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

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Eighteenth meeting of the Conference of the Parties
Colombo (Sri Lanka), 23 May – 3 June 2019

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

To include *Cedrela odorata* in Appendix II of CITES, in accordance with the provisions in paragraph 2(a) of Article II of the Convention and Paragraph B of the Annex of Resolution Conf. 9.24 (Rev. CoP17).

To include all the other species of the genus *Cedrela* in Appendix II of CITES, because of their similarity, in accordance with the provisions in paragraph 2(a) of Article II of the Convention and paragraph A of Annex 2 b of Resolution Conf. 9.24 (Rev. CoP17).

B. Proponent

Ecuador, Brazil*:

C. Supporting statement

1. Taxonomy

1.1 Class: Equisetopsida

1.2 Order: Sapindales

1.3 Family: Meliaceae

1.4 Genus, species or subspecies, including author and year: *Cedrela odorata* L. (1759) (See Annex 1 for other *Cedrela* species)

1.5 Scientific synonyms: See Annex 2 for the synonyms of *Cedrela odorata* L.

1.6 Common names:
English: cedar, Spanish cedar, Cuban cedar
French
Spanish: Cedro, cedro de castilla, cedro rojo, cedro amargo, cedro rosado

1.7 Code numbers: (PHOTO)

2. Overview

*Cedrela* is a genus of trees in the family Meliaceae, closely related to the genus *Toona* distributed in Asia-Australia, and together they form a monophyletic group in the subfamily Cedreloideae (Pennington & Muellner 2010). The genus is of enormous economic importance due to the quality of its timber, and a great

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deal of pressure is placed on the best trees in its native forests, which has generated a reduction in its populations and a loss of genetic diversity (Llerena 2012). However, the knowledge of the taxonomy, genetics, physical, mechanical and anatomical features of the wood required to differentiate it from other species, is still limited. Because of this, all the species in the genus are taken as a single species for their forestry use, which makes forestry control and regulations difficult. Several countries have reported having difficulties differentiating between species in this genus (PC24 Doc. 22 (Rev.1).

Within this genus, *Cedrela odorata* is the species of greatest commercial importance and the one that has been studied most. From 2002 on, there has been a considerable increase in the exports and prices of sawn cedar timber coinciding with its inclusion in Appendix III of CITES, and of sawn mahogany timber (*Swietenia macrophylla* King.) in Appendix II (Pérez 2011). There are records dating back over 250 years, stating that ***C. odorata*** has been one of the most important timbers in Latin America and on the international market. Its wood is renowned for its beauty, durability and pest resistance. ***Cedrela*** timber (Pennington & Muellner, 2010) has been used for many finishes in colonial buildings in different countries in South America.

According to an analysis of the CITES Trade Database (https://trade.cites.org/, consultation date: 13 November 2018), during the period 2010-2017 a total of 87,242.91 $m^3$ of timber was exported (logs, plywood, sawn wood, and veneer sheets), 99.67% corresponded to the species *Cedrela odorata.* The objective of this export was trade and its source: specimens taken from the wild; this value accounts for 53.53% of the *Cedrela* timber commercialised worldwide. 47.47 % of the trade in timber from the genus *Cedrela* includes: 62,462.10 $m^3$ from plants propagated artificially. Additionally, 12,975.03 $m^3$ of timber from pre-Convention specimens and 290.92 $m^3$ from an unknown source were commercialised. This document suggests that *C. odorata* meets the criteria for inclusion in Appendix II of CITES, in accordance with the provisions in paragraph 2(a) of Article II of the Convention and paragraph B of Annex 2 a of Resolution Conf. 9.24 (Rev. CoP17). Moreover, it is suggested that all the other species of the genus *Cedrela* should be included in Appendix II of CITES, because of their similarity, in accordance with the provisions in Article II, paragraph 2(b) of the Convention and Resolution Conf. 9.24 (Rev. CoP17) Annex 2(b), paragraph A.

3. Species characteristics

3.1 Distribution

The genus ***Cedrela*** contains 17 species and has a wide range that extends from 24º N in **Mexico** to 27º S in **Argentina**. Most of the species are restricted to deciduous forests, but the genus is widely distributed across montane forests in the Andes, and two species are widely distributed in lowland rainforests (Lombardi *et al.* 2014, Pennington & Mueller 2010) (Annex 3). ***C. odorata*** is the most widely distributed species in the genus, it is found in **Mexico**, Central America, the Greater and Lesser Antilles, in South America and throughout the Pacific in **Colombia** and **Ecuador,** and in the entire Amazon Basin and on the central and eastern coasts of **Brazil**, **Paraguay** and in northern **Argentina** (Pennington & Muellner 2010) (Annex 3). In Colombia, it is widely distributed across all the Andean foothills and low regions: it has been recorded in almost all of the country's departments, except Guayana, Norte de Santander, Vaupés and Vinchada, where its presence has not yet been confirmed (Cárdenas *et al*. 2015).

3.2 Habitat

All the ***Cedrela*** species are trees that grow in a wide variety of ecosystems across their range, from lowlands to montane forests. They grow in evergreen, seasonal evergreen, deciduous and semi-deciduous forests (Annex 3). ***C. odorata*** is a species that is ecologically very variable, being found in a vast geographical range up to 1,200 m asl (1,500 m asl), and therefore has been considered as a generalist in terms of climate (Cintron 1990, Pennington & Muellner 2010). In tropical forests in lowlands and areas with seasonal rains, the trees are taller, whilst in dry forests they are smaller and semi-deciduous. In Central America and **Mexico**, the species only grows in sites with firm ground, often on well-drained limestone, whilst in the Amazon region it is more common on more fertile, periodically flooded soils (Cárdenas et al. 2015, Pennington & Muellner 2010). It is a deciduous tree (Muellner et al. 2010, Niembro 2010, CONABIO 2010), which suggests that it originated in dry forests with marked seasonality (Muellner et al. 2010). In **Puerto Rico**, ***C. odorata*** grows on soils derived from limestone (Cintron 1990).

3.3 Biological characteristics

They are monoecious trees that have flowers of both sexes in the same inflorescence (Cintron 1990, Niembro 2010). The structure of the flowers in the family Meliaceae suggests that they are entomophilous (Styles 1972), and the main pollinators are wasps and moths (Varela 1998). The flowers are small, generally with white petals and probably pollinated by moths (van Dulmen 2001). The trees start to bear fruit when they are between 10-15 years old (Cintron 1990, Orwa et al. 2009, Salazar et al. 2000,). The tree loses its leaves when it starts fruiting (CONABIO 2010, Niembro 2010). Its fruits are capsules that open when they ripen to release 40-50 winged seeds, dispersed by the wind. One kilo of seeds contains 20,000-50,000 individual seeds. The variability of the seeds in a nursery is up to 90%, the germination is epigeal and rapid and usually completed in a period of 2-4 weeks. The existence of an inactive stage in the seed has not been reported (Cárdenas et al. 2015, Cintron 1990, Salazar et al. 2000).

***C. odorata*** is considered a long-lived, pioneer species. However, there is great debate over which ecological group it belongs to, with authors differing over this issue. This is because adult individuals can be found in open zones, as well as in secondary forests and on the verges of roads. However, in the initial stages of its life, the species can withstand shady conditions (Cintron 1990) and is also found interspersed among mature forests. In a study carried out to find out the species' growth and dendrochronology in a mature forest in the Ecuadorian Amazon, in Yasuní National Park (Nacimba 2015), it was determined that the species in the study area did form annual growth rings and that on average their historical growth (1865–2012) was 6.27 mm per year; whilst the average rate between 2013 and 2015, the years in which the research was carried out, was barely 4.7 mm. Moreover, in the individuals studied, the size of the rings in a given year varied widely, to such an extent that trees of a similar age had very different diameters. For example, trees 600 mm in diameter were between 48 and over 140 years old. The highest growth rates were in individuals with diameters of between 400 and 800 mm. In **Costa Rica**, De La Torre (2013), analysing the natural regeneration observed for ***C. odorata*** that 5% are seedlings, 26% saplings, 31% poles, and 38% mature trees. The pole and mature tree stages are the most important, because they have the highest likelihood of being recycled in larger diameter classes. However, healthy growth is often followed by the tree's death after two or three years. This can be attributed to the mahogany shoot borer (*Hypsipyla grandella*), or the scarcity of suitable soils for the species to become established.

