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Review of selected *Dalbergia* species and *Guibourtia demeusei*

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Review of selected *Dalbergia* species and *Guibourtia demeusei*.

Prepared for

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Introduction and summary

This report presents a review of five species of *Dalbergia* and one additional species, *Guibourtia demeusei* (Gabon), selected for review by the EU Scientific Review Group (SRG).

On the basis of the entry into force of the new Annexes to Council Regulation (EC) No 338/97 in February 2017, which meant that Scientific Authorities of EU Member States will be required to assess import applications for species newly listed in the CITES Appendices and EU Annexes following CITES CoP17, and on the basis of anticipated implementation challenges relating to the trade in *Dalbergia* products, in particular musical instruments, specific species/country combinations were recommended for review.

The document is provided to inform discussions by the SRG. The information is also presented as summary NDF tables (following the "9-step" NDF guidance for perennial plants) in Appendix 2 of the document.

Overview of *Dalbergia* spp. and *Guibourtia demeusei*

Species of the genus *Dalbergia* have a pan-tropical distribution (Groves and Rutherford, 2016), occurring throughout Asia, Africa and the Americas in a wide variety of habitats (Winfield *et al.*, 2016). The taxonomy of *Dalbergia* has been described as complex, with a "wide discrepancy in names, synonyms, and variations recorded and accepted throughout their ranges" (Winfield *et al.*, 2016). There is as yet no global monograph on the genus; however there are currently considered to be approximately 140 species of *Dalbergia* worldwide, with over 250 including subspecies and varieties (Klitgaard and Lavin, 2005).

Many species of *Dalbergia* are under a range of threats, including deforestation, forest conversion for agriculture and human development, and legal and illegal logging to supply domestic and international markets (Winfield *et al.*, 2016). The IUCN has carried out 86 species assessments, 57 of which place species within the Vulnerable to Critically Endangered categories; however 62 assessments now require updating (IUCN, 2017). The term 'rosewood' is used to describe species from several genera, but most commonly applied to certain species of *Dalbergia* (Soerianegara and Lemmens, 1994). Trade in *Dalbergia* species was reported to be widespread throughout their range, resulting in over-exploitation of many species and depletions of stocks (Winfield *et al.*, 2016). In 2014, a working list of commercial timber species noted that 32 species of *Dalbergia* were present in trade (Mark *et al.*, 2014) out of a possible 64 timber-producing species (Groves and Rutherford, 2016). Some *Dalbergia* species are considered to be 'precious woods' and command high prices, particularly in the Chinese Hongmu furniture trade; precious woods are 'highly valued for a range of valuable inherent qualities including appearance, tone, physical, scent, chemical, medicinal or spiritual properties, and (are) rare or of limited availability' (Jenkins *et al.*, 2012).

Harvest of different species of *Dalbergia* and similar timbers also known as rosewood appears to follow a distinctive pattern in which as the most favoured and accessible timber stocks in a particular area are depleted, attention turns to others (EIA, 2016). There is generally very little quantitative information on the impact of logging on populations of *Dalbergia* species and knowledge of the status of many of them is very limited and often out-of-date.

It was noted that the use of common trade names, such as 'rosewood', can hinder enforcement, tracking and reporting of *Dalbergia* species in trade, as they can relate to CITES-listed *Dalbergia* species or species from different CITES or non-listed genera (PC22 Doc. 17.6). Species identification is challenging as wood in trade lacks traditional morphological features such as leaves and flowers (McClure *et al.*, 2015). Many species have the same wood anatomy making identification by eye or using traditional anatomical methods often only possible to genus level (Groves and Rutherford, 2016). However, in combination with chemical methods, such as mass spectrometry, DNA sequencing and profiling, near infrared spectroscopy and stable isotope analysis, identification can consistently identify and distinguish between species (Groves and Rutherford, 2016). Inexpensive and accessible tools are not available to enforcement officers at this time. It should also be noted that there are a large number of *Dalbergia* species that have no commercial value, and do not resemble the species in international trade.

There are 292 species of *Dalbergia* currently included in the CITES Appendices; however as the taxonomy is complicated species may not be fully resolved. *Dalbergia nigra* was listed in Appendix I at CoP8 in 1992 (CoP8 Prop. 91). At CoP16 in 2013, two proposals to list logs, sawn wood and veneer sheets of *D. cochinchinensis* and the 48 recognised *Dalbergia* species from Madagascar (CoP16 Prop. 60, 63), and two proposals to list logs, sawn wood, veneer sheets and plywood of *D. granadillo*, *D. retusa*,

D. stevensonii (CoP16 Prop. 61, 62) were accepted. Several species were also listed in CITES Appendix III prior to CoP17. On 2nd January 2017, these species were included in the Appendix II genus listing for *Dalbergia*. At CoP17 in 2016, a proposal to list *Dalbergia* spp., with the exception of the species listed in Appendix I (CoP17 Prop. 55) was accepted with the following annotation:

> #15 All parts and derivatives are included, except:
> a) Leaves, flowers, pollen, fruits, and seeds;
> b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
> c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
> d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6.

CoP17 Prop. 55 stated that inclusion of the whole genus of *Dalbergia* in Appendix II was essential for the control of international trade, noting that "domestic and international experience has indicated that enforcement and customs officials who encountered specimens of *Dalbergia* products are unlikely to be able to reliably distinguish between the various species of *Dalbergia"*. On 2nd January 2017, India and Indonesia both entered reservations on the inclusion of *Dalbergia* spp. in Appendix II (CITES Notif. No. 2017/010). Indonesia's reservation on the inclusion of *Dalbergia* spp. in Appendix II was made until 4th July 2017 and will be considered automatically withdrawn as from 5th July 2017 (CITES Notif. No. 2017/010).

At CoP17, a proposal to include *Guibourtia tessmannii* and *G. pellegriniana* in Appendix II of CITES in accordance with Resolution Conf. 9.24 (Rev. CoP16), Annex 2 a, paragraph B[1], and to include *G. demeusei* in Appendix II of CITES for reasons of resemblance was accepted (CoP17 Prop. 56) with annotation #15 (as detailed above).

The genus *Guibourtia* is currently considered to comprise between 14 and 16 species; 13 occur in tropical Africa, and one in the Neotropics (RBG Kew, 2016). All three species currently listed under CITES are African forest trees. *G. demeusei* occurs in periodically flooded and swampy forest and gallery forest, often in pure stands[2], and has a larger population density and range than the other two species (TRAFFIC, 2016a).

All three species have been traded internationally since the first half of the 20th century (CoP17 Prop. 56). Historically most exports were to Europe but more recently China has become the main market; *Guibourtia* species are not a part of the recognised Hongmu standard in China, but their timber is a category A2 hardwood that is used as a substitute for Hongmu timbers (CoP17 Prop. 56). Trade data is difficult to analyse as it is not species specific; all three species appear to be traded under the same generic trade name, Bubinga (CoP17 Prop. 56). Log exports, which reached annual volumes close to 90,000 m3 in Gabon (2000), and around 15,000 m3 in Cameroon (1998), have substantially reduced the populations of the species concerned in their respective ranges (CoP17 Prop. 56). Despite log export bans in Cameroon and Gabon, trade has increased substantially in recent years due to the growth of demand in China; the resultant increase in the value of the timber has led to the emergence of illegal networks in all the range States which harvest and export the species (PCoP17 Prop. 56). Reported harvest and export of *G. demeusei* in several range States increased around 2009 and 2010, which may be associated both with increasing demand for rosewoods in general at that time, and declining availability of *G. tessmannii* and *G. pellegriniana* (TRAFFIC, 2016b).

[2] It is known, or can be inferred or projected, that regulation of trade in the species is required to ensure that the harvest of specimens from the wild is not reducing the wild population to a level at which its survival might be threatened by continued harvesting or other influences.

In February 2017, the '*International workshop on tree species in CITES'* was held in La Antigua, Guatemala (CITES, 2017). *Dalbergia* and *Guibourtia* species were among the taxa under discussion and key priority areas for future work were agreed, including timber identification, revision of current annotations that accompany the listing of tree species, supporting Parties for developing and strengthening traceability systems, and revising some Resolutions to strengthen the guidance provided on how to implement CITES for tree listed species (CITES, 2017).

Range States under review were requested to provide information on species status, trade and management, but no responses had been received at the time of writing.

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FABALES: LEGUMINOSAE

Dalbergia baronii II/B

RANGE STATES:	Madagascar
UNDER REVIEW:	Madagascar
EU DECISIONS:	None
IUCN:	Vulnerable

Trade patterns

The Madagascan population of *Dalbergia baronii* was listed in CITES Appendix II on 12th June 2013 and in Annex B of the EU Wildlife Trade Regulations on 10th August 2013, under the genus listing for Madagascan populations of *Dalbergia* spp. All populations of *D. baronii* were listed in CITES Appendix II on 2nd January 2017 and in Annex B of the EU Wildlife Trade Regulations on 4th February 2017, as part of the genus listing for *Dalbergia* spp.

Madagascar: Following the listing Madagascan populations of *Dalbergia* spp in 2013, Madagascar has submitted annual reports for the years 2013-2015. In accordance with Decision 16.152 on Malagasy ebonies and Malagasy rosewoods, Madagascar published zero export quotas *Dalbergia* spp. covering the period 13th August 2013 to 15th January 2016 and no direct trade was reported over this period. Madagascar has not yet published its quotas for 2017. All commercial trade in specimens of *Dalbergia* spp. from Madagascar has been subject to a CITES trade suspension since 15th March 2016 as recommended by the Standing Committee at its 66th Meeting (CITES Notification No. 2016/019).

There have never been any reported direct exports of *D. baronii* from Madagascar to the EU-28. Direct exports of *D. baronii* from Madagascar to counties other than the EU comprised three wild-sourced leaves and four dried plants for scientific purposes, reported in 2012 by importers only. Indirect trade in *D. baronii* from Madagascar to the EU-28 consisted of trade in three pre-Convention timber items (reported by number), re-exported via the United States to Germany in 2015, for personal purposes. This trade was reported by the United States only.

Conservation status

D. baronii is a medium-sized, slow-growing deciduous tree (Lemmens, 2008), growing up to 30 m tall and 40 cm DBH (Ravaomanalina *et al.*, 2017), endemic to eastern Madagascar (Du Puy, 1998; Lemmens, 2008; Ravaomanalina *et al.*, 2017). Lemmens (2008) reported that it had "occasionally been planted elsewhere", including in Tanzania.

D. baronii was reported to favour sandy, saline soils in lowland evergreen humid rainforest, swamp forest, the margin of mangrove vegetation, and along watercourses, at altitudes up to approximately 150 m above sea level [and rarely up to 600 m] (Lemmens, 2008). Information on the biology and harvest of *Dalbergia* spp. and *Diospyros* spp. was reported to be limited, making it difficult to establish a non-detriment finding (NDF) (Ratsimbazafy *et al.*, 2016).

There was noted to be confusion regarding the common names of *Dalbergia* species in Madagascar, with the same species of *Dalbergia* being classified as 'rosewood' or 'palisander' depending on vernacular names, the colour of the heartwood and the overall quality of wood (Ratsimbazafy *et al.,* 2016; World Resources Institute and World Bank Group, 2016). The term 'rosewood' is generally used for species displaying dark red and black patterned heartwood, whereas the term 'palisander' is used for those with more pale and brownish coloured wood (Ratsimbazafy *et al.,* 2016; World Resources Institute and World Bank Group, 2016).

According to Bosser and Rabevohitra (1996), there have also been difficulties distinguishing *D. baronii* from *D. monticola*, such that the two are often treated together in trade (Lemmens, 2008). A recent study by Hassold *et al.* (2016) emphasised the difficulties encountered in distinguishing Malagasy *Dalbergia* spp. through morphology alone. *D. baronii* is not among the 33 species listed in the Chinese National Standard for the Hongmu furniture trade, but was reported to be threatened through overexploitation, with its high value wood supplying demand for furniture and musical instrument manufacture (Lemmens, 2008). Patel (2007) described the wood of *D. baronii* as a "lustrous deep red", a characteristic that has incentivised its trade as a "prized" species (Barrett and Brown, 2013).

Madagascar: *D. baronii* is endemic to eastern Madagascar (Du Puy, 1998; Lemmens, 2008), where it was reported to be widely distributed within its lowland plain range (Du Puy, 1998). The species is known to occur in 28 populations, eight of which fall within a protected area (DBEV, 2013). *D. baronii* has been reported from Marojejy National Park (Patel, 2007), Masoala Protected Area, Ranomafana Mananara Protected Area, Antongil Bay, Maroantsetra, Sonierana, Ivongo, Ampasimaneva, Nosy Varika, Ambohimanana, and Anjanavovona Mananjary (DBEV, 2013) and Didy Protected Area (Ravaomanalina *et al*., 2017). In SC67 Doc. 19.2, Madagascar reported that rosewood occurred primarily in national parks and surrounding areas, with one third in or around Marojejy National Park and the remaining two thirds in or around Masoala National Park.

D. baronii was categorised as Vulnerable by the IUCN, but it is noted that this assessment needs updating (Du Puy, 1998). *D. baronii* was considered rare by Patel (2007). Large trees were reported to have become rare due to selective felling in eastern Madagascar (Du Puy, 1998; Labat and Moat, 2003; Lemmens, 2008; Ramananantoandro *et al.*, 2013). Nine *Dalbergia* spp. in Madagascar, including *D. baronii*, were considered to be declining (Ratsimbazafy *et al.*, 2016). Labat and Moat (2003) found that *D. baronii* rarely occured within 5 km of a protected area. Ratsimbazafy *et al.* (2016) reported densities of 10 (Manombo) to 30 (Kianjavato) trees per hectare.

The population status of *Dalbergia* taxa in Madagascar was reported to remain almost totally unknown (World Resources Institute and World Bank Group, 2016). Furthermore, given the difficulty of identifying sterile trees in the field combined with outdated geographic range information, existing reports containing potentially useful data on population status of *Dalbergia* taxa were noted to be potentially unreliable (World Resources Institute and World Bank Group, 2016).

According to Ratsimbazafy *et al.* (2016) the principal threat to *D. baronii* in Madagascar was selective logging. *D. baronii* was reported to be among the most heavily logged and traded species of timber in Madagascar (Ratsimbazafy *et al.*, 2016). *D. baronii* was reported to be logged in the "eastern and north-eastern portions of Marojejy National Park" (Patel, 2007). Lemmens (2008) cautioned that "*Dalbergia baronii* is overexploited, and will soon disappear from the timber market as stands have been largely depleted". Cunningham *et al.* (2008) also described *D. baronii* as "heavily exploited".

As well as direct deforesting effects, selective logging in Madagascar has also been associated with a number of collateral impacts (Barrett *et al.*, 2010). One such collateral impact has been the felling of non-target tree species to construct rafts, allowing the floatation of *Dalbergia* species downriver for exportation (Barrett et al., 2010; Wilmé *et al.*, 2009; Global Witness and Environmental Investigation Agency, 2010). There is also evidence for multiple other negative effects, including non-native species

invasion (Patel, 2007), reduced species diversity (Brown and Gurevitch, 2004), increased forest-fire incidence (Cochrane and Schulze, 1998), and decreased soil fertility (Favreau *et al.*, 2007; Rasolomampianina *et al.*, 2005). In sum, the Malagasy logging industry covered ground quickly, such that by 2009, human disturbance had affected up to 20 550 ha of forest in northeast Madagascar (Barrett *et al.*, 2010; Wilmé *et al.*, 2009).

The slow growth of *D. baronii* has been highlighted as a key problem in ensuring its sustainable harvest (Lemmens, 2008; Ramananantoandro *et al.*, 2013), with it taking 70-100 years to yield sufficient heartwood for felling (Ramananantoandro *et al.*, 2013). The species was reported to have a regeneration rate of 200 per cent in Kianjavato (DBEV, 2013) and 500 per cent in Manombo (WWF MWIOPO, 2010). Global Witness and Environmental Investigation Agency (2010) reported that *Dalbergia* species, including *D. baronii*, have a relatively low regeneration rate, which in conjunction with logging has resulted in a disappearance of large diameter trees. WWF MWIOPO (2010) studied the ecology of heavily traded *Dalbergia* species, and found an imbalance in population structure, leading to a reduced potential for population recovery and regeneration. DBEV (2013) included *D. baronii* in a list of species that it deemed not to be in a "good general state", such that the species was deemed at "high risk" of disappearing.

Dalbergia spp. are known to produce shoots for harvesting, burning and coppicing, but without forest maintenance such trees were reported not reach a commercially exploitable size (Ratsimbazafy *et al.*, 2016). The minimum exploitable diameter (MED) for *Dalbergia* species was reported to be defined as when diameter at breast height (DBH) is at least 15 cm (Missouri Botanical Garden, 2014). Whist DBH is not available for all *Dalbergia* species, the World Resources Institute and World Bank Group (2016) considered that, if *Dalbergia* trees with a height of at least 15 m are assumed to be exploitable (Bosser & Rabevohitra, 2002), this would include around 21 of the 63 taxa (including subspecies and varieties) known to occur in Madagascar.

About 20 per cent of Madagascar's land was reported to be forested, of which almost a quarter consisted of primary forest (FAO, 2015). The country was reported to have experienced a high rate of deforestation over the past few decades. For the period 1990-2015, the average annual deforestation rate was 0.4 per cent (FAO, 2015). Annual deforestation rates in Madagascar were reported to have reached 1.5 per cent 2010-2013 (Ratsimbazafy *et al.*, 2016). Of the remaining forests, nearly 40 per cent were reported to have been designated as protected areas (FAO, 2015). Ratsimbazafy *et al.* (2016) reported that from 2010-2015, at least 350 430 timber trees (largely rosewood) have been cut down annually in protected areas in Madagascar, and at least 1 million logs have been exported illegally from the country.

D. baronii was reported to be one of the favoured woods for musical instruments, particularly guitars, as well as being used for joinery, carpentry, framing, ship building, precision equipment and carvings (Lemmens, 2008). *D. baronii* was also reported to be among the most commonly used rosewood species by Malagasy consumers (Ramananantoandro *et al.*, 2013). Patel (2007) noted that the trade in Malagasy woods such as *Dalbergia* species is carried out through organised criminal activities, and emphasised that "extensive international, national, and local reforms will be required to discourage future logging". Similarly, in maintaining future potential harvest, Lemmens (2008) stated that protection was "badly needed", and suggested that given the slow growth of *D. baronii,* logged yield would have to be significantly reduced, if harvested sustainalby.

Following a cyclone in 2004 in north-eastern Madagascar, the administration introduced Interministerial Order no. 17939/2004 of 30 Dec. 2004, a permitting system for the collection of toppled woods (Patel, 2007; Ratsimbazafy *et al.*, 2016). This order was reported to authorise the collection of rosewood and ebony felled by cyclones in semi-finished or unfinished form (Ratsimbazafy *et al.*, 2016). However, Patel (2007) highlighted that *Dalbergia* species are typically deemed less vulnerable to toppling following cyclones, with permits instead being used to actively harvest *Dalbergia* species. Due to these concerns that temporary permits were allowing the laundering *Dalbergia* species, in March

2005 a regional decree was passed to prevent the trafficking of Malagasy *Dalbergia* species, bringing a significant increase in the number of arrests and seizures (Patel, 2007). During this period, Patel (2007) suggested that most of the confiscated *Dalbergia* species wood in north-eastern Madagascar was harvested from two protected areas [the Marojejy and Masoala National Parks], citing as evidence the limited primary forest outside of these reserves, survey records of logging within the Masoala National park, and direct physical evidence of logging within both parks. Patel (2007) highlighted the following potential management strategies for *Dalbergia*: stronger enforcement, the cooperation of local residents, no temporary permitting for cyclone damage, reforestation promotion, and patrols on key roadways.

In conjunction with the recent political unrest Madagascar has faced, logging of *Dalbergia* species has proved difficult to manage (Barrett *et al.*, 2010). Indeed, Ratsimbazafy *et al.* (2016) wrote that political instability has been accompanied by an "unprecedented increase in illegal logging of precious timbers in protected areas, particularly in north-eastern Madagascar". Following a military coup in March 2009, *Dalbergia* species exports from Madagascar were legalised through Decree no. 2009-003 (Barrett *et al.*, 2010; Bohannon, 2010; Ratsimbazafy *et al.*, 2016), only to be repealed six months later through Decree no. 2010-141 in response to international pressure (Bohannon, 2010; Barrett *et al.*, 2010). This new ban was put in place for two to five years, although the ease with which it could feasibly be enforced was questioned (Bohannon, 2010). In 2011 penalties were established (Ordinance No. 2011-001 of 8 August 2011) enabling punishment of offences related to rosewood and ebony (World Resources Institute and World Bank Group, 2016). According to Ratsimbazafy *et al.* (2016), despite the enactment of the Decree in 2010, illegal logging and exportation has continued. Ratsimbazafy *et al.* (2016) also highlighted a legislative "loophole" in the listing of *Dalbergia* spp. and *Diospyros* spp., with documentation referring to "rosewood" allowing operators to export *Dalbergia* spp. by describing it instead as "palisander".

At CoP16 in March 2013, an Action Plan to facilitate implementation of the listing of Malagasy populations of *Dalbergia* and *Diospyros* species in Appendix II was adopted (Decision 16.152 Annex), which stipulated seven action points, including the establishment of a precautionary export quota and the request to put in place an international trade embargo on logs, veneer sheets, and sawnwood, until CITES approves an audit of the existing stockpiles to establish the legality of the timber (CoP17 Doc. 55.2 Annex 1). In 2014, the CITES Management and Scientific Authority of Madagascar, in collaboration with TRAFFIC, held a workshop entitled "Assessment of the state of scientific knowledge of *Dalbergia* and *Diospyros* species with a view to the formation of NDF on the species of these two genera" (Ratsimbazafy *et al.*, 2016). The main aims of the workshop were to contribute towards the resolution of a science-based precautionary quota (Ratsimbazafy *et al.*, 2016).

At SC66 in January 2016, concerns were raised with regards the "the lack of progress made regarding the implementation of CITES for species of palisander from Madagascar" and it was also noted that, despite significant support provided, there were still serious issues related to the continued illegal logging and export of *Dalbergia* spp. and of *Diospyros* spp. (SC66 Summary Record). It was recommended that all Parties suspend commercial trade in specimens of the species *Dalbergia* spp. and *Diospyros* spp. from Madagascar until various requirements of the Action Plan and Standing Committee recommendations had been fulfilled (CITES Notification No. 2016/019).

