Inclusion of Palo santo *Bulnesia sarmientoi* in Appendix II with annotation #11 Designates logs, sawn wood, veneer sheets, plywood, powder and extracts.

Proponent: Argentina

Summary: Palo santo *Bulnesia sarmientoi* is a large slow growing tree, reaching 10-20 m in height and 30-80 cm diameter at breast height (DBH). It is confined to the Gran Chaco region in Bolivia, Paraguay, Argentina and a small part of Brazil. Within the region it is found in isolated or continuous stands mainly in the semi-arid Chaco subregion, with scattered individuals in other subregions. It may once have occurred in an area of around 100 000 km^2 and is the dominant species in some areas. FAO's Forest Resource Assessment estimated the Argentine stock in 2000 at 19.4 million m^3. One study in Argentina in 2004–2005 found an average of 58 adult trees per ha (DBH>20 cm) with average number of individuals of 227/ha. Older studies (1979) in Argentina of productivity for this species estimate standing volume of wood at 0.75–0.78^3 per ha. Average growth rate was estimated at 0.022–0.025 m^3/ha/yr. The species has the ability to re-sprout from cut stumps and can be one of the commonest species in re-growth forest. One study found it to be one of the most frequent species in an area of secondary forest in the Argentine Chaco at a volume of 3.31 m^3 per ha.

The Gran Chaco has been subject to land-use changes for agriculture and stock-farming and is intensively logged for timber and charcoal production. It has been estimated that between 1998 and 2006 at least 20 000 km^2 (2 million ha) of "chaqueño" forest have been deforested in Argentina. Extensive and more recently intensive stockbreeding systems has reportedly resulted in degradation and the loss of restoration ability of approximately 15 million hectares of native forest. Forest destruction has also reduced the species' habitat in Paraguay. In Bolivia, overall rates of deforestation in the Gran Chaco have slowed somewhat from an estimated 260 km^2 (26 000 ha) per year in 1992–2000 to ca 190 km^2 (19 000 ha) in 2001–2004, believed to be due in part to a reduction in rates of agricultural conversion because of recurrent drought.

The wood of *Bulnesia sarmientoi* is heavy (density 0.990–1.280 kg/dm³), very strong and decay-resistant, even underground, because of its resin content, which also gives it aromatic properties. It has a wide range of uses including furniture, flooring, lathe work, manufacture of propeller shaft bearings for ships, and (fence) poles. The essential oil derived from *B. sarmientoi* wood, known as "Guayacol", "Guajol" or "Guayaco" is used in the perfume cosmetics industry and in mosquito repellents. Palo santo resin, derived from the residue of the distillation process can be used to produce dark varnishes and paints. The tree is also used for charcoal production and the leaves have been used for medicinal purposes.

Trade data, especially from Bolivia, are limited for this species. Argentina and Paraguay are known to export *B. sarmientoi* wood with recorded exports increasing rapidly from approximately 100 t in the early 2000s to 40 000 t in total by 2006. The majority of Argentinean exports for 2006–2008, estimated at almost 53 000 t, were of roundwood, cylinders and posts (87%), with 12.6% sawn wood and a very small amount of firewood and charcoal. China was the main importing country, with small amounts destined for Uruguay and other countries. Between 2000 and 2006 most exports from Paraguay were of sawn wood, logs, cylinders and poles with "less than 1% destined for extracts and other items" (although it is not clear whether this is by weight and whether it was already in the form of extract). The destination of exports from Paraguay, based on data for the period 2000–2004, was primarily China (90%). The main destinations for extract are said to be France and Spain. The extent of trade in essential oil or "Guayacol", for the perfume cosmetics industry, is difficult to estimate although it appears to be met by exports from Paraguay. In the early 1970s an estimated 75 and 100 t of guaiac wood oil were produced each year. Production of extract is said to be from damaged branches and trade from Paraguay is reportedly a by-product of land clearing. There may be some limited trade in artisanal crafts to Europe and North America, although this apparently only uses dead wood because felled wood tends to crack. There is some local use for furniture.

