CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Inclusion in Appendix II of the neotropical populations of *Swietenia macrophylla* King (Meliaceae), including logs, sawn timber, veneer and plywood, in accordance with Article II, paragraph 2.(a), of the Convention and Resolution Conf. 9.24, Annex 2 a: "the harvesting of specimens from the wild for international trade has, or may have, a detrimental impact on the species by either: i) exceeding, over an extended period, the level that can be continued in perpetuity; or ii) reducing it to a population level at which its survival would be threatened by other influences.". The objective of this listing is to promote sustainable management of *S. macrophylla* in order to help ensure its further conservation and trade.

B. Proponent

Guatemala and Nicaragua.

C. Supporting statement

1. Taxonomy

1.1 Class: Magnoliopsida

1.2 Order: Sapindales

1.3 Family: Meliaceae

1.4 Genus: *Swietenia* Jacquin

Species: *Swietenia macrophylla* King

1.5 Scientific synonyms: *S. candollei* Pittier

1.6 Common names (many: see Lamb, 1966):
English: bigleaf mahogany, bigleafed mahogany, Brazilian mahogany
French: acajou d'Amérique, swiéténie
Spanish: caoba, mara, aguano or ahuano
Portuguese: mogno

The name "mahogany" is used by many dealers to refer to other species; for example the African *Khaya* species and *Shorea* species in Southeast Asia.

2. Biological parameters

2.1 Distribution

The natural distribution of *S. macrophylla* (Lamb, 1966) extends from southern **Mexico** (23° North latitude) through southern **Central America** into **South America** and from there in an arc from **Venezuela** through the Amazon basin to **Bolivia** and **Brazil** (18° South latitude). The Tropical Science Center (TSC) recently revised the current area of distribution in **Meso-America** based on the vegetation, soil, climate and botanical collections (CCT, 2000), and Conservation International is carrying out a similar study for South America (CI, 2001). Within this revised area of distribution, 235 million hectares are covered with forest (Annex 1: Figure 1), although a large part of this area has been selectively logged for *S. macrophylla* (see sections 2.2 and 2.7).

Within this range, *S. macrophylla* usually occurs in dry tropical forests, with a temperature of above 24° C, one to two metres of annual precipitation and up to 1,400 metres in altitude, although there is considerable variation (Lamb, 1966). Within this defined habitat, *S. macrophylla* is not distributed uniformly, but tends to form groups as the result of local preferences for habitat and catastrophic events that favour regeneration (section 2.7). For example, in **Brazil** *S. macrophylla* prefers low and humid areas (Grogan, 2001), in **Mexico** and **Belize** it forms groups of individual adults in clearings in the canopy that open up after hurricanes and fires (Snook, 1993 and 1996) and in **Bolivia** it prefers flooded areas (Gullison *et al.*, 1996).

2.2 Availability of habitat

For countries with native populations of *S. macrophylla* ('range States'), the average rate of deforestation is more than 1.0 per cent per year (United Nations Food and Agriculture Organization (FAO) 2001; Annex 1: Figure 2). The data from FAO has been criticized for underestimating deforestation, because FAO recently changed its methodology. Those data include plantations and secondary forest in the estimated total forest cover (Matthews 2001).

Within the countries in the area of distribution of mahogany, it seems that forest loss is even greater within areas that are apt for *S. macrophylla*, because the dry forest habitat preferred by *S. macrophylla* is also valuable for agriculture and livestock-raising (Cochrane, 2001). This is especially true in **Brazil**, where the range of *S. macrophylla* overlaps substantially with the 'deforestation belt', the area south of the Amazon where deforestation is especially heavy (Cochrane *et al.*, 1999).

Within all the total area of distribution of *S. macrophylla,* 28 per cent of the forest cover has been lost. However, even these rates underestimate loss because most of the remaining forest has already been selectively cut for extraction of *S. macrophylla* (Annex 1: Figure 3). For example, although the **Bolivian** provinces of Santa Cruz and Beni remain widely forested, unsustainable logging to supply mahogany for the international market has left commercial stands of *S. macrophylla* 'essentially extinct' and 'decimated' in those two provinces (UNEP-WCMC 2000). The direct relationship between loss of habitat, unsustainable cutting and the reduction of the population of *S. macrophylla* is described in sections 2.4, 2.5 and 2.7.

There is a complex relationship between forest exploitation, the opening of roads, human settlements and deforestation. In many cases, the only species sufficiently valuable to justify the construction of roads for extraction is *S. macrophylla* (Howard *et al.*, 1996). Roads can open the forest to colonization and clearing (Veríssimo *et al.*, 1992), especially in border areas that previously underwent limited development. In fact, exploitation can even promote the conversion of forest. Forests exploited in Pará, **Brazil**, tend to be converted into grasslands, in part, because the probability of a second cutting is rare (Veríssimo *et al.*, 1995).

Exploitation is also correlated with forest fires, especially during climatic events such as the El Niño phenomenon in 1998 (Cochrane, 2001). Together with the increase in human population in the forest and the cutting for firewood (firewood and charcoal), logging dries out the underbrush, increasing the probability of fires that will burn longer and hotter. Even when there is no subsequent cutting, fires will cause complete destruction of one third of the forest in the deforestation belt in Brazil within the next 50 years (Cochrane, 2001).