In July 2016, the Management Authority of Madagascar submitted a report to the Secretariat detailing progress made in strengthening enforcement measures and cooperation at an international level, inventorying stockpiles, capacity building and supporting local communities (SC67 Doc. 19.2). A new law (Law No. 2015/056) was reported to have established a "special chain to fight against trafficking of rosewood and/or ebony" (SC67 Doc. 19.2). Madagascar reported that the Madagascar National Parks had commissioned Global Witness and the Environmental Investigation Agency (EIA) to investigate and monitor the flow of illegally harvested precious timber (SC67 Doc 19.2). Madagascar was also

reported to be is in the process of implementing the Wildlife and Forest Crime Analytic Toolkit of the International Consortium on Combating Wildlife Crime (ICCWC) (SC67 Doc 19.2)

At SC67 in September 2016, following consideration of the various reports submitted by Madagascar (inc. SC67 Doc 19.2), together with the Secretariat's mission to Madagascar in May 2016, it was considered that the provisions of the Convention for trade in *Dalbergia* spp. and *Diospyros* spp. from Madagascar were not yet being effectively implemented, progress on legislation and prosecutions was insufficient and that the targeted suspension had not yet been effective in stopping the illegal activities (SC67 Doc 19.1).

At CoP17 in September 2016, an update on the progress of the implementation of point 1 was provided, revealing an insufficient level of ecological, biological, and harvest information for *Dalbergia* spp. quota fixing (CoP17 Doc. 55.2; Ratsimbazafy *et al.*, 2016). A remote-sensing survey was also reported to have been carried out to assess standing stocks, although its validity and underlying methodology has been called into question (World Resources Institute and World Bank Group, 2016). A new set of Decisions was adopted (Decisions 17.203-17.208), including that Madagascar should: continue to develop an inclusive process to identify the main commercially valuable species of *Dalbergia* spp. and *Diospyros* spp. from Madagascar; establish a precautionary export quota based upon a scientifically robust non-detriment finding; significantly strengthen control and enforcement measures against illegal logging and export; submit regular updates on audited inventories of at least a third of the stockpiles and provide written reports on progress.

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FABALES: LEGUMINOSAE

Dalbergia latifolia II/B

SYNONYMS:	*Dalbergia emarginata*
COMMON NAMES:	Indian rosewood (EN)
RANGE STATES:	India, Indonesia, Kenya (introduced), Malaysia, Mauritius (introduced), Myanmar (introduced), Nepal, Nigeria (introduced), Pakistan (introduced), Philippines (introduced), Réunion (introduced), Singapore, Sri Lanka (introduced), Uganda (introduced), United Republic of Tanzania (introduced), Viet Nam (introduced)
UNDER REVIEW:	India, Indonesia
EU DECISIONS:	None
IUCN:	Vulnerable (needs updating)

Trade patterns

Dalbergia latifolia was listed in CITES Appendix II on 2nd January 2017 and in Annex B of the EU Wildlife Trade Regulations on 4th February 2017, as part of the genus listing for *Dalbergia* spp. As such, there has never been any reported direct or indirect trade in *D. latifolia* from India or Indonesia to the EU-28 or elsewhere. India and Indonesia entered reservations for the genus listing *Dalbergia* spp. on 2nd January 2017. Indonesia's reservation on the inclusion of *Dalbergia* spp. in Appendix II was made until 4th July 2017 and will be considered automatically withdrawn on 5th July 2017 (CITES Notif. No. 2017/010).

Conservation status:

D. latifolia is a medium to large deciduous tree species, which can reach up to 40 m in height, with a diameter of up to 180 cm (Soerianegara and Lemmens, 1994; Praciak, 2013). *D. latifolia* occupies evergreen or deciduous forests with deep, well-drained and moist soils (Soerianegara and Lemmens, 1994; Krishnamurthy *et al*., 2010), at altitudes up to 600 m above sea level in Java and higher in India (Soerianegara and Lemmens, 1994). Mature trees were reported to be drought-resistant and can tolerate a dry season of about six months (Praciak, 2013). The species reproduces naturally by seed, but also regenerates well by root suckers (Praciak, 2013).

D. latifolia is indigenous to south and Southeast Asia (Praciak, 2013), occurring naturally in India, Indonesia, Nepal (Soerianegara and Lemmens, 1994; Asian Regional Workshop, 1998) and Malaysia (Praciak, 2013), although it was considered an introduced species in Malaysia and Nepal by Orwa *et al.* (2009). The species has also been reported as native to Singapore (ILDIS, 2015). *D. latifolia* was introduced to Kenya, Myanmar, Nigeria, Philippines, Sri Lanka, Viet Nam (Orwa et al., 2009; Forest Legality Initiative, 2016), Mauritius, Réunion, Pakistan, Uganda (ILDIS, 2015) and Tanzania (Praciak, 2013; Winfield et al., 2016).

D. latifolia was categorised as Vulnerable by the IUCN in 1996, but it was noted that this assessment needs updating (Asian Regional Workshop, 1998). Wild subpopulations of *D. latifolia* were reported to

have been widely overexploited and the species was considered under "considerable pressure" from illegal felling (Asian Regional Workshop, 1998). Other threats were reported to include disease and disturbance from insects (Winfield et al., 2016).

D. latifolia was reported to be among the high value *Dalbergia* timbers renowned for their colour and fragrance, which are used to make musical instruments and furniture (CoP 17 Prop. 55). *D. latifolia* was reported to be a multipurpose timber tree, which is also used in joinery, for veneers, flooring, plywood, mouldings, carvings (Forest Legality Initiative, 2016) and panelling (Orwa *et al*., 2009). It is a popular wood for the guitar industry and has been used extensively in acoustic guitars for many years (Wood Database, 2017). In 2012, the commercial value of this species was reported to be USD 49 656 per m^3 for instrument blanks and USD 16 575 per m^3 for sawn wood (Jenkins *et al*., 2012).

D. latifolia is included in China's National Hongmu Standard (2000) (EIA, 2016), although it was not considered one of the main species dominating Hongmu[3] trade in Southeast Asia (EIA, 2016). China was reported to be the main consumer market for Hongmu, with demand reportedly driven up in recent years by China's growing middle class (EIA, 2016). Southeast Asia and India were reported to be the traditional sources of raw Hongmu material, but it was noted that Africa and Latin America had become increasingly important sources in recent years (EIA, 2016). The rapid growth in the Hongmu sector was reported to have resulted in a poorly structured market with little regulation (EIA, 2016). Illegal felling of species for Hongmu trade was reported, with the timber either smuggled across borders or shipped as lookalike species (EIA, 2016). Logs and sawn wood were reported to be the primary exported products in the trade of rosewood species (CoP17 Prop. 55) and Indonesia was ranked 18 in the top suppliers of rosewood logs and sawnwood to China in 2014 from the Asia-Pacific region (Winfield *et al*., 2016).

D. latifolia is similar to the wood of other *Dalbergia* species that have the characteristic brownish-violet colour such as *D. cochinchinensis*, *D. congestiflora* and *D. odorifera* (Koch, pers. comm. to UNEP-WCMC 2017). However, it offers good macroscopic features for a "certain" recognition as compared to many other *Dalbergia* species (Koch, pers. comm. to UNEP-WCMC. 2017). The odour is distinct and the wood is of medium weight to heavy and hard (0.77–0.88–0.93 g/cm^3) (Koch, pers. comm. to UNEP-WCMC. 2017).

D. latifolia was reported to be increasingly established in plantations, despite having a slow growth rate and long rotations (Praciak, 2013). According to Mukhtar (2015), it is a popular tree in Indonesian agroforestry systems, interplanted with crops (mango, jackfruit and guava or shaded crops such as ginger and turmeric). As pure stands, *D. latifolia* is spaced at 1.2 - 2.5 m by 1 - 1.8 m; wider spacing may produce crooked stems (Orwa *et al*., 2009). Orwa *et al.* (2009) report that for agroforestry systems spacing of 3 by 1 m – 6 by 2 m are common and trees are usually harvested in 30-40 years (Orwa *et al.*, 2009). It has been suggested that promoting private, community and government plantations is necessary for gene conservation and future production of this timber (Thapa, 2017).

Winfield *et al.* (2016) noted that there is a good level of species-specific information available on biology and threats to inform an assessment against the NDF criteria for *D. latifolia* and a fair level of information on trade, legislation, conservation and management measures. However, there was considered to be limited species specific information available on distribution or population status and structure.

India: *D. latifolia* was reported to have a widespread distribution in India, ranging from the sub-Himalayan tract to southern India, at altitudes up to 1350 m above sea level (Praciak, 2013). It has been

[3] "Hongmu refers to a range of richly hued durable tropical hardwoods used to produce high-end reproduction furniture, flooring and handicrafts" (EIA, 2016).

reported to occur in the States of Andhra Pradesh, Bihar, Goa, Gujarat, Himachal Pradesh, Karnataka, Kerala, Madhaya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal (ILDIS, 2015). It has also been reported from Dadra-Nagar-Haveli and Pondicherry Union Territories, and the Andaman Islands (ILDIS, 2015). It has been reported from Eastern Ghats forest (Kadavul and Parthasarathy, 1999) and Western Ghats forest, in Bhadra Tiger reserve (Teegalapalli *et al.*, 2010). Optimum growing conditions were reported to be in the Bombay Region (Orwa *et al.*, 2009).

The species was reported to have declined in parts of India (Jøker, 2004). *D. latifolia* is present in Pranahita wildlife sanctuary in southern India, which covers approximately 1336 km² (Negi, 1993). A population density of three individuals per hectare was recorded in two study sites in the Eastern Ghats forest, southern India (Kadavul and Parthasarathy, 1999) and one individual per hectare in Keonjhar [eastern India] (Mahapatra and Tewari, 2005). In the Bhadra wildlife sanctuary, 66 individuals were observed in a two-hectare plot at Choudikatte [Karnataka State, southwest India] (Krishnamurthy *et al.,* 2010). Small numbers (nine individuals) of *D. latifolia* were also reported present in managed forest reserves in India throughout different sites in the Chittoor District [southern India] (Rao *et al.,* 2011).

Twenty per cent of India was reported to be covered by forest, of which over 20 per cent is primary forest and more than 15 per cent are planted forest (FAO, 2015). Forest cover has been increasing over the last few decades, with an annual rate of afforestation of 0.4 per cent for the period 1990-2015 (FAO, 2015).

D. latifolia was reported to be one of the most valuable timbers in India, with an average price higher than that of teak (*Tectona grandis*) (Praciak, 2013). It was reported that the bark and leaves of *D. latifolia* are used locally as a medicine (Jain *et al.*, 2005; Padal *et al.*, 2010). The bark is also used for ethno-veterinary medicine (Selvaraju *et al.*, 2011). However, these uses were considered small scale and were not thought to represent a major threat to the species. Urban expansion and increased demand for natural resources, particularly fuel wood, due to population growth were reported to have resulted in forest declines in India (Luoma-aho *et al.*, 2004).

In situ conservation for *D. latifolia* has been reported to have been aided by seed stands and seed production areas reported in Kerala (46 ha) and Madhya Pradesh (5 ha) (Jalonen *et al.*, 2009).

D. latifolia is protected under the Indian Forest Act 1927, and the export of *D. latifolia* logs and sawn timber is prohibited (Asian Regional Workshop, 1998). The Indian Forest Act of 1927 is the guiding forestry legislation in the country and in 2012 the Act was amended to include prohibition of fresh clearances of reserved forests (World Resources Institute, 2014). *D. latifolia* is listed as a 'restricted species' in the States of Tamil Nadu, Kerala, Gujarat and Karnataka, meaning permission is required for harvesting, transportation and marketing of this species (Chavan *et al.,* 2015). *D. latifolia* is listed as a 'reserved tree' under the Andhra Pradesh Preservation of Private Forest Rules 1978, which prohibits feeling of the species unless the tree exceeds 1.3 m in height and 120 cm girth (Winfield *et al.,* 2016). Felling of trees on private land within Maharashtra is regulated by the Maharashtra Felling of Tree (Act 1964), Maharashtra Preservation of Trees Act 1975, The Maharashtra Land Revenue Code, 1966 and the Transit Regulation, and permission for felling and transit of *D. latifolia* is required (Government of India, 2012). The removal of any trees from protected areas is an offense under the Wild Life Protection Act 1972 (Winfield *et al.,* 2016).

National and state governments are jointly responsible for the sustainable management of forest resources in India (European Timber Trade Federation, 2016a). According to the National Working Plan Code (2014), all forests are managed under the prescriptions of a ten year working plan (European Timber Trade Federation, 2016a). The Export Promotion Council for Handicrafts (EPCH) developed the 'Vriksh standard Timber Legality Assessment and Verification Scheme' for verification of legality and legal origin of wood and wood products (European Timber Trade Federation, 2016a). The standard recognises the following legal sources of timber: State Forest Divisions; State Forest Development

Corporation (SFDC); Individual Tree Owners; and Private Plantations (European Timber Trade Federation, 2016a).

As of 31 May 1999, exports of all wild-sourced species included in CITES Appendices I, II and III for commercial purposes from India were suspended (CITES Notification No. 1999/39), with the exception of cultivated varieties of plant species included in Appendices I and II. India entered a reservation on the inclusion of *Dalbergia* spp. Appendix II, effective from 2 January 2017 (CITES Notif. No. 2017/010). The Export Promotion Council for Handicrafts (EPCH) of India is entitled to issue comparable documentation for *D. sissoo* and *D. latifolia* handicraft products only.

No information on the extent or management of *D. latifolia* plantations in India could be located.

Indonesia: *D. latifolia* was reported to occur naturally in Java, Indonesia (Asian Regional Workshop, 1998; Jøker, 2004; Orwa, 2009; ILDIS, 2015), although Lemmens (2008) did not consider the species to be native to Indonesia. CABI (2013), noted that plantations of *D. latifolia* were established in Indonesia in the 1900s, especially in Java. Two varieties of *D. latifolia* are recognised in Java (Jøker, 2004). It was reported that the native variety, sonokeling, is straight and used in agroforestry (Jøker, 2004). It seldom produces seeds and is reproduced by suckers (Jøker, 2004). The naturalised variety of Indian origin, sonobrits, produces seed yearly and was reported to be crooked, fast growing and used in land rehabilitation (Jøker, 2004). Its wood is considered less valuable because of its crooked form and duller colour (Jøker, 2004).

Reportedly a popular agroforestry species in Indonesia; in Java in 1989, it was reported that there were 49 893 hectares of plantations of *Dalbergia* species (Pratiwi and Lust, 1994). According to Nair (2000), there are over 25 000 ha of *Dalbergia* plantations in Java, largely central Java, but the proportion of each species was unknown. Plantations were also reported from Lampung Province (Southern Sumatra), where the species is planted by farmers and on private forest land, although the timber is mostly processed in Java (Hinrichs pers. comm. to UNEP-WCMC, 2017). It was reported that during the first three years of growth the trees are interplanted with rice, maize, beans or cassava and when the canopies begin to close, they are underplanted with shade-tolerant crops like coffee, tumeric and ginger (Jøker 2004).

Hinrichs (pers. comm. to UNEP-WCMC, 2017) mentioned that besides musical instruments, the species is also used for kitchen products, which are becoming increasingly popular in the domestic market.

Lemmens (2008) reported widespread damage to plantations over 15 years old that in Java by the fungus *Fusarium solani*, with a seedling mortality rate up to 60 per cent (Lemmens, 2008).

In Indonesia, *D. latifolia* was considered to be threatened with habitat destruction and unsustainable harvest (Government of Indonesia, 2007). It was reported that around half of Indonesia's land area is covered by forests (over 90 million ha of forests) (Chatham House, 2017). The annual rate of deforestation for the period 2010-15 was 0.7 per cent (FAO, 2015). Illegal logging is estimated to have declined in recent years, but these findings may reflect a shift towards plantations and away from natural forest harvesting and legal ambiguity over the permitting process for forest conversion may mean that levels of illegality are higher than the data suggest (Hoare and Wellesley, 2014).

It was noted by the Government of Indonesia (2007) that despite the serious threat to *Dalbergia* species, including *D. latifolia*, no effective conservation measures have been taken to enhance their immediate protection and conservation due to a lack of, or extremely limited, data on population status. Existing data were considered out of date or inaccurate due to significant changes in land cover and forest status (Government of Indonesia, 2007). The Government of Indonesia (2017) noted problems with seed production with regards *D. latifolia* due to a "significant decrease" in population numbers, including seed trees.

There are several types of logging licences recognised under Indonesian legislation, depending on forest type and ownership (European Timber Trade Federation 2016b). Natural forest management and logging of forest products from plantations requires the license holder to develop an annual cutting plan and a pre-harvest inventory with tree map, which must be authorised by the Forest Service (European Timber Trade Federation 2016b). Wood harvest on private land requires the owner to hold a valid Land Conversion Permit (European Timber Trade Federation 2016b). It was noted that Java was the main producer of rosewood (*Dalbergia* spp.), especially Central Java, by State owned company Perum-Perhutani (Government of Indonesia, 2007).

D. latifolia is listed in the Decree of the Ministry of Forestry No. 273/KPTS-IV/93 on the classification of types of wood as the basis for forestry fees, which details those species subject to forestry fees if harvested (Government of Indonesia, 1994). The Forestry Law (No 41/1999) defines three types of conservation forest in Indonesia: sanctuary reserve, nature conservation area and hunting area. Act No. 5/1990 on Conservation of Living Resources and Their Ecosystem emphasises the need for protection, biodiversity preservation and conservation areas (Jalonen *et al*., 2009). Concerns have been raised over overlapping and inconsistent forestry legislation in Indonesia and there have been calls for greater synchronisation and harmonisation of these laws (Randriamamonjy, 2016).

A log export ban was issued in Indonesia between 1985 and 1992 and re-activated in 2001 (World Resources Institute, 2016). Since 2004, the export of logs and sawnwood from natural forests has been prohibited (U.S. International Trade Commission, 2010; World Resources Institute, 2016). However, according to Winfield *et al*. (2016), in 2009, the ban was amended to allow the export of logs sourced from plantations.

Indonesia developed a mandatory national timber legality assurance system (Sistem Verificasi Legalitas Kayu or SVLK) in 2001 and utilised the Forest Law Enforcement, Governance and Trade (FLEGT) action plan as of 2007 to improve sustainability, forest governance, to increase certification and attempt to reduce illegal logging (EU FLEGT facility, 2017). In 2014, Indonesia signed and ratified a Voluntary Partnership Agreement (VPA) with the EU to ensure products entering the EU markets from Indonesia are verified and legally sourced (European Commission, 2016). FLEGT licenses have been issued from Indonesia since 15 November 2016 (European Commission, 2016). However, musical instruments, for which this species is commonly used, are not covered by FLEGT licensing (European Commission, 2017).

D. latifolia has been listed as a priority species for conservation activities in Indonesia and it was reported that initial efforts have been made to compile a database of information on the taxonomy, biology, ecology, reproduction, utility and status of the species (Jalonen *et al*., 2009).

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FABALES: LEGUMINOSAE

Dalbergia melanoxylon II/B

SYNONYM:	*Dalbergia stocksii*
COMMON NAMES:	African Blackwood
RANGE STATES:	Angola, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Democratic Republic of the Congo, Eritrea, Ethiopia, India, Kenya, Malawi, Mali, Mozambique, Namibia, Nigeria, Senegal, South Africa, South Sudan, Sudan, Swaziland, Uganda, United Republic of Tanzania, Zambia, Zimbabwe
UNDER REVIEW:	Mozambique, South Africa, United Republic of Tanzania
EU DECISIONS:	None
IUCN:	Lower Risk/near threatened (needs updating)

Trade patterns

Dalbergia melanoxylon was listed in CITES Appendix II on 2nd January 2017 and in Annex B of the EU Wildlife Trade Regulations on 4th February 2017, as part of the genus listing for *Dalbergia* spp. As such, there has never been any reported direct or indirect trade in *D. melanoxylon* from Mozambique, South Africa or Tanzania to the EU-28 or elsewhere.

Conservation status

D. melanoxylon is a slow growing "deciduous spiny shrub or small tree", growing up to 12 m tall (Lemmens, 2008), and reaching maturity at 70-100 years (Jenkins *et al*., 2012). The species can be found on "dry, rocky sites and termite mounds", but is "most common near water or in valleys of impeded drainage", typically not beyond altitudes of 1350 m above sea level (Lemmens, 2008). Lemmens (2008) described favoured soil type as "loamy-sandy to clayey soils including lack cotton soils", in areas of mean annual rainfall at 700-1200 mm. Description of *D. melanoxylon* habitat is more generally described as Miombo woodland, referring to the wide spacing of trees, a lack of canopy cover, and grass growth between trees (Gregory *et al.*, 1999). Despite its description as a species with an affinity for water sources, Ball (2004) noted that the species is "able to grow in a variety of conditions".

Lemmens (2008) noted that, following land clearance, regeneration is often abundant, resulting in the establishment of seedlings and also coppice shoots and root suckers. In managed plots where *D. melanoxylon* is allowed to regrow without burning, regeneration is said to be "fair" (Lemmens, 2008). Contrary to Lemmens (2008), Amri *et al.* (2009) described *D. melanoxylon* as possessing "serious reproductive limitations", with a "very low germination capacity". The requirement for more research on growth rates and propagation has been described as important to the development of sustainable harvest for *D. melanoxylon* (Lemmens, 2008).

D. melanoxylon has been described as "widespread", from Senegal in the west to Eritrea, Ethiopia, and Kenya in the east, and then south as far as Namibia, Botswana, northern South Africa, and Swaziland

(Lemmens, 2008; Gregory *et al.*, 1999). The species has also been reported as introduced to India and Australia (Lemmens, 2008), although is said to have undergone rapid eradication in Western Australia (Lemmens, 2008). Winfield *et al*. (2016) noted that there had been "no recent scientific investigations on the actual distribution" of *D. melanoxylon*. Winfield *et al*. (2016) described efforts by "Global Eye" to predict distribution through habitat suitability analyses, which indicated a distribution largely excluded from Cameroon, the Democratic Republic of Congo, Uganda, and Kenya.