Significant areas of the Gran Chaco are within protected areas in Bolivia, Argentina and Paraguay and initiatives are under way to prevent further deforestation. Argentina listed the species in App. III in 2008, which has reportedly had a significant effect on trade volume and control.
Bulnesia sarmientoi shares the common names lignum-vitae and guaiac with the *Guaiacum* species, which were listed in Appendix II in 2003. *Bulnesia arborea* is also referred to as lignum-vitae and guaiac and can be used for the same purposes. Identification of *Bulnesia* to the genus level through wood anatomy is relatively straightforward; however *B. sarmientoi* and *B. arborea* are almost indistinguishable at the macroscopic and microscopic level.

Analysis: *Bulnesia sarmientoi* has a wide range and evidently a very large global population. Given the reported extent of forest clearance in the Chaco region, it is possible that its overall population has undergone a considerable decline, although given the lack of quantitative historical data, and uncertainty as to what an appropriate generation time for this species is, it is not possible to say whether such a decline is near one that might qualify it for inclusion in Appendix I in the near future. Moreover, historical declines were driven by land-use change, not by harvest for international trade. The species is now harvested for international trade, but it is not clear to what extent this is leading to population declines over and above those brought about by land-use change. If it were doing so to any extent, then it could be argued that regulation of trade was required to prevent the species becoming eligible for inclusion in Appendix I in the near future (Criterion in Annex 2 (a) A in *Resolution Conf. 9.24 (Rev. CoP14)*). The large number of small trees present in surveyed areas, its presence in re-growth forest, and current information on standing stocks and increment rates, at least in Argentina, imply that it is not doing so, although this cannot be said with certainty.

Similarly it Is not clear that regulation of trade is necessary 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 (Criterion in Annex 2 (a) B in *Resolution Conf. 9.24 (Rev. CoP14*)).

The annotation suggested appears to cover the main parts and derivatives in trade. However it would not cover handicrafts, which are also apparently in trade but are normally made from dead wood, nor would it cover furniture. It appears that manufacture of furniture takes place within importing countries and therefore the annotation would cover the main parts exported from range States.

Supporting Statement (SS)	**Additional information**
	Taxonomy
	Range
Argentina, Bolivia, Brazil, Paraguay. Endemic to the Gran Chaco.	
	IUCN Global Category
	Lower Risk/Conservation Dependent (Assessed 1998 ver. 2.3) – needs updating.

Biological and trade criteria for inclusion in Appendix II *(Resolution Conf. 9.24 (Rev. CoP14)* Annex 2 a)

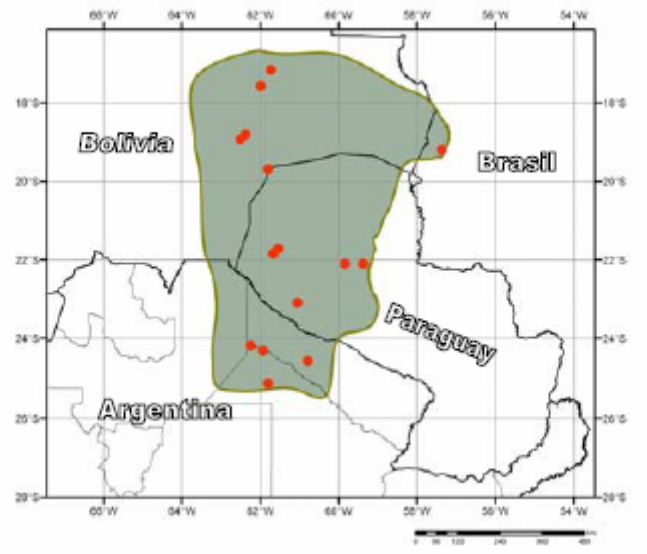
A) Trade regulation needed to prevent future inclusion in Appendix I

Supporting Statement (SS)	Additional information

B) Regulation of trade required to ensure that harvest from the wild is not reducing population to level where survival might be threatened by continued harvest or other influences

Endemic to the Gran Chaco, which is distributed from southeastern Bolivia in western areas bordering Paraguay and Brazil, to northern Argentina, where it reaches its southern limit at approximately 25°S.

- Argentina: North and North-west (provinces of Chaco, Salta, Formosa, and, marginally, Santiago del Estero).
- Bolivia: South-east (departments of Oruro, Santa Cruz and Tarija).
- Paraguay West (Departments of Alto Paraguay, Boqueron and Presidente Hayes).
- Brazil: South-west (isolated sites in the State of Mato Grosso do Sul).