Huge projects proposed for Latin America also represent a great threat to the forests in the region. For example, the project 'Avanza Brazil' plans to pave 7,000 additional kilometres of roads, especially in the Amazon, which will lead to the clear-cutting of 12-17 million hectares of primary forest within the next 25 to 35 years (Laurence *et al.*, 2001; Carvalho *et al.*, 2001). Projects such as this will only reduce the habitat available to *S. macrophylla.*

2.3 Population status

According to the IUCN Red Book of Endangered Species, *S. macrophylla* is considered vulnerable. The level of exploitation has led to its extinction and disappearance of its ecological environment, in particular its requirement for regeneration, making it more vulnerable from logging (section 2.4). Currently, there are very few incentives to manage natural trees sustainably.

Classification of *S. macrophylla* by international organizations

Organization	Comment
CITES (CoP11 Doc.13.3)	Qualifies for Appendix II [fulfils criterion 2 B.i)]
UNEP-WCMC	Qualifies for Appendix II [(fulfils criterion 2 B.i)]
IUCN (according to WCMC)	VU A1cd + 2cd
International Plant Genetic Resources Institute	Species of high priority for genetic conservation
International Tropical Timber Organization (ITTO)	Species of high priority
FAO Panel of Experts on Forest Gene Resources	Species of high priority for conservation *in situ*
Asociación National para la Conservation de la Naturaleza (**Panama**)	Threatened
IBAMA (**Brazil**)	Endangered (Proc. No. 006/92 N)
Sociedade Botánica do Brasil	Endangered
Ecuador	At risk of extinction (Article 36, Decree 131, 2000)
United States National Academy of Sciences	Vulnerable
Convención sobre la Protection de la Naturaleza y Preservación de Vida Silvestre en el Hemisferio Occidental	**Brazil** listed in Annex (22/10/65)
	Venezuela listed in Annex (3/02/42)
	Costa Rica listed in Annex (22/10/65)
	Nicaragua listed in Annex (23/04/41)

There are almost no detailed studies of population density for *S. macrophylla* throughout its range. Ecological studies and surveys of cutting cannot be used to estimate population size because they tend to report on areas with high densities of *S. macrophylla* in order to obtain large samples or areas with large amounts of wood. This leads to an overestimate of the average density of *S. macrophylla*.

Studies that use random plots suggest that the average density is very low. In plots of more than 60 hectares in **Peru**, Terborgh, Núñez and Pitman (unpublished data) found only one *S. macrophylla* tree of more than 10 centimetres in diameter at chest height. The project RADAMBRAZIL surveyed 552 plots of one hectare chosen randomly throughout the area of distribution of *S. macrophylla* in **Brazil** and found that density varied dramatically. *S. macrophylla* was found in only 55 plots, suggesting a density of about 0.1 trees of commercial size/hectare (Contente de Barros *et al.*, 1992). The Tropical Science Center estimates the density of trees with a diameter of more than 60 centimetres at chest height to be 0.025-2/hectare in **Central America** (CCT, 2000). However, extrapolation should be avoided because of extreme variation in density throughout the area of distribution (Grogan, 2001).

Based on interviews, field visits and bibliographical research, TCS found that **Costa Rica** and **El Salvador** have no commercial production because over-exploitation has exhausted this resource (CCT, 2000). In fact, throughout **Meso-America**, two-thirds of the habitat of *S. macrophylla* has disappeared and only three large areas remain with forests: El Petén, on the boarder between **Nicaragua** and **Honduras**, and the Darién in **Panama**. But even there, *S. macrophylla* has been selectively exploited in large parts of the forests (section 2.7). In **Honduras**, *S. macrophylla* is being exploited in the departments of Colón, Gracias a Dios, Olancho and Yoro, which are covered with relatively heavy forest (Honduras, 2001).

In addition to variation in density throughout the range, the genetic populations of *S. macrophylla* seem to vary. In **Central America**, Gillies *et al.* (1999) found that using random markers enhanced with polymorph DNA (RAPDs), they could identify three genetically different populations.

Plantations

Globally, there are approximately 200,000 hectares of plantations of *S. macrophylla* (Figure 4). However, very little wood from plantations enters international trade. American buyers consider that the wood grown in plantations is inferior to wood from natural trees (Robbins, 2000). There are almost no plantations within the natural area of *S. macrophylla* because these cannot compete with low-priced wood from natural forests, which is unsustainable and is frequently cut illicitly (Annex 1: Figure 4; section 2.7). In addition, plantations are susceptible to fire and are frequently attacked by an insect pest (the borer *Hypsipyla*) (Mayhew and Newton, 1998). Nonetheless several attempts have been made to create plantations throughout the area of distribution, and there are other recent initiatives.

2.4 Population trends

Natural regeneration

Regeneration of *S. macrophylla* is infrequent. It generally occurs after large-scale disturbances. It germinates better in the shade (Morris *et al.*, 2000), and seedlings are relatively intolerant of strong light (Negreros-Castillo 1991). If juveniles cannot benefit from a clearing in the canopy within the first years, they loose their ability to respond to high luminosity (Grogan, 2001). It seems that *S. macrophylla* requires a large amount of light created by large-scale disturbances, such as fires and hurricanes (Snook, 1993) or flooding (Gullison *et al.*, 1996) in order to reach the canopy. But *S. macrophylla* also persists in areas such as Pará, **Brazil**, which lack these large-scale disturbance (Grogan, 2001; Baima, 2001) – although fire can also be an important factor there (Balée and Campbell, 1990). At many sites, this dependence on large and infrequent clearings in the canopy has generated relatively mature trees (Snook, 1993; Gullison *et al.*, 1996). Exploitation can have a substantial harmful effect on regeneration because cutting removes seed-bearers and dramatically reduces the opportunity for regeneration when there are disturbances or natural catastrophes.

