 2017. Authorities were asked to provide information relevant to the formation of non-detriment findings, including distribution, conservation status, trade and management of each taxon. Where possible, national experts were also contacted to provide additional country-specific information. While responses were received from seven range States (Argentina, Cameroon, Democratic Republic of Congo, Namibia, Nepal, South Africa and Turkey), three range States did not respond to the consultation by the time of report submission (May 2017): India, Lao (People's Democratic Republic) and Turkey. A compilation of range State responses is provided in Annex 2.

[1] Accessed from https://cites.org/eng/resources/reports/biennial.php on 22 May 2017.

Species reviews

Galanthus elwesii: Turkey

A. Summary

TURKEY:	Assessed as Data Deficient by the IUCN on the basis that the exact distribution is uncertain and the population is decreasing and severely fragmented. Recent molecular studies indicate that the species is restricted to the south of Turkey. Reported to be common in the Taurus Mountains, where the largest populations occur, with densities of 40-60 individuals per m2 reported. No evidence of declines in this region. Main threats are over-collection and international trade, but these threats were considered low risk (although they could be detrimental where not monitored). High levels of trade 2006-2015 in wild-sourced live plants (bulbs), with approximately 5 million bulbs exported annually. Wild-sourced trade is generally declining, and the export quota was reduced to 4 million bulbs in 2015, whilst exports of artificially propagated plants increased 2006-2015. Annual reports were submitted by Turkey for all years 2006-2015.Turkey responded to the consultation relating to the RST. Harvesting areas and quotas are determined following field inspections/monitoring of previous harvests (5-6 sites monitored annually) to assess the impact of collection on the population. A 3-year rotation period is in place. Available information indicates that a non-detriment finding in accordance with the provisions of Article IV is in place, therefore categorised as Less concern.	RECOMMENDATION: Less concern

RST Background

Galanthus elwesii (Giant Snowdrop) was selected for the Review of Significant Trade (RST) as a priority species for review (all range States) at the 21st meeting of the Plants Committee, May 2014 (PC21 WG2 Doc. 1, PC21 ExSum. Cons.). *G. elwesii* was identified as a species that met a high volume trade threshold 2007-2011, as well as in 2012, on the basis of trade data presented in PC21 Doc. 12.4. At PC22 (October, 2015), responses to the Secretariat's consultation had been received from Greece and Turkey (PC22 Doc. 11.3 Annex). Bulgaria, Greece, Netherlands, Romania and Ukraine were removed from the RST process (no exports), whilst Turkey was retained (PC22 Com. 3 (Rev. by Sec.), PC22 Sum. 5 (Rev. 1)).

G. elwesii was reviewed as a candidate for the RST (PC14 Inf. 6) for PC14 (February, 2004), however, the species was not selected (PC14 WG 3.3 Doc. 1, PC14 Summary Record).

B. Species characteristics

Biology: According to eMonocot (2017), *G. elwesii* is a late winter- to spring-flowering snowdrop and is predominantly a species of high altitudes, occurring mostly on mountains above 800 m and up to 1 600 m. It occurs in a wide range of habitats (Davies, 2011), including broad-leaved and coniferous

woodland, and may also occur in scrub, in grassland, amongst large rocks, and in pockets of soil on rocks and cliff faces, although like most other *Galanthus* species, *G. elwesii* does not grow in places that have been severely modified by humans, such as pasture and deforested areas (eMonocot, 2017).

It was reported that *G. elwesii* usually grows in areas that are snow-covered during the winter, and remain cool in the summer, in north facing locations which provide cooler and wetter conditions than other aspects (eMonocot, 2017). The bulbs are usually located deep in the soil, between 15 and 22 cm down, with the deepest bulbs occurring where plants grow in pockets of soil in rocks and cliffs. *G. elwesii* is frequently encountered in limestone areas, but also occurs on soils of igneous and metamorphic rocks (eMonocot, 2017).

G. elwesii reproduces by seed or vegetatively by bulbs (Yüzbasioğlu, 2008). The IUCN Red List assessment reports confusion between *G. elwesii* and *G. gracilis*; both have 'glaucous leaves and two green marks (or one very large green mark) on each inner perianth segment, and they can occur in similar localities and populations' (Davis, 2011). The species are closely related but can be distinguished from one another by 'the type of vernation (the position of the leaves when they are in bud), which is applanate (leaves flat against each other) and supervolute (one leaf encircling the other), respectively' (Davis, 2011). The assessment also notes that this confusion is particularly critical in their European ranges, as their distributions are poorly understood (Davis, 2011).

Yüzbasioğlu (2008) noted that *G. elwesii* provides an important nectar source for invertebrates whilst also providing a food source for ant species (species unknown) via a fleshy oil-bearing appendage on the seed (an elaiosome).

C. Country reviews

Turkey

Distribution: *G. elwesii* was previously thought to occur in Bulgaria, Greece, Moldova, Romania, Serbia, Turkey and Ukraine with a large extent of occurrence (999 515 km²) and an area of occupancy of 7 400 km² (Davies, 2011). However, recent molecular studies indicate that *G. elwesii* is in fact an endemic species, restricted to southern Turkey (A. Davis, pers. comm. to UNEP-WCMC, 2017)[2].

Within Turkey, *G. elwesii* was previously reported to be distributed in north western, western and southern Anatolia: Adapazari, Bolu, Yozgat, Ankara, Eskisehir, Afyon, Izmir, Isparta, Konya, Karaman and Niğde provinces (Yüzbasioğlu, 2008). However, according to eMonocot (2017) 'studies of *Galanthus* in western Turkey and Greece have shown that many of the populations formerly identified as *G. elwesii* are actually *G. gracilis*, and further investigations are needed to ascertain the true distribution of *G. elwesii*'. The CITES Management Authority of Turkey (*in litt.* to UNEP-WCMC, 2017) reported that *G. elwesii* only occurs naturally to the south and south west of Turkey, with an area of distribution of around 7 000 hectares (70 km²). Additional artificially propagated specimens cover an area of approximately 5 000 hectares (50 km²) and are located in the south and west of the country (CITES MA of Turkey *in litt*. to UNEP-WCMC 2017).

Population status and trends: *G. elwesii* has been assessed as Data Deficient by the IUCN on the basis that further studies are needed to determine the exact distribution; further research is needed to determine whether the species needs to be placed within a threatened category, particularly as many subpopulations have been recognised as being severely fragmented and under a broad range of threats

[2] Species+ distribution information will be updated following publication of peer-reviewed literature on any revised distribution information for this species

(Davis, 2011). The global population (which is considered by IUCN to include Bulgaria, Greece, Maldova, Romania, Serbia, Turkey and Ukraine as range States) was considered to be declining and severely fragmented (Davies, 2011).

The species was considered to be common in the Taurus mountain range in the south of Turkey, where the largest wild populations are found within limestone areas in subalpine pastures between 800-1000 m altitude (Smith, 2008; Yüzbasioğlu, 2008). According to the CITES MA of Turkey (*in litt*. to UNEP-WCMC, 2017) the density of the wild populations ranges from 40-60 individuals per m^2 and in 2008 'annual visual inspections of the harvested populations in Turkey (in the Taurus mountains) indicated that *G. elwesii* had not declined in these regions' (Smith, 2008).

Yüzbasioğlu (2008) noted that *G. elwesii* is not included in the *Red Data Book of Turkish Plants* due to its abundance and wide distribution.

Threats: *G. elwesii* is considered to be threatened by collection and habitat loss at the global level (Davis, 2011). The proposal to include *Galanthus* spp. in CITES Appendix II in 1989 (CoP7 Prop. 54) stated that populations of *Galanthus* species in most European countries are believed to have declined substantially in recent years as a result of habitat loss. Smith (2008) and Yüzbasioğlu (2008) considered that future threats to populations may arise as a result of global warming. Davis (2011) noted that *G. elwesii* is a climate-sensitive species and climate changes may impact some populations.

In Turkey, Davis (2011) considered that collection of bulbs for the legal trade was the major threat to the species, and although this was reported to be mostly non-threatening and sustainable, in some areas where harvesting is not regulated or monitored, it was considered that collecting could be detrimental to the population status (Davis, 2011). According to the CITES MA of Turkey (*in litt*. to UNEP-WCMC, 2017), there are no threats to the population of this species nor is there evidence of illegal trade.

Trade: *G. elwesii* was listed in CITES Appendix II on 18th January 1990, as part of the genus listing for *Galanthus*. All CITES annual reports have been submitted by Turkey for the period 2006–2015. Turkey published export quotas for *G. elwesii* every year since 2006. Quotas for wild-sourced bulbs were published 2006-2017 and quotas for artificially propagated bulbs were published 2009–2017. Trade in *G. elwesii* did not exceed quotas set by Turkey for the period 2006-2015 (Table 1).

According to data in the CITES Trade Database, direct trade in *G. elwesii* from Turkey 2006-2015 consisted of live plants for commercial purposes, the majority of which were wild-sourced with 50 445 101 plants reported by Turkey and 35 547 789 plants reported by importing Parties (Table 2). The remainder of the trade in live plants was artificially propagated. According to data reported by Turkey, wild-sourced exports in 2015 were the lowest reported for the ten year period, while exports of artificially propagated plants peaked in 2015.

Indirect trade in *G. elwesii* originating in Turkey was solely for commercial purposes and predominantly comprised live, wild-sourced plants with over 8 million plants as reported by importers and more than 11.5 million plants as reported by re-exporters (Table 3).

The CITES MA of Turkey (*in litt*. to UNEP-WCMC, 2017) provided export data for combined trade in wild sourced and artificially propagated plants for the three years 2014-2016 (Table 4). For 2015, Turkey's annual report included a total of 6 609 672 plants, more than 2.4 million plants above the volume reported by the MA.

The CITES MA of Turkey (*in litt*. to UNEP-WCMC, 2017) reported that there was no evidence of illegal trade in the country.

Table 1: CITES export quotas for *Galanthus elwesii* bulbs from Turkey, 2006-2017 and global direct exports as reported by countries of import and Turkey, 2006-2015. Turkey has submitted all annual reports 2006-2015.

Quota	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Quota: wild taken bulbs	6100100	6100100	6100000	5600000	5600000	5250000	5250000	5500000	5000000	4000000	4000000	4000000
Reported by importer	5240000	1584200	4304272	2912615	3570590	4329975	3589246	2917350	4402412	2697129	-	-
Reported by Turkey	5600000	5700000	5104120	5600000	4235840	5250000	5250000	5166150	4762037	3776954	-	-
Quota: artificially propagated bulbs	-	-	-	500000	500000	750000	750000	1000000	1500000	3000000	3000000	3000000
Reported by importer	100000	619600	500000	175000	300000	750000	525000	270200	1424188	702582	-	-
Reported by Turkey	357640	400000	500000	175000	500000	750000	750000	939300	1397778	2832718	-	-

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Table 2: Direct exports of *Galanthus elwesii* from Turkey, 2006-2015. All trade was in live plants for commercial purposes. Turkey has submitted all annual reports 2006-2015.

Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
A	Importer	100000	619600	500000	175000	300000	750000	525000	270200	1424188	702582	5366570
	Exporter	357640	400000	500000	175000	500000	750000	750000	939300	1397778	2832718	8602436
W	Importer	5240000	1584200	4304272	2912615	3570590	4329975	3589246	2917350	4402412	2697129	35547789
	Exporter	5600000	5700000	5104120	5600000	4235840	5250000	5250000	5166150	4762037	3776954	50445101

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Table 3: Indirect exports of *Galanthus elwesii* originating in Turkey, 2006-2015. All indirect trade was for commercial purposes.

Term	Unit	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
flowers	-	W	Importer									36000		36000
			Exporter											
live	kg	W	Importer					500						500
			Exporter											
	-	A	Importer	81500	350500	37680	32500	400000	70270	26750	30090	234400	685750	1949440
			Exporter	81500	566000	234180	178000	400000	70000	102000	204100	378750	840235	3054765
		W	Importer	739025	1086300	1024250	994560	334880	1325515	1122890	1094710	310590	46500	8079220
			Exporter	1357600	1283052	2127200	1317400	1516280	1438965	1032615	1145880	261330	23250	11503572

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Table 4. Direct exports of *Galanthus elwesii* originating in Turkey, 2014-2016 as reported by the CITES MA of Turkey (*in litt.* to UNEP-WCMC, 2017).

Year	Exports from Turkey (wild & artificial)	Combined exports of wild and art. prop. live plants (Table 2)
2014	6 138 447	6 159 815
2015	4 183 033	6 609 672
2016	6 410 097	Annual report to be submitted in October 2017

Management: Turkey became a Party to CITES on 23rd September 1996, with entry into force on 22nd December 1996.

Current legislation, produced by the Ministry of Agriculture and Rural Affairs (MARA) (effective since August 1995), controls the harvesting and export of bulbs of *G. elwesii* through the "'Regulations about Production, Uprooting from Wild and Exporting Natural Flower Bulbs", published in the Official Gazette, 19th July 2012 No. 28358 (CITES MA of Turkey *in litt.* to UNEP-WCMC, 2017). *G. elwesii* exports are permitted subject to the publication of an annual quota of bulbs by the Technical Committee of MARA published in the Official Gazette as 'Export List of Natural Flower Bulbs' (CITES MA of Turkey *in litt.* to UNEP-WCMC, 2017).

The CITES MA of Turkey (*in litt*. to UNEP-WCMC, 2017) reported that the sustainable management of geophytes exports is supervised by the Technical Committee which consists of representatives of the Natural Flower Bulbs Experts Council (comprising academics from various universities and Scientific Authorities - TUBITAK) and the Ministries of Forestry and Water Affairs, Economy, Custom and Trade, and Food, Agriculture and Livestock.

Following field inspections and monitoring of harvest and storage facilities of both the wild and cultivated fields in all the distribution areas, the Natural Flower Bulbs Expert Council (previously called the Advisory Committee) produces a report; based on this the Technical Committee decides the quotas and determines the permitted harvesting area at a meeting held in the autumn. The following spring the quotas are divided amongst the relevant bulb companies by the Ministry of Food, Agriculture and Livestock: General Directorate of Plant Production (CITES MA of Turkey *in litt*. to UNEP-WCMC, 2017).

The CITES MA of Turkey indicated that this species has previously been harvested in south, west and central Anatolia (*in litt*. to UNEP-WCMC, 2017). According to Yüzbasioğlu (2008) a rotation system has been implemented for this species, particularly in the Taurus Mountain range, and collection sites must be allowed to regenerate for 3 years before re–collection at the same site can occur. Any small bulbs that are dug up are sieved *in-situ* and replanted immediately and collection is banned from sites where *G. elwesii* occurs alongside rarer species (Yüzbasioğlu, 2008). The CITES MA of Turkey (*in litt*. to UNEP-WCMC, 2017) reported that 5-6 sites are monitored annually.

Smith (2008) considered that these inspections have a very important role in setting harvesting quotas, and that information recorded from the wild plants at the warehouse provides important data on the conservation status of *G. elwesii* habitats and populations from which they have been collected. This information is reportedly obtained by assessing the bulbs of *Galanthus* (species, size classes, numbers etc.) and analysing interim warehouse records (e.g. assessing changing harvest effort based on records held over several years) (Smith, 2008).

Reports from 2008 indicate that despite a quota being set for 500 000 artificially propagated bulbs, only very small amounts were cultivated and any bulbs produced by this method were at that time included in the wild quota; it was generally assumed that most growers transplanted wild material to cultivation

fields (Yüzbasioğlu, 2008). The quota for artificially propagated bulbs has risen from 500 000 to 3 million over recent years whereas the wild quota has been reduced from 6.1 million in 2008 to 4 million in 2017. According to the CITES MA of Turkey (pers. comm. to UNEP-WCMC, 2017), a small amount of wild collected material was grown on in cultivation fields ten years ago with the permission of the Technical Committee; the aim is to increase cultivation of the species, reducing the amount harvested from the wild. No further details on the methods of 'artificial propagation' for *G. elwesii* bulbs in Turkey was provided.

Some wild populations occur in protected areas (CITES MA of Turkey *in litt.* to UNEP-WCMC, 2017) but no further information was received concerning the location of these areas.

Through its national legislation project, the CITES Secretariat categorised the national legislation in Turkey as category 1, meaning legislation that is believed generally to meet the requirements for implementation of CITES.

D. Problems identified that are not related to the implementation of Article IV, paras 2(a), 3 or 6(a).

None identified.

E. References

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Hoodia gordonii: Namibia and South Africa

A. Summary

Global status	Not assessed by the IUCN, with a widespread distribution across the arid regions of southern Africa. Global population size unknown, but declining locally.	
NAMIBIA:	Occurs in the south east, south, west and north west. Population size unknown, but assumed to be stable. Widely used by indigenous groups, but not considered threatened by illegal harvesting or commercial exploitation. Exports 2006-2015 were mainly in the form of extracts reported without a unit specified (132 787) and powder (24 723 kg) and were primarily artificially-propagated, with low levels of wild-sourced trade. In 2015, Namibia reported wild-sourced exports of 20 kg of powder and 90 extracts reported without a unit specified; this was the first wild-sourced trade reported since 2010. Namibia has not yet submitted an annual report for 2007, but all other annual reports 2006-2015 were submitted. Namibia responded to the consultation relating to the RST. Resource management and monitoring programmes were reported to have ceased due to diminished commercial demand, with exports limited to herbarium specimens. However, the basis for a non-detriment finding for recent wild-sourced exports (2015) is unclear, and it is not known if future wild-sourced exports are anticipated, therefore categorised as Unknown status.	RECOMMENDATION: Unknown status
SOUTH AFRICA:	Occurs in at least three provinces in south west and central locations. Population size unknown, but reported to be in decline since 2001 due to indiscriminate harvesting. May be locally rare or common. Threatened primarily by illegal harvesting and habitat loss. Exports 2006-2015 were primarily in the form of wild-taken and artificially propagated seeds (totalling >92 million), artificially-propagated live plants (275 000), and wild-sourced powder (187 475 kg).Only powder continued to be traded at notable levels after 2010. Annual reports were submitted by South Africa for all years 2006-2015. South Africa responded to the consultation relating to the RST. All exports since 2010 can be traced to the Western Cape province only. Following decimation of these populations, wild-sourced harvest is no longer permitted, although wild-trade was reported in 2014 (none was reported in 2015). Permits are issued to harvest artificially propagated individuals only and on this basis, South Africa are encouraged to publish a zero export quota for wild-sourced specimens. On the basis that wild-sourced trade is not permitted or anticipated, categorised as Less concern.	RECOMMENDATION: Less concern

RST Background

Hoodia gordonii (Bitter Ghaap) was selected for the Review of Significant Trade (RST) as a priority species for review (all range States) at the 21st meeting of the Plants Committee, May 2014 (PC21 WG2 Doc. 1, PC21 ExSum. Cons.). *H. gordonii* was identified as a species that met a high volume trade threshold 2007-2011, as well as in 2012, and a sharp increase in trade in 2011, on the basis of trade data presented in PC21 Doc. 12.4. At PC22 (October, 2015), no responses to the Secretariat's consultation had been received from range States (PC22 Doc. 11.3 Annex). Namibia and South Africa were retained in the RST process (PC22 Com. 3 (Rev. by Sec.), PC22 Sum. 5 (Rev. 1)).

B. Species characteristics

Biology: *H. gordonii* is a perennial succulent shrub (Germishuizen and Meyer, 2003) with multiple stems and sharp spines (Cole *et al.*, 2014). The species was reported to grow up to 1 meter in height (Rowley, 1980; Germishuizen and Meyer, 2003). It has large flowers near the top of the plant, which vary in colour from pale yellow to dark maroon (CITES Management Authority of South Africa *in litt.* to UNEP-WCMC 2017) and are carrion-like to attract flies and facilitate pollination (Vermaak and Viljoen, 2008). Mature plants can grow up to 50 individual branches rising from a common base, and can weigh up to 30 kg (Vermaak and Viljoen, 2008). *H. gordonii* occurs in a wide range of arid habitats characterised by sparse vegetation, from coastal to mountainous areas from 250 m to 1200 m above sea level (Swart, 2008) and including deserts, the Nama Karoo shrublands and savannah, and on both gentle and steep shale ridges (Raimondo *et al.*, 2008). *H. gordonii* can grow in densities ranging from a few plants per hectare to over 130 plants per hectare (Swart, 2008). Swart (2008) also reported that although the life span and age at maturity of *H. gordonii* is unknown, anecdotal data suggests a life span of 15-20 years, with the first flowering event occurring after 3-6 years. Flowering is unsynchronised and occurs reactively to rainfall events, regardless of the season (Swart, 2008).

Distribution: Vermaak and Viljoen (2008) stated that although *Hoodia* species are widespread in the arid regions of southern Africa, *H. gordonii* only occurs in South Africa and Namibia according to herbarium records. However, Raimondo *et al.* (2008) reported that *H. gordonii* is a widespread species with a range of 850 000 km² that covers Namibia, Botswana, Angola and the dry margins of the summer rainfall region of South Africa. The CITES MA of South Africa (*in litt.* to UNEP-WCMC, 2017) described *H. gordonii* as having a patchy distribution pattern and varied density over a wide range which predominantly covers South Africa and Namibia, but includes Botswana and Angola to a lesser extent. Cole *et al.* (2014) reported that *H. gordonii*'s range roughly corresponds to the succulent karoo biome and northwards.

Population status and trends: *H. gordonii* has not been assessed by the IUCN. Swart (2008) stated that although the global population size was unknown, local declines had been observed at sites where exploitation and subsequent die back have occurred. Swart (2008) also stated that recruitment has been reported, but not necessarily at the sites where decline occurred previously.

Threats: Swart (2008) listed naturally-occurring threats to *H. gordonii* as fungus infections, the negative impact of other species on seed production, and natural die back which could cause over 90 per cent decline in clusters. Anthropogenic threats were reported to include commercial wild (illegal) harvesting, habitat destruction resulting from overgrazing, trampling, cultivations, road construction, off-road driving, urban development, and mining, although the impact of climate change on *H. gordonii* needed to be evaluated (Swart, 2008). De Beer and van Wyk (2011) stated that *H. gordonii* stems are traditionally used to suppress appetite and thirst, and van Wyk (2008) stated that *H. gordonii*'s small and widely dispersed populations make them vulnerable to overexploitation.

Overview of trade and management: *H. gordonii* was listed in CITES Appendix II on 12th January 2005, as part of the genus listing for *Hoodia*. According to data in the CITES Trade Database, a wide variety of *H. gordonii* products were reported in global trade 2006-2015. The main products in trade were seeds (reported in 2007 and 2008 only), live plants (as reported by exporters), powder and dried plants reported by weight. Sinovas *et al.* (2016) reported that over 90 million *H. gordonii* seeds were traded in 2007-2008, when the species was the focus of attention by international pharmaceutical companies researching its properties as a dietary supplement. It has been noted that plant stems with their spines removed are the preferred part of the plant for consumption (Holt and Taylor, 2006). Global trade in *H. gordonii* was predominantly in wild-sourced and artificially propagated plants for commercial and scientific purposes.

