Review of Significant Trade: Species selected by the CITES Plants Committee following CoP14

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Euphorbiacae

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E. primulifolia was also selected for review at PC17 on the basis of trade data provided in document PC17 Doc. 8.5. The Summary record of PC18 indicates that it was decided impractical to include some varieties whilst excluding others, so *var. begardii* was deleted.

A. Summary

Overview of *Euphorbia* spp. recommendations

Species	Provisional category	Summary
Euphorbia alfredii	Urgent Concern	*E. alfredii* is endemic to Madagascar and is globally Vulnerable. The species is only known from one location. It is threatened by habitat degradation, fire and collection for horticulture. Field surveys are required to ascertain its status and the exact extent of occurrence, but it is noted that the species may qualify as Endangered or Critically Endangered. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 169 live wild sourced specimens between 1999 and 2008, as did the importers. International trade was relatively high considering the species' threatened status and very restricted known range. Although no trade was reported since 2006, no information on the basis for a species-specific non-detriment finding was provided and any trade is likely to impact the population, therefore categorised as Urgent Concern.
Euphorbia aureoviridiflora	Urgent Concern	*E. aureoviridiflora* is endemic to Madagascar and is globally Vulnerable. Currently the species is only known from one site in the south-west. It is threatened by fire, habitat degradation and collection for horticulture. Although *E. aureoviridiflora* is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 212 live wild sourced specimens between 1999 and 2008, with importers reporting 166 imports; 100 of these were in 2008. International trade was relatively high considering the species' threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.

Species	Provisional category	Summary
Euphorbia banae	Least Concern	*E. banae* is endemic to Madagascar and is globally Vulnerable. It is limited to a single location in the south-west. The species is threatened by habitat degradation, fire, habitat clearing for charcoal and collection for horticulture. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of nine artificially propagated specimens of the species in their annual reports. However, trade reported by the importers was higher (74 artificially propagated specimens), as was trade subsequently reported by the Management Authority (99 specimens in 2003-2008, source not specified). No international trade in wild specimens was reported 1999-2008 by Madagascar or any importers, and on this basis, categorised as Least Concern.
Euphorbia berorohae	Urgent Concern	*E. berorohae* is endemic to Madagascar and is Critically Endangered. The species is known from only two collections in the same locality. It is threatened by habitat degradation, habitat clearing, fire and collection for horticulture. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 165 wild sourced specimens between 1999 and 2008, with importers reporting 110 imports. Reported international trade was relatively high considering the species' threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.
Euphorbia biaculeata	Possible Concern	*E. biaculeata* is endemic to Madagascar and is globally Vulnerable. The species is only known from one site in the south-west. Its extent of occurrence and area of occupation are unknown, but are likely to be extremely reduced. Further field studies are needed to determine exact distribution and status. The species is threatened by habitat degradation, fire, habitat clearing for charcoal and collection for horticulture. Although the species is known from a potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of only one live specimen between 1999 and 2008. However trade reported by the importers was higher (27 specimens), as was trade subsequently reported by the Management Authority (50 specimens in 2003-2008, source not specified). Reported international trade in the species was relatively high considering the species' threatened status and very restricted distribution. No information on the basis for a species-specific non-detriment finding was provided. However, no trade has been reported since 2004, and on this basis, categorised as Possible Concern.
Euphorbia bulbispina	Urgent Concern	*E. bulbispina* is endemic to Madagascar and is globally Vulnerable. It is only known from one site in the north and is considered likely to be restricted to a very small area. The species is threatened by habitat degradation, fire and collection for horticulture. Although

Species	Provisional category	Summary
		the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 75 wild sourced live specimens between 1999 and 2008. However, trade reported by the importers was higher (167 specimens), as was trade subsequently reported by the Management Authority (170 specimens in 2003-2008, source not specified). Reported international trade in the species was relatively high considering the species' threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.
Euphorbia capmanambatoensis	Urgent Concern	*E. capmanambatoensis* is endemic to Madagascar and is Critically Endangered. The species is only known from one site in the north-east and its extent of occurrence and area of occupancy are extremely limited. The species is threatened by habitat degradation and fire and may also be highly endangered from any natural disaster that may occur in the area. It is highly desirable for the horticulture trade and it is prone to illegal collection. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 36 live wild specimens between 1999 and 2008, however trade reported by importers was higher (125 specimens). Reported international trade was relatively high considering the species' threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.
Euphorbia capuronii	Least Concern	*E. capuronii* is endemic to Madagascar and is globally Vulnerable. However, it may warrant listing at a higher threat category. Very little is known about the species distribution. It was reportedly collected in the plateau Mahafaly, but has not been found in the area since. The species is likely to be very rare in the wild. Fieldwork is required to locate the species and assess its area of occupancy and extent of occurrence. *E. capuronii* is threatened by habitat degradation, fire, habitat clearing for charcoal and collection for horticulture. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of five wild specimens between 1999 and 2008, which was corroborated by importer reported data. It can be implied from correspondence to the Secretariat that Madagascar does not intend to export this species, and on the basis that reported international trade in the species was relatively low (with no wild exports since 2003), categorised as Least Concern.
Euphorbia denisiana	Possible Concern	*E. denisiana* is endemic to Madagascar and is globally Vulnerable. Fieldwork is required to assess whether it qualifies for a higher threat status. The species has a restricted range and grows on the Central Plateau, which is one of the most degraded and most

Species	Provisional category	Summary
		collected parts of the island. The species is threatened by habitat degradation, fire and collection for horticulture. Although the species is reported from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 66 live wild specimens between 1999 and 2008, with importers reporting 53 corresponding imports. Reported international trade was relatively high considering the species' threatened status. No information on the basis for a species-specific non-detriment finding was provided. However, only three specimens reported exported since 2005, and on this basis, categorised as Possible Concern.
Euphorbia didiereoides	Possible Concern	*E. didiereoides* is endemic to Madagascar and is globally Endangered. The species is only known from six localities and three subpopulations in one area of Madagascar. It has a small extent of occurrence and area of occupancy. The species is threatened by habitat degradation, fire and collection for horticulture. Although it is known from two potential protected areas, both are in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 35 live wild specimens between 1999 and 2008, with ten specimens reported imported by the importers. Subsequent trade figures reported by the CITES MA for 2003-2008 were lower (ten specimens). Reported international trade was relatively high considering the species' highly threatened status. No information on the basis for a species-specific non-detriment finding was provided. However, only three wild specimens reported exported since 2005, and on this basis, categorised as Possible Concern.
Euphorbia elliotii	Possible Concern	*E. elliotii* is endemic to Madagascar and is globally Endangered. The species has a restricted range in the south-west in nine localities and with only four subpopulations. It has a small extent of occurrence and area of occupancy. The species is threatened by habitat degradation, fire and collection for horticulture. Although the species is known from a protected area, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. In their annual reports, Madagascar reported no exports between 1999 and 2008, but up to 25 wild specimens may have been exported in 2004. Reported international trade in the species was relatively high considering the species' highly threatened status. No information on the basis for a species-specific non-detriment finding was provided. However, no international trade reported since 2004, and on this basis, categorised as Possible Concern.
Euphorbia famatamboay	Least Concern	*E. famatamboay* is endemic to Madagascar and is globally Vulnerable. The species has a slightly fragmented range in south-west Madagascar. The typical subspecies has a small extent of occurrence and area of occupancy and was and was recorded from nine localities within four to five subpopulations. The distribution of *E. f. itampolensis* is more restricted. Although the species is common within its range, it is declining. It is threatened by habitat degradation, fire, habitat clearing for charcoal and collection for horticulture. Occurrence in protected areas is not known. There are

Species	Provisional category	Summary
		national regulations for wild-harvesting in relation to CITES. Madagascar reported only three wild leaves exported between 1999 and 2008, although trading partners reported 100 live plants from Madagascar imported. It can be implied from correspondence to the Secretariat that Madagascar does not intend to export this species, and no trade has been reported since 2006. On this basis, categorised as Least Concern.
Euphorbia genoudiana	Least Concern	*E. genoudiana* is endemic to Madagascar. The species' status has not been assessed by IUCN, and no further information on its status is available. The species occurs in south-west Madagascar. It is threatened by habitat degradation, fire and collection for horticulture. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported only 13 wild specimens exported between 1999 and 2008, the same level of trade was reported by importers, although four years apart. However, higher levels of trade were reported by the Madagascan MA subsequently (source not specified). International trade levels are low, and no trade has been reported since 2004. On this basis, categorised as Least Concern.
Euphorbia herman-schwartzii	Urgent Concern	*E. herman-schwartzii* is endemic to Madagascar and is globally Endangered. The species has a restricted range, with an area of occupancy estimated as 65.66 km^2, but further studies are needed to determine the exact area of occupancy and occurrence. The species is threatened by habitat degradation, fire, habitat clearance for charcoal and collection for horticulture. It occurs in one and possible two reserves, but the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 267 live wild specimens between 1999 and 2008, although importers reported much lower trade levels (17 specimens). Reported international trade (by the exporter) was relatively high considering the species' highly threatened status and restricted range. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.
Euphorbia hofstaetteri	Urgent Concern	*E. hofstaetteri* is endemic to Madagascar and is globally Vulnerable. The species' present status and distribution are unclear. It has been reported from the south-west and is considered likely to have a very restricted range. Its habitat is threatened by degradation, fire, and clearing for charcoal and the species is also threatened by collection for horticulture. The species is known from three protected areas, but the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 111 live wild specimens between 1999 and 2008, however trade reported by importers was higher (294 specimens) and the MA subsequently reported 307 specimens exported 2003-2008 (source unspecified). International trade was relatively high considering the species' threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Urgent Concern.
Euphorbia horombensis	Urgent Concern	*E. horombensis* is endemic to Madagascar and is globally Endangered. The species has a wide range in the central-south,

Species	Provisional category	Summary
		however both the area of occurrence and occupancy are small. The species is known from five sites and one to four subpopulations are recognised. It is threatened by habitat degradation, fire and collection for horticulture. *E. horombensis* is known from one protected area but the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 207 live wild specimens between 1999 and 2008, and although importer data was lower, the Madagascan MA subsequently reported that 299 specimens were exported in 2003-2008 (source unspecified). International trade in the species was relatively high considering the species' highly threatened status. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Urgent Concern.
Euphorbia iharanae	Urgent Concern	*E. iharanae* is endemic to Madagascar and is Critically Endangered. The species has a very limited area of occupancy and extent of occurrence in the north-east. The species is threatened by habitat degradation, fire and collection for horticulture. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 215 live wild specimens between 1999 and 2008, mostly in 2007. Importer data was comparable. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.
Euphorbia leuconeura	Urgent Concern	*E. leuconeura* is endemic to Madagascar and is globally Vulnerable. The species is only definitely recorded from one site in the north. Although the species is well known in the horticultural trade, it is poorly known in the field. Further studies are required to ascertain area of occupancy, extent of occurrence and status. The species is threatened by habitat degradation, fire and collection for horticulture. It possibly occurs in one protected area. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 60 live wild specimens between 1999 and 2008, however trade reported by importers was higher (160 specimens), and the Madagascan MA subsequently reported 164 specimens exported between 2003-2008 (source unspecified). International trade was relatively high considering the species' threatened status and very restricted distribution. No information on the basis for a species-specific non-detriment finding was provided, and the impact of trade on the population is unknown, therefore categorised as Urgent Concern.
Euphorbia mahabobokensis	Urgent Concern	*E. mahabobokensis* is endemic to Madagascar and is globally Vulnerable. The species has a small extent of occurrence and area of occupancy in the south-west. It is recorded from three localities and comprises one to three subpopulations. There is a continuing decline in the species' population due to habitat loss and degradation, clearing for charcoal, removal of mature individuals, and collection for horticulture. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 270 live wild specimens between 1999-2008, with importers reporting trade at slightly higher levels (299 specimens). Reported international trade is relatively high considering the species' threatened status and restricted range. No information on

Species	Provisional category	Summary
		the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Urgent Concern.
Euphorbia mangokyensis	Urgent Concern	*E. mangokyensis* is endemic to Madagascar and is globally Endangered. The species has a small extent of occurrence and area of occupancy in the west. It is recorded from three localities and has two to three subpopulations. *E. mangokyensis* is threatened by habitat degradation, fire and collection for the horticulture trade. Its population continues to decline. There are national regulations for wild-harvesting in relation to CITES. A total of 26 live wild specimens were reported by Madagascar and by the importers between 1999 and 2008. Reported international trade in the species was relatively high considering the species' highly threatened status and restricted range. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Urgent Concern.
Euphorbia neobosseri	Possible Concern	*E. neobosseri* is endemic to Madagascar and has IUCN global status Data Deficient. It occurs in the south-west; the typical subspecies has only been collected once – from the forest Sakaraha, and the subspecies *itampolensis* was also only collected once – near Itampolo. The combined ranges are likely to be very limited and extremely localized. However further fieldwork is necessary to establish the status of this taxon. The species is threatened by habitat degradation, fire, habitat clearing for charcoal collecting and collection for horticulture. It may occur within the protected forest of Zombitse. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 70 live wild specimens and smaller numbers of other derivatives between 1999 and 2008. Reported international trade levels have possibly been relatively high considering the species' unknown status and probable very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Possible Concern.
Euphorbia pachypodioides	Urgent Concern	*E. pachypodioides* is endemic to Madagascar and is Critically Endangered. The species is limited to a single site, with an area of occupancy of 7.8 km^2. There is a continuing decline in the species' population. *E. pachypodioides* is threatened by habitat degradation, fire, and also by collection for horticulture, particularly as it is a highly desirable species in the horticultural trade. Although the species is known from one protected area, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 640 live wild specimens between 1999 and 2008; however the Madagascan MA subsequently reported that exports from 2003-2008 totalled 661 specimens (source unspecified). Reported international trade in the species is very high considering the species' highly threatened status and restricted distribution. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.
Euphorbia paulianii	Urgent	*E. paulianii* is endemic to Madagascar and is globally Vulnerable.

Species	Provisional category	Summary
	Concern	The species is only known from one site in the west, with an estimated area of occupancy of less than 20 km². The species is threatened by habitat degradation, fire and collection for horticulture. Although the species is known from one protected area, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 61 live wild specimens between 1999 and 2008, however trade reported by importers was slightly higher (65 specimens). Reported international trade was relatively high considering the species threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Urgent Concern.
Euphorbia primulifolia	Urgent Concern	*E. primulifolia* is a Madagascan endemic and is globally Vulnerable. The species has two varieties, the typical variety and var. *begardii*. It has a fragmented range in the south-west and the Central Plateau area. The extent of occurrence is less than 20,000 km² and there are probably less than ten locations. There is a continuing decline in the species' population. Both varieties of the species are threatened. The major threats are habitat degradation, fire and collection for horticulture. Although the species is known from two protected areas, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 2417 live wild specimens between 1999 and 2008; however trade reported by importers was higher (4838 specimens). Reported international trade was high considering the species' threatened status. Although the Madagascan MA considered the species not threatened by collection, no information on the basis for a species-specific non-detriment finding was provided, and the impact of trade on the population is unknown, therefore categorised as Urgent Concern.
Euphorbia robivelonae	Urgent Concern	*E. robivelonae* is a Madagascan endemic and is globally Critically Endangered. The species is only known from one site in the north-east which has an area of occupancy of less than 1 km². The species is declining and is very likely to disappear should there be any stochastic event. It is also threatened by habitat degradation, habitat clearing, fire and collection for horticulture. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 11 live wild specimens between 1999 and 2008, which were also reported by importers. No information on the basis for a species-specific non-detriment finding was provided. Although international trade was reported at relatively low levels, the species is highly threatened and any trade is likely to impact the population, therefore categorised as Urgent Concern.
Euphorbia rossii	Urgent Concern	*E. rossii* is a Madagascan endemic and is globally Vulnerable. However it is possible the species may qualify for IUCN threat category Endangered or Critically Endangered; further fieldwork and taxonomic studies are required to better assess the species' status. The species has only been scientifically collected once from a site in the south-west, but grows in a scarcely collected area. The species is highly prone to habitat destruction by fires and also by habitat degradation and collection for the horticulture trade. There

Species	Provisional category	Summary
		are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 21 live, wild sourced specimens between 1999 and 2008; however importers reported a higher quantity of 261 live wild specimens imported. Reported international trade was relatively high considering the species' threatened status and restricted range. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade in the population unknown, therefore categorised as Urgent Concern

B. Overview of Euphorbias in Madagascar

Biology: The genus *Euphorbia* includes over 2,000 species, with representatives distributed throughout the world (McGough *et al.*, 2004). *Euphorbia* species range from annual plants and shrubs to large trees and succulent species but are always characterized by conspicuous milky latex. Most succulent *Euphorbia* species have green, succulent stems and range in size from only a few centimetres tall to over 4 metres tall. Leaves are usually reduced in size and ephemeral, and spines are often present at the stems edges. Succulent Euphorbia have three life forms - tree like, shrubby, and root or 'caudiciform' succulents. Spines are present on most succulent *Euphorbia* plants. With few exceptions Euphorbia flowers tend to be small and unspectacular, varying in colour from green to a vivid red. Usually the inflorescence contains one or more flowers and a series of coloured modified leaves called 'bracts' (McGough *et al.*, 2004).

About 60 *Euphorbia* species were considered endemic to Madagascar (Dotort, 2010), including the spiny Euphorbia such as *E. hofstaetteri* and *E. didiereoides*, which are a very distinct group. Another characteristic group of Madagascan Euphorbias grow in higher rainfall regions than most succulents, and include *E. pachypodioides* and *E. leuconeura* (Dotort, 2010). Their flowers are small, tightly enclosed by tubular, overlapping, often vividly coloured bracts and all produce large, rather tropical looking, though deciduous foliage (Dotort, 2010). The species selected under the Review of Significant Trade are all endemic to Madagascar.

The biology and ecology of *Euphorbia* species in Madagascar are poorly known. Research on these species to date has mainly focused on systematics (CITES Management Authority of Madagascar, *in litt.* to UNEP-WCMC, 2010).

General distribution and status: Haevermans (2004) assessed the global status of all 26 *Euphorbia* species included in this report, except *E. genoudiana.* All those assessed were categorised as globally threatened in the 2010 IUCN Red list. Five species are considered Critically Endangered: *E. berorohae*, *E. capmanambatoensis*, *E. iharanae*, *E. pachypodioides* , and *E. robivelonae*, five species are Endangered: *E. didiereoides*, *E. elliotii*, *E. herman-schwartzii*, *E. horombensis*, *E. mangokyensis*, 14 species are Vulnerable: *E. alfredii*, *E. aureoviridiflora*, *E. banae*, *E. biaculeata*, *E. bulbispina*, *E. capuronii*, *E. denisiana*, *E. famatamboay*, *E. hofstaetteri*, *E. leuconeura*, *E. mahabobokensis*, *E. paulianii*, *E. primulifolia*, and *E. rossii*, and *E. neobosseri* is considered Data Deficient.

Threats: Habitat degradation, fire, habitat clearing for charcoal, and collection for the horticulture trade were reported to be the major threats to *Euphorbia* species in Madagascar (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010). All 26 *Euphorbia* species covered in this report were considered threatened by collection for horticulture (Haevermans, 2004). Illegal trade was also considered a threat by some authors.

According to USAID (2009), an estimated third of Madagascar's land area was burnt every year to clear vegetation for crop production and to encourage the growth of grasses, causing degradation and land erosion. Logging and mining were considered to be additional significant threats to soils, vegetation and watershed conditions, contributing further to widespread habitat degradation in Madagascar (USAID, 2008).

Indigenous vegetation was also reportedly cut and burned for subsistence charcoal production. In 1998, 96% of collected forest products in Madagascar were estimated to consist of wood for household consumption, especially in the form of charcoal (USAID, 2008). Rabesihanaka *et al.* (2008) considered deforestation and bush fires to be much greater threats to biodiversity than wildlife trade. J. Lavranos (*pers. comm.* to UNEP-WCMC, 2010) reported that the National Parks of Madagascar, which were "kept intact until relatively recently, except for some peripheral damage", had during the past years been "invaded by tree-fellers and charcoal burners."

According to USAID (2008), "Illegal exploitation of natural resources continues to be an overarching concern, and one that could reduce the impact of efforts to help conserve Madagascar's biodiversity. Illegal exploitation has come increasingly under attack as unregulated and illegal exploitation of wildlife, forest products, precious minerals, and fisheries has expanded."

In their evaluation of the national policy in wildlife trade in Madagascar, Rabesihanaka *et al.* (2008) stated that, manpower shortages, smuggling and illegal trade persisted on the trade scene both nationally and internationally and that crimes of wildlife trade, illegal mines of precious woods, still existed.

Rauh (1995) reported that in Isalo National Park, "Unfortunately, commercial collectors have reduced the populations of succulent plants so that extinction is possible." Rauh (1995) also listed some succulents that occurred in the park including *Euphorbia primulifolia* var. *begardii* that were found growing in the sand fields on the plateau. S. Rakotoarisoa, (*pers. comm.* to UNEP-WCMC, 2010) felt that illegal trade in Euphorbia and Aloes in Madagascar was quite common, but no further information on illegal trade could be provided.

However, H. Ravaomanalina, of the Madagascan CITES Scientific Authority (*pers. comm.* to UNEP-WCMC, 2010) noted that, in her opinion, there was no a real problem of illegal trade in Euphorbias in Madagascar, although such data had never been quantified, and that the stock of horticultural traders spread across the island was already controlled by the Scientific and Management Authorities.

Overview of trade and management in the genus: *Euphorbia* spp. were listed in CITES Appendix II on 1 July 1975. All parts and derivatives were listed, except a) seeds, spores and pollen (including pollinia); b) seedling or tissue cultures obtained *in vitro*, in solid or liquid media, transported in sterile containers; and c) cut flowers of artificially propagated plants. A number of *Euphorbia* species are listed in Appendix I and the remainder are included in Appendix II.

According to the data in the CITES Trade Database 1999-2008, the majority of exports from Madagascar of the 26 species considered in this review were of live specimens (details of direct trade in Euphorbia species is available on p. 70). Approximately half of all exports reported by Madagascar were wild-sourced, and half were artificially propagated. The majority of the trade consisted of commercial exports. The United States of America and Germany were the major importers. Twenty-five of the species were reported in trade 1999-2008 for wild specimens; *E. primulifolia* accounted for roughly 65 per cent of all exports for wild Euphorbias (as reported by Madagascar).

The vast majority of recorded CITES trade in succulent *Euphorbia* taxa has been reported in live plants for the horticultural industry. South Africa and Madagascar were the main suppliers of wild plants to the horticultural industry and specialist collectors (McGough *et al.*, 2004).

Madagascar ratified the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) in 1975. This initiative was supported by Ordinance 75-014 of 5 August 1975 on the ratification of the Convention (Rabesihanaka *et al.* 2008).

Other relevant legislation was reported to include (Rabesihanaka *et al.*, 2008):

- Ministerial Order No. 3032/2003 of 13 February 2003, establishing fixed roles and responsibilities for the CITES Scientific Authorities of Madagascar.
- Law No. 2005-018 of 17 October 2005 on international trade in species of wild fauna and flora, designed to bring the Malagasy legislation in line with CITES. No specimen of any CITES-listed plant species, including seeds, spores, pollen, in vitro cultures and cut flowers, may be exported without an export permit.
- Decree No. 2006-097 of 31 January 2006 laying down detailed rules for implementing the Act No. 2005-018 of 17 October 2005 on international trade in species of wild fauna and flora.
- Decree No. 2006-098 of 31 January 2006 concerning the publication of the revised CITES appendices.

Rabesihanaka *et al.* (2008) identified a number of weaknesses in CITES implementation in Madagascar, including a lack of finances, equipment and government support; a shortage of manpower to tackle illegal trade and a lack of communication between the different enforcement authorities and the Scientific Authority on the identification of species.

USAID (2008) noted that major constraints in the effort to conserve Madagascar's biodiversity were "Corruption and inadequate government management of natural resources, and enforcement of CITES and other legal controls that affect the environment."

To adhere to international CITES standards and support appropriate management decisions, the Government of Madagascar identified a need to develop and clarify national policies on the following CITES topics:

- Objectives for CITES management in Madagascar;
- Decentralization of enforcement;
- Sharing commercial receipts received with local communities where species or products are harvested;
- Management policies for areas where imported species are held; and
- Developing/establishing criteria for allocation of quotas and permits (USAID, 2008).

According to the CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) plants may be harvested from the wild by plant operators which have been approved by the Malagasy State. The amount harvested was reported to be determined by a meeting between the Board of Management of the Madagascar CITES Scientific Authority Flora and the operator. Whether the opinion of the Scientific Authority is in favour of the amount harvested requested by the operator is usually decided by the species IUCN category, CITES listing and the stock status of the species in the wild (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010). Rabesihanaka *et al.* (2008) also reported that the Madagascan Management and Scientific Authorities carried out annual visits to plant propagation centres, to check their terms of reference.

Euphorbia species were reported to be included within those plant species which can be exported whatever their form (whole plants, seeds, cut flowers) by operators licensed by the Malagasy State (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010). The export quota of a species reportedly depended on the amount of stock that each operator had at their nursery (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010). However no published details of Madagascan export quotas for *Euphorbia* species (for any source) could be located.

The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) provided information on the extent of occurrence and/or area of occupation and/or the number of localities and/or the number of subpopulations for nine of the *Euphorbia* species covered in this report: *E. didiereoides*, *E. elliotii*, *E. famatamboay*, *E. herman-schwartzii*, *E. horombensis*, *E. mahabobokensis*, *E. mangokyensis*, *E. primulifolia* and *E. robivelonae*. The area of occupancy for *E. robivelonae* was calculated using GIS (Haevermans, 2004). However, no information was given for the other species on whether the data listed was collected by field surveys or determined from GIS mapping, the date the information was collected or which person or organisation collected the data. No other evidence of population monitoring of *Euphorbia* species in Madagascar was located.

The CITES Management Authority confirmed that there are no action plans currently in place for *Euphorbia* species (Rabesihanaka *pers. comm.* to UNEP-WCMC, 2010). No specific information on non-detriment findings for export of *Euphorbia* spp. was provided by the CITES Authorities of Madagascar.

The term New System of Conservation (NSC) was mentioned in several species accounts to describe certain protected areas. The new conservation sites were identified "To achieve the ambition of Madagascar's former President of the Republic, Marc Ravalomanana" (Ravaomanalina, *pers. comm.* to UNEP-WCMC, 2010).

Trade data is provided following the species accounts on page 70.

C. Species reviews

Euphorbia alfredii Rauh, 1987: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia alfredii was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. alfredii* is endemic to Madagascar and is globally Vulnerable. The species is only known from one location. It is threatened by habitat degradation, fire and collection for horticulture. Field surveys are required to ascertain its status and the exact extent of occurrence, but it is noted that the species may qualify as Endangered or Critically Endangered. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 169 live wild sourced specimens between 1999 and 2008, as did the importers. International trade was relatively high considering the species' threatened status and very restricted known range. Although no trade was reported since 2006, no information on the basis for a species-specific non-detriment finding was provided and any trade is likely to impact the population, therefore categorised as Urgent Concern.

Biology: *Euphorbia alfredii* grows up to 50 cm in height. The species has round ovate leaves which are often red below and are always glabrous. The inflorescences are few flowering (Rauh, 1987; Rauh, 1995).

The species has been found growing on limestone in deciduous xerophytic forest (Rauh, 1987; Rauh, 1995).

Distribution in range State: The species is endemic to Madagascar where it is known only from Rauh's specimens collected by A. Razafindratsira in the Ambilobe area (Haevermans, 2004). The species was reported to be restricted to this locality (Haevermans, 2004; Rauh, 1987). According to Haevermans (2004), a full field survey to ascertain the exact extent of occurrence was required, which may then qualify the species as Endangered or Critically Endangered.

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004). The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire and collection for the horticulture trade were considered to be major threats to the species (Haevermans, 2004; CITES Management Authority of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported the export of 169 live wild-sourced specimens of *E. alfredii*, four of which were exported in 1999 and 165 in 2006 (See Table 1, p. 70). The same figures were reported by the importers for these years. Most of the reported trade was for commercial purposes. The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) confirmed that commercial exports between 2003 and 2008 comprised 165 plants, all in 2006. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. alfredii* was located

Management: Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. alfredii* (PC18 Doc. 16.1.2).

Euphorbia aureoviridiflora (Rauh) Rauh, 1993: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia aureoviridiflora was selected for trade review following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. aureoviridiflora* is endemic to Madagascar and is globally Vulnerable. Currently the species is only known from one site in the south-west. It is threatened by fire, habitat degradation and collection for horticulture. Although *E. aureoviridiflora* is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 212 live wild sourced specimens between 1999 and 2008, with importers reporting 166 imports; 100 of these were in 2008. International trade was relatively high considering the species' threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.

Biology: *Euphorbia aureoviridiflora* is a small deciduous succulent shrub. The spiny stem is spirally twisted, has numerous lateral branches, is four or five angled, and grows up to 50 cm tall. The leaves grow to 5 cm long and 2.5 cm wide and are bright green above and lighter green below. The brownish spines are arranged in numerous bristles along the stem (Rauh, 1992a; Rauh, 1995; Zazamalala Forest Center, 2009).

The species has been found growing on Tsingy type rocks on steep limestone cliffs (Rauh, 1992a).

Distribution in range State: The species is endemic to Madagascar where it was known only from the Montagne des Français near Antsiranana in the south-west, although it was noted that it could also occur further south (Haevermans, 2004; Rauh, 1992a).

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004). The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire and collection for horticultural purposes were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 212 live wild-sourced specimens of *E. aureoviridiflora* (See Table 1, p. 70). During the same period, imports of 166 live, wild-sourced specimens of the species from Madagascar were reported by importers, in addition to four live artificially propagated specimens (See Table 1, p. 70). No exports of artificially propagated specimens were reported exported by Madagascar. Most of the reported trade was for commercial purposes.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised: nine live plants in 2004, 100 in 2005, five in 2006 and 100 in 2008. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. aureoviridiflora* was located.

Management: The species was stated to occur in the New System of Conservation (NSC) Mahafaly (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report. In 2008, operators held a stock of 300 plants of *E. aureoviridiflora* (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. aureoviridiflora* (PC18 Doc.16.1.2).

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Euphorbia banae Rauh, 1993: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia banae was selected for trade review following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Least Concern	*E. banae* is endemic to Madagascar and is globally Vulnerable. It is limited to a single location in the south-west. The species is threatened by habitat degradation, fire, habitat clearing for charcoal and collection for horticulture. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of nine artificially propagated specimens of the species in their annual reports. However, trade reported by the importers was higher (74 artificially propagated specimens), as was trade subsequently reported by the Management Authority (99 specimens in 2003-2008, source not specified). No international trade in wild specimens was reported 1999-2008 by Madagascar or any importers, and on this basis, categorised as Least Concern.

Biology: *Euphorbia banae* is a shrubby plant that builds tubers up to 20 cm long (Rauh, 1993). It grows up to 1.2 m tall and has a stem base 1-2 m thick. There are many branches that are gray, erect and 0.1-0.2 cm thick. The leaves are gray-green and 1.5-2 cm long (Rauh, 1995).

The species has been found growing in xerophytic bush on chalk (Rauh, 1993).

Distribution in range State: The species is endemic to Madagascar where it was recorded only from one site in the south-west on Plateau Mahafaly between Ampanihy and Androka (Haevermans, 2004; Rauh, 1993; Rauh, 1995).

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004). The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire, clearing for charcoal and collection for horticulture were considered to major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of nine live artificially propagated specimens of *E. banae*. However, during the same period, imports of 74 live specimens of the species from Madagascar were reported by importers (See Table 1, p. 70). All reported trade was for commercial purposes.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised: 90 live plants in 2004, three in 2005 and six in 2006, totalling 99 specimens. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. banae* was located.

Management: *E. banae* reportedly grew in the New System of Conservation (NSC) Mahafaly (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. banae* (PC18 Doc.16.1.2).

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Euphorbia berorohae Rauh & Hofstätter, 1995: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia berorohae was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. berorohae* is endemic to Madagascar and is Critically Endangered. The species is known from only two collections in the same locality. It is threatened by habitat degradation, habitat clearing, fire and collection for horticulture. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 165 wild sourced specimens between 1999 and 2008, with importers reporting 110 imports. Reported international trade was relatively high considering the species' threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.

Biology: *E. berorohae* is a small shrub with few branches. The leaves are deciduous and variable in size, up to 2.5 cm long and 0.5-0.7 cm wide (Rauh, 1998).

The species was reported to grow on rocky slopes close to the Mangoky River (Rauh, 1998).

Distribution in range State: The species is endemic to Madagascar where it was reported from only two collections at the same site, Beroroha on the river Mangoky in the south-west (Haevermans, 2004). One collection was in 1933 and the other in the 1990s (without knowledge of the earlier specimen). Many botanists have visited the area but no other specimens have been collected (Haevermans, 2004). The species is likely to only grow in the type locality (Haevermans, 2004; Rauh and Hofstätter, 1995).

Population trends and status: The species was classified by the IUCN as Critically Endangered (Haevermans, 2004). The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire, habitat clearing and collection for horticulture were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 165 live wild-sourced specimens of *E. berorohae*. During the same period, imports of 110 live, wild-sourced specimens of the species from Madagascar were reported by importers (See Table 1, p. 70). All reported trade was for commercial purposes. Higher figures reported by the exporter may refer to permits issued, rather than actual trade.

The CITES MA of Madagascar (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010) confirmed that commercial exports between 2003 and 2008 comprised 60 live plants, all in 2006. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. berorohae* was located.

Management: The species occurs in the New System of Conservation (NSC) Mahafaly (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report. In 2008 it was reported that operators held a stock of 212 plants of *E. berorohae* (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. berorohae* (PC18 Doc.16.1.2).

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Euphorbia biaculeata Denis, 1921: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia biaculeata was selected for trade review following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Possible Concern	*E. biaculeata* is endemic to Madagascar and is globally Vulnerable. The species is only known from one site in the south-west. Its extent of occurrence and area of occupation are unknown, but are likely to be extremely reduced. Further field studies are needed to determine exact distribution and status. The species is threatened by habitat degradation, fire, habitat clearing for charcoal and collection for horticulture. Although the species is known from a potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of only one live specimen between 1999 and 2008. However trade reported by the importers was higher (27 specimens), as was trade subsequently reported by the Management Authority (50 specimens in 2003-2008, source not specified). Reported international trade in the species was relatively high considering the species' threatened status and very restricted distribution. No information on the basis for a species-specific non-detriment finding was provided. However, no trade has been reported since 2004, and on this basis, categorised as Possible Concern.

Biology: *E. biaculeata* is a shrub with few branches, up to 1.5 m tall and with a thick stem base and thin branches. The leaves are spirally arranged, deciduous, linear and up to 6 cm long and 0.3 cm wide (Rauh, 1995).

According to Haevermans (2004) the species possibly grows in dry calcareous bush.

Distribution in range State: The species is endemic to Madagascar where it was reported only by one collection from the Plateau Mahafaly south of Tulear in the south-west (Haevermans, 2004). Its extent of occurrence and area of occupation were unknown but likely to be extremely reduced, and it was noted that further field studies were required in order to assess its exact distribution and status (Haevermans, 2004).

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004). The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire, clearing for charcoal and collection for horticulture were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported the export of one live wild-sourced specimen of *E. biaculeata* in 2000. However, during the same period, imports of 27 live, wild-sourced specimens of the species from Madagascar were reported by the importers, all in 2004 (See Table 1, p. 70). Almost all reported trade in the species was for commercial purposes.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised 50 plants, all in 2004. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. biaculeata* was located.

Management: *E. biaculeata* grows in the New System of Conservation (NSC) Mahafaly (CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. biaculeata* (PC18 Doc. 16.1.2).

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Euphorbia bulbispina Rauh & Razafindratsira, 1991: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia bulbispina was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. bulbispina* is endemic to Madagascar and is globally Vulnerable. It is only known from one site in the north and is considered likely to be restricted to a very small area. The species is threatened by habitat degradation, fire and collection for horticulture. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 75 wild sourced live specimens between 1999 and 2008. However, trade reported by the importers was higher (167 specimens), as was trade subsequently reported by the Management Authority (170 specimens in 2003-2008, source not specified). Reported international trade in the species was relatively high considering the species' threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.

Biology: *Euphorbia bulbispina* is a medium-sized deciduous shrub, 80-100 cm in diameter with lateral branches. The leaves are deciduous, three to six per branch, ovate and small measuring 1.7 x 1.5cm. They are coloured dull dark green above, gray-green below, becoming purple-red at base, and with red margins. Bulbous-based spines are densely arranged along the stem and branches (Rauh, 1995; Zazamalala Forest Center, 2009).

E. bulbispina was reported to grow in limestone rock cracks (Rauh and Razafindratsira, 1991).

The species was considered difficult to cultivate, as cuttings did not root easily and the best method propagation was stated to be by seed (Rauh, 1995).

Distribution in range State: The species is endemic to Madagascar where it was reported only from the summit of Windsor Castle and surrounding rocks, near Diego-Suarez in the north (Haevermans, 2004). The exact extent of occurrence and area of occupancy was reported to be unknown, but *E. bulbispina* was considered likely to be restricted to a very small area outside any protected areas (Haevermans, 2004; Rauh and Razafindratsira, 1991).

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004). The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire and collection for the horticulture trade were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 75 live specimens, five dried plants, one flower, one leaf and five stems of *E. bulbispina*, all wild-sourced. However, only live specimens of the species were reported

as imports from Madagascar by the importers. During the same period, imports of 167 live, wild-sourced specimens of the species from Madagascar were reported by importers (See Table 1, p. 70). The import of two live artificially propagated plants from Madagascar were also reported by importers; however no exports of live artificially propagated plants were reported by Madagascar (See Table 1, p. 70).

Most of the reported trade was for commercial purposes.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported commercial exports between 2003 and 2008 comprised: 100 plants in 2004 (none were reported within the Madagascan annual report), and 71 plants in 2006. The source of the specimens was not provided.

Madagascar has not published any export quota for this species.

No specific information on the illegal trade in *E. bulbispina* was located.

Management: The species reportedly occurred in the New System of Conservation (NSC) AP Ouest (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview. In 2008, it was reported that operators held a stock of 973 plants of *E. bulbispina* (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. bulbispina* (PC18 Doc.16.1.2).

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Euphorbia capmanambatoensis Rauh, 1995: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia capmanambatoensis was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. capmanambatoensis* is endemic to Madagascar and is Critically Endangered. The species is only known from one site in the north-east and its extent of occurrence and area of occupancy are extremely limited. The species is threatened by habitat degradation and fire and may also be highly endangered from any natural disaster that may occur in the area. It is highly desirable for the horticulture trade and it is prone to illegal collection. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 36 live wild specimens between 1999 and 2008, however trade reported by importers was higher (125 specimens). Reported international trade was relatively high considering the species' threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.

Biology: *E. capmanambatoensis* is a loose growing shrub that reaches up to 70 cm height and 1 m in diameter. It has many branches and stems which are eight-angled (Rauh, 1995).

The species has been found growing in cracks in steep, bare granite rocks at 3-20 m elevation above the sea (Rauh, 1995).

Distribution in range State: The species is endemic to Madagascar where it was reported only from Cape Manambato in the north-east, therefore its extent of occurrence and area of occupancy were considered to be extremely limited (Haevermans, 2004; Rauh, 1995).

Population trends and status: The species was classified by the IUCN as Critically Endangered (Haevermans, 2004). The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: The species may be made highly endangered by any natural disaster that may occur in its extremely restricted area of occurrence. It was reported to be a highly desirable species for the horticulture trade and prone to illegal collection (Haevermans, 2004). Other major threats to the species were considered to be habitat degradation and fire (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 36 live wild-sourced specimens of *E. capmanambatoensis*. However, importer-reported trade from Madagascar was higher, and totaled 125 live, wild-sourced specimens (See Table 1, p. 70).

Madagascar also reported the export of 60 live artificially propagated plants of *E. capmanambatoensis*. However, importers declared higher trade levels from Madagascar of 121 live artificially propagated specimens (See Table 1, p. 70). Almost all reported trade in the species was for commercial purposes.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised: 60 plants in 2005, 25 plants in 2006 and five plants in 2007, totalling 90 specimens. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. capmanambatoensis* was located.

Management: The species reportedly occurred in the New System of Conservation (NSC) AP Ouest (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report. It was reported that in 2008, operators held a stock of 470 plants of *E. capmanambatoensis* (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. capmanambatoensis* (PC18 Doc.16.1.2).

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Euphorbia capuronii Ursch & Léandri, 1955: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia capuronii was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Least Concern	*E. capuronii* is endemic to Madagascar and is globally Vulnerable. However, it may warrant listing at a higher threat category. Very little is known about the species distribution. It was reportedly collected in the plateau Mahafaly, but has not been found in the area since. The species is likely to be very rare in the wild. Fieldwork is required to locate the species and assess its area of occupancy and extent of occurrence. *E. capuronii* is threatened by habitat degradation, fire, habitat clearing for charcoal and collection for horticulture. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of five wild specimens between 1999 and 2008, which was corroborated by importer reported data. It can be implied from correspondence to the Secretariat that Madagascar does not intend to export this species, and on the basis that reported international trade in the species was relatively low, (with no wild exports since 2003), categorised as Least Concern.

Biology: *Euphorbia capuronii* is a shrub that grows up to 1 m tall and is much-branched from the base. The branches are 1 cm thick, silver-gray and green at the apex. The leaves are deciduous, linear, 3-5 cm long and 0.4-0.8 cm wide (Rauh, 1995).

According to Haevermans (2004) it is a terrestrial species, but its habitat was unknown. However the species was discovered in xerophytic bush (Rauh, 1995).

Distribution in range State: *E. capuronii* is endemic to Madagascar. Haevermans (2004) reported it to be widely cultivated, but very little was known about its distribution in the wild. The species was reportedly collected in the Plateau Mahafaly, but has not been found in the area since then (Haevermans, 2004), and the precise locality is unknown (Rauh, 1995). Haevermans (2004) stated that fieldwork was required to try to locate the species and assess its area of occupancy and extent of occurrence. According to Haevermans (2004), the species may well warrant listing as being more threatened than its current Vulnerable status.

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004). The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) described the species as very rare. Haevermans (2004) also considered it likely to be very rare in the wild.

Threats: Habitat degradation, fire and collection for the horticulture trade were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of five live wild-sourced specimens of *E. capuronii*, all in 2002 to

Switzerland. Five live, wild-sourced specimens of the species were reported imported from Madagascar by Switzerland in 2003 (See Table 1, p. 70). This is therefore likely to represent year-end trade (i.e. the import went ahead in the year following that in which the export permit was issued).

Whilst Madagascar also reported the export of two live artificially propagated plants in 2005, but no imports of artificially propagated plants were reported by the importers (See Table 1, p. 70). All trade in the species was reported for personal purposes. The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported no data on commercial exports of the species between 2003 and 2008.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. capuronii* was located.

Management: *E. capuronii* was reported to grow in the New System of Conservation (NSC) Mahafaly (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which did not include *E. capuronii* (PC18 Doc.16.1.2).

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Euphorbia denisiana Guillaumin, 1929: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia denisiana was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented (PC17 Doc.8.5).

Summary

Provisional category	Summary
Possible Concern	*E. denisiana* is endemic to Madagascar and is globally Vulnerable. Fieldwork is required to assess whether it qualifies for a higher threat status. The species has a restricted range and grows on the Central Plateau, which is one of the most degraded and most collected parts of the island. The species is threatened by habitat degradation, fire and collection for horticulture. Although the species is reported from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 66 live wild specimens between 1999 and 2008, with importers reporting 53 corresponding imports. Reported international trade was relatively high considering the species' threatened status. No information on the basis for a species-specific non-detriment finding was provided. However, only three specimens reported exported since 2005, and on this basis, categorised as Possible Concern.

Biology *E. denisiana* plants are shrubs up to 50 cm tall and have succulent stems. The leaves appear after flowering; are 5-7 cm long and 2.5-4 cm wide, pale green above, and whitish-green below (Rauh, 1995).

It was reported to be a terrestrial species that supposedly grows on rocks (Haevermans 2004).

Distribution in range State: The species is endemic to Madagascar. It has been recorded in the Central Plateau, which was reportedly one of the most degraded parts of the island Haevermans (2004). Rauh (1995) stated that the type locality was unknown and assumed the plant came from Ankarana. However, Haevermans (2004) considered it likely that the plant came from the Central Imerina area, as the other another known specimen was collected in Antongona.

Population trends and status: The species was classified by the IUCN as Vulnerable Haevermans (2004). The need for fieldwork to assess whether the species had a more threatened status was noted Haevermans (2004). The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Threats to the species were reported as habitat degradation and fire (Haevermans, 2004). Collection for the horticulture trade is a further potential threat. The Central Plateau, area was identified as one of the more collected areas due to its proximity to the capital (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 66 live wild-sourced specimens of *E. denisiana;* 63 specimens in 2005 and three in 2006. Slightly lower figures of 53 live, wild specimens were reported by importers, with 50 in 2005 and three in 2006 (See Table 1, p. 70). Most of the trade in the species was

reported as commercial. The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised three plants in 2006. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. denisiana* was located.

Management: The species reportedly occurred in the New System of Conservation (NSC) Ifotaka complex (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. denisiana* (PC18 Doc.16.1.2).

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Euphorbia didiereoides Denis & Leandri, 1934: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia didiereoides was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Possible Concern	*E. didiereoides* is endemic to Madagascar and is globally Endangered. The species is only known from six localities and three subpopulations in one area of Madagascar. It has a small extent of occurrence and area of occupancy. The species is threatened by habitat degradation, fire and collection for horticulture. Although it is known from two potential protected areas, both are in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 35 live wild specimens between 1999 and 2008, with ten specimens reported imported by the importers. Subsequent trade figures reported by the CITES MA for 2003-2008 were lower (ten specimens). Reported international trade was relatively high considering the species' highly threatened status. No information on the basis for a species-specific non-detriment finding was provided. However, only three wild specimens reported exported since 2005, and on this basis, categorised as Possible Concern.

Biology: *Euphorbia didiereoides* is the tallest of the spiny Euphorbia species of the Central Plateau. It is a large deciduous shrub with a straight sparsely branched stem that grows up to 2.5 m. The leaves are 2-2.5 cm long and 1-1.5 cm wide, gray-green with narrow red margins. The spines are up to 2.5 cm long and densely arranged in pairs along with numerous small prickles along the stem and branches (Rauh, 1995; Zazamalala Forest Center 2009).

The species has been found exclusively on rock outcrops scattered in grassland in the high plateau area (Haevermans, 2004). According to the CITES Management Authority of Madagascar (2010, pers. comm. to UNEP-WCMC) there are three subpopulations of *E. didiereoides*.

Rauh (1995) considered the species easy to propagate by cuttings although these grew slowly.

Distribution in range State: *E. didiereoides* is endemic to Madagascar where it was reported only from the Zazafotsy/ Zomandao area of Madagascar (Haevermans, 2004). The species extent of occurrence was reported as small (495,655 km^2), as was the area of occupancy (128,825 km^2) (Haevermans, 2004). It was recorded from six localities (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Population trends and status: The species was classified by the IUCN as Endangered (Haevermans, 2004). *E. didiereoides* was considered common within its range where its ecological requirements were met, according to Haevermans (2004). The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) considered the population trends of the species to be unknown.

Threats: Habitat degradation, fire and collection for the horticulture trade were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 35 live wild-sourced specimens of *E. didiereoides*. During the same period, importers reported ten live, wild specimens of the species imported from Madagascar (See Table 1, p. 70). The export of six live artificially propagated plants of the species were reported by Madagascar, although no imports of live artificially propagated plants of the species were reported by importers (See Table 1, p. 70). Approximately half of reported exports were for commercial purposes.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised: five plants in 2004, two in 2005 and three in 2006, totalling ten specimens (source not specified). Whilst this figure does correspond exactly to the total trade levels reported by importers for wild specimens 1999-2008 within the CITES Trade Database, importers reported only eight specimens imported during 2003-2008; two were imported in 1999.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. didiereoides* was located.