At average growth rates, *S. macrophylla* requires 120 years to reach 55 centimetres in diameter, the current minimum commercial diameter in **Mexico** (Snook, 1993), and 90 years in **Brazil** (Grogan, 2001). In **Bolivia**, it takes from 52 to 105 years to reach the commercial diameter of 80 centimetres at chest height (Gullison and Hubbell, 1992).

Absence of regeneration after selective cutting

In general, it is thought that exploitation of *S. macrophylla* exceeds the capacity of the forest to regenerate (Veríssimo and Grogan, 1998). In addition to the obvious effects of a decrease in abundance of population and size structure, exploitation is prejudicial because it reduces production of seeds by removing the most seed-productive trees (for example the largest trees) and any clearings created are too small to stimulate regeneration (Snook, 1993). In areas illicitly exploited in the Kayapó territory (**Brazil**), 85 per cent of the adult population was removed (Zimmerman *et al.*,

2001). Quevedo (1986) found minor regeneration of *S. macrophylla* in clear cuttings, but none after nine years. Veríssimo *et al.* (1995) found no trees between 10 and 30 centimetres in diameter in cut areas. Grogan *et al.* (in press) found that 65 per cent of cut clearings contained *S. macrophylla* seedlings two and three years later. However, only two seedlings in these 40 clearings were growing vigorously and, even then, it is not known whether they would reach the canopy and reproduce. In Acre, **Brazil**, *S. macrophylla* seedlings planted in cut clearings and on logging trails had more than 65 per cent survival and grew to about 4 metres in height in seven years (d'Oliveira 2000). Baima (2001) found high variation in the juvenile density at four sites in Pará, **Brazil** (0.67–59 juveniles of less than 10 centimetres in diameter/hectare), however, most were submitted to low luminosity and, therefore, unlikely to survive before reaching the canopy. For those in the clearings, growth was greater, but researchers were constantly removing competing vegetation, and without this intervention it is not known whether the seedlings would have died because of competition among species. Wang and Scatena (in press) found that *S. macrophylla* seedlings were poor competitors in relation to pioneer species.

Changes in population size can be inferred from changes in habitat. Approximately one third of the habitat of *S. macrophylla* has disappeared (Annex 1: Figure 3; section 2.1). Thus, it can be inferred that one third of the population of *S. macrophylla* has also disappeared. This loss is surely more important if – as it appears – cutting occurs first in areas of high density.

2.5 Geographic trends

Throughout the range, genetically distinct populations seem to exist, at least in **Central America** (section 2.3), and perhaps there are geographic differences in regeneration and response to disturbances (section 2.4).

Brazil. Although the distribution of *S. macrophylla* is wide and intensification of exploitation has occurred only in recent decades, local supplies have been exhausted and supply has tended to change "primarily because of the availability of the product (quantitatively and qualitatively) and because of environmental pressure" (**Brazil,** 2001). For example, exports have fallen in the States of Rondônia (Browder, 1989) and Pará (AIMEX, 2002). In the 1980s, loggers built 3,000 kilometres of roads just in one area of Pará (Veríssimo *et al.*, 1995). Mahogany is now commercially extinct in Mato Grosso south-eastern Pará, Rondônia and Tocantins (east of the Cuiabá-Santarem highway and west of BR-364 in the States of Amazonia and Acre (Grogan, 2001). Protected areas and Indian reserves provide only slight concrete protection. Greenpeace (2001) identified over 8,000 cubic metres illicitly cut on Kayapó land, and the Brazilian Institute for the Environment and Natural Renewable Resources (IBAMA) has banned all cutting, processing and trade until this sector can be brought under control.

Bolivia. In 1996, according to CITES, **Bolivia** was the largest exporter of *S. macrophylla.* Currently this represents less than 8 per cent of trade (Robbins, 2000). "The decrease in amounts exported reflects, in part, a decrease in the existence of wood" (Traffic, 2001c; CITES; section 2.2). "Mahogany populations underwent a rapid and drastic decrease as a consequence of illicit logging" (Bolivia, 2001). In order to promote sustainable exploitation, the Bolivian CITES authorities now require that each shipment obtain a non-detriment finding to the forest environment (Bolivia 2001). Listing in Appendix II would require additional minimum regulation.

Peru. Exports have increased dramatically (more than 400 per cent) in the past five years (**Peru,** 2001). "The drastic decrease in the populations of this species, owing to selective cutting, is more than apparent and selective cutting could have caused the systematic loss of specimens with the best genetic characteristics" (**Peru,** 2001). **Peru** (2001) has difficulty controlling exploitation in several small concessions (of fewer than 1000 hectares) that do not require management plans. For example, one sawmill financed by the **United States** in Madre de Dios has been charged with exploiting illicitly areas that are excluded from cutting, including the construction of more than 100 kilometres of logging roads (NRDC 2002). Although some remote parks act as a shelter for

protected areas with *S. macrophylla*, such as La Reserva National Pacaya-Samiria (Loreto), "they are another source of illicitly extracted wood" (**Peru,** 2001).