3.4 Morphological characteristics

The genus *Cedrela* corresponds to large, monoecious or dioecious, deciduous trees. Straight bole, with a finely fissured bark, rarely peeling off in strips of different shapes and sizes, reddish inner bark, fibrous, fragrant. Branchlets lenticellate, brown or reddish brown. Buds covered in scales with a truncated apex, which leave scars when they fall. Leaves alternate, rarely pinnate. Leaflets scythe-shaped to oblong, 5-18 pairs, glabrous or pubescent, light green, base asymmetrical. Inflorescence in terminal panicles. Unisexual flowers, cup-shaped calyx or with 5 free sepals, 5 petals, cream, pink and red. Fruit is a somewhat woody, oblong, lenticellate capsule, with 5 valves, dehiscent from the apex, with an internal somewhat woody columella, 5-angled, each side concave, containing several winged seeds. Foliage often smells of garlic (Palacios 2016).

3.5 Role of the species in its ecosystem

The species in this genus prefer well-drained soils, avoiding areas that are prone to flooding or are poorly drained. It often grows in association with leguminous trees and species from other genera in the family Meliaceae such as *Swietenia* and *Guarea* (Cintron 1990, Valera 1998). ***C. odorata*** is a canopy species, considered a long-lived, pioneer species that requires a lot of light (van Rheenen et al. 2004); it grows relatively quickly and is capable of competing with secondary vegetation once it has become established. However, in natural forests with little intervention, individuals are disperse and found in low densities (Pennington and Muellner 2010), a condition attributed to ecological factors that limit the establishment of natural regeneration (Cárdenas et al. 2015). In **Peru**, it is common to find a high density of ***C. odorata*** seedlings near to seed trees soon after the start of the rainy season, but

most of these seedlings disappear halfway through the rainy seasons or soon after; this high natural mortality may be due to shade or competition (Lombardi *et al.* 2014, Ramirez-Garcia et al. 2008).

4. Status and trends

Analysing the categories and criteria in the IUCN Red List, Pennington & Muellner (2010) reported 15 threatened species out of a total of 17: three are Critically Endangered (CR); four are Endangered (EN) and eight are Vulnerable (VU); whilst ***C. odorata*** and ***C. longipetiolulata*** are considered species of Least Concern (LC) (Annex 4). In 2017, Mark & Rivers assessed ***C. odorata*** across its entire natural range and the species is considered Vulnerable. Despite this species' widespread distribution, its populations have decreased due to selective cutting, above all of the tallest specimens, for at least 250 years and now it is in decline. Moreover, its habitat is highly fragmented due to extensive deforestation (Mark & Rivers 2017). Some countries have assessed the threat category at a national level, for several species in this genus (Annex 5).

4.1 Habitat trends

Because of deforestation, the total distribution range of ***C. odorata*** has decreased by 28.8% over the last 100 years (approximately three generations) and it is estimated that it will decline by 40.4% over the next 100 years (Mark, unpublished data). In **Ecuador**, for the period 2014 –2016 the value of the net deforestation displays an increase of 28.7%. The forested ecosystems with the highest surface area of gross deforestation for this period are the forests in northern Amazonia, the forests in the Ecuadorian Choco and the deciduous forests on the coast (MAE 2017), ecosystems where several species in this genus are found. More specifically, the country reports that ***C. angustifolia***, ***C. kuelapensis*** and ***C. montana*** have lost 50% de of their habitat, whilst ***C. odorata*** and ***C. nebulosa*** have lost 30% (Annex 5) (Palacios et al. unpublished data). In **Costa Rica**, the habitat of ***C. odorata*** has decreased by 56.7% (COP14 Prop. 33). In **Colombia**, 53.64% of the country's surface area corresponds to natural forests, and between the years 2005-2010 there was a deforested surface area of 1,191,365 ha, which represents an annual loss of 238,273 ha of natural forest (Cárdenas et al. 2015).

4.2 Population size

Although data are not available on the size of the populations of all the species in the genus ***Cedrela*** across its natural range, they are available for some countries. According to a study by the International Tropical Timber Organisation (ITTO) (Pérez 2011), in **Peru**, the population of the genus ***Cedrela*** is 1.1 million trees, whilst the CITES Plants Committee (2018) reported 1,007,894 +/-8%. *C. odorata,* the predominant species, has densities of up to 1.15 individuals/ha (Pérez 2011), with a commercial tree population of between 261,159 and 300,743 individuals. The Loreto, Ucayali and Madre de Dios regions that border **Brazil** and **Bolivia** contain ¾ of the Spanish cedar population (Pérez 2011).

**Bolivia** and **Brazil** do not have a study of the distribution or the density of the genus ***Cedrela***, but ***C. odorata*** is the predominant species in both countries. In Bolivia, it is concentrated in Pando, Beni and Santa Cruz, forming a corridor between **Peru** and **Brazil** where it extends to the Amazonas, Acre, Mato Grosso, Rondônia and Pará States (Pérez 2011). In **Costa Rica**, the estimated number of individuals of ***C .odorata*** is 12,110, which is equivalent to a population density of 0.96 ind./km, in its natural range. The area in which the largest number of individuals are found is the Caribbean zone, which is also where the largest groupings consisting of over 50 individuals were found. In the North Pacific zone, there are fewer individuals of this species, since dry forests predominate, and the species is found in small groups (Rivera et al. 2010).
In **Mexico**, Romo-Lozano et al. (2017), without differentiating between wild trees or plantations, estimate the presence of 1.397 ± 0.92 million trees in the Pacific region; 4.524 ± 1.74 million trees in the South-South-east region and 9.057 ± 2.84 million trees in the Gulf of Mexico region.

In a study by Cárdenas et al. (2015) it was reported that ***C. odorata*** is widely distributed in **Colombia** and is found in a large variety of ecosystems, with an average total density of 0.39 ind./ha. The areas with the lowest densities are in the Forestry Reserve in Tarapacá in the Amazonas Department, the UITIBOC Indigenous Reservation and the Cahuinarí-Predio Putumayo zone with densities of under 0.05 ind./ha. The low density of individuals may be due to behaviour typical of a **long-lived** heliophytic species, in which it can be seen that natural regeneration is dependent on the opening up of large clearings and the availability of viable sources of seeds. Moreover, the study mentions that the selective logging that this species has suffered for years has affected the presence of large trees and the availability of seed trees. In **Cuba**, ***C. odorata*** is distributed across the whole island, with a low density,

and at present its populations are considered to be in decline, mainly with isolated individuals under 1 m in diameter (2018).

Data from the ATDN (Amazon Tree Diversity Network: ter Steege et al. 2013), obtained in a large-scale study throughout all of Amazonia, show that having analysed 1,346 plots, a total of 155 specimens of ***Cedrela odorata*** were found, which were in 96 plots, with a maximum abundance of 6 individuals. This suggests that the species, in a mature forest, has a broad geographical range, but is scarce in sample units and not restricted to a single ecosystem, and that large-scale inventories do not provide sufficient data to carry out analyses for local management. For ***C. fissilis*** 81 individuals were found in 41 plots, with an abundance of 9 individuals. Due to this fact, specific, intensive studies need to be carried out, aimed at obtaining data on the populations in each country.

4.3 Population structure

Cavers et al. (2003), studied samples from 23 populations in 6 countries, and characterised three genetic lineages determining that ancient colonisation and secondary colonisation processes have had a great influence on the genetics of this species' populations (Hernández 2008). Moreover, it has been established in Central America that the gene flow between the populations is limited by mountain ranges. In South America, a division between the Andes was clear in the genetic data, with an association between trees in **Costa Rica** / **Panama** and the Ecuadorian Pacific, in contrast with those in Amazonian **Ecuador**, which are associated with populations in northern South America. Furthermore, the genetic analysis indicates unique halotypes for the genus, which are only found in Ecuador. It is frequently associated with deciduous and semi-deciduous forests, especially Mexico and Central America (Cintron 1990, CONABIO 2010, Pennington & Muellner 2010, Salazar et al. 2000). Studies of the structure of the population have been carried out in several countries, especially that of ***Cedrela odorata*** in some localities (Annex 6).