Raimondo *et al.* (2008) reported high national and international demand for *H. gordonii*, especially between 2004 and 2006, when the price rose to between R500 and R1200 (USD 38-92) per kilogram, causing even remote parts of the distribution to be harvested. Swart (2008) reported that Botswana, one of the range States, has no legislation specifically protecting *Hoodia* species, instead Botswana's Agricultural Resources Convention Act (CAP35:06) addresses "harvesting from the veldt", which is used to manage *Hoodia*.

C. Country reviews

Namibia

Distribution: The CITES Management Authority of Namibia (*in litt.* to UNEP-WCMC, 2017) confirmed that *H. gordonii* is widely distributed throughout the south-east, southern, western and north-west regions of Namibia. Figure 1 provides a map of the species distribution within the country.

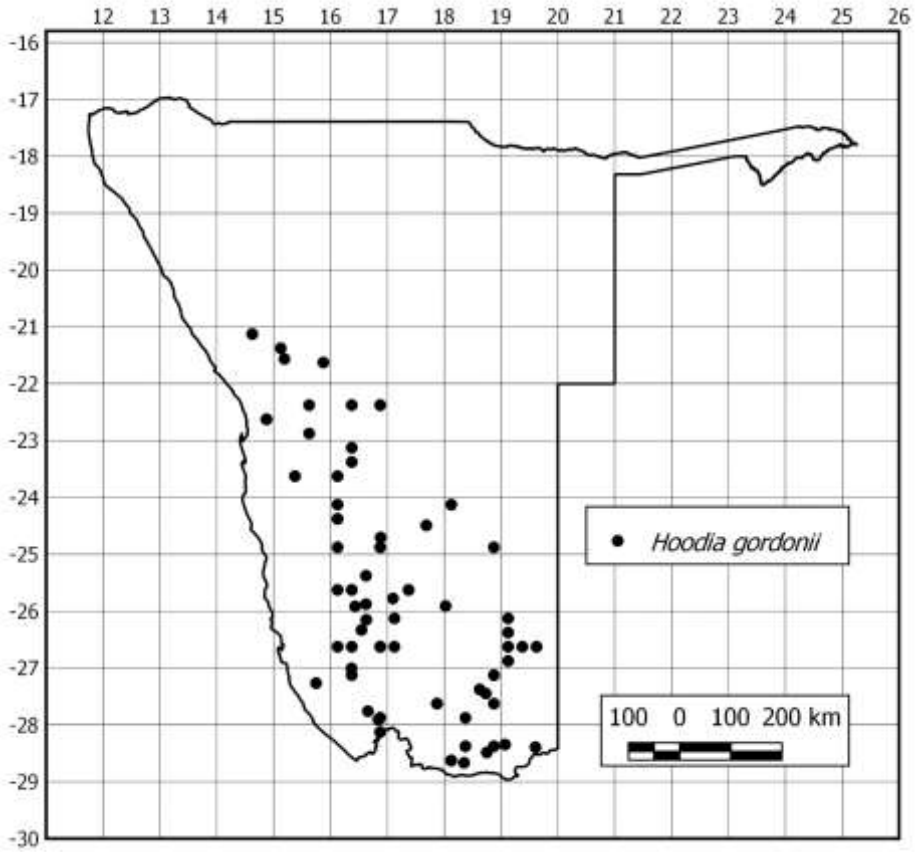

Figure 1. Distribution map of *Hoodia gordonii* in Namibia based on Carr (2017, in CITES MA of Namibia *in litt*. to UNEP-WCMC, 2017).

Population status and trends: The CITES Management Authority for Namibia (*in litt.* to UNEP-WCMC, 2017) reported that population data is not available for *H. gordonii* in Namibia, but it was assumed that the population is substantial and fairly stable and in some areas may have increased due to the abandonment of cultivated plants following the decline of commercial opportunities.

Threats: The CITES MA of Namibia (*in litt.* to UNEP-WCMC, 2017) did not consider that either commercial use or illegal wild harvesting were threats to *H. gordonii* populations, as interest in producing *H. gordonii* commercially had declined a number of years ago. It was reported that no applications had been made for new nursery or harvest permits, and only one or two farmers persisted with cultivation, harvest and export of *H. gordonii,* with attempts to establish a market for *H. gordonii* appearing to be unsuccessful. The CITES MA of Namibia (*in litt.* to UNEP-WCMC, 2017) also reported that *H. gordonii* is widely used in Namibia by the San people as an appetite suppressant and for medicinal use, and to a lesser extent by other indigenous people, although less is known about the utilisation of *H. gordonii* by other indigenous groups.

Trade: Cole *et al.* (2014) reported that 11 223 kg of dried *Hoodia* powder, with a market value of over N$700 000 (USD 53 548) was produced in 2011, with N$145 000 (USD 11 092)'s worth of powder produced in 2012. Cole *et al.* (2014) also stated that over 366 000 *Hoodia* capsules valued at N$293 528 (USD 22 454) were exported in 2011, with 206 250 capsules worth N$165 000 (USD 12 622) exported in 2012. *H. gordonii* is the only *Hoodia* species reported in trade in any substantial quantities, so although these reports only name *Hoodia* species in general, it can be assumed that the majority of these figures refer to *H. gordonii*. Cole *et al.* (2014) also named the main importers of *Hoodia* capsules from Namibia as New Zealand and European countries, particularly Austria, and some African countries. Sinovas *et al.* (2016) reported that between 2005 and 2014, Namibia exported *H. gordonii* powder with an estimated value of USD4.2 million. The CITES MA of Namibia (*in litt.* to UNEP-WCMC, 2017) reported that most of Namibia's exports of *H. gordonii* were in the form of capsules and powder, imported by South Africa, Austria and Germany, and that all exports were from artificially-propagated sources and exported for commercial purposes.

CITES annual reports have been submitted by Namibia for all years 2006-2015 with the exception of 2007. No export quotas have been published for *H. gordonii* by Namibia.

According to data in the CITES Trade Database, the main commodities of *H. gordonii* directly exported from Namibia were extracts reported by number (the majority of which were reported by importers in 2011) and powder reported both by number (principally reported by importers in 2011) and weight (reported by both importers and exporters). The vast majority of this trade was artificially propagated for commercial purposes (Table 1). In addition, Namibia reported the export of 100,000 artificially propagated live plants, for commercial purposes, in 2008; this trade was not reported by importers (Table 1).

Indirect trade in *H. gordonii* originating in Namibia principally comprised commercial trade in powder reported by weight from artificially propagated plants (Table 2); the vast majority of indirect trade was re-exported via South Africa.

Table 1: Direct exports of *Hoodia gordonii* from Namibia, 2006-2015. Quantities are rounded to whole numbers, where applicable. Low levels of trade for scientific purposes and trade for which both importers and exporters reported less than 50 units over the ten year period has been excluded from the table. Namibia has not yet submitted an annual report for 2007.

Term	Unit	Purpose	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
chips	kg	T	A	Importer											
				Exporter				2	160	1	1000			10	1173
derivatives	kg	T	A	Importer				200	4	11	1000	1000		120	2334
				Exporter											
	-	T	A	Importer					150	100					250
				Exporter			69								69
			W	Importer					150						150
				Exporter											
dried plants	kg	T	A	Importer		150						860			1010
				Exporter			321							60	381
			W	Importer		200									200
				Exporter	10										10
extract	kg	T	A	Importer					0			100			100
				Exporter				11	116	6	18	961	240		1352
	l	T	A	Importer					0	0	31	30			61
				Exporter				47	28	<1	<1	50			125
	-	T	A	Importer					754						754
				Exporter				15	4500	127267		5	1000	1000	133787
			W	Importer											
				Exporter										90	90
live	-	T	A	Importer											
				Exporter			100000								100000
medicine	kg	T	W	Importer					325						325
				Exporter											
	-	T	A	Importer					500	12					512
				Exporter											
powder	kg	T	A	Importer		680	2668	6794	7408	2482	770	1560	210	40	22612
				Exporter			3554	6071	2049	11215	1120	705		10	24723
			W	Importer					23						23
				Exporter				215	60					20	295
	-	T	A	Importer					100	100000		25			100125
				Exporter											

Term	Unit	Purpose	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
specimens	kg	T	A	Importer											
				Exporter						1	111				112
	-	T	A	Importer											
				Exporter						600		500			1100
stems	kg	T	-	Importer											
				Exporter				200							200

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 19/04/2017

Table 2: Indirect exports of *Hoodia gordonii* originating in Namibia, 2006-2015. Quantities are rounded to whole numbers, where applicable.

Term	Unit	Purpose	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
derivatives	kg	T	A	Importer											
				Exporter				5							5
extract	kg	T	A	Importer					36						36
				Exporter											
powder	kg	E	W	Importer			1								1
				Exporter											
		T	A	Importer				2000	52	2600	400	200		2	5254
				Exporter		10	125	1039	2760	240	210				4384
			W	Importer			10								10
				Exporter											
	-	T	A	Importer				500			50				550
				Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Management: Namibia became a Party to CITES on 18th December 1990, with entry into force on 18th March 1991.

The CITES MA of Namibia (*in litt.* to UNEP-WCMC, 2017) stated that *H. gordonii* is protected in Namibia. The species is included on the Schedule 9 list of protected plants (Government of the Republic of Namibia, 1975). The Nature Conservation Ordinance No. 4 of 1975 states that a permit granted by the Minister of Environment and Tourism is required for the harvest, cultivation, relocation and trade of protected plants listed on Schedule 9 (Government of the Republic of Namibia, 1975). The CITES MA of Namibia (*in litt.* to UNEP-WCMC, 2017) reported that resource management and monitoring programmes had ceased in Namibia due to the diminished demand for *H. gordonii* products, however monitoring of *H. gordonii* will expand as part of a long-term plant conservation programme in southern Namibia, subject to available funding. It was also noted that sustainable trade of *H. gordonii* is actively promoted with responsible pharmaceutical companies that support conservation, with plans to establish a controlled harvesting system.

The CITES MA of Namibia (*in litt.* to UNEP-WCMC, 2017) reported that exports were limited to herbarium specimens; however, wild sourced trade for commercial purposes was reported in 2015. Artificial propagation of the species was reported to take place in around 60 registered nurseries in Namibia, with all located in the south-east of the country (CITES MA of Namibia *in litt.* to UNEP-WCMC, 2017).

Through its national legislation project, the CITES Secretariat categorised the national legislation in Namibia as category 1, meaning legislation that is believed generally to meet the requirements for implementation of CITES.

South Africa

Distribution: Raimondo *et al.* (2008) reported that *H. gordonii* was present in three provinces in South Africa, which were all in the centre/ south-west of the country: Free State, Northern Cape and Western Cape. The CITES Management Authority of South Africa (*in litt.* to UNEP-WCMC, 2017) confirmed that the species was protected in five provinces (Western Cape, Free State, North West, Northern Cape and Kwa Zulu Natal Provinces), although it was not explicitly clear whether occurrence was confirmed in all five provinces.

Population status and trends: Raimondo *et al.* (2008) reported that populations in South Africa had declined since 2001 due to indiscriminate harvesting; however, it was not possible to quantify the degree of decline overall, as *H. gordonii* was considered to be widespread and common locally. Swart (2008) stated that although anecdotal information suggested that *H. gordonii* was becoming rarer, the population size of *H. gordonii* in South Africa was unknown. The species was reported to have an uneven distribution, with various assessments recording densities of 7-200 plants per hectare (Swart, 2008)

Threats: Raimondo *et al.* (2008) stated that as a result of a decrease in demand for *Hoodia* internationally, and the strict enforcement of new legislation to protect it, wild harvesting of *H. gordonii* had declined in South Africa. Swart (2008) considered the threats to *H. gordonii* in South Africa to be human-induced habitat loss and degradation, invasive alien species, illegal harvesting, accidental mortality through harvesting of other species, natural die back, and climatic events. Of these, Swart (2008) considered illegal gathering to be the most important threat, followed by habitat loss due to agricultural activities. Swart (2008) commented that legal wild harvesting appeared not to be a threat as harvested sites had not died back, but the possibility of future commercial exploitation and the accidental collection of other *Hoodia* species through mistaken identity was of concern. Swart (2008)

suggested management of the genus rather than individual species as a potential solution, and highlighted that internet trade of *H. gordonii*, although not quantified, was of great concern.

Trade: All CITES annual reports have been submitted by South Africa, 2006-2015. No export quotas have been published for *H. gordonii* by South Africa.

According to data in the CITES Trade Database, the main direct exports of *H. gordonii* from South Africa comprised seeds in 2007, as reported by South Africa only (30 110 000) in 2008, as reported by both South Africa (62 000 000) and importers (50 300 000). According to South Africa, 50 per cent of seeds exported were artificially propagated for scientific purposes, while importers reported 70 per cent of seeds as artificially propagated for commercial purposes.

Other notable exports from South Africa included artificially propagated live plants (according to South Africa), and wild-sourced powder and artificially propagated dried plants reported by weight, according to both South Africa and importers, all of which were for commercial purposes (Table 3). Almost all trade in dried plants was reported 2006-2008 while exports of powder were reported in all years 2006-2015.

Indirect trade in *H. gordonii* originating in South Africa principally consisted of wild-sourced and artificially propagated derivatives and powder, re-exported for commercial purposes (Table 4).

Sinovas *et al.* (2016) reported that Namibia was the main importer of *H. gordonii* seeds from South Africa. Swart (2008) reported that legal harvesting of *H. gordonii* peaked in South Africa in 2007 with 45-50 tonnes of dry material being collected, and commented that *H. gordonii* was exported either as dry material or extracts, despite the fact that according to reported trade data, virtually all exports of *H. gordonii* were seeds. The CITES MA of South Africa (*in litt.* to UNEP-WCMC, 2017) stated that according to the past five years' trade data, *H. gordonii* exports from South Africa can only be traced from the Western Cape Province, and that it is evident that there is no longer a significant market for *H. gordonii*, as demonstrated by the CITES export applications: 21 applications received from 9 applicants to export 4201 kg of *H. gordonii* products between April 2015 and April 2016, decreasing to 16 applications from 6 applicants to export 3353 kg of *H. gordonii* products between April 2016 and April 2017.

Table 3: Direct exports of *Hoodia gordonii* from South Africa, 2006-2015. Quantities are rounded to whole numbers, where applicable. South Africa has submitted all annual reports 2006-2015.

Term	Unit	Purpose	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
derivatives	kg	T	A	Importer				467					16		483
				Exporter		18	10			100	150	91	16		385
			W	Importer	200	13		34							247
				Exporter	1248	66	299	66	68	1941	101	102191	1		105981
	-	T	W	Importer											
				Exporter	21057										21057
dried plants	kg	S	W	Importer											
				Exporter			30030								30030
		T	A	Importer	467	48000	67663	32							116162
				Exporter	10455	123100	48000								181555
			W	Importer	910	204	2790								3904
				Exporter	4034	102									4136
	-	T	W	Importer											
				Exporter	1065										1065
extract	kg	T	A	Importer	60			20	33	500				346	959
				Exporter				23	5						28
			W	Importer	2320	110	250		22	60	5	150			2917
				Exporter	100	1			5		5				112
	l		W	Importer						2					2
				Exporter					5	2	1	2880			2888
	-	T	A	Importer						5200					5200
				Exporter											
leaves	kg	T	W	Importer											
				Exporter	1500	30			40						1570
live	-	M	A	Importer	2017										2017
				Exporter											
		T	A	Importer					80						80
				Exporter		275000			80	3			2		275085
medicine	-	T	A	Importer				1511							1511
				Exporter											
powder	kg	T	A	Importer	113	615	1466	2878	7427	1717	2680	2820	5890	7200	32806
				Exporter	2808	6821	9844	6844	11701	3607	460	4486	10477	12042	69090
			W	Importer	12595	10091	21154	2275	8536	4680	6019	6206	206		71762

Term	Unit	Purpose	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
				Exporter	55694	23385	32482	1834	14755	6050	7608	43842	1825		187475
	-	T	W	Importer					61						61
				Exporter					3000						3000
seeds	-	P	W	Importer											
				Exporter		10000									10000
		S	A	Importer			100000								100000
				Exporter			47000000								47000000
			W	Importer											
				Exporter		15000000	15000000								30000000
		T	A	Importer			35200000								35200000
				Exporter		100000									100000
			W	Importer			15000000								15000000
				Exporter		15000000									15000000
stems	kg	T	W	Importer	580										580
				Exporter	630										630

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 19/04/2017

Table 4: Indirect exports of *Hoodia gordonii* originating in South Africa, 2006-2015. Quantities are rounded to whole numbers, where applicable.

Term	Unit	Purpose	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
derivatives	kg	T	W	Importer		68	<1								68
				Exporter	1833	290	312		9			1	127		2572
	-	P	I	Importer					1	630					631
				Exporter											
		T	A	Importer											
				Exporter								637560			637560
			I	Importer						540					540
				Exporter			1590			310					1900
			W	Importer	710	2400	32850	8580	30960	4260	2700	30	180		82670
				Exporter	99000	49774	109410	158830	144660	58740	23130	26741	23391	12570	706246
dried plants	kg	T	W	Importer											
				Exporter		1	860								861
extract	kg	T	A	Importer		800	2200								3000
				Exporter		4329	3540		7		340		30		8246
			W	Importer		2400	39	22			46	10			2516
				Exporter	139	4057	368	86	310	150	549	867	199	13	6738
	-	T	A	Importer											
				Exporter										78500	78500
medicine	-	M	W	Importer											
				Exporter										204000	204000
		T	W	Importer											
				Exporter										57240	57240
powder	kg	T	A	Importer				545	2576		1500	50	485	24	5180
				Exporter		3279	15	731	3926		2500	100	1377		11928
			W	Importer	1250	8090	190	1104	12	25			104		10775
				Exporter	5010	2669	1960	815	170	10	169	<1	2718		13521
	-	T	W	Importer			3120	1270							4390
				Exporter			1								1

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 19/04/2017

Management: South Africa became a Party to CITES on 15th July 1975, with entry into force on 13th October 1975.

The CITES MA of South Africa (*in litt*. to UNEP-WCMC, 2017) stated that *H. gordonii* is protected by the following legislations: the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA), the Threatened or Protected Species (TOPS) Regulations, Bio prospecting, Access and Benefit Sharing (BAABS) Regulations, and provincial legislations. In addition to this national-level protection, the CITES MA of South Africa (*in litt*. to UNEP-WCMC, 2017) stated that *H. gordonii* is protected in five of the nine provinces in South Africa: Western Cape, Free State, North West, Northern Cape, and Kwa Zulu Natal provinces, (although distribution in all of these provinces is not confirmed (see 'Distribution')).

Specifically, in the Western Cape Province *H. gordonii* is a protected flora in accordance with the provisions of the Nature Conservation Ordinance, No. 19 of 1974. According to the CITES MA of South Africa (*in litt*. to UNEP-WCMC, 2017), prior to 2007, Cape Nature (the nature conservation authority of Western Cape Province) issued licenses to harvest wild *H. gordonii* in the Western Cape, dependent on the harvest methods used, but did not state a limit on the number of plants to be harvested. The Western Cape populations were decimated, so all harvesting of wild *H. gordonii* was suspended in 2007 and only artificially propagated *H. gordonii* was allowed to be harvested. Harvest licenses were replaced with picking permits, which were issued for a specified mass of artificially propagated *H. gordonii*, and permits were issued subject to an on-site inspection of the plants to be harvested. Since the introduction of artificial propagation, no permits or licenses have been issued for the harvest of wild *H. gordonii* in South Africa and the CITES MA of South Africa did not consider illegal harvesting to be an issue (*in litt*. to UNEP-WCMC, 2017).

Swart (2008) stated that the Northern Cape Province issued research permits until early 2000 and put commercial harvest permits on hold until systems were in place to handle the applications. However, no other provinces put harvest permits on hold, so harvest and trade continued without ensuring that the plants being traded were legal (Swart, 2008).

It was reported that a management plan was in place, with the purpose of enabling economic benefits to accrue to the province, to obtain minimum baseline information to ensure that landowners harvest on their own property, to set quotas to ensure sustainable resource use, to obtain baseline information to build a database for the province of its resources and the impact that harvesting has on *H. gordonii* populations, and to acknowledge and respect access and benefit sharing and indigenous knowledge systems (Swart, 2008). It was noted that whilst the main focus of the management plan is on *H. gordonii*, related species, which may be impacted upon, were not taken into account (Swart, 2008).

Swart (2008) reported that previous monitoring took place with site visits where harvesting took place and inspections carried out; these were then followed up at least one year after harvest. However confidence in monitoring at that time was considered to be moderate, as monitoring was not formally structured (Swart, 2008).

Through its national legislation project, the CITES Secretariat categorised the national legislation in South Africa as category 1, meaning legislation that is believed generally to meet the requirements for implementation of CITES.

D. Problems identified that are not related to the implementation of Article IV, paras 2(a), 3 or 6(a).

Swart (2008) reported that from 2005 until March 2008, 15.7 tonnes of dry illegal material was confiscated in South Africa, and noted that unconfirmed anecdotal data indicated that it could be more (over 41 tonnes of dry material), since only an estimated 10-15 per cent of illegal trade is detected.

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Pterocarpus santalinus: India

A. Summary

INDIA:

Assessed as Endangered by the IUCN in 1998, on the basis of severely fragmented distribution and declining populations. Endemic to hills in the Eastern Ghats of India. Overexploitation through illegal harvest for heartwood is the primary threat, with high levels of illegal harvest (in the region of 3000 tonnes annually) and illegal trade reported. Reported trade levels were highly variable during 2006-2015. No trade reported as wild-sourced by India during 2006-2015 or by the importers since 2008. Recent trade consisted of 213 tonnes of timber from plantations (source A) in 2014 only, and 2600 tonnes of seized timber (source I) in 2014-2015. Annual zero export quota set for wild-sourced trade since 2012, as well as a quota of 310 metric tonnes from artificial propagation. India have also published a quota for annual one-time exports of confiscated/seized wood since 2012 (source code 'I'); this quota has been 9090 metric tonnes since 2015. While trade has remained within quota levels, export of seized timber has been reported on several permits per year. India submitted annual reports for all years 2006-2015, except 2011. The harvest and export of wild-sourced *P. santalinus* is prohibited, management in the country focuses on controlling illegal harvest and other threats and on regeneration of natural populations. Stock from cultivated sources does not currently appear to be available to meet demand. The Plants Committee previously requested that India should clarify the level of artificial propagation of this species, and that a scientific monitoring system of harvested populations should be established; monitoring also appears relevant to plantations given the high demand for the species and the high level of exports reported from plantations (source A) in 2014. As India did not respond to the consultation relating to the RST, no update on the level of artificial propagation or management of timber from plantations is available for this endemic, Endangered species which is extremely slow-growing (reaching harvestable size at 80-100 years). The basis for robust non-detriment findings for export from populations claimed as plantations is unclear, as results of inventories have not yet been made available, therefore categorised as Action is needed. In addition, illegal trade and the continued export of large volumes of seized timber remain areas of concern not related to the implementation of Article IV, although these have an impact on the survival of populations of this speices in the wild.