The semi-arid Chaco is home to numerous edaphic communities, one of which is formed by relatively continuous stands of *Bulnesia sarmientoi* known as 'palosantales'. The species has the ability to produce new shoots by means of gemmiferous roots and to sprout from stumps, which contributes to the maintenance of the population in harvested areas. It is common to find isolated or clustered areas of regrowth in the forest, which form islets ensuring the continuity of the species.

No information is available on the historical range of the species in Bolivia.

On the basis of the distribution map for B. sarmientoi *provided in the SS, the region where the species is present in Bolivia may extend to a similar size as that in Paraguay. According to Meneses and Beck (2005),* Bulnesia sarmientoi *is endangered in Bolivia. Overall rates of deforestation in the Gran Chaco in Bolivia have slowed somewhat from an estimated 256 km^2 per year between 1992–2000 to 191 km^2 between 2001 and 2004, believed in part to be due to a reduction in the conversion of these landscapes to the cultivation of row crops because of recurrent drought.*

Supporting Statement (SS)

There are no current population data or rates of habitat destruction and land use change.

In 1987 in Paraguay the subregion containing *Bulnesia sarmientoi* was approximately 37 000 km^2. The species is included in the list of endangered species and is protected from harvests in principle (Ministerial Resolution 2534/06).

In Argentina the species was estimated to occur in approximately 25 000 km^2.

Old studies (1979) show productivity of 0.77 m3/ha of the species' wood plus 1.75 m^3/ha of branches suitable for firewood were present at its distribution centre in the province of Formosa (town of Las Lomitas), with an average growth rate of 0.025 m^3/ha/yr. Similar studies in the province of Salta, department of Las Antas, at 24° 10' S - 63° 50' W, showed similar values, 0.75 m^3/ha of wood, 1.10 m^3/ha of firewood, with an average growth rate of 0.022 m^3/ha/yr.

The species has a slow growth rate and estimated age of 100 at 45 cm DBH.

Essential oil, also know as "guayacol", "guajol" or "guayaco", is distilled and widely used in the perfume industry, due to its soft and pleasant odour, similar to that of a rose and less intense than that of a violet.

It is used in the manufacture of varnishes and dark paints.

Wood is used for flooring and is in great international demand. The SS states that furniture is one of its most lucrative uses of the wood since the fine furniture produced is valued very highly internationally. Historically used for lathe work for products such as: canes, cigar boxes, ashtrays, fine pencils, gourds, napkin holders, tobacco boxes, fans, chests, cups, sweets boxes, sewing boxes, flower containers, pedestals for sculptures, and for the manufacture of propeller shaft bearings for ships.

Its high resin composition makes it rot-proof below ground and this has led to young trees also being used for fencing poles. In the past years charcoal production from this species has been registered.

Additional information

In Paraguay, the species is widely distributed, being found in virtually three-quarters of the Paraguayan Chaco region (Mereles, 2006). Paraguay has conducted only one census. In the other range States, the B. sarmientoi *population can only be estimated. Forest destruction has also reduced the species' habitat in Paraguay, although mostly for small scale farming by local people (Adámoli, 2009).*

Giménez et al. *(2007) found the species to be one of the most frequent in one sampled area of secondary forest (Miramar-Bermejito) in the Argentine Chaco at a volume of 3.31 m^3/ha. In 2000 the stock in the forest was estimated at 19.4 million m^3 (FAO, 2005). Where Palo santo is located it is found as almost pure forests in the north-west of the Chaco region and is also associated with quebracho (*Aspidosperma quebracho-blanco *and* Schinopsis quebracho*). A study looking at the use of* Bulnesia sarmientoi *for crafts found average densities from five sample sites to be 58 adult trees per ha (DBH.20 cm) with average number of individuals 227/ha and evidence of harvest for construction (i.e. cut trunks) at nine individuals per ha (Brient, 2006). Only 15% of original forest cover is believed to remain in the Argentine Gran Chaco, 85% having been cleared in only 30 years, equating to a loss of Chaco forests of 2.2% per year, which is consistent with, or even exceeds, global trends. Forest vegetation now persists as fragments (Zak* et al., *2004).*

Studies by UMSEF-PINBN (1998–2005) in the Provinces of Salta, Chaco and Formosa in Argentina found densities of 25–54 individuals per hectare in areas of where the species was present, although the majority of trees were below 30 cm DAB. The population may be substantial.