4.4 Population trends

Habitat fragmentation as a result of selective logging can lead to a loss in the population's genetic diversity. If the populations are small and isolated, more alleles will be lost as a result of genetic drift. Several studies have revealed the impact of fragmentation in Meliaceae species such as for example in populations of *Carapa guianensis* (Dayanandan et al. 1999) and *Swietenia macrophylla*, with the susceptibility of the species to pressure from selective logging being observed (Lowe et al. 2003). In the **Peruvian** Amazon, in a study in the Manú and Los Amigos area (De La Torre 2013), the impact of selective logging is significant on the population structure (based on diameter classes) and the density, but not on the genetic diversity. However, more studies need to be carried out in other regions to determine the real effect of fragmentation and selective logging of the largest specimens on the species. In areas where logging has been most intense, small, fragmented populations can be found, mainly made up of young individuals compared to zones where no logging has been carried out, which have a higher density of individuals and a predominance of larger diameter classes (De la Torre 2013).

With regard to the height of the trees, in **Costa Rica**, ***C. odorata*** reaches heights of up to 40 m and most individuals (41.41%) have diameter classes of 11.5 to 16.5 metres. The following height classes include individuals 21.7 to 26.7 m high, accounting for 32.29%. The classes with the fewest individuals are between 31.9 and 42 m, accounting for 1.51%. This decrease in the number of individuals in the height classes may be due to selective logging in previous years, so 73.69% of individuals have heights of between 11 and 26 m (Rivera et al. 2010) (Annex 7)

In **Colombia**, ***C. odorata*** has a very wide range and inhabits several ecosystems. However, in some places the low density of individuals may be due to behaviour typical of a long-lived heliophytic species, in which it can be seen that natural regeneration is dependent on the opening up of large clearings and the availability of viable sources of seeds. It should be noted that the selective extraction that this species has suffered for years has affected the presence of large trees and the availability of seed trees. The density of *Cedrela* trees with DBH > 80 cm (minimum harvesting diameter proposed by Castaño et al. 2007) was zero or close to zero, which shows a clear depletion of trees that can be logged in national natural forests (Cárdenas et al. 2015) (Annex 8). It is estimated the population trend in **Mexico** is stable, and an increase in commercial forest plantations has been observed. Likewise, the species can be found in open, pioneering and conserved disturbed forests However, despite its wide distribution, its population has been declining in a selective manner over at least 250 years, both for domestic uses and for exportation (CITES 2007) and is now in decline.

4.5 Geographic trends

The selective logging above all of the largest individuals for at least 250 years, the deforestation and fragmentation has decreased and changed the structure of populations of ***Cedrela odorata***, so its populations are in decline (Mark & Rivers 2017). The range of this species has decreased by 28.8% over the last 100 years (approximately three generations) and it is estimated that it will decline by 40.4% over the next 100 years (Mark, unpublished data).

5. Threats

The assessment of the status of the species in the genus ***Cedrela*** reveals concerns regarding their conservation, 16 of the 17 species are threatened (Mark, J. & Rivers, M.C. 2017; Pennington & Muellner 2010). The FAO (2011) reported that each year over 13 million hectares of forest are lost worldwide (Cárdenas et al. 2015). Selective logging, changes in land use, habitat degradation, burning and other anthropic factors have contributed to the loss of forest cover across the natural range of ***Cedrela*** species. This has resulted in highly fragmented populations that lose connectivity and genetic diversity, which in turn affect the natural regeneration (Rivera et. al 2013). Habitat loss due to changes in land use has a direct effect on endemic species (**Mexico**: ***C. dugesii***, ***C. discolor***, ***C. oaxacensis***; **El Salvador**: ***C. monroensis***; **Peru**: ***C. longipetiolulata***, ***C. molinensis***, ***C. weberbaueri***) or species with restricted distribution. On the other hand, habitat fragmentation affects breeding and connectivity between populations, which is a concern for the maintenance of future genetic diversity.

Overexploitation and illegal logging, above all of the best individuals, are two of the main causes of changes in the structure of populations. Therefore, if there is no sustainable management and regulation of trade, the populations cannot recover sufficiently quickly and the risk of extinction increases. On a biological level, the presence of the mahogany shoot borer, *Hypsipyla grandella* (Lepidoptera, Pyralidae), has been reported in almost all stages of the plant, from young individuals to adults. This species is considered an important pest in economic terms for the family Meliaceae, since it bores into the shoots of the trees (Cintron 1990). The attack by *Hypsipyla grandella* can contribute to seedling mortality, especially in already stressed populations (Cintron 1990, Cordero & Boshier 2003).

6. Utilisation and trade

6.1 National utilisation

Cedar wood is one of the most valuable and important from a commercial point of view, due to its high quality and the fact that it is easy to use, which make it a highly sought-after wood on the Brazilian, Peruvian and Ecuadorian markets. In the case of Ecuador, it is mainly used to make fine furniture, doors, windows, frames, decorative veneers, turned items, crafts, canoes, as well as musical and domestic instruments in general (Aguirre et al 2015, Ecuador Forestal 2012, FAO 2018). Other recorded uses for this species include: beekeeping, food for wild animals in particular and medicinal (De la Torre et al. 2008). Spanish cedar wood continues to be highly popular on national markets, originating in native forests from which the wood is harvested in the form of round or sawn wood, the latter being the most common. Forest plantation reports indicate that the plantations have not been successful, mainly due to attacks by the mahogany shoot borer. For this reason, the trees are basically sown in their natural range in agroforestry crops. In the period 2010 – 2018, in Ecuador 3,911.94 m³ of standing timber was harvested, 86% of which corresponded to forest management programmes for cultivated forests (plantations) and the remaining 14% to logging programmes for relict trees. For the period 2000–2009, the average annual production of round Spanish cedar timber in Peru and Bolivia was 98.4 thousand m³ and 29.3 thousand m³ respectively. In Brazil, in 2007 the production of round timber was 140.1 thousand m³ with a progressive decrease to 71.3 thousand m³ in 2009 (Pérez, 2011).

6.2 Legal trade

The data on international trade were obtained from the CITES Trade Database (https://trade.cites.org/, consultation date: 13 November 2018). This is the most complete global database on the wildlife trade, encompassing all international trade in the species included in the CITES appendices since 1975 (Sinovas et al. 2016). In order to access the data on trade, a specific search can be conducted using the name of the genus: ***Cedrela,*** the period from 2010 to 2018. The search encompassed all the exporting countries, importing countries, origins, objectives and terms of trade. This was done so as to gain an overview of trade in species in the genus on a global level. The data file containing the results of the search is a file in *.csv format, with comparative tabulations, containing 749 records of trade in

the genus *Cedrela*: ***Cedrela odorata*** (730)*,* ***Cedrela fissilis*** (10) and ***Cedrela*** spp. (9). In the database, there are no data for 2018.

In addition, for data on timber (logs, plywood, sawn wood, wood and veneers) only values in cubic metres are counted ($m^3$) and values reported in $cm^3$ are converted into cubic metres. In total, globally from 2010 to 2017, 87,242.91 $m^3$ of timber (logs, plywood, sawn wood, wood and veneers), were exported, with trade being the objective and source: specimens taken from the wild; this value accounts for 53.53% of the ***Cedrela*** timber commercialised worldwide. The countries with the highest volume of exports are **Bolivia**, **Brazil**, **Peru** and **Mexico**. The number of exporting countries varies each year (Range: 2-12), with 2013 being the year when the largest number were recorded (12), coinciding with the highest volume exported, which corresponds to 49.5% of the total volume exported (87,242.91 $m^3$) in that period. It should be noted that that year (2013), a single country represented 85.37% of the total global exports. Moreover, without taking into account the extreme values of the years 2012 (8,350.23) and 2013 (36,867.86), from 2010 to 2017 the annual exports remained below 10,000 $m^3$, with a downward trend being observed from 2010 to 2016. In 2017, only two countries reported exports of under 30 $m^3$ in total. In this type of trade, 55 countries import Spanish cedar wood. The main destination of the exports is the United States; nevertheless, other important destinations include **Mexico**, **Canada**, **the Dominican Republic**, **Haiti**, **Chile** and **China**. Of the total trade in wild-harvested timber specimens (87,242.91 $m^3$), 99.67% corresponds to the species ***Cedrela odorata****.* The remaining percentage corresponds to ***C. fissilis*** (0.31%) and ***Cedrela*** spp. (0.02%). It should be noted that the trade in "wild-harvested specimens", 105.24 $m^3$ of timber in the genus ***Cedrela*** have been exported for "personal" purposes (in 2011: 64.98 $m^3$ and 2012: 40.23 $m^3$) and "scientific" purposes (0.03 $m^3$). Moreover, in the trade in wild-harvested specimens, the exports of "specimens' and the volume of "unspecified" specimens are also recorded.