RECOMMENDATION:

Less concern

RST Background

Pterocarpus santalinus (Red Sandalwood) was selected for the Review of Significant Trade (RST) as a priority species for review (all range States) at the 21st meeting of the Plants Committee, May 2014 (PC21

WG2 Doc. 1, PC21 ExSum. Cons.). *P. santalinus* was identified as a species that met a high volume trade threshold for globally threatened species 2007-2011, as well as in 2012, and also met the criteria for being a globally threatened species in trade (Endangered) on the basis of trade data presented in PC21 Doc. 12.4. At PC22 (October, 2015), no responses to the Secretariat's consultation had been received from range States (PC22 Doc. 11.3 Annex). Sri Lanka was removed from the RST process (no exports, not a range State), whilst India was retained (PC22 Com. 3 (Rev. by Sec.), PC22 Sum. 5 (Rev. 1)).

P. santalinus was previously included in the RST following CoP13 (2004). At PC15 (May 2005), information on seven Asian medicinal plant species was considered in PC15 Doc. 10.2.2, and *P. santalinus* was selected for review (PC15 WG2 Doc. 1 (Rev. 1), PC15 Summary Record). India was retained in the RST process as no response was received (PC16 Doc. 10.3 Annex 1, PC16 Summary Record), and at PC17 (April, 2008) trade from India was categorised as of 'Urgent Concern' and a series of recommendations were formulated (PC17 WG4 (Rev. 1)). At the 59th meeting of the Standing Committee (March, 2010), no response to the Secretariat's consultation had been received from India and recommendation to suspend trade was agreed (SC59 summary record). On 30th April 2012, the Secretariat received a report from the Scientific Authority of India comprising a non-detriment finding study (SC62 Doc 27.2 Rev. 1); India was considered to have complied with the recommendations of SC61 and established a zero export quota for specimens from the wild; consequently the Committee's recommendation to suspend trade was withdrawn (SC62 Summary Record).

P. santalinus was also reviewed for PC9 (June, 1999) as part of a study of trade in CITES-listed medicinal plants (Doc. PC9.9.1.3).

B. Species characteristics

Biology: *P. santalinus* is an endemic species to the tropical dry deciduous forests of the Eastern Ghats in southern India (Arunkumar and Joshi, 2014) found at altitudes of 100 m to 1000 m above sea level, with the most favourable altitudes at 200 to 800 m (Raju and Nagaraju, 1999; Padmalatha and Prasad, 2008; Arunkumar and Joshi, 2014). *P. santalinus* grows in shallow, stony, well-drained, hilly, sloping landscapes (Raju and Nagaraju, 1999) in a hot and dry climate with low rainfall of 500-800 mm (CITES Scientific Authority of India, in the 2012 NDF study submitted to the Secretariat). It is a deciduous tree that can cross or self- pollinate (Arunkumar and Joshi, 2014).

P. santalinus reaches a girth of 1.5-1.9 m and a height of 10 to 15 m (Doc. PC9.9.1.3; Padmalatha and Prasad, 2008). The species takes over 40 years to grow to maturity (CITES SA of India, 2012; Kukrety *et al.*, 2013). The CITES SA of India (2012) reported that under natural conditions, *P. santalinus* takes 80 to 100 years to reach a harvestable size of 70 cm girth for heartwood extraction, or 50 to 60 years from a pole size of 30cm.

C. Country review

India

Distribution: *P. santalinus* is endemic to the south of Eastern Ghats in southern India (Babar *et al.*, 2012; Arunkumar and Joshi, 2014). It is found in elevated areas of Chittoor, Cuddapah and Nellore districts in the Seshchalam hills within the Rayalaseema district of Andhra Pradesh (Vedavathy, 2004), partly in Arcot and Chengalpattu in the state of Tamil Nadu, Nigidi hills of Anantapur, Nallamis of Kuenool and in the state of Karnataka (Reddy *et al.*, 2009; Babar *et al.*, 2012; Government of India, 2014). Introduced populations were found in Pakistan, Sri Lanka and Taiwan (Province of China) with reports of cultivation in China and the Philippines (Mulliken and Crofton, 2008; Arunkumar and Joshi, 2014). Figure 1 provides a map of the distribution in India.

P. santalinus was reported to be present in eight forest divisions (Kukrety *et al.*, 2013), with range estimates varying from 200 000 ha (Raju and Nagaraju, 1999; MacLachlan and Gasson, 2010) to 219 000 ha (Senthilkumar *et al.*, 2015) and to 398 000 ha (CITES SA of India, 2012). Of the eight forest divisions in Andhra Pradesh, the largest forests bearing the species were reported to be Kadapa (105 000 ha), Rajampet (85,000 ha) and Proddatur (78 000 ha) (CITES SA of India, 2012).

Within Andhra Pradesh, 60 per cent of the land containing *P. santalinus* are less than one hectare in size (Kukrety *et al.*, 2013).

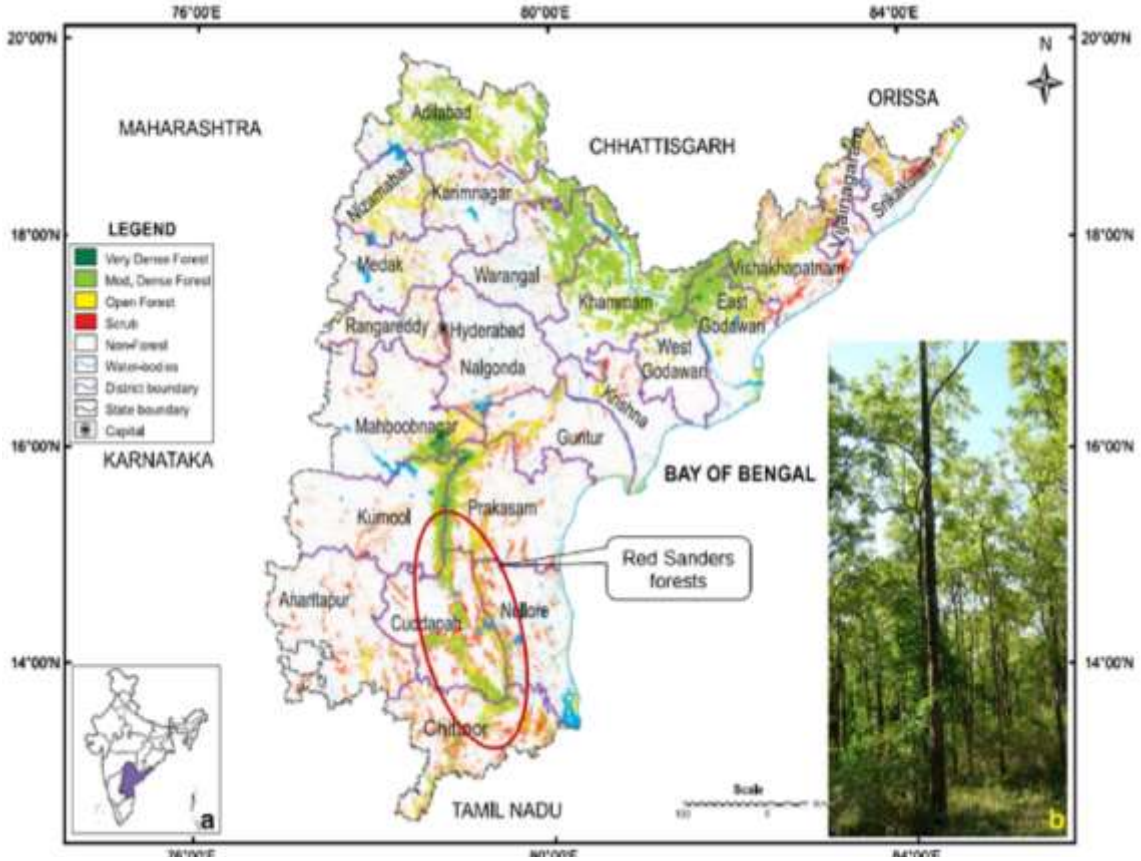

Figure 1. Distribution of *P. santalinus* in Andhra Pradesh, India sourced from Kukrety *et al.*, 2013.

Population status and trends: The IUCN Red List assessment classified *P. santalinus* as Endangered (needs updating) on the basis of severely fragmented distribution and declining populations as the result of logging and harvesting primarily for the timber and dye trade, and to a lesser extent, for harvest for the medicine and cosmetics (IUCN, 1998). *P. santalinus* was described by UNDP as an important endangered plant of medicinal value in southern India (UNDP, 2003 in PC14 Doc 9.3).

The CITES SA of India (2012) reported the area of *P. santalinus* had remained 'more or less constant over the years', but noted that the "quality of the population" was being affected. Based on a survey of random sample plots, the average density of *P. santalinus* plants was estimated to be 167 plants / ha, with 92 trees / ha for trees > 30 cm girth at breast height and 13 trees / ha for trees > 70 cm girth at breast height (CITES SA of India, 2012). The population of *P. santalinus* was reported to be skewed towards smaller girth sizes as a result of unsustainable and extensive harvesting (CITES SA of India,

2012). *P. santalinus* was reported to naturally occur in very low densities of 13 trees per ha which increases the species' vulnerability to illegal harvesting (CITES SA of India, 2012).

No accurate estimates of population status and structure within the natural range could be located.

Threats: The primary threat to *P. santalinus* was reported to be overexploitation caused by illegal harvest as a result of great international demand for its heavy dark red wood (Rao and Raju, 2002; Arunkumar and Joshi, 2014). The CITES SA of India (2012), considered that the skewed distribution of trees towards lower girth classes was due to large scale illegal felling of higher girth class trees for heartwood extraction.

P. santalinus was in demand both domestically and internationally for its two varieties of wood; a rare form which was highly valued on the international markets with rippled grains termed 'red gold' and a straight grained wood named the 'Pride of Andhra Pradesh' (CoP17 Inf. 48; Arunkumar and Joshi, 2014). Japan is a major demand centre for this wood to make the musical instrument 'Shamisen' and for other cultural uses such a traditional crafts (Arunkumar and Joshi, 2014). The wood is used in highly valued furniture in modern China and throughout Chinese history (Arunkumar and Joshi, 2014). *P. santalinus* contains a red dye 'santalin' used within European medicine, in European and American foods as a colouring agent and by French furniture makers (Arunkumar and Joshi, 2014). It was also used as incense in Myanmar and Tibet (Azamthulla *et al.*, 2015).

Global demand for *P. santalinus* was thought to be 3000 tonnes per annum (Kukrety *et al.*, 2013) and the CITES SA of India (2012), estimated that annual removal from natural forests was in the region of 3000 tonnes of heartwood through illegal felling. *P. santalinus* wood is collectable and highly valued at approximately USD 150 000 per m^3 in China due to its rarity following restrictive exportation measures (Wenbin and Xiufang, 2013). If sold at the government standard rate in India the wood was worth approximately Rs. 800 000 per tonne (USD 11 948) to Rs. 12 00 000 per tonne (USD 17 922) in 2016 (Soundararajan *et al.*, 2016). In 2014, the Andhra Pradesh government sold 3 615 tons of seized logs reportedly worth USD 149.8 million (CoP17 Inf. 48).

Illegal logging of this species has been described as 'continuous and rampant' despite the very slow natural growth rate of this species (CITES SA of India,2012), (see 'Trade'). It was reported that there was a significant threat of ecosystem degradation as a result of overexploitation (IUCN, 1998).

P. santalinus has been used domestically in traditional medicines and in folklore to treat diabetes, fever, snake bites, skin ailments, ulcers and as a cosmetic treatment (Padmalatha and Prasad, 2008; Arunkumar and Joshi, 2014). *P. santalinus* is known to have anti-hyperglycaemic, anti-inflammatory, anti-helminthic and aphrodisiac properties, as well as being used to treat dysentery (Azamthulla *et al.*, 2015). Many groups of people use this species for medicinal or cultural purposes in the Chittoor, Kandhamal, the Western Ghats, Kerala, in coastal Karnataka, Assam and Kalahandi (Arunkumar and Joshi, 2014). *P. santalinus* was widely used and 'readily available' in India's herbal medicine industry, however, two pharmaceutical companies considered the species to be in 'short supply' or limited (Mulliken and Crofton, 2008). Wood of low quality was sold for fuel in India (Business Line, 2002).

P. santalinus was traded in markets in Delhi, Kolkata, Mumbai and Haridwar with an estimated 100-400 tonnes of this species being sold per year in Delhi in 1997 (Doc. PC9.9.1.3). The price of this wood was USD 0.5 to 3.1 per kg in 1997 (Doc. PC9.9.1.3).

Other, more minor threats include overgrazing and summer wild fires (IUCN, 1998; CITES SA of India, 2012).

Trade: *P. santalinus* was listed in CITES Appendix II on 16th February 1995, with the annotation designating logs, wood-chips and unprocessed broken material. This annotation was amended on 13th September 2007 to read 'logs, wood-chips, powder and extracts'. All CITES annual reports have been submitted by India for the period 2006-2015, with the exception of 2011. India published a zero export quota for trade in *P. santalinus* for "all specimens from the wild" for the years 2012-2017. Quotas in 2012-2014 were published with the following note: "India will authorize the export of specimens of any type, from 310 metric tonnes of wood per year from artificially propagated source (Source "A") and a one-time export of specimens of any type, from 11 507 metric tonnes of wood from confiscated or seized source (Source "I")". The same note was published with the 2015-2017 quotas, albeit with a limit of 9090.09 metric tons of seized wood.

No trade in wild-sourced *P. santalinus* has been reported by either India or importers since 2008. Source I exports did not exceed the quotas published by India; a permit analysis suggests that India issued five permits for the export of Source I *P. santalinus* in 2014 and 26 permits in 2015. India has banned the commercial export of all wild-taken specimens of species included in Appendices I, II and III (CITES Notif. No. 1999/39).

According to data in the CITES Trade Database, direct trade in *P. santalinus* predominantly comprised timber for commercial purposes with 1 078 610 kg reported by India and 3 470 015 kg reported by importing countries the majority of which was pre-Convention (reported in 2006 and 2008) and confiscated/seized (Source 'I') reported in 2014 and 2015 (Table 1). Importers reported 2933 m^3 wild-sourced timber in 2006 and 177 490 kg of wild-soured timber in 2008; India did not report this trade. All trade reported since 2010 has been in confiscated or seized, or artificially propagated specimens.

Indirect trade in *P. santalinus* originating in India consisted of extracts, specimens and timber from wild-sourced, confiscated/seized and pre-convention specimens, primarily for commercial purposes (Table 2). Low quantities were reported for scientific or law enforcement judicial/forensic purposes.

Illegal trade is a threat to this species to supply international demand (CITES SA of India, 2012). The Andhra Pradesh Forest department seized 3 067 tons of wood between 2001 and 2007 (Kukrety *et al.*, 2013). In 2012-2013, 1 488 forest offence cases exclusively involved this species in Andhra Pradesh, with 1 390 tonnes of wood seized (Arunkumar and Joshi, 2014). In 2012, it was estimated that 10 437 tons of seized stock was held across India; this comprised 7 311 tons seized and held in depots in Andhra Pradesh, and an additional 3 126 tons stored by various authorities outside of Andhra Pradesh (CITES SA of India, 2012). Annually, it was that estimated 800 to 2 000 tons are illegally imported into China (Treanor, 2015). Singapore was also noted as a 'major destination for illegal' *P. santalinus* timber (PC15 Doc. 10.2.2). It is estimated that these seizures of wood only compose 30 per cent of the wood illegally smuggled out of India (CITES SA of India, 2012). Illegal trade routes were identified from the Indian port of Chennai to Malaysia, Singapore or Hong Kong (Treanor, 2015).

Annual harvest from private lands was estimated at 310 tonnes per year in 2012 and no wild harvest was permitted (CITES SA of India, 2012). Exports from plantations were previously authorized (in 1995 and 1996), but since 1999 it was reported that no wood from cultivated sources had been exported (CITES (CITES SA of India, 2012).

Table 1. Direct exports of *Pterocarpus santalinus* from India, 2006-2015. Quantities rounded to whole numbers where applicable. India has not submitted an annual report for 2011.

Term	Unit	Purpose	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
chips	-	-	I	Exporter											
				Importer					25000						25000
derivatives	kg	-	I	Exporter											
				Importer		1									1
extract	kg	T	I	Exporter									120		120
				Importer											
			O	Exporter			14178	1413							15591
				Importer											
powder	kg	T	I	Exporter							<1				<1
				Importer							<1				<1
timber	kg	T	A	Exporter									213297		213297
				Importer											
			I	Exporter									312708	2331103	2643811
				Importer									492289	2164037	2656326
			O	Exporter	458509		94096								552605
				Importer	458709		177490								636199
			W	Exporter											
				Importer			177490								177490
	m	T	O	Exporter											
				Importer			94								94
	m^3	T	O	Exporter	2933										2933
				Importer											
			W	Exporter											
				Importer	2933										2933
	-	T	O	Exporter	5003										5003
				Importer											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Table 2: Indirect exports of *Pterocarpus santalinus* originating in India, 2006-2015. Quantities rounded to whole numbers where applicable.

Term	Unit	Purpose	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
extract	kg	T	W	Importer											
				Exporter					17	12					29
specimens	-	S	I	Importer											
				Exporter										1	1
timber	kg	L	I	Importer											
				Exporter	65000	54600									119600
		T	I	Importer										26646	26646
				Exporter				169295	36020	12480				26646	244441
			W	Importer			94096			12480					106576
				Exporter	2888		48000								50888
	m	T	O	Importer											
				Exporter			94								94

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Management: India joined CITES on 20th July 1976, with entry into force on 18th October 1976.

P. santalinus is protected under Indian legislation and commercial harvest from public forests has been controlled by the government since 1956 (Kukrety *et al.*, 2013). The CITES SA India (2012) provided information on legislation relevant to the species. These included: the *Andhra Pradesh Forest Act, 1967* and the *Indian Forest Act, 1927* that make the transportation or possession of an unauthorised forest product an offence (Government of India Ministry of Law, 1927; Forestry Department, 1967). The *Wild Life Protection Act, 1972* makes the removal of trees in a protected area illegal, including *P. santalinus* (Parliment of India, 1972). *The Foreign Trade Policy, 1962* prohibits the export of *P. santalinus* in any form, including logs, timber, chips and powder from cultivated and wild sources, with the exception of extracts, dyes and instruments, with sanctions including a fine and/or imprisonment for a maximum of seven years (CITES SA of India, 2012). The *Andhra Pradesh Preservation of Private Forest Rules, 1978* categorises this species as "reserved", meaning that cutting, transportation and sale must be permitted by the Divisional Forest Officer (Governer of Andhra Pradesh, 1978). Felling this species is illegal unless the individual tree exceeds 1.3 m height and 120 cm girth (CoP17 Inf. 48). The *Tamil Nadu Forest Act, 1882*, lists this species as "scheduled timber", meaning that possession of this species over 0.5 cubic meters is prohibited, unless identifiable with the Government mark (Tamil Nadu Forest Department, 1882). *P. santalinus* is also regulated by various further transport rules, including permitting*; Andhra Pradesh Sandal Wood and Red Sanders Wood Transit Rules, 1969*, *Pondicherry Timber Transit Rules, 1983* and the *Tamil Nadu Timber Transit Rule, 1968* (CoP17 Inf. 48; CITES SA of of India, 2012).

The export of *P. santalinus* from India was prohibited through the listing of the species of the *Negative List of Exports* in 1994 (Doc. PC9.9.1.3). The Foreign Trade Policy 2015-2020 lists *P. santalinus* as a prohibited item to export in any form, except extracts, dyes and instruments, and these must be coupled with suitable permits before exportation is allowed (CoP17 Inf. 48). The export of wild sourced unworked *P. santalinus* timber has been banned since 1992 and as a result, multiple seizures of illegal shipments totalling hundreds of tonnes took place (PC15 Doc. 10.2.2). Illegal trade was 'reported to be very high' (CITES SA of India, 2012).

No managed harvest was permitted with the exception of removal from private land with permits (CITES SA of India, 2012). The only other felling was reported to be illegal and carried out by opportunistic and selective harvesters (CITES SA of India, 2012), despite the management of trees by the military (Treanor, 2015). Occasionally, the seizures of this wood are sold by the Government of Andhra Pradesh via e-commerce as other sales methods are not permitted (CoP17 Inf. 48; CITES SA of India, 2012).

Each of the eight forest divisions which contain *P. santalinus* have specific management plans for this species (CITES SA of India, 2012). These management plans focus on the control of fire, illegal harvest, grazing, reducing soil erosion and regeneration of natural *P. santalinus* forests (CITES SA of India, 2012). They aim to reduce the likelihood of wild fire by removing a grass (*Cymbopogon coloratus*), which will lessen damage to saplings and seeds of *P. santalinus* (CITES SA of India, 2012). The management plan of Andhra Pradesh Forest Department for *P. santalinus* contains four key elements: increasing the number of plantations and stock of *P. santalinus* outside the natural range, improving *in-situ* conservation by planting seedlings, increasing protection measures by controlling illegal logging by increasing on-the-ground capacity and increasing sanctions for forest-related crimes (CITES SA of India, 2012).

No detailed surveys or long term monitoring of the species were located.

P. santalinus occurs across 168 000 ha within protected areas, wildlife sanctuaries and National Parks (CITES SA of India, 2012), including in the Seshachalam Hills Biosphere Reserve (Guptha *et al.*, 2012), Chamala, Tirupathi, Balapalli, Chitvel, Siddhout, Vontimitta, Proddatur, Badvel, Rapur and Atmakur (CITES SA of India, 2012), Sri Venketswar Wildlife Sanctuary and Sri Lankamalleswara Sanctuary in the

state of Andhra Pradesh. It has been noted that a lack of conservation incentives amongst local people, farmers and other stakeholders have encouraged a switch to cash crops for higher returns instead of managing *P. santalinus* plantations (IUCN, 1998; Kukrety *et al.*, 2013). However, the high price of wood, geographical advantage, the niche market within India creates opportunities to improve local economic conditions and forest conservation (Kukrety *et al.*, 2013). Increasing sustainable wood trade practises with stakeholder participation was considered to be potentially beneficial to the persistence of *P. santalinus* (Arunkumar and Joshi, 2014).