		Existence (ind/ha) by type of DBH				
stratum	Surface Area (ha)	0-10 cm	10-30 cm	30-50 cm	50-70 cm	Total
Bosque alto	2550843	0	0.5	0	0	0.5
Bosque ribereno	183784	0	0	0	0	0
Colonizadores	2433585	37.5	8.8	4.1	3.4	53.8
Quebrachal	16110190	14.4	9.5	0.7	0	24.6
Regional	21278400	15.2	8.3	1	0.4	24.9

Regeneration is good, but growth is very slow (Mereles, 2006).

It is one of the hardest and heaviest of woods (1100–1280 kg/m^3); it is very strong and decay-resistant, even underground, because of its resin content (Mereles, 2006).

Supporting Statement (SS)

Recorded exports appear to have been increasing from the early 2000s. Argentina listed the species in Appendix III in 2008.

Argentina and Paraguay have been important exporting countries of this timber species.

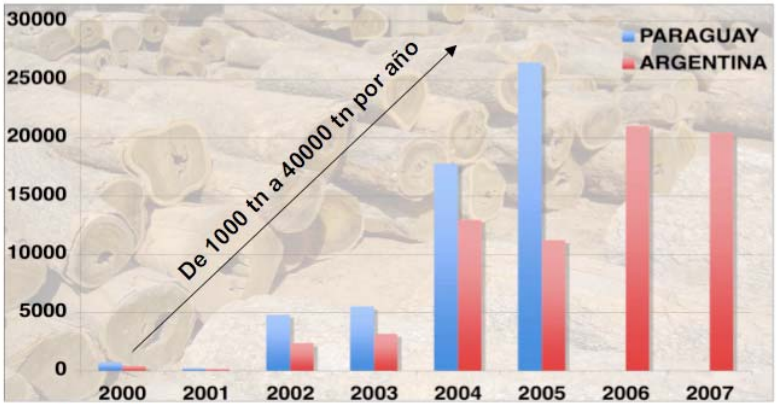
The majority of Argentinean exports from 2006–2008 were of raw (rollo) wood, "cilindros" and posts (87%) with 12.6% sawn wood and a very small amount of firewood and charcoal. China is the main importing country, with small amounts destined for Uruguay and other countries.

Figure 1: Exports from Argentina in tonnes. 2006 value is estimated as records were only available from June onwards.

Significant illegal or irregular trade has been identified through increased enforcement activities in Argentina, particularly since the listing of *B. sarmientoi* in Appendix III.

In Paraguay, in principle it is protected from harvest (Ministerial Resolution 2534/06). However, the fact that changes in land use from forest to agriculture are allowed authorizes the clearing and harvest of the species and is believed to be the source of the timber in international trade. Primary production increased significantly from 2002. Between 2000 and 2006, 33% of exports were of sawn wood, while 66% belonged to logs, cylinders and poles, with less than 1% destined for extracts and other items. The destination of exports, based on data for the period 2000–2004, was primarily China (90%).

Additional information



PY: SFN-MAG; AR: DB-SAyDS

(Fundacion Biodiversidad, 2009)

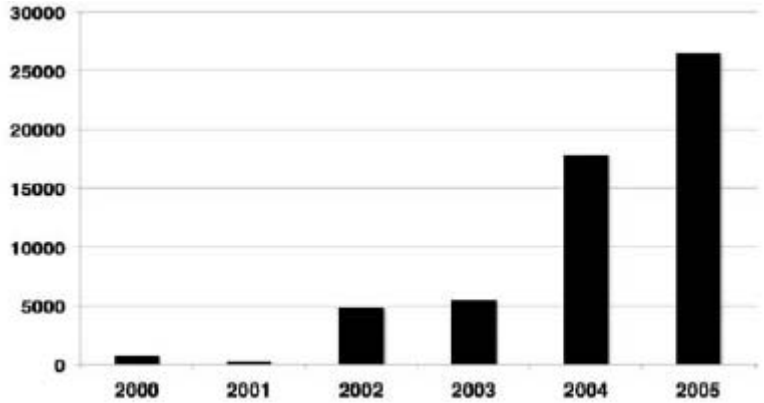
Primary production in Argentina increased from approximately 2000 t in 2002 to just over 20 000 t in 2006 and 2007 (DB-SAyDS).Similar increases to around 20 000 t have been seen in Paraguay. At a density of 1100–1280 km/m^3 this is equivalent to a volume of around 36000 m^3. However, without data on conversion ratios and recovery rates, it is not possible to relate this with any accuracy to standing stock of trees.