47.47 % of the trade in timber from the genus ***Cedrela*** includes: 62,462.07 $m^3$ from plants propagated artificially, in accordance with Resolution Conf. 11.11 (Rev. CoP15), as well as their parts and derivatives, exported in accordance with the provisions in paragraph 5 of Article VII of the Convention (specimens of species included in Appendix I that have been propagated artificially for non-commercial purposes and specimens of species included in Appendices II and III). Additionally, 12,975.03 $m^3$ of timber from pre-Convention specimens and 290.92 $m^3$ from an unknown source. Within the trade in Spanish cedar wood, and plants propagated artificially in accordance with Resolution Conf. 11.11 (Rev. CoP15), as well as their parts and derivatives, exported in accordance with the provisions in paragraph 5 of Article VII of the Convention (specimens of species included in Appendix I that have been propagated artificially for non-commercial purposes and specimens of species included in Appendices II and III), Côte d'Ivoire and Ghana are the countries that export the highest volumes. Between them, these two countries represent approximately 97% of these exports. Thirty-three countries are importers, with the main country being the **United States**, followed by **Mexico** and the **Dominican Republic**. 100% of the wood exported in this manner is ***Cedrela odorata***.

6.3 Parts and derivatives in trade

Of the total trade in wood from wild-harvested specimens (87,242.91 $m^3$), which accounts for 53.53% of the global trade in wood of the genus *Cedrela*, the highest percentage through parts and derivatives in trade corresponds to sawn wood (97.9%) (Annex 9). Within the trade in Spanish cedar wood, of plants that are propagated artificially in accordance with the provisions in Resolution Conf. 11.11 (Rev. CoP15), as well as their parts and derivatives, exported in accordance with the provisions in paragraph 5 of Article VII of the Convention (specimens of species included in Appendix I that have been propagated artificially for non-commercial purposes and specimens of species included in Appendices II and III), which correspond to 47.47%, the highest percentage for parts and derivatives in the trade corresponds to sawn wood (80.76%) (Annex 9).

6.4 Illegal trade

In **Ecuador** from 2014 to 2017, a total of 236.8 $m^3$ of ***Cedrela*** spp. were impounded. The largest quantity of seizures 139.79 $m^3$ (59.03%) corresponds to those carried out in final destination centres. The remaining 40.97% corresponds to seizures carried out by the Mobile Units and Permanent Forest Control Checkpoints belonging to the Ministry of the Environment (Annex 10).

6.5 Actual or potential trade impacts

At present, trade in timber from the genus ***Cedrela*** is declining, 47% of the trade in timber from this genus comes from trees that are propagated artificially. Several countries within its natural range have developed legal instruments at a national level, related to the legislation linked to the use/harvesting***, management and conservation of forestry resources in a sustainable manner, and specific tools for the genus ***Cedrela***. However, it is a reality that half of the trade in timber from the genus ***Cedrela***, in the years 2010 to 2017, came from specimens harvested in the wild. In the total range of ***C. odorata*****,** the most frequently used species in the genus, because of deforestation and the selective logging of individuals, the species has declined by 28.8% over the last 100 years (approximately three generations) and it is estimated that it will decrease by 40.4% over the next 100 years. Moreover, it has been reported that a large number of species in the genus are threatened.

Indeed, the issue has been raised of the replacement effect that species in the genus ***Cedrela*** have in the CITES export quota, which were occupied by (Pérez 2011). The international trade regulations that are part of Appendix II of CITES are an opportunity to strengthen and generate a positive impact, for the use of timber from the genus with trade compatible with management and conservation. However, for the application of Appendix II of CITES, it is necessary to strengthen the national inventories and those aimed at the species in the genus ***Cedrela*** and the forest statistics system, including the control and production of processed wood. Countries in Central and South America do maintain forest inventories, but forest inventories aimed at species in the genus ***Cedrela*** must be carried out, including censuses of forest plantations that provide data on areas and stands. At present, there is a vast amount of information on the genus, but it is important to monitor, follow up and transfer this knowledge to ensure proper organisation and sustainable management plans.

Additionally, it is essential to ensure the efficient application of regulatory instruments, and the legal origin of the timber and forest traceability, as well as productive and commercial operations, which are adapted in order to make sure that trade is compatible with management and conservation. Strategic alliances must be formed and intergovernmental work carried out in order improve compliance with the regulations governing CITES species, so as to discuss, coordinate and share experiences on the management, control and conservation of the species.

It is essential to strengthen forest governance and institutionalisation, in order to avoid institutional weakness or informality and/or illegal operations from overcoming the effectiveness of the control and regulation of international trade provided by CITES. Hence, training must be given to the CITES administrative authorities and customs officials in exporting and importing countries in the identification of ***Cedrela odorata*** timber products and those of other species in the genus ***Cedrela***. Strategic alliances between public and private stakeholders need to be formed based on projects, experiences, studies and the operation of systems related to the management of species listed under CITES. It is necessary to assess national experiences in voluntary forest certification and the chain of custody on the application of corrective measures for the protection of species listed under CITES and, if they are relevant, their incorporation into forest information and control systems. There are management experiences related to indigenous communities with certified forests, which should be shared and replicated. Additionally, there is information that shows the potential of the application of regulatory instruments and that transparency in the delivery of information on export permits improves the image and value of wood in high-demand markets. Thus, the report by Pérez (2011) for the ITTO, on the market study of ***Cedrela odorata*** in **Bolivia**, **Brazil** and **Peru**, shows that compliance with the above meant that the FOB price of timber from this species of Peruvian origin was 45% higher than that of **Brazil** and 40% higher than that of **Bolivia**.

It is necessary to promote the increase in value of the timber products of species listed under CITES, through distinguishing signs like stamps, marks, trademarks, which generate a fair relationship between producers and consumers. In this context, inclusive trade must be generated, with the incorporation of small producers into the value chain and business that promotes the improvement and development of the quality of life of primary producers (forest owners). Meanwhile, technological, commercial and scientific development must attempt to achieve the integration of all the stakeholders in the forestry sector, for continuous innovation that reduces waste and tries to obtain quality in the desired products. It is essential to generate the framework for the synergies and achieve integration. Alternative native species of high commercial value need to be found, to replace the use of species from the genus ***Cedrela***, which will allow the pressure on the use of these species to be mitigated. In addition, alternatives need to be generated that provide economic support to promote restoration programmes, planting activities, the enhancement of degraded forests, agroforestry or silvopastoral

systems, through the planting of species, to repopulate or increase their numbers, and also to give added economic value to the forest.

7. Legal instruments

7.1 National

The national legal instruments are related to the legislation linked to the use, management and conservation of forest resources; however, the development of specific regulations for the Spanish cedar can also be noted.

The species has been protected in **Nicaragua** since 1997 by Decree No. 30-97, but the Forestry Law of Nicaragua has been criticised for discouraging small owners from allowing the natural regeneration of *Cedrela* spp. on their farms, due to the bureaucracy that imposes obtaining a permit for felling them at a later stage (Mendoza Vidaurre, 2002). **Brazil** reported that they have a specific regulation for drawing up forest management plans for species in general; In **Ecuador**, on 12 April 2018, the Organic Environmental Code came into effect, published in the Official Register Supplement No. 983 dated 12 April 2017, this document promotes biodiversity conservation, and the sustainable use of its components. Likewise, it regulates the identification, access to and valuation of environmental goods and services. Biodiversity conservation will be carried out in situ or ex situ, depending on the ecological characteristics, levels of endemism, and endangered species categories. Moreover, there is legislation linked to the use, management and conservation of forest resources, including species in the genus ***Cedrela***, which are conditional use species, for which there are specific requirements regarding the approval of management plans; **El Salvador** applies forestry legislation to the management of this species; **Mexico** reported that the legislation in general for tree species includes specific regulations for drawing up forest management plans and that in regulation NOM-059- SEMARNAT-2010 the species is classified as being subject to Special Protection [Protección especial (Pr)]; In **Peru**, since 2001 the forestry law has attempted to encourage the exploitation of sustainable timber, and the Forestry and Wildlife Law and its regulations regulate issues related to forest management in the country. With regard to logging bans for the species, of the countries that presented a report, only **Brazil** stated that it applied partial logging and exploitation bans for the rainy season. **Colombia** classified this species as threatened at a national level through Resolution 1912 of 2017. Through regional legislation, in some cases the use of the species in the genus ***Cedrela*** is banned. However, the use of duly registered agroforestry systems is allowed (CITES PC24 Doc. 22 (Rev. 1)).