D. melanoxylon is categorised as "Lower Risk/near threatened" by the IUCN, with a note to indicate that the assessment requires updating (WCMC, 1998). Across its distribution, Lemmens (2008) reported that the status of *D. melanoxylon* had been "relatively stable for many decades". The total distribution of *D. melanoxylon* was reported to be larger than its harvestable area, owing to the lower density of larger trees in some regions of its distribution (Ball, 2004). Exploitation was said to be "high", with desirable specimens becoming "increasingly scarce" (WCMC, 1998). In association with this increased harvest, the species was reported to have experienced significant declines across the entirety of its range, particularly in larger, mature trees (Lemmens, 2008), a corollary being genetic erosion and a reduction in potential population recovery (Lemmens, 2008).

Ball (2004) considered that *D. melanoxylon* density was only sufficient for commercial harvest in East Africa. Jenkins *et al.* (2012) considered that population viability of *D. melanoxylon* was only sufficient for extraction in northern Mozambique and southeast Tanzania, and outside of these areas, "only remnant trees remain". Similarly, Dewees *et al.* (2011) noted that the Miombo woodlands in which *D. melanoxylon* resides have experienced a high level of degradation, driven by "human use". Winfield *et al*. (2016) discussed a series of studies on *D. melanoxylon* distribution, carried out between 2001 and 2016, summarising that a majority indicated "unstable" populations, "unsustainable harvesting practices", and "poor recruitment" for both protected and non-protected areas.

The heartwood of *D. melanoxylon* was described as a "very dark brown to purplish black" with a high density (Lemmens, 2008). It was reported to be highly prized for intricate carvings, marquetry and utensils, as well as being a favourite wood for musical instruments, especially wind instruments and violins (Lemmens, 2008). It should also be noted that *D. melanoxylon* typically grows as a branched, twisted tree, meaning high quality heartwood for musical instrument manufacture is naturally rare (Bevan and Harrison, 2003). *D. melanoxylon* was also noted to be of high value in the tourism industry (Amri *et al.*, 2009), being "very popular" and "highly prized for intricate carvings" (Lemmens, 2008). Lemmens (2008) noted the use of *D. melanoxylon* in traditional medicines in east Africa.

The key threats to *D. melanoxylon* have been described as aridification, disease, forest fires, habitat fragmentation, and selective logging (Lemmens, 2008; Winfield *et al.*, 2016). Previously, the main threat was considered to be the overexploitation for the "wood carving and musical instrument industries" (WCMC, 1998; Gregory *et al.*, 1999), in particular supplying the demand for clarinets (Gregory *et al.*, 1999), and other "wind-instruments such as oboes, flutes and bagpipes" (CoP17 Prop. 55). In musical instrument manufacture, the species is highly sought due to its "dark colour, stability and clearness of tone" (CoP17 Prop. 55). Mariki and Wills (2014) estimated that 7 500-20 000 D. melanoxylon trees were felled each year to make musical instruments, mainly from Tanzania and Mozambique. Jenkins *et al.*, (2012) reported a demand of 255 m^3 per year for musical instruments, with wood typically exported as semi-processed billets. This trade is considered to be relatively stable (Jenkins *et al.*, 2012) but it appears that new tonewood markets are developing, with a reported increase in demand from the guitar industry who are beginning to substitute this species for ebony in the manufacture of fingerboards (Jenkins *et al.*, 2012). According to the Mpingo Conservation and Development Initiative (2017a), long, straight sections of wood are required to form a billet, and there is substantial wastage of timber (around 90 per cent) due to the twisted nature of the mature tree. However, according to data studied by Chang and Peng (2015) and reports by Environmental Investigation Agency (2014), the majority of trade is now destined for the Chinese Hongmu furniture industry. *D. melanoxylon* has also been

associated with charcoal and firewood production, traditional medicines, construction, and livestock feed (Lemmens, 2008).

As a result of its high economic value, *D. melanoxylon* has experienced high exploitation pressure, which is said to threaten its "future existence" (Amri *et al.*, 2010; Jenkins *et al.*, 2002). Amri *et al.* (2010) described *D. melanoxylon* as "one of the most expensive timbers in the world" (Jenkins *et al.*, 2002). Indeed, the average price of *D. melanoxylon* in 2000 was reported as USD 10 900 per m^3 (Lemmens, 2008), making it "one of the most valuable timbers in Africa" (Lemmens, 2008). In 2002, the export value of semi-processed *D. melanoxylon* was estimated to be USD 2-3 million, whereas the total retail value of products containing this species were estimated to be USD 100 million (Lemmens, 2008). According to the Mpingo Conservation and Development Initiative, the average price is currently around USD 20 000 per m^3 (MCDI, 2017b), a figure echoed in a report published by the International Tropical Timber Organisation in 2014 which gave the wholesale price of logs in Chinese markets as around USD 21 700 per m^3 (ITTO, 2014).

D. melanoxylon is reported to be attacked by a species of *Cerambycidae* spp. [longhorn beetle] (Gregory *et al.*, 1999). In cases where *Cerambycidae* spp. attack is detected, harvested wood is discarded on the grounds that external damage would indicate compromised structural integrity (Gregory *et al.*, 1999). Heart rot has also been described as a threat, with *D. melanoxylon* being particularly susceptible to fungal infection following forest fires (Orwa *et al.*, 2009). *D. melanoxylon* has been referred to as beneficial to soil health, through both increased soil fertility and reduced erosion (Lemmens, 2008).

In 1993, Fauna and Flora International (FFI) founded SoundWood, aiming to protect the valuable species used to make musical instruments (Gregory *et al.*, 1999). Arboricultural studies have demonstrated that management schemes for growth maximisation of *D. melanoxylon* can be successful, but also noted the caveat that *D. melanoxylon* will often not reach harvestable size until 70-100 years (Orwa *et al.*, 2009). However, according to Jenkins *et al.* (2012) the highest quality tonewood originates from slow-growing natural forests, and trees grown in plantations, which are usually artificially watered, are not considered to be of sufficiently high quality. The involvement of the local community in conservation efforts of *D. melanoxylon* has been noted as of importance (Lemmens, 2008).

Winfield *et al.* (2016) stated that a proposal to list *D. melanoxylon* in Appendix II was discussed at CoP9 in 1994 on the basis of significant range reductions. However, the proposal was withdrawn over confusion regarding the identification of the species, despite the species reportedly being "relatively easy" to distinguish from other *Dalbergia* spp. (Winfield *et al.*, 2016). Winfield *et al.* (2016) emphasised that following this decision to withdraw the proposal, the species continued to experience exploitation.

FAEF (2013) reported that illegal logging mainly consisted of logging small and undersized trees in forest concessions and logging outside of the permitted area, and logging in fragile ecosystems was uncommon. The Zanzibar Declaration on Illegal Trade in Timber and Forest Products[4] was signed in 2015 by the national forest agencies of Kenya, Tanzania, Uganda, Madagascar and Mozambique aiming to agree a unifying strategy for both source and transit countries to combat illegal timber trade in eastern and southern Africa. The effectiveness of this agreement has yet to be assessed.

Mozambique: *D. melanoxylon* was described as "widely distributed throughout Mozambique" (Rich, 2012), from the Gaza province in the south to the Cabo Delgado province in the north (Jenkins *et al.*, 2002). The main stands were reported to occur in northern Mozambique (Jenkins *et al.*, 2012). The highest population abundances have been recorded in Cabo Delgado (Jenkins *et al.*, 2002; Rich, 2012), although Jenkins *et al.* (2002) also reported there to be stocks of *D. melanoxylon* for commercial purposes in the Niassa Province [northern Mozambique].

[4] http://www.trafficj.org/publication/15_Zanzibar-Declaration.pdf

D. melanoxylon is not yet considered to be an endangered species in Mozambique (Rich, 2012), although Jenkins *et al.* (2002) noted that "there is no accurate inventory of standing stock" for the species in this country. A survey in the 1990s found that *D. melanoxylon* accounted for on average 4 per cent of the standing trees with a DBH (diameter at breast height) greater than 5 cm (Jenkins *et al.*, 2002). According to Mozambique's national report to the Tenth Conference of the UN Forum on Forests in 2013, a National Forest Inventory conducted 2005-2007 indicated that 70 per cent of the country was still forested, with 40.1 million hectares of forested areas, of which 13.2 million hectares are conservation areas (Ministry of Agriculture, 2013). Marzoli (2007, in: Chidumayo and Gumbo, 2010) noted that, in Mozambique's 2007 national forest inventory, commercial timber species were only found at around one to two mature timber trees (or 5 m^3) per hectare, estimated to be 7 per cent of the standing volume of forests. In Cabo Delgado estimates of density varied markedly from 0.2m^3 ha^{-1} to 1m^3 ha^{-1} (Jenkins *et al.*, 2002).

Mozambique has been described as a main exporter of *D. melanoxylon* (Louppe *et al.*, 2008), supplying a growing market in China (Campbell *et al.*, 2007). Following the depletion of stands in Senegal, Kenya, and Malawi, exploitation shifted in part to Mozambique to supply the carving industry (Louppe *et al.*, 2008; Cunningham, 1998). Cabo Delgado province was reported to be responsible for 60 per cent of the *D. melanoxylon* exports from Mozambique in 2002, with an average annual export of 720 m^3 (Louppe *et al.*, 2008). In the Cabo Delgado province, overback volume was reported to be 2.2 m^3 per ha (Macome, 1996, in: Malimbwe *et al.*, 2002).

Chang and Peng (2015) noted that timber exports from Mozambique to China have risen substantially over recent years, and 10 per cent of these exports consist of *D. melanoxylon*. The figures given by Chang and Peng (2015) for Chinese imports of *D. melanoxylon* timber (round wood equivalent) were more than 5000 m^3 in 2004 rising to over 33 000 m^3 in 2013; based on the latter figures and taking the volume of timber harvested from an average tree as 0.1 to 0.2 m^3 (Jenkins *et al.*, 2002) the equivalent of between 170 000 and 330 000 trees would have been harvested. These figures indicate that the demand for this timber has shifted from the tone wood industry, mainly based in Europe and the USA, to the production of furniture in China. Discrepancies between licensed exports from Mozambique and data from Chinese customs indicate that nearly 50 per cent of exports to China are unlicensed and therefore illegal (EIA, 2014; Chang and Peng, 2015).

Deininger and Byerlee (2012) reported that in the hope of driving large-scale farming in Mozambique, over a five year period between 2004 and 2009, the rights to ~2.7 million ha of land were leased out for development. Deininger and Byerlee (2012) posited that this represented a threat to *D. melanoxylon* coverage.

Jenkins *et al.* (2002) discussed two key legislative acts: the Forestry and Wildlife Development Policy Act, and the Forestry and Wildlife Act, which regulate the harvest of *D. melanoxylon* under a license system in the case of nationals and a concession system for foreigners. More recently, Winfield *et al.* (2016) highlighted Law no. 16/2014, which "established the basic principles and rules on the protection, conservation and sustainable use of biological diversity within conservation areas." In 2014, Global Forest Watch (2017) reported that 51 949 ha of forest had been certified by the FSC.

D. melanoxylon is regulated as a precious wood species through Order 265/2005 (Winfield *et al.*, 2016). Jenkins *et al* .(2002) mentioned that in 2002, a national quota for *D. melanoxylon* roundwood was set at 1000 tonnes, 600 tonnes of which was to be met by Cabo Delgado. To be granted permission to harvest *D. melanoxylon,* loggers must submit annual licenses to the Provincial Department of Agriculture and Rural Development (DPADR) (Jenkins *et al.*, 2002). Approval of licenses is granted according to set criteria in the context of the province (Jenkins *et al.*, 2002). In 2002, the full quota of *D. melanoxylon* was reported to have not been met (Jenkins *et al.*, 2002). According to the Ministerial Decision of 1 April 2016 establishing the table of logging quotas for precious tree species (Ministério da Terra, Ambiente e Desenvolvimento Rural, 2016), a total quota of 1850 t of *D. melanoxylon* was set for 2016, distributed

across the following provinces: 750 t - Cabo Delgado, Nampula – 700 t, Zambezia -200 t, Manica – 100 t, Sofala – 50 t, Tete – 25 t, Inhambane – 20 t, Niassa – zero t.

The Nhambita project, an EU supported project, attempted to incentivise *D. melanoxylon* conservation through providing payments to the community on the condition that tree-planting schemes are adopted (Campbell *et al.*, 2007). In the interest of maintaining local enthusiasm for *D. melanoxylon* conservation, in 2006 Mozambique passed new regulations stating that the local community would receive 20 per cent of the revenue on forestry extraction (Campbell *et al.*, 2007). In 2007, the Environmental Strategy for the Sustainable Development of Mozambique was put in place, with the intention of creating "a common vision for wise environmental management, leading to sustainable development to contribute to the eradication of poverty afflicting the Mozambican society" (Winfield *et al.*, 2016).

Although there has been legislation passed in the interest of conserving *D. melanoxylon,* Mackenzie (2006) cautioned that much of this legislation had proved ineffective in preventing illegal logging. Instead, Mackenzie (2006) wrote that regulations had helped to encourage payment of bribes to the authorities, which had in turn driven up the price of *Dalbergia* spp., further incentivising harvest.

South Africa: *D. melanoxylon* was reported to be distributed in northern South Africa (Lemmens, 2008), where it was reported to prefer "clayey, moderately leached, alkaline and slightly sodic soils" (Lemmens, 2008). *D. melanoxylon* was said to occur in the Greater Giyani Municipality in the north-eastern region of the Limpopo Province (Makhado *et al.*, 2009), and in Mpumalanga Province (WCMC, 1998).

Mucina and Rutherford (2006) described *D. melanoxylon* as occurring within the mopane basalt shrublands, tsende mopaneveld, lowveld rugged mopaneveld, mopane gabbro shrubland, nwambyia-pumbe sandy bushveld, and the gabbro grassy bushveld of the Limpopo and Mpumalanga Provinces. Mucina and Rutherford (2006) classified all habitat types of the Limpopo and Mpumalanga Provinces in which *D. melanoxylon* is found, as "least threatened".

In 2015, over 7 per cent of South Africa's land area was forested (FAO, 2015). Ten per cent of these forests were reported to be primary, 20 per cent plantations and 70 per cent naturally regenerated (FAO, 2015). Forest cover has remained at the same level over the period 1990-2015 (FAO, 2015).

South Africa has been described as having a "significant trade in wood carvings for the tourist market" (Jenkins *et al.*, 2002). However, Jenkins *et al.* (2002) also noted that most of the *D. melanoxylon* carvings traded in South Africa are not harvested from within the country, but instead imported from other neighbouring countries.

Winfield *et al.* (2016) highlighted two key legislative acts in the context of South African management of *D. melanoxylon*: the Forest Act 1984, and the National Forests Act 1998.

United Republic of Tanzania: Jenkins *et al.* (2012) reported that the main stands of *D. melanoxylon* occurred in south-east Tanzania. Previously, Gregory *et al.* (1999) wrote that the highest quality Tanzanian *D. melanoxylon* timber originated in the Nachingwea district [Lindi Region, south-east Tanzania], with Liwale [Lindi Region], Masasi [Mtwara Region, southern Tanzania] and Ruvuma River [southern Tanzania] also mentioned as important harvesting areas (Moore and Hall, 1987 in: Gregory *et al.*, 1999). Winfield *et al.* (2016) reported that *D. melanoxylon* occurred "in low altitude savannahs near Morogoro [eastern Tanzania] and Itigi [Central Tanzania], all the way to the coast", citing two documents (WCMC, 1998; Rasmussen, 1993), although it is not clear in either of these documents where these records are described.

D. melanoxylon was reported to be found in "open Miombo woodlands" of Tanzania (Ball, 2004), with a mean tree height of 8.9 m and mean bole diameter of 22 cm (max tree height 19 m and maximum

diameter 68.5 cm) in natural vegetation (Lemmens, 2008). The species was described as tending to "grow in clusters" (Lemmens, 2008). Density of *D. melanoxylon* in inland forests was reported as 10 m^3 per ha and at 5 m^3 per ha for coastal forests (Lemmens, 2008).

D. melanoxylon was reported to be found at a mean density of 8.5 trees per ha in Tanzania (Lemmens, 2008). Modest *et al*. (2010) reported a density of 3.1 trees per ha in Nguru ya Ndege Forest Reserve, Morogoro [eastern Tanzania], which they noted was lower than densities in southern Tanzania recorded by Ball (2004) and Opulukwa *et al*. (2002) of 8.5 stems/ha and 20 stems/ha, respectively. They interpreted the lower density and gaps in size distribution classes as indicating the "overexploitation of this species especially in the past years", which has reduced the regeneration potential of the species within the reserve (Modest *et al*., 2010). In their study of miombo woodland in Kilosa district [Morogoro Region, east-central Tanzania], Backéus *et al.* (2006) found virtually no larger individuals of *D. melanoxylon* due to selective logging, and considered that the species was "bound to disappear with the present logging practice."

Opulukwa *et al.* (2002) reported that *D. melanoxylon* had become rare by the 1960s due to intensive exploitation, particularly in easily accessible areas, and considered it now "very hard to find harvestable wood". Likewise, Lemmens (2008) reported that Tanzanian *D. melanoxylon* had been harvested such that it has been considered appropriate to "regard the species as threatened, or at least commercially no longer exploitable in the future". Gregory *et al.* (1999) also highlighted that *D. melanoxylon* stocks have been reported to be "in decline". Milledge *et al*. (2007) described how the main harvest areas for *D. melanoxylon* had shifted over recent years, indicating localised depletions.

D. melanoxylon was reported to be the joint most expensive timber exported from Tanzania, along with *Diospyros* spp. (Ball, 2004). Treanor (2015) considered *D. melanoxylon* to be "ordinary" and "mid-low" value, although it should be noted that this description is in relation to "high value" and "collectible" wood species. *D. melanoxylon* from Tanzania was reported to be exported primarily for the "manufacture of clarinets, oboes, bagpipes and other musical instruments" (Ball, 2004), but also for local use in the form of "traditional carvings" (Ball, 2004). Average annual export of D. *melanoxylon* from Tanzania 1999-2000 was reported to be 73.5 m^3, and the average price was USD 10 900 per m^3 (Lemmens, 2008). Approximately 250 000 carvings were exported in 1999, valuing USD 970 000 (Lemmens, 2008). In 2004, the extraction of 48.59 m^3 of logs was recorded in Kilwa and 50.72 in Nachingwea [Lindi Region] (Milledge *et al*., 2007). The total volume of *D. melanoxylon* timber issued on harvest licenses in Tanzania in 2003 was reported to be 145.92 m^3, of which 115 m^3 was from Kilwa district (Milledge *et al*., 2007). *D. melanoxylon* exports from Tanzania over the period 2002-2005 were reported to be 79.05 m^3 2002/2003, 231.00 m^3 2003/2004 and 65.24 m^3 2004/2005 (Forestry and Beekeeping Division, 2006 in: Milledge *et al*., 2007).

A national inventory of standing stocks in Tanzania was reported to be urgently needed (Jenkins *et al.,* 2012). The total annual harvest rate of *D. melanoxylon* in Tanzania was estimated to be 4500 m^3, with the two remaining regions with significant stocks (Lindi and Mtwara) together representing an estimated 40-45 years of supply at the current rate of extraction (Jenkins *et al.,* 2012).

In 2015, forests covered just over half of Tanzania's land area, consisting almost entirely of naturally regenerated forest, with no remaining native forests, and plantations accounting for just 1 per cent (FAO, 2015). The annual rate of deforestation for the period 2010-2015 was 0.8 per cent (FAO, 2015). In 2004, the more inaccessible regions of southern Tanzania were reported to have 70 per cent forest cover, which was at the time reported to be "higher than the national average" (Ball, 2004). Ball (2004) stated that in this region of Tanzania, poor access across the Rufiji River and the frequency of flooding had provided the woodlands with some protection. Following the construction of a new bridge however, Ball (2004) anticipated that with improved access, harvest pressure would increase.

D. melanoxylon was reported to be protected by law in Tanzania, although Lemmens (2008) noted that obtaining permits for legal harvest was still possible. Specifically, Winfield *et al.* (2016) highlighted two key legislative acts: the Tanzanian Forest Act of 2002 (United Republic of Tanzania, 2002), and the Forest Act No. 14 of 2002. Whilst the Tanzanian Forest Act outlines the requirements for sustainable management plans and specifies the requirement for permits and licences, the Forest Act No. 14 specifies a series of harvestable diameters (Winfield *et al.*, 2016). More generally, *D. melanoxylon* trees of greater than 22 cm diameter are considered exploitable (Lemmens, 2008). According to the Global Forest Watch (2017), 131 975 ha of forest in Tanzania were certified by the FSC in 2014. Plantation initiatives such as the African Blackwood Conservation Project (ABCP) have been highlighted as promising in terms of management of *D. melanoxylon*, although the authors noted the caveat that "slow growth makes plantations unattractive from an economic point of view". Even in cases where rapid growth is achieved, this rapidity seems to "reduce the wood quality, resulting in lighter-coloured and lower-density heartwood" (Lemmens, 2008).

Raw log export was reported to be banned in Tanzania and this law was considered to be successfully implemented (Jenkins *et al.*, 2012). However, there were considered to be high levels of illegal logging and trade in Tanzania, with actual timber exports far exceeding official exports (Milledge *et al.*, 2007; Jenkins *et al.*, 2012).

Milledge *et al.* (2007) reported that during an eleven month nationwide harvest ban starting in October 2004, within four days a company specialising in *D. melanoxylon* was allowed to continue harvesting in Kilwa district, with 14 companies granted permission to continue logging, transporting or export by March 2005. Such exceptions lead to difficulties in establishing what has been legally harvested during such nationwide bans (Milledge *et al.*, 2007).

The Tanzanian Mpingo 98 project carried out a series of surveys on the state of *D. melanoxylon* in southern Tanzania, which led to the recommendation of a management plan (Gregory *et al.*, 1999). Recommendations from the project included keeping inventories of *D. melanoxylon* stocks, the integration of sawmills and carvers activities, the early burning of Miombo woodland, considering the community in decision making, improving road links from Dar es Salaam to enable more effective protection from illegal logging, and overall cooperation between all associated parties in formulating management plans (Gregory *et al.*, 1999). Gregory *et al.* (1999) also posited that artificial propagation may have previously been achieved in Tanzania, with reports that growth was achieved through leaving "nature to its course". However, Gregory *et al.* (1999) also noted that the survey hadn't been completed, and the collected data not yet analysed. More recently, this project now goes by the Mpingo Conservation and Development Initiative, reflecting its change to a more holistic conservation and management programme (MCDI, 2017c). According to their annual report, 112 000 ha of forests have now been brought under community protection (MCDI, 2016). The initiative also reported that 32 per cent of village land had been set aside by communities for forest conservation, with 37 communities in total reached. More than 200 forest stewards are reported to have now been trained (MCDI, 2016).