Wood has been exported in large quantities as wood flooring to Taiwan Province of China from Paraguay (Mereles, 2006). In Paraguay, large lots of planed logs have been observed, stacked by diameter, starting at a diameter at breast height (DBH, measured at a height of 1.40 m) of less than 10 cm (Mereles, 2006).

Distillation is sometimes hampered by lack of water in the rather dry Chaco region, but between 75 and 100 t of guaiac wood oil were estimated to be produced each year in the early 1970s (Robbins and Matthews, 1974). No information was found on the quantities of wood needed to produce each kg of extract. Although Mereles and Perez de Molas (undated) cite Jacobs (1990) that the heartwood extract content is between 3–4%.

It was reported in 1974 that there had been a major surge in demand for the oil at the end of the 1960s, following an increase in popularity of a leather-type aroma in "men's line" products, but that the market had since stabilized (Robbins and Matthews, 1974).

Extract is offered for sale on the internet. Dulsan Organica SRL state that its annual

Supporting Statement (SS)	Additional information
 Figure 2: Paraguay primary production in tonnes. The main destinations for palo santo or "guayacol" essence as a base in perfume making are France and Spain.	*shipment volume is 5000 kg of Essence of Palo Santo (from* Bulnesia sarmientoi*).* *It is unclear from the SS whether the 1% of exports that is destined for extract is of raw wood or in extract. In addition, there is no indication as to whether percentages are by weight or volume. According to Mereles and Perez de Mola (undated) Paraguay provides 85% of world production of extract. Production of extract is said to be from damaged branches and as a by-product of land clearance.* *According to the CITES trade database, Germany re-exported 1710 kg of extract originating from pre-Convention stock from Paraguay to India in 2008. Switzerland has reported importing 6300 kg of pre-Convention* Bulnesia sarmientoi *extract from Paraguay in 2008 (Caldwell, 2009).* *UK imports of oil seem to be coming from Paraguay to Hamburg and then broken up to go to Felixstowe (UK CITES Scientific Authority for plants, 2009).* *Since Argentina listed the species in App III in 2008, trade reported in the CITES trade database has been of 2.1^3 of sawn wood imported from Argentina by Germany. Germany also re-exported 1710 kg of extract originating from pre-Convention stock from Paraguay to India.* *No information was available on harvest or export of this species from Bolivia or Brazil.*

Inclusion in Appendix II to improve control of other listed species

Supporting Statement (SS)	Additional information
A) Specimens in trade resemble those of species listed in Appendix II under *Resolution Conf. 9.24 (Rev. CoP14)* Annex 2 a or listed in Appendix I	
"The technological characteristics of "palo santo" timber are very similar to those of "lignum vitae" (*Guaiacum officinale* L.) [listed in CITES Appendix II in 2003]. "Lignum vitae" is widely used in North America and Europe to make propeller shaft bearings for planes and ships, pulley wheels, screws, and for other similar purposes; according to these technical verifications, our "palo santo" could be tested for the uses mentioned, with great chances of success". Years later these predictions were fulfilled. Some species of genus *Guaiacum*, and *B. sarmientoi*, belonging to the Zygophyllaceae family, are used for oil extraction and shares the common names of "palo santo" and "guayacán", as well as some of their commercial names such as "ligum vitae" or "guaiac". This, together with the difficulty to differentiate between them during the Customs controls, leads to species of the genus *Guaiacum* to be considered "similar species".	Bulnesia sarmientoi *and* Bulnesia arborea *share the common names lignum-vitae and guaiac with the* Guaiacum *species.* *The PC recommended that attention should also be given to possible identification difficulties between this species and* Bulnesia arborea*. Identification of* Bulnesia *to the genus level through wood anatomy is relatively straightforward (UK CITES Scientific Authority for plants, 2009). However,* B. sarmientoi *and* B. arborea *are almost indistinguishable at the macroscopic and microscopic level (Richter and Dallwitz, 2009).* Bulnesia *extract imported into Europe and other countries also comes from the species* Bulnesia arborea*. If so, it might be necessary to draft a proposal encompassing the entire* Bulnesia *genus, in addition to highlighting the issue of 'similar species' (Mereles, 2006).*
B) Compelling other reasons to ensure that effective control of trade in currently listed species is achieved	