The Plants Committee in 2005 called for greater clarification and implementation of the national export controls for *P. santalinus* and major importing countries such as Japan and China to review their levels of trade, increase the checks and confirm the validity of CITES permits and increase seizures of illegal shipments (PC15 Doc. 10.2.2). India's 2012 non-detriment finding study for *P. santalinus* concluded that the harvest from natural forests was not sustainable and that future exports should be derived from cultivation (CITES SA of India, 2012).

Mulliken and Crofton (2008) in PC 17 Inf. 10 suggested action was required as there was no evidence of a fall in demand and artificial propagation was not yet at a high enough level to undercut the incentives for illegal felling. It was reported that *P. santalinus* could be cultivated outside of its natural range (CITES SA of India, 2012). It was reported that *in-situ* seed stands had been established in Tamil Nadu which covered 21 ha (CoP17 Inf. 48). *Ex-situ* measures include plantations of 3 000 ha of *P. santalinus* in Tamil Nadu and Andhra Pradesh (CITES SA of India, 2012) and establishing private and communal plantations, however the complexities of administration and regulation were noted as a deterrent (Kukrety, 2011).

The CITES MA of India (2012) suggested that future sustainable harvests could be made from plantations and trees grown on private lands, and at that time there were 3 000 ha of *P. santalinus* plantations of various ages within State Forest Departments which were not being felled. It was noted that any exports from these cultivated populations as well as those on private farmland would require detailed inventories to estimate the growing stock available and to assess the quantity and quality of the heartwood (CITES MA of India, 2012). No further details of the inventories of these stocks or information on their management and monitoring could be located, although trade in cultivated timber (source code A) resumed in 2014. The CITES SA of India (2012) recommended that a 'systemic tree improvement programme' needed to be initiated to make the cultivation of this slow growing species profitable under cultivation; it is unclear if this programme was established.

Through its national legislation project, the CITES Secretariat categorised the national legislation in India as category 2, as legislation that is believed generally not to meet all of the requirements for the implementation of CITES.

The CITES Authorities in India were consulted as part of this review, but no response was received.

D. Problems identified that are not related to the implementation of Article IV, paras 2(a), 3 or 6(a).

Illegal harvest and trade is the primary threat to the species and high volumes of seized material are being exported. Exports of source I timber have been reported on several permits per year, despite the quota for seized wood specifying that export would be a 'one-time' annual occurrence.

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Dendrobium chrysotoxum: Lao People's Democratic Republic

A. Summary

LAO PDR:	RECOMMENDATION:
Not assessed globally by the IUCN, and global population status and trend unknown. Occurs in central and southern Lao PDR. The main threats are unsustainable collection for the international trade in ornamental plants and traditional medicine, and habitat loss. Lao PDR has not published an export quota. High levels of trade in live plants 2006-2015 (730 000 kg), with all trade reported as artificially propagated since 2008. All annual reports were submitted by Lao PDR for the years 2006-2015. Lao PDR did not respond to the consultation relating to the RST. No information on monitoring or management measures were located. However, given the lack of anticipated wild-sourced trade (none has been reported since 2007), categorised as Less concern.	Less concern

RST Background

Dendrobium chrysotoxum (Fried-egg Orchid) was selected for the Review of Significant Trade (RST) as a priority species for review (all range States) at the 21st meeting of the Plants Committee, May 2014 (PC21 WG2 Doc. 1, PC21 ExSum. Cons.). *D. chrysotoxum* was identified as a species that met a high volume trade threshold 2007-2011, on the basis of trade data presented in PC21 Doc. 12.4. At PC22 (October, 2015), responses to the Secretariat's consultation had been received from Cambodia, China, Myanmar and Nepal (PC22 Doc. 11.3 Annex). Bangladesh, Bhutan, Cambodia, China, India, Myanmar, Nepal, Taiwan (Province of China), Thailand and Viet Nam were removed from the RST process (no exports), whilst Lao People's Democratic Republic (hereafter referred to as Lao PDR) was retained (PC22 Com. 3 (Rev. by Sec.), PC22 Sum. 5 (Rev. 1)).

B. Species characteristics

Biology: *D. chrysotoxum* is an epiphytic orchid with up to 20 flowers (Roy *et al.*, 2007). The flowers are deep yellow with an orange-yellow centre, are fragrant with a honey scent and are present for approximately two weeks (Kamemoto *et al.*, 1999; Atichart, 2013). *D. chrysotoxum* is tolerant to various climatic conditions and is typically located in ever-green semi-deciduous forests at 400-1 000 meters, in tropical to sub-tropical climates (Kaur and Bhutani, 2011). In Lao, PDR *D. chrysotoxum* was observed at 300-1 063 m elevation growing from a limestone substrate (Schuiteman *et al.*, 2008).

Dendrobium species have a very low reproduction rate and therefore slow growth in the wild (Neng-chang, 2004). *Dendrobium* species can reproduce to form morphologically different interspecific hybrids in the wild, which have features of both parental species (Lam *et al.*, 2015).

C. Country review

Lao, PDR

Distribution: *D. chrysotoxum* is present in Bangladesh, Bhutan, Cambodia, southern China, northeastern India, Lao, PDR, Myanmar, Nepal, Taiwan (Province of China), Thailand and Viet Nam (Kumar *et al.*, 2016). In Lao, PDR, *D. chrysotoxum* is present in the provinces of Bolikhamxa, Champasak, Khammouan, Phongsali, Savannakhet, Vientiane, Xaisomboun and Xiangkhoang in the central region and southern region (Schuiteman *et al.*, 2008).

Population status and trends: This species has not been assessed by the IUCN. Little information on population status and trends was located. Ornamental plant traders interviewed in Lao, PDR, Thailand and Myanmar noted that *D. chrysotoxum* had declined over the length of the traders' careers, which was on average six years (Phelps, 2013).

Threats: Unsustainable and excessive collection from wild populations of *D. chrysotoxum* is a global threat, particularly due to the high economic value and great demand for *Dendrobium* species coupled with the slow growth of the species (Neng-chang, 2004; Tao *et al.*, 2010).

D. chrysotoxum is heavily exploited in Lao, PDR for the domestic and international ornamental pot plant trade and the international traditional medicinal market (Schuiteman *et al.*, 2008; Lamxay, 2009; Kaur and Bhutani, 2011). *D. chrysotoxum* is the most commonly used *Dendrobium* species within traditional oriental medicine as it is a therapeutic agent with potential anti-glycaemic, antioxidant, immunostimulant, anti-cataract and anti-tumour forming properties (Roy *et al.*, 2007; Zhao *et al.*, 2007).

Unsustainable and illegal domestic and cross-border trade of *D. chrysotoxum* has been noted in Lao, PDR (Vantomme *et al.*, 2002; Schuiteman *et al.*, 2008). Collection of certain species of *Dendrobium*, including *D. chrysotoxum*, was reported to be undertaken on a large scale in Lao, PDR by Schuiteman *et al.* (2008) who noted that one exporter in central Lao, PDR sent more than 100 000 kg of dried *Dendrobium* stems of wild-sourced plants to China in a single year. Schuiteman *et al.* (2008) considered that this likely represented only a fraction of the total number collected.

Cross-border, often illegal, trade of *D. chrysotoxum* into neighbouring countries was reported to be common, occurring frequently along the Mekong River (Phelps, 2013). According to a review of Southeast Asian orchid trader reports, *Dendrobium* species, including *D. chrysotoxum,* were commonly exported from Lao, PDR to Thailand (Phelps, 2013). Illegal trade was noted to follow Road 9 in central Lao, PDR from Savannakhet, on the border of Thailand, across to the Vietnam border (Phelps, 2013).

Surveys of markets in Thailand undertaken by Phelps and Webb (2015) found a large, previously undocumented trade in wild ornamental plants. Lao, PDR was reported by to be the main source country of orchids at two of the marketplaces investigated: Jatujak and Mukdahan (Phelps and Webb, 2015). *Dendrobium* was by far the most frequently traded orchid genus reported from these markets at (Phelps and Webb, 2015). *D. chrysotoxum* was reported to be present in the Mukdahan market on the Thailand-Lao, PDR border during surveys in 2011/2012 (Phelps & TRAFFIC, 2015).

Habitat loss was also considered a general threat to orchids, with forests reportedly being rapidly converted for timber or agriculture (Schuiteman *et al.*, 2008), and was considered a threat to *D. chrysotoxum* (Kaur and Bhutani, 2011).

Trade: *D. chrysotoxum* was listed in CITES Appendix II on 1st July 1979, as part of the family listing of Orchidaceae. All CITES annual reports have been submitted by Lao, PDR for the period 2006-2015. Lao,

PDR has not published any export quotas for *D. chrysotoxum*. A trade suspension was issued for all commercial trade in specimens of CITES-listed species for Lao, PDR on 19th March 2015 for failing to submit a national ivory action plan (NIAP; CITES Notification No. 2015/013); the suspension was withdrawn on 15 September 2015 (CITES Notification No. 2015/055). A further trade suspension for all commercial trade in specimens of CITES-listed species was issued on 11th February 2016 due to a failure to submit a progress report on the implementation of a national ivory action plan (CITES Notification No. 2016/011). This recommendation to suspend trade was withdrawn on 21st March 2016 (CITES Notification No. 2016/029).

According to data from the CITES Trade Database, direct trade was primarily in live, artificially propagated plants reported by weight (Table 1). From 2006 to 2014, 730 000 kg of live *D. chrysotoxum* were exported from Lao, PDR of which 68 per cent were artificially-propagated (reported 2008-2012) and the remainder wild-sourced (reported in 2006 and 2007 only). Direct exports of artificially propagated *D. chrysotoxum* have declined from 2009 to 2014. All trade was reported by importers; Lao, PDR did not report any exports of *D. chrysotoxum*.

No indirect trade originating in Lao, PDR was reported 2006-2015. Lao, PDR did not report the export of *D. chrysotoxum* during 2006-2015 at the species, genus or family level.

Table 1: Direct exports of *Dendrobium chrysotoxum* from Lao, PDR, 2006-2014. All trade was for commercial purposes. Lao, PDR submitted annual reports for all years 2006-2015.

Term	Unit	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
live	kg	A	Importer			150000	150000	100000	50000	50000			500000
			Exporter										
		W	Importer	80000	150000								230000
			Exporter										
	-	W	Importer		5								5
			Exporter										
roots	kg	W	Importer		7000								7000
			Exporter										
stems	kg	A	Importer									50000	50000
			Exporter										

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Management: Lao, PDR became a Party to CITES on 1st March 2004, with entry into force on 30th May 2004.

No information was located regarding protection that might be in place or national legislation which may protect populations of *D. chrysotoxum* in Lao, PDR. Phelps (2015) reported that in Laos PDR harvest of forest products including orchids is restricted to production forests with sustainable management plans under Lao Forestry Law No. 6/NA, although no information on management plans could be located. A provincial quota system was established in Lao, PDR for the domestic trade in orchids, however, there was concern regarding the scientific basis this quota was based upon (Lamxay, 2009). Phelps & TRAFFIC (2015) reported that there was no evidence of Lao, PDR 'participating or making effort to participate in a sustainable or managed harvest' and a lack of domestic permit issuing. No further information could be found about the management of the species' harvest and trade in the country.

Export of dried wild orchid stems from Lao, PDR to China were reported to occur illegally (Lamxay, 2009). In 2007, it was reported that large scale commercial trade of this species from a propagative source was lacking (Roy *et al.*, 2007) and cultivation was reported as problematic because of the low rates of survival and yield of *Dendrobium* species (Neng-chang, 2004). Following imports of artificially propagated trade from Lao, PDR reported in 2008 (Table 1), it was noted that propagation and

cultivation in the country took place in the Xiangkhouang region to reduce the pressure on wild populations (Lamxay, 2009).

Phelps (2013) reported that conservation measures could be improved in Southeast Asia by targeted enforcement and greater inspection at already established checkpoints leading to known wildlife markets coupled with interventions and inspections of the expanding private transport network to minimise the illegal trade in *D. chrysotoxum.* Lamxay (2009) suggested that all species of orchids in Lao, PDR should be protected, training of customs officials in orchid identification should be improved, NGO's should have a greater role in the monitoring of orchid trade and there should be general improvement in communication and collaboration between CITES authorities and other relevant stakeholders.

Through its national legislation project, the CITES Secretariat categorised legislation in Lao, PDR as Category 3, meaning legislation "is believed generally not to meet the requirements for the implementation of CITES".

The CITES Authorities in Lao, PDR were consulted as part of this review, but no response was received.

D. Problems identified that are not related to the implementation of Article IV, paras 2(a), 3 or 6(a).

Illegal exports of *D. chrysotoxum* have been noted in the literature (Vantomme *et al.*, 2002; Schuiteman *et al.*, 2008; Phelps, 2013).

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Dendrobium moschatum: Lao People's Democratic Republic

A. Summary

LAO, PDR:	Not assessed globally by the IUCN, and global population status and trend unknown. Occurs in the south and southeast of Lao PDR. The primary threats are collection for use in traditional medicines and habitat loss. No exports of D. moschatum were reported by Lao PDR for the period 2006-2015; importers reported 150 000 kg of wild-sourced plants in 2006-2007, but no reported trade since. All annual reports were submitted by Lao PDR for the years 2006-2015. Lao PDR did not respond to the consultation relating to the RST. No information on monitoring or management measures were located. However, given the lack of anticipated wild-sourced trade (none has been reported since 2007), categorised as Less concern.	RECOMMENDATION: Less concern

RST Background

Dendrobium moschatum was selected for the Review of Significant Trade (RST) as a priority species for review (all range States) at the 21st meeting of the Plants Committee, May 2014 (PC21 WG2 Doc. 1, PC21 ExSum. Cons.). *D. moschatum* was identified as a species that met a high volume trade threshold 2007-2011, on the basis of trade data presented in PC21 Doc. 12.4. At PC22 (October, 2015), responses to the Secretariat's consultation had been received from China, Myanmar and Nepal (PC22 Doc. 11.3 Annex). Bhutan, China, India, Myanmar, Nepal, Thailand and Viet Nam were removed from the RST process (no exports), whilst Lao People's Democratic Republic (hereafter referred to as Lao, PDR) was retained (PC22 Com. 3 (Rev. by Sec.), PC22 Sum. 5 (Rev. 1)).

B. Species characteristics

Biology: *D. moschatum* is an epiphytic orchid (Deb *et al.*, 2009). The species has fragrant pink-yellow flowers that are 5-7 cm width and 4-15 cm in length, which flower during May to June and bear fruit in July to April (Rao and Chowlu, 2006; Gogoi *et al.*, 2010). *D. moschatum* occurs in sub-tropical climates at altitude in open forests (Sembi *et al.*, 2014; Pfahl, 2017). Kumar *et al.* (2011) suggested *D. moschatum* is found exclusively at approximately 1 000 m above sea level, however, Gogoi *et al.* (2010) noted this species was present at 500-1 300 m, and Yonzone *et al.* (2011) recorded its presence at 220 m above sea level. *Dendrobium* species can hybridise in the wild (Lam *et al.*, 2015).

C. Country reviews

Lao, PDR

Distribution: *D. moschatum* is distributed in Bhutan, China, India, Lao PDR, Myanmar, Nepal, Thailand and Viet Nam (Tsavkelova *et al.*, 2003). Occurrence was reported in Lao PDR by Thomas *et al.* (2006). *D. moschatum* was reported to be distributed to the south and southeast of the country, in the

Attapu, Bolikhamxai, Champasak, Louangphrabang, Savannakhet and Vientiane provinces, as well as the lowlands between 'Mekong and Hue' (Schuiteman *et al.*, 2008).

Population status and trends: This species has not been assessed by the IUCN. Little information was located on the population trend or status of *D. moschatum* within Lao, PDR, although the population was thought to have declined on the basis of collection, habitat loss and poor natural regeneration (Sembi *et al.*, 2014).

Threats: As noted above, threats include collection and habitat loss (Sembi *et al.*, 2014). *Dendrobium* species are used widely in traditional medicines (Bulpitt, 2005). Although it was reported that important phytochemicals with active ingredients are found within this species (De and Medhi, 2015), no information could be located on the specific medical use of *D. moschatum* in Lao, PDR.

Lao, PDR is undergoing rural development through the establishment of agro-industrial plantations, mines and hydroelectric power stations; this was reported to be leading to habitat loss and extirpation of native orchid species (Kumar *et al.*, 2016).

Trade: *D. moschatum* was listed in CITES Appendix II on 1st July 1975, as part of the family listing for Orchidaceae. All CITES annual reports have been submitted by Lao, PDR for the period 2006-2015. Lao, PDR has not published any quotas for the export of *D. moschatum*. A trade suspension was issued for all commercial trade in specimens of CITES-listed species for the Lao, PDR on 19th March 2015 for failing to submit a national ivory action plan (NIAP; CITES Notification No. 2015/013); the suspension was withdrawn on 15th September 2015 (CITES Notification No. 2015/055). A further trade suspension for all commercial trade in specimens of CITES-listed species was issued on 11th February 2016 due to a failure to submit a progress report on the implementation of a national ivory action plan (CITES Notification No. 2016/011). This recommendation to suspend trade was withdrawn on 21st March 2016 (CITES Notification No. 2016/029).

According to data in the CITES Trade Database, direct trade in *D. moschatum* from Lao, PDR comprised trade in live, wild-sourced plants for commercial purposes, all of which was reported by importers only in 2006 (91 000 kg) and 2007 (150 000 kg). No exports of *D. moschatum* were reported by Lao, PDR for the period 2006-2015. No indirect trade in *D. moschatum* originating in Lao, PDR was reported for the period 2006-2015.

Management: Lao, PDR became a Party to CITES on 1st March 2004, with entry into force on 30th May 2004.

Collection of this species for commercial purposes within Lao PDR was reported to be "unregulated" (Sembi *et al.*, 2014). Phelps (2015) reported that harvest of forest products including orchids is restricted to production forests with sustainable management plans under Lao Forestry Law No. 6/NA, although no information on management plans could be located. A provincial quota system was established in Lao, PDR for the domestic trade in orchids, however, there was concern regarding the scientific basis this quota was based upon (Lamxay, 2009). Phelps & TRAFFIC (2015) reported that there was no evidence of Lao, PDR 'participating or making effort to participate in a sustainable or managed harvest' and a lack of domestic permit issuing. No further information could be found about the management of the species' harvest and trade in the country.

Lamxay (2009) suggested that all species of orchid in Lao, PDR should be protected, training of customs officials in orchid identification should be improved, NGO's should have a greater role in the monitoring of orchid trade and there should be general improvement in communication and collaboration between CITES authorities and other relevant stakeholders.

Through its national legislation project, the CITES Secretariat categorised the national legislation in Lao, PDR as Category 3, meaning "legislation that is believed generally not to meet the requirements for the implementation of CITES".

The CITES Authorities in Lao, PDR were consulted as part of this review, but no response was received.

D. Problems identified that are not related to the implementation of Article IV, paras 2(a), 3 or 6(a).

None identified.

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Prunus africana: Cameroon and Democratic Republic of the Congo

A. Summary

General status:	Widespread across the Afromontane forests of mainland Africa and Madagascar. Categorised as globally Vulnerable (needs updating), with population declines throughout the range.	
CAMEROON:	Occurs in the volcanic line of Cameroon's mountain chain, with the majority of the population reported in three areas (Mt. Cameroon in the southwest, Kilum-Ijim in the northwest and Adamoua in central Cameroon). Wild populations reported to be in 'major decline'. Primarily threatened by unstainable harvest levels. All exports since 2009 comprised dried bark; quotas have been published annually since 2010 and have exceeded 1 million kg since 2015. High levels of exports 2006-2015 comprising 4.8 million kg of dried wild-sourced bark, with exports apparently exceeding the quota in 2013 (all according to importers) and with highest trade levels reported in 2014. Cameroon has not yet submitted annual reports for 2008, 2010, 2012, 2013 and 2015. Cameroon responded to the consultation relating to the RST. '*Prunus* Allocation Units' allow harvest subject to management plans and inventory. Inventories indicated that 185 000 trees could be exploited over five regions; however, it was reported that in some locations harvesting had not been suitably controlled resulting in negative effects on the species and habitat. It was reported by one expert that although inventories and minimum diameter requirements were in place, they were not being correctly implemented and good harvesting techniques were not being used. The basis for robust non-detriment findings for exports is unclear, concerns relating to harvest management have been expressed, and international trade may be impacting this globally threatened species, therefore categorised as Action is needed.	RECOMMENDATION: Action is needed
DEMOCRATIC REPUBLIC OF THE CONGO:	Occurs in four provinces: Orientale, Katanga, North Kivu and South Kivu. Total population estimated to be 109 000 trees, of which 80 000 were believed to be exploitable. Main threats considered to be habitat reduction, illegal harvest and improper implementation of legal harvest guidelines. Quotas published for dry bark (232 000 kg in 2015 and 2016). Exports 2006-2015 comprised 1 667 000 kg of dried wild-sourced bark, with exports apparently exceeding the quota in 2013. Annual reports were submitted by the DRC for all years 2006-2015. DRC responded to the consultation relating to the RST. One expert noted that	RECOMMENDATION: Action is needed

although various management measures were in place (annual inventories, detailed mapping of harvest areas, quotas established, trees only >30 cm felled), they were not all being correctly implemented and good harvesting techniques were not being used. The basis for robust non-detriment findings for exports is unclear and there are concerns relating to harvest management effectiveness in DRC which may be impacting on this globally threatened species, therefore categorised as Action is needed.

RST Background

Prunus africana (African Cherry) was selected for the Review of Significant Trade (RST) as a priority species for review (all range States) at the 21st meeting of the Plants Committee, May 2014 (PC21 WG2 Doc. 1, PC21 ExSum. Cons.). *P. africana* was identified as a species that met a high volume trade threshold 2007-2011, as well as in 2012, on the basis of trade data presented in PC21 Doc. 12.4. At PC22 (October, 2015). Responses to the Secretariat's consultation had been received from six range States (PC22 Doc. 11.3 Annex). Angola, Burundi, Comoros, Congo, Equatorial Guinea, Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Nigeria, Rwanda, Sao Tome, South Africa, South Sudan, Sudan, Swaziland, United Republic of Tanzania, Zambia and Zimbabwe were removed from the RST process (no exports), as well as Uganda, whilst Cameroon and Democratic Republic of Congo (hereafter referred to as DRC) were retained (PC22 Com. 3 (Rev. by Sec.), PC22 Sum. 5 (Rev. 1)).