Ecuador treats *S. macrophylla* as a species banned from exportation (Export Promotion Law) and subject to conditioned use, where trade is permitted if it is subject to a sustainable forestry use programme (Norm 131, Article 36). No approval had been given as of 2001 (**Ecuador** 2001).

Venezuela exported 22,607 cubic metres in 1972, primarily from the States of Barinas, Cojedes and Portuguesa, nevertheless, in 1999 fewer than 2,000 cubic metres were cut (**Venezuela** 2001).

S. macrophylla was especially abundant in **Colombia**, above all in the departments of Cesar, Chocó, Magdalena and Santander, but is now considered commercially extinct and trade is banned (**Colombia** 2001).

Populations in **Mexico** are decreasing because of over-exploitation, and trade is prohibited (CCT, 2000). Loss of habitat has caused the loss of 80 per cent of forests with *S. macrophylla* (**Mexico** 2001).

In **Guatemala**, *S. macrophylla* has suffered a substantial decrease owing to unsustainable exploitation and severe loss of habitat, and remnant populations are limited to El Petén (CCT, 2000). On the Pacific Coast, *S. humilis* has been commercially extinct since about 1950. El Petén was severely logged between 1940 and 1957 and again for *S. macrophylla* between 1982 and 1995 (CCT, 2000).

Belize once had abundant *S. macrophylla* (Lamb, 1966), however, this resource has been severely over-exploited. Trees of commercial size are now rare (Weaver and Sabido, 1996). Exploitation is 30 per cent greater than that which is considered sustainable (Presentation of **Belize** to the Mahogany Working Group (MWG) 2001).

Honduras prohibits exportation of timber of *S. macrophylla* (**Honduras,** 2001). The status of *S. macrophylla* in **Honduras** is poorly known, although at some time densities were high (Lamb, 1966). *S. humilis* is "in serious danger of becoming extinct" (**Honduras,** 2001).

El Salvador has not exported *S. macrophylla* for many decades because of a scarcity resulting from over-exploitation (CCT, 2000).

Nicaragua has prohibited trade in *S. macrophylla* for five years (**Nicaragua** 2001). *S. macrophylla* has been reduced substantially or eliminated in Boaco and Chontales, in large parts of Matagalpa and Jinotega and in Río San Juan. The region of Bluefields once had large populations of *S. macrophylla* but they have been cut for export (CCT, 2000).

Over-exploitation in **Costa Rica** has exhausted the populations of *S. macrophylla* (CCT, 2000).

Panama has experienced severe loss of habitat (Annex 1: Figure 3). Most of the remnant forests that contain *S. macrophylla* are in the Darien, but mahogany is found in these forests in very low densities.

2.6 Function of the species in its ecosystem

S. macrophylla is a tree that emerges from the canopy (Lamb, 1966; Lugo, 1992). Substantial decrease in population results from exploitation of larger size-classes (section 2.4), which leads to the elimination of *S. macrophylla* from its function. Bees and moths pollinate the flowers of *S. macrophylla* (Styles and Khosla, 1976) and its seeds are eaten by rodents (Jennings, 2002), parrots and insects.

2.7 Threats

Exploitation of large adult and reproducing specimens endangers the capacity of the forest to regenerate and renew (Veríssimo and Grogan, 1998; section 2.4). In **Belize**, loggers are exploiting trees as small as 20 centimetres in diameter (chest height 1.3 metres) (Weaver and Sabido, 1996). The selective cutting of *S. macrophylla* can reduce genetic variability, adversely affecting its capacity to adapt to environmental changes and limit future options for selective reproduction. The cutting of trees of commercial size reduces production of seeds by 85 per cent (Grogan, 2001). In addition, cutting increases endogamy, and cross-pollination decreased by 15 per cent when the forest surrounding the trees was cut (Loveless and Gullison, 1996). Cutting was directly associated with the reduction of genetic diversity of *S. macrophylla* for regeneration (Gillies *et al.*, 1999). Without evidence to the contrary, to assume that reduction in genetic diversity is harmful is a precautionary measure.

The immediate adverse effects of cutting are combined with the economic difficulty of sustainable management (Rice *et al.*, 1997). All experts and those interviewed consider that current exploitation of *S. macrophylla* is unsustainable (Lamb, 1966; Snook, 1993; Gullison, 1995; Lugo, 1999; Oldfield *et al.*, 1999; Grogan, 2001); in grand part, because loggers do not contribute to later management. Veríssimo and Grogan (1998) consider that exploitation is the equivalent of "the mining of a resource".

This unsustainable exploitation is exacerbated because loggers operate illicitly (section 3.3). In **Central America**, the Tropical Science Center reports that illicit cutting produces twice the amount of legal cutting (CCT, 2000). In 2001, IBAMA found that more than 80 per cent of *S. macrophylla* is exploited illicitly in **Brazil**. Later, IBAMA suspended all logging, production and exportation of *S. macrophylla.*

3. Use and trade

3.1 Domestic use

S. macrophylla is cut for its high-quality wood used for furniture, boats and expensive panelling. Most exports are unprocessed high-quality sawn wood (Robbins, 2000).