Management: The species was reported to occur in the New System of Conservation (NSC) AP Ouest and New System of Conservation (NSC) Ifotaka complex (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. didiereoides* (PC18 Doc.16.1.2).

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Euphorbia elliotii Léandri, 1945: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia elliotii was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Possible Concern	*E. elliotii* is endemic to Madagascar and is globally Endangered. The species has a restricted range in the south-west in nine localities and with only four subpopulations. It has a small extent of occurrence and area of occupancy. The species is threatened by habitat degradation, fire and collection for horticulture. Although the species is known from a protected area, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. In their annual reports, Madagascar reported no exports between 1999 and 2008, but up to 25 wild specimens may have been exported in 2004. Reported international trade in the species was relatively high considering the species' highly threatened status. No information on the basis for a species-specific non-detriment finding was provided. However, no international trade reported since 2004, and on this basis, categorised as Possible Concern.

Biology: *E. elliotii* is a shrubby thornless species that grows up to 1.5 m tall. It has a branching system which is unique amongst the *Euphorbia* species. It is strongly differentiated into long shoots and short shoots. The leaves are variable in size, the largest obovate, up to 4 cm long and 3 cm wide. In cultivation, *E. elliotii* flowers throughout the year (Rauh, 1995).

The species is a forest dweller and has been found in shrubland and forests on sandy, coastal and humid areas (Haevermans, 2004).

Distribution in range State: *E. elliotii* is endemic to Madagascar where it reportedly has a restricted range in the south-west: Fort Dauphin area, Mandena forest and Andohahela (Haevermans, 2004; CITES Management Authority of Madagascar, *in litt*. to UNEP-WCMC, 2010), and Tolagnaro (CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010). The species was noted to have a small extent of occurrence (1,924.48 km^2) and a small area of occupancy (457.588 km^2) (Haevermans, 2004). It was recorded from nine localities and was reported to consist of four subpopulations (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Population trends and status: The species was classified by the IUCN as Endangered (Haevermans, 2004). The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire and clearing for charcoal and collection for the horticulture trade were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar did not report any exports of *E. elliotii*. However, imports of 13 live, wild-sourced specimens from Madagascar were reported by importers, all in 2004 (See Table 1, p. 70). Most trade in the species was reported as commercial.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised 25 plants, all in 2004. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. elliotii* was located.

Management: *E. elliotii* was reported to be protected in the Andohahela Reserve (CITES MA of Madagascar, 2010, pers. comm. to UNEP-WCMC).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report. It was reported that in 2008, operators held a stock of 51 plants of *E. elliotii* (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. elliotii* (PC18 Doc.16.1.2).

Euphorbia famatamboay Friedmann & Cremers, 1976: Madagascar

Euphorbia famatamboay **ssp.** *itampolensis* **Friedmann & Cremers, 1976**

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia famatamboay was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Least Concern	*E. famatamboay* is endemic to Madagascar and is globally Vulnerable. The species has a slightly fragmented range in south-west Madagascar. The typical subspecies has a small extent of occurrence and area of occupancy and was and was recorded from nine localities within four to five subpopulations. The distribution of *E. f. itampolensis* is more restricted. Although the species is common within its range, it is declining. It is threatened by habitat degradation, fire, habitat clearing for charcoal and collection for horticulture. Occurrence in protected areas is not known. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported only three wild leaves exported between 1999 and 2008, although trading partners reported 100 live plants from Madagascar imported. It can be implied from correspondence to the Secretariat that Madagascar does not intend to export this species, and no trade has been reported since 2006. On this basis, categorised as Least Concern.

Biology: *Euphorbia famatamboay famatamboay* is a small tree, 3-4 m tall. The branches are green to yellow-green, and up to 0.2 cm in diameter. The leaves are small and deciduous (Rauh, 1998).

E. f. itampolensis is smaller than the typical subspecies, growing only to 3 m tall and with thinner branches, 0.15 cm in diameter. The branches are covered with a silver-gray layer of wax (Rauh, 1998).

The species grows in bush and forests (Haevermans, 2004).

Distribution in range State: The species is endemic to the south west of Madagascar and known from Fort-Dauphin to Ampanihy (Ambovombe, Amboasary, Andranomana) and the Itampolo area, where the population is slightly fragmented (Haevermans, 2004).

E. f. famatamboay has a small extent of occurrence (8,523.81 km^2) and an area of occupancy of 4,431.66 km^2 in south west Madagascar; this subspecies is recorded from nine localities and there are four to five subpopulations (Haevermans, 2004; CITES Management Authority of Madagascar, *in litt*. to UNEP-WCMC, 2010). The sub-species grows from Fort Dauphin to Ampanihy (Ambovombe, Amboasary, Andromana), (Haevermans, 2004).

E. f. itampolensis has a more restricted range and is known only from the Itampolo area (Haevermans, 2004). There were reportedly only a few collections of the subspecies and its extent of occurrence was unknown (Haevermans, 2004).

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004).

The population of *E. f. famatamboay* was considered common throughout its range (Haevermans, 2004). Overall, the species was reported to be declining according to Haevermans (2004) and the CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010).

Threats: Habitat degradation, fire and clearing for charcoal and collection for the horticulture trade were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar only reported exports of three wild-sourced leaves of *E. famatamboay*. However, during the same period, imports of 100 live, wild-sourced plants of the species from Madagascar were reported by importers (See Table 1, p. 70). Most of the trade was reported as commercial.

The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported no commercial exports of the species between 2003 and 2008.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. famatamboay* was located.

Management: No information on protected areas where *E. famatamboay* occurs was located.

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, however this did not include *E. famatamboay* (PC18 Doc.16.1.2).

Euphorbia genoudiana Ursch & Léandri, 1955: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia genoudiana was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Least Concern	*E. genoudiana* is endemic to Madagascar. The species' status has not been assessed by IUCN, and no further information on its status is available. The species occurs in south-west Madagascar. It is threatened by habitat degradation, fire and collection for horticulture. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported only 13 wild specimens exported between 1999 and 2008, the same level of trade was reported by importers, although four years apart. However, higher levels of trade were reported by the Madagascan MA subsequently (source not specified). International trade levels are low, and no trade has been reported since 2004. On this basis, categorised as Least Concern.

Biology: *Euphorbia genoudiana* is very similar to *E. capuronii*, but has shorter stems that are up to 25 cm tall, and thinner branches. The stems are solitary and the leaves are linear. In cultivation *E. genoudiana* forms much branched shrubs up to 50 (-70 cm) tall (Rauh, 1995).

The habitat of *E. genoudiana* was reported as unknown (CITES Management Authority of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Distribution in range State: The species is endemic to Madagascar where it was reported to occur in the south-west. No other details were available on the species distribution or status according to the CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010). However Rauh (1995) reported that the species was discovered on the limestone of the Mahafaly plateau.

Population trends and status: The species has not been assessed by IUCN (IUCN, 2010). The Madagascan CITES Management Authority recorded the species to be classified by the IUCN as Vulnerable, (CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2010), apparently erroneously. The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire and collection for the horticulture trade were considered to be major threats to the species (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported the export of 13 live, wild specimens of *E. genoudiana*, all in 2000. Importers also reported a total of 13 live, wild specimens imported Madagascar, but all in 2004, (See Table 1, p. 70).

The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised 25 plants in 2004. The source of the specimens was not provided. Data within the CITES Trade Database does not include any exports from Madagascar in 2004.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. genoudiana* was located.

Management: No information on protected areas where *E. genoudiana* occurs was located.

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. genoudiana* (PC18 Doc.16.1.2).

Euphorbia herman-schwartzii **Rauh, 1991: Madagascar**

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia herman-schwartzii was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. herman-schwartzii* is endemic to Madagascar and is globally Endangered. The species has a restricted range, with an area of occupancy estimated as 65.66 km², but further studies are needed to determine the exact area of occupancy and occurrence. The species is threatened by habitat degradation, fire, habitat clearance for charcoal and collection for horticulture. It occurs in one and possible two reserves, but the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 267 live wild specimens between 1999 and 2008, although importers reported much lower trade levels (17 specimens). Reported international trade (by the exporter) was relatively high considering the species' highly threatened status and restricted range. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.

Biology: *Euphorbia herman-schwartzii* has stems that are branched at the base, and 20-30 cm long. There are up to six leaves arranged in an apical cluster and ovate in shape. They are up to 8 cm long and 4 cm wide, vivid green above, gray-green below (Rauh, 1995).

The species was reported to grow on red soil in leaf litter over limestone in low (6m), dense, deciduous forest (Haevermans, 2004).

Distribution in range State: The species is endemic to northern Madagascar. It was noted to have a restricted range with an area of occupancy estimated at 65.66 km² (Haevermans, 2004; CITES Management Authority of Madagascar, *in litt.* to UNEP-WCMC, 2010). Haevermans (2004) considered further studies were required to determine the exact area of occupancy, as well as the extent of occurrence. The species has been described from the Falaise de l'Ankarana, where it was found in the Tsingy area. Another collection further east may have been another taxon, according to Haevermans (2004). The species was reported to possibly occur in the Analamerana Special Reserve (Haevermans, 2004).

Population trends and status: The species was classified by the IUCN as Endangered (Haevermans, 2004). In the Analamerana Special Reserve, where it may occur, the species was described as described as "locally common" (Haevermans, 2004). The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire, clearing for charcoal and collection for the horticulture trade were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 267 live wild-sourced specimens of *E. herman-schwartzii*. However, importers reported only 17 live, wild specimens imported (See Table 1, p. 70). The export of three live artificially propagated specimens was also reported by Madagascar in 2005, and

these imports were reported by the importer (See Table 1, p. 70). Most of the trade in the species was reported as commercial.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised 103 plants in 2005 and 165 plants in 2006. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. herman-schwartzii* was located.

Management: The species was reported to possibly occur in the Analamerana Special Reserve (Haevermans, 2004). According to the CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010), the species occurred in the Ankarana Special Reserve.

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. herman-schwartzii* (PC18 Doc.16.1.2).

Euphorbia hofstaetteri Rauh, 1992: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia hofstaetteri was selected for trade review following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. hofstaetteri* is endemic to Madagascar and is globally Vulnerable. The species' present status and distribution are unclear. It has been reported from the south-west and is considered likely to have a very restricted range. Its habitat is threatened by degradation, fire, and clearing for charcoal and the species is also threatened by collection for horticulture. The species is known from three protected areas, but the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 111 live wild specimens between 1999 and 2008, however trade reported by importers was higher (294 specimens) and the MA subsequently reported 307 specimens exported 2003-2008 (source unspecified). International trade was relatively high considering the species' threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Urgent Concern.

Biology: *Euphorbia hofstaetteri* is a medium-sized, deciduous spiny shrub. The stem is swollen, has a tuberous root and is branched. It grows up to 70 cm tall and up to 1 m wide. The leaves are deciduous, ovate to lanceolate, 3-4cm long and 1.5 cm wide (Rauh, 1995; Zazamalala Forest Center, 2009).

The species was reported to grow on rocky areas in the south-west dry bush (Haevermans, 2004).

Distribution in range State: The species is endemic to Madagascar where it has been reported from the south-west, although its present status and distribution is unclear. It was reportedly known from the Tongobory area (Rauh, 1992b); however it has not been collected again (Haevermans, 2004). *E. hofstaetteri* may possibly occur in La Table near Tulear, but was considered likely to have a very restricted range (Haevermans, 2004).

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004). The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire, clearing for charcoal and collection for the horticulture trade were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 111 live wild-sourced specimens of *E. hofstaetteri*. However, during the same period, importers reported a higher quantity of 294 live, wild-sourced specimens imported from Madagascar (See Table 1, p. 70). Most trade in the species was reported as commercial.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised 200 plants in 2004, five plants in 2005 and 102 plants in 2006, totalling 307 specimens. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. hofstaetteri* was located.

Management: The species was reported to occur in the Tsimanapetsotsa National Park, New System of Conservation (NSC) Mahafaly and Beza Mahafaly Special Reserve (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report. In 2008 it was reported that operators held a stock of 254 plants of *E. hofstaetteri* (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. hofstaetteri* (PC18 Doc.16.1.2).

Euphorbia horombensis Ursch & Léandri, 1955: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia horombensis was selected for trade review following CoP14 at the PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. horombensis* is endemic to Madagascar and is globally Endangered. The species has a wide range in the central-south, however both the area of occurrence and occupancy are small. The species is known from five sites and one to four subpopulations are recognised. It is threatened by habitat degradation, fire and collection for horticulture. *E. horombensis* is known from one protected area but the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 207 live wild specimens between 1999 and 2008, and although importer data was lower, the Madagascan MA subsequently reported that 299 specimens were exported in 2003-2008 (source unspecified). International trade in the species was relatively high considering the species' highly threatened status. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Urgent Concern.

Biology: *Euphorbia horombensis* is a medium-sized, hemispherical, deciduous spiny shrub that grows up to 1.5 m. The shrubs are branched and become irregularly branched when old. The leaves are 6-8 cm long and 2.5-3 cm wide, gray-green and with red margins (Rauh, 1995; Zazamalala Forest Center, 2009).

The species was found on rock outcrops (Haevermans, 2004). Rauh (1995) found it growing on denuded gneiss and granite rocks.

Distribution in range State: *E. horombensis* is endemic to Madagascar and was reported to have a wide range in the Central Plateau (Rauh, 1995). It was known from five localities over a wide range in the areas of Horombe, Ihosy and Isalo in the central-south (Haevermans, 2004; CITES Management Authority of Madagascar, *in litt.* to UNEP-WCMC, 2010). The species area of occurrence was reported to be small (2947.07 km^2), as was area of occupancy (371.95 km^2) (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Population trends and status: The species was classified by the IUCN as Endangered (Haevermans, 2004). The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown and has one to four subpopulations.

Threats: Habitat degradation, fire and collection for the horticulture trade were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 207 live wild-sourced specimens of *E. horombensis*. During the same period, importers reported 93 live, wild-sourced specimens from Madagascar imported (See Table 1, p. 70). The export of 50 live artificially propagated plants was also reported by Madagascar, all in 2006. Only five live artificially propagated plants from Madagascar were reported by importers, all in 2003 (See Table 1, p. 70). Most trade in the species was reported

as commercial.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised: 58 plants in 2004, 65 plants in 2005 and 176 plants in 2006, totalling 299 specimens. The source of the specimens was not provided. This total is higher than the number of wild specimens (207) plus artificially propagated specimens (50) reported by Madagascar in their annual reports for 1999-2008.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. horombensis* was located.

Management: *E. horombensis* was reported to be protected in Isalo National Park (CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report. It was reported that in 2008, operators held a stock of 88 plants of *E. horombensis* (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. horombensis* (PC18 Doc.16.1.2).

In response to consultation with the Madagascan CITES Management Authority following the species inclusion in the Review of Significant Trade, the CITES Secretariat received a response from Madagascar on 18 July 2008, but the data in the report were considered inconsistent (PC18 Summary Record, Annex 2).

Euphorbia iharanae **Rauh, 1995: Madagascar**

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia iharanae was selected for review following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. iharanae* is endemic to Madagascar and is Critically Endangered. The species has a very limited area of occupancy and extent of occurrence in the north-east. The species is threatened by habitat degradation, fire and collection for horticulture. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 215 live wild specimens between 1999 and 2008, mostly in 2007. Importer data was comparable. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.

Biology: *Euphorbia iharanae* is a small to medium-sized deciduous shrub that grows up to 1 m and has a sparsely branched stem. The branches are five-angled, twisted and have reddish-brown bristles along the angles. The species resembles *E. aureoviridiflora* (Zazamalala Forest Center 2009).

The species is a coastal cliff dweller (Haevermans, 2004).

Distribution in range State: *E. iharanae* is endemic to Madagascar where was reported to grow in the Iharana district near Cape Manambato in the north-east (Haevermans, 2004). Its area of occupancy and extent of occurrence were noted as very limited (Haevermans, 2004).

Population trends and status: The species was classified by the IUCN as Critically Endangered (Haevermans, 2004). The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire and collection for the horticulture trade were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 215 live wild-sourced specimens of *E. iharanae*, with importers reporting 200 specimens imported during the same period (See Table 1, p. 70). The majority of trade was reported in 2007. Most trade in the species was reported as commercial.

The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised 15 plants in 2005 and 200 plants in 2007, corresponding to the trade data submitted within the Madagascan annual reports.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. iharanae* was located.

Management: No information on protected areas *E. iharanae* occurs was located.

Regulation of wild harvesting and trade and protection of the species under CITES are covered in the genus overview of this report. It was reported that in 2008, operators held a stock of 316 plants of *E. iharanae* (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. iharanae* (PC18 Doc.16.1.2).

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Euphorbia leuconeura **Boissier, 1862: Madagascar**

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia leuconeura was selected for review following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. leuconeura* is endemic to Madagascar and is globally Vulnerable. The species is only definitely recorded from one site in the north. Although the species is well known in the horticultural trade, it is poorly known in the field. Further studies are required to ascertain area of occupancy, extent of occurrence and status. The species is threatened by habitat degradation, fire and collection for horticulture. It possibly occurs in one protected area. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 60 live wild specimens between 1999 and 2008, however trade reported by importers was higher (160 specimens), and the Madagascan MA subsequently reported 164 specimens exported between 2003-2008 (source unspecified). International trade was relatively high considering the species' threatened status and very restricted distribution. No information on the basis for a species-specific non-detriment finding was provided, and the impact of trade on the population is unknown, therefore categorised as Urgent Concern.

Biology: *Euphorbia leuconeura* is a medium-sized deciduous shrub. The stem is generally unbranched, broadened at the top, slightly spiny and grows to 60 cm. The spines are branched into short brownish bristles arranged along the four to five angled stem. The leaves are lanceolate, up to 15 cm long and 3.5 cm wide, dark green above, and lighter below (Rauh, 1995; Zazamalala Forest Center 2009).

The species was reported to grow on Tsingy limestone (Haevermans, 2004).

According to Rauh (1995), the species can keep its habit even after years of cultivation and can be propagated easily from seed,

Distribution in rage state: The species, although apparently well known in the horticultural trade, was reportedly poorly known in the wild (Haevermans, 2004). It was recently found in the Montagne des Français; however herbarium records were reported to contain two dubious specimens located outside this zone (Haevermans, 2004). According to Haevermans (2004) one specimen was sampled from a cultivated plant in the Jardin de Tsimbaza, supposedly originating from Ankarana, and the other from the valley of the Andalangy (Bemarivo). It was noted that further studies are needed to ascertain the species area of occupancy and extent of occurrence (Haevermans, 2004).

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004). The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire and collection for the horticulture trade were considered to the major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 60 live wild-sourced specimens of *E. leuconeura*. However, during the same period, imports of 160 live, wild-sourced specimens of the species from Madagascar were reported by importers (See Table 1, p. 70). Most reported trade in the species was for commercial use.

The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that commercial exports of the species between 2003 and 2008 comprised 109 plants in 2004 and 55 plants in 2006, totalling 164 specimens. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. leuconeura* was located.

Management: *E. leuconeura* was reported to possibly occur in Ankarana Reserve (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report. It was reported that in 2008, operators held a stock of 320 plants of *E. leuconeura* (CITES MA of Madagascar *in litt.* to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. leuconeura* (PC18 Doc.16.1.2).

Euphorbia mahabobokensis Rauh, 1995: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia mahabobokensis was selected for review following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. mahabobokensis* is endemic to Madagascar and is globally Vulnerable. The species has a small extent of occurrence and area of occupancy in the south-west. It is recorded from three localities and comprises one to three subpopulations. There is a continuing decline in the species' population due to habitat loss and degradation, clearing for charcoal, removal of mature individuals, and collection for horticulture. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 270 live wild specimens between 1999-2008, with importers reporting trade at slightly higher levels (299 specimens). Reported international trade is relatively high considering the species' threatened status and restricted range. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Urgent Concern.

Biology: *Euphorbia mahabobokensis* is a small, spineless deciduous shrub up to 1 m tall. It has either a single stem or several clustered stems, which are branched. Up to seven to eight leaves are arranged in a rosette; the leaves are up to 5 cm long and 2 cm wide (Rauh *et al.*, 1995; Zazamalala Forest Center 2009).

The species was discovered in a degraded xerophytic forest (Rauh *et al.*, 1995) and has later been recorded in south-west dry forest (Haevermans, 2004).

Distribution in range State: *E. mahabobokensis* was reported to have a small extent of occurrence (10,694 km^2) and a small area of occupancy (1,288.64 km^2) and was recorded from three localities in the Mahaboboka area, Amanda (Haevermans, 2004; CITES Management Authority of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Population trends and status: The species was classified by the IUCN as Vulnerable; with the population trend reported as a continuing decline (Haevermans, 2004). According to the authors one to three subpopulations were recognised by Haevermans, (2004) and the CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010).

Threats: Habitat loss and degradation, and removal of mature individuals (Haevermans, 2004); also fire, habitat clearing for charcoal and collection for the horticulture trade are considered to be major threats to the species (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 270 live wild-sourced specimens of *E. mahabobokensis*. However, during the same period, imports of 299 live, wild-sourced specimens of the species from Madagascar were reported by the importer (See Table 1, p. 70). Most reported trade in the species was for commercial use.

The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised 15 plants in 2004, 157 plants in 2005, 63 plants in

2006 and 50 plants in 2008, totalling 285 specimens. Aside from the 15 specimens exported in 2004, this trade data corresponds to the data submitted within the Madagascan annual reports.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. mahabobokensis* was located.

Management: No information on protected areas where *E. mahabobokensis* occurs was located.

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report. It was reported that in 2008, operators held a stock of 663 plants of *E. mahabobokensis* (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. mahabobokensis* (PC18 Doc.16.1.2).

Euphorbia mangokyensis Denis, 1921: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia mangokyensis was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. mangokyensis* is endemic to Madagascar and is globally Endangered. The species has a small extent of occurrence and area of occupancy in the west. It is recorded from three localities and has two to three subpopulations. *E. mangokyensis* is threatened by habitat degradation, fire and collection for the horticulture trade. Its population continues to decline. There are national regulations for wild-harvesting in relation to CITES. A total of 26 live wild specimens were reported by Madagascar and by the importers between 1999 and 2008. Reported international trade in the species was relatively high considering the species' highly threatened status and restricted range. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Urgent Concern.

Biology: *Euphorbia mangokyensis* is an apparently deciduous shrub that is less than 1m tall, and has a subterranean tap root. The leaves are ovate, 1.5-2 cm long and 1 cm wide (Rauh, 1995).

The species was collected on gneiss and cipolin limestone rocks (Rauh, 1995). According to Haevermans (2004) it has been found on woody, rocky slopes.

Distribution in range State: *E. mangokyensis* is endemic to Madagascar and was reported to have a restricted range in the west in the Mangoky Basin on the right bank of the Menamaty (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010). The species was reported to have a small extent of occurrence (1,592.43 km^2) and a small area of occupancy (318,418 km^2) and was recorded from only three localities (Haevermans, 2004; CITES Management Authority of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Population and status: The species was classified by the IUCN as Endangered; with the population trend reported as a continuing decline (Haevermans (2004). Two to three sub-populations have been recorded (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Threats: Habitat degradation, fire and collection for the horticulture trade were considered to be major threats (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 26 live wild-sourced specimens of *E. mangokyensis*, with all trade reported in 2005-2006 (See Table 1, p. 70. Importers reported exactly identical imports of the species from Madagascar. Most reported trade in the species was for commercial use.

The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) confirmed the trade data within the CITES Trade Database for commercial exports between 2003 and 2008.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. mangokyensis* was located.

Management: No information on protected areas where *E. mangokyensis* occurs was located.

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. mangokyensis* (PC18 Doc.16.1.2).

Euphorbia neobosseri Rauh, 1992: Madagascar

Euphorbia neobosseri **var**. *itampolensis* **Rauh, 1999**

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia neobosseri was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Possible Concern	*E. neobosseri* is endemic to Madagascar and has IUCN global status Data Deficient. It occurs in the south-west; the typical subspecies has only been collected once – from the forest Sakaraha, and the subspecies *itampolensis* was also only collected once – near Itampolo. The combined ranges are likely to be very limited and extremely localized. However further fieldwork is necessary to establish the status of this taxon. The species is threatened by habitat degradation, fire, habitat clearing for charcoal collecting and collection for horticulture. It may occur within the protected forest of Zombitse. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 70 live wild specimens and smaller numbers of other derivatives between 1999 and 2008. Reported international trade levels have possibly been relatively high considering the species' unknown status and probable very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Possible Concern.

Biology: The typical variety *E. neobosseri* var. *neobosseri* is a small shrub, very spiny, 30 cm tall and 40 cm broad. The shrub bears many branches; these are horizontally spreading, green and hairy when young, becoming silver-gray and glabrous with age. The leaves are deciduous, 3.5 cm long and 0.35 cm wide. It is characterized by a dense cover of thin long spines (Rauh, 1995).

E. neobosseri var. *itampolensis* differs from the typical variety by being a small and graceful plant 10-15 cm high and has leaves with a prominent hairy midrib (Rauh, 1999).

The var. *neobosseri* and var. *itampolensis* bloom at different times: the typical variety blossoms in June and July, and var. *itampolensis* blossoms in April and May (Rauh, 1999).

E. neobosseri var. *neobosseri* have been found in dry forest and bush (Haevermans, 2004). *E. neobosseri* var. *itampolensis* was recorded in light Didierea woodland on sand (Rauh, 1999).

Distribution in range State: Little is known about this species, according to Haevermans (2004). It is endemic to Madagascar and only known from the south-west (Haevermans, 2004). The typical variety was collected once from the forest of Zombitsy at Ranohira in the south-west (Rauh, 1999). The variety *itampolensis* was also only collected once, at Itampolo, north of Androka in the south-west (Rauh, 1999). The locations of both varieties were 300 km apart (Rauh, 1999). Neither variety has apparently been collected again (Haevermans, 2004). It was reported that the combined ranges were likely to be very limited and extremely localized, indicating a possible Vulnerable status (Haevermans, 2004). However the author stated that further fieldwork is necessary to establish the status of this taxon (Haevermans, 2004).

Population status and trends: The species was classified by the IUCN as Data Deficient. The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire, clearing for charcoal and collection for the horticulture trade were considered to be major threats to the species (CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 70 live plants, five dried plants, one flower, one leaf and three stems of *E. neobosseri*, all wild-sourced. However, during the same period, imports of only 53 live, wild-sourced specimens of the species from Madagascar were reported by the importer (See Table 1, p. 70). Most reported trade in the species was for commercial use.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) confirmed that commercial exports between 2003 and 2008 comprised 50 plants in 2005 and 16 plants in 2006.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. neobosseri* was located.

Management: According to Haevermans (2004) *E. neobosseri* may occur in the protected forest of Zombitse.

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. neobosseri* (PC18 Doc.16.1.2).

Euphorbia pachypodioides Boiteau, 1942: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia pachypodioides was selected for review following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. pachypodioides* is endemic to Madagascar and is Critically Endangered. The species is limited to a single site, with an area of occupancy of 7.8 km^2. There is a continuing decline in the species' population. *E. pachypodioides* is threatened by habitat degradation, fire, and also by collection for horticulture, particularly as it is a highly desirable species in the horticultural trade. Although the species is known from one protected area, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 640 live wild specimens between 1999 and 2008; however the Madagascan MA subsequently reported that exports from 2003-2008 totalled 661 specimens (source unspecified). Reported international trade in the species is very high considering the species' highly threatened status and restricted distribution. No information on the basis for a species-specific non-detriment finding was provided, and any trade is likely to impact the population, therefore categorised as Urgent Concern.

Biology: *Euphorbia pachypodioides* is a very succulent, dwarf, deciduous Euphorbia. Generally there is a single stem which is spiny, cylindrical, up to 50 (-70) cm tall and 5 cm thick. The leaves are arranged in an apical cluster, elliptic in shape, 10-12 cm long and 3-5 cm wide. They are green above and red-violet below (Rauh, 1995; Zazamalala Forest Center 2009). In the wild, leaves appear at the beginning of the rainy season, December (Rauh, 1995).

The species grows on limestone plateaux (Rauh, 1995).

E. pachypodioides was considered not easy to cultivate, but it was reported to grow well when grafted onto other Euphorbia species (Rauh, 1995).

Distribution in range State: The species reported to be restricted to the limestone plateaux of Ankarana Reserve and has been found nowhere else (Haevermans, 2004). The area of occupancy was stated to be only 7.8 km^2 (Haevermans, 2004).

Population and status: The species was classified by the IUCN as Critically Endangered (Haevermans, 2004). A continuing decline in the species' population was reported (Haevermans, 2004; CITES Management Authority of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Threats: Habitat degradation, fire and collection for horticulture were considered to be the major threats to the species (Haevermans, 2004). *E. pachypodioides* was reported to be a species with high horticultural appeal (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 640 live wild-sourced specimens of *E. pachypodioides*. During the same period, imports of 427 live, wild-sourced specimens of the species from Madagascar were

reported by importers (See Table 1, p. 70). Additionally, Madagascar reported exports of five live artificially propagated plants, all in 2005, three of which were also reported by importers (See Table 1, p. 70). Most reported trade in the species was for commercial use.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised: 55 plants in 2004, 336 plants in 2005, 205 plants in 2006 and 65 plants in 2007, totalling 661 specimens. Aside from the specimens exported in 2004, the trade data provided by the Management Authority corresponds to the data within the CITES Trade Database based on Madagascar's annual reports.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. pachypodioides* was located.

Management: The only known recorded locations for *E. pachypodioides* lie within the boundaries of the Tsingy of Ankarana Special Reserve (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report. It was reported that in 2008, operators held a stock of 343 plants of *E. pachypodioides* (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. pachypodioides* (PC18 Doc.16.1.2).

In response to consultation with the Madagascan CITES Management Authority following the species inclusion in the Review of Significant Trade, the CITES Secretariat received a response from Madagascar on 18 July 2008, but the data in the report were considered inconsistent (PC18 Summary Record, Annex 2).

Euphorbia paulianii Ursch & Léandri, 1955: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia paulianii was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. paulianii* is endemic to Madagascar and is globally Vulnerable. The species is only known from one site in the west, with an estimated area of occupancy of less than 20 km^2. The species is threatened by habitat degradation, fire and collection for horticulture. Although the species is known from one protected area, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 61 live wild specimens between 1999 and 2008, however trade reported by importers was slightly higher (65 specimens). Reported international trade was relatively high considering the species threatened status and very restricted range. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade on the population is unknown, therefore categorised as Urgent Concern.

Biology: *Euphorbia paulianii* has mostly unbranched stems that are 40 (-60) cm tall. The leaves are spirally arranged, oblong-ovate in shape, 18-25 cm long, up to 4 cm wide, and often red below (Rauh, 1995).

The species was reported to grow on Tsingy limestone (Haevermans, 2004).

Distribution in range State: *E. paulianii* is a Madagascar endemic, known only from one site, the Tsingy of Bemaraha Reserve in the west (Haevermans, 2004). This site was reported to be tremendously difficult to access (Haevermans, 2004). Two collections that have been made give the area of occupancy as less than 20 km^2, qualifying the species for Vulnerable status, however it was considered that more sampling was needed to determine a more accurate figure for the area of occupancy and to ascertain the extent of occurrence (Haevermans, 2004).

Population and status: The species was classified by the IUCN as Vulnerable. The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire and collection for the horticulture trade were considered major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 61 live wild-sourced specimens of *E. paulianii*. During the same period, imports of 65 live, wild-sourced specimens of the species from Madagascar were reported by the importer (See Table 1, p. 70). In addition, three live artificially propagated plants were reported exported by Madagascar, all in 2006. No importers reported live artificially propagated plants imported from Madagascar (See Table 1, p. 70). Most reported trade in the species was for commercial use.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised: eight plants in 2004 (which were not reported in annual reports) and 50 plants in 2006. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. paulianii* was located.

Management: The only known locations for *E. paulianii* were recorded within the boundaries of the Tsingy of Bemaraha Reserve (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report. It was reported that in 2008, operators held a stock of 1645 plants of *E. paulianii* (CITES MA of Madagascar *in litt*. to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. paulianii* (PC18 Doc.16.1.2).

Euphorbia primulifolia **Baker, 1881: Madagascar**

Euphorbia primulifolia **var.** *begardii* **Cremers, 1984**

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia primulifolia was selected following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. primulifolia* is a Madagascan endemic and is globally Vulnerable. The species has two varieties, the typical variety and var. *begardii*. It has a fragmented range in the south-west and the Central Plateau area. The extent of occurrence is less than 20,000 km^2 and there are probably less than ten locations. There is a continuing decline in the species' population. Both varieties of the species are threatened. The major threats are habitat degradation, fire and collection for horticulture. Although the species is known from two protected areas, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 2417 live wild specimens between 1999 and 2008; however trade reported by importers was higher (4838 specimens). Reported international trade was high considering the species' threatened status. Although the Madagascan MA considered the species not threatened by collection, no information on the basis for a species-specific non-detriment finding was provided, and the impact of trade on the population is unknown, therefore categorised as Urgent Concern.

Biology: *E. primulifolia* grows hidden in grass and is visible only during the rainy season. Flowering usually precedes the development of leaves. The stem annually produces a rosette of deciduous leaves which lie flat on the ground. The rosette leaves die off after flowering and fruiting, and the plant then lies dormant until the next rainy season (Rauh, 1995). The species grows on Isalo sands, in valleys and also in red laterite grasslands (Haevermans, 2004).

E. primulifolia var. *primulifolia* has a taproot 10-15 cm long and 5-7 cm wide. The rosette has 4-12 leaves which are variable in size and shape, up to 11 cm long and 3-4 cm wide (Rauh, 1995).

E. primulifolia var. *begardii* differs from var. *primulifolia* by its smaller, strongly undulate leaves. Old specimens have a thick taproot which bears several subterranean branches. These branches end at ground level forming rosettes of 6-10 leaves during the rainy season (Rauh, 1995).

Distribution in range State: *E. primulifolia* is endemic to Madagascar and was reported to have a fragmented range in the south-west, Isalo area and the central high-plateau area (Haevermans, 2004). The species' extent of occurrence was reported to be less than 20,000 km^2, and within probably less than ten locations (Haevermans, 2004; CITES Management Authority of Madagascar, *in litt.* to UNEP-WCMC, 2010).

E. primulifolia var. *primulifolia* was found to grow near Antananarivo among grasses in pure laterite at an elevation of about 1400 m (Rauh, 1995). It was also found in the Itremo mountains on gneiss and quartzite on the Horombé Plateau near Soalala in the west; and in other places including coastal sand dunes (Rauh, 1995).

E. primulifolia var. *begardii* reportedly grew in flat, sandy places within the eroded chains of the Isalo Mountains, as well as near Ihosy, southern Central Plateau (Rauh, 1995).

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004). A continuing population decline was reported (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010). Rauh (1995) described var. *primulifolia* as 'not rare' near Antananarivo. In response to the Secretariats' request for information on implementation of Article IV, Madagascar indicated on 18 July 2008 that the species was widespread in habitat and not threatened by collection (PC18 Summary Record, Annex 2).

Threats: According to Haevermans (2004), both varieties of the species were threatened. Habitat degradation, fire and collection for the horticulture were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010). Rauh (1995) reported that in Isalo National Park, "Unfortunately, commercial collectors have reduced the populations of succulent plants so that extinction is possible". Rauh (1995) also listed some succulents that occurred in the park, including *Euphorbia primulifolia* var. *begardii* that grew in sand fields on the plateau.

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 2417 live wild-sourced plants, one dried plant, one flower, one leaf and three stems of *E. primulifolia*. However, during the same period, imports of 4838 live, wild-sourced plants of the species from Madagascar were reported by importers (See Table 1, p. 70). In addition, Madagascar reported the export of 13 live artificially propagated plants of the species (1999-2008), although importers reported four live artificially propagated plants from Madagascar (See Table 1, p. 70). Most reported trade in the species was for commercial use.

The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised: 400 plants in 2003, 3605 plants in 2004, 790 plants in 2005, 266 plants in 2006, 467 plants in 2007 and 468 plants in 2008, totalling 5996 specimens. The source of the specimens was not provided.

Rauh (1995) pointed out that commercial collectors had reduced the populations of succulent plants on the Isalo Plateau so that extinction is possible. Although *E. primulifolia* var. *begardii* was not specifically mentioned as being threatened, it was one of the species which grow on sand fields on the Isalo plateau.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. primulifolia* was located.

Management: *E. primulifolia* has been recorded in Isalo National Park and New System of Conservation (NSC) Ibity (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report. These include the regulation that Euphorbia species must be exported from the garden centres of stock traders. In 2008 it was reported that operators held a stock of 2091plants of *E. primulifolia* var. *primulifolia* and 256 plants of *E. primulifolia* var. *begardii* (CITES MA of Madagascar *in litt.* to CITES Secretariat, 2008).

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, included *E. primulifolia* and *E. primulifolia* var. *begardii* (PC18 Doc.8.4).

In a letter dated 18 July 2008 Madagascar indicated that the species was widespread in habitat and not threatened by collection (PC18 Summary Record, Annex 2).

Euphorbia robivelonae Rauh, 1994: Madagascar

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia robivelonae was selected for review following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. robivelonae* is a Madagascan endemic and is globally Critically Endangered. The species is only known from one site in the north-east which has an area of occupancy of less than 1 km². The species is declining and is very likely to disappear should there be any stochastic event. It is also threatened by habitat degradation, habitat clearing, fire and collection for horticulture. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported exports of 11 live wild specimens between 1999 and 2008, which were also reported by importers. No information on the basis for a species-specific non-detriment finding was provided. Although international trade was reported at relatively low levels, the species is highly threatened and any trade is likely to impact the population, therefore categorised as Urgent Concern.

Biology: *Euphorbia robivelonae* is a small to medium-sized spineless deciduous shrub which grows up to 1 m and has several many branched stems (Zazamalala Forest Center, 2009). The leaves are linear-lanceolate, 5-8 cm long and 0.7-0.8 cm wide, dark green above and pale green below (Rauh, 1995).

It is a riparian species and grows on stream shores (Haevermans, 2004). Plants are found among basalt boulders at the water's edge (Rauh, 2005). *E. robivelonae* is the only xerophytic Euphorbia species in Madagascar that is riparian (Rauh, 1995).

In spite of its curious habit, the species was considered not difficult to cultivate and was reported to be easily propagated by cuttings, if grown in very humid conditions and in peat moss (Rauh, 1995).

Distribution in range State: *E. robivelonae* is endemic to Madagascar and was known only from the Analava forest, Iharana-Sambava area in the north-east (Haevermans, 2004). The area of occupancy (from GIS analysis) was less than 1 km² (Haevermans, 2004; CITES Management Authority of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004). It was considered to be declining and very likely to disappear should there be any stochastic event, including human-induced fires (Haevermans, 2004).

Threats: Habitat degradation and clearing, fire and collection for the horticulture trade were considered to be major threats to the species (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 11 live wild-sourced specimens of *E. robivelonae*, all in 2006. During the same period, the same number of imports of live, wild-sourced specimens of the species (11) from Madagascar was reported by the importer, also in 2006 (See Table 1, p. 70). In addition, the export of two live artificially propagated plants of *E. robivelonae* was reported by Madagascar. However, importers reported higher quantities (252 specimens) of artificially

propagated plants of the species from Madagascar (See Table 1, p. 70). Most reported trade in the species was for commercial use.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised: two plants in 2005 and 11 plants in 2006. These data are identical to the trade within the CITES Trade Database based on annual reports.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. robivelonae* was located.

Management: No information on protected areas where *E. robivelonae* occurs was located.

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of such species was provided, which included *E. robivelonae* (PC18 Doc.16.1.2).

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Euphorbia rossii **Rauh & Buchloh, 1967: Madagascar**

Euphorbiacae

Selection for Review of Significant Trade

Euphorbia rossii was selected for review following CoP14 at PC17 (PC17 Summary Record) based on trade data presented in document PC17 Doc.8.5.

Summary

Provisional category	Summary
Urgent Concern	*E. rossii* is a Madagascan endemic and is globally Vulnerable. However it is possible the species may qualify for IUCN threat category Endangered or Critically Endangered; further fieldwork and taxonomic studies are required to better assess the species' status. The species has only been scientifically collected once from a site in the south-west, but grows in a scarcely collected area. The species is highly prone to habitat destruction by fires and also by habitat degradation and collection for the horticulture trade. There are national regulations for wild-harvesting in relation to CITES. Madagascar reported the export of 21 live, wild sourced specimens between 1999 and 2008; however importers reported a higher quantity of 261 live wild specimens imported. Reported international trade was relatively high considering the species' threatened status and restricted range. No information on the basis for a species-specific non-detriment finding was provided, and impact of trade in the population unknown, therefore categorised as Urgent Concern.

Biology: *Euphorbia rossii* is a small to medium-sized deciduous shrub which is densely branched and densely leaved. The stem is much branched from the base, has a 30 cm broad tuber, is very spiny and grows up to 1 m tall. The leaves are deciduous, linear and 4 cm long and 0.2-0.3 cm wide (Rauh, 1995; Zazamalala Forest Center 2009).

The species grows on sandstone rocks (Rauh, 1995).

Distribution in range State: *E. rossii* is endemic to Madagascar and has only been found in the Mangoky river valley near Nosy Ambositra (Befandriana South) in the south-west (Haevermans, 2004). The species has only been collected once, although it grows in a scarcely collected area.

Population trends and status: The species was classified by the IUCN as Vulnerable (Haevermans, 2004). It was considered likely that *E. rossii* would qualify for listing as Endangered or Critically Endangered; however, without further information it was classified as Vulnerable whilst awaiting further fieldwork and taxonomic studies (Haevermans, 2004). The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: *E. rossii* grew in an area which was considered highly prone to habitat destruction by fires. Other major threats included habitat degradation and collection for the horticulture trade (Haevermans, 2004; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 21 live wild-sourced specimens of *E. rossii*. However, during the same period, imports of 261 live, wild-sourced specimens of the species from Madagascar were reported by the importer (See Table 1, p. 70). In addition, the import of 100 live artificially propagated plants from Madagascar of *E. rossii* was reported by the importer, but Madagascar did not report any exports of live artificially propagated plants of the species

(See Table 1, p. 70). Most reported trade in the species was for commercial use.

The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised: 258 plants in 2004 and 21 plants in 2006. The source of the specimens was not provided. These quantities are higher than those reported by Madagascar in their annual reports.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *E. rossii* was located.

Management: No information on protected areas where *E. rossii* occurs was found.

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

On 9 January 2009, the CITES Scientific Authority for Flora in Madagascar proposed maintaining in CITES Appendix II only those species that are not included in Appendix I and that are exported. A list of species was provided and included *E. rossii* (PC18 Doc.16.1.2).

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

The trade data submitted by Madagascar within their CITES annual reports were in some cases lower than the trade levels reported by the CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) for a number of *Euphorbia* spp. Annual reports were received by Madagascar for all of the ten years 1999-2008, however it seems apparent that the trade, especially in 2004 provided by Madagascar in their annual report for *Euphorbia* spp. was incomplete. It is noted that trade levels in 2003-2008 were higher than reported within the CITES Trade Database in some years for *E. aureoviridiflora*, *E. banae*, *E. biaculeata*, *E. bulbispina*, *E. elliotii*, *E. genoudiana*, *E. herman-schwartzii*, *E. hofstaetteri*, *E. horombensis*, *E. leuconeura*, *E. mahabobokensis*, *E. pachypodioides*, *E. paulianii*, *E. primulifolia* and *E. rossii*.

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Table 1: Direct trade in *Euphorbia* spp. from Madagascar, 1999-2008.

Species	Source	Term	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Euphorbia alfredii	W	live	Exporter	4							165			169
			Importer	4							165			169
Euphorbia aureoviridiflora	A	live	Exporter											
			Importer					4						4
	W	live	Exporter	4						103	5		100	212
			Importer	4					4	53	5		100	166
Euphorbia banae	A	live	Exporter							3	6			9
			Importer						65	3	6			74
Euphorbia berorohae	W	live	Exporter	5						100	60			165
			Importer							100	10			110
Euphorbia biaculeata	W	live	Exporter		1									1
			Importer						27					27
Euphorbia bulbispina	A	live	Exporter											
			Importer					2						2
	W	dried plants	Exporter			5								5
			Importer											
		flowers	Exporter			1								1
			Importer											
		leaves	Exporter			1								1
			Importer											
		live	Exporter	2						2	71			75
			Importer	2					100	2	63			167
		stems	Exporter			5								5
			Importer											
Euphorbia capmanambatoensis	A	live	Exporter							60				60
			Importer					60		61				121

Species	Source	Term	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
	W	live	Exporter	5						1	25	5		36
			Importer							100	25			125
Euphorbia capuronii	A	live	Exporter							2				2
			Importer											
	W	live	Exporter				5							5
			Importer					5						5
Euphorbia denisiana	W	live	Exporter							63	3			66
			Importer							50	3			53
Euphorbia didiereoides	A	live	Exporter							6				6
			Importer											
	W	live	Exporter	22	5					5	3			35
			Importer	2						5	3			10
Euphorbia elliotii	W	live	Exporter											
			Importer							13				13
Euphorbia famatamboay	W	leaves	Exporter					3						3
			Importer											
		live	Exporter											
			Importer							50	50			100
Euphorbia genoudiana	W	live	Exporter		13									13
			Importer						13					13
Euphorbia herman-schwartzii	A	live	Exporter							3				3
			Importer							3				3
	W	live	Exporter	4						100	163			267
			Importer	4							13			17
Euphorbia hofstaetteri	W	live	Exporter	4						5	102			111
			Importer	4					200	4	72	14		294

Species	Source	Term	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Euphorbia horombensis	A	live	Exporter								50			50
			Importer					5						5
	W	live	Exporter	20	1					60	126			207
			Importer		1				39		53			93
Euphorbia iharanae	W	live	Exporter							15		200		215
			Importer									200		200
Euphorbia leuconeura	W	live	Exporter	5							55			60
			Importer		5				100		55			160
Euphorbia mahabobokensis	W	live	Exporter							157	63		50	270
			Importer						9	157	83		50	299
Euphorbia mangokyensis	W	live	Exporter							10	16			26
			Importer							10	16			26
Euphorbia neobosseri	W	dried plants	Exporter			5								5
			Importer											
		flowers	Exporter			1								1
			Importer											
		leaves	Exporter			1								1
			Importer											
		live	Exporter	4						50	16			70
			Importer	4							49			53
		stems	Exporter			3								3
			Importer											
Euphorbia pachypodioides	A	live	Exporter							5				5
			Importer							3				3
	W	live	Exporter	6	31					333	205	65		640
			Importer	6					31	295	75	20		427
Euphorbia paulianii	A	live	Exporter								3			3

Species	Source	Term	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
			Importer											
	W	live	Exporter	9				2			50			61
			Importer	4				10	1		50			65
Euphorbia primulifolia	A	live	Exporter							13				13
			Importer					2		2				4
	W	dried plants	Exporter			1								1
			Importer											
		flowers	Exporter			1								1
			Importer											
		leaves	Exporter			1								1
			Importer											
		live	Exporter	59	51	81		412		813	266	267	468	2417
			Importer	6	10			175	3015	1260	99	52	221	4838
		stems	Exporter			3								3
			Importer											
Euphorbia robivelonae	A	live	Exporter							2				2
			Importer					250		2				252
	W	live	Exporter								11			11
			Importer								11			11
Euphorbia rossii	A	live	Exporter											
			Importer					100						100
	W	live	Exporter								21			21
			Importer						250		11			261

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Pericopsis elata (Harms, 1913) Meeuwen, 1962: Cameroon, Central African Republic, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Ghana, Nigeria

Leguminosae, Afrormosia

Selection for Review of Significant Trade

CITES Decision 12.74 directed the Plants Committee to review *Pericopsis elata* under the Review of Significant Trade (RST) and the species was included in the process at the 12th meeting of the Plants Committee. Dickson *et al.* (2005) produced a report on the conservation status, management and regulation of the trade in *P. elata* for the 15th meeting of the Plants Committee (PC15 Inf. 2). Recommendations were formulated by country (PC15 Doc. 10.1.1 (Rev. 1). The first review was completed and the species removed from the process (see SC54 Doc. 42).