P. africana was previously included in the RST following CoP11 (2000). At PC12 (May 2002), *P. africana* was among four taxa selected for review (PC12 Executive Summary) and a review of the species was also called for at CoP12 (2002). This review (PC16 Doc. 10.2 Annex 1) was discussed at PC16 (July, 2006), following which Burundi, Cameroon, DRC, Equatorial Guinea, Kenya, Madagascar and United Republic of Tanzania were categorised as 'Urgent Concern', a number of general recommendations and recommendations specific to range States were made and an intersessional working group was established (PC16 WG1 Doc. 1, PC16 Summary record). Responses from the seven range States and a determination regarding compliance with the PC recommendations is given in SC57 Doc. 29.1 (Rev. 2). Cameroon established a zero export quota for this species for 2009 and the Standing Committee recommended Parties to suspend trade from DRC, Equatorial Guinea and United Republic of Tanzania (Notification No. 2009/03). The recommendation to suspend trade from DRC was withdrawn in 2012 following SC62 (Notification No. 2012/057) whilst the SC recommendations to suspend trade from Equatorial Guinea and United Republic of Tanzania remain in place.

B. Species characteristics

Biology: *P. africana* is a long-lived (Nsawir and Ingram, 2007; Ingram *et al.*, 2015), fast-growing forest tree that can sometimes grow as a large shrub (Kalkman, 1965), but can also grow to over 30 m in height (Schippmann, 2001). It inhabits mountain savannah (Cunningham and Mbenkum, 1993) and tropical forests (Ingram *et al.*, 2015) between 1000-2500 meters above sea level, and montane riverine forests (Kalkman, 1965).

P. africana was considered to be a light-demanding species (PC16 Doc. 10.2; Stewart, 2003; Kiama and Kiyiapi, 2001) that is most abundant along forest margins and in disturbed areas (Stewart, 2003). *P. africana* was considered to be an important element in the ecosystem (Oldfield *et al.*, 1998), including in the diet and shelter of pollinators and rare fauna, and the support of canopy epiphytes (Fashing, 2004; Vinceti *et al.*, 2013). The species was considered to respond well to cultivation (Orwa *et al.*, 2009) and to

regenerate well (Oldfield *et al.*, 1998), with "a remarkable ability to withstand bark removal" (Cunningham and Mbenkum, 1993). However, it was reported that poor harvesting methods may lead to tree death (Orwa *et al.*, 2009).

P. africana was reported to be a long-lived species, which "can grow up to 14 m high and 37 cm diameter at breast height in 18 years" (PC16 Doc. 10.2). The species was reported to reproduce primarily from seed (PC16 Doc. 10.2). Genetic studies of *P. africana* throughout Africa identified five distinct regions (Kadu *et al.*, 2011, 2012).

Distribution: *P. africana* is widespread across the Afromontane forests of mainland Africa (Kalkman, 1965), from Ethiopia in the northernmost part of its range to South Africa in the southernmost part of its range (Hall *et al.*, 2000), and in Madagascar and the islands of Grande Comore, São Tomé and Bioko in Equatorial Guinea (Kalkman, 1965). In total it has been recorded from 22 countries across Central, East and Southern Africa (Ingram *et al.*, 2015). However, it is restricted to increasingly isolated "islands" of tropical montane habitat (Schippmann, 2001); and was considered to have a highly fragmented distribution (Vinceti *et al.*, 2013).

Population status and trends: Throughout its range, and especially in Cameroon and Madagascar, the unsustainable exploitation of *P. africana* for its bark and timber has caused rapid population declines (Oldfield *et al.*, 1998). The species was classified as Vulnerable globally in the IUCN Red List (with an annotation to indicate that the assessment needs updating) (World Conservation Monitoring Centre, 1998). The IUCN Red List assessment noted that *P. africana* can be very common locally (World Conservation Monitoring Centre, 1998).

According to Stewart (2003), prior to the discovery of its use as a herbal remedy in 1966, *P. africana* was relatively common, but never abundant. The species was not considered in danger of extinction due to its very large geographical range (Cable and Cheek, 1998 in World Conservation Monitoring Centre, 1998; Jøker, 2003). However, unsustainable exploitation was reported to have resulted in population declines over much of its geographic range (Cunningham and Mbenkum, 1993; Oldfield *et al.*, 1998; Bodeker *et al.*, 2014). The species was reported to be locally common in montane regions (Vinceti *et al.*, 2013).

Threats: The main threat to the species was considered to be the large-scale unsustainable harvesting for international trade, driven by demand for the bark of *P. africana* for the pharmaceutical market (Cunningham and Mbenkum, 1993; Oldfield *et al.*, 1998; Bodeker *et al.*, 2014). Commercial harvesting of *Prunus* bark was reported from the 1960s, and in the late 1990s, the international market for *P. africana* bark extract (used in the treatment of benign prostatic hyperplasia (BPH)) was estimated to be worth approximately US$220 million; over 3300 tons of bark were reported to have been collected annually (Cunningham *et al.*, 1997 in Bodeker *et al.*, 2014). The species' bark was reported to be one of the most valuable medicinal exports from Africa (Cunningham *et al.*, 1997).

The bark is peeled off the tree, dried and then either chipped or powdered to produce an extract (Ingram *et al.*, 2015). It was reported that on Mount Cameroon and other areas across the range of *P. africana*, many trees have died due to girdling caused by bark removal (World Conservation Monitoring Centre, 1998).

Prior to commercial use, *P. africana* was used locally in a variety of different ways for hundreds of years (Cheboiwo *et al.*, 2014): from the bark being used as a traditional treatment for fever, chest pain and malaria (Cunningham and Mbenkum, 1993), a purgative for cattle and poison for arrows (Kalkman, 1965) to the use of the timber as axe handles (Schippmann, 2001), poles, carving and fuelwood (Ingram *et al.*, 2015; Nkongmeneck *et al.*, 2014; Nsawir and Ingram, 2007), and in wagon making (Cunningham

and Mbenkum, 1993). It is also reported to be an important species for bees and honey yields (Ingram *et al.*, 2015). Cheboiwo *et al.* (2014) found that in Cameroon, Madagascar and Kenya, the demand for bark by commercial enterprises led to increased extractions, excessive debarking and felling of entire trees.

In addition to exploitation, Dawson *et al.* (2000) found that *P. africana* trees were also being lost as a result of general forest clearance for agricultural expansion because populations of *P. africana* often coincide with regions of high human population density. Nkeng *et al.* (2010) reported that human activities, especially harvesting, grazing and fire, affect *P. africana* tree and seedling growth, mortality and reproduction. Fashing (2004) reported that a decrease in biodiversity negatively impacts the seed dispersal of *P. africana,* as it is reliant upon animals dispersing its seeds. Ingram *et al.* (2015) reported that habitat loss is also an issue in the areas where *P. africana* occurs, in the form of habitat fragmentation, deforestation and degradation (Vinceti *et al.*, 2013; Muchugi *et al.*, 2006; Mbatudde *et al.*, 2012). Over-exploitation was considered to pose a threat to the genetic distinctness and diversity of populations (Cunningham and Mbenkum, 1993; Dawson *et al.*, 2000).

The species was found to be highly vulnerable to a warming climate (Mbatudde *et al.*, 2012) and Vinceti *et al.*, 2013) predicted that by 2050, the climate would no longer be suitable for *P. africana* over about half of its current distribution.

Overview of trade and management: *P. africana* was listed in CITES Appendix II on 16th February 1995. This listing was formerly annotated by #1[3] and is now annotated by #4[4]. The Panel of Experts of the FAO on Forest Genetic Resources was reported to have included *P. africana* as one of the eighteen priority species for conservation action in Africa (FAO, 1997 in Navarro, 2008; Cheboiwo, 2014). Vinceti *et al.* (2013) noted that policies to ensure the sustainable management of *P. africana* had been established in various African countries, but that enforcement issues and control problems persisted. While Cheboiwo (2014) thought that most producer countries had "yet to make concrete efforts to enact policies and legal structures to promote planting, sustainable harvesting procedures, appropriate extraction technologies and legal trade in its bark."

Cunningham *et al.* (2016) reported that more wild harvested bark is internationally traded from *P. africana* than from any other African medicinal plant species. PC22 Doc13 stated that Cameroon, Uganda and the DRC were the main exporters of *P. africana*, and that the EU pharmaceutical industry was the primary importer. According to data in the CITES Trade Database, global direct trade during the 10 year period 2006-2015 was primarily in wild-sourced bark for commercial purposes with 7 570 333 kg reported by importing countries and 4 934 032 kg reported by exporting countries. According to exporters, global exports of wild-sourced bark for commercial purposes decreased 2006-2010, and then increased 2011-2014; trade reported by importers showed a similar trend, with an increase 2012-2014. Reported trade in 2015 declined compared to 2014, as reported by both exporters and importers.

Cunningham *et al.* (1997) estimated the annual over-the-counter value of the trade in herbal preparations to be USD220 million. Cunningham (2008) reported that initially only two brand-name products were produced using *P. africana*, but by 2008 there were at least 40 brand-name products using *P. africana* bark extract being marketed in ten countries directly, and globally through the internet.

[3] #1 refers to the all parts and derivatives, except: seeds, spores and pollen (including pollinia); seedling or tissue cultures obtained in vitro, in solid or liquid media, transported in sterile containers; cut flowers of artificially propagated plants

[4] #4 refers to all parts and derivatives except: seeds, spores and pollen; seedling or tissue cultures obtained in vitro, in solid or liquid media, transported in sterile containers; cut flowers of artificially propagated plants.

Cunningham *et al.* (1993) and Hall *et al.* (2000) reported that if the *P. africana* bark is partially stripped (by stripping only two quarter panels from a tree), as opposed to stripping all of the bark, the tree would not be killed and it would be able to regenerate and could be exploited at intervals of 5-15 years. Nkeng (2009) in Cunningham *et al.* (2014) found the intervals required for regeneration to occur to be slightly larger and stated that a minimum of seven years was required between exploitation rotations, but acknowledged that this would result in significantly lower bark harvests; Eben-Ebai (2011) in Cunningham *et al.* (2014) reported that a six-year rotation on Mount Cameroon would yield 21 per cent less bark than a five-year rotation.

Based on a detailed survey by Nkeng (2009), a 7-8 year minimum rotation was considered to be needed for wild harvest to continue (Cunningham *et al*., 2014).

Cunningham *et al.* (1997) stated that *P. africana* is traded as unprocessed and processed dried bark, and as bark extract, with approximately 2000 kg of unprocessed bark producing 1000 kg of dried bark, which in turn produces 5 kg of extract (Cunningham, 2008). Schippmann (2001) stated that these multiple forms of trade in *P. africana* bark meant that reporting and monitoring of trade was inadequate as it was difficult to measure in comparable figures.

PC22 Doc13 stated that both Cameroon and the DRC received support from the "Programme for Implementing CITES Listings of Tropical Tree Species" that is jointly implemented between the CITES Secretariat and the International Tropical Timber Organisation (ITTO). This programme works to define and implement methodologies to perform NDFs. Both Cameroon and DRC based their management and export regime for *P. africana* on this programme. However, ICCN (2013) reported that the DRC's programme had experienced delays in implementation.

It was considered that *P. africana*'s vulnerability to multiple threats justified the need to set high priority areas for conservation of the species (Jimu, 2011; Smith *et al*., 2011; Vinceti *et al*., 2013; Ingram *et al*., 2015).

C. Country reviews

Cameroon

Distribution: *P. africana* is distributed along the volcanic line of Cameroon's mountain chain (Nkongmeneck *et al*., 2014), covering six different regions: South-West, North-West, West, Littoral, Centre and Adamawa (Betti *in litt.* to UNEP-WCMC 2017). Nsawir and Ingram (2007) and Chupezi and Ndoye (2006) found that the majority of *P. africana* populations were in three areas: Kilum-Ijim forests in the North-West, Mount Cameroon in the South-West, and Adamoua province in Central Cameroon. Table 1 below shows the specific localities where *P. africana* grows in Cameroon.

Table 1: Distribution of *P. africana* in Cameroon (source: Betti *in litt.* to UNEP-WCMC 2017)

Regions	Division	Localities
Adamawa	Mayo-Banyo Faro et Deo	Tchabal Mbabo Galim Tignere, Foungoy
Centre	Mbam et Kim Mefou et Akono	Mt Ngora, Yangba, Golep Mt Eloumdem, Wé, Banda banda
Littoral	Moungo	Mt Manengouba, Kupe, Nlonako
North west	Bui Boyo Ngoketunjia Momo Mezam	Oku, Jakiri, Kilum Ijim, Kumbo, Kom, Nvem Fundong, Belo, Njinikom, Ngeni Kigem Sabga Njikwa, Menka, Ngui, Oshey, Gouzang Santa, Awing, Njong, Bafouchu, Medankwe

Regions	Division	Localities
	Menchum Donga Mantung	Mbot, Abor, Abou, Kidjiogam, Adon Abizenaku Furawa, Akweto, Tabenken
South west	Fako Meme Lebialem Manya	Mt Cameroun Mt Cameroun Mt Bambouto, Wabane Akwaya et environs
West	Menoua Noun Bamboutos Haut Nkam Ndé Haut Plateau	Santchou, Gwata Malantouem, Bangourain, Nkoutoupit Mt Bambouto: Babadjou Mt Bana, Bafang Bangoulap, Bassamba, Balembo Baham, Bapa, Badenkop

Population status and trends: Nsawir and Ingram (2007) reported that wild *P. africana* populations in Cameroon appeared to be in major decline, and they added that there was a complete lack of knowledge about the state of the remaining populations. Katende (1995, in CITES PC16 Doc 10.2) described the status of the Cameroonian *P. africana* population as "Vulnerable" and Stewart (2001) considered current harvest levels to be unsustainable. CITES PC16 Doc 10.2 stated that there were low numbers of large trees alive in the North West and West provinces of Cameroon, and that commercial exploitation had expanded to the remote Adamawa plateau. Cunningham (2008) reported that the demographic structure of *P. africana* populations showed a very low proportion of mature trees with a diameter greater than 30 cm, and found exploitation rates of 80 per cent of the total number of individuals in some areas with less than 10 per cent of the surveyed trees being exploited sustainably.

Betti (*in litt.* to UNEP-WCMC, 2017) provided information on population density and numbers derived from management inventories for *P. africana* conducted between 2009 and 2012 (Table 2). The inventories were undertaken by the National Forest Agency (ANAFOR) as part of the ITTO-CITES programme on CITES-listed trees, as well as by bark exporting companies, and covered five of the six regions where *P. africana* is present.

Table 2: Population density and number of *P. africana* in Cameroon (source: Betti *in litt.* to UNEP-WCMC 2017)

Region	Trees / ha	Exploitable trees / ha	Number of trees	Number of exploitable trees
Adamawa	2.8	1.1	197 199	78 414
Centre	2.9	1.3	78 965	34 664
Littoral	3.1	1.2	47 691	18 517
North west	4.1	0.6	130 079	18 692
South west	3.1	1.4	69 914	31 461
Total	3.1	1.1	521 108	184 972

Threats: Betti (*in litt.* to UNEP-WCMC 2017) considered the threats to *P. africana* in Cameroon to be habitat reduction, disregard for management plan guidelines, and low market demand that may encourage local communities to replace the species with eucalyptus plantations. Nsawir and Ingram (2007) reported that uncontrolled exploitation and illegal harvesting were threatening a viable *P. africana* market in Cameroon.

Trade: CITES annual reports have been submitted by Cameroon for 2006-2009, 2011 and 2014. Cameroon published export quotas for *P. africana* every year since 2006 (Table 3). Quotas for powder were published 2006-2009 and quotas for dried bark were published 2010-2017. Trade in *P. africana,* as

reported by Cameroon, did not exceed published quotas for the period 2006-2015; trade in dried bark as reported by importers appears to have exceeded the published quotas in 2014 (Table 3). A permit analysis suggests that 207 500 kg of bark reported by importers in 2014 was exported on permits issued in 2013, therefore bringing trade in 2014 under quota. When trade reported with permits issued in 2013 but reported in 2014 is considered with trade reported in 2013 (746 901 kg), trade reported by importers appears to have exceeded the quota for 2013. Some of this trade can be attributed to the 2012 quota on the basis of a permit analysis however trade reported by importers in 2013 still appears to have exceeded the published quota.

According to data in the CITES Trade Database, direct trade in *P. africana* for the period 2006-2015 was predominantly in wild-sourced bark for commercial purposes, with 2 422 339 kg reported by Cameroon and 4 823 953 kg reported by importing countries (Table 4). The main importer of *P. africana* bark was France, accounting for approximately three-quarters of trade 2006-2015. Importing countries typically reported higher quantities of trade in bark for commercial purposes than Cameroon, with Cameroon only reporting trade in bark for commercial purposes in 2006 and 2014 (Table 4). Remaining *P. africana* exports principally comprised powder, with 557 000 kg reported by importers in 2006 and 706 500 kg reported by Cameroon in 2007.

Indirect trade in *P. africana* originating in Cameroon was solely for commercial purposes and predominantly comprised wild-sourced bark, powder and extract, with 203 632 kg bark reported by importers and 473 139 kg bark reported by re-exporters (Table 5).

Table 3: CITES export quotas for *Prunus africana* powder and dry bark from Cameroon, 2006-2017 and global direct exports as reported by countries of import and Cameroon, 2006-2015. Cameroon has not yet submitted annual reports for 2010, 2012, 2013 and 2015.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Quota: dried bark (kg)	-	-	-	-	150000	350000	658674	634763	974853	1082879	1042353	1042353
Reported by importer	735904	700500		499125		300000	359304	539401	1056140	633579	-	-
Reported by Cameroon	1497500								924914		-	-
Quota: powder(kg)	2000000	2000000	1000000	0	-	-	-	-	-	-	-	-
Reported by importer	557000										-	-
Reported by Cameroon		706500									-	-

Table 4: Direct exports of *Prunus africana* from Cameroon, 2006-2015. All direct trade was wild-sourced. Cameroon has not yet submitted annual reports for 2010, 2012, 2013 and 2015.

Term	Unit	Purpose	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
bark	kg	S	Importer											
			Exporter									75		75
		T	Importer	735904	700500		499125		300000	359304	539401	1056140	633579	4823953
			Exporter	1497500								924839		2422339
extract	kg	T	Importer			2								2
			Exporter											
leaves	-	S	Importer			60								60
			Exporter			50								50
powder	kg	T	Importer	557000										557000
			Exporter		706500									706500
specimens	-	S	Importer											
			Exporter			240								240
timber	-	S	Importer			240								240
			Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Table 5: Indirect exports of *Prunus africana* originating in Cameroon, 2006 - 2015. Quantities rounded to whole numbers, where applicable.

Term	Unit	Purpose	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
bark	kg	T	W	Importer			74150				9594	49894	69994	<1	203632
				Exporter	550	71850	74150	1561			99410	251	69069	156298	473139
derivatives	kg	T	A	Importer											
				Exporter					<1						<1
			W	Importer	1708	2750	590								5048
				Exporter	1900	3102	<1	1	1	2	<1				5007
	-	T	W	Importer				2160							2160
				Exporter											
extract	kg	T	O	Importer							30	106			136
				Exporter							265				265
			W	Importer	5591	2191	2568	3260	2353	2235	7505	4489	321	2800	33311
				Exporter	7096	2376	3149	3524	3680	1937	2565	2818	1788	3405	32337
	-	T	W	Importer					108						108
				Exporter				14760	1374				50		16184
live	kg	T	W	Importer									<1		<1
				Exporter											
medicine	kg	T	W	Importer					<1						<1
				Exporter											
powder	kg	T	O	Importer						920	30	306			1256
				Exporter						1170	110	362			1642
			W	Importer		6640	1	1	4300	20	7400	200	90	1330	19982
				Exporter	18800	17100	452	4373	5450	349.2	10110	300	4980	790	62704
timber	m^3	T	W	Importer					<1						<1
				Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Management: Cameroon became a Party to CITES on 3rd June 1981, with entry into force on 3rd September 1981.

Schippmann (2001) noted that Cameroon was the biggest exporter of *P. africana* and that Mount Cameroon supported the most important population of *P. africana* in the country. Schippmann (2001) stated that most of the bark exported from Cameroon was harvested from Mount Cameroon and the Bamenda Highlands in the north west of the country. Cunningham *et al.* (1997) reported that Cameroon was one of only two *P. africana* range States that have extraction facilities, and that most of the bark exploited there was extracted locally for export.

Between 1972 and 1987, the company 'Plantecam' had a monopoly on bark exploitation and attempted to harvest the bark sustainably by removing opposing quarters of the trunk bark up to the first branch to avoid girdling the trees, which limited tree die-off (Nkongmeneck *et al.*, 2014; Schippmann, 2001). However, Cunningham and Mbenkum (1993) found that after an additional 50 harvest licenses were issued in 1985, this sustainable harvesting method was no longer used, especially in north-west Cameroon.

Nsawir and Ingram (2007) listed the constraints affecting the development of the market for Cameroonian *P. africana* as a complete lack of knowledge of the state and amount of *P. africana*, a lack of market, expensive bureaucracy, a lack of processing and capital available in Cameroon, lack of quality control, and poor governance and transparency. These authors recommended the following actions to enable sustainable exploitation of *P. africana*: sustainable management of wild populations, meeting CITES requirements to ensure continued exportation, promoting domestic planting of *P. africana*, revise the regulatory system for *P. africana*, enhance the market chain, increase collaborations and networks, and increase the knowledge of *P. africana* to optimise exploitation (Nsawir and Ingram, 2007).

Despite Ingram *et al.* (2009) strongly advising against harvesting in protected areas in Cameroon, Ingram *et al.* (2015) stated that harvesting was allowed in multiple protected areas including the Oku Plantlife Sanctuary and Mount Manengouba, both of which are in west Cameroon. Mount Cameroon National Park in west Cameroon was reported by Tchouto *et al.* (2014, in Ingram *et al.*, 2015) to be the only place that had more restrictive regulations, which resulted from a long-running sustainable forest management project. Ingram *et al.* (2015) mentioned concern that the level of harvesting in protected areas indicated that there is still pressure on populations of *P. africana* in the wild.

Ingram *et al.* (2009) outlined the national *P. africana* management plan for Cameroon, which included the introduction of national exploitation quotas and Prunus Allocation Units (PAUs), the clarification of sustainable harvesting techniques, and the strengthening of controls and monitoring. Ingram *et al.* (2009) also acknowledged several weaknesses including no checking of the inventory before issuing permits, many permit holders in the same area causing unsustainable harvesting and no accountability, no formal procedure for daily collaboration with the Ministry of Forests and Fauna (MINFOF) and the National Forestry Development Agency (ANAFOR), and the lack of Cameroonian ownership, as initiatives are led by international organisations. The Government of Cameroon (2015) discussed the development of a Prunus Management Plan, and stated that the Mount Cameroon National Park Service was working with local communities to implement it through the Prunus Allocation Unit (PAU) system.

Betti (*in litt.* to UNEP-WCMC, 2017) stated that the Cameroon government have made efforts to promote the sustainable harvest of *P. africana*, but inventories were not being conducted, minimum diameters of harvested trees were not being observed, and good harvesting techniques were not being used. However, Betti (*in litt.* to UNEP-WCMC, 2017) added that the Cameroon CITES Management

Authority submitted a project proposal for the third phase of the ITTO-CITES programme, to tackle the lack of implementation.