7.2 International

Regarding the inclusion of populations of ***Cedrela odorata*** in Appendix III and of other species in the genus ***Cedrela***, **Brazil**, **El Salvador**, **Peru**, **Jamaica** and **Guatemala** considered the production of identification materials for these species and similar ones, as well as cooperation with the relevant expert organisations. Moreover, **El Salvador**, **Peru**, **Jamaica** and **Guatemala** reported having promoted national synergies, through the formal and specific formation of inter-institutional committees made up of competent scientific organisations to support the Scientific Authorities (CITES PC24 Doc. 22 (Rev. 1)).

8. Species management

8.1 Management measures

During the 24th meeting of the Plants Committee in Geneva (Switzerland), in July 2018, it was mentioned that: “Regarding the inclusion of populations of ***Cedrela odorata*** in Appendix III and of other species in the genus ***Cedrela***, **Brazil**, **El Salvador**, **Peru**, **Jamaica** and **Guatemala** considered the production of identification materials for these species and similar ones, as well as cooperation with the relevant expert organisations. Moreover, **El Salvador**, **Peru**, **Jamaica** and **Guatemala** reported having promoted national synergies, through the formal and specific formation of inter-institutional committees made up of competent scientific organisations to support the Scientific Authorities. **Brazil, Peru, Guatemala** and **Colombia** have carried out population studies of the *Cedrela* species in order to discover the current status of these species and to adopt measures to promote their forest management. **El Salvador**, meanwhile, reported that it had analysed the possibility of including in the technical regulations a specific treatment for CITES species, in order to ensure that forest management

plans consider censuses based on the lower minimum cutting diameters, so as to determine the stock of remnant trees, the percentage of remnant trees that should remain, and the exploitation techniques."

8.2 Population monitoring

**Brazil, Peru, Guatemala** and **Colombia** have carried out population studies of the *Cedrela* species in order to discover the current status of these species and to adopt measures to promote their forest management (CITES Plants Committee Report 2018). **Mexico** and **Guyana** are countries that have estimates of population size, cover and density. **Cuba** has provided information on population cover and density (Results "Action Plan for *Cedrela odorata*, *Dalbergia retusa, Dalbergia granadillo* and *Dalbergia stevensonii*"). With regard to the assessment of ***Cedrela***, ***Brazil*** reported that at a national level the species is found in Amazonia and in the Atlantic Forest (CITES Plants Committee Report 2018). In **Peru**, the size of the total population of this genus is estimated at 1,077,894 +/- 8%, including protected natural areas (PNAs). The commercial tree population (> MCD and outside of PNAs) amounts to between 261,159 and 300,743 specimens. **Peru** has a great deal of information on the distribution of the species in the genus identified for that country. There are a total of 10 species (CITES Plants Committee Report 2018).

8.3 Control measures

8.3.1 International

***Cedrela fissilis***: populations of this species have been included in Appendix III of CITES by Bolivia since 2010 and Brazil since 2016. They include logs, sawn wood and laminated veneers. ***Cedrela odorata***: The trade in registered logs, sawn wood and laminated veneers of the populations of this species has been listed in Appendix III of CITES by **Peru** and **Colombia** since 2001. Logs, sawn wood and laminated veneers are listed in Appendix I of CITES for the populations in **Guatemala** (2008), **Bolivia** (2010) and **Brazil** (2011).

8.3.1 National

During the 24th meeting of the Plants Committee in Geneva (Switzerland), in July 2018, it was mentioned that: *With regard to the existence of forest management plans for* Cedrela*, **Brazil** reported that there are forest management plans for timber exploitation, with short cycles of 25-35 years, an average annual growth of 0.86 m3/ha/year, a minimum cutting diameter of 50 cm, leaving 15% of the trees with a diameter of over 50 cm as seed trees; **El Salvador** reported that it had no management plans for the cedar; **Mexico** reported that it had commercial management plans, that they propose 25-year cutting cycles, with average annual growth of 0.4 to 0.6 cm for the species, the minimum cutting diameter of 55 cm and they recommend leaving 10% of the trees as seed trees. **Peru** also has forest management plans for this species, and reported average annual growth of 0.5 cm, with 20-year cutting cycles, a minimum cutting diameter of 65 cm for* Cedrela odorata *and 41 cm for the other species in the genus* Cedrela*, the management plans consider 10-20% of the trees to be seed trees. **Jamaica** also reported that it required forest management plans for the sustainable management of these species, and that it uses a minimum cutting diameter of 25 cm. In general, all the countries that carry out forest management reported that they validate and verify the forest management plans they carry out. In some regions of **Colombia**, where the natural populations are in good condition, the Environmental Authorities grant exploitation quotas for management plans that are not going to endanger the population that is being harvested."* In the Province of Misiones, where the highest percentage of ***C. fissilis*** is found, through a provincial regulation, **Argentina** established a logging ban for naturally occurring specimens, only allowing logging when it could be proven that the individuals had been planted. Moreover, the Ministry of the Environment and Sustainable Development (MAyDS) and the Ministry of Agro-industry, promote the enhancement of native forests in order to encourage the sustainable management of the latter through the harvesting of plantations of natives species, including ***Cedrela*** spp. (CITES Scientific Authority, 2018)

8.4 Captive breeding and artificial propagation

Several attempts have been made to carry out massive plantations of cedars in Latin America, with little success. To a great extent, this failure was due to the poor selection of the experimental sites, since they did not meet the species' requirements, and for example did not have well-drained, deep

and damp soil. (Fernández & Díaz 2010). It should be noted that the moisture conditions cannot be very high, since this would entail a higher risk of attack by the mahogany shoot borer, *Hypsipyla grandella* Zeller (Lep., Pyralidae) (Cintron 1990, Toledo et al. 2008). During its larval stage, this insect attacks the buds, forming protuberances on the main shoot, killing the apical shoot of the tree, especially in their juvenile stage (Pennington & Muellner 2010).

According to the CITES Plants Committee Report (2018), with regard to the cedar forest plantations, only Mexico reported the existence of a surface area of 37,176 ha of plantations with a yield of 160 $m^3$/ha, with its commercial purpose being round wood. Colombia reported that it has registered 8,021.10 ha of plantations of this species.

8.5 Habitat conservation

Populations of several species of *Cedrela* occur in the Protected Areas System in various countries. However, they are subject to illegal logging and there are problems regarding control within these protected areas. Moreover, in several reserves there are problems with the land tenure and invasions, and they are subject to changes in land use, which has a direct effect on the habitat of these species. In **Costa Rica**, ***C. odorata*** is found in the Guanacaste Conservation Area (Santa Rosa and Guanacaste national parks), Tempisque Conservation Area (Palo Verde National Park and Lomas de Barbudal Biological Reserve), Central Pacific Conservation Area (El Rodeo Protected Zone, Carara Biological Reserve), Osa Conservation Area (Golfo Dulce Forest Reserve) (Rivera et al. 2010). In **Ecuador**, the six species recorded are found in several protected areas such as Yasuní National Park, Cuyabeno Wildlife Reserve, Podocarpus National Park, Sangay National Park, etc. (Palacios et al. unpublished data).

8.6 Safeguards

9. Information on similar species

During the 24th meeting of the Plants Committee in Geneva (Switzerland), in July 2018, it was mentioned that: *"Regarding the existence of identification problems, only **Mexico** and **Guatemala** did not report problems with identifying the wood of **Cedrela odorata**; **Brazil** reported that, in general, it is hard to identify species in the genus **Cedrela**; **El Salvador** reported that they have more experience with identifying **Cedrela odorata**. However, the little information available and its great similarity with most of the other species of **Cedrela** means this is a confusing task; **Peru** reported that there are problems with the dendrological and anatomical identification. Description sheets were made for each of the species in the genus **Cedrela** distributed in **Peru**."* For **Ecuador**, it is difficult to differentiate the timber of different species in this genus, which makes forestry control hard. In **Cuba** (2018), two species, ***C. odorata*** and ***C. cubensis***, are considered to be endemic to the island (Albert 2005), and the latter is considered by Pennington & Muellner (2010) to be a synonym of ***C. odorata***. Therefore, a more detailed assessment is required due to the researchers' disagreement over the validity of ***C. cubensis***.