Pericopsis elata was selected for all range States for the second time at the 17th meeting of the Plants Committee, on the basis of trade data provided in document PC17 Doc. 8.5 and noting the substantial recent increase in reported trade. *P. elata* is being used as a case study to evaluate the RST process (see PC18 Summary record, Annex 2).

No response was received to the Secretariat's request for information on implementation of Article IV from all countries selected for the review except Ghana, which did reply, however additional data from the country was sought (see PC18 Summary record).

A. Summary

Range State	Provisional category	Summary
Cameroon	Possible Concern	Cameroon has substantial populations of the species in some areas. Average densities of 0.53 stems/ha were found in 30 Forest Management Units for stems ≥ 20 cm dbh. Overexploitation and lack of compliance with minimum exploitable diameters were considered the main threats. Considerable quantities of sawn wood (over 55,000 m^3) were reported as exports 1999-2008 (although trade has not approached export quotas set in recent years). There are adequate control measures in place for the species, but not all have apparently been implemented, and there are suggestions of fundamental flaws in the legal framework in the country, indicating that the provisions of Article IV have not been fully implemented. Therefore, categorised as Possible Concern.
Central African Republic	Least Concern	Known to occur in the south west of the country and logged in those areas. No specific details of population status or threats were located. It is unknown if the species occurs in protected areas. Some management measures in place but effectiveness is unclear, and no information on population monitoring available. No information on the basis for non-detriment findings provided. However, international trade levels are low; there have been no reported exports from Central African Republic in the last five years. International trade is unlikely to be a current threat, therefore categorised as Least Concern.

Range State	Provisional category	Summary
Congo	Possible Concern	Congo has good populations of the species at least in some areas, and it occurs in two protected areas. Fairly substantial quantities were reported as exports 1999-2008, mainly for timber (over 25,000 m^3), although exports have declined (based on importer data). There are sufficient control measures in place, but implementation is apparently not adequate, especially in relation to production of management plans. Most harvest of this species has been from Forest Management Units (FMUs) which lack management plans, indicating that any non-detriment findings may be based on inadequate data. Therefore categorised as Possible Concern.
Côte d'Ivoire	Urgent Concern	Populations in Côte d'Ivoire appear to be localized and isolated. The species is considered threatened in the country and presence in any protected areas is unconfirmed. Known threats are forest fragmentation and selective logging. International trade levels are moderate but appear to be increasing, with importers reporting higher quantities in trade than Côte d'Ivoire. Trade mostly comprised veneer (8,052 m^2 reported by importers 1999-2008). Whilst the species is reportedly protected, felling can be authorized in plantations. No details of management, monitoring or the basis for non-detriment findings provided. On the basis of threatened status, localized distribution and increasing trade with no demonstrable non-detriment finding in place; categorised as Urgent Concern.
Democratic Republic of the Congo	Possible Concern	The Democratic Republic of the Congo has the widest distribution and the largest populations of the species, with various estimates of exploitable stock from ten to over 22 million m^3. The species range does include several protected areas. Main threats are considered to be timber extraction, use of wood for charcoal and carpentry and bark for medicinal use. Published export quotas and reported international trade levels are high. Exports in 1999-2008 were mainly for logs (over 54,000 m^3), sawn wood (13,073 m^3) and timber (5,135 m^3). Although trade has not approached annual quotas of 50,000 m^3, export levels reported by DRC appear to be increasing. There are detailed control measures in place, but implementation does not appear to be comprehensive. The basis for non-detriment findings is unclear and on this basis, categorised as Possible Concern.
Ghana	Least Concern	Restricted in distribution in Ghana, occurring in the west of the country. Reported to have become threatened by forest fragmentation and selective logging, and stocking rates reported to be low. No international trade was reported by Ghana or importers since 2000. The requirements of Article IV do not currently appear to be applicable, and on this basis, categorised as Least Concern. However, Ghana noted that some exports took place without proper CITES documentation, and if exports are anticipated, then Possible Concern may be more appropriate on the basis that no information on a non-detriment finding for the species was provided.

Range State	Provisional category	Summary
Nigeria	Least Concern	Occurs in the east of Nigeria. Reportedly rare in the country as a whole, but may be locally abundant. Main threats include encroachment, forest clearance and illegal logging. There were no reported exports of the species from Nigeria 1999-2008, as reported by the exporter or importers. The requirements of Article IV do not currently appear to be applicable and on this basis, categorised as Least Concern.

B. Species overview

Biology: *Pericopsis elata* is a tall forest tree, up to 50 m tall and 5 m girth at breast height (FAO Forestry Department, 1986). It is a semi-gregarious species with a widely dispersed but local distribution, occurring in the drier parts of moist semi-deciduous forests with an annual rainfall of 1,000 – 1,500 mm, perhaps favouring water courses and seasonally water-logged soils.

As noted in PC14 Doc. 9.22 (Annex 3):

> "Swaine and Whitmore (1988) considered the species to be a true pioneer, stimulated to germinate by gaps in the canopy. The lack of natural regeneration has been widely noted (e.g. Anon, 1979; Hawthorne, 1995). Forni (1997) studied *Pericopsis elata* in unexploited forest in south-east Cameroon and reported low recruitment and regeneration levels under closed canopy conditions.
>
> Ripe, indehiscent pods, which may be wind-dispersed in strong winds, are produced at the beginning of the dry season (August – November) (Hawthorne, 1995). Each pod contains between 1-3 flat seeds. Years of abundant seed generation have been recorded but in many fruiting years germination is said to be poor (Howland, 1979). Seedlings are reported to be drought tolerant. Saplings tend to have a spreading, bushy habit and in suitable conditions growth may be rapid, up to 1 cm increment in diameter per year."

General distribution and status: The species has a disjunct distribution with several isolated sub-stands in four different areas: (1) eastern Côte d'Ivoire and western Ghana; (2) western Nigeria and western Cameroon; (3), eastern Cameroon, Central African Republic, Congo, and Democratic Republic of the Congo.

The species was categorized as Endangered in the IUCN Red List (African Regional Workshop, Conservation and Sustainable Management of Trees, Zimbabwe, 1998). However this IUCN classification is annotated to indicate that it requires updating.

Overview of trade and management in the species: *P. elata* was listed in CITES Appendix II on 11/06/1992, designating saw-logs, sawn wood and veneer sheets. Since 13/09/2007 the CITES Appendix II listing designated logs, sawn wood and veneer sheets. International trade predominantly involved logs, sawn wood and timber, with Cameroon, Congo, Democratic Republic of the Congo and Côte d'Ivoire being the major exporters.

C. Country reviews

CAMEROON

Provisional category: Possible Concern

Distribution in range State: *Pericopsis elata* is found mainly in the south-east of the country, in Boumba and Ngoko, Haut-Nyong and Kadei Divisions, which are in the basins of the Dja,

Boumba, Ngoko and Sangha rivers. MINEF (2004) estimated its area of occurrence as 4,071,857 ha, which represented around 19% of the national forest estate. About 42% of this distribution consisted of areas that were subject to managed exploitation: 1,652,961 ha were made up of Unités Forestières Amenagement (UFAs) and 63,501 ha of communal forest. Just over 15% of the total distribution area was described as being subject to multiple uses, and the remaining 43% was under complete protection (MINEF, 2004). The CITES Scientific Authority of Cameroon (Amougou *et al.*, 2009) found that the distribution area was greater than previously thought. They gave a total area of 5,339,023 ha, mainly in the south-east region of Cameroon, with small, isolated stands in the southern regions around Djoum, the central region in the area between Ndom and Ngambe, and the south-west region in Mafe around Eyumedjock. The area comprised the following: 29 allocated Forest Management Units (FMUs) covering 2,057,982 ha; nine unallocated FMUs covering 895,492 ha; three community forests covering a total of 85,486 ha, of which two had their management plans implemented; three National Parks totalling 777,729 ha; one Integral Ecological Reserve of 51,797 ha; and one National Area covering 1,470,537 ha.

The species occurs in nine different forest strata in the East and South regions of Cameroon; in the South region it is only found in dense humid forests, whereas in the East region it is also found other forest habitats (CITES SA of Cameroon, Amougou *et al.*, 2009).

Population trends and status: The CITES SA of Cameroon (Amougou *et al.*, 2009) found that, based on data from the 1980s, the density of the species varied in different areas of the distribution; in the south region it occurred at less than 0.02 stem/ha in all forest strata and habitat types for diameter classes ≥ 20 cm, whereas in the east region it was generally much higher, ranging from less than 0.02 stem/ha in the evergreen forest of *Gilbertiodendron dewevrei* to 0.66 stem/ha in the semi-deciduous forests for diameter classes ≥ 20 cm. A national forest resources assessment conducted by FAO in 2003-2004 gave a density of 0.03 stem/ha for *Pericopsis elata* in Cameroon, indicating a Vulnerable status for the species; however, the results included trees of < 20 cm dbh (diameter at breast height) and many ecological zones of Cameroon, including some in which the species was absent (CITES SA of Cameroon, Amougou *et al.*, 2009). More recently, as part of the ITTO/CITES programme in Cameroon, efforts have been made to verify the results of inventories conducted by timber companies and use them in management plans. About 30 FMUs were examined in the east region and an average density of 0.53 stems/ha for stems of diameter ≥ 20 cm was found, with a range of 0.00 to 1.51.

According to Forni (1997), a plant species should be considered as threatened when its density is less than 0.05 stems/ha. The results from different inventories for *P. elata* were not comparable because of different survey methods and different samples and, therefore, it was not considered possible to determine any trends in population numbers (CITES SA of Cameroon, Amougou *et al.*, 2009).

Threats: Overexploitation through illegal logging and lack of compliance with the minimum exploitable diameter were considered to be the main threat to *P. elata* in Cameroon, rather than legally controlled commerce (PC14 Doc. 9.22 Annex 3). The CITES SA of Cameroon, (Amougou *et al.*, 2009) added habitat loss/degradation owing to agriculture and mining as additional threats. The poor regeneration of the species, particularly in areas where there is dense forest cover, means the species is particularly vulnerable to overexploitation (Bourland and Doucet, 2009).

Trade: According to the data within the CITES Trade Database, during the period 1999-2008, virtually all of the reported trade was in sawn wood, with total exports from Cameroon of 55,524 m^3 reported by Cameroon and 58,591 m^3 reported by importing countries (Table 1).

The latter figure is higher than the former because Cameroon did not submit an annual report for 2007 and 2008.

A CITES export quota of 15,200 m^3 of sawn wood was set annually from 2005 to 2009. Since 2000, exports have not reached 8,000 m^3 (52.6% of the export quota) because timber companies have not been able to obtain enough good quality wood. Many larger individual trees (diameter ≥ 100 cm) have rotten stems, and are therefore often abandoned in the forest, leading to an economic loss for both the forest company and the Cameroon government. It is hoped that applying the new Minimum Exploitable Diameter (MED) (90 cm) will help to mitigate this problem (CITES SA of Cameroon, Amougou *et al.*, 2009).

Management: Protected areas within the area of distribution of *P. elata* are Parc National de Boumba-Bek (321,078 ha), Parc National de Nki (238,853 ha), Parc National de Lobeké (217,200 ha) and Réserve Ecologique Intégrale de Messomesso. In total these cover 22% of the zone of distribution of the species. In addition there are 30 Forest Management Units (FMUs) in the area of distribution, nine of which, with an area of 895,494 ha, are covered by a biodiversity conservation project. In total therefore, 46% of the area of distribution of *P. elata* in Cameroon was reported to be protected (PC14 Doc. 9.22 Annex 3).

Law No. 94/01 of 20 January 1994 – to lay down Forestry, Wildlife and Fisheries Regulations, divided the Permanent Forest Estate into state forests and communal forests. Six different types of logging permits specified and of these, it was noted that concessions, which could include one or more Forest Management Units (FMUs), for exploitation were allocated through a competitive bidding process (PC14 Doc. 9.22 Annex 3). More than 83 FMUs have been attributed in Cameroon for a total area of 1,835,367 ha. The concessions were for a specified volume of timber and were initially set for a preliminary three years, during which time the forest company had to produce a management plan for the whole concession, a five year management plan for the forest logging unit and an operation plan for the first year of activity. At the end of the three years, if the documents proved satisfactory, a definitive agreement could be signed for a renewable period of 15 years. Management plans for FMUs were agreed by MINEF (2002) who specified the area and volume of timber that could be cut annually (Forests Monitor, 2001; CITES SA of Cameroon, Amougou *et al.*, 2009).

The Minimum Exploitable Diameter (MED) was specified in Decree No. 74/357 of 1974; *Pericopsis* spp. were listed as 'exceptionelle' species with the MED set at 100 cm. The Association Technique Internationale des Boix Tropicaux (ATIBT, 2002) recommended that the MED be reduced to 80 cm to relieve pressure on the smaller diameter classes, which were being cut indiscriminately due to the lack of trees over 100 cm in diameter; however, this has not been implemented. The CITES SA of Cameroon, calculated an 'annual possibility' for *Pericopsis elata* at MED 100 cm in all forest concessions to be 34,183 m^3 (Amougou *et al.*, 2009).

Cerutti *et al.* (2008) noted that, as of 2007, about 3.5 million hectares (60%) of the productive forests were being harvested, following the prescriptions of 49 approved management plans; the development and implementation of these plans had been interpreted by several international organizations as long awaited evidence that sustainable management was being applied to production forests. However, reviews of some plans had concluded that their quality was inadequate. Their study of the legal framework highlighted a fundamental flaw: although some of the existing management plans complied with most legal prescriptions they did not include the adoption of minimum precautionary safeguards – in 2006, 100% of the timber production for *P. elata*

was carried out as though no improved management rules were in place. Clough *et al.* (2009) voiced similar concerns.

The CITES SA of Cameroon explained that the basis of Non-Detriment Findings (NDF) was outlined in element 5, article 6 of the arête *n° 0222/A/MINEF of 25 May 2001/:* calculation of the forest possibility and determination of the managed minimum exploitable diameter Amougou *et al.* (2009). The distribution area of *P. elata* was reported to be 5,339,023 ha, largely restricted to the East region of the country. The density overall was 0.53 stems/ha and the annual possibility was 34,183 m^3 at MED 100 cm. They suggested that a better MED would be 90 cm which, if adopted by the Cameroon government, would produce an exploitable volume of 1,791,646 m^3 and an annual possibility of 59,722 m^3 in the production forests in Cameroon. The processing rate for the species was 0.4242 (instead of 0.33 as often used), which would lead to an export quota of 14,400 m^3 at MED 100 cm instead of 15,200 m^3 and 25,334.07 m^3 at MED 90 cm.

Koutou (2010) stated that further measures would be required before CITES non-detriment findings could be considered operational: harvest quotas would need to be determined on an individual FMU basis, using formulas and methodology developed recently. This would take into account the non-uniform distribution of the species and would facilitate control of harvest in FMUs with small populations.

Koutou (2010) also made the following observation: 'Fifteen years after the enactment of Cameroon's 1994 Forest Law, a process has been put in place to revise it. A revision is needed for several reasons, including: problems in the community management of resources (the rules are not well codified); repercussions from the decentralization of taxation; the vagueness of property rights in the field and in the distinction between permanent and non-permanent forest; the need to improve policy measures to encourage sustainable forest management; the livelihood impacts experienced by people living in or near protected areas; and the need to increase the contribution of the forest sector to sustainable development nationally. Moreover, there have been several national and regional developments since proclamation of the law that, to some extent, render it obsolete. Perhaps the most significant of these was the Yaoundé Declaration, which committed COMIFAC countries to a range of measures aimed at improving forest management in the region. The revision aims to:

- address the observed flaws in the practice of the law
- integrate the regional dimension in the management of forest resources
- integrate the commitments entered into by the country at the national level and under regional and international agreements
- address the concerns of climate change: forests are part of the global solution
- take more account of the real capacities of forests in development
- reinforce transparency and governance in the sector
- encourage a timber-processing industry that assists the country to develop sustainably
- encourage the full adherence of forest users to the sustainable management of the resource

In document PC14 Doc. 9.22 Annex 3, it was noted that, at that time (2003), a significant proportion of log production was not being monitored and recorded in Cameroon. In addition, there was under-resourcing of the forest institutions which would clearly have implications for monitoring.

CENTRAL AFRICAN REPUBLIC

Provisional category: Least Concern

Distribution in range State: Forests Monitor (2001) noted that, in the south-west of the country, in the regions of Sangha and Lobaye, forests covered 3.7 million ha. *Pericopsis elata* was being logged in these areas, particularly close to the borders with Cameroon and Congo (PC14 Doc. 9.22 Annex 3).

Population trends and status: No information was located.

Threats: The species has been logged in Central African Republic; however, no additional information on threats was located.

Trade: According to the data within the UNEP-WCMC Trade Database, during the period 1999-2008, timber exports were reported only in 2003, when the United States of America reported the import from Central African Republic of 23 m^3 of sawn wood (Table 1). Central African Republic did not submit an annual report for 2003.

Central African Republic has not published any export quotas for this species.

Management: Sayer *et al*. (1992) noted that *P. elata* possibly occurred in the Dzanga-Sangha Dense Forest Faunal Reserve, incorporating the Dzanga-Ndoki National Park.

Forest Monitor (2001) stated that forest concessions and other forestry matters were governed by the Forestry Code of 9 June 1990 and by some articles of the 1995 Finance Law, and that, according to 1997 Ministry data, 2.5 million hectares of the forests in the south-west had been allocated to nine industrial permit holders, covering 68% of the forests of the Sangha and Lobaye regions. Data from the Ministry obtained in the year 2000 indicated that the total area under concession in the south-west had risen to 3.2 million hectares, or 86% of the region. Concessions were granted for unlimited duration. Although companies did not own the areas they logged, their lifelong rights allowed them to obtain bank credit and to receive compensation if their rights were cancelled without reason.

Furthermore, Forest Monitor (2001) reported that efforts to ensure that logs were mainly processed in the country had been intensified. The 1990 Forestry Code established that companies had to implement a wood-processing unit and process 60% or more of their production from their third year onwards. The 1995 Finance Law, however, established that logging companies had to transform at least 85% of the logs into timber within CAR. A 1996 Finance Law went further, prohibiting exports of raw logs unless companies complied with several requirements, such as making investments in the country of US$4 million in two years and contributing to social initiatives. There were also tax incentives to process timber in the country: log exports were taxed at 20% but processed timber exports at 10%.

The 1990 law was substantially revised and the text came into force on October 17, 2008 (Law No. 08.022). Three implementing provisions of the 1990 Act were retained: Decree No. 91098 of February 2, 1991, which laid down detailed rules for granting logging and management permits ("Permis d'exploitation et aménagement"); a ministerial decision in May 2006 cancelled special cutting permits ("Permis spéciaux de coupe"); and Ministerial Decree No. 019 MEFCPE from July 5, 2006 validated the national norms for preparing management plans (de Wasseige *et al.*, 2009).

In 2003, it was noted that resources for monitoring and recording production were severely limited (PC14 Doc. 9.22 Annex 3). In addition, there was under-resourcing of the forest institutions which would clearly have had implications for monitoring. Furthermore it was noted that 'In general the range states for *P. elata* have policies and legislation in place which could be used to regulate the harvesting at appropriate levels

for export in accordance with CITES. It is not clear, however, whether procedures are in place to make non-detriment findings' (PC14 Doc. 9.22 Annex 3).

CONGO

Provisional category: Possible Concern

Distribution in range State: MFEE (2004) estimated the distribution of *Pericopsis elata* in the Congo at 4.4 million hectares, based on its presence in the FMUs of Sembé, Souanké, Tala-Tala, Ngombé and Kabo (2.67 million hectares) and in the two protected areas of Odzala and Nouabalé-Ndoki National Parks (1.74 million hectares). It was subsequently found in the FMU of Pokola, resulting in an estimated distribution of 4.89 million hectares, a figure based on its presence/absence in pre-defined FMUs (Dickson *et al.*, 2005). Distribution of *P. elata* in Congo is indicated in Figure 1.

Because the figure of 4.89 million hectares is based upon FMU boundaries, it likely overestimates the true distribution of *P. elata* in Congo. Unpublished data from several planning or management inventories, as well as from observations and surveys in the two national parks, indicate that the species has an extremely limited distribution within many of these units (Dickson *et al.*, 2005).

Figure 1. FMUs and protected areas of northern Congo highlighting the distribution of *Pericopsis elata* (Source: Dickson *et al.*, 2005).

Population trends and status: Dickson *et al.* (2005) provided status information for the six FMUs and the two national parks, summarized in Table 2.

Table 2: Status information for *P. elata* (source: Dickinson *et al.* (2005)).

Site	Site type	Size	Abundance	Notes
Kabo	FMU	280,000 ha	Very low	No further information
Ngombé	FMU	1,350,289 ha	Small quantities along water courses at the border with Pokola FMU in the east; possibly very small quantities elsewhere	No further information
Pokola	FMU	480,000 ha	Small quantities along water courses at the border with Ngombé FMU in the centre SW	No further information
Sembé	FMU	221,567 ha	Moderate abundance	According to planning inventories in 2001, only 124,148 ha are considered exploitable; the study covered 1,374 ha (1.1% of the potential harvest area) and found low to moderate abundance with a 200% error margin
Souanké	FMU	317,783 ha	Moderate abundance	MFEE (2004) cited a planning inventory of 2001 that found 5.2 harvestable trees/100 ha, and 13.5 stems of >20 cm dbh/100 ha
Tala-Tala	FMU	496,020 ha	Reportedly highest levels of any FMU, especially in the west	MFEE (2004) cited a planning inventory in 2001 in the east that found 5.1 harvestable trees/100 ha, and 11.4 stems of >20 cm dbh/100 ha
Nouabalé-Ndoki	National Park	386,592 ha	Small quantities restricted to the south	No further information
Odzala	National Park	1,354,600 ha	Presence unconfirmed, but reported in the north	No further information

No trends in population numbers have been located.

Threats: Commercial logging was reported to be the only threat (Dickson *et al.*, 2005).

Trade: According to the data within the CITES Trade Database for the years 1999-2008, Congo reported exports totalling 25,568 m^3 of timber, 1,618 m^3 of sawn wood and 255 m^3 of logs (Table 1). Importers reported corresponding imports of 11,732 m^3 of timber, 2,943 m^3 of sawn wood and 1,164 m^3 of logs (Table 1). Exports appear to be declining, with only 668 m^3 of timber, 337 m^3 of logs and 13 m^3 of sawn wood reported imported since 2006. Congo did not report any exports of the species for 2006-2008, but did not submit any annual reports for the years 2007 and 2008.

Congo has not published any export quotas for this species.

Management: The species was reported to occur in the Odzala-a Kokoua and Nouabalé-Ndoki National Parks (Dickson *et al.*, 2005).

Maisels (1996) reported that *Pericopsis elata* was a protected timber species in Congo according to Law No 004/74; Decree No. 84/910 of 19.10.84; Law No 32/82 and Law No 003/91. It was reported in PC14 Doc. 9.22 Annex 3 that the Minimum Exploitable Diameter (MED) was set at 60 cm dbh.

It was reported in PC14 Doc. 9.22 Annex 3 that 'A national Forestry Code was adopted under Law No 004/74 of January 1974 and partly amended by Law No 32/82 of July 1982. The Forestry Code stipulated sustainable forest management in particular through the

establishment of Forest Management Units (FMU) and the determination of Annual Allowable Cuts (AAC). The division of the National Forest Estate into FMUs took place in 1980 with support from FAO but forest management plans were not implemented at the time because of political instability. Subsequently a Tropical Forest Action Plan (PAFT) was developed and completed in 1997. A new Forestry Code was produced based on this Plan and was adopted under Law No 16/2000 of 20 November 2000.'

It was further reported in PC14 Doc. 9.22 Annex 3, that there were 23 FMUs in northern Congo, including two where *Pericopsis elata* was being felled. Allocation of development rights for FMUs was by calls for tender. Granting of logging rights in the forest estate was made either through an Industrial Processing Agreement (CTI), a Management and Processing Agreement (CAT) or a Special Permit (PS), decided by the Ministry of Forestry. Logging operators were obliged to harvest specifically determined areas according to an AAC, which corresponded to the Maximum Annual Volume authorized by the Forest Administration. The annual cut could only cover areas that had been the subject of a full enumeration of harvestable trees and the most sought after species. All holders of a logging permit were required to present a request each year for approval of the annual cut they planned to execute. The Forest Administration was responsible for verifying the enumerations and ensuring that the boundaries defined for the annual cut were in order before granting the logging permit. Each quarter, the operator was required to submit to the Forest Administration a summary account indicating the volume of production per species and destination.

An inventory project for the species in the Tala-Tala FMU was initiated by the International Tropical Timber Organization (ITTO) in September 2009 (Anon., 2010). Expected results include a total inventory report for *P. elata* demonstrating the population parameters (population structure, population dynamics and density), and a sustainable management plan for the species (Anon., 2010). Preliminary results in 2010 indicated that this activity was being implemented as scheduled (Anon., 2010).

Two reports on current practices and analysing the gaps between the CITES and the national policy had been concluded and submitted to the coordination team and the steering committee (Anon., 2010). Forest inventories had been conducted by February 2010. Major results were: i) 75 000 ha of the Tala Tala FMU had been 80% exploited; ii) *P. elata* was not threatened in the Tala Tala forest; iii) average densities were 0.22 stems/ha; iv) all *P. elata* trees over 60 cm of Minimum Exploitable Diameter (MED) were logged; v) mother trees were not kept; vi) forest openings stimulated regeneration of *P. elata*; vii) 60 cm MED did not allow desirable regeneration in terms of the Average Annual Volume (AAV) limiting its regeneration rate to 42%; viii) 70 cm MED would allow regeneration rate up to 74% (Anon., 2010).

It was suggested that, based on the results SIFCO should adopt 70cm diameter as the managed minimum exploitable diameter for the AAV 2009/2010 and enrich the block A by planting *P. elata* for regeneration of the forest (Anon., 2010).

Dickson *et al.* (2005) noted that the issuing of CITES export permits for *P. elata* required the CITES Scientific Authority to determine that the proposed export was within the Maximum Allowable Volume (MAV) for the FMU from which the timber originated. They expressed the view that, given the way in which MAVs were set, this determination might reasonably be regarded as fulfilling the requirement that the export was not detrimental to the survival of the species. However, for FMUs where management plans were not in place, MAVs had not been set and, therefore, potential exports could not be measured against MAVs. At that time most exports of *Pericopsis elata* originated in FMUs which were without management

plans.

It was noted in PC14 Doc. 9.22 Annex 3 that there was a lack of supervision and monitoring of forest operations in Congo, particularly in the north where most production was taking place. In addition, there was under-resourcing of the forest institutions which would clearly have had implications for monitoring.

CÔTE D'IVOIRE

Provisional category: Urgent Concern

Distribution in range State: The species is localized in the east (Abengourou), north-east (Bondoukou) and along the frontier with Ghana. It was noted in PC14 Doc. 9.22 Annex 3 that some isolated populations have been reported in the west (Guiglo) and in the Forêt Classée de Yapo in the south.

Population trends and status: *Pericopsis elata* was included in a list of threatened species of Côte d'Ivoire published in 1988 (Aké Assi, 1988 in PC14 Doc. 9.22 Annex 3).

Threats: Forest fragmentation and selective logging were identified as threats by Anglaaere (2008).

Trade: According to the data within the UNEP-WCMC Trade Database, between 1999 and 2008, Côte d'Ivoire reported the export of 65 m^3 of sawn wood and 15 carvings (Table 1). However, importers reported higher overall quantities of the species imported from Côte d'Ivoire over the same period, comprising 8052 m^2 veneer, and 51 m^3 of sawn wood (Table 1). Trade from the country appeared to be increasing, with the majority of trade reported in 2006 and 2007, mostly as veneer. Whilst importers reported 4098 m^2 and 3953 m^2 veneer in 2006 and 2007 respectively, Côte d'Ivoire did not report any exports. However, the country did not submit an annual report for 2006.

Côte d'Ivoire has not published any export quotas for this species.

Management: No information on the presence of the species in any protected area was located.

ITTO (2006) reported that 'The forest code dates from 1965 (Law 65-425). Since then, all major decisions on land-use, forest management, forest service organization and the commercialization of products have been taken by decrees or ministerial orders (arrêtés), including Decree 78-231 of 1978, which defined the management of the PFE and Decree 94-385 of 1994, which reformed forest harvesting. A process supported by FAO commenced in 2003 to revise the forest code. A forestry master plan (Plan Directeur Forestier) was formulated in 1988; when it was evaluated in 1998, a number of corrective measures were proposed to be included in the new forest policy. In 2000, an inter-ministerial working group developed a new policy under the Programme Cadre de Gestion des Forêts'

Pericopsis elata was included in a list of protected species given by Decree No. 66-122, 31 March 1966. Under this Decree, uprooting and damage to the species was prohibited, as was the destruction of their seeds and fruit. Felling could be authorized, however, on sites of industrial plantations (CoP8 Prop. 92).

No information on population monitoring was located.

It was noted in PC14 Doc. 9.22 Annex 3 that 'In general the range States for *Pericopsis elata* have policies and legislation in place which could be used to regulate the harvesting of the species at appropriate levels for export in accordance with CITES. It is not clear, however, whether procedures are in place to make non-detriment findings.'

DEMOCRATIC REPUBLIC OF THE CONGO

Provisional category: Possible Concern

Distribution in range State: According to the Ministère de l'Environnement, Conservation de la Nature, Eaux et Forêts (MECNEF, 2004), the distribution area of *Pericopsis elata* was of the order of 33,650,000 ha, straddling the Congo River in Province de l'Equateur and Province Orientale (Figure 2). Of the total distribution area, at least 24% (8,227,411 ha) has been inventoried (MECNEF 2004). These inventory data date from the period 1974-1991 and therefore do not take account of the exploitation that occurred subsequently.

Population trends and status: Dickson *et al.* (2005) noted that it was not easy to determine the overall population size of *Pericopsis elata*, particularly given its patchy distribution pattern. Inventory data, supplied by MECNEF (2004), covering 24% of the total distribution area, showed a stock of over 11 million m^3 at an average density of 1.35 m^3/ha. These figures were extrapolated to give a total exploitable stock of at least 22,713,750 m^3, but there were various uncertainties associated with these estimates.

Dickson *et al.* (2005) took account of these uncertainties and what was known about exploitation since 1991 and considered it reasonable to assume that the exploitable stock at that time was over 10 million m^3. More detailed inventories were being carried out by logging companies in their concession areas. The results of one of these 100% inventories, conducted in concessions around Kisangani, showed an overall stock density of 2.31 m^3 of *Pericopsis elata* per hectare, but this density estimate was open to question.

Another inventory was described by Boyemba (2009), who measured the spatial distribution of the species and the demographic parameters of the adult population (trees = 10 cm dbh) in a permanent 250 ha forest reserve in Kisangani. The results showed that the species had an average density of 1 tree/ha and an average standing volume of 5 m^3/ha for trees 10 cm dbh, and 10 m^3/ha for trees 60 cm dbh. The trees studied showed a patchy spatial distribution and had a low abundance of trees less than 30 cm dbh (8.7%). At the rate of 7% damage and 1% mortality caused by the exploitation in this region, and the average growth rate of 0.7 cm dbh / year, only 11% to 12.5% of commercial actions could be recovered within 25-30 years (period of rotation). This study illustrated the difficulty of achieving sustainable exploitation of this species without specific measures to stimulate its regeneration.

Butynski and McCullough (2007) found a stocking rate at Lokutu of 0.32 individuals/ha and commented that, considering the Kisangani area had been described as the last stronghold of the species, the situation appeared to be more serious than had been previously thought.

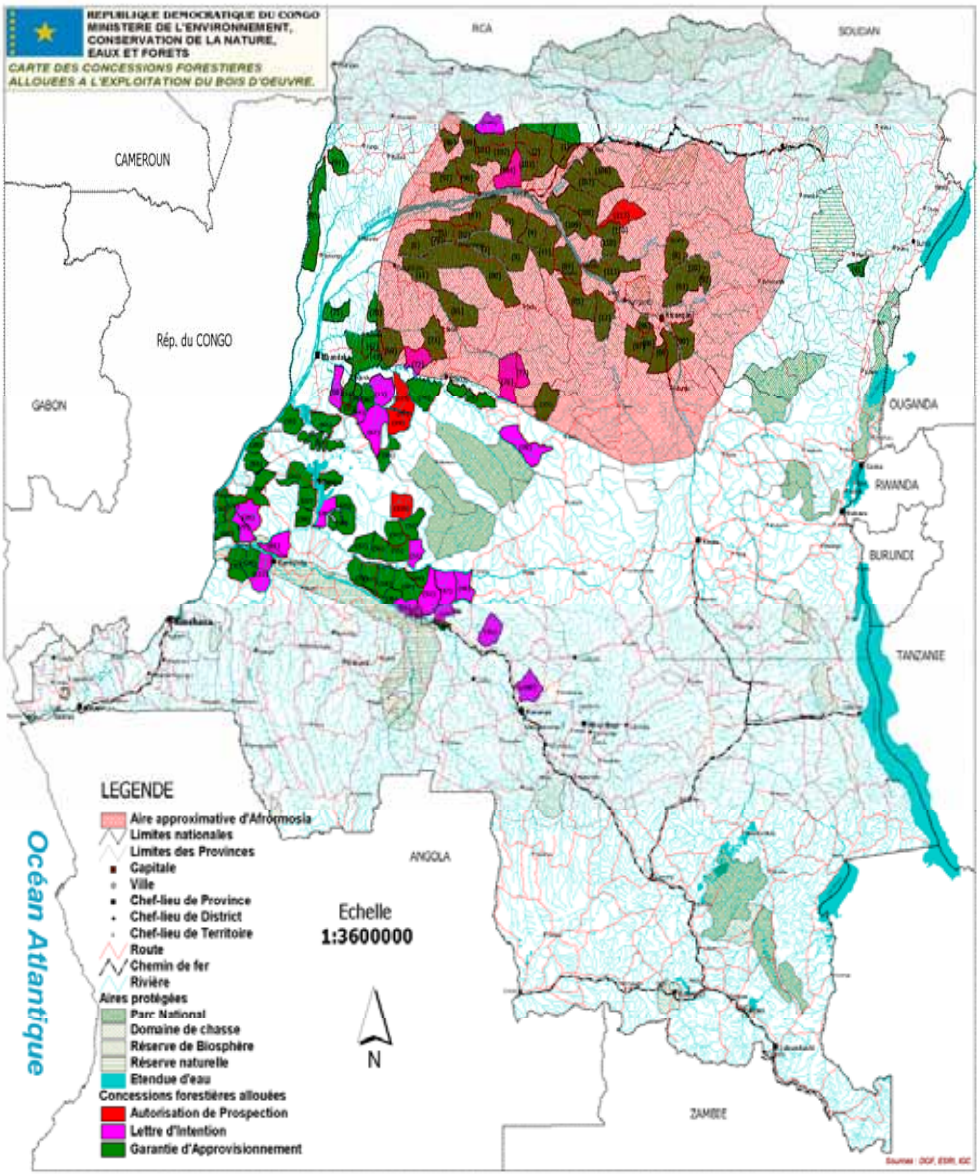

Figure 2. Distribution of *Pericopsis elata* in the Democratic Republic of the Congo (source: Dickson *et al.*, 2005).

Threats: Reported threats to *Pericopsis elata* in Kisangani were use of the wood by local people for charcoal production, use of wood for carpentry, medicinal use of bark for treating cancer, and increasing exploitation of the timber by foreign logging companies (PC14 Doc. 9.22 Annex 3).

Trade: According to the data in the CITES Trade Database, during 1999-2008, the Democratic Republic of the Congo reported exports of predominantly logs (54,750 m^3), sawn wood (13,073 m^3) and timber (5,135 m^3) (Table 1). Importers reported lesser quantities in trade from DRC over the same period: 17,462 m^3 of logs, 12, 748 m^3 of sawn wood and 312 m^3 of timber (Table 3). An importer reported 117,602 kg of timber confiscated/seized in 1999, although no seizures have been reported since. Total exports (in m^3) appeared to increase in 2007 and 2008 based on previous trade levels, as reported by the DRC (Table 1).

The Democratic Republic of the Congo published an export quota of 50,000 m^3 annually from 2003 to 2010. Trade has remained within quota.

Large quantities (23% of exports in 2003) were also reported to be exported as parquet

flooring, a category not covered by CITES controls (Dickson *et al.*, 2005).

Management: Protected areas where this species has been found are: Yangambi Man and Biosphere Reserve in the Kisangani region; Rubitele Forest Reserve; and probably Maïko National Park, but no inventory has been carried out there (PC14 Doc. 9.22 Annex 3).

The forestry sector was initially governed by Royal Decree of 1949 (Sébastien and Kiyulu N'Yanga-Nzo, 2001). A new Forest Code was developed in 1979 and amended in 1989. According to SGS Trade Assurance Services (2002) 40 million ha of forest out of a total of 125 million ha was under direct government control, following political upheaval. Forest concessions covered approximately 11.8 m ha, of which 8.2 million ha were possibly operational. A logging company was required to spend a year evaluating the concession and three years creating appropriate infrastructure before use of the concession was allowed. Logging concessions were allocated on a 25-year lease. It was a legal requirement that one or two trees were to be planted for every tree felled, but there was evidence that this was not being implemented (Forests Monitor, 2001), including for *Pericopsis elata* (PC14 doc. 9.22 Annex 3). Sébastien and Kiyulu N'Yanga-Nzo (2001) reported that there were no regulations for protection of the species at a national level.

New forestry legislation was passed in August 2002 (Law no. 011/2002 of 29 August 2002), which introduced the principles of community-based forestry and management planning and revenue-sharing with local communities, called for an expansion of protected areas, and provided protection for traditional rights of local communities (PC14 Doc. 9.22 Annex 3). Up to 2009, the Forest Code had been supplemented by 38 pieces of legislation, including three ordinances, five decrees and 30 ministerial decrees. In addition to these purely legal texts, the Ministry in charge of forests issued operational guidelines to establish technical standards for implementing management work (inventories, mapping, low-impact logging, developing management plans etc.) in forest concessions.

In 2002, illegal logging concessions covering 25 million ha were cancelled, and in the same year a moratorium on awarding new concessions was established, and this was subsequently reconfirmed as a Presidential Decree in 2005 (Decree 50/116 of Oct 24, 2005 setting the modalities for the conversion of old forest titles into forest concession contracts and extension of the moratorium on the granting of new forest logging titles) (Anon., 2009). The Forest Code stipulated that old logging contracts had to be converted into Forest Concessions, which implied that these old contracts needed to undergo a legal review before they could be converted. The criteria and procedures for this legal review were set by the presidential decree of 24 October 2005, published in the Official Journal of 1 November 2005. The review was to be conducted by an interministerial committee with participation of representatives of the private sector, NGOs and local communities. An independent expert was to take part to ensure objectivity and transparency, and its reports were to be made public (Debroux *et al.*, 2007).

A Ministerial Decree (no. 0011/CAB/MIN/ECN-EF/2007 of 12/04/2007) (Anon., 2007), regulated the issuing of permits for industrial extraction of timber and authorized the buying, selling and export of timber. *Pericopsis elata* has been treated as a 'special' species under this decree. The Minimum Exploitable Diameter was set at 80 cm dbh by MECNEF. Extraction of the species was reported in the Province l'Equateur (territories of Bumba, Djolu, Bolomba, Bongandanga, Lingende, Lisala, Basankusu, Bomonga, Kungu and Libenge) and in the Province Orientale (territories of Ubundu, Yauma, Banalia, Bafwasende, Basoko, Aketi, Isangi and Wanie-Rukula (MECNEF 2004, in Dickson *et al.*, 2005).

ITTO (2006) reported that the arrangements for forest and concession management and the enforcement of rules were in a state of flux; the capacity for Sustainable Forest Management

remained minimal and its widespread adoption seems a long way off. Nevertheless, the forest sector has the potential (with appropriate planning and regulation) to play a crucial role in the country's recovery and subsequent development (ITTO, 2006).

It was reported in PC14 doc. 9.22 Annex 3 that there was little or no field capacity to supervise or enforce regulations. In addition, there was under-resourcing of the forest institutions which would clearly have implications for monitoring.

The inference from the foregoing information is that, although there are clearly extensive populations of the species in the country, there are still questions about the implementation of the legislation and it is, therefore, not clear whether procedures are in place to make non-detriment findings.

GHANA

Provisional category: Least Concern

Distribution in range State: The species has been recorded in the mid-west of the country between latitudes 64°5'N and 7°30'N and between longitude 3°00'W and 1°30'W (FAO Forestry Department, 1986). This restricted distribution occupies a triangle with its base along the western frontier from about 7°40'N to about 6°45'N, and the apex in the Bounfum Forest Reserve, about 7°00'N 1°30'W. Two groups of trees were found in the Worobong Forest Reserve, about 6°30'N 0°25'W but these were poor specimens and likely to be outliers (FAO Forestry Department, 1986).

Population trends and status: It was reported in PC14 doc. 9.22 Annex 3 that, according to Hawthorne (1995), *Pericopsis elata* was once common in semi-deciduous forest but had become threatened by excessive logging; a low stocking rate of two individuals/ha was recorded. Based on inventory data, Alder (1989) estimated the resource life (i.e. the number of years that a species could continue to be commercially utilized at the current rate of extraction) for *Pericopsis elata* to be zero.

It was also reported that tropical high forest covered about 7% of Ghana's land area, almost all of which was found in forest reserves, and the Forest Department had estimated that about half of this forest area was in reasonable condition; outside of the reserves, forest resources were restricted to small patches and trees on farms (PC14 Doc. 9.22 Annex 3).

Threats: The main threats were considered to be forest fragmentation and selective logging (Anglaaere, 2008).

Trade: According to data within the CITES Trade Database, during 1999-2008 reported trade levels of *P. elata* from Ghana were very low, with only 99.18 m^3 of sawn wood reported by importers (Table 1). Ghana did not report any exports of the species during the ten years (Table 1). No trade has been reported since 2000 by either Ghana or its trading partners.

Ghana has not published any export quotas for this species.

Management: *Pericopsis elata* has been reported in Bia National Park (CoP8 Prop. 92) and in Bounfum and Worobong Forest Reserves (FAO Forestry Department, 1986).

ITTO (2006) reported that the first forest policy was established in 1947; it was subsequently revised in line with Ghana's 1992 constitution and approved in 1994 as the Forest and Wildlife Policy. The policy contains five specific objectives related to: the management of the Permanent Forest Estate (PFE) for the conservation of soil, water and biodiversity; the development of viable and efficient forest-based industries; public awareness and the involvement of rural people in forestry and wildlife conservation; research-based and technology-led forestry and wildlife management; and the

development of capacity in Sustainable Forest Management (SFM). The policy had been implemented most effectively within the forest reserves, with off-reserve forests often unregulated and over- or illegally harvested. Forests were owned by communities through traditional authorities, managed by government, and logged/utilized by private contractors. These arrangements, specified in the 1992 constitution, were reflected in the 1997 Timber Resource Management Act and the 1999 Forestry Commission Act. It was considered that Ghana's forest-related laws, policies and regulations were somewhat confusing and that fines for breaches were low. A Forestry Development Master Plan (1996–2020) was launched to guide the implementation of the Forest and Wildlife Policy. The master plan has been implemented through the multi-donor-assisted ten-year National Resources Management Programme (NRMP), with four components: high forest, savanna, wildlife resource management and biodiversity conservation in the high-forest zone.

In document PC14 Doc. 9.22 Annex 3 it was noted that the export of logs of *Pericopsis elata* was banned in 1979 and that in forest reserves exploitation was on the basis of the 'Modified Selection System', with trees of 2.1 m girth and above being cut, leaving the lower girth classes untouched. There was an export levy of 30% on air-dried lumber exports of *Pericopsis elata*.

It has not been determined whether populations of the species are monitored.

The Ghana CITES MA (*pers. comm.* to the CITES Secretariat, 2008) noted that exports of this species had taken place that were not accompanied by a CITES permit, though they had been accompanied by a certificate of sustainability; however, steps were being taken to address this.

NIGERIA

Provisional category: Least Concern

Distribution in range State: *Pericopsis elata* was recorded as occurring mainly in the east of the country (PC14 Doc. 9.22 Annex 3).

Population trends and status: Keay *et al.* (1964) noted that the species was 'locally abundant' in the east, but that it was a rare species in the country as a whole. The area of tropical high forest in Cross River State, the State with the greatest closed forest cover, was 729,000 ha. Table 3 shows inventory data for *Pericopsis elata* in Cross River State based on an inventory carried out in 1994 (PC14 Doc. 9.22 Annex 3).

Table 3: Inventory data (1994) for *Pericopsis elata* in Cross River State, Nigeria

Diameter size classes (cm)	10-29	30-49	50-69	70-89	>90
Stocking (individuals/ha)	0.169	0.119	0.034	0.021	0.008

Threats: In document PC14 Doc. 9.22 Annex 3, it was reported that in the north of Cross River State, serious farm encroachment had been recorded as a threat to *Pericopsis elata*, including girdling, cutting and destruction of trees in the process of forest clearance, and burning of stands of *Pericopsis elata*. Despite legal protection in Cross River State, illegal logging continued to be a threat.

Trade: According to the CITES Trade Database, during 1999-2008 Nigeria did not report any exports of *P. elata*, nor did any importers.

Nigeria has not published any export quotas for this species.

Management: The species has been reported in Ifu, Owo, Afi River and Eggua Forest Reserves (FAO Forestry Department, 1986).

The 1998 Timber Export Promotion Decree No. 1 prohibited the export of timber (whether processed or not) and wood in the rough form (PC14 doc. 9.22 Annex 3).

No information on population monitoring of this species in Nigeria was located.

As no exports of this species have been reported since 1998, there has apparently been no requirement to make non-detriment findings.

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

It was noted by the CITES Management Authority of Ghana that exports of *P. elata* had taken place without CITES permits. However, it was reported that this was being addressed.

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Table 1. Direct exports of *Pericopsis elata* from Cameroon, Central African Republic, Congo, Côte d'Ivoire, Democratic Republic of the Congo, and Ghana, 1999-2008.