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FABALES: LEGUMINOSAE

Dalbergia retusa II/B

SYNONYMS:	*Amerimnon lineatum*; *Amerimnon retusum*; *Dalbergia hypoleuca*; *Dalbergia lineata; Dalbergia retusa var. lineata*; *Dalbergia retusa var. retusa; Dalbergia pacifica*
COMMON NAMES:	Cocobolo (EN), Cocobolo Prieto (ES)
RANGE STATES:	Belize, Colombia (?), Costa Rica, El Salvador, Guatemala, Honduras, Mexico (introduced), Nicaragua, Panama
UNDER REVIEW:	El Salvador, Guatemala, Nicaragua
EU DECISIONS:	None
IUCN:	Vulnerable (needs updating)

Trade patterns

The Guatemalan population of *Dalbergia retusa* was listed in CITES Appendix III on 12th February 2008 and in Annex C of the EU Wildlife Trade Regulations on 11th April 2008. All other populations of *D. retusa* were listed in Annex D of the EU Wildlife Trade Regulations on 11th April 2008. The Panama population of *D. retusa* was listed in CITES Appendix III on 22nd December 2011 and in Annex C of the EU Wildlife Trade Regulations on 15th December 2012. All populations of *D. retusa* were listed in CITES Appendix II on 12th June 2013 and in Annex B of the EU Wildlife Trade Regulations on 10th August 2013 and were included in the CITES listing for *Dalbergia* spp. on 2nd January 2017 and in the EU listing for *Dalbergia* spp. on 4th February 2017.

El Salvador: El Salvador has submitted annual reports for all years 2008-2015 with the exception of 2008 and 2013. El Salvador has never published any annual export quotas for *D. retusa*.

Direct trade in *D. retusa* from El Salvador to the EU-28 2008-2015 consisted of 12.3 m^3 of wild-sourced timber for commercial purposes, reported by El Salvador only in 2015. Direct trade to countries other than the EU-28 also comprised timber for commercial purposes, the majority of which was wild-sourced and the remainder pre-convention (Table 1). There has never been any reported indirect trade in *D. retusa* originating from El Salvador to the EU-28.

Table 1: Direct exports of *Dalbergia* retusa from El Salvador to the EU-28 (EU) and the rest of the world (RoW), 2013-2015. Quantities have been rounded to one decimal place, where applicable. All trade was in timber for commercial purposes. No trade was reported 2008-2012.

Importer	Source	Unit	Reported by	2013	2014	2015	Total
EU	W	m^3	Importer				
			Exporter			12.3	12.3
RoW	O	m^3	Importer	31.2			31.2
			Exporter		15		15
	W	m^3	Importer	37	439.5	53.6	530.1
			Exporter		416.6	51.8	468.4
		-	Importer		215		215
			Exporter				

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 11/04/2017

Guatemala: Guatemala has submitted annual reports for the years 2008-2014; Guatemala's annual report for 2015 had not been received at the time of writing. Guatemala has never published any annual export quotas for *D. retusa*.

Direct trade in *D. retusa* from Guatemala to the EU-28 comprised 31.1 m^3 wild-sourced timber for commercial purposes, reported by Guatemala in 2012. Direct trade to the rest of the world also comprised wild-sourced timber for commercial purposes in 2012, with 116.5 m^3 reported by Guatemala.

There has never been any reported indirect trade in *D. retusa* originating from Guatemala to the EU-28.

Nicaragua: Nicaragua has submitted annual reports for the years 2008-2015. Nicaragua has never published an annual export quota for *D. retusa*.

Direct trade in *D. retusa* from Nicaragua to the EU-28 comprised wild-sourced timber for commercial purposes, with 79 m^3 reported in 2012 by Nicaragua and 8.6 m^3 in 2014 according to importers (Table 2). Direct exports to countries other than the EU-28 also primarily comprised wild-sourced timber for commercial purposes (Table 2)

Indirect trade in *D. retusa* originating from Nicaragua to the EU-28 comprised wild-sourced timber for commercial purposes (32.9 m^3 and 100 items) as reported by importers only in 2015.

Table 2: Direct exports of *Dalbergia retusa* from Nicaragua to the EU-28 (EU) and the rest of the world (RoW), 2012-2015. Quantities are rounded to one decimal place where appropriate. No trade was reported 2008-2011.

Importer	Term	Purpose	Source	Unit	Reported by	2012	2013	2014	2015	Total
EU	timber	T	W	m^3	Importer			8.6		8.6
					Exporter	79				79
RoW	timber	P	I	-	Importer				6	6
					Exporter					
		T	A	m^3	Importer				19	19
					Exporter					
			I	kg	Importer				20	20
					Exporter					
			W	m^3	Importer		204.1	1815.2	2038.1	4057.3
					Exporter	50.330	1616.2	1215.9	2328.3	5210.73
				-	Importer					
					Exporter				6.8	6.8
	veneer	T	W	m^3	Importer				1	1
					Exporter					

Source: CITES Trade Database, UNEP-WCMC, Cambridge, UK, downloaded on 11/04/2017

Conservation status

D. retusa is a tropical dry forest species, reported to occur in Mexico and in the meso-American Pacific Region from Guatemala to Panama (Americas Regional Workshop, 1998; Marin and Flores, 2003; Grandtner and Chevrette, 2013); some authors also reported its occurrence in Colombia (Americas Regional Workshop, 1998; Zamora Villalobos, 2010; Grandtner and Chevrette, 2013), although Cárdenas Lopez *et al.* (2011, in: CoP16 Prop. 61) did not consider it to occur there. At a "*Workshop on evaluating the timber species of the genus Dalbergia in Mexico in the context of NOM-059-SEMARNAT-2010*", organised by the CITES Scientific Authority of Mexico in 2015, experts determined that *D. retusa* was not distributed naturally in Mexico, and online records for the species (e.g. Trópicos) represented introduced specimens (PC22 Doc. 22.4).

It was reported to be a small to medium-sized sub-canopy tree that grows well in open areas, reaching 15 to 20 m in height and 40 cm DBH (Marin and Flores, 2003). It is found on flatlands or moderate slopes in tropical, dry forests at altitudes of 50 to 300 m (Marin and Flores, 2003). Natural regeneration was reported to be scarce, although saplings and juveniles can be found in areas periodically exposed to fire (Marin and Flores, 2003). It was reported that, in plantations in Guatemala, *D. retusa* averaged 15.93 cm diameter at 20 years (FNPV, 2016b). *D. retusa* was reported to grow in groups, with an even distribution in natural forests (FNPV, 2016b).

D. retusa is categorised as Vulnerable globally by the IUCN (annotated as needing updating), with a limited occurrence of the species reported north of the Canal in Panama and reasonably-sized (introduced) subpopulations reported in Mexico (Americas Regional Workshop, 1998). It was described as a 'common tree species' in Atlantic forests of Central America (Grebner *et al.*, 2013).

D. retusa was reported to be the most prominent *Dalbergia* species in trade from the Americas, and the second most traded CITES-listed *Dalbergia* species (Winfield *et al.*, 2016). It is used in musical instruments, furniture and handicrafts (PC22 Doc. 17.2), as well as one of the most important woods in the cutlery trade for handles (Marin and Flores, 2003). It was noted in CoP14 Prop. 31 that wastage of wood appeared to be high "as the sapwood is of low value and there is a premium on the most highly patterned heartwood pieces" (CoP14. Prop. 31).

Exploitation for the timber industry was reported to be 'intense' with stock completely exhausted from places where the species was formerly widespread (Americas Regional Workshop, 1998). Illegal felling was reported to be a frequent problem in Central America (Jenkins *et al.*, 2012 in: PC22 Doc. 17.2). Habitat destruction due to agriculture, cattle ranching and burning was also considered a threat (Americas Regional Workshop, 1998). According to a report published by the International Tropical Timber Organisation in 2014, the wholesale price of logs in Chinese markets was around USD 8000 per m^3 (ITTO, 2014a).

At CoP15, an Action Plan for range States of a number of species, including *D. retusa*, was adopted (ITTO, 2010). In July 2013, an ITTO-CITES program workshop was held in Guatemala. At the workshop, the program was introduced and activities were developed to assist in implementation of the CITES-listings for *Dalbergia* (ITTO, 2013).

El Salvador: Winfield *et al.* (2016) stated that the distribution of *D. retusa* is restricted to the north-western region of the country. Its presence was reported in the Montecristo tri-national protected area in northern El Salvador (Komar *et al.*, 2005).

El Salvador's list of Threatened Species (Naturales, 2009) does not list *Dalbergia retusa*.

Forest coverage in El Salvador in 2015 was reported to be more that 12 per cent of land area, of which less than 2 per cent were primary forests (FAO, 2015). For the period 2010-2015, the annual rate of

deforestation was reported to be 1.6 per cent (FAO, 2015). Illegal logging was considered a problem in the country (Chatham House, 2017a).

No information was found on population status or threats.

The wood of *D. granadillo*, which occurs in El Salvador, was reported not to be distinguishable from *D. retusa* (PC22 Doc. 17.2).

El Salvador was reported to have a Law of Wildlife (CoP16 Prop. 61), and FAO (2015) considered El Salvador to have relevant national, regional, provincial and local legislation/regulations that supported Sustainable Forest Management. No regional species management measures for *D. retusa* were located.

Guatemala: *D. retusa* was reported to be scarce in Guatemala; a field study carried out by FAUSAC-FNPV in 2015 reported that only one population (48 trees) of *D. retusa* could be found in Suchitepéquez department and only a few scattered trees could be found in Santa Rosa and Escuintla departments, all of which are located in the south western part of the country. Komar *et al.* (2005) reported the presence of *D. retusa* in the Montecristo tri-national protected area in south-eastern Guatemala. Previously, *D. retusa* was reported to have been widely distributed across the coastal plains in the South Pacific regions of Guatemala (Standley and Steyermark, 1946). *Dalbergia* populations in Guatemala were reported to be in decline, principally as a result of lost forest cover due to unsustainable farming practices, demographic growth, fires and illegal logging (PC22 Doc. 17.2). The CITES Working Group on Neotropical Tree Species reported that 'in the majority of places where these species are present, there are not favourable conditions for sustainable exploitation" (PC22 Doc. 17.2). A high percentage of trees (69 per cent) were reported to be in the lowest diameter size classes (0-20 cm DBH) with only 21 per cent in the range 20-40 cm DBH, confirming a high level of over exploitation (CoP17 Prop. 55). Within the species' area of distribution, the basal area density was estimated at between 0.0082 and 0.0405 m^2/ha (FNPV, 2016b).

In 2015, forests were reported to cover one third of Guatemala's land area, of which nearly 38 per cent were primary forests (FAO, 2015). For the period 2010-2015, the annual rate of deforestation was reported to be 1 per cent (FAO, 2015). Illegal logging was considered a widespread problem in the country (Chatham House, 2017b). The natural distribution area of *D. retusa* in 2012 was estimated at 274,256 ha, representing a 31% reduction since 1991 (FNPV, 2016b).

Logs and sawn wood of *Dalbergia* timber tree species were reported to be the main products in international trade (CoP17 Prop. 55), but *Dalbergia* spp. was said to be used locally in the form of planks for the construction of houses and fences, as well as for furniture and sculptures for local and craft markets (PC22 Doc. 17.2). *Dalbergia* species were reported to be commonly used domestically for handicrafts, furniture, musical instruments, firewood, coal, agriculture and houses, but rarely used for industrial purposes (FNPV, 2016b). Use of species of *Dalbergia* in Guatemala was reported to be dependent on poverty levels, livelihoods, lack of governance, and lack of education and environmental awareness (FNPV, 2016b). As a consequence, the survival of *Dalbergia* species in areas of natural occurrence was considered uncertain (FNPV, 2016b).

Wild populations of *Dalbergia* spp., including *D. retusa*, were considered likely to have been severely diminished as a result of heavy logging and land-change effects during the period 1991-2012 (CoP17 Prop. 55). Traffickers were reported to have taken advantage of the gaps in CITES listings by mis-declaring *D. retusa* as the unregulated and similar-looking *D. bariensis* (Environmental Investigation Agency, 2016). It was reported that the timber of *D. retusa* could easily be confused with *D. stevensonii* and *D. tucurensis* (PC22 Doc. 17.2), with strong technical knowledge required to distinguish between them (Wiedenhoeft, 2011). The Faculty of Agronomy of the University of San Carlos de Guatemala, was reported to have carried out microscopic analysis to facilitate identification of wood at the species level (PC22 Doc. 17.2). An inventory of *Dalbergia* species in Guatemala found large trees to be almost non-

existent (FNPV, 2016b). An analysis of forest cover change found that the area of natural distribution of *D. retusa* had declined from 396,727 ha in 1991 to 274,287 ha in 2012, representing a decline of more than 30 per cent (FNPV, 2016b).

Dalbergia species in Guatemala were reported to be threatened by the loss of areas of natural occurrence (one third between 1991 and 2012) (FNPV, 2016b), land use change, illegal trade, forest fires, traditional agriculture, and lack of knowledge about the use and value of the species (ITTO, 2014c).

During the period 2011-2014, 38 shipments, with a total amount of 906 m^3 of *Dalbergia* timber, including *D. retusa,* of illegal origin were reported to have been confiscated in Guatemala (almost twice the CITES timber reported as legally exported for the same period) (CoP17 Prop. 55; PC22 Doc. 17.2). With the exception of two shipments destined for Honduras and El Salvador, all the other shipments were destined for Asia (CoP17 Prop. 55, PC22 Doc. 17.2).

Following the 2013 ITTO-CITES program workshop, Guatemala implemented two activities: an inventory of population and abundance of *D. retusa* and *D. stevensonii* in areas of natural occurrence in the country, and establishment of a forensic laboratory for wood identification and description for the application of the legal processes and traceability systems of forest products included in CITES (ITTO, 2014b; FNPV, 2016a). Guidance for CITES authorities on the procedures, methodologies and information required to develop non-detriment findings for timber and other tree species were also developed by Universidad de Córdoba (Spain), CONAP (Guatemala) and BALAM Association (ITTO, 2016). From May 2014 to October 2016, an inventory of the population and abundance of *D. retusa* and *D. stevensonii* in Guatemala was carried out by Fundación Naturaleza para la Vida (FNPV) and Consejo Nacional de Áreas Protegidas (CONAP) (FNPV, 2016b) and distribution maps for a number of *Dalbergia* species, including *D. retusa* were developed (ITTO, 2015).

D. retusa is listed on the official list of threatened species in Guatemala as a category 2 species, indicating restricted distribution (CONAP, 2009). In Guatemala, governmental management of forests was reported to be the responsibility of the National Forestry Institute (INAB), which is responsible for the administration and management of forests outside of protected areas, and of the National Council of Protected Areas (CONAP), which is responsible for forestry management within the Guatemalan System of Protected Areas (SIGAP) (PC22 Doc. 17.2). Currently, sustainable forest management for species of the *Dalbergia* genus was reported to be permitted, with extraction of *D. retusa* regulated through management plans that comply with technical requirements and national legislation (Szejner, 2005 in: CoP16 Prop. 61; PC22 Doc. 17.2). The legal frameworks that regulate forestry activities in Guatemala were reported to be the Forestry Law (Decree 101-96) and the Law on Protected Areas (Decree 4-89 and its reforms: 18-89; 110-96; 117-97), as well as specific regulations for these species (PC22 Doc. 17.2; Cop16 Prop. 61). Articles 65, 88, 95, 100 of the Forest Act and its amendments regulate particular aspects of international trade in timber species (República de Guatemala, 1996, 2005).

Nicaragua: *D. retusa* was reported to be distributed across Nicaragua from the Pacific to the Atlantic coast (Stevens *et al*., 2001); it was reported to be present in the Domitila Private Wildlife reserve in western Nicaragua (Lezama-Lopez and Grijalva, 1999).

Stevens *et al*. (2001) and Lezama-Lopez and Grijalva (1999) described the species as "frequent" in Nicaragua, whereas González-Rivas *et al.* (2006) found *D. retusa* to be one of the rarest species in their survey of tropical dry forest in Chacocente Wildlife Reserve [department of Carazo, Pacific coast]. The CITES Working Group on Bigleaf Mahogany and Other Neotropical Timber Species reported that *D. retusa* is distributed across Nicaragua outside of forests at a density of 0.064 trees per hectare (CoP16 Prop. 61) and is considered a low-priority species in Nicaragua's Forestry Action Plan (Ampié and Ravensbeck, 1994).

No information could be found regarding threats to *D. retusa* in Nicaragua.

In 2015, forests were reported to cover one quarter of Nicaragua's land area, of which nearly 40 per cent were primary forests (FAO, 2015). For the period 1995-2015, the annual rate of deforestation was reported to be 1.5 per cent (FAO, 2015). Illegal logging was considered to be a widespread problem in the country, with valuable hardwoods targeted by traffickers (Chatham House, 2017c).

Nicaragua main piece of national forestry legislation is Forestry Law 462 and is Regulation 73-2003, which sets general requirements for forestry exploitation, including the need for a management plan for areas above 10 ha of natural forest (Presidente de la República de Nicaragua, 2003). The 2015 Global Forest Resources Assessment confirms this, stating that Nicaragua has a forest policy and national legislation/regulations in place to support the implementation of Sustainable Forest Management, but it is unknown if Nicaragua has regional, provincial, or local legislation/regulations (FAO, 2016).

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FABALES: LEGUMINOSAE

Dalbergia sissoo II/B

COMMON NAMES:	Shisham (EN)
RANGE STATES:	Afghanistan, Antigua and Barbuda (introduced), Australia (introduced), Bangladesh, Bhutan, Cameroon (introduced), Chad (introduced), China (introduced), Cyprus (introduced), Dominican Republic (introduced), Ethiopia (introduced), French Polynesia (introduced), Ghana (introduced), Guinea-Bissau (introduced), India, Indonesia (introduced), Islamic Republic of Iran, Iraq, Israel (introduced), Kenya (introduced), Mauritius (introduced), Malaysia (introduced), Mozambique (introduced), Myanmar, Nepal, New Caledonia (introduced), Niger (introduced), Nigeria (introduced), Oman (introduced), Pakistan, Paraguay (introduced), Philippines, Puerto Rico (introduced), Senegal (introduced), Sierra Leone (introduced), South Africa, Sri Lanka (introduced), Sudan (introduced), Thailand (introduced), Togo (introduced), Uganda (introduced), United Republic of Tanzania (introduced), United States of America (introduced), Virgin Islands of the USA (introduced), Zambia (introduced), Zimbabwe (introduced)
UNDER REVIEW:	India
EU DECISIONS:	None
IUCN:	Not assessed

Trade patterns

Dalbergia sissoo was listed in CITES Appendix II on 2nd January 2017 and in Annex B of the EU Wildlife Trade Regulations on 4th February 2017, as part of the genus listing for *Dalbergia* spp. As such, there has never been any reported direct or indirect trade in *D. sissoo* originating in India to the EU-28 or elsewhere. India entered a reservation for the genus listing on 2nd January 2017.

Conservation status

D. sissoo is a medium to large, long-lived, deciduous tree, growing up to 30 m height (CABI, 2013) and 80 cm D.B.H. under favourable conditions (Orwa, 2009), that occupies well-drained soils near rivers and streams (Soerianegara and Lemmens, 1994; Shah *et al.*, 2010), at altitudes up to 1500 m above sea level (CABI, 2013). Lodhiyal *et al.* (2002) noted that the species is adapted to a wide range of ecological habitats, and as a result, displays a "remarkable variation in growth pattern and yield per unit area". *D. sissoo* was considered adapted to a seasonal monsoon climate and a dry season of up to six months (Orwa *et al.*, 2009). According to Lodhiyal *et al.* (2002), *D. sissoo* is found in pure forest stands[5] or with other species, commonly *Acacia catechu*. The species reproduces mostly by seed, but is also able to root sucker, and can therefore form dense thickets (CABI, 2013). *D. sissoo* starts producing flowers at nine months (Orwa, 2009). According to Orwa (2009), the species appears to be insect pollinated and trees can apparently be both self- and outcrossing to varying degrees, depending on local conditions. 'Stump

[5] Consisting exclusively or largely of a single species.

planting' was considered the best method of artificial regeneration of *D. sissoo* (Lodhiyal *et al.*, 2002). It was noted by CABI (2013) that the species is a fast-growing, nitrogen-fixing tree, which can be easily propagated. Successful regeneration requires abundant moisture and lack of competition and seedlings were reported to be intolerant of shade (CABI, 2013). Genetic diversity in *D. sissoo* at the species and population levels has been found to be relatively high and gene flow among populations was considered strong (Wang *et al.*, 2011).

D. sissoo was reported to occur naturally throughout the sub-Himalayan tract and outer Himalayan valley, ranging from the Indus to Assam (Lodhiyal *et al.*, 2002). A broader native distribution was recognised by CABI (2013), as proposed by ILDIS (2007), from Oman to Burma and southern India, although it was noted that the species may have been introduced to areas in earlier times. *D. sissoo* was reported to be an introduced species in countries in Asia, Africa, North, Central and South America, and the Caribbean, Europe and Oceania (CABI, 2013). *D. sissoo* is included in the Global Invasive Species Database (GISD, 2017) and has been listed by the Florida Exotic Pest Plant Council on the Invasive Plant List as a category II pest (FLEPPC, 2017). It is considered an environmental weed in the Northern territory and parts of Queensland in Australia and is prohibited in Western Australia (Weeds of Australia, 2016). This species is regarded as invasive in Kenya and Tanzania (BioNET-EAFRINET, 2017). However, its use as a high value timber and agroforestry species may over-ride any risks of invasion in many developing countries (CABI, 2013).

The species has not been assessed by the IUCN.

The status of *D. sissoo* as a 'rosewood' was debated as a result of its lower density, hardness and colour intensity in comparison to other *Dalbergia* species (Wood Database, 2017). Within India, the wood has high value and it was reported to be the second most widely cultivated species due to its fast growth (Cunningham *et al.*, 2005).