Wood available for domestic and international markets represents a fraction of all wood cut. Only about one third of the wood from fallen trees is used as wood. Approximately 26 per cent of the amount cut is left in the forest (Barreto *et al.*, 1998). Of the rest, about half or more is lost in processing. The yield of sawmills in **Bolivia** is 55 per cent (Panfill *et al.*, 2001); in **Brazil** it is 47 per cent (Veríssimo *et al.*, 1995); and in **Peru** it is 35 per cent (Mancilla, 2001).

The amount of *S. macrophylla* used domestically varies from one producing country to another (Robbins, 2000; MWG, 2001). **Central America** (CCT, 2000) and **Peru** (2001) use approximately one third locally. Estimates of domestic use in **Brazil** vary between 33 per cent (Veríssimo *et al.*, 1995) and 60 per cent (**Brazil,** 2001).

3.2 Legal international trade

Each year, approximately 150,000 cubic metres of *S. macrophylla* are exported (Annex 1: Figure 5), approximately two thirds to the **United States**. Volume is not the only – nor the best – indication of the importance of *S. macrophylla* in international trade. Usually, the best quality of wood is exported ("Firsts and Seconds" [FAS] and "No. 1 and Better") (Robbins, 2000), leaving the lowest-quality material in the producing countries. *S. macrophylla* sells for USD 1,300/cubic metre on the international market, for only USD 800/cubic metre in **Brazil** (ITTO, 2002). In Peru, the market price for sawn mahogany timber ranges from USD 276 to USD 553/cubic metre, and it sells for approximately USD 1,590/cubic metre in the **United States** (Ríos *et al.* , 2000). Furthermore, foreign

buyers finance cutting. Without foreign buyers willing to pay high prices, cutting would not occur, because low domestic prices would not make cutting a profitable activity.

Since November 1995, *S. macrophylla* has been subject to CITES regulations when **Costa Rica** included "all populations of the species in the Americas" in Appendix III. Since then, **Bolivia** (March 1998), **Mexico** (April 1998), **Brazil** (July 1998), **Peru** (June 2001) and **Colombia** (October 2001) also included their populations in Appendix III. According to the CITES Mahogany Working Group (Santa Cruz, 2001), listing in Appendix III has been useful to regulate overall trade and obtain more information about amounts traded. However, there are still problems of illicit trade across borders and illicit cutting of mahogany, in addition to unreported trade.

The sharp decrease of *S. mahagoni* in the 1850s led to more trading in *S. macrophylla.* Easily accessible in **Central America**, *S. macrophylla* has been exhausted and now represents only approximately 10 per cent of international trade (Robbins, 2000). Even within South America**,** trade follows the same pattern of local exhaustion and then by a change in source. For example, exports have decreased dramatically in **Bolivia** and as a result those of **Peru** have increased (Annex 1: Figures 5 and 6). However, as the overall supply of *S. macrophylla* is becoming more and more difficult to maintain, traders will want to change to similar species, such as meranti and *Khaya* spp., from **Latin America** or **Southeast Asia** and **Africa**.

The **United Kingdom** was the second largest importer early in the 1990s, but a campaign of Friends of the Earth, UK, called "Mahogany is murder", apparently contributed to a reduction of its trade by almost 90 per cent (Hering and Tanner, 1998). The campaign pointed out the connection between the purchase of *S. macrophylla* and its illicit cutting from Indian reserves, frequently at the cost of the life of the Indians – either directly because they were killed for their wood or indirectly from contagious diseases transmitted by loggers.

The **Dominican Republic** now appears to be the largest importer of *S. macrophylla* (Annex 1: Figure 7), despite not having reported this trade to CITES (Robbins, 2000). Since 1997–1999, reports of exportation to the **Dominican Republic** almost equal the combined imports of all the **European Union** (Traffic, 2001a).

The appearance of a constant supply of *S. macrophylla* for export has been maintained by a reduction in the limits on minimum diameters for cutting (Weaver and Sabido, 1996) and a change in the source of supply once local populations have been exhausted.

3.3 Illicit trade

Because of its very nature, the extent of illicit activity is difficult to estimate. However, the continuous and high demand for this valuable wood, combined with lax application of legislation and existing informal actions, have produced inadequate control of the exploitation of *S. macrophylla* (sections 2.5 and 2.7). "Given the extraordinary value of mahogany, it is extremely difficult to protect it – even the existence of below-commercial-standard trees – from illicit cutting" (**Brazil**, 2001).

Illicit cutting

In **Central America**, illicit cutting is more than twice that of legal cutting (CCT, 2000). In **Peru**, the Government estimates that 30-40 per cent of trade is illicit (Traffic, 2001b). In 1999, a state of emergency was declared in the provinces of Madre de Dios and Tahuamanu, and high officials were sent there because illicit cutting was out of control (Traffic, 2001b). A sawmill financed by the Newman Company (**United States**) was indicted for a total of USD 44 million because of illicit cutting of *S. macrophylla* in the region of Madre de Dios between 1998 and 1999 (NRDC 2002).