Exporter	Source	Term	Units	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Cameroon	I	logs	-	Importer	22										22
				Exporter											
	W	logs	m³	Importer	911.72	129.36									1041.08
				Exporter		114.87									114.87
		sawn wood	kg	Importer						24269					24269
				Exporter											
			m³	Importer	8512.71	3790.80	6302.88	3744.35	6107.94	7665.81	6307.62	5462.33	6865.83	3831.22	58591.48
				Exporter	10093.07	7526.37	2719.57	6501.40	7284.86	7357.5	7626.20	6415.04			55524.00
		timber	m³	Importer	1546.22					19			25.71	76.01	1666.94
				Exporter	11285.59										11285.59
Central African Republic	W	sawn wood	m³	Importer					23						23
				Exporter											
Congo	W	logs	m³	Importer	139.57				116.66	121.86	449.54	336.51			1164.13
				Exporter							255.47				255.47
		sawn wood	m³	Importer	1153.98				25	1007.01	743.86			13.03	2942.88
				Exporter							1618.41				1618.40
		timber	m³	Importer	584.58	2761.88	4302.04	2210.00	1185.12	21			667.64		11732.254
				Exporter	3025.95	6288.60	6607.90	5137.42	4508.22						25568.07
Côte d'Ivoire	W	carvings	-	Importer											
				Exporter									15		15
		sawn wood	m³	Importer		25.09	25.97								51.06
				Exporter		25.093	25.97						13.80		64.86
		veneer	m²	Importer								4098.75	3953.38		8052.13
				Exporter											

Exporter	Source	Term	Units	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Democratic Republic of the Congo	I	timber	kg	Importer	117602										117602
				Exporter											
	W	carvings	m³	Importer											
				Exporter							0.25				0.25
		logs	m³	Importer	91.43				1851.67	734.15	5484.46	3770.17	3961.51	1568.14	17461.52
				Exporter					3244.42	3665.52	5886.11	11721.07	16012.89	14220.45	54750.45
			-	Importer										140.39	140.39
				Exporter											
		sawn wood	m³	Importer	1701.38				331.75	517.38	564.33	2446.23	3789.12	3397.97	12748.16
				Exporter	647.69				407.25	529.61	724.50	2590.32	3691.09	4482.91	13073.36
		timber	m³	Importer		72.64	82.84			50.51			106.36		312.35
				Exporter	5052.61		82.85								5135.46
Ghana	W	sawn wood	m³	Importer	83.07	16.11									99.18
				Exporter											

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Aloe spp., Madagascar (and *Aloe pratensis*: Lesotho, South Africa)

Liliaceae, Aloes

Selection for Review of Significant Trade

Aloe acutissima, *A. antandroi*, *A. betsileensis*, *A. bosseri*, *A. bulbillifera*, *A. capitata*, *A. conifera*, *A. deltoideodonta*, *A. erythrophylla*, *A. guillaumetii*, *A. humbertii*, *A. imalotensis*, *A. isaloensis*, *A. itremensis*, *A. macroclada*, *A. pratensis*, *A. prostrata* and *A. suarezensis* were selected for review following the 14th Conference of the Parties (CoP14) at the 17th meeting of the Plants Committee (PC17) on the basis of trade data provided in PC17 Doc 8.5, but no further justification was provided for selection (PC17 WG4 Rev.1; PC17 Summary Record). The response to the Secretariats' request for information on implementation of Article IV from Madagascar was received on 18 July 2008 but either no data was included in the response or it was inconsistent, however Madagascar also stated to be awaiting results of field studies (PC18 Summary record).

With regards to *A. pratensis*, the Secretariat received a response from Lesotho and Lesotho also noted that field studies were required (PC18 Summary record). South Africa did not provide a written response but responded in the meeting that field studies were required (PC18 Summary record).

A. Summary

Overview of *Aloe* spp. recommendations.

Species (range state)	Provisional category	Summary
Aloe acutissima (Madagascar)	Least Concern	Endemic to Madagascan with a widespread distribution: var. *acutissima* in the south-east and west and var. *antanimorensis* in the north-east. Threatened by habitat degradation, fire, habitat clearing for charcoal, as well as collection for the horticulture trade. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 reported international trade was relatively low: Madagascar reported the export of 18 live wild-sourced specimens and 11 live artificially propagated specimens, whereas only four wild-sourced specimens were reported by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.
Aloe antandroi (Madagascar)	Least Concern	*A. antandroi* is a Madagascan endemic with a wide range in the south and south-west, where it grows on the Plateau Mahafaly. Threatened by habitat degradation, fire, habitat clearing for charcoal, as well as collection for the horticulture trade. Although the species was reported to occur in two protected areas in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was relatively low: Madagascar reported the export of 3 live wild-sourced specimens compared to 19 live wild-sourced specimens reported by the importers. On the basis of very low levels of reported international trade, and no trade reported since 2004, categorised as Least Concern.
Aloe betsileensis (Madagascar)	Least Concern	*Aloe betsileensis* is a Madagascan endemic with a restricted range; it has only been recorded between Ihosy and Betroka in the south-west. Threatened by habitat degradation, fire and collection for charcoal. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, reported international trade in the species

		was relatively low: 25 live wild-sourced specimens were reported by the importers, all for personal use, whereas no exports were reported by Madagascar. On the basis of very low levels of reported international trade, and no trade reported since 2003, categorised as Least Concern.
Aloe bosseri (Madagascar)	Least Concern	*Aloe bosseri* is a Madagascan endemic, restricted in occurrence to the limestone cliffs of the Manambolo gorge. Threatened by habitat degradation and fire. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, international trade in the species was low: five live wild-sourced specimens were reported by the importers whereas no exports were reported by Madagascar. On the basis of very low levels of reported international trade, and no trade reported since 2002, categorised as Least Concern.
Aloe bulbillifera (Madagascar)	Least Concern	*Aloe bulbillifera* is a Madagascan endemic and has a wide but fragmented range. Threatened by habitat degradation, fire and collection for the horticultural trade. Although the species is known from two protected areas, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was relatively low: six live artificially propagated specimens were reported by Madagascar whereas three live artificially propagated specimens and 25 live wild-sourced specimens were reported by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.
Aloe capitata (Madagascar)	Possible Concern	*Aloe capitata* is a Madagascan endemic with a wide but fragmented range, considered to be widespread in the Central Highlands. Threatened by habitat degradation, fire, mining, as well as collection for the horticulture trade. Although the species is known from five protected areas, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, Madagascar reported the export of 103 live wild-sourced specimens whereas the importers reported a total of 138 live wild-sourced specimens. During the same period, Madagascar reported the export of 22 live artificially propagated specimens whereas the importers reported 18 live artificially propagated specimens. No information on the basis for a species-specific non-detriment finding was provided, and given that the trade in wild-sourced specimens was moderate, categorised as Possible Concern.
Aloe conifera (Madagascar)	Possible Concern	*Aloe conifera* is a Madagascan endemic with a restricted range in the central mountains. Threatened by habitat degradation, fire, and collection the for horticulture trade. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, Madagascar reported the export of 103 live wild-sourced specimens whereas only 29 live wild-sourced specimens were reported by the importers. In addition, ten live artificially propagated specimens were reported by Madagascar and by the importers. No information on the basis for a species-specific non-detriment finding was provided, and given that trade in wild-sourced specimens was moderate and that the species has a restricted range, categorised as Possible Concern.
Aloe deltoideodonta (Madagascar)	Possible Concern	*Aloe deltoideodonta* is a Madagascan endemic with a fragmented range in the south-west. Threatened by habitat degradation, fire, clearing for charcoal and collection for the horticulture trade. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the

		period 1999-2008 there was a relatively high level of international trade, although this was mainly of artificially propagated specimens (5520 live artificially propagated specimens reported by Madagascar and 10820 specimens reported by the importers). Exports of live wild-sourced specimens consisted of 5355 specimens, according to Madagascar and 40 specimens according to the importers (the large discrepancy was due to an export of 4800 specimens reported as wild-sourced by Madagascar and artificially propagated by the importer). The majority of trade was for commercial purposes. No information on the basis for a species-specific non-detriment finding was provided, and on the basis of high levels of trade, categorised as Possible Concern.
Aloe erythrophylla (Madagascar)	Least Concern	*Aloe erythrophylla* is a Madagascan endemic with a restricted range in the west Itremo mountains where it is considered abundant. Threatened by habitat degradation and fire. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, reported exports were relatively low: 21 live wild-sourced specimens were reported by Madagascar and 20 live wild-sourced specimens by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.
Aloe guillaumetii (Madagascar)	Least Concern	*Aloe guillaumetii* is endemic to Madagascan; it has been found from Ambilobe in the west to Cape Manambato in the east. Threatened by habitat degradation and fire. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was relatively low and only reported by the exporter: 22 live wild-sourced specimens in 2005. On the basis of very low levels of reported international trade, categorised as Least Concern.
Aloe humbertii (Madagascar)	Least Concern	*Aloe humbertii* is a Madagascan endemic with a restricted range in the far south. Threatened by habitat degradation, fire, mining, clearing for charcoal and collection for the horticulture trade. Although the species is known from one potential protected area, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, the reported international trade was relatively low: 17 live specimens reported by Madagascar and 15 live specimens reported by the importers, all wild-sourced. On the basis of very low levels of reported international trade, categorised as Least Concern.
Aloe imalotensis (Madagascar)	Least Concern	*Aloe imalotensis* is a Madagascan endemic with a restricted range in the central-south. Threatened by habitat degradation, fire and possibly by collection for the horticulture trade. The species is reported from one protected area, the Isalo National Park, but commercial collectors were reported to have reduced the populations of succulent plants so that extinction was possible. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was low: only three live wild-sourced specimens reported by the exporter. On the basis of very low levels of reported international trade, and no trade reported since 2000, categorised as Least Concern.
Aloe isaloensis (Madagascar)	Least Concern	*Aloe isaloensis* is a Madagascan endemic which is known only from the Isalo Mountains. Threatened by collection for horticulture. Although the species is reported from one protected area, the Isalo National Park, commercial collectors were reported to have reduced the population of succulent plants so that extinction was possible. There are national

		regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was low: two live specimens reported by Madagascar and two live specimens by the importers, all wild-sourced. In addition, four live artificially propagated specimens were reported by Madagascar only. On the basis of very low levels of reported international trade, and no trade reported since 2004, categorised as Least Concern.
Aloe itremensis (Madagascar)	Least Concern	*Aloe itremensis* is a Madagascan endemic with a restricted range limited to the Itremo Mountains. Threatened by collection for the horticulture trade. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was low: eight live specimens and seven dried specimens reported by Madagascar and three live specimens were reported by the importers, all wild-sourced. On the basis of very low levels of reported international trade, categorised as Least Concern.
Aloe macroclada (Madagascar)	Least Concern	*Aloe macroclada* is a Madagascan endemic with a wide range in the grasslands of the Central Highlands, where it was considered abundant at several sites. Threatened by habitat degradation, fire and collection for the horticulture trade. Although it is known from five protected areas, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was relatively low: a total of 26 live specimens were reported by Madagascar and 31 live specimens by the importers, all wild-sourced. In addition, 28 live artificially propagated specimens were reported by Madagascar and three by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.
Aloe pratensis (Lesotho)	Least Concern	*Aloe pratensis* is limited to three localities in Lesotho, where it is considered to be Vulnerable. The main threat is harvesting, although this may be mainly for ethno medicines. *A. pratensis* is covered by national legislation in Lesotho. During the period 1999-2008 international trade in the species was low: only ten live wild-sourced specimens were reported by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.
Aloe pratensis (South Africa)	Least Concern	The main distribution of *A. pratensis* is in South Africa, in the Eastern Cape and KwaZulu-Natal provinces, where it is widespread. It is considered Least Concern and occurs in protected areas. During the period 1999-2008 international trade in the species was low and all trade was from artificially propagated sources: 175 live specimens were reported by South Africa and 60 specimens were reported by the importers. On the basis of no reported trade in wild specimens, and the species' favourable conservation status, categorised as Least Concern.
Aloe prostrata (Madagascar)	Least Concern	*Aloe prostrata* is a Madagascan endemic with a restricted distribution; spp. *prostrata* occurs in Andohahela National Park in the far south and ssp. *pallida* has been recorded near Toliara in the south-west. No information was available on threats. Although the species is known from a protected area, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was relatively low: six live wild-sourced specimens were reported by Madagascar and 25 wild-sourced specimens were reported by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.
Aloe suarezensis	Least	*Aloe suarezensis* is a Madagascan endemic with a restricted range, only

(Madagascar)	Concern	occurring in one locality in the extreme north. Threatened by habitat degradation, fire and collection for the horticulture trade. Although it is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was low: nine live wild-sourced specimens were reported by Madagascar and five by the importers. Eight live artificially propagated specimens were reported by both importers and the exporter. On the basis of very low levels of reported international trade, categorised as Least Concern.

B. Overview of Aloes in Madagascar

The species covered in this report are all found in Madagascar, except for *Aloe pratensis* which occurs in South Africa and Lesotho. The following overview covers the Madagascar species, all of which are endemic to Madagascar, and many of which have restricted distributions (Rasolondraibe, 2003). A. pratensis is described in a separate species account.

Biology: According to Hart (2007), over 100 taxa of Aloe have been recognised in Madagascar. They were reported to be highly variable in size and form, but most feature rosettes of narrow, triangular succulent leaves that have margins of soft teeth (Hart, 2007). Inflorescences are usually erect, simple or branching and contain highly coloured (usually red or yellow, rarely white) tubular flowers (Hart, 2007). Most Aloe species have long tubular flowers that are pollinated by birds (Oldfield 1997).

The biology and ecology of Aloes in Madagascar were reported to be poorly known, because research to date has mainly focused on systematics (CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010). Madagascan Aloes were reported to be mainly found in rocky habitats on the high plateau and in the arid south-west (Rasolondraibe, 2003).

General distribution and status: Aloes occur in southern and eastern Africa, Madagascar and Arabia (Oldfield, 1997). The status of the Aloe species in this report have not yet been assessed by IUCN (IUCN, 2010).

Threats: Habitat degradation, fire, habitat clearing for charcoal, mining and collection for horticultural trade were mentioned as the major threats to Aloes in Madagascar (CITES MA of Madagascar, *in litt* to UNEP-WCMC, 2010).

According to USAID (2009), an estimated third of Madagascar's land area was burnt every year to clear vegetation for crop production and to encourage the growth of grasses, causing degradation and land erosion. Rabesihanaka *et al.* (2008) considered deforestation and bush fires as much higher threats to wildlife in Madagascar than trade. Also J. B. Castillon (*pers. comm*. to UNEP-WCMC, 2010) considered burning to be a major threat to the species, along with cattle grazing. However, Rasolondraibe (2003) noted that Aloes may be partially protected from fire, as many species grow on rocky habitats.

A further major threat to indigenous vegetation was reported to be the burning of charcoal for household consumption (USAID, 2008). J. Lavranos (*pers. comm*. to UNEP-WCMC, 2010) reported that the National Parks of Madagascar, which were "kept intact until relatively recently, except for some peripheral damage", had during the past years been "invaded by tree-fellers and charcoal burners."

The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) identified mining as a specific threat to some Aloe species (*A. capitata*, *A. conifera* and *A. humbertii*). USAID (2008) reported a recent increase in both large and small mining operations in the country, spurred by higher world market prices and economic stimulation policies.

A total of ten of the 18 Aloe species covered in this report were identified as threatened by collection for horticulture, according to the CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010). Two of the remaining species were reported to be possibly threatened by collection for horticulture (Rauh, 1995).

According to USAID (2008), "Illegal exploitation of natural resources continues to be an overarching concern, and one that could reduce the impact of efforts to help conserve Madagascar's biodiversity." In an evaluation of the national policy in wildlife trade in Madagascar, Rabesihanaka *et al.* (2008) stated that, "Due to manpower shortages, smuggling and illegal trade persist on the trade scene both nationally and internationally."

Rauh (1995) reported that in Isalo National Park, "commercial collectors have reduced the populations of succulent plants so that extinction is possible." *A. isaloensis* and *A. imalotensis* were reported to occur in the park (Rauh, 1995). J. B. Castillon (*pers. comm.* to UNEP-WCMC, 2010) reported that concerning Madagascan Aloe, "plants are so much collected that a lot of them have disappeared and are nearly impossible to find again; I think that in about 20 years, many, many of them would have totally disappeared." S. Rakotoarisoa (*pers. comm.* to UNEP-WCMC, 2010), noted that although he had little concrete information concerning the illegal trade of Aloes, his guide had noted that when *A. florencea* was recently described as a new species, it quickly disappeared from around Itremo due to massive illegal collecting by a plant trade operator in Antananarivo. Rakotoarisoa (*pers. comm.* to UNEP-WCMC, 2010) considered this phenomenon to be "quite common", although difficult to prove.

In contrast, J. Lavranos (*pers. comm.* to UNEP-WCMC, 2010) reported that "The occasional visitor may bring back the odd specimen [of Aloes], but I would not describe this as significant […] I cannot see any benefit to persons bent upon making money, in importing illegally collected Aloe material for profit. There are other, much rarer plants in Madagascar potential trade in which would be much more profitable." H. Ravaomanalina of the CITES Scientific Authority of Madagascar (*pers. comm.* to UNEP-WCMC, 2010) noted that, in her opinion, there was no a real problem of illegal trade in Aloes in Madagascar, although such data had never been quantified, and that the stock of horticultural traders spread across the island was already controlled by the Scientific and Management Authorities.

Overview of trade and management: *Aloe* spp. were listed in CITES Appendix II on 1 July 1975. All parts and derivatives have been listed since 1 August 1985 except a) seeds, spores and pollen (including pollinia); b) seedling or tissue cultures obtained *in vitro*, in solid or liquid media, transported in sterile containers; and c) cut flowers of artificially propagated plants. A number of Aloe species are listed in Appendix I.

According to the data in the CITES Trade Database 1999-2008, the majority of exports from Madagascar of the seventeen Aloe species considered in this review were of live specimens, both artificially propagated and wild-sourced, with the bulk of the trade consisting of commercial exports to France. *Aloe deltoideodonta* accounted for roughly 96 per cent of the exports.

Madagascar ratified the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) in 1975. This initiative was supported by Ordinance 75-014 of 5 August 1975 on the ratification of the Convention (Rabesihanaka *et al.*, 2008).

Other relevant legislation was reported to include (Rabesihanaka *et al.*, 2008):

- Ministerial Order No. 3032/2003 of 13 February 2003, establishing fixed roles and responsibilities for the CITES Scientific Authorities of Madagascar.
- Law No. 2005-018 of 17 October 2005 on international trade in species of wild fauna and flora, designed to bring the Malagasy legislation in line with CITES. No

specimen of any CITES-listed plant species, including seeds, spores, pollen, in vitro cultures and cut flowers, may be exported without an export permit.

- Decree No. 2006-097 of 31 January 2006 laying down detailed rules for implementing the Act No. 2005-018 of 17 October 2005 on international trade in species of wild fauna and flora.
- Decree No. 2006-098 of 31 January 2006 concerning the publication of the revised CITES appendices.

Rabesihanaka *et al.* (2008) identified a number of weaknesses in CITES implementation in Madagascar, including a lack of finances, equipment and government support, a shortage of manpower to tackle illegal trade and a lack of communication between the different enforcement authorities and the Scientific Authority on the identification of species.

USAID (2008) noted that major constraints in the effort to conserve Madagascar's biodiversity were "Corruption and inadequate government management of natural resources, and enforcement of CITES and other legal controls that affect the environment."

To adhere to international CITES standards and support appropriate management decisions, the Government of Madagascar identified a need to develop and clarify national policies on the following CITES topics:

- Objectives for CITES management in Madagascar;
- Decentralization of enforcement;
- Sharing commercial receipts received with local communities where species or products are harvested;
- Management policies for areas where imported species are held; and
- Developing/establishing criteria for allocation of quotas and permits (USAID, 2008).

The CITES Management Authority of Madagascar *(in litt* to UNEP-WCMC, 2010) reported that Madagascan Aloes (whole plants, seeds, cut flowers) could only be exported by operators licensed by the Malagasy State, the export quota of a species depending on the amount of stock that each operator had in their nursery. They reported that operators were required to propagate plants in their nurseries and that an assessment of stocks was carried out annually by the Management and Scientific Authorities (CITES MA of Madagascar *in litt* to UNEP-WCMC, 2010). Rabesihanaka *et al.* (2008) also reported that the Madagascan Management and Scientific Authorities carried out annual visits to plant propagation centres, to check their terms of reference.

The CITES Management Authority of Madagascar *(in litt* to UNEP-WCMC, 2010) confirmed that in general, exported Aloes came from the nurseries of traders, not from the wild. As for wild plant harvest, this was only permitted for operators licensed by the Malagasy State, with quantities for each species determined by agreement between the Management Authority and the operator. Whether the opinion of the Scientific Authority is in favour of the harvest amount requested by the operator was usually decided by the species' IUCN and CITES status as well as the status of the species in the wild (CITES MA of Madagascar *in litt* to UNEP-WCMC, 2010).

With regard to quota setting, it was reported that the Scientific Authority participated in a meeting with environmental NGOs each year, to share data in order to set annual quotas for wild Appendix-II listed species (Rabesihanaka *et al.*, 2008). However, no details of published Madagascar export quotas for Aloes could be located.

The CITES Management Authority confirmed that there are no action plans currently in place for *Aloe* species (Rabesihanaka *pers comm.* to UNEP-WCMC, 2010). No information on

population monitoring or the basis for making non-detriment findings was provided by the CITES authorities of Madagascar.

The term New System of Conservation (NSC) was mentioned in several species accounts to describe certain protected areas. The new conservation sites were identified "To achieve the ambition of Madagascar's former President of the Republic, Marc Ravalomanana" (Ravaomanalina, *pers. comm.* to UNEP-WCMC, 2010).

C. Species reviews

Aloe acutissima H. Perrier, 1926: Madagascar

Aloe acutissima var. antanimorensis **Reynolds, 1956**

Liliaceae

Selection for Review of Significant Trade

Aloe acutissima was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	Endemic to Madagascan with a widespread distribution: var. *acutissima* in the south-east and west and var. *antanimorensis* in the north-east. Threatened by habitat degradation, fire, habitat clearing for charcoal, as well as collection for the horticulture trade. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 reported international trade was relatively low: Madagascar reported the export of 18 live wild-sourced specimens and 11 live artificially propagated specimens, whereas only four wild-sourced specimens were reported by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.

Biology: *Aloe acutissima* var. *acutissima* was described as a succulent scrub with several branched stems up to 1 m in length. The rosette is composed of about 20 leaves, which are grey-green with a reddish tinge and have red-brown teeth along the margins. The inflorescence is 50 cm high. At higher altitudes, plants are of more robust growth whereas at lower altitudes with lower rainfall, plants are smaller (Reynolds, 1966).

A. acutissima var. *antanimorensis* was reported to be smaller than the typical variety, with much shorter stems, shorter leaves and shorter flowers (Reynolds, 1966).

A. acutissima var. *acutissima* was reported to grow on limestone, gneiss, or granite rocks, often in the shade of bushes, whilst *A. var. antanimorensis* was reported to grow on bare rocks (Rauh, 1998)

Distribution in range State: *A. acutissima* was reported to be endemic to Madagascar with a widespread distribution; var. *acutissima* from Fianarantsoa (central Madagascar) south-east to Beloha and west to Toliara and var. *antanimorensis* 8 km north-west of Antanimora in the south (Rauh, 1998; Reynolds, 1966). The species was recorded at altitudes between 240 and 1200 m (Reynolds, 1966).

Population trends and status: The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Major threats to *A. acutissima* were reported to include habitat degradation, fire, habitat clearing for charcoal and collection for the horticulture trade (CITES MA of Madagascar, *in litt* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported the export of 18 live, wild-sourced specimens of *A. acutissima* and a further three live wild-sourced specimens of *A. acutissima* var. *antanimorensis* (Table 1). Madagascar also reported the export of 11 artificially propagated live specimens of *A. acutissima* and four artificially propagated live specimens of *A. acutissima* var. *antanimorensis*. The only trade

reported by the importers over this period was of four live wild-sourced *A. acutissima*. Most of the trade reported in *A. acutissima* and *A.* var. *antanimorensis* was for personal purposes.

Table 1. Direct exports of *Aloe acutissima* from Madagascar, 1999-2008. All trade was in live specimens.

Taxon	Source	Reported	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Aloe acutissima	A	Exporter		6					5				11
		Importer											
	W	Exporter							14		4		18
		Importer									4		4
Aloe acutissima var. *antanimorensis*	A	Exporter		4									4
		Importer											
	W	Exporter		3									3
		Importer											

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised of four plants in 2007. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on any illegal trade in *A. acutissima* or *A. a.* var. *antanimorensis* was located.

Management: *A. acutissima* was reportedly found in the New System of Conservation (NSC) of Itremo site (CITES MA of Madagascar, *in litt.* to CITES Secretariat, 2008).

Regulation of wild harvesting, trade and protection of *A. acutissima* under CITES is discussed in the genus overview section of this report.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe antandroi (Decary) H. Perrier, 1926: Madagascar

Liliaceae

Selection for Review of Significant Trade

Aloe antandroi was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*A. antandroi* is a Madagascar endemic with a wide range in the south and south-west, where it grows on the Plateau Mahafaly. Threatened by habitat degradation, fire, habitat clearing for charcoal, as well as collection for the horticulture trade. Although the species was reported to occur in two protected areas in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was relatively low: Madagascar reported the export of 3 live wild-sourced specimens compared to 19 live wild-sourced specimens reported by the importers. On the basis of very low levels of reported international trade, and no trade reported since 2004, categorised as Least Concern.

Biology: *Aloe antandroi* was described as a medium to large-sized, rosette-forming succulent (Zazamalala Forest Center, 2009). It forms a copiously branched bush about 1 m in height. The leaves are loosely arranged, up to 25 cm long, grey-green, white spotted and with small, white teeth along the margins (Rauh, 1998; Reynolds, 1966). *A. antandroi* was reported to be usually partly supported by dry twiggy bushes with the stems climbing up to 3 m through the bushes; in clearings between bushes, stems were found to be erect and more rigid (Reynolds, 1966).

A. antandroi was reported to grow on calcareous rocks and on limestone rubble in dry bush (Reynolds, 1966). It was also reported to occur in scrublands and woodlands on limestone or calcareous soil (Zazamalala Forest Center, 2009).

Distribution in range State: *A. antandroi* was reported to be endemic to Madagascar, with a wide range in the intensely hot and dry parts of the south and south-west (Reynolds, 1966), on the Plateau Mahafaly from Toliara to Tanjona Vohimena (Rauh, 1998). Reynolds (1966) recorded the species growing at an altitude of 165 m.

Population trends and status: The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Major threats to the species were reported to include habitat degradation, fire, habitat clearing for charcoal and collection for the horticulture trade (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, Madagascar reported the export of three live wild-sourced specimens for the years 1999-2008, all in 2000. However, imports of 19 live wild-sourced *A. antandroi* specimens from Madagascar were reported by the importers during the same period (2 specimens in 2000 and 17 specimens in 2004). No trade was reported since 2004.

Around half of the trade reported by importers was for the purpose of personal use or for artificial propagation; the remainder was reported as commercial trade.

The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported

the export between 2003 and 2008 of 15 specimens, all exported in 2004. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on illegal trade in *A. antandroi* was located.

Management: *A. antandroi* occurs in the New System of Conservation (NSC) Table de Tuléar (CITES MA of Madagascar, *in litt.* to CITES Secretariat, 2008) and New System of Conservation (NSC) Mahafaly (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Regulation of wild harvesting and trade and protection of the species under CITES is discussed in the genus overview of this report. It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe betsileensis H. Perrier, 1926: Madagascar

Liliaceae

Selection for Review of Significant Trade

Aloe betsileensis was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe betsileensis* is a Madagascar endemic with a restricted range; it has only been recorded between Ihosy and Betroka in the south-west. Threatened by habitat degradation, fire and collection for charcoal. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, reported international trade in the species was relatively low: 25 live wild-sourced specimens were reported by the importers, all for personal use, whereas no exports were reported by Madagascar. On the basis of very low levels of reported international trade, and no trade reported since 2003, categorised as Least Concern.

Biology: *Aloe betsileensis* was reported to form large rosettes of 20-30 leaves on average. The leaves are 30-40 cm long and 7-9 cm broad at the base, dull green with a reddish tinge and with red teeth at the margins. The inflorescence was described as a cylindrical spike 60 cm to 1 m long of orange-yellow flowers (Reynolds, 1966).

The species was reported to occur on barren gneiss rocks (Rauh, 1995), and also on dry plains and rocky grasslands (Reynolds, 1966).

Distribution in range State: *Aloe betsileensis* is endemic to Madagascar. The species has a restricted range and is only known between Ihosy and Betroka (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010; Reynolds, 1966) where it has been recorded at altitudes between 800 and 1400 m (Reynolds, 1966).

Population trends and status: The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Major threats to the species are habitat degradation, fire, habitat clearing for charcoal (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar has not reported any trade in *A. betsileensis*. However, the import of 25 live wild-sourced specimens of *A. betsileensis* from Madagascar was reported by the importers, all in 2003. All trade was reported for the purpose of personal use.

The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported no data on commercial exports for the species between 1999 and 2008.

Madagascar has not published any export quotas for this species.

No specific information on any illegal trade in *A. betsileensis* was found.

Management: Regulation of wild harvesting and trade and protection of the species under CITES are covered in the genus overview of this report. It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe bosseri J.-B. Castillon, 2000: Madagascar

Liliaceae

Selection for Review of Significant Trade

Aloe bosseri was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe bosseri* is a Madagascan endemic, restricted in occurrence to the limestone cliffs of the Manambolo gorge. Threatened by habitat degradation and fire. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, international trade in the species was low: five live wild-sourced specimens were reported by the importers whereas no exports were reported by Madagascar. On the basis of very low levels of reported international trade, and no trade reported since 2002, categorised as Least Concern.

Biology: *Aloe bosseri* was reported to grow up to 60 cm height, have long narrow green banded leaves with tiny spines barely visible to the naked eye, and red and green flowers (Tropicos, 2010a).

Distribution in range State: *A. bosseri* was reported to be endemic to Madagascar, only found in the limestone cliffs of the Manambolo Gorge (Castillon, 2000; CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2010; Tropicos, 2010b).

Population trends and status: The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Major threats to the species were said to include habitat degradation and fire (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to the CITES Trade Database, Madagascar did not report any trade in *A. bosseri* for the years 1999-2008. However, importers reported five live wild-sourced specimens in 2002. No purpose code was reported.

The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported no data on commercial exports for the species between 1999 and 2008.

Madagascar has not published any export quotas for this species.

No specific information on any illegal trade in *A. bosseri* was located.

Management: Regulation of wild harvesting and trade and protection of the species under CITES are covered in the genus overview of this report.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe bulbillifera H. Perrier, 1926: Madagascar

Aloe bulbillifera var. paulianae **Reynolds, 1956**

Liliaceae

Selection for Review of Significant Trade

Aloe bulbillifera was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe bulbillifera* is a Madagascan endemic and has a wide but fragmented range. Threatened by habitat degradation, fire and collection for the horticultural trade. Although the species is known from two protected areas, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was relatively low: six live artificially propagated specimens were reported by Madagascar whereas three live artificially propagated specimens and 25 live wild-sourced specimens were reported by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.

Biology: *Aloe bulbillifera* was described as a large, rosette-forming succulent (Zazamalala Forest Center, 2009). It was reported to be the only Aloe in Madagascar that produces bulbils (leaf buds) in the axils of the inflorescence bracts (Rauh, 1995). It was reported to be stemless and have 20-30 green leaves 40-60 cm long with teeth on their margins (Reynolds, 1966).
A. bulbillifera var. *bulbillifera* was reported to have generally taller inflorescence (2-2.5 m) than var. *paulianae* (2 m). Also the branches of var. *bulbillifera* were reported to be longer (up to 1 m), compared to var. *paulianae* (30 cm) (Reynolds, 1966).

A. bulbillifera var. *bulbillifera* was found to grow in seasonally dry forests (Zazamalala Forest Centre, 2009), whereas var. *paulianae* was recorded on rocky slopes (Reynolds, 1966) and on granite rocks (Rauh, 1995).

Distribution in range State: *A. bulbillifera* was reported to be a Madagascar endemic with a wide but fragmented range. *A. bulbillifera* var. *bulbillifera* was recorded from the Haut Bemarivo and Sambirano in Mahajanga province and var. *paulianae* from south-east of Antsonihy, and between Befandriana-Nord and the Sofia River (CITES MA of Madagascar *in litt*. to UNEP-WCMC, 2010; Rauh, 1995). According to the author of the species description (Perrier), var. *bulbillifera* was characteristic of the mountains in the north-west region at altitudes of 300-800 m (Reynolds, 1966).

Population trends and status: The Madagascar CITES Management Authority (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Major threats to the species were reported to include habitat degradation, fire and collection for the horticultural trade (CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Trade: According to the CITES Trade Database, for the years 1999-2008, Madagascar did not report any trade in wild-sourced specimens. However, the import of 25 live wild-sourced specimens from Madagascar was reported by the importers in 2003. During the same period, Madagascar reported exports of six artificially propagated specimens, but only three were reported by the importers. Most of the trade was for personal use.

The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported the total commercial exports of *A. bulbillifera* between 2003 and 2008 to consist of three plants exported in 2005. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *A. bulbillifera* could be located.

Management: *A. bulbillifera* was reported to occur in the Special Reserves of Bemarivo and Manongarivo (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Regulation of wild harvesting and trade and protection of the species under CITES are covered in the genus overview of this report.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe capitata **Baker, 1883: Madagascar**

Aloe capitata **var.** *cipolinicola* **H. Perrier, 1926**

Aloe capitata **var.** *gneissicola* **H. Perrier, 1926**

Aloe capitata **var.** *quartziticola* **H. Perrier, 1926**

Aloe capitata **var**. *silvicola* **H. Perrier, 1926**

Liliaceae

Selection for Review of Significant Trade

Aloe capitata was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Possible Concern	*Aloe capitata* is a Madagascan endemic with a wide but fragmented range, considered to be widespread in the Central Highlands. Threatened by habitat degradation, fire, mining, as well as collection for the horticulture trade. Although the species is known from five protected areas, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, Madagascar reported the export of 103 live wild-sourced specimens whereas the importers reported a total of 138 live wild-sourced specimens. During the same period, Madagascar reported the export of 22 live artificially propagated specimens whereas the importers reported 18 live artificially propagated specimens. No information on the basis for a species-specific non-detriment finding was provided, and given that the trade in wild-sourced specimens was moderate, categorised as Possible Concern.

Biology: *Aloe capitata* was reported to be a very polymorphic species, with several described varieties, all named after the habitat or geologic substrate on which they grow (Rauh, 1995).

A. capitata var. *capitata* was described as a large, decorative, stemless plant with thick leaves that are bluish-green when young, red in full sun and have red spines at the margins. Inflorescences were reported to consist of numerous pendent yellow-orange flowers (Rauh, 1995), and be about 80 cm high (Reynolds, 1966). It was reported to be typical of the gneiss and granite plateaus, as well as of certain inselbergs where it grows amongst grass and bushes between altitudes of 1200-1500 m (Rauh, 1995).

A. capitata var. *cipolinicola* was reported to have thick, seldom branched stems up to 3 m high, with leaves that are bright green to brown in colour, up to 60 cm in length, forming a dense rosette (Rauh, 1995). The inflorescence was described to be about 1 m high (Reynolds, 1966). This variety was reported to be the only arborescent Aloe of the Central Plateau, occurring in loose stands on cipolin slopes and also on cipolin marble rocks (Rauh, 1995). Veins of marble at Itremo were said to be easily identified by the presence of var. *cipolinicola* (Schatz, 2003).

A. capitata var. *gneissicola* was said to differ from var. *capitata* by having less numerous and smaller leaves which have white marginal teeth and yellow flowers. This variety was reported to grow on gneiss rocks (Rauh, 1995). It was described to have about 20 leaves, 40-45 cm long and an inflorescence of 80 cm height (Reynolds, 1966).

A. capitata var. *quartziticola* was described to have about 24-30 broad, bluish-grey leaves

about 30 cm long, with a reddish tinge and with red teeth at the margins, and an inflorescence of up to 1 m in height (Reynolds, 1966). This variety was reported to grow on quartzite (Rauh, 1995).

A. capitata var. *silvicola* was reported to differ from other varieties of the species by its long narrow leaves, 60 cm by 3-4 cm, very small marginal teeth that are sometimes absent and a short stem (Reynolds, 1966). It was reportedly found in forests, occasionally as an epiphyte on old tree stumps (Rauh, 1995), similar to bromeliads (Rasolondraibe, 2003).

Distribution in range State: *A. capitata* was reported to be endemic to Madagascar with a wide but fragmented range (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010). According to Rauh (1995) it was one of the most widespread species of the Central Highlands.

A. capitata var. *capitata* was reported to occur in the Central Highlands at altitudes between 1200 and 1500 m; var. *cipolinicola* near the villages of Itremo and Ambatofinandrahana east of Ambositra; var. *gneissicola* in the foothills of the Tsaratanana mountains in the north-west; var. *quartziticola* in the Itremo mountains between 1200- 1700 m, and var. *silvicola* in Manongarivo massif in the north-west and the Montagne d'Ambre in the north, between 1000-1200 m (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010; Rauh, 1995).

Population trends and status The Madagascar CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) reported that the species was abundant, although population trends were unknown.

Threats: The Madagascar CITES Management Authority *in litt.* to UNEP-WCMC, 2010 listed habitat degradation, fire, mining and collection for the horticultural trade as threats to the species. However, the CITES MA of Madagascar (*in litt.* to the CITES Secretariat, 2008) reported that the four varieties of the species (var. *capitata*, var. *cipolinicola*, var. *gneissicola* and var. *quartziticola*) were widespread throughout most of their habitat and not threatened by excessive collection.

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported the export of 103 live wild-sourced specimens and 22 live artificially propagated specimens (reported at the species and variety level) (Table 2). During the same period, a total of 138 live wild-sourced specimens and 18 live artificially propagated specimens from Madagascar were reported by the importers. Most of the trade was for personal use.

Table 2. Direct exports of *Aloe capitata* from Madagascar, 1999-2008.

Taxon	Source	Term	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Aloe capitata	A	live	Exporter		6	5				5				16
			Importer			5				13				18
	W	leaves	Exporter	160				3						163
			Importer											
		live	Exporter	13	41	14	3	7		16				94
			Importer	5	7	3			8	6				29
Aloe capitata var. *capitata*	W	live	Exporter											
			Importer					25						25
Aloe capitata var. *cipolinicola*	A	live	Exporter		6									6
			Importer											
	W	live	Exporter		3									3
			Importer					30	4					34
Aloe capitata var. *gneissicola*	W	live	Exporter		3									3
			Importer					25						25
Aloe capitata var. *quartziticola*	W	live	Exporter		3									3
			Importer					25						25
Species subtotal (live)	A		Exporter		12	5				5				22
			Importer			5				13				18
	W		Exporter	13	50	14	3	7		16				103
			Importer	5	7	3		105	12	6				138

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised of 40 plants in 2004 and three plants in 2005. The source of the specimens was not provided.

The CITES Management Authority of Madagascar (*in litt.* to CITES Secretariat, 2008) reported that operators of nurseries in Madagascar had stocks of 763 *A. c.* var. *capitata.*

Madagascar has not published any export quotas for this species.

No specific information on any illegal trade in *A. capitata* or varieties of the species was located.

Management: *A. capitata* was reported to occur in the New System of Conservation (NSC) Itremo site; *(*CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2010). It was also found in Andringitra Nature Reserve (Goodman, 1996).

Protection of the species, regulation of wild harvesting and trade are covered in the genus overview of this report. These include the regulation that *Aloe* species must be exported from the nurseries of stock traders. In 2008, the operators held a stock of 763 plants of *A. capitata* var. *capitata* (CITES MA of Madagascar, *in litt.* to CITES Plants Secretariat, 2008*).*

In a letter dated 18 July 2008, Madagascar stated that four varieties of *A. capitata*: *A. capitata* var *capitata*, *A. capitata* var. *cipolinicola*, *A. capitata* var. *gneissicola* and *A. capitata* var. *quartziticola* were widespread in habitat and not threatened by excessive collection (*in litt.* to CITES Secretariat, 2008). However, in 2010, the CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) listed over-collection among the threats to *A. capitata* and its varieties.

Aloe conifera H. Perrier, 1926: Madagascar

Liliaceae

Selection for Review of Significant Trade

Aloe conifera was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Possible Concern	*Aloe conifera* is a Madagascan endemic with a restricted range in the central mountains. Threatened by habitat degradation, fire, and collection the for horticulture trade. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, Madagascar reported the export of 103 live wild-sourced specimens whereas only 29 live wild-sourced specimens were reported by the importers. In addition, ten live artificially propagated specimens were reported by Madagascar and by the importers. No information on the basis for a species-specific non-detriment finding was provided, and given that trade in wild-sourced specimens was moderate and that the species has a restricted range, categorised as Possible Concern.

Biology: *Aloe conifera* was described as a decorative, small species, particularly attractive when young (Rauh, 1995). It was reported to be stemless with a medium-sized rosette that is 40 cm in diameter. The 20-24 leaves average 16 cm long and 4-4.5 cm at the base, are bluish-grey, with a reddish tinge, and have reddish teeth along the margins. The inflorescence averages 50 cm in height (Reynolds, 1966; Zazamalala Forest Center 2009). The yellow flowers were said to produce copious amounts of nectar which attract honey-birds (Rauh, 1995).

The species was reported to grow on denuded granite hills in the black humus of the *Coleochloa setifera* trees (Rauh, 1995), and also on rocky slopes in shallow pockets of soil or soil margins of bare rocks (Reynolds, 1966).

Distribution in range State: *A. conifera* was reported to be endemic to the mountains of central Madagascar with a restricted range. The species was recorded to occur at altitudes between 1300 and 1500 m on Mount Ravotay south of Ambatofinandrahana and south-west of Ivato (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010; Reynolds, 1966). It was also found elsewhere in the Fianarantsoa region (Rauh, 1995).

Population trends and status: The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire, mining and collection for the horticulture trade were listed as threats to the species (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported exports of 103 live wild-sourced specimens. During the same period, imports of 29 live, wild-sourced specimens from Madagascar were reported by the importers (Table 3). Also the export of ten live artificially propagated specimens was reported by Madagascar in 2000, and the import of ten live artificially propagated specimens was reported by the importers in 2005 (Table 3). Most of the trade was for personal use.

Table 3. Direct exports of *Aloe conifera* from Madagascar, 1999-2008.

Source	Term	Reported	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
A	live	Exporter		10									10
		Importer							10				10
W	live	Exporter	5	3	15	10	6		62	2			103
		Importer					15	2	12				29

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

The Madagascar CITES Management Authority (*in litt*. to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 comprised of 17 plants in 2004 and two in 2006. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on any illegal trade in *A. conifera* was found.

Management: *A. conifera* was reported to occur in the New System of Conservation (NSC) Itremo site (CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe deltoideodonta Baker, 1883: Madagascar

Aloe deltoideodonta **var.** *brevifolia* **(H. Perrier, 1926)**
Aloe deltoideodonta **var.** *candicans* **(H. Perrier, 1926)**
Aloe deltoideodonta **var.** *fallax* **(Castillon, 2006)**

Liliaceae

Selection for Review of Significant Trade

Aloe deltoideodonta was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Possible Concern	*Aloe deltoideodonta* is a Madagascan endemic with a fragmented range in the south-west. Threatened by habitat degradation, fire, clearing for charcoal and collection for the horticulture trade. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 there was a relatively high level of international trade, although this was mainly of artificially propagated specimens (5520 live artificially propagated specimens reported by Madagascar and 10820 specimens reported by the importers). Exports of live wild-sourced specimens consisted of 5355 specimens, according to Madagascar and 40 specimens according to the importers (the large discrepancy was due to an export of 4800 specimens reported as wild-sourced by Madagascar and artificially propagated by the importer). The majority of trade was for commercial purposes. No information on the basis for a species-specific non-detriment finding was provided, and on the basis of high levels of trade, categorised as Possible Concern.

Biology: *Aloe deltoideodonta* was reported to be a polymorphic species with four described varieties (Rauh, 1995).

Aloe deltoideodonta var. *deltoideodonta* was reportedly only known from Baker's original description in 1883 and by Rev. R. Baron's material collected in 1882 and 1887. It was described as a small plant, with 12-16 densely arranged leaves, 10-13 cm long and 3 cm broad, and with teeth along the margins (Reynolds, 1966). The habitat of *A. deltoideodonta* var. *deltoideodonta* was unrecorded (Reynolds, 1966).

A. deltoideodonta var. *candicans* was reported to have grey-green leaves with a reddish tinge, 15-20 cm long and 5-6 cm wide, and an inflorescence 35-50 cm high (Reynolds, 1966). It was reported to grow in colonies of 50-100 or more individuals (Castillon, 2006). It was found on semi-denuded rocky slopes, pavements (Reynolds, 1966) and flat gneiss rocks (Rauh, 1995).

A. deltoideodonta var. *brevifolia* was reported to have leaves up to 10 cm long and 2.5 cm wide (Reynolds, 1966). It was recorded to grow on denuded sandstones (Reynolds, 1966) and on barren, gneiss rocks (Rauh, 1995).

A. deltoideodonta var. *fallax* was reported to have flowers very similar to var. *candicans*. However, the leaves of var. *fallax* were described as generally less upright, shorter, with fine lines along the leaves, roughly triangular in shape and bright green in colour. This variation was reported to grow in small colonies of 15-20 plants compared to the larger colonies of var. *candicans* (Castillon, 2006). *A. deltoideodonta* var. *fallax* was recorded to grow on granite and gneissic rocks (Castillon, 2006).

Distribution in range State: *A. deltoideodonta* was reported to be endemic to Madagascar with a fragmented range. The precise locations of *A. deltoideodonta* var. *deltoideodonta* were unknown and recorded by Rev. R. Baron as 'Central Madagascar' and 'Chiefly from north-west Madagascar (Reynolds, 1966). *A. deltoideodonta* var. *candicans* was recorded from north-eastern Zazafotsy, Central Plateau and var. *brevifolia* from the Onilahy river valley near Benenitra in the south-west (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010; Rauh, 1995). *A. deltoideodonta* var. *fallax* was described from 15 km south of Ambalavao (Castillon, 2006). Reynolds (1966) noted that var. *candicans* was been recorded at altitudes of 660-800 m and var. *brevifolia* at 100 m.

Population trends and status: The Madagascar CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire, clearing for charcoal and collection for the horticulture trade were listed as threats to the species (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, the export of 5355 live wild-sourced specimens was reported by Madagascar. Imports of 38 live wild-sourced specimens of *A. deltoideodonta* and two wild-sourced live specimens of *A. deltoideodonta* var. *candicans* were reported by the importers during the same period (Table 4). The export of 5520 live artificially propagated specimens was reported by Madagascar, while a total of 10820 live artificially propagated specimens from Madagascar were reported by the importers. However, it should be noted that there is a possibility of misreporting or discrepancy in the data for 2005, as 4800 specimens were reported as wild-sourced by Madagascar and as artificially propagated by the importer (Table 4). All of the trade in artificially propagated specimens and most of the trade in wild specimens was for commercial purposes.

Table 4. Direct exports of *Aloe deltoideodonta* from Madagascar, 1999-2008.

Taxon	Source	Term	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
A. deltoideodonta	A	live	Exporter								3600	1920		5520
			Importer							4800	3600	1920	500	10820
	W	live	Exporter	14	5	15		6		4800	5	510		5355
			Importer		12		5		6		5	10		38
A. deltoideodonta var. *Candicans*	W	live	Exporter											
			Importer						2					2

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK.

The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 consisted of 4800 plants in 2005, 3605 plants in 2006 and 2430 plants in 2007. The source of the specimens was not provided. Madagascar has not published any export quotas for this species. No specific information on any illegal trade in *A. deltoideodonta* from Madagascar was located.

Management: *A. deltoideodonta* was reported to occur in the New System of Conservation (NSC) Itremo site (CITES MA of Madagascar, *in litt.* to CITES Secretariat, 2008). Regulation of wild harvesting and trade and protection of the species under CITES are covered in the genus overview of this report.

Aloe erythrophylla Bosser, 1968: Madagascar

Liliaceae

Selection for Review of Significant Trade

Aloe erythrophylla was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe erythrophylla* is a Madagascan endemic with a restricted range in the west Itremo mountains where it is considered abundant. Threatened by habitat degradation and fire. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, reported exports were relatively low: 21 live wild-sourced specimens were reported by Madagascar and 20 live wild-sourced specimens by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.