D. sissoo was considered to have great economic importance, with its hardwood best suitable for the furniture trade (Bajwa *et al.*, 2003) and it was considered highly valued due to its 'superior quality, colour, grain, finishing and durability' (Ghouse and Yunus, 1973). According to the Wood Database, 2017, the species is highly valued in India, where its commercial value is similar to teak. *D. sissoo* is considered an important multipurpose tree species (Sharma *et al.*, 2009) and its wood has been used to make furniture, cabinets, veneers, commercial plywood, musical instruments (Pradhan *et al.*, 1998), and sporting goods (Winfield *et al.*, 2016), and has been used in the construction of houses (Ghouse and Yunus, 1973). High market demand for the international furniture trade was reported to have driven indiscriminate logging resulting in a significant population decline (Pradhan *et al.*, 1998).

Koch (pers. comm to UNEP-WCMC, 2017) reports that *D. sissoo* offers good macroscopic features for a "certain" recognition in comparison to other *Dalbergia* species (G. Koch, pers. comm to WCMC, 2017).

Threats to the species were reported to include agricultural cultivation, animal grazing, disease, forest fires, disturbance from insects, and logging (Winfield *et al.*, 2016).

According to one author, poor germination and the death of seedlings meant the propagation of *D. sissoo* through seeds was unreliable under normal environmental conditions (Chand and Singh, 2004). However, Joshi *et al.* (2013) suggested *D. sissoo* is very suitable for plantations, as it has a rapid growth rate and low mortality rate.

It was mentioned by Winfield *et al.* (2016) that there is a good level of species specific information available on the threats, and conservation and management measures to inform an assessment against the NDF criteria for *D. sissoo*, there is a fair level of information on biology and trade, but limited species specific information on distribution and legislation and insufficient information available on its population status and structure (Winfield *et al.*, 2016).

India: *D. sissoo* is widespread in India (natural and planted) (CABI, 2013), occurring in the States of Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujarat, Haryana, Himachal Pradesh, Indian Punjab, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal (Sharma *et al.*, 2000; CABI, 2013). It has also been reported from Delhi and Puducherry [Union Territories] (Sharma *et al.*, 2000). Within its wide distribution in India, *D. sissoo* was reported to grow up to 900 m in the sub-Himalayan tract and occasionally ascending to 1500 m (Sharma *et al.*, 2000), and to be a primary coloniser of new alluvial soils (Sharma *et al.*, 2000).

D. sissoo has been used in plantations throughout dry regions in India to conserve soil and water, as this hardy species is adaptable, drought resistant and fixes nitrogen (Lodhiyal *et al.*, 2002). It was reported to have been widely planted in plantations and agroforestry systems in India, primarily for timber (Cunningham *et al.*, 2005); larger timber are produced from rotations of 40-60 years (CABI, 2013). *D. sissoo* was reported to be "widely used for afforestation in most parts of the country" and extensively planted alongside roads, canal banks and sometimes on private vacant and agricultural lands, especially in the States of Bihar, Haryana, Punjab, Uttar Pradesh, and many other areas of India (Sharma *et al.*, 2000). The species can be grown in combination with a variety of other crops (Sharma *et al.*, 2000). In north India, it was reported to account for nearly 10-15 per cent of total forest cover (Sharma *et al.*, 2000). An observed dieback of *D. sissoo* in natural forests, plantations and agroforestry systems was attributed to "complex phenomenon involving a combination of many environmental stresses", with large-scale mortality reported from the northern States of India (Sharma *et al.*, 2000). Maximum damage was reported to have been observed in areas with exclusive artificial forests of *D. sissoo* (Sharma *et al.*, 2000).

Local declines have been noted, such as a "substantial decline" in forest resources, including *D. sissoo*, observed around Similipal Tiger Reserve as a result of overharvesting (Dash *et al.*, 2016). *D. sissoo* was previously considered common in north and north-eastern parts of India (Ghouse and Yunus, 1973). In 1996-1997, 266 580 ha of *D. sissoo* plantations were established by the Forest Departments (Saigal, 2002). A stock of 898 000 trees was noted as part of a regeneration project by the Indira Gandi Nahar Project in 1998 (Cunningham *et al.*, 2005). In a plantation in Terai Central Himalaya, north-western India, *D. sissoo* was observed as growing at a density of 1010 trees per hectare (Joshi *et al.*, 2013) and the biomass of the tree layer in the plantation was recorded as 29.51 to 42.85 depending on the maturity of the tree (Joshi *et al.*, 2013).

D. sissoo was reported to be one of the most important timber species in India (Sharma *et al.*, 2000). Due to an increase in domestic and international demand for *D. sissoo* and *D. latifolia*, there was a switch to these species from ebony (*Diospyros ebenum*) in the wood craft trade in Northern India and *D. sissoo* was reported to account for 80-85 per cent of woodcrafts (Cunningham *et al.*, 2005).

D. sissoo, sourced from plantations, was reported to be used as fodder by local people for their animals, and its ash used as a fertiliser (Jalota and Sangha, 2000). Use of *D. sissoo* as a non-timber forest product contributed approximately one million rupees to Madumalia in India in 1993 (ca. USD 3 185) (Jalota and Sangha, 2000). *D. sissoo* has also used for fuel wood, due to its rapid growth rate (Soerianegara and Lemmens, 1994; Lodhiyal et al., 2002; Orwa *et al.*, 2009). *D. sissoo* leaves and bark are used as traditional medicine (Parveen *et al.*, 2007), and oil from the heartwood is used as a lubricant (CABI, 2013).

The dry deciduous woodland of northern India, which includes *D. sissoo*, was reported to have been affected by conversion through industrialisation, agriculture, grazing pressures, lopping of trees for fodder and the gathering of fuel wood (Sagar and Singh, 2004).

Over 20 per cent of India was reported to be covered by forest, of which more than 20 per cent comprised primary forest and more than 15 per cent are planted forest (FAO, 2015). Forest cover was

reported to have been increasing over the last few decades, with an annual rate of afforestation of 0.4 per cent reported for the period 1990-2015 (FAO, 2015).

D. sissoo is a plantation species in India and Nepal and in 2000, the value of *D. sissoo* plantations in northern India was estimated at Rs. 13.4 million per hectare (ca. USD 313 303) (Jalota and Sangha, 2000). Orwa *et al* (2009) noted that growth rates had been recorded of 3.7 m in 1 year, 5 m in 3 years, 11 m in 5 years and 15 m in 10 years. Plantations are established in blocks or strips at 1.8 x 1.8 m to 4 x 4 m, and trees are closely spaced to produce straight, good quality timber (Orwa *et al,* 2009). When managed as a coppice crop, stumps become less vigorous after two or three rotations (Orwa *et al,* 2009).

In situ conservation for *D. sissoo* was reported from India, aided by seed stands and productions areas, such as 975 ha in Arunachal Pradesh, 250 ha in Jammu and Kashmir (including other species) and 146 ha in Uttar Pradesh (Jalonen *et al.*, 2009). Phenotypically superior *D. sissoo* individuals were selected from Maharashtra, Uttar Pradesh, Uttarakhand and Rajasthan in India to assist conservation measures (Jalonen *et al.*, 2009). *D. sissoo* seed orchards were noted in Binhar (2 ha), Haryana, Jharkhand, Marashtra (1 ha), Punjab (4 ha) and Uttar Pradesh (95 ha) (Jalonen *et al.*, 2009).

It was noted that there are "potential management opportunities" for promoting sustainable timber through certification of *D. sissoo* plantations (Winfield *et al.*, 2016). This species was reported to have been selected by the Indian government as a focal species for development and improvement (Jalonen *et al.*, 2009).

The Indian Forest Act of 1927 is the guiding forestry legislation in the country and in 2012 the Act was amended to include prohibition of fresh clearances of reserved forests (World Resources Institute, 2014). The removal of any trees from protected areas is prohibited under the Wild Life (Protection) Act, 1972 (Winfield *et al.,* 2016). National and state governments are jointly responsible for the sustainable management of forest resources in India (European Timber Trade Federation, 2016). According to the National Working Plan Code (2014), all forests are managed under the prescriptions of a ten year working plan (European Timber Trade Federation, 2016). The European Timber Trade Federation (2016) reported that India has banned the export of unprocessed logs. *D. sissoo* is listed as a 'restricted species' in the States of Jharkhand and West Bengal, meaning permission is required for harvesting, transportation and marketing of this species (Chavan *et al*., 2015). The Export Promotion Council for Handicrafts (EPCH) developed the 'Vriksh standard Timber Legality Assessment and Verification Scheme' for verification of legality and legal origin of wood and wood products (European Timber Trade Federation, 2016). The standard recognises the following legal sources of timber: State Forest Divisions; State Forest Development Corporation (SFDC); Individual Tree Owners; and Private Plantations (European Timber Trade Federation, 2016).

As of 31 May 1999, exports of all wild-sourced CITES-listed species for commercial purposes from India were suspended (CITES Notification No. 1999/39), with the exception of cultivated varieties of plant species included in Appendices I and II. India entered a reservation on the inclusion of *Dalbergia* spp. in Appendix II, effective from 2 January 2017 (CITES Notif. No. 2017/010). According to a publication of the Indian Export Promotion Council for Handicrafts (EPCH), the reservation was entered to protect the traditional handicrafts and artisans in India who utilise *Dalbergia* species, including *D. sissoo* for their trade and craftsmanship (Export Promotion Council for Handicrafts, 2016). The Export Promotion Council for Handicrafts (EPCH) of India has been entitled to issue comparable documentation for *D. sissoo* and *D. latifolia* handicraft products only.

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FABALES: LEGUMINOSAE

Guibourtia demeusei II/B

SYNONYMS:	*Copaifera demeusei; Copaifera laurentii*
COMMON NAMES:	Copal tree (EN), Ébana (FR)
RANGE STATES:	Cameroon, Central African Republic, Congo, Democratic Republic of the Congo, Equatorial Guinea, Gabon
UNDER REVIEW:	Gabon
EU DECISIONS:	None
IUCN:	Not assessed

Trade patterns

Guibourtia demeusei was listed in CITES Appendix II on 2nd January 2017 and in Annex B of the EU Wildlife Trade Regulations on 4th February 2017. As such, there has never been any reported direct or indirect trade in *G. demeusei* originating from Gabon to the EU-28 or countries other than the EU-28.

Conservation status

G. demeusei is a medium-sized to large "swamp-forest upper-canopy tree" (Moutsambote *et al.*, 1994; Georgiev *et al.*, 2011), typically not exceeding 40 m in height and 1 m diameter, with a minimum exploitable diameter of 70 cm (Meunier *et al.*, 2015; CoP17 Prop. 56). Doucet (2004) reported *Guibourtia* spp. to be a genus with an affinity for damp conditions, describing them as a group of "hygrophilous evergreen rain forest species". The wood of *G. demeusei* was described as durable, with a greyish, smooth appearance and a reddish edge (Meunier *et al.*, 2015).

G. demeusei was reported to occur in the western region of Central Africa, from the Democratic Republic of the Congo (Takeda, 1990; Georgiev *et al.*, 2011; Beaune *et al.*, 2012) to Gabon in the west, and then north to Cameroon and the southwestern tip of the Central African Republic (Estrella *et al.*, 2006; Meunier *et al.*, 2015). *G. demeusei* was reported to have a wider distribution than the closely related and more highly exploited *G. tessmannii* and *G. pellegriniana* (CoP17 Prop. 56). According to Tosso (pers. comm. to UNEP-WCMC, 2017), *G. tessmannii* and *G. pellegriniana* are very dispersed and have very low density populations (less than a foot per hectare) but *G. demeusei* is less threatened due to its abundance along the Congo river.

G. demeusei has not yet been assessed by the IUCN and few global estimates of population status were found. In surveys of the Central African Republic and the Democratic Republic of Congo, *G. demeusei* was reported to have "dominated" both "low inundated regions" (Cribb and Fay, 1986) and "the upper canopy" (Bwangoy *et al.*, 2010). Relative to the more heavily traded *G. pellegriniana* and *G. tessmannii,* it was noted that populations of *G. demeusei* "seem of less concern", with locally high densities (CoP17 Prop. 56). However, there is a general lack of all data for these species, including distribution, regeneration, and population status and trends and gaps remain in all range states on data related to increasing/decreasing occurency/occupancy areas (Betti, 2012). Betti (2012) reports that the only data

available comes from logging concessions, which under forest legislation have to provide inventories in order to obtain permission to log; as methods to conduct inventories vary from one country to another, and from one operator to another, and are not done on a regular basis, data are very unreliable.

The main threats to *Guibourtia* spp. in central and southern Africa were reported to be habitat degradation through urban development (IUCN SSC East African Plants Red List Authority, 2013), and exploitation for the trade in a variety of items, including flooring, furniture, boats, chess boards, pool tables, and toys (Contu, 2012; Lemmens *et al.*, 2012).

Logging in Central Africa was reported to be characterised by high selectivity, with just a few commercialised species and a deforestation rate of 0.4 per cent per year (Doucet, 2004); three species of the genus *Guibourtia* were listed among the most exported species from Cameroon and Gabon, but *G. demeusei* was not among them (Doucet, 2004). Despite this difference in trade level, *G. demeusei* was reported to be often confused with the more heavily exploited *G. tessmannii* and *G. pellegriniana* (CoP17 Prop. 56), known variously as Kevazingo or Bubinga. According to a workshop organised by ITTO in 2012, *G. demeusei, G. pellegriniana* and *G. tessmannii* are all traded under the generic trade name Bubinga (ITTO, 2012). Trade data is therefore difficult to analyse as it is not species specific. *G. tessmannii* and *G. pellegriniana* are commonly referred to as Rose Bubinga and are reportedly indistinguishable in trade (TRAFFIC, 2106). *G. demeusei*, or Red Bubinga, is considered of inferior quality and can be identified, but apparently may be easily confused with, or substituted for, that of the other two on the international market (TRAFFIC, 2016). Between 2012 and 2016, the price of *Guibourtia* wood was noted to have increased markedly, making the genus the "most expensive wood from the tropical rainforests of Central Africa" (CoP17 Prop. 56). According to reports published by the International Tropical Timber Organisation the wholesale price of Bubinga logs in Chinese markets rose from USD 500 per m^3 in 2006 (ITTO, 2006) to around USD 2100 per m^3 in 2015 (ITTO, 2015). This significant increase in value led to the emergence of an illegal industry for the extraction of *Guibourtia* spp. (CoP17 Prop. 56). Meunier *et al.* (2015) noted that *G. demeusei* seeds were used in traditional medicines, and the resin locally in traditional rites; local use of the species and commercial utilisation of its wood were categorised as low.

In Central Africa, the key logging companies were reported to be associated with large European firms, although the Asian logging industry was reported to be becoming more important (Doucet, 2004). Bubinga is not a part of the recognised Hongmu standard in China, but is a category A2 hardwood that is used as a substitute for Hongmu timbers (TRAFFIC, 2016). In bringing themselves in line with regional forestry legislation, many of these companies were reported to be producing forest management plans (Doucet, 2004). Reported harvest and export of *G. demeusei* in several range States increased around 2009 and 2010, which may be associated both with increasing demand for rosewoods in general at that time, and declining availability of *G. tessmannii* and *G. pellegriniana* (TRAFFIC, 2016). Data from logging requests submitted by forest management units indicates that during the period 2008 to 2012, around 75 per cent of logged volume of *Guibourtia* spp. in Cameroon was of *G. demeusei*, with volumes requested for this species for 2011 to 2013 considerably higher than those requested in previous years (TRAFFIC, 2016). At the same time requested volume of *G. tessmannii* (probably including *G. pellegriniana*) halved (TRAFFIC, 2016).

Koch (pers. comm. to UNEP-WCMC, 2017) notes that the timber is indistinguishable at the macroscopic and microscopic level but species identification can be conducted through vegetative characters. Bubinga is traded as veneer and sawn boards and is a timber that in a European context is apparently in relatively low demand (R. Smith, pers. comm. to UNEP-WCMC 2017). Smith (pers. comm. to UNEP-WCMC, 2017) estimates the total UK usage to be the equivalent of five trees per annum for sawn timber, and even less for the UK veneer trade. Being listed as similar in appearance to *G. tessmannii* and *G. pellegriniana*, *G. demeusei* was listed in Appendix II following COP17, which Koumba Pambo *et al.* (2016) described as "an important step towards sustainable forest management". In particular, Koumba

Pambo *et al*. (2016) noted that through listing look-alike species, the region would be better equipped to regulate illegal logging.

Gabon: The range map in Meunier *et al.* (2015) indicated the occurrence of *G. demeusei* throughout Gabon. *G. demeusei* was reported to occur in the gallery forests along the river Ogooué in Lopé National Park, central Gabon (White and Abernethy, 1997). Tutin and Fernandez (1985) reported *Guibourtia* spp. to be present in Belinga, northern Gabon. *G. demeusei* was also reported to occur in Fernan-Vaz on the Atlantic coast, Gabon (Henry *et al.*, 2011).

Little information was found on the population size or status of *G. demeusei* in Gabon. One study included the species in a list of the "commonest" floral species in the highly diverse gallery forests of Gabon (Hughes and Hughes, 1992).

Few reports of threats specifically concerning *G. demeusei* in Gabon were found, although it has been emphasised that as a *G. tessmannii* and *G. pellegriniana* look-alike, exploitation in *G. demeusei* may have been overlooked (Koumba Pambo *et al*., 2016). A more recently emerging threat has been through the international market, with growth in demand for Chinese furniture incentivising extraction (CoP17 Prop. 56).

White and Abernethy (1997) reported that if wounded, the bark of *G. demeusei* exudes a clear resin (copal); fossil copal was reported to be extracted from ancient stands of *G. demeusei* in swampy areas, and used in the manufacture of varnish. Indeed, *G. demeusei* has been reported to be the most important source of copal in the world (Lagenheim, 2003). In the mid-20th Century, export of copal reached 18 million kg, but was said to have "declined, with fluctuations, thereafter" (Lagenheim, 2003).

Doucet (2004) reported Gabon to be one of the most forested countries in Africa. In a remote sensing study of forest cover, Sannier *et al.* (2014) found a reduction in the rate of deforestation in Gabon between 2004 and 2014, which they attributed to the creation of national parks and the implementation of "forest concession management plans". For the year 2000, estimates of forest cover in Gabon were c. 88.5 per cent of the country, over an area of more than 23.5 million ha. Between 2000 and 2010, the net deforestation rate was found to not significantly differ from zero (Sannier *et al.*, 2016). ATIBT (2016) reported that forest cover in 2015 was estimated at 23.59 million ha, 88.97 per cent of the country. Between 2010 and 2015, forest cover losses were estimated at 96 230 ha, or 0.40 per cent, and gains were estimated at 36 824 ha, or 0.15 per cent, representing a net loss of 59 406 ha, or 0.25 per cent (ATIBT, 2016).

A report by Putzel *et al*. (2011) noted that Chinese companies owned 121 concession permits to manage and log 2.67 million ha of forestland, which is more than 10 per cent of Gabon's dense forest area; however, their development and implementation of management plans to ensure sustainability and social responsibility has been slow (Putzel *et al*., 2011). According to ATIBT (2010, cited in Tosso *et al*, 2015), Gabon exports *Guibourtia* spp. to China, Hong Kong, Japan, Italy, Belgium, Turkey, United States, Portugal, Spain, and the UK. Asia is the main importer of *Guibourtia* spp. and Gabon exported nearly 90 000 m^3 per year in the form of logs between 2007-2010 to Asia; following the export ban on roundwood in 2010, 11 000 m^3 of sawn timber was exported per year in 2011 and 2012 (Tosso *et al.,* 2015).

The Division of Trade and Industry (2015) reported that increased operator costs in Gabon have helped to disincentivise the exportation of tropical sawnwoods, leading to a reduction in investment in the industry. They also reported that roundwood export restrictions were imposed in 2010, which coincided with an increase in veneer and sawnwood exports from Gabon in 2012, 2013, and 2014, although they do not specify the species in trade (The Division of Trade and Industry, 2015). Minimum felling diameters have been set for *G. demeusei* of 70 cm in Gabon (Tosso *et al.,* 2015).

According to a market report published by the International Tropical Timber Organisation in May 2017 Gabon has set up a special economic zone (SEZ), a public-private partnership between Olam International, the Republic of Gabon and the African Finance Corporation which is being widely advertised in India (ITTO, 2017). The publicity states that log supplies will be guaranteed for manufacturers setting up in the zone and notes that Gabon can supply a wide range of timbers, including large stocks of kevazingo (ITTO, 2017).

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Appendix 1: Purpose and source codes

Table 1: Purpose of trade

Code	Description
B	Breeding in captivity or artificial propagation
E	Educational
G	Botanical garden
H	Hunting trophies
L	Law enforcement / judicial / forensic
M	Medical (including bio-medical research)
N	Reintroduction or introduction into the wild
P	Personal
Q	Circus and travelling exhibitions
S	Scientific
T	Commercial
Z	Zoos

Table 2: Source of specimens

Code	Description
W	Specimens taken from the wild
R	Specimens originating from a ranching operation
D	Annex A animals bred in captivity for commercial purposes and Annex A plants artificially propagated for commercial purposes in accordance with Chapter XIII of Regulation (EC) No 865/2006, as well as parts and derivatives thereof
A	Annex A plants artificially propagated for non-commercial purposes and Annexes B and C plants artificially propagated in accordance with Chapter XIII of Regulation (EC) No 865/2006, as well as parts and derivatives thereof
C	Annex A animals bred in captivity for non-commercial purposes and Annexes B and C animals bred in captivity in accordance with Chapter XIII of Regulation (EC) No 865/2006, as well as parts and derivatives thereof
F	Animals born in captivity, but for which the criteria of Chapter XIII of Regulation (EC) No 865/2006 are not met, as well as parts and derivatives thereof
I	Confiscated or seized specimens (to be used only in conjunction with another source code)
O	Pre-Convention (to be used only in conjunction with another source code)
U	Source unknown (must be justified)
X	Specimens taken in “the marine environment not under the jurisdiction of any State”

Appendix 2: NDF tables

Table 1: Assessment of *Dalbergia baronii* from Madagascar following protocol outlined in a nine-step process to support CITES Scientific Authorities making science-based non-detriment findings (NDFs) for tree species listed in CITES Appendix II.