Both Betti (*in litt.* to UNEP-WCMC 2017) and Ingram *et al.* (2009) discuss the *Prunus* Allocation Units introduced by the Cameroon forest administration, which are 15 harvesting zones which grant long-term exploitation rights to permit holders, subject to an inventory and management plan. Details of the locations and permit holders of each *Prunus* Allocation Unit are in Table 6 below. Cunningham *et al.* (2014) reported that the Mount Cameroon *Prunus* Allocation Unit was the best-managed site.

Table 6: *Prunus* Allocation Units in Cameroon (adapted from Ingram *et al.* 2009)

Major Prunus landscapes in Cameroon	Proposed PAUs
Adamaoua Landscape (divided into 5 permit holders for an agreed tone per year depending on verification of quantity contained current inventory) 5 563 434 ha >800m asl	Adamaoua 1
	Adamaoua 2
	Adamaoua 3
	Adamaoua 4
	Adamaoua 5
North West Landscape (divided into 4 permit holders, each for agreed t /yr to be confirmed by an inventory) 1 306 236 ha >800m asl	North West Region 1 (Kilum-Ijim 18 community forests)
	North West Region 2 (outside region 1 and private plantations)
	North West 3 (Zone with private plantations and community forests)
	North West 4 (Zone with private plantations and community forests)
Mt Cameroon Landscape (divided into 2 permit allocations, each with agreed t /yr to be confirmed by an inventory) 335 422 ha >800m asl	Mt Cameroon 1 (in gazettement process for Mt Cameroon National Park- boundaries not yet finalised)
	Mt Cameroon 2 (outside Mt Cameroon National Park)
Littoral and Bakossi Mountains Landscape (divided into 2 permit allocations, each with agreed t /yr to be confirmed by an inventory) 159 707 ha >800m asl	Littoral and Bakossi Mountains 1
	Littoral and Bakossi Mountains 2 (areas outside integrated ecological reserves)

Through its national legislation project, the CITES Secretariat categorised the national legislation in Cameroon as category 1, meaning legislation that is believed generally to meet the requirements for implementation of CITES.

Democratic Republic of the Congo

Distribution: Betti (*in litt.* to UNEP-WCMC 2017) and ICCN (2013) stated that *P. africana* was found in four provinces in the DRC: Province Orientale, Katanga, North Kivu and South Kivu.

Population status and trends: Betti (*in litt.* to UNEP-WCMC, 2017) estimated the total population of *P. africana* in the DRC to be 109 314 trees, of which 79 975 were believed to be exploitable. A more detailed breakdown of population density and size is provided in Table 7. CITES PC16 Doc. 10.2 described the status of the DRC's *P. africana* population as "Data deficient" due to opportunistic and unregulated harvesting. Controlled harvest was not considered possible due to armed conflict, and a densely populated surrounding area of up to 300 people/ km² (PC16 Doc. 10.2). Across the habitat range, Betti (*in litt.* to UNEP-WCMC, 2017) reported that inventories conducted by private companies followed the same methodology as the ITTO-CITES programme and found that *P. africana* is growing at a density of 3.6 trees per hectare, with exploitable trees growing at a density of 2.7 trees per hectare. Betti (*in litt.* to UNEP-WCMC 2017) calculated that within the North Kivu province, there were 30 089 hectares of available habitat for *P. africana*, which amounts to 77.38 per cent of the province's total area.

Table 7: Population density and number in the DRC (Betti *in litt.* to UNEP-WCMC, 2017)

Production site	Trees / ha	Exploitable trees / ha	Total number of trees	Total number of exploitable trees
Mwenda	7.2	3.1	4 316	1 867
Ibathaama	3.0	2.3	15 064	11 538
Lumé Nord	1.4	0.6	997	415
Lumé Sud	4.3	3.7	17 155	14 740
Mangurejipa Ouest	2.9	2.1	9 871	7 144
Mangurejipa Est	0.9	0.9	639	639
Walikalé I	3.2	1.9	8 851	5 465
Walikalé II	4.1	3.3	44 426	35 970
Ikumbi	1.6	1.2	2 988	2 224
TOTAL	**3.6**	**2.7**	**109 314**	**79 975**

Threats: Betti (*in litt.* to UNEP-WCMC 2017) stated that four threats can be identified for *P. africana* in the DRC: habitat reduction due to agricultural expansion, disregard for the management plan guidelines, rebel groups in North Kivu facilitating illegal harvest, and low market demand that may encourage local communities to replace the species with eucalyptus plantations.

Trade: All CITES annual reports have been submitted by the DRC for the period 2006-2015. The DRC published quotas for bark by weight, 2006-2008 and 2012-2016; the quotas published 2012-2016 specified 'dried bark' (Table 8). The export quota for dried bark appears to have been exceeded in 2013, as reported by importing countries (Table 8); a permit analysis indicated that some of this apparent excess could be due to year-end trade. Additionally, 132 556 kg of *P. africana* bark reported by importers in 2013 was reported to have been traded with permits listed as unaccounted for by the DRC in CITES Notif. No. 2014/017. A trade suspension was issued for all commercial trade in specimens of CITES-listed species for DRC on 19th March 2015 for failing to submit a national ivory action plan (NIAP; CITES Notification No. 2015/012); the suspension was withdrawn on 15th April 2015 (CITES Notification No. 2015/021).

Table 8: CITES export quotas for *Prunus africana* bark (kg) from the Democratic Republic of the Congo, 2006-2017 and global direct exports as reported by countries of import and the DRC, 2006-2015. The DRC has submitted all annual reports 2006-2015.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Quota: bark* (kg)	1000000	1000000	1000000	-	-	-	72000	72000	102000	232000	232000	-
Reported by importer	280000	90000	192480	30000	-	160000	-	273337	101660	-	-	-
Reported by DRC	380000	308000	631000	-	-	-	72000	72000	102000	102000	-	-

*The DRC published quotas for 'dry bark' 2012-2016.

According to data in the CITES Trade Database, direct trade in *P. africana* from the DRC 2006-2015 was predominantly in wild-sourced bark for commercial purposes, with 1 127 477 kg reported by importing countries and 1 565 000 kg reported by the DRC (Table 9). Trade in *P. africana* bark, reported by the DRC increased between 2013 and 2014, but remained lower that trade reported by the DRC 2006-2008.

Table 9: Direct exports of *Prunus africana* from Democratic Republic of the Congo, 2006-2015. All trade was wild-sourced and reported by weight (kg). The DRC has submitted all annual reports 2006-2015.

Term	Purpose	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
bark	T	Importer	280000	90000	192480	30000		160000		273337	101660		1127477
		Exporter	380000	308000	631000				72000	72000	102000	102000	1667000
powder	T	Importer	30000										30000
		Exporter											
specimens	S	Importer										4	4
		Exporter											

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Indirect trade in *P. africana* originating in DRC was predominantly in bark and extracts for commercial purposes; re-exports of bark were reported in 2008 and 2009 only, while re-exports of extract was reported in all years 2006-2015 and peaked in 2014 (Table 10).

Table 10: Indirect exports of *Prunus africana* (kg) originating in the Democratic Republic of the Congo, 2006-2015. Quantities rounded to whole numbers, where applicable.

Term	Purpose	Source	Reported by	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
bark	T	W	Importer			22700	306000							328700
			Exporter			22700								22700
derivatives	T	W	Importer			300								300
			Exporter		200	100	240							540
extract	T	A	Importer											
			Exporter										27	27
		W	Importer	688	417	299	599	140	2241	161	6263	6352	555	17715
			Exporter	607	75	507	933	206	2896	1768	1867	4652	745	14255
	Z	W	Importer				10							10
			Exporter				10							10
medicine	T	W	Importer											
			Exporter										5	5
powder	T	O	Importer											
			Exporter				2600	1744	2770					7114
		W	Importer					81						81
			Exporter									184		184

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Management: The DRC became a Party to CITES on 20th July 1976, with entry into force on 18th October 1976.

ICCN (the Congolese Institute for the Conservation of Nature) and the CITES SA of DRC (*in litt.* to UNEP-WCMC, 2017) stated that exploitation of *P. africana* and other forest products in DRC is regulated by the Ministry of Environment and Sustainable Development. The ministry is comprised of two departments; the Forest Management Department, which deals with issues of management, transformation and exploitation of resources, and the Directorate of Nature Conservation, which deals with conservation of nature outside of protected areas, and issues relating to the management of endangered or CITES-listed species, including the issuance of CITES permits (ICCN and CITES SA of DRC *in litt.* to UNEP-WCMC, 2017). ICCN and CITES SA of DRC (*in litt.* to UNEP-WCMC, 2017) reported that the following management measures were in place in North Kivu province to ensure that the exploitation of *P. africana* bark is not detrimental to the ongoing survival of the population: annual inventories and detailed mapping of prospective harvest areas, quotas for each harvest zone, restrictions on harvest of bark from stems of a minimum of 30 cm diameter at breast height only, bark is permitted to be removed from two opposite quarters of each trunk between the level of breast height and the

height at which the first branch joins the tree, a rotation of eight years between harvests must be respected (ICCN and CITES SA of DRC *in litt.* to UNEP-WCMC, 2017).

Betti (*in litt.* to UNEP-WCMC 2017) stated that the DRC government have made efforts to promote the sustainable harvest of *P. africana*, but inventories were not being conducted, minimum diameters of harvested trees were not being observed, and good harvesting techniques were not being used. ICCN and CITES SA of DRC (*in litt.* to UNEP-WCMC, 2017) reported that anyone wishing to exploit *P. africana* needed to be recognised as a trader and apply for an annual permit, which detailed the quantity and location of allowed harvest. Once the product has been harvested, a CITES permit then needs to be applied for from the Directorate of Nature Conservation (ICCN and CITES SA of DRC *in litt.* to UNEP-WCMC, 2017).

Cunningham *et al.* (1997) found that, historically, bark was harvested from the afro-montane forests on the Kivu range in the eastern part of the country, but that due to more recent political and infrastructural problems in the region, it was difficult to assess the subsequent level and structure of the bark trade. ICCN (2013) suggested that harvesting of *P. africana* should be banned in the hills of Kateku and Buhimba, but that 30.12 tonnes of dried bark per year could be harvested sustainably from Kano, Kamuli, Kalongue kasopo and Runguta hills, using a rotation of 12 years. ICCN (2013) added that to ensure the conservation of *P. africana* in the North Kivu province, more research and mapping of *P. africana* sites was required, a management plan needed to be developed, a suitable harvesting method which allowed the bark to regenerate needed to be used, and a monitoring and research programme needed to be implemented.

Through its national legislation project, the CITES Secretariat categorised the national legislation in the DRC as category 1, meaning legislation that is believed generally to meet the requirements for implementation of CITES.

D. Problems identified that are not related to the implementation of Article IV, paras 2(a), 3 or 6(a).

None identified.

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Nardostachys grandiflora: Nepal

A. Summary

NEPAL:	Critically Endangered globally according to the IUCN Red List, with a population that is declining continuously and very rapidly. Widespread in Nepal, occurring mainly in west and central districts, but with higher densities in the west and a declining population in the east. Considered nationally 'threatened' in 2005. Main threats reported to be over-collection for domestic and international trade, as well as overgrazing. High and increasing levels of trade 2006-2015 in wild-sourced derivatives (870 746 kg) and oil (111 147 kg) as reported by Nepal only; 2016 exports were reported to be higher still based on Nepal's response to the consultation relating to the RST. Annual reports were submitted by Nepal for all years 2006-2015.District management plans are in place, allowing an annual harvest of 55 per cent of the growing stock, with harvest restricted to two months of the year, and inventories undertaken every 5 years. However, no details of comprehensive surveys were provided; it is unclear how harvest rates per district are calculated, and information on other management measures, such as length of rotation periods, is lacking. The basis for a robust non-detriment finding for this Critically Endangered species is unclear, and trade levels are likely to be impacting the species; therefore categorised as Action is needed.	RECOMMENDATION: Action is needed

RST Background

Nardostachys grandiflora was selected for the Review of Significant Trade (RST) as a priority species for review (all range States) at the 21st meeting of the Plants Committee, May 2014 (PC21 WG2 Doc. 1, PC21 ExSum. Cons.). *N. grandiflora* was identified as a species that met a high volume trade threshold 2007-2011 and a sharp increase in trade in 2011, on the basis of trade data presented in PC21 Doc. 12.4. At PC22 (October, 2015), responses to the Secretariat's consultation had been received from China and Nepal (PC22 Doc. 11.3 Annex). Bhutan, China and India were removed from the RST process (no exports), whilst Nepal was retained (PC22 Com. 3 (Rev. by Sec.), PC22 Sum. 5 (Rev. 1)).

N. grandiflora was previously included in the RST following CoP13 (2004). At PC15 (May, 2005), information on seven Asian medicinal species was considered in PC15 Doc. 10.2.2, and *N. grandiflora* was selected for review (PC15 WG2 Doc. 1 (Rev. 1), PC15 Summary Record). At PC16 (July, 2006), responses had been received from Bhutan, China and Nepal and the species was not retained in the RST process (PC16 Doc. 10.3 Annex 1, PC16 Summary Record).

B. Species characteristics

Taxonomic note: *N. grandiflora* was considered the only species in the genus *Nardostachys* (Olsen, 2005). Some literature, including the most recent IUCN assessment consider *N. grandiflora* to be a synonym of *N. jatamansi* (Ved *et al.*, 2015). In Inf PC10.2, TRAFFIC noted the need for clarity regarding the taxonomy of *Nardostachys grandiflora* with respect to *Nardostachys jatamansi* and

Valeriana jatamansi which also appeared to be used in Nepal. Where the literature used in this review uses a synonym, this is indicated by using square brackets.

Biology: *N. grandiflora* is a small, long-lived, perennial herb of between 10 and 60 cm with a stout rhizome (Singh *et al.*, 2013; Larsen and Olsen, 2008). A single plant produces one inflorescence and on occasion up to three, in August to September in Nepal (CITES Management Authority of Nepal *in litt*. to UNEP-WCMC, 2017). The fruiting season occurs from May until October (Ghimire *et al.*, 2008). Habitats include rocky outcrops, alpine meadows, juniper scrub, dwarf *Rhododendron* forests and open pine forests (Larsen and Olsen, 2008). The species occurs at around 4 000 meters above sea level, with a range between 2 200 m and 5 000 m above sea level (Larsen and Olsen, 2008; Ved *et al.*, 2015). Population density is at its lowest at an elevation of 3 300-3 400 m, and increases both above and below this range (CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017). Within Nepal, it is found from east to west in the high mountains in the Himalaya region, at a 25-45 degree slope in alpine and subalpine zones (CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017). Growth and recovery rates from perturbations were reported to be significantly higher in meadow habitat compared to rocky-outcrop habitat (Ghimire *et al.*, 2008).

C. Country review

Nepal

Distribution: *N. grandiflora* is endemic to the Himalayan mountain range, which passes through India, Nepal, southeast China (CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017), southwest China, including Tibet, Yunnan and Sichuan, Myanmar and Bhutan (Larsen and Olsen, 2008; Singh *et al.*, 2013; Ved *et al.*, 2015). *N. grandiflora* occupies over 2000 miles (>5 000 km²) globally (Molur and Walker, 1998). It is found throughout the Himalayan region of Nepal, occurring in 25 districts (CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017). It is present in Western Nepal in the Jumla, Humla, Mugu, Bajhang, Bajura, Dolpa, Kalikpt, Rukum, Rolpa, Jajarkot, Daliekh, Doti and Pyuthan regions (Singh *et al.*, 2013; CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017). In Central Nepal, it is present in Manang, Dhading, Lamajung, Gorkha, Sindhupalchok, Baglung, Myagdi, Ramechhap, Nuwakot, Rasuwa (CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017). No detailed information on distribution in Nepal is available (Olsen, 2005, *in*: CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017). Occurrence in the country is provided in Figure 1.

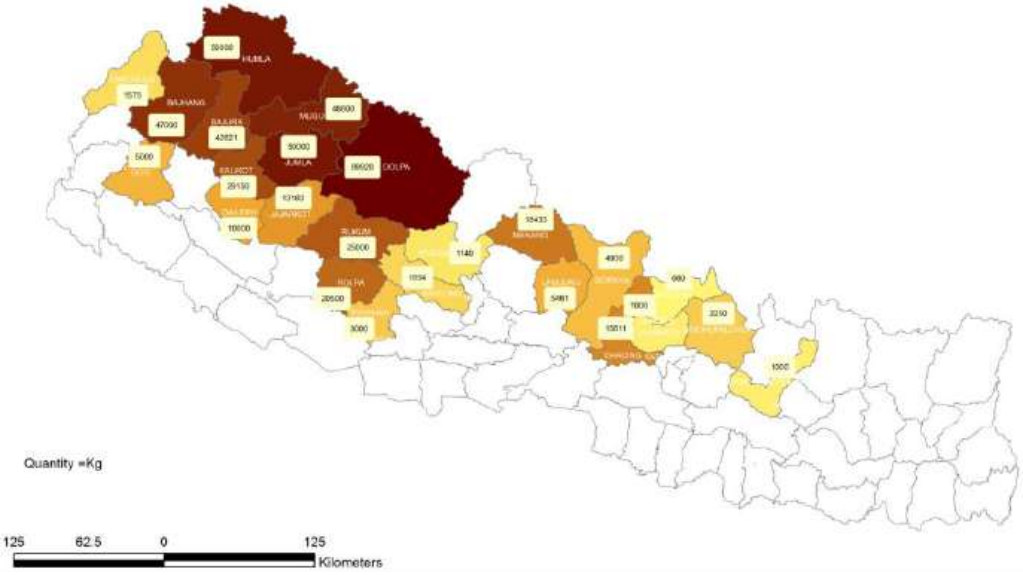

Figure 1. Distribution map of *N. grandiflora* in Nepal (CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017). Shading represents population density, with darker shading representing higher densities. No key was provided.

Population status and trends: *N. grandiflora* [*Nardostachys jatamansi*] was categorised as Critically Endangered globally by the IUCN on the basis of overharvesting by medicinal plant collectors for commercial and smaller scale purposes, forest degradation and reduction in habitat size and quality (Ved *et al.*, 2015). The species was noted to be declining continuously and at a very fast rate on account of high demand and indiscriminate collection (Goraya *et al*., 2013, in Ved *et al.*, 2015), severely impacting the natural regeneration of the population (Ved *et al.*, 2015). This assessment stated that there are no extreme fluctuations or severe fragmentation in the population, but there is a decline in the area and/or the quality of the species habitat (Ved *et al.*, 2015).

A Conservation Assessment and Management Plan (CAMP) workshop which aimed to rapidly assess status of selected medicinal plant taxa of the north, north east and central India reported an observed population decline of 75-80 per cent in India for *N. grandiflora* 1997 to 2008 (Molur and Walker, 1998; Larsen and Olsen, 2008). The Nepali population declined by 30 per cent over a 10 years span before 2008 (Larsen and Olsen, 2008). *N. grandiflora* was classified as 'Critically Endangered' in northern India (Molur and Walker, 1998).

No further information on status in Nepal is available (Olsen, 2005, *in*: CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017), although *N. grandiflora* was assessed as 'vulnerable' based on overharvesting (Olsen, 2005).

The greatest abundance of *N. grandiflora* in Nepal was reported to be in the Mid-Western Development Region with populations reported to be declining towards the east (Figure 1) (Amatya and Sthapit, 1994; CITES MA *in litt.* to UNEP-WCMC, 2017). Populations were reported to be concentrated in the districts of Jumla, Dolpa, Humla, Kalikot, and to some extent, the northern part of Gorka, Rasuwa and the southern part of Ganesh Himal (Nuwakot District) and Mustang (Amatya and Sthapit, 1994; CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017).

According to Larsen and Olsen (2008), greater spatial and temporal monitoring was required in Nepal, and globally, to gain a more detailed account of the population and trends.

Threats: *N. grandiflora*, often referred to in trade as jatamansi, balchhad, bhulte (CITES MA of Forests Nepal, 2017), Indian nard, balchar and spikenard (Singh *et al.*, 2013) is considered to primarily be threatened by overharvesting of rhizomes and roots for traditional medicines, incense and aromatic oil, both for local use and for commercial export (Ghimire *et al.*, 2008). There has been a 'small but increasing' trade to Europe and North America for this purpose (PC15 Doc. 10.2.2). In 2000, an increase in demand was noted for herbal drugs, specifically from Himalayan medicinal plants, such *N. grandiflora* (Airi *et al.*, 2000). Overgrazing was noted as secondary threat in Nepal (Larsen and Olsen, 2008). Current market demand was reported to be 'sizable', with the level of exploitation noted to be high (Ved *et al.*, 2015).

N. grandiflora is used in Nepal for medicinal purposes, including to treat certain neurological and heart conditions (Larsen and Olsen, 2008), as well as an antibacterial, antifungal and anti-malarial (Singh *et al.*, 2013). During collection, whole plants are uprooted and disturbed (Ved *et al.*, 2015).

It has been noted there are three main forms of users of this species; the large scale commercial collectors, traditional medicine specialists for local use for medicine and incense and non-specialists, whose only use for this species is for incense (Ghimire *et al.*, 2008). It is estimated that 19 00 households gain 18-30 per cent of their income from the trade of this species and *Neopicrorhiza scrophulariiflora* (Larsen and Olsen, 2008).

Nepal was estimated to supply 82-87 per cent of rhizomes of *N. grandiflora* in the global trade (Olsen, 2005). Nepali *N. grandiflora* is primarily exported to India for use as an essential oil (Olsen, 2005). Despite being a leading exporter, Nepal was noted to import this species from Tibet (China) for the production of essential oils between 2001 and 2004 (Larsen and Olsen, 2008). A study of Nepali traders indicated that between 2005 and 2007, 2735 kg of dried *N. grandiflora* were exported from Nepal and generated on average 110 Nepalese rupees (ca. USD 1.42) per kilogram (Humagain and Shrestha, 2009). Annual trade of dried *N. grandiflora* in Nepal was estimated at 100-500 tonnes per annum (Larsen and Olsen, 2008). The export from Nepal of 21 tonnes of essential oils derived from *N. grandiflora* between 2000 and 2002 was also reported (Larsen and Olsen, 2008).

Within Nepal, non-selective harvesting by commercial traders was considered the greatest concern for species survival compared to the selective harvesting practise from the Tibetan medicine experts, the *amchi,* who do not exceed 10 per cent harvest rate, selectively harvest according to maturity, rhizome size and other factors and carry out cultivation and in situ management, such as seasonal harvests and wider ecosystem management (Ghimire *et al.*, 2008).