In **Brazil**, approximately 22.5 per cent of the range of *S. macrophylla* is in Indian reserves (Contente de Barros *et al.*, 1992), and, although illicit, a large amount of timber is taken from these reserves (Veríssimo *et al.*, 1992; Greenpeace, 2001). In 1996, IBAMA suspended or cancelled 75 per cent of cutting operations because they did not comply with regulations. Again in 1999, IBAMA suspended 29 of 31 operations dealing in *S. macrophylla*. In 2001, IBAMA found that 80 per cent of the *S. macrophylla* exploited was illicit and again suspended trade. A Brazilian court decided to permit companies to trade processed *S. macrophylla* and considered the action by IBAMA illicit (ITTO, 2001).

In light of this regulatory environment, there is slim probability that sanctions such as confiscation and fines for illicit cutting are being enforced. As a result, the behaviour of traders is rational: they want to exhaust *S. macrophylla* as soon as possible in order to maximize the current net value of the resource and reduce risk of exposing this resource to regulation (Rice *et al.*, 1997). This leads to the familiar pattern of local exhaustion and change in source of supply.

Illicit trade

In **Nicaragua**, illicit trade represents approximately 60 per cent of the total amount of mahogany exports (Traffic, 2001c). **Belize** estimates illicit trade to be 40 per cent of total mahogany exports, of which one fourth passes as contraband over the borders. This illicit cross-border trade is also a concern between **Colombia** and **Ecuador**, **Costa Rica**, **El Salvador**, **Honduras** and **Nicaragua**, as well as between **Argentina, Bolivia, Brazil** and **Peru** (Traffic, 2001c).

Almost all declared shipments (about 90 per cent) that entered the **United States** between 1997 and 2000 had correct CITES documents (Blundell and Rodan, 2001). But in **Canada**, about 60 per cent of the imports of *S. macrophylla* did not have correct documentation. For example, none of the documents of **Peru** or **Brazil** had been signed by the officials authorized to issue CITES documentation (Gerson, 2001).

Undeclared trade in *S. macrophylla* is much more difficult to detect. *S. macrophylla* can enter trade to the **United States** through the **Dominican Republic** and **Puerto Rico** classified as other species (CCT, 2000).

3.4 Real or potential effects of trade

Current unsustainable cutting of *S. macrophylla* is promoted by international trade and thus the species qualifies for listing in Appendix II in accordance with Article II, paragraph 2.(a), of the Convention and Resolution Conf. 9.24, Annex 2a: "the harvesting of specimens from the wild for international trade has, or may have, a detrimental impact on the species by either: i) exceeding, over an extended period, the level that can be continued in perpetuity; or ii) reducing it to a population level at which its survival would be threatened by other influences.". In contrast to Appendix I, the criteria for Appendix II do not require that the species be endangered.

Since the original 1997 proposal, recent scientific information reinforces the conclusion that *S. macrophylla* qualifies for listing in Appendix II. In particular:

1) The amount of forest within the range of *S. macrophylla* in **Central America** is rapidly decreasing – less than one third remains (CCT, 2000);

2) Protected areas are inadequate – only three per cent of the range is within parks (CI, 2001);

3) Illicit cutting is scattered even within the protected areas. In some countries, for example **Brazil**, more than 80 per cent of *S. macrophylla* cut is illicit;

4) The growing of *S. macrophylla* in plantations is well understood (Mayhew and Newton, 1998). There is sufficient technical information available for management of mahogany populations (Anonomuy, 2002);

5) Furthermore, all experts and persons interviewed agree that current exploitation of *S. macrophylla* is unsustainable (section 2.7).

International demand for *S. macrophylla* is the cause of threats to it – and possible solutions – and for unsustainable management of *S. macrophylla.* If applied properly, the requirements of Appendix II could limit trade to sustainable levels and could increase the production costs for *S. macrophylla* at the same time. This increase would better reflect the true value of *S. macrophylla* as a resource, incorporating externalities of management and legality. In addition, the safe-conduct associated with an Appendix-II listing (for example non-detriment findings) would serve to protect representative populations and genetic resources.

For the mahogany range States, control of borders by the importing countries serves to add value to domestic compliance by those countries. The legitimacy granted by CITES would also make consumers confident that the *S. macrophylla* they buy is obtained legally and from sustainable sources. If Appendix II provides for bans on trade (such as is now applied in **Brazil**), inclusion is in the best interest of the industry.

3.5 Artificial reproduction for commercial purposes

During the past decade, almost all imports of *S. macrophylla* came from wood cut from mature forests; less than 2 per cent came from plantations, primarily from **Indonesia** (see section 2.3).

4. Conservation and management

4.1 Legal status

4.1.1 National

According to a recent review carried out by Traffic (2001b), all the larger producers have laws and regulations for sustainable management of *S. macrophylla*.

Forest management in **Brazil** is determined by National Forestry Law No. 4771, which requires management plans based on exploratory inventories and reduced-impact cutting (Traffic, 2001b). Since 1996, **Brazil** has not permitted new concessions (Traffic, 2001b), which has led to the creation of a cartel of producers. Currently, **Brazil** bans cutting, processing and export of *S. macrophylla* in order to reduce illicit logging. This law suspends activities, stipulating that only certified operations will be excluded from the ban.

Bolivia passed a new forestry law (Forestry Law #1700, Article 28) in 1996 that requires, for example, management plans with a tax on concessions of USD 1/hectare/year and that shipments of *S. macrophylla* obtain a non-detriment finding (despite its being listed only in Appendix III). These controls seem to have dramatically reduced illicit cutting (Bolivia, 2001), although commercial stands were widely reduced before these controls were applied (Traffic, 2001a).