Step	Question/criteria	Outcome	Rationale
3.1	Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?	No	**Relevant legislation includes:** - Following a military coup in March 2009, *Dalbergia* species exports from Madagascar were legalised through Decree no. 2009-003 (Barrett *et al*., 2010; Bohannon, 2010; Ratsimbazafy *et al*., 2016), only to be repealed six months later through Decree no. 2010-141 in response to international pressure (Bohannon, 2010; Barrett *et al*., 2010). - In 2011 penalties were established (Ordinance No. 2011-001 of 8 August 2011) enabling punishment of offences related to rosewood and ebony (World Resources Institute and World Bank Group, 2016). - Ratsimbazafy *et al.* (2016) also highlighted a legislative "loophole" in the listing of *Dalbergia* spp. and *Diospyros* spp., with documentation referring to "rosewood" allowing operators to export *Dalbergia* spp. by describing it instead as "palisander". - A new law (Law No. 2015/056) was reported to have established a "special chain to fight against trafficking of rosewood and/or ebony" (SC67 Doc. 19.2). Zero quotas were published by Madagascar for the period 13th August 2013 to 15th January 2016.
3.2	Are the timber specimens applied for covered by CITES Appendix II / the EU Wildlife Trade Regulation Annex B?	Yes	*Dalbergia* spp. were listed under CITES Appendix II with annotation CoP17 #15[6] on 02/01/2017 (previously logs, sawn wood and veneer sheets for all Malagasy populations were listed under CITES Appendix II on 12/06/2013) and the EU Wildlife Trade Regulation Annex B with the annotation No 2017/160 #15[7] on 04/02/2017 (previously only Madagascan populations had been listed under Annex B on 10/10/2013).
3.3	Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?	No	Difficult to establish NDF due to limited information about biology and harvest practices (Ratsimbazafy *et al*., 2016)
4.1	Conservation status assessments	Yes	IUCN Red List: Vulnerable A1cd+2cd (1998), but in need of updating (Du Puy, 1998). National Red List: NA (endemic).
4.2	Severity of conservation concern relevant to harvest area	High	**Global and national (endemic species):** According to Ratsimbazafy et al. (2016) the principal threat to D. baronii in Madagascar was selective logging, which was reported to have resulted in large trees becoming rare in eastern Madagascar (Du Puy, 1998; Labat and Moat, 2003; Lemmens, 2008; Ramananantoandro et al., 2013). D. baronii was reported to be among the most heavily logged and traded species of timber in Madagascar (Ratsimbazafy et al., 2016). - The species was reported to be threatened through overexploitation, with its high value wood supplying demand for furniture and musical instrument manufacture (Lemmens, 2008).

[6] All parts and derivatives are included, except:
a) Leaves, flowers, pollen, fruits, and seeds;
b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6

Step	Question/criteria	Outcome	Rationale
			- DBEV (2013) included D. baronii in a list of species that it deemed not to be in a "good general state", such that the species was deemed at "high risk" of disappearing.
5	Potential Biological Risks	Precautionary high	**Geographic distribution:** Endemic to eastern Madagascar (introduced to United Republic of Tanzania) (Louppe et al., 2008). **National population size and abundance:** There are 28 known populations of this species (DBEV 2013). It has a widespread distribution across its lowland plain range (Du Puy, 1998), but overall is considered rare (Patel, 2007). Regional densities estimated between 10 and 30 trees/ha (Ratsimbazafy et al. 2016). The population status of *Dalbergia* taxa in Madagascar was reported to remain almost totally unknown (World Resources Institute and World Bank Group, 2016). **Habitat specificity and vulnerability:** reported to favour sandy, saline soils in lowland evergreen humid rainforest, swamp forest, the margin of mangrove vegetation, and along watercourses, at altitudes up to approximately 150 m above sea level [and rarely up to 600 m] (Louppe et al., 2008). **Reproduction and regeneration:** slow growth (it takes 70-100 years to yield sufficient heartwood for felling) (Ramananantoandro et al., 2013). The species was reported to have a regeneration rate of 200 per cent in Kianjavato (DBEV, 2013) and 500 per cent in Manombo (WWF MWIOPO, 2010). WWF MWIOPO (2010) studied the ecology of heavily traded *Dalbergia* species, and found an imbalance in population structure, leading to a reduced potential for population recovery and regeneration.
6	Harvest impacts	High	**Impact on individual plants:** harvesting is lethal. **Impact on national population:** Selective felling of older specimens has made large trees rare (Louppe et al., 2008; Ramananantoandro et al., 2013). *D. baronii* was considered "overexploited" by Louppe et al. (2008), who suggested that logged yield needed to be significantly reduced to be sustainable. **Impact on other species:** felling of non-target tree species to construct rafts, allowing the floatation of *Dalbergia* species downriver for exportation (Barrett et al., 2010; Wilmé *et al.*, 2009; Global Witness and Environmental Investigation Agency, 2010). There is also evidence for multiple other negative effects, including non-native species invasion (Patel, 2007), reduced species diversity (Brown and Gurevitch, 2004), increased forest-fire incidence (Cochrane and Schulze, 1998), and decreased soil fertility (Favreau *et al.*, 2007; Rasolomampianina *et al.*, 2005).
7	Trade impacts (national level)	Precautionary high	**Magnitude and trend of legal trade:** negligible global exports between 2006 and 2015; no exports to EU28 ever reported. **Magnitude of illegal trade:** despite the enactment of the Decree in 2010, illegal logging and exportation has continued (Ratsimbazafy *et al.*, 2016) and Ratsimbazafy *et al.* (2016) noted that a legislative "loophole" exists in the listing of *Dalbergia* spp. with documentation referring to "rosewood" allowing operators to export *Dalbergia* spp. by describing it instead as "palisander". Ratsimbazafy *et al.* (2016) reported that from 2010-2015, at least 350 430 timber trees (largely rosewood) have been cut down annually in protected areas in Madagascar, and at least 1 million logs have been exported illegally from the country, however it is not possible to determine the proportion of which was *D. baronii*.
8	Management measures in place	Uncertain	- At CoP16 in March 2013, an Action Plan to facilitate implementation of the listing of Malagasy populations of *Dalbergia* and *Diospyros* species in Appendix II was adopted (Decision 16.152 Annex), which stipulated seven action points, including the establishment of a precautionary export quota and the request to put in place an international trade embargo on logs, veneer sheets, and sawnwood, until CITES approves an audit of the existing stockpiles to establish the legality of the timber (CoP17 Doc. 55.2 Annex 1). - At SC66 in January 2016, following the expression of concerns; it was recommended that all Parties suspend commercial trade in specimens of the species *Dalbergia* spp. and *Diospyros* spp. from Madagascar until various requirements of the Action Plan and Standing Committee recommendations had been fulfilled (CITES Notification No. 2016/019). - Madagascar reported that the Madagascar National Parks had commissioned Global Witness and the Environmental Investigation Agency (EIA) to investigate and monitor the flow of illegally harvested precious timber (SC67 Doc 19.2). - Madagascar was also reported to be in the process of implementing the Wildlife and Forest Crime Analytic Toolkit of the International Consortium on Combating Wildlife Crime (ICCWC) (SC67 Doc 19.2).

Step	Question/criteria	Outcome	Rationale
			- At SC67 in September 2016 it was considered that the provisions of the Convention for trade in *Dalbergia* spp. and *Diospyros* spp. from Madagascar were not yet being effectively implemented, progress on legislation and prosecutions was insufficient and that the targeted suspension had not yet been effective in stopping the illegal activities (SC67 Doc 19.1). - At CoP17 in September 2016, a new set of Decisions was adopted (Decisions 17.203-17.208), including that Madagascar should: continue to develop an inclusive process to identify the main commercially valuable species of *Dalbergia* spp. and *Diospyros* spp. from Madagascar; establish a precautionary export quota based upon a scientifically robust non-detriment finding; significantly strengthen control and enforcement measures against illegal logging and export; submit regular updates on audited inventories of at least a third of the stockpiles and provide written reports on progress.

Table 2: Assessment of *Dalbergia latifolia* from India following protocol outlined in a nine-step process to support CITES Scientific Authorities making science-based non-detriment findings (NDFs) for tree species listed in CITES Appendix II.

Step	Question/criteria	Outcome	Rationale
3.1	Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?	Yes	**Relevant legislation includes:** **National:** *D. latifolia* is protected under the Indian Forest Act 1927 and the export of *D. latifolia* logs and sawn timber is prohibited (Asian Regional Workshop, 1998). -Wild Life Protection Act (1972); prohibits removal of *D. latifolia* from protected areas **Regional:** *D. latifolia* is listed as a 'restricted species' in the States of Tamil Nadu, Kerala, Gujarat and Karnataka, meaning permission is required for harvesting, transportation and marketing of this species (Chavan *et al.,* 2015). -Maharashtra Preservation of Trees Act (1975), Maharashtra Land Revenue Code (1966), Maharashtra Felling of Tree Act (1964), and the Transit Regulation regulate felling of *D. latifolia* on private land within Maharashtra, with authorisation required from government appointed tree officers - *D. latifolia* species is listed as a 'reserved tree' under the Andhra Pradesh Preservation of Private Forest Rules 1978, which prohibits feeling of the species unless the tree exceeds 1.3 m in height and 120 cm girth (Winfield *et al.,* 2016). India has never published CITES export quotas for *D.* latifolia.
3.2	Are the timber specimens applied for covered by CITES Appendix II / the EU Wildlife Trade Regulation Annex B?	Yes	*Dalbergia* spp. were listed under CITES Appendix II with annotation CoP17 #15[7] on 02/01/2017. India entered a reservation for this genus listing on 02/01/2017. *Dalbergia* spp. were listed under the EU Wildlife Trade Regulation Annex B with the annotation NO 2017/160 #15[8] on 04/02/2017.
3.3	Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?	No	Winfield et al. (2016) note that whilst there is a good level of species-specific information on biology and threats, and a fair level of information on trade, legislation, conservation and management measures for *D. latifolia*, there was limited information on distribution and legislation, and insufficient information on distribution and population status and structure for an NDF assessment.
4.1	Conservation status assessments	Yes	IUCN Red List: Vulnerable A1cd (1996), but in need of updating (Asian Regional Workshop, 1998).
4.2	Severity of conservation concern relevant to harvest area	Medium	**Global:** Globally *D. latifolia* is threatened by legal and illegal overexploitation for the international hardwood trade, which has led to "major decline" (CoP 17, prop. 55). This includes harvesting for the Hongmu[8] trade in Southeast Asia, but it is not considered one of the dominant species in this trade (EIA, 2016). Other threats include disease and disturbance from insects (Winfield et al., 2016). **National:** In Madagascar, in addition to threats from harvesting for the hardwood trade, small scale harvesting of bark and leaves for medicinal purposes was also reported in India, but not considered a major threat (Selvaraju et al., 2011). Urban expansion has also been linked to general (i.e. not species-specific) forest declines in India (Luoma-aho et al., 2004).
5	Potential Biological Risks	Medium	**Geographic distribution:** *D. latifolia* is indigenous to south and Southeast Asia (Praciak, 2013). **National population size and abundance:** widespread distribution in India (Asian Regional Workshop, 1998; Swamy et al., 2000; Pathak, 2009), including in protected areas (Krishnamurthy et al., 2010; Teegalapalli et al., 2010), although is declining

[7] All parts and derivatives are included, except:
a) Leaves, flowers, pollen, fruits, and seeds;
b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6

[8] "Hongmu refers to a range of richly hued durable tropical hardwoods used to produce high-end reproduction furniture, flooring and handicrafts" (EIA, 2016).

Step	Question/criteria	Outcome	Rationale
			in parts (Jøker, 2004). Regional densities range from 1 - 33 individuals/ha (Bhat et al., 2000; Krishnamurthy et al., 2010). Optimal growing conditions were reported to be in the Bombay region (Orwa *et al.,* 2009). **Habitat specificity and vulnerability:** occupies evergreen or deciduous forests with deep, well-drained and moist soils (Soerianegara and Lemmens, 1994; Krishnamurthy et al., 2010), at altitudes over 600 m above sea level in India (Soerianegara and Lemmens, 1994). Mature trees were reported to be drought-resistant and can tolerate a dry season of about six months (Praciak, 2013). **Reproduction and regeneration:** The species reproduces naturally by seed, but also regenerates well by root suckers (Praciak, 2013). *D. latifolia* was reported to have a slow growth rate and long rotations (Praciak, 2013).
6	Harvest impacts	Unknown	**Impact on individual plants:** harvesting is lethal. **Impact on national population:** unknown **Impact on other species:** unknown
7	Trade impacts (national level)	Precautionary High	**Magnitude and trend of legal trade:** listed under CITES too recently (2017) for there to be any reported direct or indirect trade to the EU-28 or elsewhere. Exports of all wild-sourced species for commercial purposes from India were suspended 31/05/1999 (CITES Notification No. 1999/39) with the exception of cultivated varieties of plant species included in Appendices I and II. India entered a reservation on the inclusion of *Dalbergia* spp. Appendix II, effective from 2 January 2017 (CITES Notif. No. 2017/010). **Magnitude of illegal trade:** globally considered under “considerable pressure” from illegal felling (Asian Regional Workshop, 1998). Illegal felling of species, timber smuggled across borders and shipped as “lookalike” species from India for the Hongmu trade has been reported (EIA, 2016), although the amount of *D. latifolia* illegally traded in this way is unknown.
8	Management measures in place	Uncertain	**Management of conservation concerns:** *In situ* conservation for *D. latifolia* has been reported to have been aided by seed stands and seed production areas reported in Kerala (46 ha) and Madhya Pradesh (5 ha) (Jalonen *et al.*, 2009). It was reported that the species is increasingly being established in plantations (Praciak, 2013), which were considered “necessary” for gene conservation and future production of this species (Thapa, 2017). The extent and/or management of *D. latifolia* plantations in India is unclear. **Management of trade impacts:** The Export Promotion Council for Handicrafts (EPCH) developed the ‘Vriksh standard Timber Legality Assessment and Verification Scheme’ for verification of legality and legal origin of wood and wood products (European Timber Trade Federation, 2016a).

Table 3: Assessment of *Dalbergia latifolia* from Indonesia following protocol outlined in a nine-step process to support CITES Scientific Authorities making science-based non-detriment findings (NDFs) for tree species listed in CITES Appendix II.

Step	Question/criteria	Outcome	Rationale
3.1	Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?	Yes (but not logs and sawnwood)	**Relevant legislation includes:** - *D. latifolia* is listed in the Decree of the Ministry of Forestry No. 273/KPTS-IV/93 on the classification of types of wood as the basis for forestry fees, which details those species subject to forestry fees if harvested (Government of Indonesia, 1994). - A log export ban was issued in Indonesia between 1985 and 1992 and re-activated in 2001 (World Resources Institute, 2016). - Since 2004, the export of logs and sawn-wood from natural forests has been prohibited (U.S. International Trade Commission, 2010; World Resources Institute, 2016). According to Winfield *et al.* (2016), in 2009, the ban was amended to allow the export of logs sourced from plantations. - In 2014 Indonesia signed and ratified a Voluntary Partnership Agreement (VPA) with the EU to ensure that products entering the EU are verified and legally sourced. Indonesia has never published CITES export quotas for *D.* latifolia.
3.2	Are the timber specimens applied for covered by CITES Appendix II / the EU Wildlife Trade Regulation Annex B?	Yes	*Dalbergia* spp. were listed under CITES Appendix II with annotation CoP17 #15[9] on 02/01/2017. Indonesia entered a reservation for this genus listing on 02/01/2017. *Dalbergia* spp. were listed under the EU Wildlife Trade Regulation Annex B with the annotation NO 2017/160 #15[10] on 04/02/2017.
3.3	Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?	No	Winfield et al. (2016) note that whilst there is a good level of species-specific information on biology and threats, and a fair level of information on trade, legislation, conservation and management measures for *D. latifolia*, there was limited information on distribution and legislation, and insufficient information on distribution and population status and structure for an NDF assessment.
4.1	Conservation status assessments	Yes	IUCN Red List: Vulnerable A1cd (1996), but in need of updating (Asian Regional Workshop, 1998).
4.2	Severity of conservation concern relevant to harvest area	Medium	**Global:** Primary threats from legal and illegal overexploitation for the international hardwood trade, which has led to "major decline" (CoP 17, prop. 55). This includes harvesting for the Hongmu[10] trade in Southeast Asia, but it is not considered one of the dominant species in this trade (EIA, 2016). Other threats include disease and disturbance from insects (Winfield et al., 2016). **National:** the fungi *Fusarium solani* has reportedly caused widespread damage to established plantations (with mortality rates <60% in plantations >15 years old) across Java (Lemmens, 2008), symptoms include: inward rolling of young leaves, dieback and discoloration of other leaves, and red streaks formed on outer layers of the sapwood and root suckers of affected trees should not be used for propagation. Seedlings often suffer seriously from damping-off; the mortality rate may be up to 60 per cent (Lemmens, 2008). In Indonesia, *D. latifolia* was reported to be threatened with habitat disruption, encroachment and unsustainable harvest (Government of Indonesia, 2007).
5	Potential Biological Risks	Precautionary high	**Geographic distribution:** *D. latifolia* is indigenous to south and Southeast Asia (Praciak, 2013). Two varieties of *D. latifolia* are recognised in Java (Jøker, 2004): the native variety; sonokeling (straight and used in agroforestry) and the naturalised variety; sonobrits (crooked, fast growing and used in land rehabilitation). **National population size and abundance:** naturally occurring in Java (Asian Regional Workshop, 1998).

[9] All parts and derivatives are included, except:
a) Leaves, flowers, pollen, fruits, and seeds;
b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6

[10] "Hongmu refers to a range of richly hued durable tropical hardwoods used to produce high-end reproduction furniture, flooring and handicrafts" (EIA, 2016).

Step	Question/criteria	Outcome	Rationale
			Habitat specificity and vulnerability: occupies evergreen or deciduous forests with deep, well-drained and moist soils (Soerianegara and Lemmens, 1994; Krishnamurthy et al., 2010), at altitudes up to 600 m above sea level in Java (Soerianegara and Lemmens, 1994). **Reproduction and regeneration:** *D. latifolia* has a slow growth rate (Praciak, 2013), with the endemic Javan variety ("sonokeling") reproducing mainly by suckers, rather than seeds (Jøker, 2004).
6	Harvest impacts	Unknown	**Impact on individual plants:** harvesting is lethal. **Impact on national population:** unknown **Impact on other species:** unknown
7	Trade impacts (national level)	Unknown	**Magnitude and trend of legal trade:** listed under CITES too recently (2017) for there to be any reported direct or indirect trade to the EU-28 or elsewhere. **Magnitude of illegal trade:** globally considered under "considerable pressure" from illegal felling (Asian Regional Workshop, 1998), leading to a "major decline" in the species (CoP 17, prop. 55).). In Indonesia, illegal logging is estimated to have declined in recent years, but these findings may reflect a shift towards plantations and away from natural forest harvesting and legal ambiguity over the permitting process for forest conversion may mean that levels of illegality are higher than the data suggest (Hoare and Wellesley, 2014). Quantitative estimates illegal trade of *D. latifolia* are not available.
8	Management measures in place	Uncertain	- It was noted by the Government of Indonesia (2007) that despite the serious threat to *Dalbergia* species, including *D. latifolia*, no effective conservation measures have been taken to enhance their immediate protection and conservation due to a lack of, or extremely limited, data on population status. Existing data were considered out of date or inaccurate due to significant changes in land cover and forest status (Government of Indonesia, 2007). -The Government of Indonesia (2017) noted problems with seed production with regards *D. latifolia* due to a "significant decrease" in population numbers, including seed trees. **Management of conservation concerns:** *D. latifolia* has been listed as a priority species for conservation activities in Indonesia and it was reported that initial efforts have been made to compile a database of information on the taxonomy, biology, ecology, reproduction, utility and status of the species (Jalonen *et al.*, 2009).

Table 4: Assessment of *Dalbergia melanoxylon* from Mozambique following protocol outlined in a nine-step process to support CITES Scientific Authorities making science-based non-detriment findings (NDFs) for tree species listed in CITES Appendix II.

Step	Question/criteria	Outcome	Rationale
3.1	Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?	Yes	**Relevant legislation includes:** - Forestry and Wildlife Development Policy Act and Forestry and Wildlife Act, which regulate the harvest *of D. melanoxylon* under a license system in the case of nationals and a concession system for foreigners; - Law no. 16/2014, which established the basic principles and rules on the protection, conservation and sustainable use of biological diversity within conservation areas (Winfield *et al*., 2016); - Order 265/2005, which regulates *D. melanoxylon* as a precious wood species; and - Zanzibar Declaration on Illegal Trade in Timber and Forest Products, which was signed in 2015 by the national forest agencies of Kenya, Tanzania, Uganda, Madagascar and Mozambique aiming to agree a unifying strategy for both source and transit countries to combat illegal timber trade in eastern and southern Africa. Although there has been legislation passed for *D. melanoxylon*, Mackenzie (2006) reports that this has largely proved ineffective in preventing illegal logging. Mozambique has never published CITES export quotas for *D. melanoxylon*. A 2016 national quota for *D. melanoxylon* roundwood was set at 1850 t, with 750 t coming from Cabo Delgado (Ministerial Decision of 1 April 2016).
3.2	Are the timber specimens applied for covered by CITES Appendix II / the EU Wildlife Trade Regulation Annex B?	Yes	*Dalbergia* spp. were listed under CITES Appendix II with annotation CoP17 #15[11] on 02/01/2017 and the EU Wildlife Trade Regulation Annex B on 04/12/2017[12].
3.3	Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?	No	No NDF has been reported.
4.1	Conservation status assessments	Yes	IUCN Red List: Lower Risk/near threatened (1998), but in need of updating (WCMC, 1998).
4.2	Severity of conservation concern relevant to harvest area	Medium	**Global:** Key threats to *D. melanoxylon* described as aridification, disease, forest fires, habitat fragmentation and particularly selective logging (Lemmens, 2008; Winfield *et al*., 2016). Previously, the main threat to wild populations was considered to be the overexploitation for musical instruments; trees grown in plantations were not considered to be of sufficiently high quality for musical instruments (Jenkins *et al.,* 2012). Demand has shifted from the tone wood industry, based in Europe and the USA, to the production of furniture in China (Jenkins et al., 2002). Also vulnerable to attack from species of Cerambycidae spp. [longhorn beetle] (Gregory *et al*., 1999) and to fungal infection following forest fires (Orwa *et al*., 2009). **National:** In 2004-2009 ~2.7 million ha of land were leased out for development as part of a plan to increase large-scale farming in Mozambique, threatening areas of *D. melanoxylon* (Deininger and Byerlee, 2012).
5	Potential Biological Risks	Precautionary high	**Geographic distribution:** Senegal in the west to Eritrea, Ethiopia, and Kenya in the east, and then south as far as Namibia, Botswana, northern South Africa, and Swaziland (Lemmens, 2008; Gregory *et al*., 1999). Reportedly introduced to India and Australia (Lemmens, 2008).