Other major threats affecting the species were reported to be habitat loss due to road construction, agricultural invasion and human settlements, as well as overgrazing by yak, sheep and cattle in high altitude areas (Ved *et al.*, 2015).

Trade: *N. grandiflora* was listed in CITES Appendix II on 18th September 1997. Nepal has submitted all CITES annual reports for the period 2006-2015 and has not published any quotas for the export of *N. grandiflora*.

According to data in the CITES Trade Database, direct trade in *N. grandiflora* from Nepal primarily comprised 870 746 kg of wild-sourced derivatives for commercial purposes, reported by Nepal only (Table 1). Direct exports of derivatives increased by more than four-times 2008-2014. Other products with notable levels of trade reported by Nepal were wild-sourced oil and roots reported by weight for commercial purposes. The CITES MA of Nepal (*in litt.* to UNEP-WCMC, 2017) reported that 330 589 kg of *N. grandiflora* derivatives and 5973 kg of oil were exported in 2016, higher than the annual quantities reported in trade for these products 2008-2015.

According to importers, direct exports from Nepal principally consisted of relatively low levels of wild-sourced oil reported by weight in 2014 and 2015.

In Nepal, oil was reported to be obtained from rhizomes at a yield of 1-2 per cent (CITES MA of Nepal *in litt*. to UNEP-WCMC).

Table 1: Direct exports of *Nardostachys grandiflora* from Nepal, 2008-2015. No trade was reported 2006-2007. Quantities rounded to whole numbers where applicable. Nepal has submitted all annual reports 2006-2015.

Term	Unit	Purpose	Source	Reported by	2008	2009	2010	2011	2012	2013	2014	2015	Total
derivatives	kg	T	W	Importer									
				Exporter	64501	74398	45026	41557	103570	128435	278872	237957	870746
extract	kg	T	W	Importer								15	15
				Exporter									
	-	T	W	Importer									

Term	Unit	Purpose	Source	Reported by	2008	2009	2010	2011	2012	2013	2014	2015	Total
				Exporter									
oil	kg	T	A	Importer								25	25
				Exporter									
			W	Importer							139	413	552
				Exporter	221	51	713	948	834	2609	3556	3163.5	11147.5
		-	-	Importer									
				Exporter					5				5
	-	T	W	Importer									
				Exporter								267	2664
roots	kg	T	W	Importer									
				Exporter				77380	83599				160979

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 21/03/2017

Indirect trade in *N. grandiflora* originating in Nepal comprised very low levels of commercial trade in wild-sourced and artificially propagated extracts and oils reported in 2011, 2014 and 2015 only.

Management: Nepal became Party to CITES on 18th June 1975, with entry into force on 16th September 1975, but has not yet ratified the Convention.

N. grandiflora was reported to be banned for export in Nepal by The Forest Act 1993 and Forest Regulation 1995, unless the species is included within a processed product (oil, derivatives) and permission of the Department of Forests has been granted (CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017). Collection of the species takes place only in the west and central areas of the country (CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017). Details of harvests (including actual area of collection, forest block, amount to be harvested, etc.) were reported to be compiled prior to collection permits being issued ensuring that that harvest only takes place from specific, pre-identified sites and only during October to November (CITEA MA of Nepal *in litt.* to UNEP-WCMC, 2017).

The Regional Forest Directorate Office monitors the status of *N. grandiflora*, trade and collection activities (CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017). Officials of the Department of Forests were reported to visit collection sites and monitor activities (CITEA MA of Nepal *in litt.* to UNEP-WCMC, 2017). According to the CITES MA of Nepal (*in litt.* to UNEP-WCMC, 2017), the annual allowable harvest of *N. grandiflora* totals 487 838 kg across all 25 districts where *N. grandiflora* is present. The current annual harvesting quota is based on a maximum of 55 per cent of the growing stock in each region and is kept lower than the annual increment (CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017). The actual available growing stock of *N. grandiflora* was not provided due to lack of availability of precise statistics (CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017).

Medicinal and aromatic plants, thus including *N. grandiflora*, are managed by the Department of Forests through District Forest Management Plans, which require a resource inventory and stock take of forest species every five years within each district (CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017). Of the districts with approved District Forestry Management Plans, *N. grandiflora* is harvested from 23 districts (CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017). Annual allowable harvest (AAH) quantities per district are provided in Table 2. Wild collection was reported to mainly occur from government and community managed forests (Districts 1-23), with Shey Phoksundo National Parks being a Buffer Community Forest; Api Nampa Conservation Area was reported to have an approved management plan (CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017).

On the basis that the total AAH was reported to be 487 838 kg and exports are lower, it was considered by the CITES MA of Nepal (*in litt*. to UNEP-WCMC, 2017) that export is "within the range of sustainability".

Table 2. Annual allowable harvestable (AAH) of *N. grandiflora* in Nepal, by district (CITES MA of Nepal *in litt*. to UNEP-WCMC, 2017).

	District name	Location within Nepal	AAH (in kg)
1	Jumla	West	50 000
2	Humla	West	50 000
3	Mugu	West	48 600
4	Bajhang	West	47 000
5	Bajura	West	42 621
6	Dolpa	West	39 920
7	Kalikot	West	29 150
8	Rukum	West	25 000
9	Rolpa	West	20 500
10	Manang	Central	18 433
11	Dhading	Central	15 811
12	Jajarkot	West	13 163
13	Dailekh	West	10 000
14	Lamajung	Central	5 461
15	Doti	West	5 000
16	Gorkha	Central	4 900
17	Pyuthan	West	3 000
18	Sindhupalchok	Central	2 250
19	Baglung	Central	1 654
20	Myagdi	Central	1 140
21	Ramechhap	Central	1 000
22	Nuwakot	Central	1 000
23	Rasuwa	Central	660
24	Shey Phoksundo National Parks	West	50,000
25	Api Nampa Conservation Area, Darchula	West	1 575
		Total	**487 838**

Each District's Five Year Management Plan was reported to include sustainable harvest mechanisms including harvesting techniques and rotation obligations (CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017), although it was not clear exactly what these obligations relate to. According to the CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017), status and trends of individual species including *N. grandiflora* are updated following forest inventories to update management plans of the District Forest Offices and the protected/conservation areas, and regular monitoring of the trade and status of medicinal aromatic plants takes place; however no specific information on the monitoring results and status of populations within districts was provided. According to the CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017), wild collection is strictly regulated within government and community managed forests, and is backed by strong monitoring from community forestry user groups, district forest offices and Departments.

In accordance with the Environmental Protection Act 1996 and Environmental Protection Regulation 1997, an Initial Environmental Examination and an Environmental Impact Assessment is mandatory if a region collects more than 50 000 kg of *N. grandiflora* in a single year (CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017). It was reported that the relevant studies have been approved for *N. grandiflora*, and detailed EIA studies were being conducting in Humla, Jumla, Manang and other districts, with

plans to carry out a detailed inventory of 10 high value medicinal/aromatic plants, including *N. grandiflora* in 2017 (CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017).

N. grandiflora is present in some protected areas including the buffer zone area of Shey-Phoksundo National Park and Apinampa Conservation Areas which are under the jurisdiction of Department of National Parks and Wildlife Conservation, and up to 51 575 kg per year of *N. grandiflora* can be collected and traded from these areas (CITES MA of Nepal *in litt.* to UNEP-WCMC, 2017). A lack of enforcement and implementation of the Environmental Protection Acts of 1996 and 1997 was regarded as a concern by Larsen and Olsen (2008), who highlighted a need for greater capacity building (e.g. species-level training for police and customs officials), and a need to address institutional corruption.

There is evidence of management practises that allow sustainable harvest if less than 10 per cent of rhizomes are removed every five years in Nepal; however, this depends on the habitat as regeneration and growth rates vary (Ghimire *et al.*, 2008). Large scale harvesters for the commercial trade often employ unsustainable harvesting techniques, depending on value and market demand (Ghimire *et al.*, 2008).

Molur and Walker (1998) suggested that *in-situ* and *ex-situ* conservation was 'urgently needed' and recommend increased surveys, monitoring, ecosystem management, research into husbandry requirements and life history studies.

The Nepal National Biodiversity Strategy and Action Plan 2014-2020 outlined actions to conserve non-timber forest products and medicinal plants, including *ex-situ* propagation, but *N. grandiflora* was not specifically referred to (Ministry of Forests and Soil Conservation, 2014).

Through its national legislation project, the CITES Secretariat categorised the national legislation in Nepal as category 3, meaning legislation that is believed generally not to meet the requirements for the implementation of CITES.

D. Problems identified that are not related to the implementation of Article IV, paras 2(a), 3 or 6(a).

Illegal exports of banned wildlife from Nepal were previously noted in the literature; it was estimated that 47 per cent of *N. grandiflora* exported from Nepal was illegal in 1997-1998 (Olsen, 2005). Trade between Nepal and India was not in line with CITES regulations as of 2005 (PC15 Doc. 10.2.2).

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Bulnesia sarmientoi: Argentina and Paraguay

A. Summary

Global status	Endemic to the Chaco region of South America. Globally assessed by the IUCN as Lower Risk/conservation dependent (needs updating).	
ARGENTINA:	Occurs in three provinces in the north of the country. Commercially usable timber volume in Formosa province (where three quarters of all exports originate) was on average 5.3 m3 / ha in sample plots with presence of the species, although trees of a harvestable size were only present in a small proportion of plots surveyed. Over-exploitation is a threat. No export quotas have been published. High volume of exports 2008-2015 comprising >52 million kg of wild-sourced timber, plus additional trade reported by volume (converted to ~ 6 million kg) as reported by Argentina. Trade peaked in 2011 and has subsequently declined. Argentina has not yet submitted an annual report for 2014, but all other annual reports 2006-2015 were submitted. Argentina responded to the consultation relating to the RST. Management plans are a requirement of harvest; felled trees must be >35 cm DBH in Formosa. Some studies suggest that harvesting had not been suitably controlled, resulting in negative effects on the species and its habitat. Whilst some management measures are in place, the locations of permitted harvests and the volume of harvest in these areas was not provided. The basis for robust non-detriment findings for export in these locations is unclear and concerns relating to harvest management have been expressed, therefore categorised as Action is needed.	RECOMMENDATION: Action is needed
PARAGUAY:	Occurs in the west of the country in three departments. Considered an 'endangered' species in the country due to a number of factors, including rarity. Average abundance reported to be 23 individuals/ha for trees > 9.9 cm DBH, and 9 individuals/ha for trees > 30 cm DBH (minimum harvestable diameter), with an estimated average harvestable volume (trees > 30 cm DBH) of 7.1 m3/ha, although this harvestable volume is lower when considering trunks alone (1.73 m3/ha). Can be a dominant species where it occurs. Habitat loss, degradation, fire and over-exploitation are threats to the species. Export quotas of 250 000 kg of extract and 1.4 million kg of wood in 2014 only; trade in extract reported by Paraguay appears to have exceeded the quota. Exports 2008-2015 comprised > 2 million kg of wild-sourced timber, plus additional trade reported by volume (converted to ~ 900 000 kg). Notable	RECOMMENDATION: Action is needed

levels of trade in extract and oil were also reported. Trade peaked in 2011/2012 and has subsequently declined. Paraguay has not yet submitted an annual report for 2008, but all other annual reports 2006-2015 were submitted. Paraguay did not respond to the consultation relating to the RST. However, Paraguay submitted an NDF for this species to the European Commission in 2017, and this has been used extensively for this report. Management measures are in place, including a requirement for management plans in the location of harvest; felled trees must be >30 cm DBH. Quotas are calculated on the basis of a sustainable harvest level of 0.25 m3/ha/year, although it is unclear whether this is the most appropriate estimate to use when 0.1 m3/ha/year was derived from available tree growth rate information. The basis for the sustainability of this harvest rate, the locations where harvests are permitted and the volumes harvested in these areas are unclear. The basis for robust non-detriment findings for export in these locations is not clear; therefore, categorised as Action is needed.

RST Background

Bulnesia sarmientoi (Holy Wood) was selected for the Review of Significant Trade (RST) as a priority species for review (all range States) at the 21st meeting of the Plants Committee, May 2014 (PC21 WG2 Doc. 1, PC21 ExSum. Cons.). *B. sarmientoi* was identified as a species that met a high volume trade threshold 2007-2011, as well as in 2012, and a sharp increase in trade in 2011, on the basis of trade data presented in PC21 Doc. 12.4. At PC22 (October, 2015), responses to the Secretariat's consultation had been received from Argentina and Brazil (PC22 Doc. 11.3 Annex). The Plurinational State of Bolivia and Brazil were removed from the RST process (no exports), whilst Argentina and Paraguay were retained (PC22 Com. 3 (Rev. by Sec.), PC22 Sum. 5 (Rev. 1)).

B. Species characteristics

Biology: *B. sarmientoi* is a large tree with mature individuals reaching a height of 8-20 m and a diameter at breast height (DBH) of 30-70 cm (Waller *et al.*, 2012). The trees were reported to be xerophilous (TRAFFIC, 2010) and inhabit semi-arid parts of the Gran Chaco region which receives 600-900 mm rainfall per year (Waller *et al.*, 2012). *B. sarmientoi* was considered to grow in isolation or in small groves with good drainage (TRAFFIC, 2010). Navarro (1997, in CITES Scientific Authority of Paraguay *in litt*. to European Commission, 2017) noted the species preference for clay soils, which may indicate that the species develops in different conditions across the distribution.

B. sarmientoi is considered to be a slow-growing species, with an average growth rate estimated at 0.022-0.025 m^3/ha/ year (TRAFFIC South America, 2010) and trees reaching a basal diameter of 45 cm after 100 years (Giménez *et al.*, 2007). Their wood is aromatic (Waller *et al.*, 2012) and has a high-density of 1,280 g/dm^3 (Zerbatto *et al.*, 2009). The timber of *B. sarmientoi* is very hard and heavy (CITES SA of Paraguay *in litt*. to EC, 2017).

B. sarmientoi flowers between October and November and fruits between December and February, with seed germination in winter only; maturation is reached at around 20 years (Brack and Weik, 1994, in CITES SA of Paraguay *in litt*. to EC, 2017).

Distribution: *B. sarmientoi* is endemic to the Chaco region of South America (CoP15 Prop. 42) and can therefore be found in Argentina, Bolivia and Paraguay (Oldfield *et al.*, 1998) and marginally in Brazil (Taber *et al.*, 1997). The Gran Chaco is one of South America's most extensive biogeographical provinces, stretching from Santa Cruz in Bolivia (the northernmost extent) to Argentina's Chaco province in the south (Zerbatto *et al.*, 2009), and from the foot of the Andes mountains in the west to the tropical sub-humid forest and savannah of the Brazilian shield in the east, covering approximately 1 million km^2 in total (Taber *et al.*, 1997). The area contains heterogeneous vegetation with a variety of ecosystems (Taber *et al.*, 1997), and *B. sarmientoi* is mixed into the forest throughout 25 million hectares, but only sparsely distributed soil-specific plant communities provide adequate settlement conditions for the species (Waller *et al.*, 2012).

Population status and trends: *B. sarmientoi* was assessed by the IUCN Red List and classified as Lower Risk/conservation dependent (World Conservation Monitoring Centre, 1998). The Argentine Republic (2010) in UNEP-WCMC (2011) reported that there were no current quantitative population data for *B. sarmientoi*, but IUCN and TRAFFIC (2010) stated that the species had a wide range and apparently a very large global population.

Threats: *B. sarmientoi* was considered to be threatened by habitat destruction and by exploitation (TRAFFIC South America, 2010). The species is exploited for its fragrant wood (Oldfield *et al.*, 1998), essential oil (Waller *et al.*, 2012) and charcoal production (TRAFFIC South America, 2010). Traditional uses include burning the wood to act as an insect repellent, making fences or handicrafts, and brewing medicinal teas from its bark and leaves (Waller *et al.*, 2012) to treat a range of ailments (Mereles and Perez de Molas, 2008; TRAFFIC, 2010).

B. sarmientoi produces a fragrant essential oil called "lignum vitae oil", "guiac oil", "guayacol", "guajol", or "guayaco", which is obtained by steam distillation of wood chips and is widely used by the perfume and soap industries (Waller *et al.*, 2012), as well as in aromatherapy (Waller *et al.*, 2012). *B. sarmientoi* is a popular wood in the international timber trade for high quality furniture and floors; it was reported to have experienced a surge in trade at the beginning of the 21st century, with 100 tonnes exported from Argentina and Paraguay in the early 2000s, and with 40 000 tonnes exported in 2006 (TRAFFIC South America, 2010). Sawdust of *B. sarmientoi* can also be treated with solvents, which produces palo santo resin, which is used to make varnish, dark paints, and mosquito repellent coils (Waller *et al.*, 2012). The species produces quality coal that is easily ignited (CITES SA of Paraguay *in litt*. to EC, 2017).

Overview of trade and management: The Argentinian population of *B. sarmientoi* was listed in CITES Appendix III by Argentina on 12th February 2008 with the following annotation "Logs, sawn wood, veneer sheets, plywood, powder and extracts". On 23rd June 2010, *B. sarmientoi* was listed in Appendix II with the aforementioned annotation which was then updated on 2nd January 2017 as follows: "Logs, sawn wood, veneer sheets, plywood, powder and extracts. Finished products containing such extracts as ingredients of finished products, including fragrances, are not considered to be covered by this annotation."

According to data in the CITES Trade Database, global direct trade in *B. sarmientoi* predominantly comprised wild-sourced timber (reported by weight) for commercial purposes, with 42.6 million kg reported by importing countries and 53.3 million kg reported by exporting countries 2006-2015. Timber was also reported by volume. Based on an estimated weight of 1190 kg/m^3 (Meier, 2016), global trade in wild-sourced timber reported by volume comprised an additional 1.7 million kg timber (importers) and 7.1 million kg (exporters).

In 1997, Taber *et al.* found that 4.7 per cent of the Gran Chaco region is protected in various forms, including 3 441 000 ha in the Kaa-lya del Gran Chaco National Park and Integrated Management Area in Bolivia.

At CoP15, Argentina presented a proposal for inclusion of *B. sarmientoi* on Appendix II (CoP 15 Prop. 42), with all necessary requirements under CITES. The proposal was adopted and entered into force from June 2010 with annotation # 11, which designates logs, sawn wood, veneer sheets, plywood, powder and extracts.

C. Country reviews

Argentina

Distribution: *B. sarmientoi* was reported to occur in three provinces in Argentina: Chaco, Formosa and Salta, occupying an area of 8.3 million hectares, 1.7 million of which are its ecological optimum habitat (Waller *et al.*, 2012). Of these three provinces, Formosa and Salta are the main sources of *B. sarmientoi* timber, with Formosa producing 74 per cent of Argentina's *B. sarmientoi* annual exports (Waller *et al.*, 2012).

Population status and trends: Waller (2009) in CoP15 Prop 42 reported that *B. sarmientoi* populations in Argentina had been roughly estimated to occupy an area smaller than 25 000 km^2.

The CITES Management Authority of Argentina (*in litt.* to UNEP-WCMC 2017) reported that a survey of 193 plots of approximately 0.1 ha each was carried out in Salta and Chaco provinces in 2014 to monitor *B. sarmientoi* adult trees (diameter greater than 7.5 cm), with subplots of 0.02 ha for young 'regneration' trees (diameter less than 7.5 cm). The survey found that a relatively high proportion (6 per cent) of standing trees were dead in both provinces, with the health of the remaining trees generally better in Salta, where 65 per cent of standing trees in Rivadavía Department were considered healthy, compared to 52 per cent in Chaco in Güemes Department. A total of 717 adult trees and 184 young trees were recorded across all plots surveyed, giving an average of 39 adult trees and 49 young trees per hectare, equating to a total of 58 m^3 of timber with an average of 3.1 m^3 of timber per hectare. A previous survey at a study site in the Güemes Department (Chaco Province) resulted in a similar density estimate of 3.31 m^3/ha (Giménez *et al.*, 2007).

The CITES MA of Argentina (*in litt.* to UNEP-WCMC, 2017) reported that a similar survey was conducted in Formosa province also in 2014, with 128 plots of approximately 0.1 ha each to monitor *B. sarmientoi* adult trees (diameter greater than 7.5 cm), and subplots of 0.02 ha for young trees (diameter less than 7.5cm). A total of 320 adult trees in 55 plots, and 89 young trees in 20 plots were recorded, giving an average of 58 adult trees and 35 young trees per hectare, equating to an estimated average of 2.4 m^3 of timber per hectare, excluding branches (*i.e.* parts of the trees that can be used as sawn wood), and 5.3 m^3 of timber per hectare, including branches over 7 cm in diameter (*i.e.* parts of the trees that can be used commercially). Trees with a diameter over 30 cm, which is considered to be the minimum diameter used by the timber industry in the province of Formosa in practice (although 35 cm is the legal minimum), were present in only 37 plots, and healthy individuals of that size were only recorded in eight plots.

Threats: There was limited commercial use of *B. sarmientoi* until 2002, when demand from Asian countries drove its exploitation in Argentina (Zerbatto *et al.*, 2009). Exploitation was noted to be a general threat to the species across its range (TRAFFIC South America, 2010).

Trade: CITES annual reports have been submitted by Argentina 2006-2015 with the exception of 2014. Argentina has not published export quotas for *B. sarmientoi*.

According to data in the CITES Trade Database, direct trade in *B. sarmientoi* from Argentina predominantly comprised wild-sourced timber for commercial purposes, reported by weight, with 52 593 673 kg reported by Argentina and 40 711 694 kg reported by importers (Table 1). When considering trade reported by volume converted to weight (based on an estimated 1190 kg/m^3) importers reported an additional 1 664 798 kg and Argentina reported an additional 6 203 730 kg of wild-sourced timber.

Direct trade in *B. sarmientoi* from Argentina was first reported in 2008 (corresponding with the listing of the Argentinian population in Appendix III) and peaked in 2011 according to Argentina, and in 2012 according to importers (Table 1).

Table 1: Direct exports of *Bulnesia sarmientoi* from Argentina, 2008-2015. All direct trade was for commercial purposes. Quantities have been rounded to whole numbers, where applicable. Argentina has not yet submitted an annual report for 2014.

Term	Unit	Source	Reported by	2008	2009	2010	2011	2012	2013	2014	2015	Total
derivatives	kg	W	Importer			18952						18952
			Exporter									
plywood	kg	W	Importer									
			Exporter	1425								1425
timber	kg	A	Importer	129520	28220							157740
			Exporter									
		O	Importer	54280								54280
			Exporter									
		W	Importer	836103	631280	1870353	11920442	11980498	6960902	4575478	1936638	40711694
			Exporter	12327	9757	14368074	16117625	11940933	7992700		2152259	52593673
	m^2	W	Importer									
			Exporter					160				160
	m^3	A	Importer	21								21
			Exporter									
		W	Importer	426	101	219	490		68	78	16	1399
			Exporter	2187	703	955	917	63	30		358	5213
	-	W	Importer									
			Exporter	1716	1							1717
unspecified	kg	W	Importer									
			Exporter								28000	28000
veneer	kg	W	Importer									
			Exporter	13							1273	1286
	-	W	Importer									
			Exporter	2								2

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 20/04/2017

Indirect trade in *B. sarmientoi* originating in Argentina 2008-2015 comprised chips and derivatives reported by weight and timber reported by weight and volume (Table 2). All re-exports were for commercial purposes with the majority comprising wild-sourced trade.