10. Consultations

See Annex 11.

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**Anexo 1**

Especies del género *Cedrela* (Pennington & Muellner 2010)

*Cedrela angustifolia Sessé & Moc. ex (1824)*

*Cedrela balansae* C.DC. (1914)

*Cedrela discolor* S.F. Blake (1920)

*Cedrela dugesii* S. Watson (1883)

*Cedrela fissilis* Vell. (1829)

*Cedrela kuelapensis* T.D. Penn. & Daza (2010)

*Cedrela longipetiolulata* Harm (1927)

*Cedrela molinensis* T.D. Penn. & Reynel (2010)

*Cedrela monroensis* T.D. Penn. (2010)

*Cedrela montana* Moritz ex Turcz. (1858)

*Cedrela nebulosa* T.D. Penn. & Daza (2010)

*Cedrela oaxacensis* C. DC. & Rose (1899)

*Cedrela odorata* L. (1759)

*Cedrela saltensis* M.A. Zapater & del Castillo (2004)

*Cedrela salvadorensis* Standl. (1929)

*Cedrela tonduzii* C. DC. (1905)

*Cedrela weberbaueri* Harms (1930)

**Anexo 2**

Sinónimos de *Cedrela odorata* L. (Pennington & Muellner 2010)

*Cedrela adenophylla* Mart. (1878)

*Cedrela brachystachya* (C.DC.) C.DC. (1907)

*Cedrela brownii* Loefl. (1758)

*Cedrela caldasana* C.DC. (1907)

*Cedrela cubensis* Bisse (1974)

*Cedrela glaziovii* C.DC. (1878)

*Cedrela guianensis* A.Juss. (1830)

*Cedrela hassleri* (C.DC.) C.DC. (1907)

*Cedrela huberi* Ducke (1922)

*Cedrela imparipinnata* C.DC. (1894)

*Cedrela longipes* S.F.Blake (1922)

*Cedrela mexicana* M. Roem. (1846)

*Cedrela mexicana* var. *puberula* C.DC. (1905)

*Cedrela mourae* C.DC. (1907)

*Cedrela occidentalis* C.DC. & Rose (1899)

*Cedrela odorata* var. *xerogeiton* Rizzini & Heringer (1966)

*Cedrela palustris* Handro (1962)

*Cedrela paraguariensis* Mart. (1837)

*Cedrela paraguariensis* var. *brachystachya* C. DC. (1878)

*Cedrela paraguariensis* var. *hassleri* C.DC. (1903)

*Cedrela paraguariensis* var. *multijuga* C.DC. (1878)

*Cedrela rotunda* S.F. Blake (1920)

*Cedrela sintenisii* C.DC. (1907)

*Cedrela velloziana* M.Roem. (1846)

*Cedrela whitfordii* S.F.Blake (1920)

*Cedrela yucatana* S.F.Blake (1920)

*Surenus brownii* (Loefl.) Kuntze (1891)

*Surenus glaziovii* (C.DC.) Kuntze (1891)

*Surenus guianensis* (A.Juss.) Kuntze (1891)

*Surenus mexicana* (M.Roem.) Kuntze (1891)

*Surenus paraguariensis* (Mart.) Kuntze (1891)

*Surenus vellozoana* (M.Roem.) Kuntze (1891)

**Anexo 3**

Especies del género *Cedrela*, estatus, distribución por países, ecosistemas y rango altitudinal (Pennington & Muellner 2010)

| Especie | Estatus | Distribución | Habitat | Altitud (msnm) |
|---|---|---|---|---|
| *C. angustifolia* | nativa | Argentina, Bolivia, Ecuador y Perú | Bosques montanos húmedos o bosques nublados | 1800-3500 |
| *C. balansae* | nativa | Argentina, Bolivia, Paraguay | Bosques semideciduos | < 800 |
| *C. discolor* | endémica | México | Bosques deciduos | 1400-2000 |
| *C. dugesii* | endémica | México | Bosques deciduos | 1800-2200 |
| *C. fissilis* | nativa | Argentina, Bolivia, Brazil, Colombia, Ecuador, El Salvador, Guyana, Paraguay, Perú, Venezuela | Bosques semideciduos/Bosques húmedos de tierras bajas | < 1200 (1450) |
| *C. kuelapensis* | nativa | Perú, Ecuador[1] | Bosques deciduos y semideciduos | 900-2200 |
| *C. longipetiolulata* | endémica | Perú | Bosques siempreverdes de tierras bajas | < 400 |
| *C. molinensis* | endémica | Perú | Bosques deciduos | 700-1600 |
| *C. monroensis* | endémica | El Salvador | Bosques semideciduos | 800-1600 |
| *C. montana* | nativa | Colombia, Ecuador, Perú, Venezuela | Bosques montanos húmedos o bosques nublados | 1300-3000 |
| *C. nebulosa* | nativa | Colombia, Ecuador, Perú | Bosques montanos húmedos | 1100-2400 |
| *C. oaxacensis* | endémica | México | Bosques montanos húmedos | 580-2200 |
| *C. odorata* | nativa | México hasta Argentina y el Caribe | Bosques semideciduos, deciduos y bosques húmedos de tierras bajas | < 800 (1500) |

| | | | | |
|---|---|---|---|---|
| *C. saltensis* | nativa | Argentina, Bolivia y Perú | Bosques montanos húmedos y Bosques semideciduos | 700-1300/600-2500 |
| *C. salvadorensis* | nativa | Costa Rica, El Salvador, Guatemala, Honduras, México | Bosques deciduos | 350-1400 |
| *C. tonduzii* | nativa | Costa Rica, El Salvador, Guatemala, Honduras, México, Nicaragua, Panamá | Bosques montanos húmedos | 1000-2500 |
| *C. weberbaueri* | endémica | Perú | Bosques deciduos | 1700-2200 |

**Anexo 4**

Categorías de Amenaza de las especies del género *Cedrela* según categorías y criterios del UICN (Mark & Rivers 2017[1], Pennington & Muellner 2010)

| | **Categoría UICN** | | **Especie** |
|---|---|---|---|
| AMENAZADAS | En Peligro Crítico | CR A2c | *Cedrela kuelapensis* |
| | | CR A2c | *Cedrela molinensis* |
| | | CR A2c; B2ab(iii) | *Cedrela discolor* |
| | En Peligro | EN A2c B1ab(iii) | *Cedrela monroensis* |
| | | EN A2c | *Cedrela dugesii* |
| | | EN A2c | *Cedrela oaxacensis* |
| | | EN A2c; B1ab(iii) | *Cederla weberbaueri* |
| | Vulnerable | VU A2c | *Cedrela salvadorensis* |
| | | VU A2c | *Cedrela tonduzii* |
| | | VU A2c | *Cedrela montana* |
| | | VU A2c | *Cedrela angustifolia* |
| | | VU A2c | *Cedrela fissilis* |
| | | EN A2 | *Cedrela balansae* |
| | | VU A2c | *Cedrela saltensis* |
| | | VU A2c | *Cedrela nebulosa* |
| | | LC/ VU A3bcd+4bcd[1] | *Cedrela odorata* |
| | Preocupación Menor | LC | *Cedrela longipetiolulata* |

**Anexo 5**

**Estado y tendencias**

**Perú** informó que el estatus de las especies del género ***Cedrela*** según la categorización de especies amenazadas de flora silvestre, es el siguiente: *C. lilloi* (C. ***angustifolia***)– En Peligro; ***C. fissilis*** – Vulnerable; *C. montana* - Vulnerable; ***C. odorata*** – Vulnerable. Para **Ecuador**, cinco de las seis especies registradas para el país están amenazadas principalmente por la pérdida y degradación del habitat: ***C. angustifolia***, ***C. montana*** y ***C. kuelapensis***- En Peligro; ***C. nebulosa*** y ***C. odorata***-Vulnerables (Tabla 1). ***C. odorata*** está En Peligro Crítico para la **Islas Caimán** (2008) y **República Dominicana** (2011); Vulnerable para **Brazil** (2012) y **Guatemala** (2006); Preocupación Menor para **Cuba** y **México** sugiere una protección especial (2010) (UICN 2017).