Peru (2001) also has a new law (Forestry and Wildlife Law #27308), adopted in July 2001.

Many countries use a system of export quotas for *S. macrophylla*. In **Colombia**, it has been illegal to export mahogany since 1967; in **Costa Rica** since 1997 and in **Honduras** since 2000 (Traffic, 2001c). In **Brazil** (2001), the quota has decreased steadily from 150,000 cubic metres in 1990 to 50,000 cubic metres in 2000. However, legal permits for exports

in addition to these quotas have been issued; for example, an additional 12,962 cubic metres were shipped in 1999 (Traffic, 2001b). In **Bolivia**, a 2000 presidential order permitted an additional 6,000 cubic metres beyond the quota to be exported from Indian reserves. Without a system to trace the origin of logs, those exceptions permit introduction of illicit logs into legal international trade.

Implementation of forestry regulations has been insufficient for eliminating illicit cutting and trade, and thus has not ensured sustainable cutting. Listing in Appendix II would facilitate compliance by adding a level of required inspection for logging operations of *S. macrophylla*. In addition, this would serve to level the playing field among countries, some of which, **Bolivia** for example, have already requested a non-detriment finding for their exports.

4.1.2 International

CITES Appendix II and Resolution Conf. 8.3 are compatible with other objectives of sustainable use, such as those of ITTO Objective 2000, regional producers (for example AIMEX and the Cámara Forestal in **Bolivia** and other countries) and international buyers (for example IWPA).

4.2 Management of the species

4.2.1 Population monitoring

There are no population monitoring reports published in any country in the area of distribution for this species. The World Wide Fund for Nature (WWF) has studied *S. macrophylla* in **Peru**. The Tropical Science Center revised the status of *S. macrophylla* in **Central America** (CCT, 2000), and Conservation International is in the process of doing the same for **South America** (CI, 2001).

4.2.2 Conservation of habitat

At the present time, only three per cent of the area of distribution of *S. macrophylla* is in forests in protected areas (Annex 1: Figure 8). Given the extent of illicit cutting (section 3.3), these areas are insufficient for the protection of populations and their genetic variability.

4.2.3 Management means

All experts agree that *S. macrophylla* is exploited unsustainably (section 2.7). Currently, only 300,000 hectares of forests with *S. macrophylla* are managed and certified by the Forest Stewardship Council (FSC). All are in **Central America** (FSC 2001).

Conservation International has recommended the precautionary measure of forming a network of protected areas to support and ensure long-term viability of the species and to serve as a germ plasma bank (Gullison *et al.*, 2000). Traffic (Robbins, 2000) recommends the paying of an export duty for conservation. At the present time, sawn wood of *S. macrophylla* is not subject to duty in the **United States**.

4.3 Control measures

4.3.1 International trade

All trade is subject to the requirements of CITES Appendix III, which seems to function well in the **United States** (Blundell and Rodan 2001). However, application remains inconsistent in other importing countries (Traffic, 2001a). For exporting countries, questions remain about how range States confirm that *S. macrophylla* has been legally obtained (Traffic, 2001a).

4.3.2 National measures

As stated earlier (section 4.1.1), regulations exist but are laxly applied. *S. macrophylla* is usually cut unsustainably and illicitly (section 2.7).

5. Information on similar species

The other two species in this genus are currently regulated under Appendix II [*S. humilis* (July 1975) and *S. mahagoni* (June 1992)], but both are commercially extinct. Related species, such as *Carapa guianensis*, are traded, but have a greatly inferior quality. Cedar (*Cedrela odorata*) is also listed in Appendix III, although mahogany continues to pass as cedar in several countries, and there are problems of identification. *Khaya* and *Entandrophragma* spp., known as the 'African mahoganies', are being traded in larger quantities but give inferior wood.

6. Other comments

At the 10th meeting of the Conference of the Parties to CITES (CoP10), a proposal to include *S. macrophylla* in Appendix II lacked eight votes for approval (67 votes in favour, 45 against), and at CoP9 the proposal lacked six votes for approval (50 votes in favour, 33 against). **Costa Rica** and the **United States** first submitted their proposals at CoP8.

The taxonomy of *Swietenia* is uncertain because of the possibility of hybridization, especially with *S. humilis.* In fact, several experts do not distinguish between *S. humilis* and *S. macrophylla* (Costa Rica, 2001). *S. humilis* is listed in Appendix II.

7. Additional comments

Unsustainable cutting distorts the market

Unsustainable and illicit cutting distorts the market, flooding it with low-price wood. Illicit loggers do not invest in management. A listing in Appendix II, which has the objective of eliminating illicit competitors, would help to eliminate distortions in the market. Listing in Appendix II could allow range States to lift bans on new concessions, thus breaking up the existing cartel of suppliers and, in addition, eliminating distortions in the market.

Appendix II provides credibility

The presence of illicit and unsustainable operators will continue to be a focus of scrutiny and activism of environmental organizations. Scrutiny will continue to attempt to influence international buyers and also management authorities to closely follow and prohibit trade, if necessary, as has occurred in **Brazil** with the current prohibition on cutting and trade.