Biology: *Aloe erythrophylla* was reported to have dark red leaves, lanceolate to triangular, 10-17 cm long and 2-4 cm wide with red teeth on the margins, and inflorescence of about 20 dark red flowers (Rauh, 1995). The species was reported to grow on gneiss and quartzite rocks (Bosser, 1968).

Distribution in range State: *A. erythrophylla* was reported to be a Madagascar endemic with a restricted range. It was known to occur only near Ambatomenaloha on the west side of Mount Itremo mountains (CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2010; Rauh, 1995).

Population trends and status: Bosser (1968) described the species as common in parts of the Itremo mountains. The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010), described the species as abundant within its limited range, although its population trends were unknown.

Threats: Habitat degradation and fire were listed as threats to the species by the CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported the export of 21 live wild-sourced plants (Table 5). For the same period, the import of 20 wild-sourced live specimens from Madagascar was reported by the importers. Most of the trade was for personal use.

Table 5. Direct exports of *Aloe erythrophylla* from Madagascar, 1999-2008. All trade was in live wild-sourced specimens.

Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Exporter	3	3					15				21
Importer						5	15				20

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

The Madagascar CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) reported no commercial exports for the species between 2003 and 2008.

Madagascar has not published any export quotas for this species.

No specific information on any illegal trade in *A. erythrophylla* in Madagascar was located.

Management: *A. erythrophylla* was reported to occur in the New System of Conservation (NSC) Itremo site (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Regulation of wild harvesting and trade and protection of the species under CITES were covered in the genus overview of this report.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe guillaumetii Cremers, 1976: Madagascar

Liliaceae

Selection for Review of Significant Trade

Aloe guillaumetii was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe guillaumetii* is endemic to Madagascan; it has been found from Ambilobe in the west to Cape Manambato in the east. Threatened by habitat degradation and fire. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was relatively low and only reported by the exporter: 22 live wild-sourced specimens in 2005. On the basis of very low levels of reported international trade, categorised as Least Concern.

Biology: *Aloe guillaumetii* was reported to form large mats and have 6-12 bright green leaves, tinged red with white spots, densely arranged, triangular in shape, 38-40 cm long and 2-5 cm wide. The flowers were described as red at the base, becoming pink and then green in the upper half, and the inflorescence is 80-110 cm tall. The species was reported to flower from June to August and fruit in July (Cremers, 1976).

A. guillaumetii was recorded on eroded sandstone outcrops (Cremers, 1976) and on granite rocks (Rauh, 1995).

Distribution in range State: *A. guillaumetii* was reported to be a Madagascar endemic, found from Ambilobe in the west to Cape Manambato in the east (Rauh, 1995).

Population trends and status: The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation and fire were listed as threats to the species by the CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported the export of 22 live wild-sourced specimens of *A. guillaumetii* in 2005, for personal use. No imports of *A. guillaumetii* from Madagascar were reported by the importers during this period.

The Madagascar CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) reported no commercial exports of the species between 2003 and 2008.

Madagascar has not published any export quotas for this species.

No specific information on any illegal trade of *A. guillaumetii* was located.

Management: Regulation of wild harvesting and trade and protection of the species under CITES are covered in the genus overview of this report.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe humbertii H. Perrier, 1931: Madagascar

Liliaceae

Selection for Review of Significant Trade

Aloe humbertii was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe humbertii* is a Madagascan endemic with a restricted range in the far south. Threatened by habitat degradation, fire, mining, clearing for charcoal and collection for the horticulture trade. Although the species is known from one potential protected area, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008, the reported international trade was relatively low: 17 live specimens reported by Madagascar and 15 live specimens reported by the importers, all wild-sourced. On the basis of very low levels of reported international trade, categorised as Least Concern.

Biology: *Aloe humbertii* was described to be stemless, have 13 leaves that are about 25 cm long and 5-6 cm wide, and a red inflorescence (Rauh, 1998) which is 35-40 (-80 cm tall) (Reynolds, 1966). It was found to grow on silicious rocks (Reynolds, 1966).

General distribution and status: *A. humbertii* is endemic to Madagascar and has only been recorded on the Andohahela Massif which lies east of Behara in the far south - a nearly inaccessible region (Rauh, 1998). It was recorded to occur at altitudes between 1800 m and the summit of the massif (1979 m) (Reynolds, 1966).

Population trends and status: The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: *A. humbertii* was reportedly threatened by habitat degradation, fire, mining, clearing for charcoal and collection for the horticulture trade (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, for the years 1999-2008, Madagascar reported the export of 17 live wild-sourced specimens for personal use (Table 6). During the same period, importers reported 15 live wild-sourced specimens from Madagascar, for the purpose of commercial trade.

Table 6. Direct exports of *Aloe humbertii* from Madagascar, 1999-2008. All trade was in live wild-sourced specimens.

Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Exporter		10					7				17
Importer						15					15

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

The Madagascar CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) reported that commercial exports between 2003 and 2008 totalled 15 plants in 2004. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on any illegal trade in *A. humbertii* could be located.

Management: *A. humbertii* was reported to be protected in the Andohahela National Park (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Regulation of wild harvesting and trade and protection of the species under CITES are covered in the genus overview of this report.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe imalotensis Reynolds, 1957: Madagascar

Aloe imalotensis var. longiracemosa J.-B. Castillon, 2005

Liliaceae

Selection for review in significant trade

Aloe imalotensis was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe imalotensis* is a Madagascan endemic with a restricted range in the central-south. Threatened by habitat degradation, fire and possibly by collection for the horticulture trade. The species is reported from one protected area, the Isalo National Park, but commercial collectors were reported to have reduced the populations of succulent plants so that extinction was possible. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was low: only three live wild-sourced specimens reported by the exporter. On the basis of very low levels of reported international trade, and no trade reported since 2000, categorised as Least Concern.

Biology: *Aloe imalotensis* var. *imalotensis* was reported to have inflorescences about 50-65 cm in height (Reynolds, 1966) with numerous densely arranged coral-red, pendent flowers (Rauh, 1995). Leaves were described as erect in the dry season and spreading in the rainy season, up to 30 cm long, 12-15cm wide, and a red bluish-brown colour in full sun (Rauh, 1995). *A. imalotensis* var. *imalotensis* was reported to grow on sandstone rocks (Rauh, 1995) and on Triassic shales (Reynolds, 1966).

Aloe imalotensis var. *longiracemosa* was reported to have leaves very similar to the typical variety. However, var. *longiracemosa* was said to have less fleshy leaves that are often flecked white and with wavy margins, smaller flowers, 25 mm on average, less numerous, elongated inflorescences and less densely arranged flowers than those of var. *imalotensis* (Castillon, 2005). *A. imalotensis* var. *longiracemosa* was described from specimens found on rocks and debris (Castillon, 2005).

Distribution in range State: *A. imalotensis* was reported to be endemic to Madagascar with a range restricted to the central-south of the country. The variety *imalotensis* was known from the Isalo Mountains, near Ranohira and in the Imaloto river valley near Benenitra village (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010; Reynolds, 1966), between altitudes of 270-770 m (Reynolds, 1966). Rauh (1995) also recorded the species on the Col des Tapia. A. *imalotensis* var. *longiracemosa* was described from near the city of Mahaboboka in Toliara Province (Castillon, 2005).

Population trends and status: The Madagascar CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Threats to the species were reported to include habitat degradation and fire (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010). Rauh (1995) reported that in Isalo National Park, where the species was listed, "Unfortunately, commercial collectors have reduced the populations of succulent plants so that extinction is possible."

Trade: According to the CITES Trade Database, for the years 1999-2008, Madagascar reported the export of three live wild-sourced specimens of *A. imalotensis* for commercial

purposes in 2000. No trade in the species from Madagascar was reported by importers during this period.

The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported no commercial exports of the species between 2003 and 2008.

Madagascar has not published any export quotas for this species.

No other specific information on any illegal trade of *A. imalotensis* was located.

Management: *A. imalotensis* was reported to occur in the Isalo National Park (CITES MA of Madagascar, *in litt*. to the CITES Secretariat, 2008).

Regulation of wild harvesting, trade and protection of the species under CITES are covered in the genus overview of this report.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe isaloensis H. Perrier, 1927: Madagascar

Liliaceae; Isalo Aloe

Selection for Review of Significant Trade

Aloe isaloensis was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe isaloensis* is a Madagascan endemic which is known only from the Isalo Mountains. Threatened by collection for horticulture. Although the species is reported from one protected area, the Isalo National Park, commercial collectors were reported to have reduced the population of succulent plants so that extinction was possible. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was low: two live specimens reported by Madagascar and two live specimens by the importers, all wild-sourced. In addition, four live artificially propagated specimens were reported by Madagascar only. On the basis of very low levels of reported international trade, and no trade reported since 2004, categorised as Least Concern.

Biology: *Aloe isaloensis* was described as a small, rosette-forming succulent, with a branched stem up to 50 cm in height. The rosette is composed of 10 to 14 leaves which are narrowly linear, 20 cm long by 1.5 cm wide, grey with small whitish teeth along the margins, and spirally arranged along the branch (Zazamalala Forest Center, 2009; Rauh, 1998), and the inflorescence is 30 cm high (Reynolds, 1966).

The species was reported to grow in sandstone crevices (Reynolds, 1966) or in woodlands dominated by the Tapia tree *Uapaca bojeri* (Rauh, 1998).

Distribution in range State: *A. isaloensis* was reported to be a Madagascar endemic, only known from the Isalo Mountains, about 200 km north-east of Toliara (Rauh, 1998), at altitudes between 600 and 1200 m (Reynolds, 1966).

Population trends and status: The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Rauh (1995) reported that in Isalo National Park, where *A. isaloensis* occurs, "commercial collectors have reduced the populations of succulent plants so that extinction is possible."

Trade: According to data in the CITES Trade Database for the years 1999-2008, Madagascar reported exports of two live wild-sourced specimens (Table 7). During the same period, imports of four live, wild-sourced specimens from Madagascar were reported by the importers. Most trade was for the purpose of artificial propagation, botanical gardens or personal use. Also four live, artificially propagated specimens of the species were reported to have been exported by Madagascar, but were not reported by the importers.

Table 7. Direct exports of *Aloe isaloensis* from Madagascar, 1999-2008. All trade was in live specimens.

Source	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
A	Exporter		4									4
	Importer											
W	Exporter					2						2
	Importer						4					4

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

The Madagascar CITES Management Authority (*in litt*. to UNEP-WCMC, 2010) reported no commercial exports between 2003 and 2008 for the species.

Madagascar has not published any export quotas for this species.

Illegal collection was mentioned to be a problem in the Isalo National Park (Rauh, 1995); no other information of illegal trade on *A. isaloensis* was found.

Management: *A. isaloensis* was found in the Isalo National Park (CITES MA of Madagascar, *in litt*. to the CITES Secretariat, 2008).

Regulation of wild harvesting and trade are covered in the genus overview of this report. These include the regulation that *Aloe* species must be exported from the nurseries of stock traders. In 2008 the traders held a stock of 171 plants of *A. isaloensis* (CITES MA of Madagascar, *in litt*. to CITES Secretariat, 2008).

Protection of the species under CITES is also covered in the genus overview.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe itremensis Reynolds, 1955: Madagascar

Liliaceae

Selection for Review of Significant Trade

Aloe itremensis was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe itremensis* is a Madagascan endemic with a restricted range limited to the Itremo Mountains. Threatened by collection for the horticulture trade. Although the species is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was low: eight live specimens and seven dried specimens reported by Madagascar and three live specimens were reported by the importers, all wild-sourced. On the basis of very low levels of reported international trade, categorised as Least Concern.

Biology: *Aloe itremensis* was described to be either stemless or have stems up to 15 cm long, with 12-16 leaves, 30 cm long and 2.4 cm wide with brownish teeth. The inflorescence was described to be 1-1.2 m high and the flowers are mainly scarlet (Rauh, 1995; Reynolds, 1966). The species was recorded only on steep sandstone slopes and on outcrops usually in exposed positions, but sometimes in partial shade (Reynolds, 1966).

Distribution in range State: *A. itremensis* was reported to be a Madagascar endemic with a range restricted to the Itremo Mountains (CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2010; Rauh, 1995). According to Reynolds (1966) it was found on the western side of the plateau along the top of the Itremo Range at an altitude of 1700 m.

Population trends and status: The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Collection for the horticulture trade was mentioned as the main threat to the species (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database for the years 1999-2008, Madagascar reported exports of eight live wild-sourced specimens and seven dried plants (Table 8). During the same period, imports of three live wild-sourced specimens from Madagascar were reported by the importers. Trade in live specimens was reported for personal use or purpose unspecified; trade in dried plants was reported for scientific use.

Table 8. Direct exports of *Aloe itremensis* from Madagascar, 1999-2008. All trade was in wild-sourced specimens.

Term	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
dried plants	Exporter										7	7
	Importer											
live	Exporter			5	3							8
	Importer					3						3

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported commercial exports of 12 plants between 2003 and 2008, all in 2004. The source of the

specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on any illegal trade in *A. itremensis* was located.

Management: *A. itremensis* was reported to occur in the New System of Conservation (NSC) of Itremo site (CITES MA of Madagascar, *in litt.* to the CITES Secretariat, 2008).

Regulation of wild harvesting and trade and protection of the species under CITES are covered in the genus overview of this report.

Aloe macroclada Baker, 1883: Madagascar

Liliaceae

Selection for Review of Significant Trade

Aloe macroclada was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe macroclada* is a Madagascan endemic with a wide range in the grasslands of the Central Highlands, where it was considered abundant at several sites. Threatened by habitat degradation, fire and collection for the horticulture trade. Although it is known from five protected areas, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was relatively low: a total of 26 live specimens were reported by Madagascar and 31 live specimens by the importers, all wild-sourced. In addition, 28 live artificially propagated specimens were reported by Madagascar and three by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.

Biology: *Aloe macroclada* was described as having a large, stemless rosette of about 50 leaves, with leaves measure up to 80 (-100) cm long and 17-22 cm wide at the base, appearing green or reddish-yellow in the dry season and bearing 3 mm long spines at the margins. The inflorescences were described to have yellow/red flowers (Rauh, 1995) and be 1.75 m tall (Reynolds, 1966).

A. macroclada was the only Aloe species found in the Central Plateau grasslands (Rauh, 1995). Although thousands of seedlings are produced annually, the species was not found to grow in dense stands, only as solitary individuals (Rauh, 1995). It was said that *A. macroclada* is difficult to cultivate, possibly because it grows at 1500 m elevation in the wild (Rauh, 1995)

Distribution in range State: According to Reynolds (1966) *A. macroclada* was the most widely distributed Aloe in Madagascar. It was reported to be endemic to Madagascar and have a wide range in the grasslands of the Central Plateau (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010), found at altitudes between 700-1500 m (Reynolds, 1966). It was recorded from near Mont Tsaratanana in the north to Tolagnaro district in the south (Reynolds, 1966).

Population trends and status: The CITES Management Authority (*in litt.* to UNEP-WCMC, 2010), and Reynolds (1966) described the species as abundant at several sites. The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the population trends were unknown.

Threats: Habitat degradation, fire and collection for the horticulture trade were mentioned as threats to the species by the CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010). However, Reynolds (1966) considered that the species was essentially a species of burnt grasslands. In addition, Rauh (1995) noted that the species' very succulent leaves enabled it to survive, although most seedlings are killed by fire.

Trade: According to data in the CITES Trade Database for the years 1999-2008, Madagascar reported exports of 26 live wild-sourced specimens. During the same period, imports of 31 live wild-sourced specimens were reported by the importers (Table 9). The export of 28 live artificially propagated specimens was also reported by Madagascar, whereas importers

reported the import of only three live artificially propagated specimens from Madagascar during the same period. Around half of the trade was reported as personal use; the remainder of the trade was for commercial purposes.

No specific information on illegal trade in *A. macroclada* was located.

Table 9. Direct exports of *Aloe macroclada* from Madagascar, 1999-2008. All trade was in live specimens.

Source	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
A	Exporter		25					3				28
	Importer							3				3
W	Exporter	3	10	4				4	1	4		26
	Importer		2			25				4		31

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Between 2003 and 2008, the Madagascar CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) reported commercial exports of three plants in 2005 and four in 2007. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

Management: *A. macroclada* was reported to occur in the New System of Conservation (NSC) of Ibity, Itremo and Ranomafana Andringitra, in the Andringitra National Park, and in the forest station of Angavokely (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Regulation of wild harvesting and trade and protection of the species under CITES are covered in the genus overview of this report.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe pratensis Baker, 1880: Lesotho, South Africa

Liliaceae

Selection for Review of Significant Trade

Aloe pratensis was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Range state	Provisional category	Summary
Lesotho	Least Concern	*Aloe pratensis* is limited to three localities in Lesotho, where it is considered to be Vulnerable. The main threat is harvesting, although this may be mainly for ethno medicines. *A. pratensis* is covered by national legislation in Lesotho. During the period 1999-2008 international trade in the species was low: only ten live wild-sourced specimens were reported by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.
South Africa	Least Concern	The main distribution of *A. pratensis* is in South Africa, in the Eastern Cape and KwaZulu-Natal provinces, where it is widespread. It is considered Least Concern and occurs in protected areas. During the period 1999-2008 international trade in the species was low and all trade was from artificially propagated sources: 175 live specimens were reported by South Africa and 60 specimens were reported by the importers. On the basis of no reported trade in wild specimens, and the species' favourable conservation status, categorised as Least Concern.

Biology: *Aloe pratensis* was described as a stemless plant with rosettes 15-25 cm in diameter, 30-40 leaves, densely arranged and up to 15 cm long by 4-5 cm broad. The marginal teeth and surface spines form white tubercular bases. The flowers were described pinkish-red and typically the inflorescence is 50-60 cm tall (Reynolds, 1969).

According to the CITES Management Authority of South Africa (Meintjes, 2010, *in litt.* to UNEP-WCMC, 2010) and Reynolds (1969), the species was found to grow in grassland in rocky places on sloping ground and in exposed positions, wedged in shallow pockets of soil among rocks.

Flowering time was reported to be from June to October (Jeppe, 1969). The means of pollination was unknown, but was presumed to be sunbirds, as the flowers have long corolla tubes (Jeppe, 1969). In cultivation in South Africa, the age at first flowering was found to be 3-5 years (Meintjes, *in litt.* to UNEP-WCMC, 2010).

Based on information provided by A. Hankey (a specialist horticulturalist at the South African National Biodiversity Institute), the CITES Management Authority of South Africa (S. Meintjes *in litt.* to UNEP-WCMC, 2010) reported that *A. pratensis* could easily be cultivated from seed, although flowering is erratic, and that the species was tolerant of both wet and dry conditions, with a moderate growth rate and unknown lifespan. In contrast, Van Wyk and Smith (1996) reported that the species did not seem to thrive in cultivation.

Annual rainfall was found to vary considerably within the species' distribution range from 500 mm in the drier parts of the Eastern Cape to 1025 mm in the high mountain areas of KwaZulu-Natal (Jeppe, 1969).

General distribution and status: *A. pratensis* was reported to be distributed in the Eastern Cape and KwaZulu-Natal provinces extending across the border into Lesotho, chiefly in mountainous areas (S. Meintjes, *in litt.* to UNEP-WCMC, 2010).

Overview in trade and management: According to the data in the CITES Trade Database, between 1999 and 2008 there was relatively small reported trade in *A. pratensis*, the majority of trade was in live artificially propagated specimens from South Africa, with a small quantity of live artificially propagated specimens from Germany and live wild-sourced specimens from Lesotho. The majority of trade was for commercial purposes, the main importers being the United States, Saudi Arabia, Czech Republic and Germany.

LESOTHO

Distribution in range State: *A. pratensis* was reported to be limited to three districts in southern Lesotho: Thaba Tseka (Ha Koma-Koma village), Quthing (Kubung village) and Qacha's Nek (Pheellong and Ha Sekake villages) (R. Ntsohi, CITES Management Authority of Lesotho *in litt.* to UNEP-WCMC, 2010). According to the Lesotho Red List of Plants, the species was limited to Qacha's Nek district (Golding, 2002).

Population trends and status: *A. pratensis* was assessed as Vulnerable in the Lesotho Plant Red Data List (Golding, 2002). According to the CITES Management Authority of Lesotho (R. Ntsohi *in litt.* to UNEP-WCMC, 2010), there were an estimated 350-400 "clumps" of the species across the three districts in Lesotho. No further specific information on population size or status was provided.

Threats: Harvesting was mentioned as the main threat to the species (Golding, 2002; R. Ntsohi *in litt.* to UNEP-WCMC, 2010). Harvesting was reportedly done for ethno-medicinal (Lesotho Department of Environment, 2009) or ornamental purposes (R. Ntsohi *in litt.* to UNEP-WCMC, 2010)). It was also mentioned that to a small extent, *A. pratensis* was collected as livestock medicine (R. Ntsohi *in litt.* to UNEP-WCMC, 2010). The populations of *A. pratensis* were not considered to be under threat from over-harvesting (R. Ntsohi *in litt.* to UNEP-WCMC, 2010).

Trade: Lesotho ratified CITES on 1 October 2003, and no annual reports were received by the Secretariat since 2003, as Lesotho reported that no trade had taken place. However, according to the CITES Trade Database for the years 1999-2008, imports of ten live wild-sourced specimens of *A. pratensis* from Lesotho were reported by the importers in 2005. Trade was for commercial purposes.

Lesotho has not published any export quotas for this species.

No specific information on illegal trade in *A. pratensis* from Lesotho was located.

Management: No information on the occurrence of *A. pratensis* in protected areas was located.

According to the CITES Management Authority of Lesotho (R. Ntsohi *in litt.* to UNEP-WCMC, 2010), "All aloes of Lesotho are listed under the Monuments, Relics, Fauna and Flora Act as protected plants." The Historical Monuments, Relics, Fauna and Flora Act No 41 of 1967 stated that it is an offence to destroy, damage or remove any fauna or flora from Lesotho or its original habitat without the written consent of the Commission established under the Act (Anon., 2001). The Act was also said to prohibit harvesting of the species for commercial purposes, although it was noted that the enforcement of the law was limited (R. Ntsohi, *in litt.* to UNEP-WCMC, 2010).

The Environment Act 2001 aimed to provide for the management of the environment and all natural resources in Lesotho (Anon., 2001). The country now has a National Biodiversity

Strategy and Action Plan. The priority activities of the Action Plan included implementation of biodiversity goals (Lesotho Department of Environment, 2009).

It was reported by the CITES Management Authority of Lesotho (R. Ntsohi *in litt.* to UNEP-WCMC, 2010) that Lesotho did not have a monitoring programme for *A. pratensis* and no population surveys had been conducted, although the species was reported to have been seen on other field trips.

At PC18, Lesotho made a verbal response that field studies on *A. pratensis* in Lesotho were required (PC18 Summary Record).

SOUTH AFRICA

Distribution in range State: The CITES Management Authority of South Africa (S. Meintjes *in litt.* to UNEP-WCMC, 2010) reported that *A. pratensis* was "widespread in the Eastern Cape and KwaZulu-Natal provinces, growing at a range of altitudes from sea level around Grahamstown and East London in the south-west, to inland among the foothills of the Drakensberg and up to some of the highest and coldest peaks on the eastern side of the Drakensberg, such as Cathedral Peak and Champagne Castle and as far as Witsieshoek in the Free State Drakensberg." The species was also reported to occur in the KwaZulu-Natal Midlands around Richmond, Hilton and Merrivale (S. Meintjes, *in litt.* to UNEP-WCMC, 2010).

Population trends and status: *A. pratensis* was categorised as Least Concern in South Africa's national Red List (Raimondo *et al.*, 2009; SANBI, 2010). An earlier assessment listed the species as Near Threatened in the Eastern Cape and stated that the species may qualify as being 'threatened with extinction' in the near future (Victor and Dold, 2003).

Threats: Victor and Dold (2003) reported that the main threats to plant species in The Albany Centre of Endemism, South Africa were illegal collecting for commercial (horticultural) purposes, urban residential development and industrial development. They noted specifically that illegal collection had been a threat to Aloes in the 1960's, causing significant population declines, but they did not report any threats at the species level (Victor and Dold, 2003).

The CITES Management Authority of South Africa (S. Meintjes *in litt.* to UNEP-WCMC, 2010) listed grazing, forestry and collecting for horticultural purposes as threats to *A. pratensis*, citing the assessment by Victor and Dold (2003).

Near Grahamstown in the Eastern Cape, it was reported that *A. pratensis* was not harvested for any use and that it was able to survive heavy grazing (T. Dold, Selmar Schonland Herbarium *pers. comm.* to A. Southwood, *in litt.* to UNEP-WCMC, 2010). Pineapple farming was mentioned as a possible threat in the area, although *A. pratensis* was reported to mainly grow in rocky areas that are not suitable for pineapples. Urbanization and the expanding informal settlements to the north of Grahamstown were also mentioned as threats (T. Dold *pers. comm.* to A. Southwood, *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database, exports of 175 live artificially propagated specimens were reported by South Africa. During the same period, imports of 60 live artificially propagated specimens from South Africa were reported by the importers (Table 10). Almost all trade was for commercial purposes.

South Africa has not published any export quotas for this species.

No information on illegal trade in *A. pratensis* from South Africa was located.

Table 10. Direct exports of *Aloe pratensis* from South Africa, 1999-2008. All trade was in artificially propagated specimens.

Term	Reported by	1999	2000	2001	2002	2003	2004	2005	2007	2008	Total
Live	Exporter		119	35	12	1		4	4		175
	Importer		40	20							60

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Management: *A. pratensis* was recorded in the Drakensburg National Park (Carbutt and Edwards, 2006).

The National Environmental Management: Biodiversity Act, No. 10 of 2004, and subsequent amendments (Parliament of the Republic of South Africa, 2004), provides for the management and conservation of South Africa's biodiversity. It includes restricted activities for species listed as threatened or protected species, including the regulation of trade. Several Aloe species are listed on the 'Publication of lists of Critically Endangered, Endangered, Vulnerable and Protected Species' (Parliament of the Republic of South Africa, 2007), but not *A. pratensis*.

At PC18, South Africa made a verbal response that field studies on *A. pratensis* in South Africa were required (PC18 Summary Record).

Aloe prostrata (H. Perrier) L.E. Newton and G. D. Rowley, 1997: Madagascar

Liliaceae

Aloe prostrata **ssp.** *pallida* **Rauh and Mangelsdorff**

NB This subspecies is a basionym of Aloaceae *Aloe sakarahensis* Lavranos and Teissier subsp. *pallida* Rauh & Mangelsdorff 2004.

Selection for Review of Significant Trade

Aloe prostrata was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe prostrata* is a Madagascan endemic with a restricted distribution; spp. *prostrata* occurs in Andohahela National Park in the far south and ssp. *pallida* has been recorded near Toliara in the south-west. No information was available on threats. Although the species is known from a protected area, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was relatively low: six live wild-sourced specimens were reported by Madagascar and 25 wild-sourced specimens were reported by the importers. On the basis of very low levels of reported international trade, categorised as Least Concern.

Biology: *Aloe prostrata* ssp. *prostrata* was described to be a stemless plant with spreading, prostrate, narrow-triangular leaves 16-20 cm long and 1.5-2 cm wide, dark green to dark brown above and white spotted with white serrated margins. The flowers were reported to be bright carmine-red, green-tipped pendent and to grow on a very short stalk (Eggli, 2001; Rauh, 1995).

Aloe prostrata ssp. *pallida* was reported to have up to 20 leaves in a rosette, with leaves measuring up to 11 cm long and 1.5 cm broad, and coloured pale green and chocolate brown towards the rosette centre (Rauh and Mangelsdorff, 2000; Mangelsdorff *in litt*. to UNEP-WCMC, 2010). The leaf margins are very coarsely toothed, with teeth ca. 4 mm high and 5 mm broad. The inflorescence is ca. 8 cm long, with up to 15 pale reddish to yellow flowers. The flowering period was estimated to be at the beginning of the rainy season in January (Rauh and Mangelsdorff, 2000; Mangelsdorff *in litt*. to UNEP-WCMC, 2010).

Aloe prostrata ssp. *prostrata* was found to grow in limestone crevices (Rauh, 1995).

According to Rauh and Mangelsdorff (2000) and the CITES Management Authority of Madagascar (Mangelsdorff, *in litt*. to UNEP-WCMC, 2010) *A. p.* ssp. *pallida* was recorded in humus-filled gaps amidst basaltic boulders above a brook in dense semi-deciduous forest.

Distribution in range State: *A. prostrata* was reported to be a Madagascar endemic. The Madagascar CITES Management Authority (*in litt*. to UNEP-WCMC, 2010) reported its occurrence in Ankarana, northern Madagascar.

A. p. prostrata was described from the slopes of Ikavo at the Mahavavy river (Ambongo) in the west (Rauh, 1995) and was reported to occur in the Andohahela National Park in the far south (CITES MA of Madagascar, *in litt*. to CITES Secretariat, 2008).

A. p. pallida was recorded in Toliara Province on Massif Analavelona NW of Mahaboboka, at ca. 1000 m (Rauh and Mangelsdorff, 2000).

Population trends and status: The Madagascar CITES Management Authority (*in litt*. to

UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: No information on threats was located.

Trade: According to data in the CITES Trade Database for the years 1999-2008, Madagascar reported exports of six live wild-sourced specimens (in 2005). During the same period imports of 25 live wild-sourced specimens from Madagascar were reported by the importers (in 2003). Trade was for personal use.

The Madagascar CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) reported no commercial exports of the species for the period 2003-2008.

Madagascar has not published any export quotas for this species.

No specific information on any illegal trade in *A. p. prostrata* or *A p. pallida* was located during this study.

Management: *A. prostrata* was reported to occur in the Andohahela National Park according to the Madagascar CITES Management Authority (CITES MA of Madagascar, *in litt.* to CITES Secretariat, 2008), and in Ankarana National Park according to the CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010).

Regulation of wild harvesting and trade and protection of the species under CITES are covered in the genus overview of this report.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

Aloe suarezensis H. Perrier, 1926: Madagascar

Liliaceae

Selection for Review of Significant Trade

Aloe suarezensis was selected for trade review following CoP14 at PC17 (PC17 Summary record), based on trade data presented in document PC17 Doc 8.5.

Provisional category	Summary
Least Concern	*Aloe suarezensis* is a Madagascan endemic with a restricted range, only occurring in one locality in the extreme north. Threatened by habitat degradation, fire and collection for the horticulture trade. Although it is known from one potential protected area in the New System of Conservation category, the level of protection is unknown. There are national regulations for wild-harvesting in relation to CITES. During the period 1999-2008 international trade in the species was low: nine live wild-sourced specimens were reported by Madagascar and five by the importers. Eight live artificially propagated specimens were reported by both importers and the exporter. On the basis of very low levels of reported international trade, categorised as Least Concern.

Biology: *Aloe suarezensis* was reported to be a large and usually stemless plant, with spreading or recurved leaves that measure 60 cm long and 8-10 cm at the base, are red in colour and have small, pale red teeth along the margins (Rauh, 1995). The inflorescence was described to be 60-80 cm high (Reynolds, 1966).

The species was found to grow in very scanty soil on limestone in well-drained positions (Reynolds, 1966).

Distribution in range State: *A. suarezensis* was reported to be a Madagascar endemic with a restricted range. It was recorded in Montagne des Français and Windsor Castle in the Antsiranana area in the extreme north (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010; Reynolds, 1966).

Population trends and status: The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that the status of the species was unknown.

Threats: Habitat degradation, fire and collection for the horticulture trade were reported as main threats (CITES MA of Madagascar *in litt.* to UNEP-WCMC, 2010).

Trade: According to data in the CITES Trade Database for the years 1999-2008, Madagascar reported exports of nine live wild-sourced specimens (Table 11). During the same period, imports of five live wild-sourced specimens from Madagascar were reported by the importers. Madagascar also reported exports of eight live artificially propagated specimens, also reported by the importers. Most of the trade in wild-sourced specimens was reported for personal use. The trade in artificially propagated specimens was for commercial purposes and botanical gardens.

Table 11. Direct exports of *Aloe suarezensis* from Madagascar, 1999-2008.

Source	Term	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
A	live	Exporter							3	5			8
		Importer							3		5		8
W	live	Exporter		3					6				9
		Importer						5					5

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Between 2003 and 2008, the CITES Management Authority of Madagascar (*in litt.* to UNEP-

WCMC, 2010) reported commercial exports of 13 specimens: five plants in 2004, three plants in 2005 and five plants in 2006. The source of the specimens was not provided.

Madagascar has not published any export quotas for this species.

No specific information on the illegal trade in *A. suarezensis* was located.

Management: *A. suarezensis* was reported to occur in the New System of Conservation (NSC) of the Montagne des Français (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Regulation of wild harvesting and trade and protection of the species under CITES were covered in the genus overview of this report.

It was reported that the results of field studies for this species were awaited (PC18 Summary Record).

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

The trade data submitted by Madagascar within their CITES annual reports were in some cases lower than the trade levels reported by the CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) for a number of *Aloe* spp. Annual reports were received by Madagascar for all of the ten years 1999-2008, however it seems apparent that the trade, especially in 2004 provided by Madagascar in their annual report for *Aloe* spp. was incomplete. It is noted that trade levels 2003-2008 were higher than reported within the CITES Trade Database for *A. antandroi*, *A. capitata*, *A. conifera*, *A. deltoideodonta*, *A. humbertii* and *A. itremensis*.

Look-alike problems with *Aloe* spp. were reported to create problems for enforcement, particularly where Appendix II species closely resemble species listed in Appendix I (PC16 Inf. 8). For example, it was reported that "*Aloe droseroides* Lavranos & McCoy and *A. pseudoparvula* Castillon closely resemble *A. parvula* Berger, *A. inexpectata* Lavranos & McCoy is very similar to *A. calcairophila* Reynolds, *A. hoffmannii* Lavranos is quite similar to *A. parallelifolia* Perrier and *A. florenceae* Lavranos & McCoy is very similar to *A. haworthioides* Baker" (PC16 Inf. 8).

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Swietenia macrophylla (King, 1886): Belize, Bolivia, Colombia, Ecuador, Honduras, Nicaragua, Venezuela

Meliaceae, Big leaf mahogany

Selection for Review of Significant Trade

Swietenia macrophylla was selected at the 17th meeting of the Plants Committee (PC17) and the populations of those countries that had not demonstrated that they had sufficient information to make non-detriment findings, in compliance with Article IV, paragraph 2. a) of the Convention, were included. Three range states (Brazil, Guatemala and Mexico) were excluded from the process. At PC18, Costa Rica, Dominica, the Dominican Republic, El Salvador, Guyana, Panama, Peru, Saint Lucia, and Saint Vincent and the Grenadines, were also excluded. The Bolivarian Republic of Venezuela (hereafter referred to as Venezuela) and the Plurinational State of Bolivia (hereafter referred to as Bolivia) did not respond to a request for information from the Secretariat. Belize, Colombia, Ecuador, Honduras and Nicaragua did respond, but it was determined that additional data was required (PC18 Summary Record). These seven countries remained in the Review of Significant Trade process.

A. Summary

Overview of *Swietenia macrophylla* recommendations.

Range State	Provisional category	Summary
Belize	Possible Concern	The distribution area of the species in the country has decreased substantially. Overharvesting has reportedly led to the near depletion of large trees of commercial size, of which densities have been recorded as very low. Logging, including illegal logging, as well as land use change were considered important threats to the species in the country. It is reported to occur in several protected areas, and forestry legislation in Belize was considered to be adequate by one author. However, concerns were expressed by various authors about insufficient mahogany regeneration as a result of selective logging. Sustainable harvesting was reported to take place in an experimental area, however this was considered to be uncompetitive in the market. Belize and importers reported international trade of around 9,000m^3 during 1999-2008. Exports of the species were reported to originate in areas with approved sustainable forest management plans, which include volume quotas defined on the basis of species specific characteristics. International trade levels as reported by Belize and importers have decreased considerably in recent years. However, it remains unclear if current trade levels are impacting the population and whether the provisions of Article IV are being implemented fully, therefore categorised as Possible Concern.
Bolivia	Urgent Concern	Occurs in the northern half of the country. Overharvesting reportedly led to the near disappearance of the species in Bolivia. Low densities reported from the country. Logging, including illegal logging, even in protected areas was considered to be an important threat to the species in the country. Forest certification is well established in the country. Management in Bolivia was reported to be greatly improved by a law introduced in 1997, and although considered to have various limitations, seen positively in

		general by various authors. It is unclear how a recent change in the structure of the forest authorities in the country will affect management. An ITTO-funded project on mahogany is to be implemented in the country to evaluate population density and impact of harvest on growth and regeneration. Relatively high levels of international trade from the country reported 1999-2008 (73,000 m^3). Although positive steps made towards establishing non-detriment findings, they do not have been formulated to date in Bolivia, therefore categorised as Urgent Concern.
Colombia	Least Concern	Occurs in the northern half of the country. Classified as Critically Endangered nationally. Populations considered decimated and commercially extinct in Colombia, having been reduced by more than 80%. Overexploitation was reported as the main threat. The extent of illegal harvest and trade is unclear. However, regional harvesting bans are in place in the main regions where the species is distributed. No international trade was reported from the country 1999-2008. The requirements of Article IV do not currently appear to be applicable, therefore, categorised as Least Concern.
Ecuador	Least Concern	Confirmed from several provinces, but a lack of distribution and abundance information in the country is apparent. This will be addressed by an FAO-supported project initiated in 2009. Species considered rare in the country. Illegal trade considered to be the main threat, but efforts being made to tackle the problem, including deployment of a special enforcement unit. Relatively low levels of international trade reported 1999-2008, only by importers. Two-year harvesting ban put in place in 2007 and renewed for another two years in 2009. On this basis, categorised as Least Concern. However, it is unclear if exports from 2011 are anticipated. No information for the basis of non-detriment findings currently available, and if trade should resume then Possible Concern may be more appropriate.
Honduras	Possible Concern	Reported from a number of regions but distribution considered to have declined considerably. Many populations outside protected areas almost disappeared due to overharvesting. Deforestation, poor forestry management and illegal trade were considered to be the main threats to the species. Exports reported by Honduras for 1999-2008 were 3,211 m^3, although importers reported much lower quantities in trade. International trade levels decreased in recent years. However, despite recent lower trade levels, it remains unclear whether the provisions of Article IV are being implemented fully. Therefore categorised as Possible Concern.

Nicaragua	Least Concern	Occurs in a number of regions, but with patchy distribution. Protected areas cover 1.4 m ha of potential range for the species. Status may vary across range, with occurrence described from common to uncommon. Declining in Nicaragua and very few trees in the highest diametric classes remaining as a result of overharvesting. Commercially extinct in parts of the country, with the main remaining populations in areas of the Atlantic side of the country. Logging, including illegal logging, was considered to be an important threat to the species in the country. Moderate levels of international trade reported 1999-2008 (35,671m^3) although trade levels lower than the sustainable levels of harvest calculated by one author. Ten-year harvest and trade ban put in place in 2006, allowing only the export of timber from registered plantations and finished goods. On this basis, categorised as Least Concern.
Venezuela	Least Concern	Reported to be widely distributed in the coastal regions of the country. Little information available on the abundance of the species in the country, however some authors considered it to be depleted as a consequence of overharvesting. Harvest and trade of the species banned in the country. Very low levels of international trade reported 1999-2008, with no exports since 2004. On this basis, categorised as Least Concern.

B. Species overview

Biology: *Swietenia macrophylla* is a large, canopy-emergent, deciduous tree up to 40(-60) m tall with a diameter at breast height (dbh) up to 1.5 (-2) m, with an umbrella-shaped crown and an often buttressed bole (Lamb, 1966; Soerianegara and Lemmens, 1994; Gullison *et al.*, 1996; Mayhew and Newton, 1998).

S. macrophylla was reported to be able to tolerate a very wide range of environmental conditions and to be found naturally in both tropical dry and tropical wet forest types (Mayhew and Newton, 1998). Annual rainfall across its ecological range was reported to be typically 1000-2500 mm, reaching 3800 mm in Amazonian Ecuador and Peru (Lamb, 1966; Mayhew and Newton, 1998). According to Lamb (1966), mahogany reaches its 'optimum natural development' under tropical dry forest conditions, with an annual precipitation of 1000-2000 mm, a mean annual temperature of 24°C and a potential evapotranspiration ratio of 1-2. It was reportedly recorded at altitudes of up to 1400 m.

Mahogany was reported to grow naturally on a very wide range of soil types (Bauer and Francis, 1998; Mayhew and Newton, 1998), including alluvial soils of mixed origin, volcanic soils, and soils derived from limestone, granite, andesite, and other sedimentary, igneous, and metamorphic rocks (Lamb, 1966; Bauer and Francis, 1998).

It was reported to occur in seasonal primary forests, often clustered together in groups along watercourses or in highly disturbed transition zones between forest types (Lamb, 1966; Grogan *et al.*, 2002).

Mahogany trees are monoecious, their flowers are pollinated by insects and their fruits are woody capsules that take 10-11 months to mature (Gullison *et al.*, 1996). Trees were reported to start producing capsules at 30 cm dbh but fecundity was considered to be relatively low for trees 30-80 cm dbh, with fecundities of trees > 80 cm dbh being much higher and peaking at c. 130 cm dbh (Gullison *et al.*, 1996). Snook *et al.* (2005) similarly found that fruit production increased with dbh and trees >75 cm produced significantly more fruits each year than did trees of smaller diameters. Gullison *et al.* (1996) determined that some trees produce as many as 600 capsules and that capsules contained an average of 55 seeds, with the most fecund trees therefore producing c. 33,000 seeds in a year.

Seeds were reported to be dispersed primarily by the wind and a median dispersal distance of 35 m was reported, with maximum dispersal distances of >80 m (Gullison *et al.*, 1996). Mahogany was considered a light demanding climax species and its seedlings and saplings to be shade intolerant (Lamb, 1966; Gullison *et al.*, 1996; Grogan *et al.*, 2002), although shade was reported to facilitate germination by maintaining soil moisture (Morris *et al.*, 2000). The seeds were reported to lack dormancy mechanisms, therefore no seed banks accumulate in the soil (Lamb, 1966).

As mahogany seedlings require high light availability for successful establishment, the extent of regeneration in natural forests was considered to be strongly influenced by the incidence of disturbance to the forest canopy (Mayhew and Newton, 1998). *S. macrophylla* was reported to be long lived and to have co-evolved with periodic catastrophic disturbances including hurricanes, fires, blowdowns and flooding, which the species can survive better than most other tree species (Snook, 1996; Gullison *et al.*, 1996). After these catastrophic events, surviving adult mahogany trees disperse their seeds, by wind or water, across the resulting gaps or clearings, with seedlings becoming established in these open areas in essentially even-aged cohorts, intermixed with other species (Snook, 1996; Gullison *et al.*, 1996; Mayhew and Newton, 1998). While regeneration of mahogany is generally associated with catastrophic disturbances, field studies in the Brazilian Amazon indicated that regeneration may also occur following smaller-scale disturbances such as natural tree-fall gaps in closed forest (Grogan, 2001; in Grogan *et al.*, 2002) and that prolific regeneration can occur in the transition zone between evergreen and deciduous forest (Brown *et al.*, 2003).

The diameter growth rates of mahogany were reported to be 2.0-10.9 mm/yr by Snook (1993), 2.6-9.0 mm/yr by Gullison *et al.* (1996), 3.6-9.1 mm/yr by Lamb (1966), 4.9-7.9 mm/yr by Grogan (Grogan, 2001; in Grogan *et al.*, 2002) and 6.9-12.1 mm/yr by Shono and Snook (2006). Based on these growth rates, Gullison *et al.* (1996) determined it should be assumed that it will take somewhere between 105 and 148 years for mahogany trees to reach commercial size in natural forest. Snook (2003) reported from a study in Mexico that although the fastest-growing trees may reach 55 cm dbh in about 82 years, two-thirds of the trees will take well over a century and some closer to two.

Martini *et al.* (1994) classified *Swietenia macrophylla* as a species potentially susceptible to logging impacts based on its ecological characteristics. WCMC (1998) noted that the "regeneration of the species is stochastic, depending in nature on large-scale disturbance. This ecological strategy makes mahogany vulnerable to logging regimes".

Seedlings and saplings were reported to be often infested by the shoot borer *Hypsipyla* spp., which affects vertical growth and damages stem form, representing the main factor limiting the cultivation of mahogany in plantations (Lamb, 1966; Mayhew and Newton, 1998; Floyd *et al.*, 2003; Lugo *et al.*, 2003).

General distribution and status: The natural distribution of *S. macrophylla* was reported to extend from southern Mexico through southern Central America into South America and from there in an arc from Venezuela through the Amazon basin to Bolivia and Brazil (Lamb, 1966). See Figure 1.

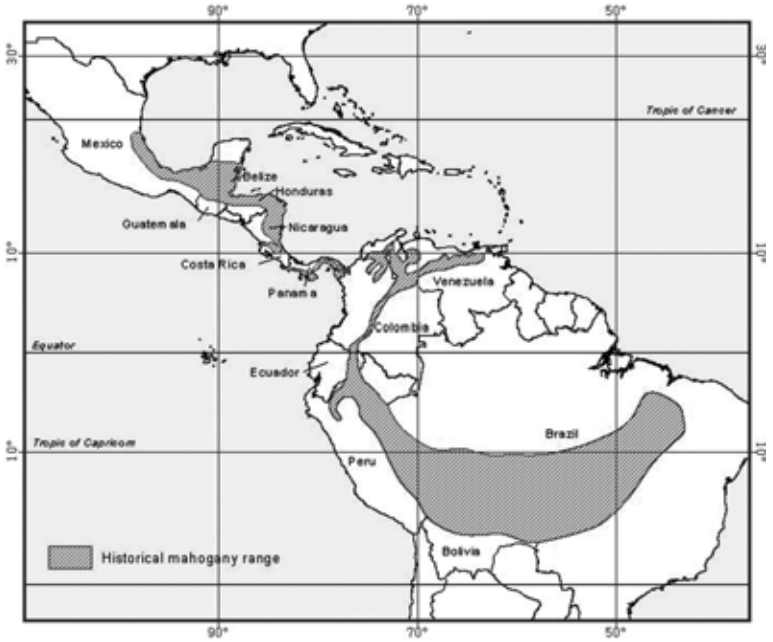

Figure 1. Historic range of *Swietenia macrophylla*, based on Lamb (1966). Source: Blundell and Gullison (2003).

Because of its well-established market value and ability to adapt to a variety of site conditions, *S. macrophylla* was reported to have been planted extensively throughout the world, both within and outside its native range, including South and Southeast Asia, the pacific regions and on almost every island in the West Indies (Bauer and Francis, 1998; Mayhew and Newton, 1998). By 1998, the total recorded mahogany plantation area around the world was reported to be at least 200,000 ha (Mayhew and Newton, 1998). The largest mahogany plantations were reported to be located in South and Southeast Asia (Mayhew and Newton, 1998).

Calvo (2000) and the Tropical Science Center (2000) estimated that the original distribution area of *S. macrophylla* in Mesoamerica would have been 41 million ha, of which only 15 million ha (36% of original extent) remained in the mid 1990s. It was estimated that in all of Mesoamerica, 4.3% of the original distribution and 11.5% of the forested area that still exists is within the conservation units of absolute protection as natural parks (Tropical Science Center, 2000). Navarro *et al.* (2003) noted that by 2003 in Mesoamerica, the area of natural forest containing important populations of mahogany was reduced to one-third of the area described by Lamb (1966).

In South America, the species' historical natural range was estimated as 278 million ha, of which 57% occurred in Brazil (Martinez *et al.*, 2001; Grogan *et al.*, 2009). Approximately 58 million ha (21%) of mahogany's historic range in South America were reported to have been deforested by 2001 (Martinez *et al.*, 2001; Grogan *et al.*, 2009). Grogan *et al.* (2009) considered that surviving stocks were "extremely low-density populations in remote regions representing a smaller fraction of historic stocks than expected based on estimated current commercial range". See Figure 2.