**Tabla 1.** Categorías de amenaza de las especies del género *Cedrela* para Ecuador (Palacios et al. datos no publicados)

| Especie | % de habitat conservado | % de habitat pérdido | EOO (Km2) | AOO (km2) | Categoría de Amenaza UICN para Ecuador |
|---|---|---|---|---|---|
| *Cedrela angustifolia* | 44 | 56 | 1313 | 24 | **En Peligro** |
| *Cedrela fissilis* | NA | NA | NA | NA | Datos Insuficientes |
| *Cedrela kuelapensis* | 46 | 54 | 2830 | 28 | **En Peligro** |
| *Cedrela montana* | 48 | 52 | 29337 | 132 | **En Peligro** |
| *Cedrela nebulosa* | 69 | 31 | 29920 | 128 | **Vulnerable** |
| *Cedrela odorata* | 66 | 34 | 203822 | 320 | **Vulnerable** |

En **Colombia**, ***C. odorata*** es una especie En Peligro, ya que de acuerdo a los reportes de las corporaciones, cerca del 60% de sus poblaciones se encuentran en regiones explotación intensiva. Por lo cual Colombia incluyó a esta especie en el Apéndice II de la CITES, en el año 2001. Algunas Corporaciones Autónomas Regionales han prohibido su aprovechamiento (Cárdenas & Salinas 2007, Cárdenas et al. 2015). Posteriormente el Ministerio de Ambiente y Desarrollo Sostenible mediante la Resolución 192 de 2014 la declarada como especie amenazada a nivel nacional (MAVDT 2014) (Cárdenas et al. 2015). En **Costa Rica**, ***C. odorata*** es una especie con un alto riesgo de peligro de extinción pues sus poblaciones han disminuido drásticamente, por lo que se debe realizar programas de conservación "in situ" (Rivera et al. 2010). Esta especie se ha convertido en un foco de preocupación por parte de agencias de conservación y desarrollo como la FAO y algunos gobiernos porque se encuentra fuertemente afectada luego de más de 300 años de explotación (De La Torre 2013). En **Puerto Rico**, el Departamento de Recursos Naturales catalogó a ***C. odorata*** como elemento crítico / Especie de elemento crítico en 2007. En **Cuba**, ***C. odorata*** y ***C. cubensis*** fueron categorizadas como Preocupación Menor (LC) (Gonzáles et al. 2009).

**Anexo 6**

Estudios sobre la estructura de la población de *Cedrela odorata*

en los diferentes países de la región

En **Ecuador**, en la parcela permanente de 50 ha del Parque Nacional Yasuní, establecida en un bosque maduro de la Amazonía, se encontraron 120 individuos de ***C. odorata*** con un diámetro ≥ 1 cm; aproximadamente 35 son árboles con diámetro ≥ 30 cm (diámetro máximo 116.5 cm) y 15 individuos con diámetros entre 10 y 30 cm. Entre 1995 y 2002, la mortalidad fue de 6.8 % (CI: 4.8-9.2) y el reclutamiento 2.6% (CI: 1.5-4.5); mientras que entre 2002 y 2007: 4.8 (CI: 2.9-7.7) y 8.1 (CI: 5.6-11.4), para mortalidad y reclutamiento, respectivamente (Pérez et al. 2014).

En **Costa Rica**, la estructura horizontal de las poblaciones de ***C. odorata*** no se ajusta al comportamiento típico de la J invertida, porque en la clase baja de 10-19.9 cm de DAP sólo presenta un 14.7% de individuos, en comparación con las clases que van de 20 a 49.9 cm de DAP que en total sobrepasa el 60.44%. Esto se debe a que la cantidad de individuos que está siendo reclutada en las clases diamétricas de 20 a 49.9 cm es muy alto, porque la especie presenta un rápido crecimiento en sus primeros años de vida. En otros estudios se encontró resultados similares, en la clase de 10 < 20 cm de DAP sólo se establece un 1%, en cambio en las clase de 30 < 40 y de 50 < 60 se establecen el 55%, debido a un rápido crecimiento. Además, se observa que en las clases mayores de 60 cm de DAP se encuentran solamente un 5.56%, siendo este el tamaño de corta en Costa Rica, lo cual podría ser el resultado de un fuerte aprovechamiento que se hizo de la especie hace varios años (Rivera et al. 2010) (Figura 1).

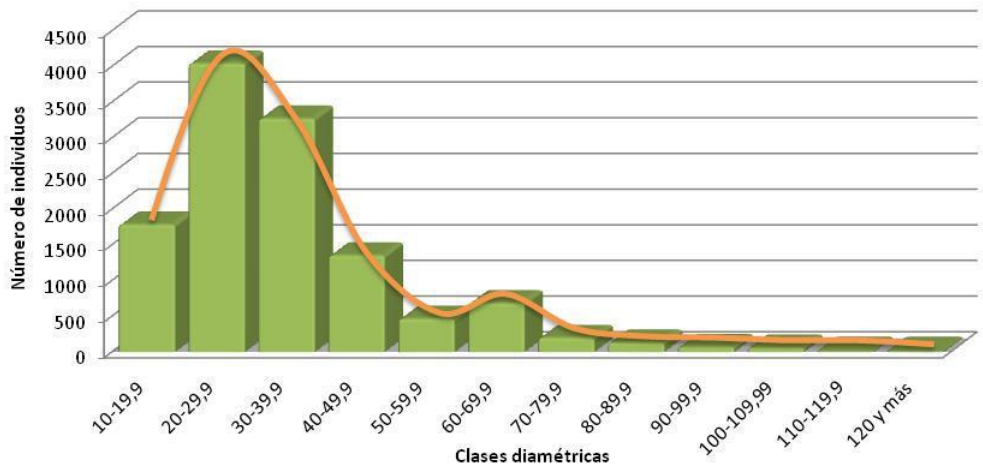



**Figura 1.** Distribución en clases diamétricas de los individuos de *C. odorata* L. en Costa Rica (Rivera et al. 2010).

En la Amazonia de **Perú**, zona de Manú, al evaluar la estructura poblacional de los individuos se encontró una estructura diamétrica creciente, presentando un mayor número de individuos en la clase de más de 60 cm de DAP. En cambio en las poblaciones de Los Amigos, la distribución entre clases fue más pareja (Figura 2). En relación a la densidad, en un área de 632 774 ha en Manú se registraron 540 individuos lo que representa 0.85 ind/ha, mientras que en Los Amigos se censaron 60 individuos en 644 953 ha y esto equivale a 0.09 ind/ha (De La Torre 2013).

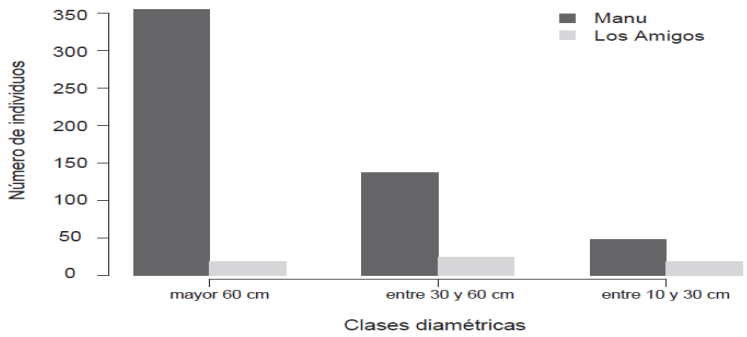



**Figura 2.** Diferencia entre clases diamétricas de las poblaciones de *C. odorata* L. en las zonas de Manú y Los Amigos en la Amazonia de Perú (De La Torre 2013)

En **Colombia**, la estructura de la población varía dependiendo del sitio, en las localidades de Alto Mulatos y la Macarena, hay una mayor concentración de individuos en las clases diamétricas intermedias (20-40 cm) y presenta una distribución en campana que se observa en las especies heliofitas durables, donde el reclutamiento está asociado a distirbios en el bosque (Orozco & Brumér 2002, Penington & Muellner 2010). En cambio, en la zona de Amacayacu se observó que el 50% corresponde a regeneración con diámetro menor a 10 cm de DAP, mientras que el otro 50% son árboles mayores a 10 cm, pero inferiores a 70 cm de diámetro. Esta población muestra un comportamiento en J invertida que se relaciona con poblaciones en la fase inicial de desarrollo y que podría ser el resultado del aprovechamiento selectivo de madera en el pasado y dos episodios de reclutamiento puntuales (Cárdenas et al. 2015) (Figura 3).