[11] All parts and derivatives are included, except:
a) Leaves, flowers, pollen, fruits, and seeds;
b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6

Step	Question/criteria	Outcome	Rationale
			National population size and abundance: Not yet considered to be an endangered species in Mozambique (Rich, 2012), with a survey in the 1990s finding *D. melanoxylon* to account for around 4% of standing trees with a DBH (diameter at breast height) >5 cm (Jenkins *et al.,* 2002). Described as "widely distributed throughout Mozambique" (Rich, 2012), with main stands reported in northern Mozambique (Jenkins *et al*., 2012). The highest population abundances were recorded in Cabo Delgado (Jenkins *et al*., 2002; Rich, 2012), although be stocks for commercial purposes have also been reported in Niassa Province [northern Mozambique] (Jenkins *et al*., 2002). **Habitat specificity and vulnerability:** Miombo woodland (Gregory *et al*., 1999); favours habitat close to water in areas with mean annual rainfall at 700-1200 mm (Lemmens, 2008) but able to grow in a variety of conditions (Ball, 2004) up to 1350 m above sea level (Lemmens, 2008). **Reproduction and regeneration:** Slow growing, reaches maturity at 70-100 years (Jenkins *et al*., 2012). Information on regeneration appears conflicting: Lemmens (2008) reports *a*bundant regeneration following land clearance if allowed to regrow without burning, whilst Amri *et al.* (2009) reports it as possessing "serious reproductive limitations", with a "very low germination capacity" and Winfield *et al.* (2016) report "poor recruitment" in both protected and unprotected areas.
6	Harvest impacts	High	**Impact on individual plants:** harvesting is lethal. **Impact on national population:** Jenkins *et al.* (2012) considered that population viability of *D. melanoxylon* was only sufficient for extraction in northern Mozambique and southeast Tanzania. No accurate inventory of standing stock has been reported, however *D. melanoxylon* accounted for on average 4% of standing trees with a DBH >5 cm (Jenkins *et al*., 2002). Only northern areas of Mozambique considered suitable for extraction (Jenkins *et al.* 2012). An estimated 7500-20 000 trees were reported felled each year to make musical instruments, mainly from Mozambique and Tanzania (Mariki and Wills, 2014). **Impact on other species:**
7	Trade impacts (national level)	Medium	**Magnitude and trend of legal trade:** Mozambique has been described as a main exporter of *D. melanoxylon* (Louppe *et al*., 2008). Chinese imports of *D. melanoxylon* timber (round wood equivalent) were more than 5000 m^3 in 2004 rising to over 33 000 m^3 in 2013 (Chang and Peng, 2015). Cabo Delgado province was reported to be responsible for 60 per cent of the *D. melanoxylon* exports from Mozambique in 2002, with an average annual export of 720 m^3 (Louppe *et al*., 2008). In the Cabo Delgado province, overback volume was reported to be 2.2 m^3 per ha (Macome, 1996, in: Malimbwe *et al*., 2002). **Magnitude of illegal trade:** Discrepancies between licensed exports from Mozambique and data from Chinese customs indicate that nearly 50% of exports to China are unlicensed and therefore illegal (EIA, 2014; Chang and Peng, 2015).
8	Management measures in place (national level)	Low	**Management of conservation concerns:** The Nhambita project, an EU supported project, attempted to incentivise *D. melanoxylon* conservation through payments to the community for adopting tree-planting schemes (Campbell *et al*., 2007). In 2006 Mozambique passed new regulations stating that the local community would receive 20% of the revenue on forestry extraction (Campbell *et al*., 2007). In 2007 the Environmental Strategy for the Sustainable Development of Mozambique attempted to create a common vision for environmental management and poverty alleviation (Winfield *et al*., 2016).

Table 5: Assessment of *Dalbergia melanoxylon* from South Africa following protocol outlined in a nine-step process to support CITES Scientific Authorities making science-based non-detriment findings (NDFs) for tree species listed in CITES Appendix II.

Step	Question/criteria	Outcome	Rationale
3.1	Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?	Yes	**Relevant legislation includes:** - Forest Act 1984; - National Forests Act 1998 South Africa has never published CITES export quotas for *D. melanoxylon*.
3.2	Are the timber specimens applied for covered by CITES Appendix II / the EU Wildlife Trade Regulation Annex B?	Yes	*Dalbergia* spp. were listed under CITES Appendix II with annotation CoP17 #15[12] on 02/01/2017 and the EU Wildlife Trade Regulation Annex B on 04/12/2017[13].
3.3	Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?	No	No NDF has been reported.
4.1	Conservation status assessments	Yes	IUCN Red List: Lower Risk/near threatened (1998), but in need of updating (WCMC, 1998).
4.2	Severity of conservation concern relevant to harvest area	Medium	**Global:** Key threats to *D. melanoxylon* described as aridification, disease, forest fires, habitat fragmentation and particularly selective logging (Lemmens, 2008; Winfield *et al.*, 2016). Previously, the main threat to wild populations was considered to be the overexploitation for musical instruments; trees grown in plantations were not considered to be of sufficiently high quality for musical instruments (Jenkins *et al.,* 2012). Demand has shifted from the tone wood industry, based in Europe and the USA, to the production of furniture in China (Jenkins et al., 2002). Also vulnerable to attack from species of Cerambycidae spp. [longhorn beetle] (Gregory *et al.*, 1999) and to fungal infection following forest fires (Orwa *et al.*, 2009). **National:** Unknown.
5	Potential Biological Risks	Precautionary high	**Geographic distribution:** Senegal in the west to Eritrea, Ethiopia, and Kenya in the east, and then south as far as Namibia, Botswana, northern South Africa, and Swaziland (Lemmens, 2008; Gregory *et al.*, 1999). Reportedly introduced to India and Australia (Lemmens, 2008). **National population size and abundance:** *D. melanoxylon* was reported to be distributed in northern South Africa (Lemmens, 2008) and said to occur in the Greater Giyani Municipality in the north-eastern region of the Limpopo Province (Makhado et al., 2009), and in Mpumalanga Province (WCMC, 1998). Reported to occur in habitat types of the Limpopo and Mpumalanga Provinces in which *D. melanoxylon* is found classified as "least threatened" (Mucina and Rutherford, 2006). **Habitat specificity and vulnerability:** Miombo woodland (Gregory *et al.*, 1999); favours habitat close to water in areas with mean annual rainfall at 700-1200 mm (Lemmens, 2008) but able to grow in a variety of conditions (Ball, 2004) up to 1350 m above sea level (Lemmens, 2008).

[12] All parts and derivatives are included, except:
a) Leaves, flowers, pollen, fruits, and seeds;
b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6

Step	Question/criteria	Outcome	Rationale
			Reproduction and regeneration: Slow growing, reaches maturity at 70-100 years (Jenkins *et al*., 2012). Information on regeneration appears conflicting: Lemmens (2008) reports *a*bundant regeneration following land clearance if allowed to regrow without burning, whilst Amri *et al.* (2009) reports it as possessing "serious reproductive limitations", with a "very low germination capacity" and Winfield *et al.* (2016) report "poor recruitment" in both protected and unprotected areas. Artificial propagation may have previously been achieved in Tanzania with little input (Gregory et al., 1999).
6	Harvest impacts	Precautionary high	**Impact on individual plants:** harvesting is lethal. **Impact on national population:** Jenkins *et al.* (2012) considered that population viability of *D. melanoxylon* was only sufficient for extraction in northern Mozambique and southeast Tanzania, and outside of these areas (including South Africa), "only remnant trees remain" **Impact on other species:** No information is available.
7	Trade impacts (national level)	Unknown	**Magnitude and trend of legal trade:** Significant trade in wood carvings for the tourist market, although often not harvested from within South Africa (Jenkins *et al*., 2002). **Magnitude of illegal trade:** No information is available.
8	Management measures in place	Uncertain	No information on management measures was found.

Table 6: Assessment of *Dalbergia melanoxylon* from the United Republic of Tanzania following protocol outlined in a nine-step process to support CITES Scientific Authorities making science-based non-detriment findings (NDFs) for tree species listed in CITES Appendix II.

Step	Question/criteria	Outcome	Rationale
3.1	Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?	Yes	**Relevant legislation includes:** - Tanzanian Forest Act (2002), which outlines the requirements for sustainable management plans across villages, private lands and full forest management, including specifying the requirement for permits and licenses; - Forest Act No. 14 (2002), which specifies a series of harvestable diameters. Tanzania has never published CITES export quotas for *D. melanoxylon*.
3.2	Are the timber specimens applied for covered by CITES Appendix II / the EU Wildlife Trade Regulation Annex B?	Yes	*Dalbergia* spp. were listed under CITES Appendix II with annotation CoP17 #15[13] on 02/01/2017 and the EU Wildlife Trade Regulation Annex B on 04/12/2017[14].
3.3	Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?	No	No NDF has been reported.
4.1	Conservation status assessments	Yes	IUCN Red List: Lower Risk/near threatened (1998), but in need of updating (WCMC, 1998).
4.2	Severity of conservation concern relevant to harvest area	Medium	**Global:** Key threats to *D. melanoxylon* described as aridification, disease, forest fires, habitat fragmentation and particularly selective logging (Lemmens, 2008; Winfield *et al.*, 2016). Previously, the main threat to wild populations was considered to be the overexploitation for musical instruments; trees grown in plantations were not considered to be of sufficiently high quality for musical instruments (Jenkins *et al.,* 2012). Demand has shifted from the tone wood industry, based in Europe and the USA, to the production of furniture in China (Jenkins et al., 2002). Also vulnerable to attack from species of Cerambycidae spp. [longhorn beetle] (Gregory *et al.*, 1999) and to fungal infection following forest fires (Orwa *et al.*, 2009). **National:** Reported to be in decline (Gregory *et al.*, 1999), with multiple authors referring to harvest pressure (Backéus *et al.*, 2006; Opulukwa *et al.*, 2002; Lemmens, 2008).
5	Potential Biological Risks	Precautionary high	**Geographic distribution:** Senegal in the west to Eritrea, Ethiopia, and Kenya in the east, and then south as far as Namibia, Botswana, northern South Africa, and Swaziland (Lemmens, 2008; Gregory *et al.*, 1999). Reportedly introduced to India and Australia (Lemmens, 2008). **National population size and abundance:** The main stands for this species were reported in south-east Tanzania (Jenkins *et al.,* 2012). Densities were reported as 10 m^3 per ha in inland forests and 5 m^3 per ha for coastal forests (Lemmens, 2008), with a mean density of 8.5 trees per ha (Lemmens, 2008). Regional variation in density was also reported, ranging from 3.1 trees per ha in Nguru ya Ndege Forest Reserve, Morogoro [eastern Tanzania] (Modest *et al.*, 2010), to <20 stems per ha in southern Tanzania (Opulukwa *et al.* 2002). In Kilosa district [Morogoro Region, east-central Tanzania], virtually no larger individuals of *D. melanoxylon* were found (Backéus *et al.*, 2006).

[13] All parts and derivatives are included, except:
a) Leaves, flowers, pollen, fruits, and seeds;
b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6

Step	Question/criteria	Outcome	Rationale
			Habitat specificity and vulnerability: Miombo woodland (Gregory *et al*., 1999); favours habitat close to water in areas with mean annual rainfall at 700-1200 mm (Lemmens, 2008) but able to grow in a variety of conditions (Ball, 2004) up to 1350 m above sea level (Lemmens, 2008). **Reproduction and regeneration:** Slow growing, reaches maturity at 70-100 years (Jenkins *et al*., 2012). Information on regeneration appears conflicting: Lemmens (2008) reports *a*bundant regeneration following land clearance if allowed to regrow without burning, whilst Amri *et al.* (2009) reports it as possessing "serious reproductive limitations", with a "very low germination capacity" and Winfield *et al*. (2016) report "poor recruitment" in both protected and unprotected areas. Artificial propagation may have previously been achieved in Tanzania with little input (Gregory et al., 1999).
6	Harvest impacts	Precautionary high	**Impact on individual plants:** Harvesting is lethal. **Impact on national population:** The total annual harvest rate of *D. melanoxylon* in Tanzania was estimated to be 4500 m^3, with the two remaining regions with significant stocks (Lindi and Mtwara) together representing an estimated 40-45 years of supply at the current rate of extraction (Jenkins *et al*., 2012). The total volume of *D. melanoxylon* timber issued on harvest licenses in Tanzania in 2003 was reported to be 145.92 m^3, of which 115 m^3 was from Kilwa district (Milledge *et al*., 2007). *D. melanoxylon* exports from Tanzania over the period 2002-2005 were reported to be 79.05 m^3 2002/2003, 231.00 m^3 2003/2004 and 65.24 m^3 2004/2005 (Forestry and Beekeeping Division, 2006 in: Milledge *et al*., 2007). This species was considered in decline in the 1990s (Gregory *et al*., 1999), with Winfield *et al.* (2016) reporting virtually no large diameter individuals to be found in a more recent report. As a result of harvesting pressure, this species was considered threatened or not commercially exploitable in Tanzania (Lemmens, 2008; Opulukwa *et al*., 2002), and likely to disappear from the country if logging practices reported in the mid-2000s remain (Backéus *et al*., 2006). Jenkins *et al.* (2012) considered that population viability of *D. melanoxylon* was only sufficient for extraction in northern Mozambique and southeast Tanzania. **Impact on other species:** No information is available.
7	Trade impacts (national level)	Unknown	**Magnitude and trend of legal trade:** Amongst the most expensive timber species exported from Tanzania, primarily for musical instruments and traditional carvings (Ball, 2004). Following reductions in Kenyan populations, *D. melanoxylon* harvest shifted to southern Tanzania (Cunningham, 1998). *D. melanoxylon* exports from Tanzania over the period 2002-2005 were reported to be 79.05 m^3 in 2002/2003, 231.00 m^3 in 2003/2004 and 65.24 m^3 in 2004/2005 (Forestry and Beekeeping Division, 2006 in: Milledge et al., 2007). **Magnitude of illegal trade:** No information found on magnitude of illegal trade for Tanzania.
8	Management measures in place (national level)	Moderate	**Management of wild harvest impacts:** 131 975 ha of forest in Tanzania certified by the FSC in 2014 (Global Forest Watch, 2017). - The African Blackwood Conservation Project (ABCP) has been highlighted as promising in terms of management of *D. melanoxylon*, although slow growth makes plantations economically unattractive (Lemmens, 2008). **Management of conservation concerns:** Mpingo Conservation and Development Initiative (previously Mpingoo 98 project) has brought 112 000 ha under community protection, with around 32% of village land set aside for forest conservation (across 37 communities reached) and >200 forest stewards trained in implementing protection (MCDI, 2016).

Table 7: Assessment of *Dalbergia retusa* from El Salvador following protocol outlined in a nine-step process to support CITES Scientific Authorities making science-based non-detriment findings (NDFs) for tree species listed in CITES Appendix II.

Step	Question/criteria	Outcome	Rationale
3.1	Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?	Yes	**Relevant legislation includes:** - El Salvador was reported to have a Law of Wildlife (CoP16 Prop. 61), and FAO (2015) considered El Salvador to have relevant national, regional, provincial and local legislation/regulations that supported Sustainable Forest Management. El Salvador has never published CITES export quotas for *D. retusa*.
3.2	Are the timber specimens applied for covered by CITES Appendix II / the EU Wildlife Trade Regulation Annex B?	Yes	*Dalbergia* spp. were listed in CITES Appendix II with annotation CoP17 #15[14] on 02/01/2017 (previously logs, sawn wood and veneer sheets of *D. retusa* were listed in CITES Appendix II on 12/06/2013) and the EU Wildlife Trade Regulation Annex B with the annotation NO 2017/160 #15[15] on 04/02/2017 (previously logs, sawn wood, veneer sheets and plywood of *D. retusa* had been listed under Annex B on 10/08/2013). Live specimens and logs, sawn wood and veneer sheets were listed in the EU Wildlife Trade Regulation Annex D on 11/04/2008.
3.3	Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?	No	No NDF has been reported.
4.1	Conservation status assessments	Yes	IUCN Red List: Vulnerable A1acd (1994) globally, but in need of updating (Americas Regional Workshop, 1998). Not included in El Salvador's list of Threatened Species (Naturales, 2009).
4.2	Severity of conservation concern relevant to harvest area	Moderate (Global)	**Global:** *D. retusa* was reported to be the most prominent *Dalbergia* species in trade from the Americas, and the second most traded CITES-listed *Dalbergia* species (Winfield *et al.*, 2016). Exploitation for the timber industry was reported to be 'intense' with stock completely exhausted from places where the species was formerly widespread (Americas Regional Workshop, 1998). It was noted in CoP14 Prop. 31 that wastage of wood appeared to be high. Illegal felling was reported to be a frequent problem in Central America (Jenkins *et al.*, 2012 in: PC22 Doc. 17.2). Habitat destruction due to agriculture, cattle ranching and burning was also considered a threat (Americas Regional Workshop, 1998). **National:** Illegal logging was considered a problem in the country (Chatham House, 2017a).
5	Potential Biological Risks	Unknown	**Geographic distribution**: Reported to occur in the meso-American Pacific Region from Guatemala to Panama (Americas Regional Workshop, 1998; Marin and Flores, 2003; Grandtner and Chevrette, 2013); some authors also reported its occurrence in Colombia (Americas Regional Workshop, 1998; Grandtner and Chevrette, 2013), although Cárdenas Lopez *et al.* (2011, in: CoP16 Prop. 61) did not consider it to occur there. Winfield et al. (2016) stated that the distribution of *D. retusa* is restricted to the north-western region of El Salvador. Its presence was reported in the Montecristo tri-national protected area in northern El Salvador (Komar et al., 2005). **National population size and abundance:** No information could be located. **Habitat specificity and vulnerability:** Reported to grow well in open areas and is found on flatlands or moderate slopes in tropical, dry forests at altitudes of 50 to 300 m (Marin and Flores, 2003). **Reproduction and regeneration:** Natural regeneration was reported to be scarce, although saplings and juveniles can be found in areas periodically exposed to fire (Marin and Flores, 2003).
6	Harvest impacts	High	**Impact on individual plants:** Harvesting is lethal.

[14] All parts and derivatives are included, except:
a) Leaves, flowers, pollen, fruits, and seeds;
b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6

Step	Question/criteria	Outcome	Rationale
			Impact on national population: No information available. **Impact on other species:** The wood of *D. granadillo* [distribution range El Salvador and Mexico] was reported not to be distinguishable from *D. retusa* (PC22 Doc. 17.2).
7	Trade impacts (national level)	Precautionary high	**Magnitude and trend of legal trade:** Moderate global exports between 2006 and 2015; direct exports to the EU28 comprised 12.3m^3 wild-sourced timber for commercial purposes in 2015, reported by El Salvador only. **Magnitude of illegal trade:** Illegal logging was considered a problem in El Salvador (Chatham House, 2017a).
8	Management measures in place	Uncertain	No regional species management measures for *D. retusa* were located.

Table 8: Assessment of *Dalbergia retusa* from Guatemala following protocol outlined in a nine-step process to support CITES Scientific Authorities making science-based non-detriment findings (NDFs) for tree species listed in CITES Appendix II.

Step	Question/criteria	Outcome	Rationale
3.1	Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?	Yes	**Relevant legislation includes:** - The Forestry Law (Decree 101-96) and the Law on Protected Areas (Decree 4-89 and its reforms: 18-89; 110-96; 117-97), as well as specific regulations for this species (PC22 Doc. 17.2; CoP16 Prop. 61). - Articles 65, 88, 95, 100 of the Forest Act and its amendments regulate particular aspects of international trade in timber species (República de Guatemala, 1996, 2005). Guatemala has never published CITES export quotas for *D. retusa*.
3.2	Are the timber specimens applied for covered by CITES Appendix II / the EU Wildlife Trade Regulation Annex B?	Yes	*Dalbergia* spp. were listed in CITES Appendix II with annotation CoP17 #15[15] on 02/01/2017 (previously logs, sawn wood and veneer sheets of *D. retusa* were listed in CITES Appendix II on 12/06/2013) and the EU Wildlife Trade Regulation Annex B with the annotation No. 2017/160 #15[16] on 04/02/2017 (previously logs, sawn wood, veneer sheets and plywood of *D. retusa* had been listed under Annex B on 10/08/2013). Logs, sawn wood and veneer sheets of the Guatemalan population of *D. retusa* were listed in CITES Appendix III on 12/02/2008 and in the EU Wildlife Trade Regulation Annex C on 11/04/2008.
3.3	Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?	No	No NDF has been reported.
4.1	Conservation status assessments	Yes	IUCN Red List: Vulnerable A1acd (1994) globally, but in need of updating (Americas Regional Workshop, 1998). Listed on the official list of threated species in Guatemala due to restricted distribution (CONAP, 2009).
4.2	Severity of conservation concern relevant to harvest area	High	**Global:** *D. retusa* was reported to be the most prominent *Dalbergia* species in trade from the Americas, and the second most traded CITES-listed *Dalbergia* species (Winfield *et al.*, 2016). Exploitation for the timber industry was reported to be 'intense' with stock completely exhausted from places where the species was formerly widespread (Americas Regional Workshop, 1998). It was noted in CoP14 Prop. 31 that wastage of wood appeared to be high. Illegal felling was reported to be a frequent problem in Central America (Jenkins *et al.*, 2012 in: PC22 Doc. 17.2). Habitat destruction due to agriculture, cattle ranching and burning was also considered a threat (Americas Regional Workshop, 1998). **National:** *Dalbergia* species in Guatemala were reported to be threatened by the loss of areas of natural occurrence (one third between 1991 and 2012) (FNPV, 2016b), land use change, illegal trade, forest fires, traditional agriculture, lack of knowledge about the use and value of the species (ITTO, 2014c), heavy logging (CoP17 Prop. 55) and demographic growth (PC22 Doc. 17.2). Illegal logging was considered a widespread problem in the country (Chatham House, 2017b). It was reported that 'in the majority of places where these species are present, there are not favourable conditions for sustainable exploitation" (PC22 Doc. 17.2).
5	Potential Biological Risks	High	**Geographic distribution:** Reported to occur in the meso-American Pacific Region from Guatemala to Panama (Americas Regional Workshop, 1998; Marin and Flores, 2003; Grandtner and Chevrette, 2013); some authors also reported its occurrence in Colombia (Americas Regional Workshop, 1998; Grandtner and Chevrette, 2013), although Cárdenas Lopez *et al.* (2011, in: CoP16 Prop. 61) did not consider it to occur there. *D. retusa* was reported to occur at low densities in southern Guatemala (Komar *et al.* 2005).