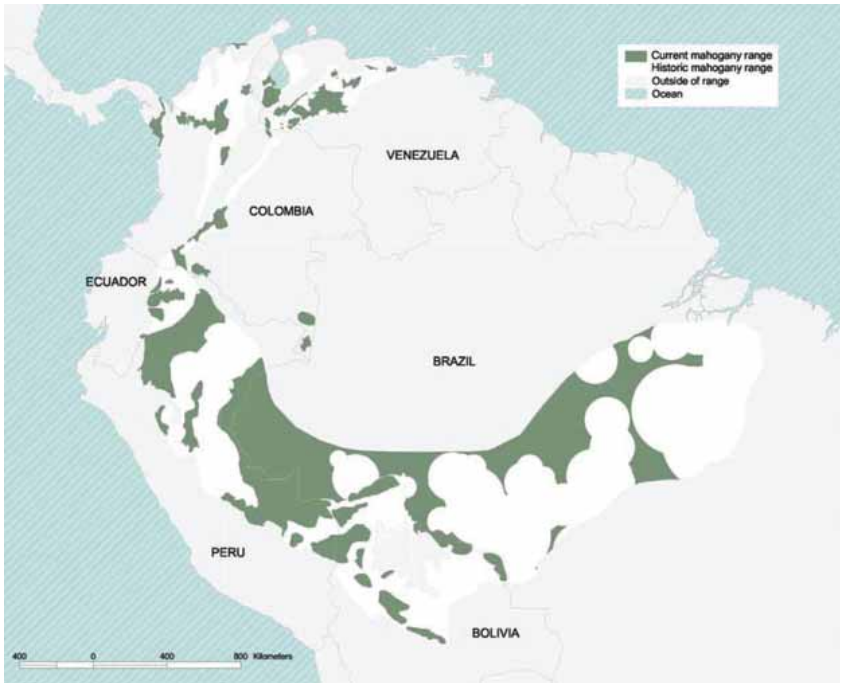

Figure 2. Distribution of existing commercial populations of *Swietenia macrophylla* in South America, shown by the darkened area within its historic range. Source: Grogan *et al.* (2009).

The Tropical Science Centre (2000) reported a wide variation in the density of mahogany trees with a dbh > 60 cm in Mesoamerica, ranging from 0.025 to 2 trees per hectare. Gullison *et al*. (1996) found densities from 0.31 to 1.6 trees per hectare in Bolivia and Grogan *et al*. (2002) noted that the species occurred at densities generally less than one adult tree per hectare.

The species is considered to be globally Vulnerable in the IUCN Red List (WCMC, 1998). The classification is annotated to indicate that it requires updating. *S. macrophylla* was considered to be decreasing globally (Mejía *et al.*, 2008).

Unsustainable exploitation was considered to be the main threat to the species (UNEP-WCMC, 2000; e.g. Calvo, 2000; Blundell, 2004; Verwer *et al.*, 2008; Newton, 2008; Grogan *et al.*, 2009; CoP12 Inf. 33; MWG2 Doc. 6) and Rodan and Campbell (1996) summarised the available scientific information on *S. macrophylla* as follows: "(1) the species is being overexploited virtually throughout its range; (2) illegal logging is widespread; (3) populations are being reduced, including those in ostensibly protected areas; (4) genetic resources are threatened; (5) the prospects of sustainable harvesting to supply the trade are constrained by economic and biological difficulties; and (6) there are considerable adverse impacts from current extraction practices on associated tropical forests and the indigenous populations dwelling in them".

Overview of trade and management in the species

Use: Mahogany was initially used mainly for shipbuilding and later also for ornamental pieces, including furniture (Lamb, 1966). Because of its attractive appearance, ease of working and excellent finishing qualities, mahogany was considered to be the world's premier cabinet wood (Lamb, 1966; Knees and Gardner, 1983; Rodan *et al.*, 1992; Bauer and Francis, 1998; Robbins, 2000) and it was reported to be the most valuable widely traded Neotropical timber species (Blundell and Rodan, 2003; Grogan and Barreto, 2005; André *et al.*, 2008). Prices in excess of $1,000 per m^3 have been reported (Robbins, 2000; Grogan *et al.*, 2002).

The extraction and exportation of mahogany for international trade from the Caribbean and

Central American countries was reported to have led to the commercial depletion of *Swietenia mahagoni* and *S. humilis*, resulting in a shift to *S. macrophylla* and to South America (Robbins, 2000). Robbins (2000) also considered that the increasing prices for mahogany and a growing reliance on substitute species such as African mahogany (*Khaya* spp.) suggested increasingly limited supplies of mahogany from the Americas.

Lamb (1966) recognised commercial logging as one of the main causes of the depletion of mahogany-producing forests. Other authors considered extraction for commercial trade to be an important threat to mahogany populations (Knees and Gardner, 1983; Oldfield, 1988; Rodan *et al.*, 1992).

CITES background: A summary of CITES discussions surrounding mahogany is provided in Table 1.

Table 1. Summary of CITES discussions surrounding *S. macrophylla* (Source: CITES Secretariat (2010)).

Year	Meeting (if applicable)	CITES discussions surrounding *S. macrophylla*
1992	CoP8 (Kyoto)	Proposal to include *S. macrophylla* in Appendix II by Costa Rica and the United States of America (unsuccessful)
1994	CoP9 (Fort Lauderdale)	Proposal to include *S. macrophylla* in Appendix II by Netherlands (unsuccessful)
1995		Inclusion of *S. macrophylla* in Appendix III (populations in the Americas) by Costa Rica
1997	CoP10 (Harare)	Proposal to include *S. macrophylla* (Neotropical populations) in Appendix II by Bolivia and United States of America (unsuccessful)
1997	CoP10 (Harare)	Establishment of a working group comprising the range States and importing countries, in order to examine the conservation status of bigleaf mahogany and make recommendations to ensure sustainable international trade.
1998		Inclusion of *S. macrophylla* in Appendix III (Bolivia, Brazil and Mexico listed their populations)
2000	CoP11 (Gigiri)	Brazil reported on the working group conclusions after a meeting in that country in June 1998 (document Doc. 11.38.2). The countries party to the *Tratado de Cooperación Amazónica* (Amazonian Cooperation Treaty) reiterated their commitment to comply with all the obligations relating to the listing in Appendix III of *S. macrophylla* in the region. Bigleaf Mahogany Working Group was established (mandate detailed in Decision 11.4).
2001		Inclusion of *S. macrophylla* in Appendix III (Colombia and Peru listed their populations)
2002	CoP12 (Santiago)	CoP12 Prop. 50 by Guatemala and Nicaragua to include the neotropical populations of *Swietenia macrophylla* in Appendix II, covering only logs, sawn timber, veneer and plywood was adopted and came into effect on 15 November 2003.
2002	CoP12 (Santiago)	A report of the Bigleaf Mahogany Working Group (BMWG) (see document CoP12 Doc. 47) was considered by the CoP, which agreed to maintain the Working Group and gave it a new mandate (recorded in Decision 12.21).
2003	2nd meeting of the BMWG (Belem)	Resulted in a series of recommendations.
2004	PC14 (Windhoek)	Recommendations of the BMWG presented in order to establish priorities and to seek practical advice on their

Year	Meeting (if applicable)	CITES discussions surrounding *S. macrophylla*
		implementation [see documents PC14 Doc. 19.1 (Rev. 1), PC14 WG7 Doc.1, and PC14 Summary Record].
2004	CoP13 (Bangkok)	Presentation by Brazil of a report (document CoP13 Doc. 39, Annex) indicating that the Working Group had completed the tasks allocated to it in Decision 12.21. At the same meeting, the CoP decided that the BMWG would continue its work under the Plants Committee (see Decisions 13.55 to 13.59).
2005	PC15 (Geneva)	Plants Committee made a statement specifying the new mandate of the Working Group and its composition.
2006	PC16 (Lima)	BMWG submitted its work plan (see document PC16 Doc. 19.1) which, in accordance with Decision 13.56, [presented] a report at the 14th meeting of the CoP on the progress made by the Working Group.
2007	CoP14 (The Hague)	Action plan for the control of international trade in big leaf mahogany' (Decision 14.145 and Annex 3 to CoP14 decisions) adopted. Plants Committee instructed to be the body under which the BMWG would continue its work.
2008	PC17 (Geneva)	Plants Committee completed the tasks allocated to it in Annex 3 to CoP14 decisions and decided to include in the Review of Significant Trade the populations of those countries that had not demonstrated that they had sufficient information to make non-detriment findings, in compliance with Article IV, paragraph 2. a) of the Convention.
2009	PC18 (Buenos Aires)	BMWG reported on its fourth meeting (Cancun, November 2008), which took place in conjunction with the First Latin American Workshop on the Joint CITES-ITTO Timber Project 'Ensuring international trade in CITES-listed timber species is consistent with their sustainable management and conservation'. The meeting resulted in three main strategic objectives, namely implementation (adoption of standard NDF guidelines), institutional strengthening (including promotion of national synergies; implementation of an electronic system to control the chain of custody; raise awareness on forestry regulations; share experiences at the regional level; involve all stakeholders; and capacity building activities), and funding (PC 18 Doc. 13.1.2). In addition, responses received from Parties on progress on the implementation of the strategy were submitted at PC18.
2010	CoP15 (Doha)	Plants Committee reported on the work of the Committee and of the Working Group and the name of the Bigleaf Mahogany Working Group was changed to 'Working Group on the Bigleaf Mahogany and Other Neotropical Timber Species' and its terms of reference and membership were agreed (Annex 3 to CoP 15 Decisions).

Implementation of listing in CITES Appendix II: While the listing of mahogany in CITES was considered to interpose a layer of regulatory control between mahogany and international markets and to offer an opportunity to build a better system (Rodan and

Campbell, 1996; Rodan and Blundell, 2003; Grogan and Barreto, 2005), the implementation of the species' listing in CITES was reported to pose considerable challenges (Blundell, 2004) and to be hampered by the lack of sufficient resources and human capacity to produce national inventories and conduct other population studies, evaluate management plans and monitor their implementation, or control the illegal trade (MWG2 Doc. 8).

Blundell and Gullison (2003) contended that "mahogany is unsustainably harvested because countries lack the capacity and the political will to enforce their science-based regulations […] Under these conditions, research on ecology, conservation and silviculture has little ability to influence the management and trade of mahogany".

Blundell (2007) considered that "implementation [of mahogany's listing on CITES Appendix II] has been weak, in part because countries have yet to develop a common, pragmatic, cost-effective system to make the legal and non-detriment findings". The author also reported that "the unmanaged harvest of mahogany appears to exceed the forest's capacity for regeneration and recruitment (Gullison *et al.*, 1996; Verissimo and Grogan, 1998; Kometter *et al.*, 2004). Therefore, a non-detriment harvest is unlikely without management, including artificial regeneration (Brown *et al.*, 2003; Grogan and Galvão, 2006)". Blundell (2007) recommended a combination of land-use planning, including a network of protected areas and well-managed production forests, operational management plans, and chain of custody.

Illegal trade: Illegal trade was considered to be a problem in most range States and to be one of the main threats to the species (Rodan *et al.*, 1992; Watson, 1996; Blundell, 2004; Newton, 2008; MWG2 Doc. 8). Calvo (2000) noted that, in Mesoamerica, the levels of illegal harvest may be in the region of 100% to 200% of legal harvest levels. Blundell and Rodan (2003) also referred to "numerous credible reports of widespread illegal mahogany logging". Illegally harvested mahogany timber was reported to be sometimes processed in the field and later transported to unknown destinations, and other times to be reported as timber of similar species that are not listed in CITES (Calvo, 2000). PC17 Inf. 3 estimated that, based on volumetric conversion factors, between 30% and 80% of the mahogany sawnwood exported under CITES permits was illegal, or of controversial sources.

Rodan and Blundell (2003) suggested that the logistical challenge for enforcement officers in Latin America to halt illegal logging could be addressed by placing the burden of proof on forestry operations to demonstrate sustainable forest management, rather than on enforcement agencies to demonstrate breaches.

Impacts of logging: Calvo (2000) reported timber harvesting in Mesoamerica to be highly selective and to focus mainly on *S. macrophylla*. The author considered this practice to greatly reduce the probability of leaving mahogany seed sources (Calvo, 2000). Mayhew and Newton (1998) similarly reported that "selective logging of mahogany in natural forests, which produces small gaps in the canopy and a relatively undisturbed understorey, greatly limits establishment and growth of regeneration", a view shared by Whitman *et al.* (1997).

Verissimo *et al.* (1995) noted that the effect of logging on *S. macrophylla* population numbers and genetic structure may be significant. Newton *et al.* (1996) reported that "deforestation and selective logging certainly have the potential to deplete the genetic resources of tropical timber species, but as yet there is only quantitative evidence to support the occurrence of genetic erosion in mahogany". Gillies *et al.* (1999) reported that results indicated that selective logging did significantly reduce genetic diversity within *S. macrophylla*. Lugo (1999) questioned whether genetic erosion was occurring in big-leaf mahogany as a result of logging and suggested that management actions, such as the establishment of reserves, maintaining large seed trees in harvested areas, actively regenerating the species, and artificially exchanging seeds among populations, can help mitigate threats to the genetic

diversity of the species.

Lemes *et al*. (2007) reported that due to its generalist and flexible pollination system, *S. macrophylla* seemed to be resilient to environmental disturbances such as those caused by logging. The authors further argued that the remaining individuals in logged areas or in relict fragments may therefore be very important for long-term population recovery and genetic conservation programmes.

Loveless and Gullison (2003) reported that "the loss of a single population in a region is not likely to seriously erode the genetic base of the species" but added that "regional habitat fragmentation will carve up large forest tracts into smaller, more isolated habitats, thus potentially impeding gene movement. Even under a scenario of selective timber extraction or local land-use change, large uncut tracts would need to be left undisturbed to maintain the historical processes that underwrite the genetic structure of the species".

André *et al.* (2008) reported a significant loss of genetic diversity in post-logging seedlings vs. pre-logging adult generational cohorts of a logged mahogany population in southeastern Brazilian Amazonia. The authors suggested initiatives to promote the maintenance of genetic diversity, including that forest management projects involving mahogany should implement active programmes for seed collection and germination and seedling production and outplanting in disturbed areas associated with logging activities (André *et al.*, 2008).

Despite being a light-demanding species requiring canopy disturbance for successful regeneration, mahogany's re-stocking rates following conventional logging operations were reported to be inadequate for population recovery (Snook, 1996; Grogan *et al.*, 2002; MWG2 Doc. 6). It was considered this may result from the lack of seeds, seedlings, and/or adequate growing conditions for seedlings and juvenile trees in the post-logging forest environment (Grogan *et al.*, 2002; Grogan and Galvão, 2006; MWG 2 Doc. 6). Grogan *et al.* (2002) therefore considered that successful regeneration and recruitment following logging would require two types of silvicultural interventions: first, seed dispersal (or seedling, if outplanting) to appropriate growing sites; and second, tending operations in subsequent years to maintain growth rates as canopy gaps close.

It was considered that harvesting and processing of the species across range States generally had only around 50% efficiency (the conversion value of logs to timber) (WCMC, 1998; Calvo, 2000), and that there were few economic incentives to manage natural stands sustainably (WCMC, 1998). Grogan and Schulze (2008) estimated that the average commercial-sized (>75 cm diameter) mahogany tree would yield 6.4-8.5 m^3 of roundwood, which in turn would be processed or milled into 1.7-2.2 m^3 of export-grade sawnwood. PC17 Inf. 3 developed a methodology for calculating mahogany volume conversions between standing volume and export grade sawnwood, and reported that export grade sawnwood is typically only 20% of the standing volume.

Management: Various authors considered that the sustainable use of mahogany is possible under adequate silvicultural practices (e.g. Lamb, 1966; Lugo, 1999; Calvo, 2000; Dávila Aranda, 2008; MWG2 Doc. 6) and Lugo (1999) argued that various traits of big-leaf mahogany may provide it with resilience: "copious production of sewed, particularly during mast years; abundant seed germination; morphological and physiological plasticity of its seedlings toward light conditions; high genetic diversity; high level of outcrossing; high nutrient-use efficiency; long lifespan; resistance to drought and high wing speeds; and ability to dominate the crown of the tropical forest."

Newton (2008), however, considered the species to have a low potential for conservation through use. The species was classified as having a high commercial value, however it was

considered to have a low potential for sustainable harvesting, harvesting was thought to likely lead to increased access to the forest, the distribution of profit along the market chain was regarded as inequitable, and the income was not considered to act as an incentive for conservation (Newton, 2008).

Verwer *et al.* (2008) and Cohen (1999) considered that mahogany populations need to be actively managed to achieve sustainability and contended that the application of reduced impact logging techniques are not enough to achieve sustainable harvesting of mahogany in semi-deciduous forests.

Schulze *et al.* (2008) argued that while the opportunity costs of lower initial harvest intensity and up-front investment in silvicultural treatments do not necessarily render logging operations unprofitable, they can reduce profit margins enough that loggers may have strong economic incentives to resist them.

Grogan and Schulze (2008) questioned whether non-detriment findings for mahogany could be adequately made for timber species by setting export quotas, since "sustainable production occurs by definition at the level of individual trees and local populations within forest management units, and can only be evaluated through detailed field audits. In contrast, export quotas assume absolute knowledge of natural stocks and a shared commitment by a community of producers to transparent harvest and business practices".

Grogan *et al.* (2008) calculated based on studies in the Brazilian Amazon that 80% harvest intensity would not be sustainable over multiple cutting cycles for most populations without silvicultural interventions ensuring establishment and long-term growth of artificial regeneration to augment depleted natural stocks, including repeated tending of outplanted seedlings.

Management of mahogany in recent years was reported to have involved primarily minimum diameter cutting limits, polycyclic rotations and forest certification (Mayhew and Newton, 1998; MWG2 Doc. 6). However, minimum diameter cutting limits were considered to be rarely respected across most of Amazonia and were considered to lead to depletion of adult populations without management of regeneration; harvest intensities in polycyclic rotations were considered to be too high for sustained yields; and it was considered unclear whether certified areas managed mahogany on a sustainable basis (MWG 2 Doc. 6).

MWG2 Doc. 6 proposed, apparently following Grogan *et al.* (2002), the following guidelines for the sustainable use of mahogany:

> "Where densities of adult trees are relatively high (>1/ha), natural processes favoring regeneration – disturbance regimes, competitive environment, and physiographic factors influencing growth – may assist management efforts, reducing investments necessary to ensure sustainability. Where adult densities are low (<1/ha), conditions favorable to successful regeneration and growth may occur rarely, and management investments necessary for sustainability may be higher.
>
> […]
>
> Empirical information regarding stocking densities is essential for planning resource use at both macro- and micro-scales. At national levels, annual harvest quotas can only be rationally determined if stocking data is current and periodically updated.
>
> […]
>
> Planned extraction should include mapping of all merchantable trees and pre-harvest design of road and skidding networks.

[…]

Rotation and cutting cycle lengths should be derived from regional or site-specific diameter growth and regeneration rates. Where active management of sub-merchantable trees and regeneration are planned (e.g., vine cutting, canopy thinning to reduce competition), rotation lengths will be shorter than indicated by mean natural growth rates. Minimum diameter cutting limits will vary according to adult density, population structure, and regional or site-specific potential growth rates. Limits should be set so that sub-merchantable trees are retained at sufficient densities to provide second harvests under planned cutting cycles (and third harvests where three cutting cycles per rotation are planned). Minimum diameter cutting limits must be strictly enforced.

Seed trees should be retained as sources for seed dispersal by wind where natural regeneration will provide future harvests, which may be the case where adult densities are high (>1/ha). Seed trees should be retained as sources for seed collection and re-distribution across management areas where artificial regeneration will be necessary. This will be the case where adult densities are low (<1/ha) because seed dispersal areas downwind of any given tree will be small relative to the total area requiring seeds after logging. Large hollow unmerchantable mahogany trees may be perfectly healthy otherwise and capable of producing high-quality seeds. Where adult densities are low, seed trees may need to be retained in groups to maintain reproductive capacity.

Where possible, trees should be felled directionally to open canopy gaps where seeds and seedlings are most likely to occur naturally, that is, in the direction of prevailing dry season winds. If tree felling occurs before seed dispersal, unopened fruit should be removed from crowns for seed collection.

The second harvest should be identified and treated at the time of first harvest […] by cutting vines and thinning neighbouring tree crowns competing for canopy space with sub-merchantable mahogany trees (35 – 60 cm diameter where the minimum diameter cutting limit is 60 cm). Suppressed trees may be capable of accelerating diameter increments in response to canopy thinning operations. Sub-merchantable trees should be ready for harvest approximately 30 years following the first cut.

The third harvest should also be anticipated at the time of first harvest by treating trees 10 – 35 cm diameter and pre-established natural regeneration. Where population densities are low, artificial regeneration – enrichment plantings in logging gaps – will be necessary. Operations should include: thinning competing crowns and vine cutting […], opening clearings for natural regeneration […], enrichment planting […], silvicultural treatments […].

Sub-merchantable trees 35 – 60 cm diameter treated during the first cutting cycle should be ready for harvest after approximately 30 years; this time-period will depend on site-specific growth rates. At the time of the second harvest, trees 10 – 35 cm diameter, natural regeneration, and enrichment plantings that were treated or established in logging gaps in year 0 will likely require tending operations to stimulate growth rates. Harvest of these trees, assumed to have grown to 35 – 60 cm during the time since the first harvest, occurs during the third harvest or 60 years after the first cut.

At the time of third harvest, natural regeneration should be treated and enrichment plantings established in logging gaps. That is, each harvest should be accompanied

by regeneration treatments ensuring establishment of future harvests.

Where forests have been logged for mahogany only once, it may be possible to manage surviving populations. These practices would emphasize treatments favoring second- and third-harvest trees, including: thinning competing crowns and vine-cutting […], establishing the 3rd harvest […]".

MWG2 Doc. 6 indicated that these guidelines will require adjustments in emphasis and timing according to local and regional population density patterns, growth and regeneration rates, and site conditions including socio-economic factors. MWG2 Doc. 6 also recognised the importance of non-technical aspects of sustainable management of mahogany, including economic costs, regulation and control, market policies and land tenure.

Grogan *et al.* (2002) listed the following natural forest management recommendations for mahogany derived from ecological studies in Brazil: "planned harvests to reduce damage to residual stands, strict adherence to minimum diameter cutting limits (recommended 55 cm dbh), selection criteria for seed-tree retention, directional felling, and seed collection from felled trees for redistribution in logging gaps. Instead of relying on naturally occurring seedling regeneration, which is rare in natural forests, collected seeds should be planted at low density in enlarged and treated (cleaned) treefall gaps to ensure establishment of the next generation of harvestable trees. Planted seedlings will require tending at 1- to 5-year intervals through the first decade, and then again after 25 - 30 years when today's juvenile trees (25 - 55 cm dbh) are harvested. A second round of enrichment plantings should accompany the second harvest, and so on through successive 25- to 30-year rotation periods".

Dávila Aranda (2008) outlined the basic elements for formulating non-detriment findings for mahogany. In brief, these included: estimation of mahogany range area (at the national, sub-national and local levels); population parameters (periodic measurements, indicators of sustainable management and local reference values); management principles, methods and indicators; and tools for monitoring and verifying harvests, processing and conservation.

Snook (2003) considered that a mahogany selective harvesting system based on a 25-year cutting cycle and a minimum 55-cm commercial diameter as implemented in Mexico's Yucatan forests could not be expected to be sustainable because extraction would exceed growth. She recommended species other than mahogany should also be harvested and silvicultural treatments should be implemented to provide adequate regeneration conditions. Snook *et al.* (2005) argued that harvesting all mahogany trees over a minimum diameter well below the maximum fecundity of this species (>75 cm) is likely to significantly reduce the availability during the next cutting cycle of mahogany seed needed for regeneration. Snook *et al.* (2005) therefore recommended that it is important to retain mahogany trees >75 cm DBH as seed sources. Peña-Claros *et al.* (2008) found that silvicultural treatments can lead to increased timber volumes being recovered after the first cutting cycle.

Mayhew *et al.* (2003) considered the shelterwood system (canopy thinning with retention of mahogany seed trees to encourage establishment of natural regeneration) to offer the best compromise solution for managing mahogany over the long term.

Grogan and Galvão (2006) reported post-logging seedling regeneration density by *S. macrophylla* to be very low and considered silvicultural interventions designed to increase seedling densities and growth rates to be essential to avoid commercial extirpation of the species as a result of logging. Negreros-Castillo *et al.* (2003) suggested that the slash and burn practice used for agricultural clearing may be a good way to prepare sites for seeding

with mahogany.

Robbins (2000) regarded certified and plantation-grown mahogany as possible solutions to improve the management and conservation of the species and its natural populations.

Out of the 14 mahogany range states, four (Colombia, Costa Rica, Panama and Venezuela) were reported to have bans on mahogany international trade in place (MWG2 Doc. 8).

C. Country reviews

BELIZE

Provisional category: Species of Possible Concern

Distribution in range State: In Belize, mahogany was reported to occur in broadleaf forests on moderately fertile, freely draining soils (Weaver and Sabido, 1997; Rosado, 1999). A total area of 7,533 km^2 of broadleaf forest was reported from Belize (Alder, 1993; Rosado, 1999).

The Tropical Science Centre (2000) estimated an original area of distribution of the species in Belize of 1.41 million ha of which 0.95 million ha remained in the 1990s (loss of 33%). An estimated fifteen percent of the area of forests with mahogany was reportedly protected in the country (Tropical Science Center, 2000).

Population trends and status: Forest cover in Belize was reported to have decreased from almost 97% in 1971 to 79% in 1992, mostly due to agricultural practices such as cane sugar plantations in the north of the country (Rosado, 1999) and to around 65% by 1999 (Sabido and Novelo, 2005).

Weaver and Sabido (1997) reported that "by the 1980's, economically accessible mahogany was scarce". Rosado (1999) similarly noted that "there is little mahogany left of merchantable size" and that "large over mature mahogany trees are a thing of the past. Where an isolated tree might have remained in the forest due to inaccessibility or other reason, these are being wiped out with the use of the chainsaws".

Based on six regional broadleaf forest inventories carried out between 1969 and 1981, Ader (1993) calculated that the density of mahogany was very low, with densities of 0.1 - 0.2 stems/ha for merchantable size (>60 cm dbh) and of 0.4 – 0.6 stems/ha in the >40 cm dbh class. Only the >20 cm dbh class, where density was 5.9 – 7.4 stems/ha was considered satisfactory (Alder, 1993; Rosado, 1999).

Threats: Logging and land use changes were reported as the main threats to the species (Rosado, 1999). Rosado (1999) also reported that threats to the species in Belize included "illegal logging, cutting undersized trees, chain saw and too many sawmills, too many licenses, and conflict with groups".

Trade: According to the CITES Trade Database, direct trade in *S. macrophylla* from Belize amounted to a total of around 9,000 m^3 during 1999-2008 according to both Belize and the importers. The United States of America was the main importer during this period, accounting for around 80% of the trade, and was the only importer during 2006 - 2008. Mexico, Canada and Germany accounted for the majority of the remainder of the trade. Reported trade levels declined during 1999-2008, from a high of 2326 m^3 reported by Belize and 1409 m^3 reported by the importers in 1999, to 251 m^3 reported by Belize in 2006 (last year for which the country submitted annual reports) and to 612 m^3 reported by the importers in 2008 (Table 2).

There were reported to be 12 companies exporting, importing or re-exporting mahogany in Belize in 2002 (MWG2 Doc. 8), with the species being exported from the ports of Commerce Bight, Big Creek and Belize City, and across the land border at Santa Elena (MWG1 Doc. 7).

MWG1 Doc. 7 reported that approximately 40% of total trade was illegal and that, of this, 25% could be considered cross-border illegal trade. Rosado (1999) noted that transborder illegal logging had occurred on the western border along the Cayo/Orange Walk and the Toledo Borders section.

Belize has not published any export quotas for this species.

Management: The species was reported to occur in the following protected areas: Tapir Mountain Nature Reserve, Bladen Nature Reserve, Shipstern Private Reserve, Rio Bravo Conservation and Management Area, and National Parks of Monkey Bay, Aguas Turbias, Five Blues Lake, Blue Hole, Chiquibul, Temash Sarstoon, in addition to Cockscomb Basin Wildlife Sanctuary, and Caracol Archaeological Reserve (Rosado, 1999).

Historically in Belize, mahogany logging was described as "the heavy felling of the best trees. Trees too large to cut remained in the forest, incidentally serving as seed sources. A 30- to 40-year period of inactivity followed before the next cutting cycle. This approach fortuitously resulted in a simple but effective management system" (Weaver and Sabido, 1997). Weaver and Sabido (1997) noted, however, that during the last two to three decades of the 20th century, the exploitation of mahogany was "intensive".

The principal forest legislation in Belize regulating the forestry sector and function in relation to the conservation and commercialization of mahogany were reported to be the following: The Forest Act, The Private Forests (Conservation) Act, The Forest Fire Protection Act and the National Parks System Act (Rosado, 1999). The legislation in place in Belize to regulate forest exploitation was considered to be "early and adequate" (Rosado, 1999).

Belize's Forest Department was reported to be the government institution responsible for all forestry aspects and an NGO, "Programme for Belize", was considered to be very important in relation to the conservation and management of mahogany in the country (Weaver and Sabido, 1997; Rosado, 1999).

Thirty permanent sample plots were reportedly established between 1992 and 1997 by the Forest Planning and Management Project across a range of forest types, with the results being used to adapt forest management practices (Bird, 1998).

Ader (1993) calculated, based on a 40-year felling cycle, the sustainable annual allowable cut for mahogany to be 6,041 m^3, which at the time was reportedly being exceeded by a factor of 3:1. Ader (1993) concluded that mahogany was being grossly overcut and recommended that "if possible, the export of mahogany and cedar, other than as manufactured products (mouldings, veneers, plywood, furniture, craft products), should be prohibited." Rosado (1999) argued that an outright ban would not be suitable because it would undermine the value and importance of Mahogany and noted that "stricter controls are needed at the point of export to get the true value obtained for the product so that government can get its fair revenue share."

Regeneration of mahogany in Belize was reported to be dependent on disturbances, such as agriculture clearings, hurricanes and fires (Rosado, 1999). Selection logging of mahogany in Belize was found to create insufficient disturbance to promote adequate mahogany regeneration (Whitman *et al.*, 1997) and the silvicultural clearing of 5000 m^2 patchcuts were recommended (O'Connor, 2000).

A study in the Rio Bravo Conservation and Management Area found the average growth rate of mahogany trees <60 cm diameter to be 0.93 cm/year (Shono and Snook, 2006). Shono and Snook (2006) consequently concluded that "mahogany trees as small as 23 cm dbh that were left standing after harvests could be expected to attain the commercial diameter of 60 cm in the 40 years between cutting cycles". The authors further noted that "eighty years

from the first harvest, in the third cutting cycle, the harvest will have to be made up primarily of new mahogany trees from regeneration that became established after the first harvest. Even under a conservative assumption that newly germinated seedlings will reach 20 cm dbh in 30 years, and that they can sustain a growth rate of 0.8 cm $year^{-1}$ thereafter, new seedlings that become established in year 0 should provide the next generation of harvest trees by the third cutting cycle in year 80. However, naturally occurring mahogany seedlings and saplings are rare in the forest today (personal observation), so it seems that silvicultural techniques must be applied to favour the establishment of mahogany regeneration on each cutting area at each harvest" (Shono and Snook, 2006).

Rosado (1999) reported that selective logging with minimum cutting diameter restrictions removed the largest specimens thus removing seed sources, creating openings too small for regeneration, and therefore deemed this system inappropriate for the management of mahogany in Belize. The author considered there should be management plans including stock taking requirements, specified cutting cycles, girth limit, intensive yet careful logging, leaving scattered superior seed trees for regeneration and post logging inspections, and reported that this system was taking place in three forest reserves in the country.

The CITES National Focal Point for Belize (Sabido, *in litt.* to CITES Secretariat, 2008) reported that the mahogany exported from Belize was exported from areas with approved sustainable forest management (SFM) plans, which reportedly needed to be endorsed and approved by the country's Scientific and Management Authorities. Sabido (CITES National Focal Point for Belize, Sabido *in litt.* to CITES Secretariat, 2008) noted that most members of the Scientific Authority may not possess the expertise to review forest management plans but considered that the review and approval of the plans by the Management Authority sufficed to ensure the non-detriment to the species.

The CITES National Focal Point for Belize stated that "the Sustainable Forest Management Plans characterize areas that range in size from 25,000 to 100,000 acres and stipulate volume quotas based on annual allowable cut which in turn is based on *inter alia* species specific characteristics such as abundance, regeneration characteristics, seed dispersal mechanisms, maintenance of forest structure, seed trees and diametric distribution (Sabido *in litt.* to CITES Secretariat, 2008). The species specific volume quota is refined to account for site specific characteristics through 100% stock surveys done in annual cutting compartments" (Sabido *in litt.* to CITES Secretariat, 2008).

They further reported that:

> "the SFM Plans prescribe annual plans of operations (AOPs) which are developed (annually). The annual cutting compartments are enumerated using a stock survey methodology developed under a British-DFID funded (formerly ODA) Forest Planning and Management Project (FPMP). Species and site specific (forest unit) volume quotas are then calculated from the results of the enumeration. The annual production from any given area is therefore known and can be compared against the predicted global production determined as part of the SFM Plan.
>
> […]
>
> Entities that qualify to export mahogany must apply to the Management Authority and the application must undergo a series of checks. An overall check is conducted to ensure that the exporter is not exporting in excess of the cutting quota established under the management plan. It is generally not expected that 100% of the cutting quota will be exported; the Management Authority calculates that around 30% of the standing volumes (measured in board feet) may qualify for export based on lumber quality. Thus

a detailed check is made to ascertain the exact percentage of the cutting quota (volumes) which have been extracted for that year. Once this is ascertained and background checks on the destination have been made, preliminary approval is granted. Final approval is based on the results of the physical inspection performed on the bundled lumber which has been prepared for export".

'Programme for Belize' was reported to own and manage 105,000 ha of land (4% of the national territory) in north-west Belize, in the so-called Rio Bravo Conservation and Management Area (Sabido and Novelo, 2005), where it was reported to conduct experiments in mahogany regeneration and to be also involved in sustainable logging (Rosado, 1999; Sabido and Novelo, 2005; Shono and Snook, 2006; PfB, 2008). Programme for Belize's forestry production, coming from an area of 24,000 ha, was certified by both Smart Wood (Rainforest Alliance, USA) and Wood Mark (Soil Association, UK) under the rules set down by the Forest Stewardship Council (FSC) (Rosado, 1999; Sabido and Novelo, 2005; PfB, 2008). They were reported to use a GIS system and to complete stock surveys to quantify and plan their annual harvests, which follow a 40-year cutting cycle (Sabido and Novelo, 2005).

The management system implemented in the Rio Bravo Conservation and Management Area by Programme for Belize was considered to be an example demonstrating that sustainable use is possible in the country, but it was noted that the production costs of this sustainably-sourced timber were higher than for timber harvested unsustainably, therefore rendering it uncompetitive in the market (Sabido and Novelo, 2005). Alternatives such as combining timber extraction with the harvest of non-timber forest products and with payments for carbon storage were therefore being considered (Sabido and Novelo, 2005).

Sabido and Novelo (2005) reported that Belize's Forest Department worked together with the UK's Department for International Development to develop forestry management plans, but that the implementation of those plans was not successful due to the lack of economic and human resources within the Forest Department.

Weaver and Sabido (1997) and Rosado (1999) recommended that mahogany plantations should be considered but Savido and Novelo (2005) reported that few had been established because of the costs involved and because of pest attacks.

BOLIVIA

Provisional category: Species of Urgent Concern

Distribution in range State: Information in MWG1 Doc. 8.8 and distribution maps in Kometter *et al.* (2004), Mostacedo (2006) and Vargas (2010a) showed the natural range of the species in Bolivia as occupying the northern half of the country, including the whole department of Pando, north and northeast La Paz, north and northeast Cochabamba, north and northwest Santa Cruz and the east, south and west of El Beni, but not the central or northeast parts of this department.

A historic range of 29.9 million hectares was reported for Bolivia (Mejía *et al.*, 2008). The potential range of the species in Bolivia was estimated at 3 million ha, of which 2 million ha were reported to be in protected areas (CoP14 Doc. 64 (Rev. 1)).

Population trends and status: Kometter *et al.* (2004) indicated that as of 2001, 8% of mahogany's original range in Bolivia had been deforested. The authors further reported that over the last two decades of the 20th century, mahogany was reduced across 97% of its historic Bolivian range, and that the species was no longer commercially viable (>60 cm dbh) across 79% of its range (Kometter *et al.*, 2004).

Mejía *et al*. (2008) noted that insufficient information existed to calculate the population size of mahogany in Bolivia.

The populations in Santa Cruz were reported to be essentially extinct; in Beni they were reported to be decimated; and in Pando they were expected to be exhausted within a decade (Killeen, 1997, in UNEP-WCMC, 2000). Navarro Cerrillo (*pers. comm*. to UNEP-WCMC, 2010) noted that the species was not yet extinct in Pando, but considered that it will be in the near future due mainly to illegal logging and illegal trade with Brazil.

Vargas (2010a) reported that the species "used to be very common in previous decades but it has now virtually disappeared".

An overall density of 0.3 - 0.5 trees/ha was reported for the country (CoP14 Doc. 64 (Rev. 1)). Densities of 0.07, 0.35, 0.46, 0.44 and 0.53 trees (>20 cm diameter)/ha were reported from the Amazon, pre-Andean Amazon, Amazon (Choré), Chiquitano-Amazon transitional (Guarayos) and Chiquitano-Amazon transitional (Bajo Paraguá) ecoregions (subregions) of Bolivia, respectively (Mejía *et al.*, 2008).

Based on inventories carried out in Bolivia, Mostacedo (2006) reported mahogany densities of 0.033 merchantable trees (>70 cm dbh) /ha, 0.023 sub-merchantable trees (40-70 cm dbh)/ha, and 0.011 remnant trees (>70 cm dbh)/ha.

Park *et al.* (2005) considered that, given the very low densities of mahogany in La Chonta, planting programmes may be necessary to re-establish the species.

Gullison *et al*. (1996) documented that the overall density of mahogany in the Chimanes forest (in the state of Beni, Bolivia) may be lower than 0.1-0.2 trees/ha. They considered that "It is too late to manage for the sustained production of mahogany in the Chimanes Forest. One company finished its supply of mahogany three years ago, and two others admit to having only a one or two year supply left. All three companies are in the process of buying illegally felled mahogany trees from the Multiethnic Indigenous Territory located in the middle of the Chimanes Forest. […] Luckily the density of mahogany is low, and little structural damage has been done to the forest even though the harvest levels are unsustainable at the species level."

Threats: Habitat loss and degradation (Mejía *et al.*, 2008) and unsustainable logging (Kometter *et al.*, 2004; Mejía *et al.*, 2008) were considered to be the main threat to the species. Vargas (2010a) similarly reported overexploitation, illegal logging and deforestation to be the main threats to the species.

Trade: Mahogany logging reportedly began in Bolivia in the 1950s-1960s (Kometter *et al.*, 2004; Mejía *et al.*, 2008). Riverine populations were logged first and mechanized overland logging began in the 1980s (Mejía *et al.*, 2008). During the 1980s and early 1990s, mahogany was reported to account for more than 60 percent of total timber export value in Bolivia (Fredericksen *et al.*, 2003), but the importance of mahogany in terms of volume harvested declined after the late 1990s (Mejía *et al.*, 2008).

According to the CITES Trade Database, direct trade in *S. macrophylla* from Bolivia amounted to a total of around 73,000 m^3 during 1999-2008 according to both Bolivia and the importers. The United States were the main importer during this period, accounting for around 90% of the trade. The Dominican Republic, and to a lesser extent Chile, Spain and Mexico accounted for the majority of the remainder of the trade. Reported trade levels remained relatively stable during 1999-2008, with an average of around 8,000 m^3 reported by Bolivia between 1999 and 2007 (last year for which the country submitted annual reports) and an average of around 7,400 m^3 reported by the importers 1999-2008 (Table 2).

The Forestry Superintendence in Bolivia reportedly approved average harvests of 16,590 m^3 of roundwood per year during 1998-2006 (Mejía *et al.*, 2008).

Mejía *et al*. (2008) noted that "Probably a portion of the harvested volume is consumed in-country as mahogany is highly valued in Bolivia."

There were reported to be 28 companies exporting, importing or re-exporting mahogany in Bolivia in 2002 (MWG2 Doc. 8).

The species was reportedly harvested within protected areas in Bolivia (Kometter *et al*., 2004; MWG 2 Doc. 8). Pacheco *et al.* (2010) considered that "while it can be assumed that most of the timber directed to foreign markets is from managed forests, anecdotal evidence suggests that timber traders also buy wood from illegal sources". Navarro Cerrillo (*pers. comm*. to UNEP-WCMC, 2010) similarly noted that despite legal companies controlling most of the mahogany trade in Bolivia, illegality was still a problem.

ITTO (2004) reported that "although no data are available for the illegal mahogany trade, the situation has improved greatly since the implementation of the 1997 Forestry Law". Navarro Cerrillo (*pers. comm*. to UNEP-WCMC, 2010) considered that, more recently, the situation worsened as a consequence of the politicization and loss of technical power of the forestry body and the excessive tolerance of illegal practices.

Bolivia has not published any export quotas for this species.

Management: Approximately 4.5 million ha of protected areas were reported to fall within mahogany's historic range in Bolivia, but mahogany was reported to occur at densities >0.1 trees/ha in only 36% of this area (Kometter *et al*., 2004). Kometter *et al.* (2004) also noted that illegal logging was occurring in at least two protected areas in Bolivia, representing 5% of the country's total range under protection.

Mahogany was reported to be one of the main species harvested in the regions of Chiquitanía, Bajo Paraguá, Guarayos, Choré, Pre andino-amazónico, and Amazonía (Mostacedo, 2006).

Forests in Bolivia were reported to be under the control of the state and subject to the competence of the national government (ITTO, 2004).

Vargas (*pers. comm*. to UNEP-WCMC, 2010b) indicated that the following legislations are of relevance to the conservation of mahogany in Bolivia: Law 12301 of 1975 (on wildlife, national parks, hunting and fishing), Law 1333 of 1992 (on sustainable use), Decree 22641 of 1990 (banning the collection and harvesting of wild animals and plants), and Decree 25458 of 1999 (amending Decree 22641 to allow the sustainable use of some species). Vargas (*pers. comm*. to UNEP-WCMC, 2010b) also listed the following, more specific, regulations: Forestry Law 1700 of 1996 (regulating the sustainable use and protection of forests), Decree 24453 of 1996 (regulating the implementation of Forestry Law 1700), Decree 0071 of 2009 (eliminating the Forestry Superintendence and establishing the National Forest and Land Authority), Regulation 131/97 of 1997 (regulating the controlled burning of forested areas). In addition, a number of technical regulations (132/97, 133/97, 134/97, 135/97, 136/97, 167/97 and 248/98) were reported to regulate the preparation of forestry management plans, inventories, etc. in different ecoregions (Vargas *pers. comm*. to UNEP-WCMC, 2010b). Navarro Cerrillo (*pers. comm*. to UNEP-WCMC, 2010), however, expressed concerns about whether regulations were being implemented.

The sustainable use of forests in Bolivia was primarily regulated by the Ley Forestal (Forestry Law) No. 1700 of 12th July 1996 (Congreso Nacional, 1996), which was promulgated in 1997 and was considered by the Management Authority of Bolivia (MWG1

Doc. 8.8) to have corrected the situation in which mahogany populations were in rapid decline as a consequence of illegal cutting resulting from a lack of effective government control and to have created management and forest models based on manuals, procedures, instructions and forestry practices aimed at protecting sustainable forest resources.

Forestry Law 1700 was reported to include regulations and technical standards for forest management, including:

> "- drafting of a general forest management plan (GFMP) based on a total forest inventory of the area (following systematic sampling as defined in the regulations). These results help determine which species offer potential for timber yield, the logging cycle to be used (minimum 20 years) and the size of the annual logging areas, which are a function of the logging cycle. The GFMP must be updated every five years;
>
> - restriction of the logging of species with fewer than 0.25 specimens per hectare, or the so-called rare species (taking into account specimens with over 20 cm diameter at breast height (DBH));
>
> - establishment of minimum cutting diameters (MCD) for commercial species according to forest type – for mahogany it is 70 cm DBH;
>
> - maximum logging levels: only 80% of trees with a diameter over the MCD may be logged. The remaining trees are left as insurance for the following cycle and to ensure the regeneration of harvested species;
>
> - definition and demarcation of ecological reserves in the area under forest management. Respect for key species and species of significance as wildlife food. Census of all commercial species in the annual logging areas to determine the volume to be logged per species, on the basis of the MCD;
>
> - preparation of an annual forest operational plan (AFOP) based on the commercial census. AFOPs include maps indicating the location of trees to be logged and trees to be left standing, possible collection areas, and planning of major and secondary roads;
>
> - establishment of permanent monitoring plots to determine the impact of logging on forest dynamics and yield; and
>
> - the application of silvicultural treatments as required" (ITTO, 2004).

The law also created a 'Superintendencia Forestal' (Forestry Superintendence) to enforce forestry laws and review and monitor compliance with management plans (Fredericksen *et al.*, 2003).

MWG1 Doc. 7, ITTO (2004) and Grogan *et al.* (2009) considered the situation in Bolivia to be encouraging and reported that the 1997 Forestry Law 1700 strengthened the technical, operational and regulatory framework. Fredericksen *et al.* (2003) similarly reported that since the implementation of the 1997 Forestry Law, "the management of Bolivian forests has vastly improved" and Mejía *et al.* (2008) noted that "Law 1700 has had a very positive effect on mahogany conservation".

MWG1 Doc. 7 noted, however, that concerns remained with regard to the sustainability of harvests and reported that there were indications of illegal cross-border trade. Fredericksen *et al.* (2003) added that regeneration problems in Bolivia remained largely unaddressed as silvicultural treatments were not implemented. The authors also noted that "the Superintendencia Forestal lacks the resources and political clout needed to obligate

forest managers to comply with existing regulations (such as establishment and monitoring of growth and yield plots), much less create new and technically more sophisticated regulations regarding the implementation of silvicultural treatments" (Fredericksen *et al.*,2003). Vargas (2010a) considered enforcement mechanisms to be insufficient and reported that illegal logging was still a significant problem.

The CITES Management Authority of Bolivia highlighted that Bolivia was in the vanguard in relation to the international certification of tropical forests using approved national standards (MWG1 Doc. 8.8). Ebeling and Yasué (2009) reported that, by 2008, there were 1.9million ha of certified forest in Bolivia, representing 4% of the country's total forest cover and 22% of managed forests. The authors considered the success of forest certification in Bolivia to be a result, amongst others, of strong government enforcement of forestry regulations, the fact that forestry laws in Bolivia are highly compatible with certification requirements, and that the government provides significant tax benefits to certified producers (Ebeling and Yasué, 2009).

ITTO (2004) noted that Bolivia had made 'significant progress' in the implementation of the CITES listing of mahogany. Navarro Cerrillo (*pers. comm.* to UNEP-WCMC, 2010), however, considered that more recently the situation had worsened.

ITTO (2004) reported that, in 2004, Bolivia had 7,996,065 ha of natural forests under forest management plans, of which approximately 60% were forest considered to be, or to have been, mahogany production areas. Since 1998 the Forest Superintendence reportedly authorized mahogany volumes to be logged mainly on the basis of management plans for four kinds of users: forest concessions, native community lands, private properties and long-term contracts. Approximately 10,000 m^3 per year were authorized between 2001 and 2003 (ITTO, 2004).