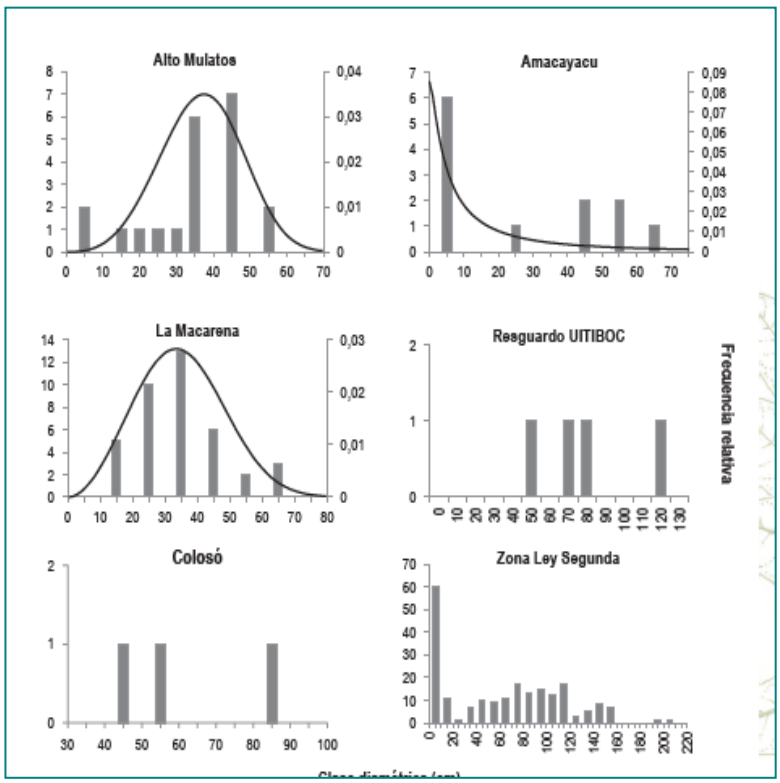
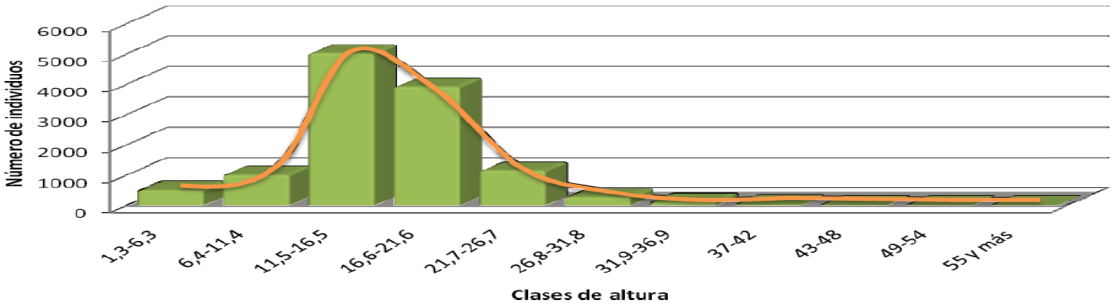



**Figura 3.** Distribuciones diamétricas reales y ajustadas a una función teórica de poblaciones de Cedro en bosque primario poco intervenido en Colombia (Cárdenas et al. 2015)

**Anexo 7**

Distribución por clases de altura de *C. odorata* L. para Costa Rica
(Rivera et al. 2010)



## Anexo 8

Densidad de Cedro en las diferentes zonas de estudio en el territorio colombiano (Cárdenas et al. 2015)

| Localidad | No. Individuos | Intensidad de muestreo Global | Densidad en bosque primario Ind./ha. | Densidad de individuos con DAP ≥ 80 cm Ind./ha. |
|---|---|---|---|---|
| Parcela Permanente de Tarapacá (Amazonas) | 1 | 1 ha | 1 | 0 |
| La Macarena (Meta) | 7 | 3.5 km | 0.45 (0.11-0.82) | 0 |
| Colosó (Sucre) | 3 | 11.4 km | 0.41 (0.01 - 18.43) | 0.14 |
| Parcela Permanente PNN Amacayacu (Amazonas) | 14 | 25 ha | 0.48 (0.00 – 0.77) | 0 |
| Alto Mulatos (Antioquia) | 22 | 10.75 km | 0.40 (0.20 – 0.82) | 0 |
| Zona Ley 2da, Tarapacá* (Amazonas) | 144 | 2819.7 ha | 0.05 | 0.02 |
| Resguardo UITIBOC, Tarapacá (Amazonas) | 4 | 2.2 km | 0.05 (0.01 – 0.39) | 0.01 |
| Cahuinarí - Predio Putumayo (Amazonas) | 2 | 12.7 km | 0.25 | 0.13 |

## Anexo 9

Partes y derivados en el comercio

Comercio de madera de especímenes extraídos de la naturaleza

| Termino | Cantidad reportada por el exportador | % |
|---|---|---|
| trozas | 165.91 | 0.19 |
| plywood | 46.48 | 0.05 |
| madera aserrada | 85412.65 | 97.90 |
| madera | 620.30 | 0.71 |
| chapas | 997.57 | 1.14 |
| total | 87242.91 | 100.00 |

Comercio de madera de cedro, de plantas que se propagan artificialmente

| Termino | Cantidad reportada por el exportador | % |
|---|---|---|
| trozas | 1710.76 | 2.74 |
| plywood | 97.43 | 0.16 |
| madera aserrada | 50442.87 | 80.76 |
| madera | 10208.37 | 16.34 |
| chapas | 2.63 | 0.00 |
| total | 62462.07 | 100.00 |

## Anexo 10

### Retenciones de madera de Cedrela en Ecuador

**Fuente: Dirección Nacional de Biodiversidad**

| Año | Destino Final | Puestos Fijos | Unidades móviles | Total Resultado |
|---|---|---|---|---|
| 2014 | 81.12 | - | 34.31 | **115.43** |
| 2015 | 21.39 | - | 31.48 | **52.87** |
| 2016 | 11.85 | 7.58 | 19.82 | **39.25** |
| 2017 | 25.43 | - | 3.82 | **29.25** |
| **Total Resultado** | **139.79** | **7.58** | **89.43** | **236.80** |

**Anexo 11**

**Estados del área de distribución de** *Cedrela* spp**. y respuestas a la consulta**

| **País** | **Consulta** | **Respuesta (Si No/ Indeciso / No Objeción)** | **Resumen de la información proporcionada** |
|---|---|---|---|
| Argentina | Si | **No** | **Informe Técnico** |
| Belice | Si | **Si** | |
| Bolivia | Si | | |
| Brasil | Si | | |
| Colombia | Si | | |
| Costa Rica | Si | **Si** | **Estudio Poblacional y Datos de Comercio** |
| Cuba | Si | **Si** | **Informe Técnico** |
| Curacao | Si | | |
| El Salvador | Si | | |
| Guatemala | Si | | |
| Guyana | Si | | |
| Guyana Francesa | Si | | |
| Haití | Si | | |
| Honduras | Si | **Si** | **Datos de Comercio** |
| Islas Caimán | Si | | |
| Jamaica | Si | | |
| Leeward Islands | Si | | |
| México | Si | **Si** | **Estudio Poblacional, Datos de Comercio** |
| Nicaragua | Si | | |
| Panamá | Si | | |
| Paraguay | Si | | |
| Perú | Si | | |
| Puerto Rico | Si | | |
| República Dominicana | Si | | |
| Surinam | Si | | |

| | | | |
|---|---|---|---|
| Tobago | Si | | |
| Trinidad | Si | | |
| Venezuela | Si | | |
| Windward Islands | Si | | |
| **Estados no rango de distribución** | | | |
| Estados Unidos | Si | | |
| Netherlands | Si | | |