Appendix II provides scrutiny of the market

Current activities make the international market confused and unstable about the future concerning a steady supply of *S. macrophylla.* It is possible that several consumers will stop buying not only *S. macrophylla* but also tropical woods in general. Any action taken to regulate the industry will be perceived by consumers concerned about legality and conservation as a beneficial step.

Although a listing in Appendix II decreases trade to sustainable levels, legal loggers will benefit by eliminating illicit and unsustainable competitors from the market.

8. References

See Annex 2.

FIGURES

Figure 1. Area of forest in the range of *S. macrophylla* (based on satellite images from the mid-1990s) [data from CCT (2000) and CI (2001)]

	Forest area (millions hectares)		Forest area (millions hectares)
Brazil	139.6	Honduras	1.7
Peru	56.5	Venezuela	1.2
Bolivia	18.9	Panama	1.0
Nicaragua	5.0	Belize	0.95
Mexico	3.6	Costa Rica	0.29
Ecuador	3.5	El Salvador	0.14
Guatemala	2.8		

Figure 2. Rate of deforestation (FAO FRA 2001)

	Change per year (%)			Change per year (%)	
	'80–'90	'90–'00		'80–'90	'90–'00
Nicaragua	-1.9	-3.0	Honduras	-2.1	-1.0
Belize	-0.2	-2.3	Costa Rica	-2.9	-0.8
Guatemala	-1.7	-1.7	Brazil	-0.6	-0.4
Panama	-1.9	-1.6	Peru	-0.4	-0.4
Ecuador	-1.8	-1.2	Venezuela	-1.2	-0.4
Mexico	-1.3	-1.1	Bolivia	-1.2	-0.3

Figure 3. Loss of habitat available for *S. macrophylla* [CCT (2000) and CI (2001)]

	%		%		%		%
Venezuela	91	Panama	75	Nicaragua	47	Brazil	27
Costa Rica	84	Honduras	55	Bolivia	33	Ecuador	5
El Salvador	80	Guatemala	47	Belize	32	Peru	5
Mexico	76						

Figure 4. Plantations† of *S. macrophylla* (Mayhew and Newton, 1998)

Indonesia	116,000 ha	Guadalupe	4,200 ha
Fiji	42,000	Salomon Islands	3,000
Philippines	~ 25,000	Western Samoa	2,300
Sri Lanka	4,500	Martinique	1,479

Figure 5. Exports of *S. macrophylla* in 1997-1999 (cubic metres) (CITES; Traffic, 2001c)

	1997	1998	1999
Brazil	116,916	46,816	59,758
Peru	10,893	20,720	35,170
Bolivia	27,963	20,159	8,520
Nicaragua	19,029	5,773	5,165
Guatemala	1,687	1,098	406
Honduras	885	880	1,324
Belize	233	125	2,326
Mexico	521	271	212
Panama	0	71	23
Ecuador	0	0	77

Figure 6. Imports of the United States of *S. macrophylla* in 1991-2000 (cubic metres) (U.S. Departments of Agriculture, Commerce, and the Treasury; Robbins, 2000)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	%
Belize	281	180	161	760	2,634	1,853	5,286	3,084	2,424	1,939	2
Bolivia	47,646	21,017	24,244	44,668	51,414	42,331	28,815	17,456	7,802	8,811	28
Brazil	54,913	71,558	66,901	54,381	51,388	35,324	34,375	46,634	40,907	31,604	46
Chile	2,957	343	442	4,474	9,490	6,622	400	0	0	0	2
Costa Rica	79	61	0	0	7	0	144	0	59	163	< 1
Ecuador	0	89	0	0	50	0	0	0	344	0	< 1
Guatemala	4,871	4,673	3,729	4,061	5,060	2,799	1,896	1,368	442	2,004	3
Guyana	0	0	0	0	0	20	2	3	0	0	< 1
Honduras	141	491	775	1,668	951	10	62	37	2,222	241	1
Mexico	81	610	0	30	4,998	2,692	400	26	409	43	1
Nicaragua	412	164	913	688	3,653	3,925	7,483	1,615	1,628	1,007	2
Panama	0	0	0	0	0	84	0	71	0	1,139	< 1
Peru	1,908	2,223	3,565	7,265	8,654	11,257	19,965	31,033	39,851	37,613	15
Venezuela	103	0	0	40	0	0	18	0	0	0	< 1
Total	113,392	101,409	100,730	118,035	138,299	106,917	98,846	101,327	96,088	84,564	

Figure 7. Imports of *S. macrophylla* in 1997-1999 (cubic metres) (for countries with more than 1,000 cubic metres of trade) (CITES; Traffic, 2001c)

	1997	1998	1999
United States	90,870	77,066	85,307
Dominican Republic	10,643	5,163	11,634
United Kingdom	1,676	4,167	5,078
Spain	825	2,392	2,034
Netherlands	537	1,685	2,819
Canada	28	470	1,231
Cuba	832	458	225
Argentina	220	1,032	227
Denmark	687	207	412
Belgium	582	364	89
Puerto Rico	327	105	573

Figure 8. Amount of area of distribution of *S. macrophylla* in Categories I and II (IUCN) protected forest areas [CCT (2001) and CI (2001)]

	%		%
El Salvador	0	Venezuela	1
Nicaragua	1	Brazil	2
Costa Rica	2	Peru	4
Honduras	4	Bolivia	11
Mexico	4	Ecuador	27
Panama	7		
Belize	10		
Guatemala	11		

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