[15] All parts and derivatives are included, except:
a) Leaves, flowers, pollen, fruits, and seeds;
b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6

Step	Question/criteria	Outcome	Rationale
			National population size and abundance: Reported to be scarce in Guatemala; a field study carried out by FAUSAC-FNPV in 2015 reported that only one population (48 trees) of *D. retusa* could be found in Suchitepequez department and only a few scattered trees could be found in Santa Rosa and Escuintla departments, all of which are located in the south western part of the country. Komar *et al*. (2005) reported the presence of *D. retusa* in the Montecristo tri-national protected area in south-eastern Guatemala. **Habitat specificity and vulnerability:** The species was reported to occur at altitudes up to 800 m above sea level and common in areas of natural forest, slopes, pastures, secondary forests, and degraded habitats (FNPV, 2016b). An analysis of forest cover change in Guatemala, found that the area of natural distribution of *D. retusa* had declined from 396 727 ha in 1991 to 274 287 ha in 2012, representing a decline of more than 30 per cent (FNPV, 2016b). **Reproduction and regeneration:** Natural regeneration was reported to be scarce, although saplings and juveniles can be found in areas periodically exposed to fire (Marin and Flores, 2003). It was reported that, in plantations in Guatemala, *D. retusa* averaged 15.93 cm diameter at 20 years (FNPV, 2016b).
6	Harvest impacts	High	**Impact on individual plants:** Harvesting is lethal. **Impact on national population:** A high percentage of trees reported to be lowest diameter size classes, confirming a high level of over exploitation (CoP17 Prop. 55). It was reported that "in the majority of places where these species are present, there are not favourable conditions for sustainable exploitation" (PC22 Doc. 17.2). Wild populations of *Dalbergia* spp., including *D. retusa*, were considered likely to have been severely diminished as a result of heavy logging and land-change effects during the period 1991-2012 (CoP17 Prop. 55). **Impact on other species:** It was reported that the timber of *D. retusa* could easily be confused with *D. stevensonii* and *D. tucurensis* (PC22 Doc. 17.2), with strong technical knowledge required to distinguish between them (Wiedenhoeft, 2011). Traffickers were reported to have taken advantage of the gaps in CITES listings by mis-declaring *D. retusa* as the unregulated and similar-looking *D. bariensis* (Environmental Investigation Agency, 2016).
7	Trade impacts (national level)	Precautionary high	**Magnitude and trend of legal trade:** negligible global exports reported between 2006 and 2015; direct exports to the EU28 comprised 31.1 m^3 wild-sourced timber for commercial purposes in 2012, reported by Guatemala only. Logs and sawn wood of *Dalbergia* timber tree species were reported to be the main products in international trade (CoP17 Prop. 55), but *Dalbergia* spp. was said to be used locally in the form of planks for the construction of houses and fences, as well as for furniture and sculptures for local and craft markets (PC22 Doc. 17.2). **Magnitude of illegal trade:** Illegal logging was considered a widespread problem in the country (Chatham House, 2017b). During the period 2011-2014 a total amount of 906 m^3 of *Dalbergia* timber (including *D. retusa*) of illegal origin were reported to have been confiscated in Guatemala (almost twice the CITES timber reported as legally reported for the same period) (CoP17 Prop.55; PC22 Doc. 17.2). It was reported that the timber of *D. retusa* could easily be confused with *D. stevensonii* and D. *tucurensis* (PC22 Doc. 17.2), with strong technical knowledge required to distinguish between them (Wiedenhoeft, 2011). Traffickers were reported to have taken advantage of the gaps in CITES listings by mis-declaring *D. retusa* as the unregulated and similar-looking *D. bariensis* (Environmental Investigation Agency, 2016).
8	Management measures in place	Moderate	**Management of wild harvest impacts:** Extraction is regulated through management plans that comply with technical requirements and national legislation (Szejner, 2005 in: CoP16 Prop. 61; PC22 Doc. 17.2).

Table 9: Assessment of *Dalbergia retusa* from Nicaragua following protocol outlined in a nine-step process to support CITES Scientific Authorities making science-based non-detriment findings (NDFs) for tree species listed in CITES Appendix II.

Step	Question/criteria	Outcome	Rationale
3.1	Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?	Yes	**Relevant legislation includes:** **National:** Relevant legislation includes Forestry Law 462 and Regulation 73-2003, which set general requirements for forestry exploitation, including the need for a management plan for areas above 10 ha of natural forest (Presidente de la República de Nicaragua, 2003). **Regional:** It is unknown if Nicaragua has regional, provincial, or local legislation/regulations (FAO, 2016). Nicaragua has never published CITES export quotas for *D. retusa*.
3.2	Are the timber specimens applied for covered by CITES Appendix II / the EU Wildlife Trade Regulation Annex B?	Yes	*Dalbergia* spp. were listed in CITES Appendix II with annotation CoP17 #15[16] on 02/01/2017 (previously logs, sawn wood and veneer sheets of *D. retusa* were listed in CITES Appendix II on 12/06/2013) and the EU Wildlife Trade Regulation Annex B with the annotation NO 2017/160 #15[17] on 04/02/2017 (previously logs, sawn wood, veneer sheets and plywood of *D. retusa* had been listed under Annex B on 10/08/2013). Live specimens and logs, sawn wood and veneer sheets were listed in the EU Wildlife Trade Regulation Annex D on 11/04/2008.
3.3	Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?	No	No NDF has been reported.
4.1	Conservation status assessments	Yes	IUCN Red List: Vulnerable A1acd (1994) globally, but in need of updating (Americas Regional Workshop, 1998). Considered a low-priority species in Nicaragua's Forestry Action Plan (Ampié and Ravensbeck, 1994).
4.2	Severity of conservation concern relevant to harvest area	Medium (Global)	**Global:** *D. retusa* was reported to be the most prominent *Dalbergia* species in trade from the Americas, and the second most traded CITES-listed *Dalbergia* species (Winfield *et al.*, 2016). Exploitation for the timber industry was reported to be 'intense' with stock completely exhausted from places where the species was formerly widespread (Americas Regional Workshop, 1998). It was noted in CoP14 Prop. 31 that wastage of wood appeared to be high. Illegal felling was reported to be a frequent problem in Central America (Jenkins *et al.*, 2012 in: PC22 Doc. 17.2). Habitat destruction due to agriculture, cattle ranching and burning was also considered a threat (Americas Regional Workshop, 1998). **National:** Illegal logging was considered to be a widespread problem in the country, with valuable hardwoods targeted by traffickers (Chatham House, 2017c). It was reported to be considered a low-priority species in Nicaragua's Forestry Action Plan (Ampié and Ravensbeck, 1994).
5	Potential Biological Risks	Unknown	**Geographic distribution:** Reported to occur in the meso-American Pacific Region from Guatemala to Panama (Americas Regional Workshop, 1998; Marin and Flores, 2003; Grandtner and Chevrette, 2013); some authors also reported its occurrence in Colombia (Americas Regional Workshop, 1998; Grandtner and Chevrette, 2013), although Cárdenas Lopez *et al.* (2011, in: CoP16 Prop. 61) did not consider it to occur there. *D. retusa* was reported to be distributed across Nicaragua from the Pacific to the Atlantic coast (Stevens et al., 2001); it was reported to be present in the Domitila Private Wildlife reserve in western Nicaragua (Lezama-Lopez and Grijalva, 1999). **National population size and abundance:** There appears to be some confusion as to the national population size and abundance of *D. retusa* in Nicaragua. Stevens *et al.* (2001) and Lezama-Lopez and Grijalva (1999) described the species as

[16] All parts and derivatives are included, except:
a) Leaves, flowers, pollen, fruits, and seeds;
b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6

Step	Question/criteria	Outcome	Rationale
			"frequent" in Nicaragua, whereas González-Rivas *et al.* (2006) found *D. retusa* to be one of the rarest species in their survey of tropical dry forest in Chacocente Wildlife Reserve [department of Carazo, Pacific coast]. The CITES Working Group on Bigleaf Mahogany and Other Neotropical Timber Species reported that *D. retusa* is distributed across Nicaragua outside of forests at a density of 0.064 trees per hectare (CoP16 Prop. 61) and is considered a low-priority species in Nicaragua's Forestry Action Plan (Ampié and Ravensbeck, 1994). **Habitat specificity and vulnerability:** reported to grow well in open areas and is found on flatlands or moderate slopes in tropical, dry forests at altitudes of 50 to 300 m (Marin and Flores, 2003). **Reproduction and regeneration:** natural regeneration was reported to be scarce, although saplings and juveniles can be found in areas periodically exposed to fire (Marin and Flores, 2003).
6	Harvest impacts	Unknown	**Impact on individual plants:** Harvesting is lethal. **Impact on national population:** No information available. **Impact on other species:** No information available.
7	Trade impacts (national level)	Precautionary high	**Magnitude and trend of legal trade:** moderate global exports between 2006 and 2015; direct exports to the EU28 comprised 79 m^3 wild-sourced timber for commercial purposes in 2012, reported by Nicaragua only and 8.6 m^3 in 2014 reported by importers only. **Magnitude of illegal trade:** Illegal logging was considered to be a widespread problem in the country, with valuable hardwoods targeted by traffickers (Chatham House, 2017c).
8	Management measures in place	Uncertain	No information available.

Table 10: Assessment of *Dalbergia sissoo* from India following protocol outlined in a nine-step process to support CITES Scientific Authorities making science-based non-detriment findings (NDFs) for tree species listed in CITES Appendix II.

Step	Question/criteria	Outcome	Rationale
3.1	Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?	Yes	**Relevant legislation includes:** - The Indian Forest (Amendment) Bill, 2012 prohibits the fresh clearance of reserved forests (World Resources Institute, 2014). The removal of any trees from protected areas is prohibited under the Wild Life (Protection) Act, 1972 (Winfield et al., 2016). India was reported to have banned the export of unprocessed logs (European Timber Trade Federation, 2016). - *D. sissoo* is listed as a 'restricted species' in the States of Jharkhand and West Bengal, meaning permission is required for harvesting, transportation and marketing of this species (Chavan et al., 2015). - As of 31 May 1999, exports of all wild-sourced CITES-listed species for commercial purposes from India were suspended (CITES Notification No. 1999/39), with the exception of cultivated varieties of plant species included in Appendices I and II. However, India entered a reservation on the inclusion of *Dalbergia* spp. in Appendix II, effective from 2nd January 2017 (CITES Notif. No. 2017/010). Inia has never published CITES export quotas for *D. sissoo*.
3.2	Are the timber specimens applied for covered by CITES Appendix II / the EU Wildlife Trade Regulation Annex B?	Yes	*Dalbergia* spp. were listed under CITES Appendix II with annotation CoP17 #15[17] on 02/01/2017 and the EU Wildlife Trade Regulation Annex B with the annotation No. 2017/160 #15[18] on 04/02/2017.
3.3	Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?	No	No NDF has been reported.
4.1	Conservation status assessments	No	No global IUCN Red List assessment.
4.2	Severity of conservation concern relevant to harvest area	Unknown	**Global:** threats to the species include agricultural cultivation, animal grazing, disease, forest fires, disturbance from insects, and logging (Winfield *et al.*, 2016). High market demand for the international furniture trade was previously reported to have driven indiscriminate logging resulting in a significant population decline (Pradhan *et al.*, 1998). **National:** The dry deciduous woodland of northern India, which includes *D. sissoo*, was reported to have been affected by conversion through industrialisation, agriculture, grazing pressures, lopping of trees for fodder and the gathering of fuel wood (Sagar and Singh, 2004).
5	Potential Biological Risks	Low	**Geographic distribution:** Native to the sub-Himalayan tract and outer Himalayan valley and introduced in Asia, Africa, North, Central and South America, and the Caribbean, Europe and Oceania. Considered invasive in some countries (Lodhiyal *et al.*, 2002; CABI, 2013; GISD, 2017). **National population size and abundance:** Described as widespread in India, both natural and planted (CABI, 2013), previously reported to account for nearly 10-15 per cent of total forest cover in north India (Sharma *et al.*, 2000). "Widely used for afforestation in most parts of the country" and extensively planted alongside roads, canal banks and sometimes on private vacant and agricultural lands (Sharma *et al.*, 2000). Observed as growing at a density of 1010 trees per hectare in one plantation in north-western India (Joshi et al., 2013) and the biomass of the tree layer in the plantation was recorded as 29.51 to 42.85 depending on the maturity of the tree (Joshi et al., 2013). Widely planted in plantations and

[17] All parts and derivatives are included, except:
a) Leaves, flowers, pollen, fruits, and seeds;
b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6

Step	Question/criteria	Outcome	Rationale
			agroforestry systems in India, primarily for timber (Cunningham et al., 2005) and second most widely cultivated species within India due to its fast growth (Cunningham et al., 2005). **Habitat specificity and vulnerability:** occupies well-drained soils near rivers and streams (Soerianegara and Lemmens, 1994; Shah *et al.*, 2010), at altitudes up to 1500 m above sea level (CABI, 2013). Adapted to a wide range of ecological habitats, and as a result, displays a "remarkable variation in growth pattern and yield per unit area" (Lodhiyal *et al.,* 2002). Used in plantations throughout dry regions in India to conserve soil and water, as this hardy species is adaptable, drought resistant and fixes nitrogen (Lodhiyal *et al.*, 2002). Can be grown in combination with a variety of other crops (Sharma *et al.*, 2000). An observed dieback of *D. sissoo* in natural forests, plantations and agroforestry systems was attributed to "complex phenomenon involving a combination of many environmental stresses", with large-scale mortality reported from the northern States of India (Sharma *et al.*, 2000). Maximum damage was reported to have been observed in areas with exclusive artificial forests of *D. sissoo* (Sharma et al., 2000). **Reproduction and regeneration:** reproduces mostly by seed, but is also able to root sucker, and can therefore form dense thickets (CABI, 2013). Appears to be insect pollinated and trees can apparently be both self- and outcrossing to varying degrees, depending on local conditions (Orwa, 2009). 'Stump planting' considered the best method of artificial regeneration (Lodhiyal *et al.*, 2002). Successful regeneration requires abundant moisture and lack of competition and seedlings were reported to be intolerant of shade (CABI, 2013). The species is a fast-growing, nitrogen-fixing tree, which can be easily propagated (CABI, 2013). Genetic diversity in *D. sissoo* at the species and population levels has been found to be relatively high and gene flow among populations was considered strong (Wang *et al.*, 2011). According to one author, poor germination and the death of seedlings meant the propagation of *D. sissoo* through seeds was unreliable under normal environmental conditions (Chand and Singh, 2004). However, Joshi *et al.* (2013) suggested *D. sissoo* is very suitable for plantations, as it has a rapid growth rate and low mortality rate.
6	Harvest impacts	Precautionary high	**Impact on individual plants:** harvesting is lethal. **Impact on national population:** previously considered common in north and north-eastern parts of India (Ghouse and Yunus, 1973). Local declines noted, such as a "substantial decline" in forest resources, including *D. sissoo*, observed around Similipal Tiger Reserve as a result of overharvesting (Dash *et al.*, 2016). High market demand for the international furniture trade was previously reported to have driven indiscriminate logging resulting in a significant population decline (Pradhan *et al.*, 1998). **Impact on other species:** unknown
7	Trade impacts (national level)	Unknown	**Magnitude and trend of legal trade:** Listed in CITES Appendix II and Annex B of the EU Wildlife Trade Regulations in 2017, as such, there has never been any reported direct or indirect trade in *D. sissoo* originating in India to the EU-28 or elsewhere. Due largely to an increase in domestic and international demand for *D. sissoo* and *D. latifolia*, there was a switch to these species from ebony (*Diospyros ebenum*) in the wood craft trade in Northern India and *D. sissoo* was reported to account for 80-85 per cent of woodcrafts (Cunningham et al., 2005). Koch (pers. comm to UNEP-WCMC, 2017) reports that *D. sissoo* offers good macroscopic features for a "certain" recognition in comparison to other *Dalbergia* species (G. Koch, pers. comm to WCMC, 2017). **Magnitude of illegal trade:** unknown
8	Management measures in place	Moderate	**Management of conservation concerns:** *In situ* conservation aided by seed stands and productions areas, such as 975 ha in Arunachal Pradesh, 250 ha in Jammu and Kashmir (including other species) and 146 ha in Uttar Pradesh (Jalonen *et al.*, 2009). Phenotypically superior *D. sissoo* individuals selected from Maharashtra, Uttar Pradesh, Uttarakhand and Rajasthan in India to assist conservation measures (Jalonen *et al.*, 2009). *D. sissoo* seed orchards were noted in Binhar (2 ha), Haryana, Jharkhand, Marashtra (1 ha), Punjab (4 ha) and Uttar Pradesh (95 ha) (Jalonen *et al.*, 2009). - This species was reported to have been selected by the Indian government as a focal species for development and improvement (Jalonen *et al.*, 2009).

Step	Question/criteria	Outcome	Rationale
			- National and state governments are jointly responsible for the sustainable management of forest resources in India (European Timber Trade Federation, 2016). According to the National Working Plan Code (2014), all forests are managed under the prescriptions of a ten year working plan (European Timber Trade Federation, 2016). **Management of trade impacts:** The Export Promotion Council for Handicrafts (EPCH) developed the 'Vriksh standard Timber Legality Assessment and Verification Scheme' for verification of legality and legal origin of wood and wood products (European Timber Trade Federation, 2016). The standard recognises the following legal sources of timber: State Forest Divisions; State Forest Development Corporation (SFDC); Individual Tree Owners; and Private Plantations (European Timber Trade Federation, 2016).

Table 11: Assessment of *Guibourtua demeusei* from Gabon following protocol outlined in a nine-step process to support CITES Scientific Authorities making science-based non-detriment findings (NDFs) for tree species listed in CITES Appendix II.

Step	Question/criteria	Outcome	Rationale
3.1	Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?	Yes	Gabon has never published CITES export quotas for *G. demeusei*.
3.2	Are the timber specimens applied for covered by CITES Appendix II / the EU Wildlife Trade Regulation Annex B?	Yes	*G. demeusei* was listed under CITES Appendix II with annotation CoP17 #15[18] on 02/01/2017 and the EU Wildlife Trade Regulation Annex B on 04/02/2017 with annotation No. 2017/160 #15[19].
3.3	Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?	No	No NDF has been reported.
4.1	Conservation status assessments	No	No global IUCN Red List assessment.
4.2	Severity of conservation concern relevant to harvest area	Unknown	**Global:** The main threats to *Guibourtia* spp. in central and southern Africa were reported to be habitat degradation through urban development (IUCN SSC East African Plants Red List Authority, 2013), and exploitation for the trade in a variety of items, including flooring, furniture, boats, chess boards, pool tables, and toys (Contu, 2012; Lemmens *et al.*, 2012). **National:** Few reports of threats specifically concerning *G. demeusei* in Gabon were found, although it has been emphasised that as a *G. tessmannii* and *G. pellegriniana* look-alike, exploitation in *G. demeusei* may have been overlooked (Koumba Pambo *et al.*, 2016). A more recently emerging threat in Gabon has been through the international market, with growth in demand for Chinese furniture incentivising extraction (CoP17 Prop. 56). Tosso *et al.* (2016) reported *Guibourtia* spp. to be "under significant threat due to illegal logging".
5	Potential Biological Risks	Precautionary high	**Geographic distribution:** *G. demeusei* was reported to occur in the eastern region of Central Africa. *G. demeusei* is reported to occur throughout Gabon (Meunier *et al,* 2015). **National population size and abundance:** According to Tosso (pers. comm. to UNEP-WCMC, 2017), *G. demeusei* is less threatened than *G. tessmannii* and *G. pellegrinian,* which are very dispersed and have very low density populations (less than a foot per hectare). **Habitat specificity and vulnerability:** Doucet (2004) reported *Guibourtia* spp. to be a genus with an affinity for damp conditions. One of the main threats to *Guibourtia* spp. in central and southern Africa were reported to be habitat degradation through urban development (IUCN SSC East African Plants Red List Authority, 2013).
6	Harvest impacts	High	**Impact on individual plants:** Harvesting is lethal. **Impact on national population:** No information is available. **Impact on other species:** *G. demeusei* was reported to be often confused with the more heavily exploited *G. tessmannii* and *G. pellegriniana* (CoP17 Prop. 56), known variously as Kevazingo or Bubinga. According to a workshop organised by ITTO in 2012, *G. demeusei, G. pellegriniana* and *G. tessmannii* are all traded under the generic trade name Bubinga (ITTO, 2012).

[18] All parts and derivatives are included, except:
a) Leaves, flowers, pollen, fruits, and seeds;
b) Non-commercial exports of a maximum total weight of 10 kg. per shipment;
c) Parts and derivatives of *Dalbergia cochinchinensis*, which are covered by Annotation # 4;
d) Parts and derivatives of *Dalbergia* spp. originating and exported from Mexico, which are covered by Annotation # 6

Step	Question/criteria	Outcome	Rationale
			Koch (pers. comm. to UNEP-WCMC, 2017) notes that the timber is indistinguishable at the macroscopic and microscopic level but species identification can be conducted through vegetative characters.
7	Trade impacts (national level)	Unknown	**Magnitude and trend of legal trade:** listed under CITES too recently (2017) for there to be any reported direct or indirect trade to the EU-28 or elsewhere. **Magnitude of illegal trade:** Tosso *et al.* (2016) reported *Guibourtia* spp. to be "under significant threat due to illegal logging", however no quantitative estimate of illegal logging was found.
8	Management measures in place	Uncertain	**Management of wild harvest:** Minimum felling diameters have been set for *G. demeusei* of 70 cm in Gabon (Tosso *et al.,* 2015).