Harvest of mahogany in Bolivia was reported by the country's CITES authorities to be regulated by quotas established by the Forestry Superintendence according to the management plans and to the supply and processing programmes in place (MWG2 Doc. 8).

Blundell and Gullison (2003) reported that "In 2000, the Bolivian forest ministry (Superintendencia Forestal) set an export quota for mahogany at 5200 m^3. However, that same year, more than 11,000 m^3 was exported, facilitated by the President of Bolivia's issuance of a decree (Decreto Supremo No 25561) that allowed mahogany to be exported from indigenous reserves that were not part of the managed forest base. This executive order thus 'legalized' the mahogany harvested from these reserves and potentially allowed other mahogany to enter the 'legal' supply chain, thereby undermining the efforts of the Superintendencia Forestal to manage Bolivia's mahogany resource on a sustainable basis". Mejía *et al.* (2008) reported that no quotas applied to mahogany in Bolivia.

It was reported that certificates of logging origin (certificado forestal de origen, CFO), issued by the Forestry Superintendence, must accompany all timber during the production chain, in order to track mahogany timber from the forest to the point of export (Mostacedo, 2006; Mejía *et al.*, 2008). CFOs are reportedly required by the CITES Management Authority to provide export permits, and there are checkpoints on main roads that compare CFOs with volumes and species being transported (Mejía *et al.*, 2008).

ITTO (2004) and Mejía *et al.* (2008) reported that Bolivian management plans required most of the components recommended by the second meeting of the Mahogany Working Group (commercial census, mapping of commercial and sub-commercial trees, seed tree selection and minimum post-logging density, minimum cutting diameter, monitoring dynamics of future crop trees, improvement of regeneration), but that little progress had been made in

the formulation of non-detriment findings for mahogany, which was also recommended by the second meeting of the Mahogany Working Group.

This was considered to be mainly because information on the dynamics of the species was lacking, and resources to carry out this kind of study were not available (ITTO, 2004; Mejía *et al.*, 2008). The Scientific Authority was reported to only confirm that the logging had been done in forests under management plans and forest operational plans based on the commercial census approved the Forestry Superintendence (ITTO, 2004).

Other problems noted included the insufficient information on the mahogany production chain available to the Management and Scientific Authorities to qualify them to certify timber for export; the lack of relevant mechanisms by the Management Authority to impose direct sanctions on the exporter when it detects irregularities; and problems with the control of some of the links in the production chain (such as a lack of accurate information on performance at the time of timber processing; the difficulties encountered in tracing timber once it has been processed and sold to different consumers; and the lack of formality of processing centres and some exporting companies) (ITTO, 2004). Mejía *et al*. (2008) also noted that no restoration measures were required. Problems highlighted by Mostacedo (2006) included the efficiency of sawn wood conversion, timber being concealed amongst timber of other species, illegal logging with the use of chainsaws, and the need to create an electronic network to verify the origin of the timber.

ITTO (2004) considered that the existence of the Forestry Law made it easier for many areas to obtain certification under FSC criteria and noted that despite its financial and logistic limitations, the Forestry Superintendence had maintained a presence in the main mahogany production areas, as well as in major access points, and had also identified problematic links in the timber production chain and launched a process to remedy failures. ITTO (2004) contended that "although no non-detriment finding has been forthcoming for the country, several research initiatives are under way to help provide information on the dynamics of mahogany under ecological and disturbance conditions".

Verwer *et al.* (2008) considered that the management practices of the Bolivian Forestry Law (reduced-impact logging techniques, MCD of 70 cm DBH, 80% harvesting of harvestable trees) represented a large improvement from the previous prescriptions used for mahogany exploitation. Based on research at La Chonta concession the authors indicated, however, that "for the current prescriptions to be sustainable, it is necessary to use longer cutting cycles (at least > 50 years) than are now being recommended in the Bolivian Forestry Law (i.e. minimum cutting cycle of 20 years). Moreover, when harvesting intensity is reduced to 50%, overexploited populations will be sustainably harvestable only if cutting cycles of at least 25 years are used and the effects of treatment (harvesting plus additional silvicultural treatments) are maintained through time." Gullison *et al.* (1996) considered, based on work in the Chimanes Forest, that cutting cycles of at least 100 years would be required and that seed trees should be concentrated in areas that are most suitable for regeneration.

Mejía *et al*. (2008) concluded: "In Bolivia, although significant advances have been made towards developing a sustainable model for mahogany harvests and therefore towards NDF, the question of how mahogany regeneration can be promoted requires further examination. It will also be necessary to assess whether silvicultural treatments applied at La Chonta have the same results on mahogany populations in other forest types."

Following a change in government in Bolivia in 2006, the Forestry Superintendence was eliminated in 2009 and its functions were amalgamated under a newly established National Forest and Land Authority (Pacheco *et al.*, 2010). In late 2008, 7.8 million ha of Bolivia's territory were identified as public forests by the new administration (Pacheco *et al.*, 2010).

Pacheco *et al.* (2010) noted that "while existing land-use zoning plans are to be respected, nothing prevents forests from being converted to agricultural use, especially when mechanisms of support to community forestry development are not provided".

Vargas (2010a; *pers. comm.* to UNEP-WCMC, 2010b) reported that an ITTO-funded project to evaluate the population density and the impact of forest harvesting on natural regeneration and diameter growth of mahogany in Bolivia had been approved and was going to be implemented. She also indicated that although no non-detriment findings (NDFs) had been formulated for mahogany in Bolivia, the aforementioned project would provide the basis for such NDFs in the future (Vargas, *pers. comm.* to UNEP-WCMC, 2010b).

COLOMBIA

Provisional category: Species of Least Concern

Distribution in range State: López Camacho and Cárdenas López (2002) reported that, in the past, the species was abundant, occurring in the departments of Antioquia, Bolívar, Córdoba, Guajira, Huila, Magdalena and Santander. The authors noted that some natural populations remained in the regions of Magdalena Medio, Córdoba, Cesar and el Dairén in Antioquia.

Cárdenas López and Salinas (2006) reported the species to occur in the Atlantic coast and in the central valley of the Magdalena River in the departments of Bolívar, Chocó, La Guajira, Magdalena, Santander and Sucre, at altitudes below 200m (see Figure 3).

The species was not recorded from the Amazonian region of Colombia (López Camacho and Cárdenas López, 2002).

Figure 3. Distribution of *Swietenia macrophylla* in Colombia. (Source: Cárdenas López and Salinas (2006)).

Population trends and status: The species was classified as Critically Endangered in

Colombia, as intense harvesting reportedly resulted in a >80% reduction of natural populations (Cárdenas López and Salinas, 2006). Castaño Arboleda (*pers. comm*. to UNEP-WCMC, 2010) noted that the Colombian populations were decimated and that information on the species was lacking in the country.

The species was considered to be 'commercially extinct' in Colombia, where it was reported to only supply the national market for the purpose of luxury cabinet making (López Camacho and Cárdenas López, 2002).

Threats: Overexploitation was considered to be the main threat to the species (Cárdenas López and Salinas, 2006).

Trade: According to the CITES Trade Database, no direct trade in *S. macrophylla* from Colombia has been reported 1999-2008.

The CITES Management Authority of Colombia (Sanclemente *in litt*. to UNEP-WCMC, 2010) noted that there were no records of mahogany exports from the country since 1976). The CITES MA of Colombia (Pardo Fajardo *in litt*. to the CITES Secretariat, 2008) reported that although domestic trade in mahogany had been reported up until 1999, data for the 2003-2007 five-year period indicated that no legal or illegal trade in mahogany had been reported. The CITES MA of Colombia (Sanclemente *in litt*. to UNEP-WCMC, 2010) also stated that no illegal trade in mahogany had been reported to their knowledge during 2005-2009.

Illegal trade between Colombia and Peru was reported in document MWG1 Doc. 7. The CITES MA of Colombia (Pardo Fajardo *in litt*. to the CITES Secretariat, 2008) noted that measures were being put in place to control the illegal harvest of timber species.

Colombia has not published any export quotas for this species.

Management: Cárdenas López and Salinas (2006) reported that the species had not been reported from any protected areas in the country.

According to Gómez Hoyos (*in litt*. 2010), the forestry sector in Colombia was managed according to a strategic framework established by the National Forestry Programme adopted by the country in 2000.

Agreement 29 of 1976 banned the export of mahogany pieces, sawn wood and veneer, allowing only the export of value-added processed mahogany goods (López Camacho and Cárdenas López, 2002; MWG2 Doc. 8). Agreement 29 of 1976 was later replaced by Decree 1791 of 1996 and the national export ban lifted. However, according to the CITES MA of Colombia, the species was reportedly not exported from the country since the ban of 1976 (Sanclemente *in litt*. to UNEP-WCMC, 2010).

Gómez Hoyos (*in litt*. to UNEP-WCMC, 2010) informed that Decree 1791 of 1996 provides that any harvesting from the wild was subject to a harvesting permit issued by the environmental authority of the region where the harvest was to take place. For this, the authority was reported to consider the forest inventory information contained in the management plans and also to carry out field checks. Any products transported within the country must be accompanied by a Unique Mobilisation Permit. Exports were reported to be subject to an Export Permit, issued on the basis of the Harvesting Permit and the Unique Mobilisation Permit. Resolution 584 of 2002, regulating the conservation actions for threatened species in Colombia (Gómez Hoyos *in litt*. to UNEP-WCMC, 2010).

Harvesting bans were put in place by the following Autonomous Regional Corporations: CARDER (Risaralda), CORPOURABA (Urabá), and CDMB (Meseta de Bucaramanga) (López Camacho and Cárdenas López, 2002; Cárdenas López and Salinas, 2006). These bans aim to protect the natural populations recorded in the Tapón del Darién (region bordering

Panama), Magdalena Medio (central region of the country) and Bahía Málaga in Valle del Cauca (Pacific region) (*in litt*. Gómez Hoyos, 2010). The species can reportedly be harvested in the rest of the country, subject to the issuing of the relevant permits (CITES MA of Colombia, Sanclemente *in litt*. to UNEP-WCMC, 2010).

Cárdenas López and Salinas (2006) recommended identifying natural populations of the species in the country and conducting studies on population structure and dynamics to inform management plans. The authors also recommended planting the species in degraded areas within its habitat and looking for populations of the species in the Ciénaga de Santa Marta and Jorge Herández Camacho Wildlife Sanctuaries and in the Katíos National Park.

Subsidies and tax benefits were reported to exist in the country to promote investments in commercial reforestation, including mahogany reforestation (Gómez Hoyos *in litt*. to UNEP-WCMC, 2010).

The CITES MA of Colombia (Pardo Fajardo *in litt*. to the CITES Secretariat, 2008) indicated that the Scientific and Management Authorities of Colombia had started work on a research project to study the conservation status of timber species, including mahogany, in the country. Pardo Fajardo (*in litt*. to the CITES Secretariat, 2008) also highlighted some experimental plantation initiatives but noted that these are not yet producing mahogany for commercial purposes.

ECUADOR

Provisional category: Species of Least Concern

Distribution in range State: *Swietenia macrophylla* was reported to occur in the humid tropical forests of Ecuador, in particular in the provinces of Pastaza (communities of Quichuas de Canelos and Shuar de Musullacta, in the Uwijint, Nangue, Tawankar and Uyuime sectors), Sucumbiós (Diureno and Tarapoa sectors) and Orellana (Yasuni National Park, core area of the Huaorani territory) (Sarango Valverde *in litt*. to UNEP-WCMC, 2010). The species was also reported to occur in the provinces of Napo and Morona Santiago and along trails in the provinces of Los Rios and Guayas (Ecuador Ministry of Environment, 2006).

The potential range of the species in the country was estimated at 1.8 million ha (CoP14 Doc. 64 (Rev. 1)). However, the distribution of the species in the country was considered to be patchy and not well known (Sarango Valverde *in litt*. to UNEP-WCMC, 2010).

Population trends and status: The species was considered to be rare in the country (Ecuador Ministry of Environment, 2006). Sarango Valverde (*in litt*. to UNEP-WCMC, 2010) noted that no inventories were available to determine the distribution, abundance or conservation status of the species in Ecuador. The Ministry of Environment of Ecuador, supported by FAO, reportedly initiated in 2009 a project to evaluate the distribution and abundance of important timber species, including mahogany (Sarango Valverde, *in litt*. to UNEP-WCMC, 2010).

Only a few populations were reported to remain in north-east Ecuador, where selective logging was reported to have caused genetic erosion and population decreases (Buitrón, 1996, in UNEP-WCMC, 2000).

Densities of 1.1 trees (>60 cm dbh)/ha were reported for the country (CoP14 Doc. 64 (Rev. 1)).

Threats: Illegal harvesting of the species was considered to be the main threat to the species in Ecuador (Sarango Valverde *in litt*. to UNEP-WCMC, 2010). In addition, lack of awareness

by local communities about the harvesting ban was reported to be a problem in the country (Sarango Valverde *in litt*. to UNEP-WCMC, 2010).

Before a current harvesting ban was put in place, inappropriate management of the resource (including not taking the abundance of individuals into account, too short (15 year) cutting cycles, not leaving seed sources, poor control of the production chain) was considered to also pose a threat to the species (Sarango Valverde *in litt*. to UNEP-WCMC, 2010).

Trade: According to the CITES Trade Database, no direct trade in *S. macrophylla* from Ecuador 1999-2008 was reported by Ecuador. According to importer-reported figures, direct trade in the species from Ecuador during this period amounted to 1165 m^3; of those, 511 m^3 were reported in 2008. The United States accounted for 83% of these imports, with the Dominican Republic, Spain and Colombia importing smaller quantities (Table 2).

The CITES Management Authority of Ecuador (*in litt*. to UNEP-WCMC, 2010) indicated that mahogany was not traded nationally or internationally (following a harvesting ban in place since January 2007). Trade after that date was reported to refer to stocks authorized before the ban was put in place (Velasco Ruano *in litt*. to UNEP-WCMC, 2010). During 2008-2009, mahogany exports reportedly amounted to 386 m^3 (Velasco Ruano *in litt*. to UNEP-WCMC, 2010).

Illegal trade was considered to be a problem in the country (MWG1 Doc. 7). Sarango Valverde (*in litt*. to UNEP-WCMC, 2010) indicated that, despite tight controls, there was evidence of illegal trade by river towards Colombia and Peru, particularly in the Huaorani Territory and the Yasuni National Park *(*Sarango Valverde *in litt*. to UNEP-WCMC, 2010).

A forest control body, Green Surveillance began its operational activities in July 2000 and during the first year of operation, a total of 6062 m^3 were reportedly intercepted (MWG1 Doc. 8.10).

Ecuador has not published any export quotas for this species.

Management: Prior to 2001, the management of the species in Ecuador was summarized as follows:

> "*Swietenia macrophylla* exports have been prohibited since 1990 under ministerial Agreement No. 0678 of 14 December and subsequently under Law No. 147. RO/901 of 25 March 1992 (Ley de Facilitación de las Exportaciones y del Transporte Acuático). *S. macrophylla* is included in a national list of threatened timber species (INEFAN Resolution No. 031, 20 July 1995, revised via INEFAN Resolution No. 046, 15 August 1996 and ministerial Agreement No. 0001, 6 January 1997). INEFAN Resolution No. 064 (29 November 1996), which banned mahogany harvest for five years at the national level, was modified in 1997 by INEFAN Resolution No. 033 of 22 July 1997, which excluded the ban from forests of Esmeraldas and Sucumbíos Provinces and timber from plantations, subject to management plans. The ban was suspended by ministerial Decree 131 of December 21, 2000. According to Article 36 of the Decree, *S. macrophylla* is considered a species at risk of extinction, and therefore, its exploitation and transport is authorised only if it is subject to a Sustainable Forestry Exploitation Programme approved by the Ministry of the Environment. Among other measures established was the setting of a minimum diameter for cutting mahogany at 60 cm" (MWG1 Doc. 7).

Norm No. 131 RO/249 of 22 January 2001 listed mahogany as a harvestable species under certain conditions (Sarango Valverde *in litt*. to UNEP-WCMC, 2010).

Similarly, Ministerial Agreement No. 039 RO/399 of 16th August 2004 provided that mahogany could be harvested if the forest inventory demonstrates densities of the species

higher than 0.5 trees (>30 cm dbh)/ha, and that a minimum density of 0.5 trees/ha must remain after harvesting (Bodero *et al.*, 2007; Sarango Valverde *in litt.* to UNEP-WCMC, 2010).

On 11th January 2007, the Ministry of Environment published Ministerial Resolution 167 banning the harvest of *S. macrophylla* for a period of two years while population studies are carried out (Bodero *et al.*, 2007; Velasco Ruano *in litt.* to UNEP-WCMC, 2010). The CITES Management Authority of Ecuador (Sarango Valverde *in litt.* to UNEP-WCMC, 2010; Velasco Ruano *in litt.* to UNEP-WCMC, 2010) noted that the harvesting ban was renewed by Ministerial Agreement No. 002 of 29th January 2009 for a period of two more years. The ban was reportedly put in place in response to the overharvesting that was threatening the species, but Ecuador reportedly intends to develop management plans that will allow the sustainable use of the species in the short term (Velasco Ruano *in litt.* to UNEP-WCMC, 2010). Sarango Valverde (*in litt.* to UNEP-WCMC, 2010) noted that the timber industry had repeatedly requested the Ministry of Environment to lift the ban.

Velasco Ruano (*in litt.* to UNEP-WCMC, 2010) noted that in 2009 a 'National Forest Evaluation' study was initiated, with the intention of gathering information on important timber species, including *S. macrophylla*. The study will reportedly run until the end of 2011.

Bodero *et al.* (2007) made several recommendations for the sustainable management of mahogany in Ecuador. These included:

- Evaluate the remaining populations in Ecuador;

- Carry out silviculture research;

- Raise awareness about the value and importance of the species;

- Capacity building in relation to the management, silviculture, harvesting and processing of mahogany;

- Establish a management programme for the remaining populations in Ecuador;

- Establish plantations of the species in the country.

Sarango Valverde (*in litt.* to UNEP-WCMC, 2010) considered that sustainable management of the species would be possible in some parts of the country if appropriate silvicultural practices were applied, including the establishment of minimum harvestable diameters and of a limit of one tree harvested per ha.

Ecuador reported various capacity building activities, including intergovernmental workshops and meetings and the preparation of printed materials with information on mahogany (CoP14 Doc. 64 (Rev. 1)).

A mahogany reforestation programme was reportedly in place in Ecuador, promoted by the ´PROFORESTAL´ Forestry Development Promotion Unit of Ecuador (*in litt.* Sarango Valverde, 2010).

HONDURAS

Provisional category: Species of Possible Concern

Distribution in range State: The Tropical Science Centre (2000) estimated an original area of distribution of the species in Honduras of 3.79 million ha of which 1.73 million ha remained in the 1990s (loss of 54%). An estimated nine percent of the area of forests with mahogany was protected in the country (Tropical Science Center, 2000).

Ferreira and Oyuela (1998; cited in Anaité Menéndez, 2007) reported the species from the Atlantic side of the country (mainly Mosquitia); however, Anaité Menéndez (2007) also recorded the species in lowlands of the departments of Santa Bárbara and Comayagua,

between 200 and 830 m above sea level. Cardona *et al.* (2004) reported the species to be distributed in Honduras up to 800 m above sea level and to occur in the following departments: Copán, Santa Bárbara, Cortés, Yoro, Atlántida, Colón, Olancho, El Paraíso, Gracias a Dios, Francisco Morazán and Comayagua.

Mendieta *et al.* (1999) gave the following location records: Merendón Cordillera, Sierra de Espíritu Santo and Sierra de Omoa (departments of Copán, Santa Bárbara and Cortés); Nombre de Dios Cordillera (departments of Atlántida, Yoro and Colón); Botaderos Mountain, Sierra de la Esperanza and Sierra del Río Tinto (departments of Colón and Olancho); Río Plátano Mountains and Sierra Punta Piedra (departments of Olancho, Colón and Gracias a Dios); Sierra de Warunta and Kruta Mountains (departments of Gracias a Dios and La Mosquitia); Sierra de Agalta and Patuca Mountains (department of Olancho); Yoro and Pico Pijol Mountains (department of Yoro); La Flor Mountain (departments of Yoro and Francisco Morazán); Meámbar Mountain, Comayagua Mountain and Indio Mountain (department of Comayagua); Entre Ríos Cordillera (departments of Olancho and El Paraíso); and Wanks River basin.

The main reserves of mahogany in the country were reported to be located in the mountains of the departments of Colón, Gracias a Dios and Olancho (Mendieta *et al.*, 1999).

Population trends and status: Mendieta *et al.* (1999) reported mahogany volumes of 0.19 – 31 m^3/ha (average of 5.42 m^3/ha) and average densities of 1 - 2 trees/ha. Based on the estimated average density of 5.42 m^3/ha and on an area of harvestable forests outside protected areas of 1,175,284 ha, the authors estimated a total mahogany volume of 6.37 million m^3 (Mendieta *et al.*, 1999).

Information from two sites in the Mosquitia area indicated that mahogany densities were 1.4 trees/ha and that the average volume of timber in the area was 12 m^3/ha (AFE, 2006).

Anaité Menéndez (2007) conducted surveys in the departments of Santa Bárbara and Comayagua, where she located various small forest remnants where the species was still present despite strong harvesting pressures that had reportedly removed the best individuals. The author recorded the highest densities of the species in the localities of El Calichito (200 trees, all over 50 cm dbh, in an area of 5 ha), La Comunidad (80 trees, mostly over 70 cm dbh, in an area of 4 ha), and El Quebracho (68 seedlings/ha).

Del Gatto (2002) noted that overharvesting had almost completely wiped out mahogany populations outside protected areas, with the possible exception of remnant populations in the Sierra del Río Tinto in Colón.

Mendieta *et al.* (1999) and Figueroa Sierra and Sánchez Rodríguez (2006) noted that mahogany was subject to the highest harvesting pressures in the departments of Colón, Olancho and Gracias a Dios (La Mosquitia) and that the remaining populations in protected areas were threatened.

Mendieta *et al.* (1999) considered that mahogany would be depleted in ten years if the rate of harvesting at the time was maintained.

The CITES Management Authority of Honduras (Ártica and Regalado Weizemblut, *in litt.* to UNEP-WCMC, 2010) noted that the CITES Scientific Authority of Honduras, with support from the United States Forest Service and USAID, was carrying out a forest inventory, focusing on mahogany, in the Río Plátano Man and Biosphere Reserve. The inventory, which would cover an area of 273,758 ha, started in 2009 and was expected to be completed in two years (Ártica and Regalado Weizemblut *in litt.* to UNEP-WCMC, 2010).

Threats: Magin (2006) stated: "Hardwood forests have been particularly poorly managed in

Honduras, and by the 1970s they were already disappearing at a rate of 80,000 ha per year. Cattle grazing and settlement by migrants are the major causes of this decrease; the process has been exacerbated by the policies of the Honduran government and international agencies, which have promoted agriculture – and therefore deforestation – rather than forestry".

Magin (2006), paraphrasing Cortes (2004), further reported that "factors that hinder the sustainable management of the species include: illegal indiscriminate logging that does not comply with any regulations; the advance of the agricultural frontier, agriculture being the most important activity for Honduran campesinos; increased cattle ranching among major landowners (in many cases these two factors are incentivized by national and international banks); the lack of a regulatory scheme to promote forestry, with costs and benefits that could improve the income of forest managers".

Trade: According to the CITES Trade Database, direct trade in *S. macrophylla* from Honduras 1999-2008 amounted to a total of 3,211 m^3 as reported by Honduras and to 352 m^3 as reported by the importers. The United States accounted for 95% or 85% of these imports according to Honduras and to the United Sates, respectively, with Puerto Rico and the Dominican Republic accounting for the majority of the remainder of the trade. Trade reported by Honduras decreased from more than 1300 m^3 in 1999 to around 600 m^3 per year 2000-2001 and to around 100 m^3 per year 2006-2008 (Table 2).

The CITES Management Authority of Honduras (Ártica and Regalado Weizemblut, *in litt.* to UNEP-WCMC, 2010) reported the export of 47,097 board feet (111 m^3) and 24,216 board feet (57 m^3) in 2008 and 2009, respectively, all to the United States.

Del Gatto (2002) estimated that a total of between 30,000 and 50,000 m^3 of mahogany were harvested annually in Honduras (including reported and illegal trade).

Evidence of illegal trade was reported to exist for the country (MWG1 Doc. 7 and MWG1 Doc. 8.5). Illegal harvest and trade of timber, including mahogany, was reported to be an important problem in Honduras, reportedly due to an inadequate legal and policy framework as well as insufficient capacity and enforcement (Contreras-Hermosilla, 2002; Del Gatto, 2002; Del Gatto *et al.*, 2003; Cortes, 2004). Illegal harvest in the Sico-Paulaya valley was considered to be particularly problematic (Del Gatto, 2002; Del Gatto *et al.*, 2003).

Mendieta *et al.* (1999) considered that for each cubic meter of mahogany harvested legally, two or more cubic meters were harvested illegally.

The CITES MA of Honduras reported that routes of illegally traded mahogany timber were identified in the departments of Gracias a Dios, Colón, Yoro and Olancho and that enforcement huts had been built to address the problem (MWG1 Doc. 8.5).

Illegal activities were reported to include laundering of round wood, nocturnal transportation of sawn timber and illegal timber exports (MWG1 Doc. 8.5).

Honduras has not published any export quotas for this species.

Management: The CITES Management Authority of Honduras noted that timber harvesting was reported to be prohibited in the core zones of the Platano River and Tawahka biosphere reserves and of the Patuca National Park (MWG1 Doc. 8.5). Mendieta *et al.* (1999) reported that the species occurred within 1.18 million ha of forests in protected areas. The range being exploited within the country was reported to amount to 50,000 ha (CoP14 Doc. 64 (Rev. 1)).

The main regulations governing the management of forest resources in Honduras were reported to be: The Forests Act (Decree 85 of 1971), containing the principles of sustainable forest use; the Honduran Forestry Development Corporation Act (Executive Order 103 of

1974), on the social forest system and the nationalisation of forests; Resolution No. GG-057-95, governing the preparation of management plans for broad-leaved forests; Decree No. 323-98, referring to the national programme for reforestation, aforestation and environment for sustainable development, and including a ban on the export of unfinished timber products from broad-leaved forests; Agreement 1189-00 refers to the use of timber felled by Hurricane Mitch and establishes rules on the transportation of mahogany timber, forest-related crimes and associated penalties (MWG1 Doc. 8.5).

Magin (2006) reported that "with the exception of protected areas such as the Río Plátano Biosphere and Humankind Reserve, Patuca National Park and the Tawahka Biological Reserve, hardwood forests in Honduras are largely composed of small areas managed by Forest Social System groups. Management plans for these areas are relatively recent, dating from the 1990s. These management plans take into account the biophysical characteristics of the area (soil, water, climate, flora and fauna) and the rotation period of the key species. To improve implementation, evaluation and follow-up, management plans are divided into five-year periods; at the end of each phase, changes necessary to ensure achievement of the objectives of the plan are identified and must be implemented".

The issuing of permits for mahogany export were reportedly based on information to demonstrate, *inter alia*, that the timber comes from an area under management plans; in order to track the timber, the trees to be cut during each five-year period are numbered (Cortes, 2004).

In the Mosquitia area, where harvesting was reported to be focused mostly on mahogany, there were reported to be 16 management plans in place covering an area of ca. 60,000 ha (AFE, 2006).

The CITES MA of Honduras (AFE, 2006) noted that only 40% of the available volume, and only from trees over 85 cm dbh, could be harvested.

Figueroa Sierra and Sánchez Rodríguez (2006) reported that each annual harvesting plan included the harvest of 10-12 trees, representing 4 - 21 m^3/ha. The authors noted that, despite the relatively high volumes, the efficiency was very low, with around 70% of the timber being lost.

460 certificates were reportedly issued for plantations in the departments of Atlántida and Colón, where two million seedlings of timber tree species including mahogany had been planted over 1500 ha (AFE, 2006).

In order to address the problem of illegal mahogany trade, capacity building activities for enforcement authorities were reported to be planned for 2004-2005 (Cortes, 2004). A capacity building programme for the supervision and management of mahogany was reported by the country (CoP14 Doc. 64 (Rev. 1)).

Anaité Menéndez (2007) reported ca. 100 ha of *S. macrophylla* plantations from the 1920s and 1940s in Lancetilla research station and botanical garden, in Tela, Atlántida. More recently, a total of 150 ha of mahogany plantations were reported to exist in the country (CoP14 Doc. 64 (Rev. 1)).

NICARAGUA

Provisional category: Species of Least Concern

Distribution in range State: The species was reported to occur in the North Atlantic Autonomous Region (RAAN), the South Atlantic Autonomous Region (RAAS), the Río San Juan department (Tropical Science Centre, 1999; Magin, 2006), the Matagalpa department (Tropical Science Centre, 1999), the Jinotega department (Magin, 2006) and the Boaco and

Chontales departments (Guillén, 1999). Occurrence of the species within forested areas in the country was reported to be patchy (Guillén, 1999). Three large blocks of closed hardwood forest were identified in the Atlantic region of the country (Magin, 2006) (see Figure 4).

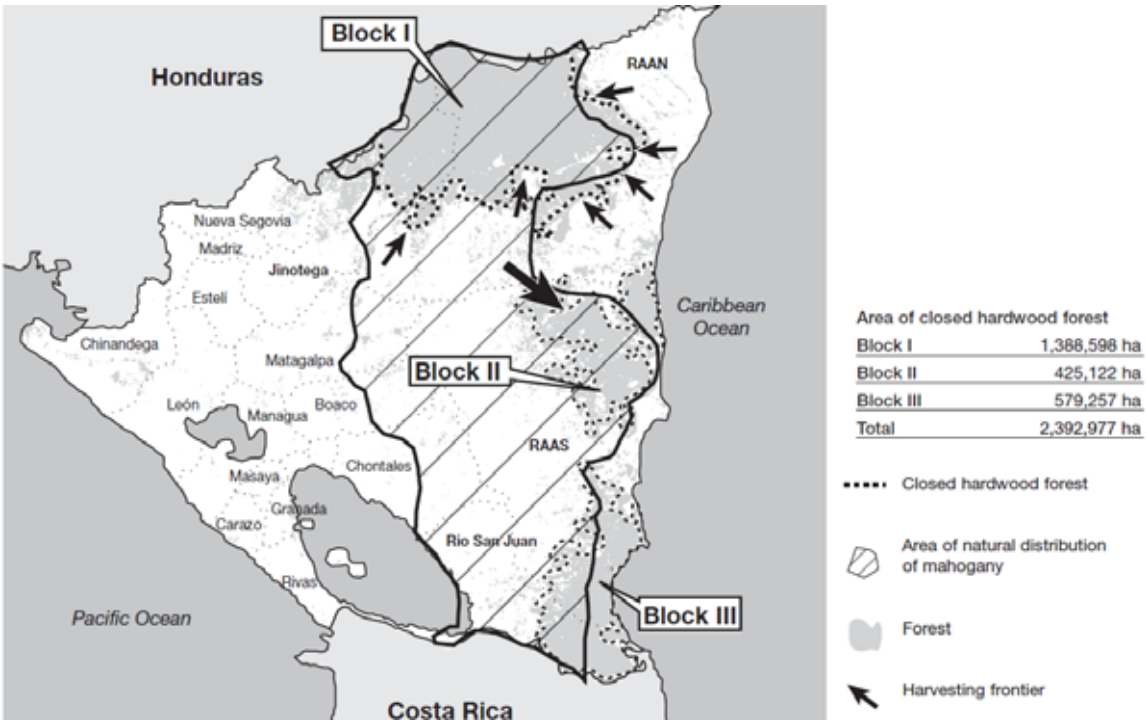

Figure 4. Distribution of *Swietenia macrophylla* in Nicaragua. Source: Magin (2006).

Population trends and status: The Tropical Science Centre (2000) estimated an original area of distribution of the species in Nicaragua of 9.40 million ha of which 5.05 million ha remained in the 1990s (loss of 46%). An estimated three percent of the area of forests with mahogany was protected in the country (Tropical Science Centre, 2000). A deforestation rate of 120,000 ha per year was reported for the country (Castro Marín and Aguilar, 2003) and the total area of natural forests in the country was estimated at 3.2 million ha during 2007-2008, of which 2.8 million ha were reported to be broadleaf forests (INAFOR, 2009). The potential range of the species in the country was estimated at 2.4 million ha, of which 1.4 million ha were reported to be in protected areas (CoP14 Doc. 64 (Rev. 1)).

Magin (2006) reported a total area of closed hardwood forest containing mahogany of 2.4 million ha. Of this area, productive forests were reported to cover 950,000 ha, mostly in the RAAN (73%) and the RAAS (21%). Conservation forests were reported to cover the remaining 1.4 million ha, mostly in the RAAS (32%), Jinoteca (26%), RAAN (25%) and Rio San Juan (16%).

S. macrophylla was reported to be common in the wet forests of the Atlantic side of Nicaragua (Stevens *et al.*, 2010) but Díaz Santos (2005) considered it to be uncommon in El Castillo municipality (Río San Juan department), where the author found average densities of 0.09 trees/ha.

The Tropical Science Centre (1999) reported average densities for Nicaragua of 2 trees/ha and harvestable volumes of 4 – 5 m^3/ha. More recently, densities of 0.64 to 0.65 trees/ha were reported for the country (CoP14 Doc. 64 (Rev. 1)).

The species was reported to be declining in Nicaragua, both in its natural area of distribution and in the volumes available for commercial use, and to have become extinct in

open hardwood forest due to selective logging (Travisany, 2004; Travisany, 2005; Magin, 2006).

The species was considered to be commercially extinct in several parts of the country, including the departments of Boaco and Chontales (central region), much of Matagalpa and Jinotega (north of the country) and the department of Río San Juan (Guillén, 1999; Magin, 2006). The mahogany populations of commercial importance were reportedly restricted to the North Atlantic Autonomous Region (RAAN) and some parts of the South Atlantic Autonomous Region (RAAS) and Matagalpa (Guillén, 1999).

The municipalities with the highest area of productive mahogany forests were reported to be Waspan, Rosita, Prinzapolka, Bonanza and Desembocadura Río Grande (Travisany, 2005).

In the RAAN, there was reported to be an average density of 1 tree/4.7 ha and in the RAAS, there was reported to be an average density of 1 tree/2.3 ha (Magin, 2006).

In the RAAN, the highest densities (1 tree/ha and 2.5 m^3/ha) were reported from the Rosita sector (Wasakin and Río Bambana), Kukalaya and Prinzapolka, and lower densities (0.20 trees/ha and 0.72 m^3/ha) were reported from Waspan/Awas tingni (Tropical Science Centre, 1999).

In the RAAS, the highest densities (up to 2 trees/ha and 5 m^3/ha) were reported from the Rama sector (Walpapina, Sulatin, El Tortuguero and San Miguel de los Olivos) and high densities were also reported from the Wawashang, Kasnigtingni and Kukarawala sectors (Tropical Science Centre, 1999). However, in Pongla, the density of the species had reportedly decreased markedly as a result of intensive harvesting (Tropical Science Centre, 1999).

The following commercial mahogany volumes (m^3/ha) were reported from various forest inventories in Nicaragua: 1.09 (Wakambay), 1.30 (Awas Tingni), 1.26 (La Esperanza), 0.23 (Kukalaya), 1.40 (Lago Kukalaya), Southeast inland (0.28) (Travisany, 2005; Magin, 2006).

The areas where mahogany was most intensively harvested were reported to be Alamikamba (Río Prinzapolka), Tasba Pouni, Mulukukú and an area to the northeast of Bosawas (Guillén, 1999).

Very few trees in the 60 cm and above dbh classes were reported to remain (Magin, 2006; INAFOR, 2009), apparently as a consequence of the overexploitation of the species in the early 20th century (Magin, 2006). In the RAAS, almost no individuals in the dbh classes of 60 cm and above were reported to remain, and in the RAAN, 87% of the individuals were reported to correspond to the 40-50-60 cm dbh classes, with some of the remaining trees being of larger diameter (Magin, 2006).

Rodríguez (2003) calculated that 0.5 million m^3 of mahogany (in diameter classes above 40 cm dbh) remained in the closed broadleaf forests of Nicaragua. According to more recent estimates, 1.64 million m^3 of mahogany (in diameter classes above 40 cm dbh) were available in the country, half of which were in productive forests and the other half in conservation forests (Nicaragua, 2006; Magin, 2006). Magin (2006) estimated that approximately 542,000 m^3 corresponded to trees over 50 cm dbh (the minimum cutting diameter for mahogany in Nicaragua) in productive forests.

Threats: Overharvesting, farming and illegal harvesting were considered to be the main threats to the species in Nicaragua (Tropical Science Centre, 1999; Travisany, 2005). Magin (2006) considered overharvesting and illegal logging and trade to be important

threats to the species in Nicaragua.

Trade: Exports of mahogany from Nicaragua reportedly peaked in the 1960s, when volumes of more than 20,000 m^3 were exported annually, but later decreased to under 10,000 m^3 exported annually during the 1970s, 1980s and 1990s (Travisany, 2005).

According to the CITES Trade Database, direct trade in *S. macrophylla* from Nicaragua 1999-2008 amounted to a total of 35,671 m^3 as reported by Nicaragua and to 49,425 m^3 as reported by the importers (Table 2). To date, Nicaragua has not submitted its 2008 annual report. The United States and the Dominican Republic accounted for 47% and 26%, respectively, of the trade reported by Nicaragua. Both countries accounted for 47% of the trade as reported by the importers. Spain and Honduras accounted for the majority of the remainder of the trade.

It was considered that 75-80% of the mahogany harvested in Nicaragua was exported (Tropical Science Centre, 1999). There were reported to be 76 mahogany exporting companies in Nicaragua in 2006 (Nicaragua, 2006).

Illegal harvest and trade of timber, including mahogany, was reported to be an important problem in Nicaragua (Pommier, 2002; Contreras-Hermosilla, 2002; Nicambiental *et al.*, 2003; Travisany, 2005; Magin, 2006). Production costs were reported to be over three times lower for illegal than for legal mahogany timber (Nicambiental *et al.*, 2003). Magin (2006) noted that there was a large discrepancy between authorized harvest volumes and the volume of roundwood required to produce the volume of sawn timber exported, and argued that the only plausible explanation was uncontrolled harvesting.

The Tropical Science Centre (1999) indicated that in normal circumstances 1/3 of the trade in mahogany was illegal but that when restrictions were put in place, this raised to 2/3 of the trade.

The CITES Management Authority of Nicaragua reported that in order to address the problem of illegal mahogany trade, the Government of Nicaragua passed Law No. 585 in June 2006, banning mahogany harvest and trade for a period of ten years (Castellón *in litt.* to the CITES Secretariat, 2008). After the ban was put in place, the reported levels of exported mahogany sawn wood dropped from 7,150 m^3 in 2005 to 1,644 m^3 in 2006 and to 74 m^3 in 2007, with no trade reported in 2008 (CITES MA of Nicaragua, Castellón *in litt.* to the CITES Secretariat, 2008). Conversely, reported exports of finished goods increased from no trade in 2005 - 2006 to 1,389 m^3 in 2007 and 692 m^3 in 2008 (CITES MA of Nicaragua, Castellón *in litt.* to the CITES Secretariat, 2008). The harvest of the timber used to produce these finished goods had been reportedly authorized before the ban was put in place (CITES MA of Nicaragua, Castellón *in litt.* to the CITES Secretariat, 2008).

According to the CITES Trade Database, Nicaragua did not report any exports for 2006-2008. However, importers reported quantities of 1537 m^3, 1341 m^3 and 930 m^3 of sawn wood in 2006, 2007 and 2008 respectively. It is unclear why exports reported above by the CITES Management Authority of Nicaragua were not included within annual reports for 2006 and 2007. It also seems apparent that importers used the term sawn wood in their annual reports to report imports of this species from Nicaragua in 2006-2008, rather than carvings (of furniture for example).

Nicaragua published an export quota for the species of 16,000 (no units) in 1997, but has not published any export quotas subsequently.

Management: The species was reportedly protected in the Bosawas Reserve (Tropical Science Centre, 1999).

Before the early 1990s, forest management in Nicaragua was reportedly largely unregulated;

the improved regulations put in place in the 1990s were still considered to be confusing and ineffective (Guillén, 1999). A system of concessions was tried during the 1990s but it was not successful due to conflicts over land ownership, breaching of contracts by logging companies, and lack of adequate regulations and enforcement (Guillén, 1999).

Decree 30-97 of 5th June 1997 noted that *S. macrophylla* was considered to be in danger of extinction and put in place an export ban of five or more years for unprocessed mahogany timber. One year later, acknowledging the continuing high deforestation rates in the country, a five-year export ban on all mahogany timber was put in place through Decree 35-98 of 5th June 1998 (Guillén, 1999). However, the ban reportedly led to an increase in illegal trade and unsustainable harvesting of the species (Guillén, 1999; Tropical Science Centre, 1999).

More recently, the legal framework for the sustainable use of mahogany in Nicaragua was reported to be based on Ministerial Resolution No. 36-2003 (establishing the administrative process to issue export permits), Law 462 of 2003 and Decree No. 73-2003 (establishing administrative guidelines for the sustainable use of forests) and Law 559 (dealing with enforcement related to natural resources) (Nicaragua, 2006).

Measures in place to control the harvest of *S. macrophylla* were reported to include the requirement of forest management plans, the zoning of forests in protected and producing areas, and a minimum cutting diameter of 50 cm dbh (Nicaragua, 2006).

Magin (2006) suggested that the very limited presence of individual trees of more than 50 and 60 cm dbh may be the result of the minimum cutting diameter of 50 cm dbh for mahogany, which lead to the systematic logging of trees as soon as they grow to such proportions. Magin (2006) noted, however, that the impact of this system was not as great as the effects of the overexploitation in the past century.

Magin (2006) reported that approximately 37,000 ha of forest from which mahogany was harvested were under General Forest Management Plans (GFMPs), accounted for by two management plans in the RAAS and the rest in the RAAN. Mahogany was also reportedly harvested from areas between ten and 50 ha under Minimum Management Plans (MMPs). Magin (2006) indicated that MMPs contributed to the fragmentation of the forest and noted that they were the most frequently used way of harvesting illegally: "These types of plan offer the greatest possibilities for illegal felling and evasion of the technical and administrative responsibilities required in GFMPs. MMPs give rise to various types of illegal and fraudulent harvest: a permit is secured for a small plot of land, but the timber is actually extracted from a larger area, or inventories overestimate the volume of wood in the authorized area".

Magin (2006) indicated that "mahogany harvest areas are concentrated around the productive forests of the RAAN, where most of the General Forest Management Plans are being implemented, and in the RAAS, where a significant timber frontier is advancing from La Cruz de Rio Grande, in areas with a large number of Minimum Management Plans in operation".

MMPs were subsequently eliminated (Nicaragua, 2006). In addition, Magin (2006) considered that illegal extraction was likely to decrease as a result of Forestry Law No. 462 and its Bylaws, approved in 2003.

More recently, Law No. 585 of 2006 banned the harvest and trade in mahogany for a period of ten years. Only timber from registered plantations and finished goods (e.g. furniture) can be exported under Law No. 585, provided they comply with the relevant management plans (CITES Management Authority of Nicaragua Castellón, *in litt.* to UNEP-WCMC, 2008).

Magin (2006) provided a number of recommendations to promote the sustainable use of mahogany in Nicaragua:

"•Carry out a forest inventory in municipalities with closed hardwood forests containing mahogany as soon as possible.

• Once the inventory has been completed, use the results to establish annual harvesting quotas at the regional and municipal levels.

• Review mahogany extraction permits from areas under Minimum Management Plans and establish the use of General Forest Management Plans for mahogany extraction in natural forest.

• Improve the follow-up of General Forest Management Plans, including measurable indicators, according to the Criteria and Indicators for Sustainable Forest Management prescribed by law.

• Expedite the certification of remaining productive forests, using a scheme with verifiable technical commitments that will protect the forest in the long term.

• Promote added value in mahogany products for export.

• Evaluate whether increasing the minimum cutting diameter for mahogany to 55 cm and prolonging the logging cycle to around 40 years would benefit the species.

• Involve regional universities in forest research, especially regarding development, monitoring and evaluation of permanent plots.

• Evaluate the different types of management plans in operation and analyse how they contribute to sustainable forest development, updating the only evaluation carried out in 1996.

• Evaluate and update Forest Development Policy, based on paradigms established in the new Forest Law of 2003.

• Involve the municipal authorities in areas where mahogany occurs in the distribution of, and support for, these recommendations."

Magin (2006) calculated that 12,000 m^3 could be harvested sustainably per year in Nicaragua, taking into account the whole 950,000 ha of productive forest in the country.

Nicaragua reported capacity building activities, including regional workshops to evaluate the status of mahogany and a training programme on the identification of the species (CoP14 Doc. 64 (Rev. 1)).

Between 2007 and 2008, the National Forestry Institute of Nicaragua, with support from the FAO, collected information on various forest variables and indicators throughout the country in order to compile the first ever national forest inventory for the country (INAFOR, 2009).

VENEZUELA

Provisional category: Species of Least Concern

Distribution in range State: The CITES Management Authority of Venezuela reported that *S. macrophylla* was widely distributed in the coastal regions of Venezuela, from the coastal regions to the Orinoco River, including the following states: Apure, Aragua, Barinas, Carabobo, Cojedes, Delta Amacuro, Distrito Capital, Lara, Mérida, Miranda, Nueva Esparta, Portuguesa, Táchira, Vargas and Zulia *(*Lugo Salinas *in litt*. to UNEP-WCMC, 2010).

The potential range of the species in the country was estimated at 7994 ha (CoP14 Doc. 64

(Rev. 1)).

Population trends and status: Plonczak (1993; cited in Tacoronte *et al.*, 2004) considered mahogany to be very rare in Venezuela due to poor management, excessive deforestation and low natural regeneration rates. Densities of 0.09 to 1.42 trees/ha were reported for the country (CoP14 Doc. 64 (Rev. 1)).

Logging at the Forest Reserve of Caparo, in the western plains of Venezuela, reportedly resulted in the near disappearance of *S. macrophylla* (Kammesheidt, 1998).

Threats: The main threats to the species in Venezuela were reported by the CITES Management Authority of Venezuela as unsustainable harvest, habitat destruction and fragmentation of natural populations (Lugo Salinas *in litt.* to UNEP-WCMC, 2010). Tacoronte *et al.* (2004) considered uncontrolled logging and *Hypsipyla grandella* attacks as threats to the species.

The lack of plantation programmes for the species was also considered to be an indirect threat; however, plantation projects were reported from the following states: Cojedes, Barinas, Mérida, Yaracuy and Portuguesa. In addition, the CITES Management Authority of Venezuela reported that mahogany plantations had been established by various forestry-related bodies (Lugo Salinas *in litt.* to UNEP-WCMC, 2010). A total of 72.8 ha of mahogany plantations were reported to exist in the country (CoP14 Doc. 64 (Rev. 1)).

Trade: The CITES Management Authority of Venezuela (Lugo Salinas *in litt.* to UNEP-WCMC, 2010) indicated that the species had not been exported from Venezuela 2005-2008 and that no export permits were issued as a result of an export ban relating to the species.

According to the CITES Trade Database, direct trade in *S. macrophylla* from Venezuela 1999-2008 consisted of 12.65 m^3 of sawn wood and 50 carvings (unspecified units) exported in 2004 to the United States and Puerto Rico, respectively, as reported by Venezuela and 27 m^3 imported by the United States in 2001 as reported by the importer. No trade in *S. macrophylla* from Venezuela was reported 2005-2008 (Table 2).

Between 2002 and 2006 an average of 12.8 m^3 of mahogany was reportedly confiscated per year in the country (CoP14 Doc. 64 (Rev. 1)).