Other information

Threats

Since the 90s, Argentina and Paraguay increased land use change for farming and agriculture caused the large-scale decline of the remaining Chaco. It has been estimated that between 1998 and 2006 at least two million hectares of "chaqueño" forest have been deforested in Argentina, a process that has also been observed in Paraguay. Extensive and more recently intensive stockbreeding systems has resulted in degradation and the loss of restoration ability of approximately 15 million hectares of native forest. Use of in pasture management affects the growth of trees. In Argentina, the main impacts affecting the Gran Chaco until recently were forest activities mainly involved production of joists, posts, logs, firewood and charcoal and extensive goat and bovine stockbreeding. Twenty percent of Argentina's cropland is located in the Chaco region. In Paraguay, the species was badly affected by increasing farming and agricultural activities. The species has medicinal properties and has been used medicinally locally.	*The main threat to the species in Paraguay is land use change, which is not stopping. In the process they extract Palo Santo (Mereles, 2009).*

Supporting Statement (SS)	Additional information
Conservation, management and legislation	
In 2007, the CITES Management Authority of Argentina requested the CITES Secretariat to include the species in Appendix III with annotation # 11 Designating logs, sawn wood, veneer sheets, plywood, powder and extracts. This came into effect in February 2008.	*The listing of* B. sarmientoi in Appendix III *in 2008 by Argentina has reportedly resulted in a significant effect on trade volume and control.*
Various national laws are in place in Argentina for the protection of forest resources The following provincial laws exist:	
Formosa: Allows the export from the province of timber species which have been previously industrialized, protecting local resources but also local labour and industry. Sets special rules for the use of *B. sarmientoi* species, requiring technical marking and a minimum cutting diameter. Instructs 20% of harvestable individuals to be left standing, per surface unit, as seed trees. Hammering must be carried out by professionals and rangers. The silvicultural plan must include aspects on natural regeneration, possibility of enriching of the native forest through strips or thickets, thinning, etc.	*In the Province of Formosa (North Argentina, on the border with Paraguay), Provincial Government has established the Program Land Use Planning which aims to retain between 80 and 90% of the forests (Adámoli, 2009).*
Salta: Felling of *B. sarmientoi* is forbidden in State lands while it is permitted, along with its sale and commercialization, in private properties which are subject to clearing due to changes in land use.	
Chaco: Allows selective logging of *B. sarmientoi.* Santiago del Estero: The export from provincial territory of untransformed forest products is banned.	
The species is protected within the Reserva Natural Formosa protected area in Argentina which covers a 10 000 ha of Dry Chaco.	*A large subpopulation of* B. sarmientoi *occurs in Kaa-Iya del Gran Chaco National Park, Bolivia (WCMC, 1998). In Paraguay 11.3% of the Dry Chaco is within protected areas, although investment in the protection and management of the system began to decrease to its present state (Catterson and Fragano, 2004).*
Populations of the species are found in two other large protected areas in the Gran Chaco region: Defensores del Chaco National Park (780 000 hectares) in Paraguay and Kaa-Iyá National Park (3 441 115 hectares) in Bolivia.	
In Paraguay the species is included in the list of endangered species and is protected from harvests in principle (Ministerial Resolution 2534/06). However, the fact that changes in land use from forest to agriculture are allowed authorizes the clearing and harvest of the species and is believed to be the source of the timber in international trade.	
There is no information available on legislation or management of the species for Bolivia and Brazil.	

Supporting Statement (SS)	Additional information

Captive breeding/Artificial propagation

There is no artificial propagation of this species.

Other comments

Reviewers:
TRAFFIC South America

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