Table 2: Indirect exports of *Bulnesia sarmientoi* originating in Argentina, 2008-2015. All indirect trade was for commercial purposes and quantities are rounded to whole numbers, where applicable.

Term	Unit	Source	Reported by	2008	2009	2010	2011	2012	2013	2014	2015	Total
chips	kg	W	Importer							22880		22880
			Exporter									
derivatives	kg	W	Importer				5142					5142
			Exporter									
timber	kg	A	Importer							25800		25800
			Exporter									
		W	Importer				12382		71080	68522		151984
			Exporter		40	1168						1208
	m^3	W	Importer							55800		55800
			Exporter					1				1

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 20/04/2017

Management: Argentina became a Party to CITES on 8th January 1981, with entry into force on 8th April 1981.

The CITES MA of Argentina (*in litt.* to UNEP-WCMC, 2017) outlined the multiple laws in Argentina that provide protection to native species such as *B. sarmientoi*. Resolution 1766/2007 states that all importation or exportation of products, by-products or derivatives of wild flora require documentation issued by the provincial authority. Law 26.331 establishes the minimum environmental protection

budgets for enrichment, restoration, conservation, use and sustainable management of native forests and the environmental services that they provide to society. This law is regulated by Decree 91, which suspends the possibility of authorising deforestation until territorial planning is completed and the national plan for the enrichment and conservation of native forests has been created. Resolution 393/2013 details the forest management requirements for exporting *B. sarmientoi* and states that the management plan must include information about the legal status of the forest, the owner, and the conservation category of the forest. The management plan also needs to include details of the current state of the forest, a history of the use and management of the forest, a forest inventory, details of planned activities for the forest including timber harvest, control measures for risks such as erosion and invasive species, and details of the expected future conditions of the forest (CITES MA of Argentina, *in litt*. to UNEP-WCMC, 2015).

Taber *et al.* (1997) found that by 1995, 0.2 per cent (96 118 ha) of Argentina's 500 000 km² of Gran Chaco had some form of protection in nine reserves.

Waller *et al*. 2012 reported that the Argentinian provinces of Formosa and Salta allow the harvest and transport of timber under a weak enforcement system predominantly composed of quotas, minimum log diameter restrictions, extraction permits and transport certificates. The main enforcement constraint in these areas was reported to be the lack of *in situ* control over the harvest and transport of *B. sarmientoi* (Waller *et al.*, 2012).

Zerbatto *et al.* (2009) found that a greater volume of trees were harvested by the timber industry than the volume of trees that remained in the forest, and in the six study sites investigated in central/ west of Formosa province that had recently been subjected to industrial exploitation, only 10 per cent of surviving trees with a diameter greater than 30 cm were healthy and fit for use, and in some areas no healthy trees remained. Zerbatto *et al.* (2009) suggested that the presence of large trees in the forest was a result of them being discarded by the timber industry, rather than the result of forest management. In one site in the western part of Formosa province, Zerbatto *et al.* (2009) were unable to find any healthy trees remaining after intervention by the timber industry. The authors stated that this suggested that the nature of exploitation under current circumstances was unsustainable. Zerbatto *et al.* (2009) reported that previous studies had found that the volume of abandoned trunks and thick branches in the forest was twice the volume of timber extracted by the industry; however in one hectare at one study site, Zerbatto *et al.* (2009) found that the volume of abandoned timber was equal to the extracted timber. Zerbatto *et al.* (2009) concluded that sustainable harvesting was not ensured at the provincial level in Argentina, and that the low levels of health of remaining individuals of *B. sarmientoi* after the timber industry have extracted their trees had a direct negative impact on the potential productivity of the forest.

Waller *et al.* (2012) stated that new legislation in Argentina was aiming to produce land management plans that would ensure forest persistence, and provincial management plans that would protect the most important forest regions. TRAFFIC South America (2010) stated that Argentina also has provincial laws that protect forest resources: Formosa province requires technical marking and a minimum cutting diameter for *B. sarmientoi* harvested individuals, and also requires 20 per cent of harvestable trees to be left standing; Salta province forbids the felling of *B. sarmientoi* on state land, but allows it on private land; Chaco province allows selective logging of *B. sarmientoi*; and Santiago del Estero province has banned the export of all untransformed forest products (TRAFFIC South America, 2010).

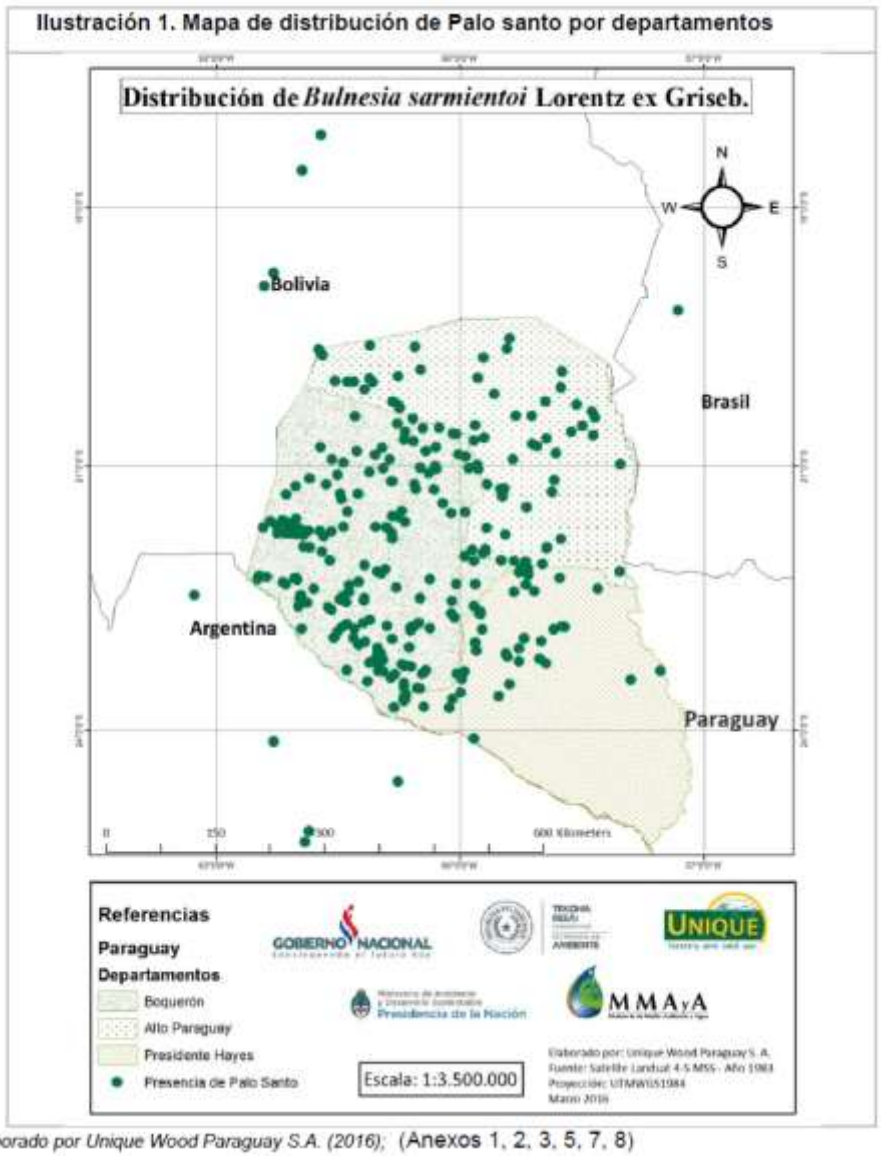
The CITES MA of Argentina (*in litt.* to UNEP-WCMC, 2017) stated that national legislations had been implemented to manage sustainable exports of *B. sarmientoi*. In 2013, Resolution 393 established the minimum requirements for sustainable harvest of *B. sarmientoi*, and required the production of management plans and land use change plans. The implementation of this legislation resulted in a decrease in the export of *B. sarmientoi* products from the provinces of Chaco, Salta and Formosa. In

2014, Resolution 585 was implemented, which banned the export of *B. sarmientoi* timber from areas that had land use change plans, as it was thought that there was insufficient information to assess whether allowing the harvest of species from these areas would be non-detrimental to *B. sarmientoi*. As a result of this, a regional forestry inventory was conducted in 2014 and Resolution 585 was extended in 2015 by Resolution 962.

Through its national legislation project, the CITES Secretariat categorised the national legislation in Argentina as legislation that is believed generally to meet the requirements for implementation of CITES.

Paraguay

Distribution: The species occurs in the west of the country in the Departments of Boquerón (9 166 900 ha), Alto (8 234 900 ha) and Presidente Hayes (7 290 700 ha) (CITES SA of Paraguay *in litt*. to EC, 2017). Although widely distributed within the Paraguayan Chaco, it was reported to have a homogenous distribution, being irregular and grouped (CITES SA of Paraguay *in litt*. to EC, 2017). Figure 1 provides a distribution map within the country.



Elaborado por Unique Wood Paraguay S.A. (2016); (Anexos 1, 2, 3, 5, 7, 8)

Figure 1. Distribution map of *B. sarmientoi* within Paraguay (CITES SA of Paraguay *in litt*. to EC, 2017).

Population status and trends: *B. sarmientoi* is included in the SEAM (Secretariat for the Environment) category 'N2N3' due to its rarity (6-20 localities, few individuals per hectare), or other factors rendering the species likely to disappear from the country or region, and at the national level the species is considered 'endangered' (CITES SA of Paraguay *in litt*. to EC, 2017).

In the Paraguyan Chaco, *B. sarmientoi* grows in dry forests where it thrives on loamy, well-structured soils that are brackish to salty and with a brackish to salty water table less than 6 m deep; in this environment it was reported to be the dominant species in the upper layer forming pure stands (CoP15 Prop. 42; CITES SA of Paraguay *in litt*. to EC, 2017).

According to the CITES SA of Paraguay (*in litt*. to EC, 2017) a number of inventories have taken place in different ecoregions in the country that surveyed individuals with a DBH of >9.9 cm (Table 3). Distribution of individuals by diametic classes is provided. An average abundance of 23 individuals/ha over 9.9 cm DBH was estimated (CITES SA of Paraguay *in litt*. to EC, 2017). The average volume estimated was 4.5 m^3/ha in the wet Chaco, 5.5 m^3 in the dry Chaco and 0.4 m^3 in Pantanal, but the overall harvestable volume was estimated at an average of 7.1 m^3 / ha (CITES SA of Paraguay *in litt*. to EC, 2017). Individual trees were estimated to grow at an average of 0.01 m^3 per year (CITES SA of Paraguay *in litt*. to EC, 2017). In their study of two forests in the Boqueron region of the Paraguay Chaco in north-west Paraguay, Mereles and Perez de Molas (2008) found that *B. sarmientoi* grew in an abundance of 11-46 trees per hectare.

Table 3. Abundance of *B. sarmientoi* in regions of Paraguay, according to diametic classes (CITES SA of Paraguay *in litt*. to EC, 2017).

Author	Ecoregion	Individuals / ha	Diametric classes					
			I (10-20)	II (20.1-30)	III 30.1-40)	IV (40.1-50)	V (50.1-60)	VI (>60)
Santacruz (2014a)	Humid Chaco	23	10	4	5	3		1
Moals (2011); Ferreira (2012)	Humid Chaco	31	15	14		2		
Duate (2013)	Humid Chaco	15	5	3	3	4		
Rempel (2007)	Dry Chaco	26	8	8	7	3		
Benitez (2010)	Dry Chaco	19	5	4	8	2		
Molas (2013)	Dry Chaco	24	13	8	2	1		

Threats: The CITES SA of Paraguay (*in litt*. to EC, 2017) recognised the main threats to the species in the country as habitat loss and degradation and fire. It was noted that 143 656 ha was deforested between August 2013 and January 2014, with the estimated rate of deforestation of 629 ha per day in the West Region (Chaco) and 35 ha per day in the East Region between January-July 2014 (CITES SA of Paraguay *in litt*. to EC, 2017). In the West region deforestation rates increased to 1008 ha per day between July 2014 to January 2015. Trade was not considered a threat by the CITES SA of Paraguay (*in litt*. to EC, 2017), who also reported that illegal trade was almost unknown.

The species is mainly utilized in Paraguay for its timber, but also the essential oil extracted from debarked wood that is used in cosmetics (CITES SA of Paraguay *in litt*. to EC, 2017).

Exploitation was noted to be a general threat to the species across its range (TRAFFIC South America, 2010). Waller *et al*. (2012) reported that 89 per cent of Paraguay's timber exports of *B. sarmientoi* from

2000 to 2004 were exported to China, and from 2000 to 2006, 67 per cent of *B. sarmientoi* timber exports were trunks in different stages of processing, and 33 per cent of exports were sawn wood. Mereles and Perez de Molas (2008) noted that Paraguay is the main producer of *B. sarmientoi* essential oil. Waller *et al*. (2012) stated that during the last decade, Paraguay exported 130-180 tonnes of essential oil per year, equivalent to approximately 5,000 tonnes of timber, with the main importers being France, Germany, US, India, Spain, UK, Korea, Netherlands and Switzerland. However, Waller *et al*. (2012) also reported that according to Paraguayan producers, most of the wood used in the oil distillation process is the by-product of timber extraction of land clearance activities such as fallen trees, branches and sawdust, and is therefore not a threat to *B. sarmientoi*. Despite this claim, Waller *et al*. (2012) considered that it still needed to be demonstrated that all wood used in oil distillation was a by-product of other activities.

Trade: CITES annual reports have been submitted by Paraguay for all years 2006–2015, with the exception of 2008. Paraguay published export quotas in 2014 for 250 000 kg extract and 1 400 000 kg wood. Trade in *B. sarmientoi* extract appeared to exceed the export quota value set in 2014, as reported by Paraguay (Table 3). The CITES SA of Paraguay (*in litt*. to EC, 2017) confirmed that a precautionary export quota of 1 400 tons/year of wood and 250 tons of extract was set for 2014 with a two year duration, but that with regular monitoring of the Scientific Authority could be changed.

Paraguay issued a voluntary moratorium on all trade in specimens of CITES-listed species in 2003 (CITES Notif. No. 2003/058); in 2009 this was lifted for Appendix III species and non-commercial trade (CITES Notif. No. 2009/036). The voluntary moratorium was further lifted in 2011 for, *inter alia*, essential oil and timber of *B. sarmientoi* (CITES Notif, No. 2011/009) and was completely lifted in 2014 (CITES Notif. No 2014/009). Trade in *B. sarmientoi* from Paraguay was reported 2009-2015 by Paraguay and 2008-2015 by importers (Table 4).

According to data in the CITES Trade Database, direct exports of *B. sarmientoi* from Paraguay was mainly in wild-sourced timber, reported by weight, for commercial purposes and reported without a purpose specified (2 343 394 kg wild-sourced timber according to Paraguay and 1 891 243 kg according to importers (Table 4). When trade reported by volume is converted to weight, Paraguay reported an additional 898 202 kg of wild-sourced timber while importers reported 53 187 kg of additional trade. When trade by weight is considered (including those reported by volume and converted to kilograms), exports peaked in 2011 according to Paraguay and 2012 according to importers. Notable levels of trade in extract and oil (by weight) were also reported by both Paraguay and importers 2008-2015 (Table 4). The CITES SA of Paraguay (*in litt*. to EC, 2017) stated that the waxed cyclinder was the most exported product from Paraguay.

Indirect trade in *B. sarmientoi* originating in Paraguay 2008-2015 predominantly comprised wild-sourced extract, oil and timber for commercial purposes (Table 5). Both importers and re-exporters reported an increase in indirect trade reported by weight 2008-2015.

According to the biennial reports of the CITES MA of Argentina, there were a number of seizures of *Bulnesia sarmientoi* in 2008 that totalled 199, 584 m² timber, 28 kg of logs, 730 logs and 20 pieces.

Table 4: Direct exports of *Bulnesia sarmientoi* from Paraguay, 2008-2015. Quantities rounded to whole numbers where applicable. Paraguay has not yet submitted an annual report for 2008.

Term	Unit	Purpose	Source	Reported by	2008	2009	2010	2011	2012	2013	2014	2015	Total
carvings	kg	T	W	Importer									
				Exporter					357730	189000			546730
		-	W	Importer									
				Exporter						27000			27000
			-	Importer			1890						1890
				Exporter									
	m^3	T	W	Importer									
				Exporter		16			40				56
chips	kg	-	W	Importer									
				Exporter							21531	26000	47531
derivatives	kg	T	W	Importer		190				4370			4560
				Exporter									
		-	W	Importer									
				Exporter								28	28
extract	kg	T	W	Importer	6300	5700	19550	62422	20130	26460	77613	82656	300832
				Exporter		104810	159274	347220		40256			651560
		-	W	Importer									
				Exporter							273006	60115	333121
	m^3	T	W	Importer									
				Exporter			1791						1791
	-	T	W	Importer									
				Exporter				18299					18299
live	kg	T	W	Importer								380	380
				Exporter									
oil	kg	T	A	Importer							1140		1140
				Exporter									
			I	Importer						35			35
				Exporter									
			W	Importer			30210	80960	38072	53365	57541	20595	280743
				Exporter					298240	90706			388946
		-	W	Importer									
				Exporter					39590				39590

Term	Unit	Purpose	Source	Reported by	2008	2009	2010	2011	2012	2013	2014	2015	Total
			-	Importer		3420	3430						6850
				Exporter									
	-	T	W	Importer									
				Exporter					4900				4900
timber	kg	T	W	Importer			4006	520580	674794	967	197184	493712	1891243
				Exporter			98983	500822	49249	59359			708413
		-	W	Importer									
				Exporter							1048377	586605	1634982
			-	Importer			560						560
				Exporter									
	m^3	T	W	Importer				40	4		1		45
				Exporter				672	83				755
	-	T	W	Importer									
				Exporter					596				596

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 20/04/2017

Table 5: Indirect exports of *Bulnesia sarmientoi* originating in Paraguay, 2008-2015. All indirect trade was for commercial purposes. Quantities rounded to whole numbers where applicable.

Term	Unit	Source	Reported by	2008	2009	2010	2011	2012	2013	2014	2015	Total
derivatives	kg	O	Importer									
			Exporter		155							155
		W	Importer			300	875					1175
			Exporter		190	1040	1273	185				2688
extract	kg	A	Importer							30		30
			Exporter							31		31
		O	Importer		25	100						125
			Exporter	1710	445	330		22				2507
		W	Importer		3230	5940	33580	6487	6699	14696	7570	78203
			Exporter		4750	16050	9291	9560	14592	20123	13524	87890
	l	W	Importer									
			Exporter				590	190				780
oil	kg	A	Importer									
			Exporter								215	215

Term	Unit	Source	Reported by	2008	2009	2010	2011	2012	2013	2014	2015	Total
		W	Importer		190	1175	2210	2571	7369	5084	9176	27775
			Exporter		1780	7868	8130	8656	15420	15196	19938	76989
	-	W	Importer						1			1
			Exporter									
timber	kg	W	Importer							70000		70000
			Exporter									

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 20/04/2017

Management: Paraguay became a Party to CITES on 15th November 1976, with entry into force on 13th February 1977.

Species that are classified as 'endangered' under the Paraguayan SEAM Resolution No 2243/06, including *B. sarmientoi,* cannot be harvested or used commercially unless areas of harvest have management plans approved by competent authorities and with relevant permits, under SEAM Resolution 2531/06 (CITES SA of Paraguay *in litt*. to EC, 2017)

Harvests were reported to be governed by the management plans of the National Institute of Forestry (INFONA), with a requirement for forest inventories that record trees greater than or equal to 10 cm DBH within plots of 2000 m^2, with commercial height and health of tree reported (CITES SA of Paraguay *in litt*. to EC, 2017). Species management plans and Land Use Plans are authorized by IFONA (CITES SA of Paraguay *in litt*. to EC, 2017). During 2011-2014, INFONA authorized the change of land use for 442 712 ha of forest containing *B. sarmientoi*; 201 335 m^3 of logs were subsequently extracted, although the documentation on possession represented only 19 823 m^3 (CITES SA of Paraguay *in litt*. to EC, 2017).

The CITES SA of Paraguay (*in litt*. to EC, 2017) reported that the plausible sustainable harvest for the species is from 0.10 to 0.40 m^3/ha/ year and by knowing the total area with forests of the species remaining, the total approximate increase in Paraguay can be derived. At the production stage, the annual extraction quota was calculated by multiplying the average range of sustainable harvest (0.25 m^3/ha/ year) to the estimated surface area of 62 641 ha/ year to calculate the gross harvestable volume of 15 660 m^3/ year (CITES SA of Paraguay *in litt*. to EC, 2017). The CITES SA of Paraguay (*in litt*. to EC, 2017) provided some information on the calculation of sustainable harvest rates. These rates were derived from calculations of volume produced per tree (0.0034 m^3 per year) multiplied by total number of trees per hectare (30 trees/ha), resulting in 0.1 m^3/ha/year; as well as from estimates of available harvestable (>30cm DBH) volume per hectare (average of 5.3 m^3/ha,), adjusted by the number of years (15 or 20) between harvests, resulting in 0.35 m^3/ha/year, although it is unclear how it was determined that these harvest cycles are sustainable.

Taber *et al.* (1997) found that by 1995, 3.1 per cent (1 100 000 ha) of Paraguay's 350 000 km^2 of Gran Chaco had some form of protection in three reserves. Waller *et al*. (2012) stated that new legislation in Paraguay was aiming to make land management plans that would ensure forest persistence, but noted that timber trade statistics in Paraguay are not sufficiently reliable to assess the volume of harvest.

Through its national legislation project, the CITES Secretariat categorised the national legislation in Paraguay as category 1, meaning legislation that is believed generally to meet the requirements for implementation of CITES.

The CITES Authorities in Paraguay were consulted as part of this review, but no response was received. However, Paraguay did submit a non-detriment finding for this species to the European Commission in 2017, and this has been used extensively for this report.

D. Problems identified that are not related to the implementation of Article IV, paras 2(a), 3 or 6(a).

Waller *et al.* (2012) found that each Argentinian province had different taxes and rules regarding the processing of timber, which may have encouraged smuggling operations between provinces. Some illegal trade in Argentina was previously reported (see 'Trade').

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