Venezuela has not published any export quotas for this species.

Management: Commercial logging in Venezuela was reported to have begun in the 1920s, when it was highly selective, focusing mostly on mahogany (Kammesheidt *et al.*, 2001).

A minimum harvestable size of 35 cm dbh was considered to be too low for mahogany and to threaten the long-term viability of the species (Kammesheidt, 1998).

A ban on mahogany harvest and trade was reportedly put in place by Venezuela in 2001 for a period of six years through MARN Resolution No. 100 of 18th September 2001 (MWG2 Doc. 8). Through Ministerial Resolution No. 217 of 23rd May 2006, the harvest of *S. macrophylla* was completely banned in the whole of Venezuela (CITES Management Authority of Venezuela, Lugo Salinas *in litt.* to UNEP-WCMC, 2010).

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

Illegal harvesting and trade were considered to be a problem particularly in Belize, Bolivia, Ecuador, Honduras and Nicaragua.

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Table 2. Direct exports of *Swietenia macrophylla* from Belize, Bolivia, Colombia, Ecuador, Honduras, Nicaragua and Venezuela, 1998-2008.

Exporter	Source	Term	Units	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Belize	W	timber	kg	Exporter											
				Importer										680	680
		sawn wood	-	Exporter						35.39					35.39
				Importer											
			m^3	Exporter	2326.23	1750.46		1173.46	1658.98	1351.53	523.65	251.40			9035.72
				Importer	1409	1533	709	820.47	1730.54	1109.18	429.89	344	301	612	8998.07
			shipments	Exporter											
				Importer	1										1
		carvings	-	Exporter	13										13
				Importer											
			m^3	Exporter								1.89			1.89
				Importer											
		leaves	-	Exporter						1					1
				Importer											
	I	sawn wood	m^3	Exporter											
				Importer						2					2
			shipments	Exporter											
				Importer						1					1
Bolivia	-	sawn wood	m^3	Exporter											
				Importer			61.32		5						66.32
	W	timber	m^3	Exporter											
				Importer						1.5			1.65		3.15
		veneer	m^3	Exporter						21.09	15.6	0.1			36.79
				Importer						3.5				3.4	6.9
			m^2	Exporter											

Exporter	Source	Term	Units	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
				Importer									14900	3340	18240
		sawn wood	m^3	Exporter	8519.68	5782.66	7391.94	7182.94	9645.05	9646	7942.73	9626.96	6777.72		72515.68
				Importer	6663	10106.59	6590.1	4612.68	8689	9086.18	6165.94	8804.29	7236.83	5565.81	73520.42
		carvings	-	Exporter							2				2
				Importer											
		plywood	m^3	Exporter											
				Importer									3.58		3.58
Ecuador	-	sawn wood	m^3	Exporter											
				Importer	32										32
	W	timber	m^3	Exporter											
				Importer				40.86							40.86
		sawn wood	m^3	Exporter											
				Importer	45			50	181				202	510.64	988.64
	A	sawn wood	m^3	Exporter											
				Importer					44				28		72
	I	sawn wood	m^3	Exporter											
				Importer									32		32
Honduras	W	timber	m^3	Exporter	1312.12	665.52	555.66								2533.29
				Importer											
		sawn wood	m^3	Exporter					24.50	242.53	133.31	105.25	78.00	94.64	677.78
				Importer	12		8		15	40.19	41	79	55	95	345.19
		timber pieces	-	Exporter						19					19
				Importer											
	I	sawn wood	m^3	Exporter											

Exporter	Source	Term	Units	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
				Importer			7								7
Nicaragua	W	sawn wood	m^3	Exporter	5164.51	3863.16		7199.12	7166.62	5271.26	7006.63				35671.29
				Importer	1882	1160.15	5991.33	6100.28	4539.88	21937.60	4004.34	1537.83	1341	930.97	49425.38
			kg	Exporter											
				Importer		69029									69029
		timber pieces	-	Exporter					940						940
				Importer											
		carvings	-	Exporter					141						141
				Importer											
Venezuela	W	sawn wood	m^3	Exporter						12.65					12.65
				Importer			27								27
		carvings	-	Exporter						50					50
				Importer											

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Calanthe alleizettii Gagnepain, 1950: Viet Nam

Orchidaceae

Selection for Review of Significant Trade

Selected following the 14th Conference of the Parties at the 17th meeting of the Plants Committee (PC17 WG4 Rev 1, PC17 Summary record) on the basis of trade data provided in document PC17 Doc 8.5.

A. Summary

Provisional category	Summary
Least concern	Possibly endemic to Viet Nam, occurring in two provinces. The species status was reportedly "rare", although one author considered it to occur occasionally and be of "lower risk". No information on population size is available. Threats to the species may include habitat fragmentation, climate change forest fires and illegal trade. Trade is not permitted for commercial purposes, and reported international trade levels are very low (only 37 specimens reported in trade and none since 2003). It appears unlikely that international trade is currently a serious threat to the species, unless it proves that the number of individual plants at all localities is extremely small. On this basis, categorised as Least Concern.

B. Species overview

Biology: *Calanthe alleizettii* was described as a terrestrial herb with odourless flowers, light violet tepals, a white lip with a violet tint, and white keels and column (Averyanov and Averyanova, 2002). It was listed as one of a number of species occurring generally in broadleaved, evergreen, closed and humid primary forest, on the middle and lower reaches of slopes below rocky limestone ridges (Averyanov *et al.*, 2003a). At Long Luong Mun, the habitat was described as primary wet, broad-leaved evergreen and semi-deciduous mossy forest along the tops of a remnant limestone highly eroded ridge (Averyanov and Averyanova, 2002). The altitude of six records from northern Viet Nam ranged from 1094 m to 1800 m (Tropicos, 2010).

Taxonomic note: The species name was spelt as *Calanthe alleizettii* in the type description (Gagnepain 1950), followed by Roberts *et al.* (2001) and Govaerts *et al.* (2010); however, the International Plant Names Index (2010) spelt it as *Calanthe alleizettei*, as did Seidenfaden (1992).

C. Country review

VIET NAM

Distribution in range State: The species was reported to be endemic to Viet Nam (Averyanov *et al.*, 2003b; Roberts *et al.*, 2001), although Schuiteman *et al.* (2008) listed it as a species expected to be found in Lao Peoples Democratic Republic. It is apparent that the species occurs mainly in the north of Viet Nam, but was also reported from one unspecified location in the south (Figure 1).

Gagnepain (1950) described the species from a specimen in Poilane's collection from col de Lo-qui-ho (22°21'N 103°52'E), Lao Cai Province, Tonkin. He also referred to a specimen from "Cochinchine: env. de Bien-hoa (D'ALLEIZETTE)", which Averyanov (1994) later listed as a

lectotype and referred it to Dong Nai Province. A specimen was collected near Sang Cai village at Long Luong Municipality, Moc Chau District, Son La Province (20°45'51''N, 104°51'26''E), at 1400-1500 m on 8 March 2001; the species was considered to be rare at this locality (Averyanov and Averyanova, 2002). Three more specimens were collected nearby in April 2001 and December 2002 – one of these was from nearby Hoa Binh Province (Tropicos, 2010).

C. alleizettii was recorded in the Lang Cung Mountains, Van Ban District and Lao Cai Province in 2001-2002 (Averyanov *et al.*, 2003b). Averyanov collected two more specimens: one at 22°39'29"N 105°19'35"E in Ha Giang Province in March 2005, and the other at 22°32'53"N 103°33'40"E in Lao Cai Province in December 2006 (Tropicos, 2010).

The CITES Management Authority of Viet Nam (*in litt.* to UNEP-WCMC, 2010) reported that this species was "just recorded in Lao Cai and Dong Lai but not other areas in Vietnam", but no references were provided. It is likely that Dong Lai was an error for Dong Nai. Averyanov and Averyanova (2003) listed it as occurring in three of the six floristic regions of Viet Nam: Sikang-Yunnan province, South Chinese province and South Annamese province. However, Long Luong Mun is in North Indochinese Province.

Population trends and status: The species has not yet been assessed by the IUCN (IUCN, 2010) but its occurrence was considered "occasional" by Averyanov and Averyanova (2003). The Viet Nam CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) reported that the species was very rare but that there was no information on population size. Averyanov and Averyanova (2003) found it to be of occasional occurrence and categorized it as "lower risk".

Threats: The CITES MA of Viet Nam (*in litt.* to UNEP-WCMC, 2010) mentioned a number of general threats affecting the plant species from Viet Nam subject to the current Review of Significant Trade which included habitat fragmentation, climate change, forest fires, and illegal trade, which may be relevant to this species.

Trade: According to the CITES Trade Database for the period 1999-2008, the only trade record involving this species was 37 live plants of wild origin reported by the United States of America and imported from Viet Nam for commercial purposes in 2003.

The CITES MA of Viet Nam (*in litt.* to UNEP-WCMC, 2010) reported that there were no records of any illegal trade in this species.

Viet Nam has not published any export quotas for this species.

Management: According to the CITES MA of Viet Nam (*in litt.* to UNEP-WCMC, 2010) the species was not listed in a Government Decree, but harvesting was stated to be prohibited in protected areas. It was also reported that trade in this species was not allowed for commercial purposes; however, no further information on the legal basis for this was provided by the CITES MA of Viet Nam (*in litt.* to UNEP-WCMC, 2010).

The type locality, col de Lo-qui-ho, was located within one protected area, the Hoang Lien Nature Reserve.

It was noted that population monitoring was not being undertaken due to lack of human resources and technical support (CITES MA of Viet Nam, *in litt.* to UNEP-WCMC, 2010).The CITES MA of Vietnam reported that no non-detriment findings had been made for this species. They further noted they were looking for external funding to conduct comprehensive surveys of species included within the CITES Review of Significant Trade process (CITES MA of Viet Nam, *in litt.* to UNEP-WCMC, 2010).

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

None identified.

E. References

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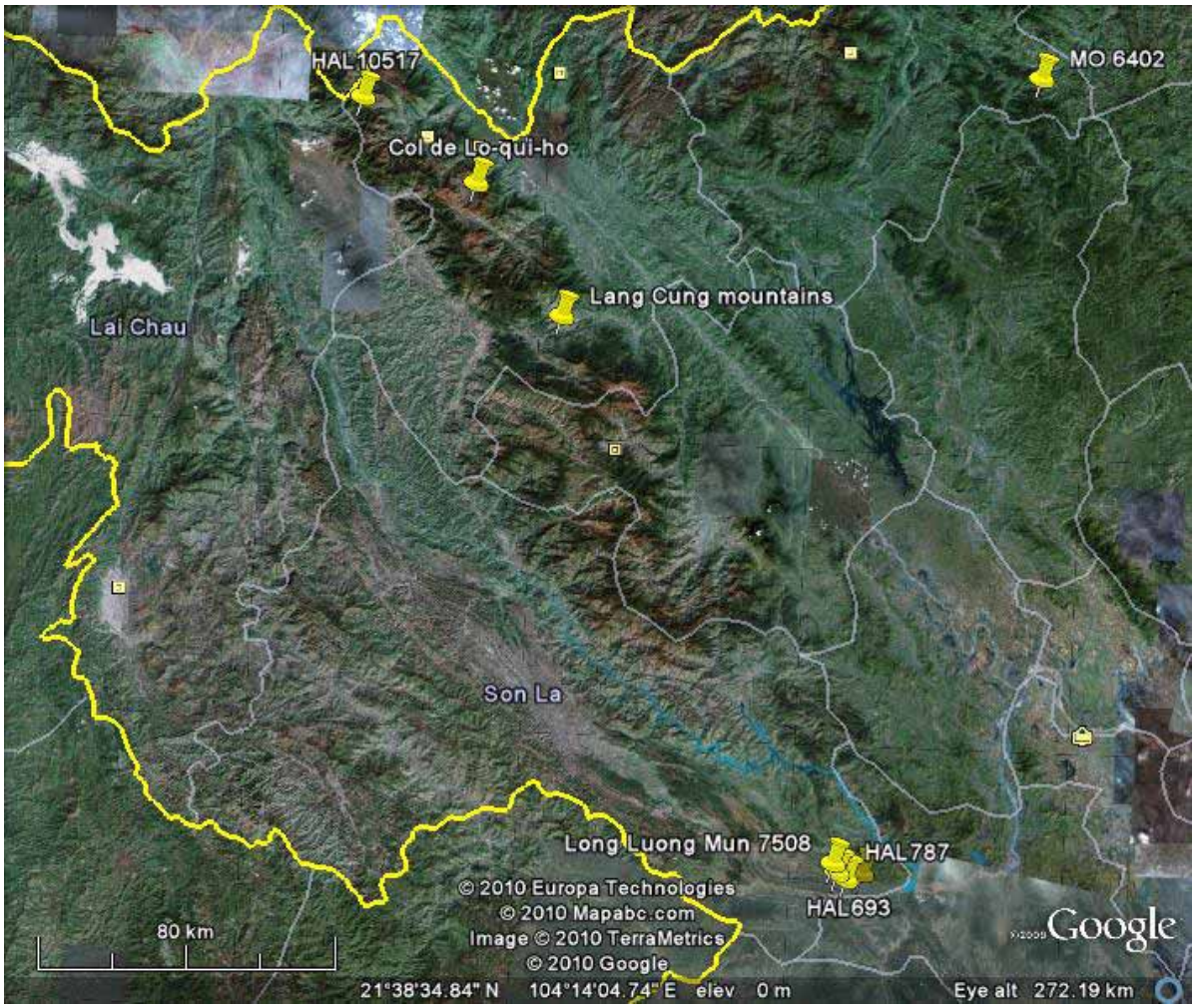

Figure 1. Distribution of *Calanthe alleizettii* in north Viet Nam (based on information in the Distribution section above, Tropicos (2010). Note also recorded at an unspecified locality in Dong Nai province in the south of the country.

Cymbidium erythrostylum Rolfe, 1905: Viet Nam

Orchidaceae, Red column cymbidium

Selection for Review of Significant Trade

Cymbidium erythrostylum was selected following the 14th Conference of the Parties at the 17th meeting of the Plants Committee (PC17 WG4 Rev 1, PC17 Summary record) on the basis of trade data provided in document PC17 Doc. 8.5.

A. Summary

Provisional category	Summary
Possible Concern	Reported to be endemic to Viet Nam, possibly only occurring in the central and south of the country. Little information on population status is known, and although not officially assessed by the IUCN, several authors consider the species to be "endangered". Threats to the species may include habitat fragmentation, climate change and forest fires. Viet Nam reported total exports of 560 live wild specimens in 1999-2000, although has not reported any exports since then. However, importers reported higher quantities imported from Viet Nam totalling 914 wild specimens, with trade in each year 1999-2004. No international trade has been reported since 2004, but overall, international trade levels relatively high considering the species' probable threatened status and restricted range. No information on the basis for a non-detriment finding provided, although trade is apparently not permitted for commercial purposes. On this basis, categorised as Possible Concern.

B. Species overview

Biology: *Cymbidium erythrostylum* was described as a perennial, epiphytic, lithophytic or terrestrial herb with pseudobulbs about 6 cm long, 2 cm in diameter, produced annually, narrowly ovoid, bilaterally flattened, with 6-8 distichous leaves; flowers generally 4-8, with mainly white petals and sepals, the lip yellow-white and veined deep red. It was reported to typically grow epiphytically in open coniferous woodlands, which were considered to be the most widespread habitats in the northern part of south Viet Nam, usually developing on degraded soils on granite and hill slopes between 1000-1800 m where *Pinus kesiya* was the commonest dominant tree species (Du Puy and Cribb, 2007). Averyanov and Averyanova (2002) recorded that the habitat of a record from north Viet Nam was as an epiphyte on *Livistona* in primary wet broad-leaved evergreen and semi deciduous mossy forest along the top of a remnant highly eroded limestone ridge.

C. Country review

VIET NAM

Distribution in range State: *C. erythrostylum* was reported to be endemic to Viet Nam (Du Puy and Cribb, 2007). It was reported that "It appears to be a narrow endemic to a small region of southern Vietnam" (Du Puy and Cribb, 2007). No localities and no references were given and a distribution map showed an extent of occurrence of about 100,000 km^2 in the South and Central Annamese floristic provinces, extending into both Cambodia and the Lao People's Democratic Republic, although this was presumably a mapping error.

The species was described by Rolfe (1905) from a plant cultivated at the Royal Botanic Garden, Glasnevin, which had been collected by Wilhelm Micholitz in 1891 in Annam. The Muséum National d'Histoire Naturelle (MNHN, 2010) reported a specimen collected at Da

Lat [11°56'N 108°26'E Lam Dong Province] by F. Evrard in August 1924 (see also Seidenfaden, 1992), one collected in the Da Lat region by Tixier in 1960, three specimens collected from Nha Trang [12°14'N 109°12'E, Khanh Hoa Province] and three from west of Nha Trang by Poilane in May-July 1922, and one collected in July 1927 by J. and M. S. Clemens from Mount Ba Na [15°15'N 107°54'E, described as near Tourane (= Da Nang) but actually in Quang Nam Province]. Seidenfaden (1992) reported specimen records from 'Langbian', 'Dalat', 'Mt. Bana', 'Tourane' and 'Nhatrang'. Averyanov (1994) noted its occurrence as "Phu Khanh (Nhatrang, 1600 m), Lam Dong (Dalat, Langbian, Khanhhoa)". Figure 1 provides a distribution map of specimen records.

Averyanov and Averyanova (2002) reported the species as occurring in north Viet Nam, but was not common, at Long Luong Mun., near Sang Cai village (20°45'1"N, 104°51'26"E), Moc Chau District, Son La Province, at 1500 m. However, a year later, Averyanov *et al.* (2003) and Averyanov and Averyanova (2003) noted its occurrence only in the South Annamese floristic province.

The CITES Management Authority of Viet Nam (*in litt.* to UNEP-WCMC, 2010) noted that it was locally distributed in Da Nang and Kon Tum Provinces (Central Annamese Floristic Province), and in Khanh Hoa and Lam Dong Provinces (South Annamese Floristic Province). The reference to Da Nang may refer to the Mount Ba Na specimen mentioned above.

Population trends and status: The species was not included in the IUCN Red List (IUCN, 2010), although Du Puy and Cribb (2007) considered it within the category of Endangered (under A1cd; B1a, b (ii) (iii)), and Averyanov and Averyanova (2003) listed it as rare, and also "endangered". The CITES MA of Viet Nam (*in litt.* to UNEP-WCMC, 2010) stated that there was no available information on the species population sizes. No information on population trends could be located.

Threats: The CITES MA of Viet Nam (*in litt.* to UNEP-WCMC, 2010) listed a number of general threats affecting plant species from Viet Nam subject to the current Review of Significant Trade, which included habitat fragmentation, climate change and forest fires which may be of relevance to this species.

Trade: According to data within the CITES Trade database 1999-2008, Viet Nam reported the export of 560 live, wild-sourced plants. All trade was reported in 1999 and 2000 (Table 1), and all was for commercial purposes. No exports were reported Viet Nam in subsequent years, and annual reports were submitted by Viet Nam for the years 2001-2008 inclusive. However, importers continued to report imports originating from Viet Nam in each year from 2001-2004, with much higher quantities reported in trade overall during 1999-2008 (914 live specimens) than reported by the exporter (Table 1).

Table 1. Direct exports of *Cymbidium erythrostylum* from Viet Nam, 1999-2008. All trade was in wild-sourced, live specimens.

Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Exporter	220	340									560
Importer	20	290	105	350	114	35					914

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Viet Nam has not published any export quotas for this species.

The CITES MA of Viet Nam (*in litt.* to UNEP-WCMC, 2010) reported that there were no records of any illegal trade in this species.

Management: *C. erythrostylum* was not included in a Government Decree, and harvesting was reported to be probihited in Special Use Forests (CITES MA of Viet Nam, *in litt.* to

UNEP-WCMC, 2010).

The CITES MA of Viet Nam (*in litt*. to UNEP-WCMC, 2010) noted that trade in the species for commercial purposes was not allowed. However, the date when this restriction came into effect was not provided.

No population monitoring of *C. erythrostylum* had been undertaken (CITES MA of Viet Nam, *in litt*. to UNEP-WCMC, 2010).

It was noted that population monitoring was not being undertaken due to lack of human resources and technical support (CITES MA of Viet Nam, *in litt*. to UNEP-WCMC, 2010).The CITES MA of Vietnam reported that no non-detriment findings had been made for this species. They further noted that they were looking for external funding to conduct comprehensive surveys of species included within the CITES Review of Significant Trade process (CITES MA of Viet Nam, *in litt*. to UNEP-WCMC, 2010).

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

None identified.

E. References

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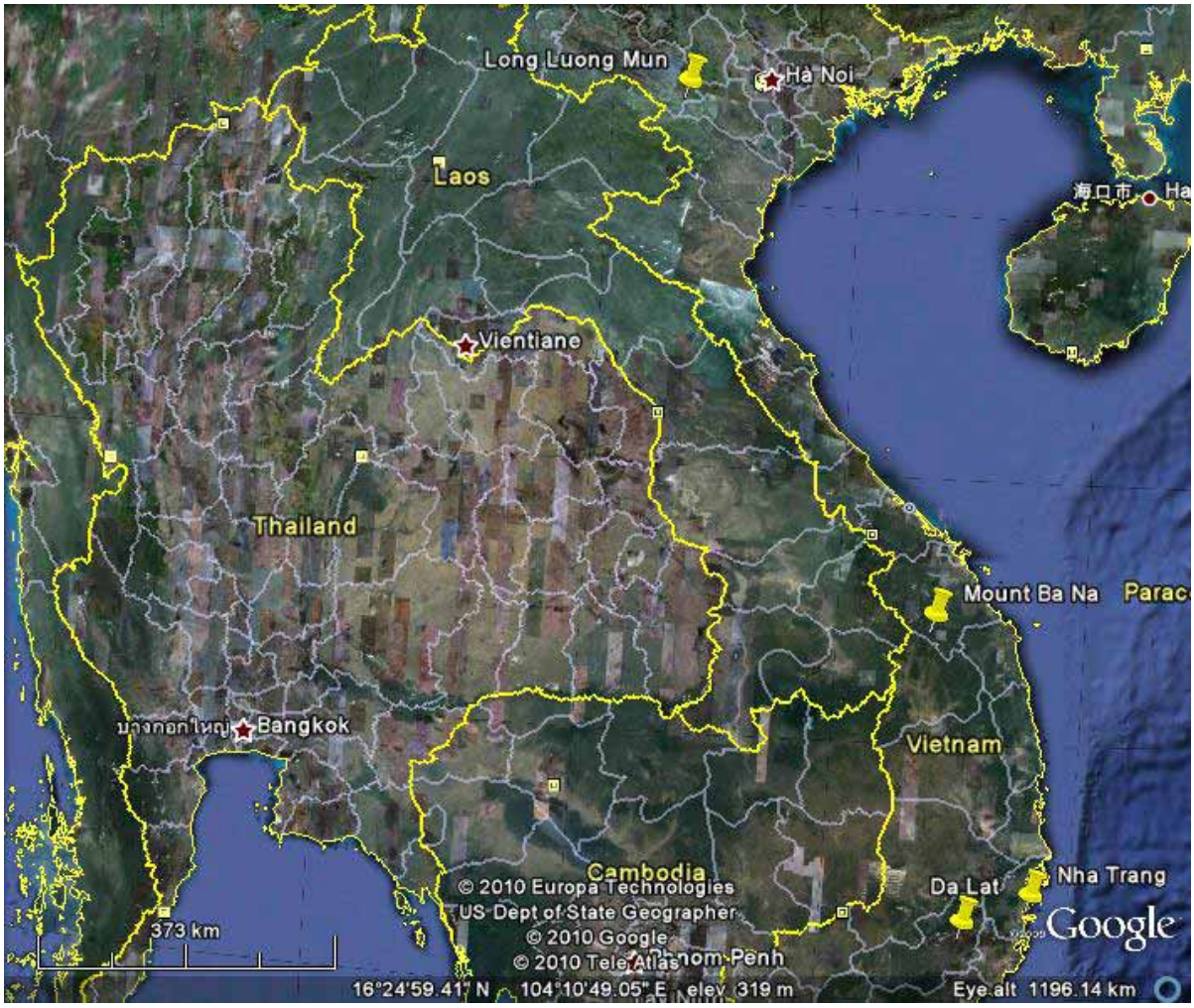

Figure 1. Distribution of *Cymbidium erythrostylum*, based on information in the Distribution section above.

Renanthera annamensis Rolfe, 1906: Myanmar, Viet Nam

Orchidaceae

Selection for Review of Significant Trade

Renanthera annamensis was selected for review of significant trade following the 14th Conference of the Parties at the 17th meeting of the Plants Committee (PC17) on the basis of trade data provided in document PC17 Doc. 8.5. No response was received from Myanmar or Viet Nam to the Secretariat's request for information on implementation of Article IV (PC 18 Summary Record).

A. Summary

Range State	Provisional category	Summary
Myanmar	Least Concern	No information on the conservation status of the species located for Myanmar. However, no exports have been reported from Myanmar and so international trade does not presently appear to pose a threat to the species. The requirements of Article IV do not currently appear to be applicable, and on this basis, categorised as Least Concern.
Viet Nam	Possible Concern	The validity of the taxon *Renanthera annamensis* was considered uncertain by one author, who regarded it a depauperate form of *R. imschootiana*. The species was considered to be endemic to Viet Nam by the CITES Management Authority; however distribution in Viet Nam remains unclear. It was considered to be very rare and "critically endangered" in the country by one author. Threats to the species may include habitat fragmentation, climate change and forest fires. Commercial trade in the species is apparently not allowed in Viet Nam, and there have been no reported exports of wild-sourced specimens from the country since 2002, indicating the requirements of Article IV may not currently be applicable. However, high previous trade levels were reported in 1992-2002, and given the highly threatened status and limited distribution of this species; any further trade is likely to pose a serious threat to the population. Therefore, categorised as Possible Concern.

B. Species overview

Taxonomic note: *R. hennisiana* and *R. pulchella* are considered to be synonyms of *R. annamensis* (Roberts *et al*., 2002).

Biology: Rolfe (1906) described the species from 'Annam' as epiphytic and like a small-flowered version of *Renanthera imschootiana*. Rolfe (1914) described *Renanthera pulchella* from 'Burma', with a similar comparison to *R. imschootiana*. Schlechter (1914) described *Renanthera hennisiana* from 'Burma'. Averyanov *et al.* (2003) described *R. annamensis* as occurring in epiphytic orchid lianas in lowland woods on silicate rocks in Viet Nam.

An illustration of the type specimen is provided in Figure 1. L. Averyanov (*pers. comm*. to UNEP-WCMC, 2010) stated that the validity of this species was uncertain – he considered that it might be a depauperate form of *R. imschootiana*.

Figure 1. *Renanthera annamensis*, **illustration of type specimen (Source: http://upload.wikimedia.org/wikipedia/commons/4/44/Renanthera_annamensis_-_Curtis%27_133_%28Ser._4_no._3%29_pl._8116_%281907%29.jpg)**

General distribution and status: The species was reported to occur in Viet Nam (*sensu stricto*) and in Myanmar (*R. hennisiana* and *R. pulchella*) (Roberts *et al.*, 2002). The conservation status of the species has not yet been assessed by IUCN (IUCN, 2010) but Averyanov and Averyanova (2003) considered it to be very rare and "critically endangered" in Viet Nam.

Overview trade and management in the species: *R. annamensis* was listed in CITES Appendix II on 01/07/1975 under *Orchidaceae* spp. All parts and derivatives were listed, except a) seeds, spores and pollen (including pollinia) b) seedling or tissue cultures obtained *in vitro*, in solid or liquid media, transported in sterile containers c) cut flowers of artificially propagated plants.

No trade in *R. annamensis* originating from Myanmar was reported 1999-2008. Exports have been reported from Viet Nam.

C. Country reviews

MYANMAR

Provisional category: Species of Least Concern

Distribution in range State: *R. hennisiana* was reported from Ayeyarwady, Kayah, Tanintharyi and Yangon provinces (Kress *et al.*, 2003). No information on the distribution of *R. pulchella* in Myanmar has been located.

Population trends and status: No species specific information has been located.

Threats: No species specific information has been located.

Trade: No trade was reported in specimens of this species originating from Myanmar 1999-2008. Myanmar has not published any export quotas for this species.

Management: No information has been located on the legal protection in the range State,

regulation of wild harvesting and trade or occurrence in protected areas.

No information has been located on population monitoring in Myanmar and no non-detriment findings appear to have been made as no international trade was reported.

VIET NAM

Provisional category: Species of Possible Concern

Distribution in range State: Rolfe (1906) described the species from a specimen collected by Micholitz from 'Annam'. A specimen collected at Da Lat (11º 56'N 108º 26'E) by Evrard in May 1924 was referred to this species by Gagnepain and Guillaumin (1934) and the Muséum National d'Histoire Naturelle (MNHN, 2010). However, Seidenfaden (1992) noted that the specimen lacked an "indication of colours of the flowers, but the measurements are twice as large as those on Micholitz's plant, so I believe it to be *R. imschootiana*."

Tordoff *et al.* (2000) observed the species in Ngoc Linh proposed nature reserve in Quang Nam Province (Central Annamese floristic province), but L. Averyanov (*pers. comm.* 12 May 2010) considered that this record should be treated as unconfirmed in the absence of a specimen. Averyanov *et al.* (2003) and Averyanov and Averyanova (2003) listed it as occurring only in the South Annamese floristic province. The CITES Management Authority of Viet Nam (*in litt.* to UNEP-WCMC, 2010) stated that this species had only been recorded in Lam Dong Province (South Annamese floristic province), presumably based on Evrard's specimen and that the species was endemic to Viet Nam.

Population trends and status: Averyanov and Averyanova (2003) considered the species to be very rare and "critically endangered" in Viet Nam. The CITES MA of Viet Nam (*in litt.* to UNEP-WCMC, 2010) stated that there was no information on population sizes for this species.

Threats: The CITES MA of Viet Nam (*in litt.* to UNEP-WCMC, 2010) mentioned a number of general threats affecting the plant species from Viet Nam subject to the current Review of Significant Trade which included habitat fragmentation, climate change and forest fires, which may be relevant to this species.

Trade: According to the CITES Trade Database, Viet Nam reported the export of 2,135 wild-sourced live specimens for commercial purposes 1999-2008 (275 in 1999 to the United States and 1,850 and ten in 2000 to Japan and Thailand, respectively). Importers reported the import of 680 wild-sourced live specimens during 1999-2004 (Table 1). No trade in wild-sourced specimens has been reported from Viet Nam since 2002 (when Japan reported the import of 250 live specimens) and no further trade in the species has been reported from the country since 2004 (when Germany reported the import of 28 artificially-propagated live specimens).

It is possible that all trade reports of this species are the result of misidentification – certainly all the photographic images displayed from a Google search (20 July 2010) that were labeled as this species are clearly not *R. annamensis* and most appear to relate to *R. citrina* (e.g. http://www.orchidphotos.org/images/orchids/whiteoak/IMG0090.jpg from the United States of America, and http://picasaweb.google.com/lh/photo/ianFGRLAf4lpinfDjGDVQw from Viet Nam).

Table 1: Direct exports of *Renanthera annamensis* from Viet Nam, 1999-2008. All trade was in live specimens.

Source	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
A	Exporter											
	Importer						28					28
W	Exporter	275	1860									2135
	Importer	75	350	5	250							680

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Viet Nam has not published any export quotas for this species.

Management: The harvesting of this species was stated to be probihited in Special Use Forests (CITES MA of Viet Nam *in litt.* to UNEP-WCMC, 2010).

The CITES MA of Viet Nam (*in litt.* to UNEP-WCMC, 2010) noted that trade is not allowed for commercial purposes and that no cases of illegal trade had been detected. However, the date when this restriction came into effect was not given.

No population monitoring has been undertaken and no non-detriment findings have been conducted so far because of a lack of funding and technical support (CITES MA of Viet Nam *in litt.* to UNEP-WCMC, 2010).

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

The validity of *Renanthera annamensis* was considered uncertain by one author. It is unclear if reported international trade in the species represents specimens that have been mis-identified.

E. References

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Cistanche deserticola Ma, 1960: China, Mongolia

Orobanchaceae, desert-living cistanche

Selection for Review of Significant Trade

Cistanche deserticola was selected for review following the 14th Conference of the Parties (CoP14) at the 17th meeting of the Plants Committee (PC17) on the basis of trade data provided in document PC17 Doc. 8.5. Additional information on the species was available within document PC17 Inf. 10.

A. Summary

Overview of *Cistanche deserticola* recommendations.

Range State	Provisional category	Summary
China	Possible Concern	The species has declined substantially in China and was classified as Critically Endangered in the country in 2004. It is protected under various pieces of legislation in China. Main threats are harvest for medicinal use, cutting of the host plant for fuelwood, and overgrazing of the host plant. Exports from wild sources have declined considerably in recent years, in line with an expansion of artificially cultivated stocks. However, wild-sourced exports are continuing at a lower level, despite a reported ban on harvesting from the wild in 2000. Whilst population surveys have been conducted, no information on how survey results relate to a non-detriment finding was provided, and the impact of international trade on wild populations remains unclear. On this basis, categorised as Possible Concern.
Mongolia	Least Concern	The species is distributed in the south of Mongolia. It was classified as Endangered in the country. Little information concerning the status of the species is available, although densities were recorded as very low in one location. Harvesting of the species is prohibited, although it is subject to illegal collection and seizures at borders have been reported. Prolonged drought conditions are also considered a threat to the species. However, no international trade from Mongolia has been reported. The requirements of Article IV do not currently appear to be applicable, therefore categorized as Least Concern.

B. Species overview

Biology: *Cistanche deserticola* is a perennial parasitic herb, up to 1.6 m tall, that lacks chlorophyll, mainly parasitizing the roots of saxaul *Haloxylon ammodendron* and *H. persicum* (family Chenopodiaceae) (CoP11 Prop. 11.59; CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010). The leafy stems are 2-10 cm in diameter and bear inflorescences that are 15-50 cm long, with yellowish-white or pale purple flowers (Zhang, 1998). The flowers are produced in May-June, followed by fruits in June-August (Zhang, 1998). The species grows in desert areas of fine sandy, slightly acidic soil, at elevations of 225-1150 m (CoP11 Prop. 11.59). It was reported to have a low capacity for natural regeneration (CITES Management Authority of Mongolia *in litt*. to UNEP-WCMC, 2010).

General distribution and status: Occurs in China and Mongolia. Not included in the IUCN Red List (IUCN, 2010) but categorized as Critically Endangered within the Red List for China (Wang and Xie, 2004), and as Endangered in the Mongolian Red Book (Shiirevdamba *et al*., 1997).

Overview of trade and management in the species: *Cistanche deserticola* was listed in CITES

Appendix II on 19/07/00. The annotation for the Appendix II listing has been amended at subsequent meetings of the CoP, and these are provided in Table 1. According to the CITES Trade Database, the majority of exports of *C. deserticola* involved derivatives of wild specimens, reported in kilograms, primarily from China. Other derivatives recorded in trade include stems, dried plants, roots and extract. The major importers of the species are Japan and the United States of America. The main threats to the species were identified as collection of the host species which are utilised for timber, fuelwood and fodder, collection for medicinal use and overgrazing of the host plant by camels (Wang and Xie, 2004, cited in PC17 Inf. 10).

Table 1. History of annotations to Appendix II listing relevant to *Cistanche deserticola*

Annotation	Entry into force
#4: All parts and derivatives, except: seeds, (including seedpods of Orchidaceae), spores and pollen (including pollinia). The exemption does not apply to seeds from Cactaceae spp. exported from Mexico, and to seeds from *Beccariophoenix madagascariensis* and *Neodypsis decaryi* exported from Madagascar; b) seedling or tissue cultures obtained *in vitro*, in solid or liquid media, transported in sterile containers; c) cut flowers of artificially propagated plants; d) fruits and parts and derivatives thereof of artificially propagated plants of the genus *Vanilla* and of the family Cactaceae; e) stems, flowers, and parts and derivatives thereof of naturalized or artificially propagated plants of the genera *Opuntia* subgenus *Opuntia* and Selenicereus (Cactaceae); and f) finished products of *Euphorbia antisyphilitica* packaged and ready for retail trade.	23-06-2010
#1: Designates all parts and derivatives, except: a) seeds, spores and pollen (including pollinia); b) seedling or tissue cultures obtained *in vitro*, in solid or liquid media, transported in sterile containers; c) cut flowers of artificially propagated plants; and d) fruits and parts and derivatives thereof of artificially propagated plants of the genus *Vanilla*.	13-09-2007
#1: Designates all parts and derivatives, except: a) seeds, spores and pollen (including pollinia); b) seedling or tissue cultures obtained *in vitro*, in solid or liquid media, transported in sterile containers; and c) cut flowers of artificially propagated plants.	12-01-2005
The #3 annotation was deleted specifying that for the purpose of the Convention whole and sliced roots and parts of roots, excluding manufactured parts or derivatives such as powders, pills, extracts, tonics and confectionery of *Cistanche deserticola* are included in Appendix II.	13-02-2003
#3: Whole and sliced roots and parts of roots, excluding manufactured parts or derivatives such as powders, pills, extracts, tonics, teas and confectionery. NB The reference to "roots" should be interpreted to refer to undeveloped inflorescences, see CITES notification 2001/067.	19-07-2000

C. Country Reviews

CHINA

Distribution in range State: In China, the species occurs in the provinces of Gansu, Qinghai and the autonomous regions of Xinjiang Ugyur, Ningxia Hui and Inner Mongolia (CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010). It was also reported to occur in Shaanxi province (CoP11 Prop. 11.59).

The species primarily grows in Xinjiang Ugyur Autonomous Region (Fuhai, Habahe, Fuwen, Chabuchaer, Jinghe, Wushu, Jumushaer, Qitai, Bole, Fukang, Manasi, Hebukeseer, Huocheng, Hutubi), the Inner Mongolia Autonomous Region (Alashanzuoqi, Ejinaqi, Alashanyouqi, Wulatehouqi), Qinghai province (Haile, Hainan), Gansu province (Wuwei, Zhangye, Jiuquan), and the Ningxia Hui Autonomous Region (Zhongwei, Lingwu, Yanci)

(CoP11 Prop. 11.59; CITES Management Authority of China *in litt.* to UNEP-WCMC, March 2010).

The TCMGISI (suitability evaluation geographic information system of traditional Chinese medicine producing area) designed by Sun *et al.* (2006) was used to analyze the appropriate producing area of *C. deserticola* based on the optimum ecological factors of the traditional producing areas by Chen *et al.* (2007). The results showed that the total suitable producing area of *C. deserticola* in China was 675,354.9 $km^{2,}$ and the species was distributed mainly in Aalashan Leagure of Inner Mongolia, north-eastern Xinjiang, northern Gansu and central Ningxia. The results matched up to the traditional producing area of *C. deserticola* recorded in ancient literature and the successful cultivation areas used today (Xu *et al.*, 2009).

Population trends and status: Wang and Xie (2004, cited in PC17 Inf. 10.) categorised the species as Critically Endangered in the China Species Red List, with an estimated 80% decline (period of decline not specified). Production of the species in Gansu Province had been important for many years, but was much reduced by indiscriminate collecting. In addition, it became difficult to find the species within 20 km of residential areas in Inner Mongolia and within 100 km in Xinjiang Ugyur Autonomous Region (CoP11 Prop. 11.59). In Shaanxi Province, populations have been reduced to the level where production is no longer possible (Tan *et al.*, 2004, cited in PC17 Inf. 10). In the early 1960s, the host plant, *Haloxylon ammodendron* occurred over an area of 1,127,000 ha, supporting an annual collection of about 800 tonnes of *Cistanche deserticola*, but, by the end of the decade, the area had been reduced by about 50%, and there were further reductions subsequently (Fan, 2001, cited in PC17 Inf. 10)

A survey of the species was carried out in China from March to June 2009 by the CITES Management Authority of China, to determine the population status and gather information on trade and cultivation of the species (CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010). Sample plots were selected from the provinces of Gansu and Qinghai and the autonomous regions of Xinjiang Ugyur, Ningxia Hui and Inner Mongolia. The field plots were surveyed and combined with data from scientific literature and from interviews with local people to extrapolate an estimate of the total resource. The results indicated that there were about 906 tonnes of stems of *Cistanche deserticola* available from natural populations, mainly distributed in Xinjiang and Inner Mongolia Autonomous Regions, with 406 and 364 tonnes, respectively. The total available resource in 1989 was about 2,000 tonnes (Zhang *et al.*, 1993), and this fell to 1,030 tonnes in 2003, following annual harvests of about 209 tonnes from 1989 to 2002. However, in recent years the available resource has remained fairly static, with figures from 2004 to 2008 of 972, 927, 919 and 906 tonnes respectively, suggesting that the populations have stabilised (CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010).

The CITES Management Authority of China (*in litt.* to UNEP-WCMC, 2010) noted that plantations of *C. deserticola* were increasing in China, and the area of cultivation represented 9810 ha yielding 5700 tons in 2008.

Threats: Harvest for medicinal use, cutting of the host plant for fuelwood, and overgrazing of the host plant by camels are considered to be threats to this species (Wang and Xie, 2004, cited in PC17 Inf. 10). *C. deserticola* has been used as a medicine for nearly 2,000 years; the primary plant part used is the below-ground stem, usually in its dried form (CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010). The Pharmacopoeia Commission of the People's Republic of China (2005, cited in CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010) recorded that the drug has been used for the treatment of a variety of ailments including impotence, constipation and infertility. At

present, over 100 different preparations containing the drug are available as tablets, pills, powder and oral liquid (CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010).

Trade: According to data within the CITES Trade Database, direct exports of wild-sourced *Cistanche deserticola* decreased over the period 2000-2008 (Table 2). China directly exported 3,750 kg and 2,500 kg of wild-sourced stems in 2001 and 2002, but none were exported subsequently. Similarly, exports in wild-sourced derivatives were exported at relatively high levels in 2000, 2002 and 2003 compared to quantities exported in 2004-2008 (totalling 753.55 kg). At the same time, exports of artificially-propagated parts and derivatives appeared to increase from a total of 117 kg (derivatives and stems combined) in 2001 to 3,524 kg (derivatives, stems, and roots combined) in 2008, as reported by China.

Table 2. Direct exports of wild-sourced *Cistanche deserticola* from China, 1999-2008. (No trade reported in 1999).

Term (unit)	Reported by	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
derivatives	Exporter			2	60000						60002
	Importer										
derivatives (kg)	Exporter	4200		1145.75	5965.22	325.3	223.37	0.36	3.63	200.90	12064.52
	Importer			90							90
dried plants	Exporter										
	Importer				100						100
roots (kg)	Exporter							89.28			89.28
	Importer										
specimens	Exporter										
	Importer				2						2
stems (kg)	Exporter		3750	2500							6250
	Importer			178.56							178.56

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

The CITES Management Authority of China (*in litt.* to UNEP-WCMC, 2010) confirmed that in recent years, *C. deserticola* plants in trade have been largely supplied from artificially propagated sources. Cultivation in China began in 1985 and by 1991 involved an area of 500 ha; this gradually increased so that there were estimated yields of 1,000 tonnes in 2001-2002, and then increased substantially so that by 2008 yields reached 5,700 tonnes from a cultivation area of 9,810 ha (Xu *et al.*, 2009; CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010).

C. deserticola is also traded domestically within China. In 1995, annual demand was estimated at 450-550 tonnes (Anon., 1995a and Anon., 1995b, cited in CITES Management Authority of China, *in litt.* to UNEP-WCMC, 2010). It was reported that the overall standard of living in China had improved, leading to an increase in demand for tonics, and it was believed that demand for *C. deserticola* was increasing within China (CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010). In 2004, annual demand was estimated at around 3,500 tonnes (Tan *et al.*, 2004, cited in CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010). Recent survey results indicated a current annual demand of 3,500-4,000 tonnes (CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010). In Ningxia Hui Autonomous Region, the species has been restricted to local use in recent years (CoP11 Prop. 11.59).

It was noted that products of the species may be included in packaged medicines, which are frequently labelled as containing '*Cistanche*' rather than specifying a particular species,

leading to uncertainty in the trade data with regard to the quantities of *C. deserticola* involved (PC15 Doc. 10.2.2).

There is some evidence of illegal trade in the species. Importers reported over 59,000 derivatives plus 1,238 kg of derivatives of *C. deserticola* originating from China confiscated/seized during 2001-2008, according to the CITES Trade Database.

China has not published any export quotas for this species.

Management: *C. deserticola* is protected under various pieces of legislation in China (CITES Management Authority of China *in litt.* to UNEP-WCMC, 2010):

a) the 1998 revision of the Forest Law (http://www.novexcn.com/forrestry_1998.html). Article 6 stipulates that a forest ecological benefit compensation fund be established to support afforestation and the tending, conservation and management of forest resources. Article 20 provides that forest administrative sectors in national and provincial levels should set up nature reserves to protect typical forests distributed in various geographical zones, habitats of rare and endangered animals and plants, and other forests with special conservation values;

b) the 1987 Regulations on the Management of Protection of Resources of Wild Medicinal Materials. *C. deserticola* was listed as a Grade III species, which are defined as 'major and commonly used wild medicinal species whose resources are reducing'. Collection of these species requires a licence;

c) the 1997 Regulations on the Protection of Wild Plants (http://faolex.fao.org/cgi-bin/faolex.exe?database=faolex&search_type=query&table=result&query=LEX-FAOC012060&format_name=@ERALL&lang=eng). The Regulations have a list of species of 'national key significance'. *Cistanche deserticola* is not currently included, but the list is being amended by the Chinese State Forestry Administration and the Ministry of Agriculture, and the species will be included in the new list (CITES Management Authority of China *pers. comm.* to UNEP-WCMC, 2010). Article 10 of the Regulations refers to 'Wild plants under special local protection' and the species was afforded protection in Xinjiang Ugyur Autonomous Region in 2007 and in Inner Mongolia Autonomous Region in 2009 (CITES Management Authority of China *pers. comm.* to UNEP-WCMC 2010). For the collection of wild *Cistanche deserticola*, comments must first be sought from the collecting locality at the county level and then a permit must be applied for from the Department of Wild Plants Administration in the relevant autonomous region or municipality (CITES Management Authority of China *pers. comm.* to UNEP-WCMC, 2010).

d) The 1994 Regulations for Nature Reserves (http://faolex.fao.org/cgi-bin/faolex.exe?database=faolex&search_type=query&table=result&query=LEX-FAOC011954&format_name=@ERALL&lang=eng) stipulates detailed rules for the establishment, construction, and management of nature reserves.

The species was catalogued in the first volume of the *China plant Red Data book* in 1992 (Fu, 1992). Other measures have also been taken to protect the species including: teaching correct collecting methods, designation of *Haloxylon* forest protection areas (e.g. the Ganjiahu Suosuo Forest National Nature Reserve in Xinjiang [Anon., 2008]), and encouragement of research on cultivation techniques (CITES Management Authority of China *pers. comm.* to UNEP-WCMC, 2010). *Cistanche deserticola* occurs in protected areas such as Linhe County, Inner Mongolia, where collection has not been observed (PC17 Inf. 10).

According to Article 38 of the Forest Law and Article 20 of the Regulations on the Protection of Wild Plants, exports of any specimens of *C. deserticola* require an export permit issued by

the CITES Management Authority, and customs only clear the exports after examining the pertinent permit (CITES Management Authority of China *pers. comm*. to UNEP-WCMC, 2010). The controls are outlined in the 2006 Regulations on the Administration of the Import and Export of Endangered Wild Animals and Plants (http://www.bjreview.com/document/txt/2006-12/14/content_50707.htm). The CITES Management Authority and the General Administration of Customs have jointly developed and implemented the HS Commodity Catalogue of Import and Export on Wild Fauna and Flora, with 10-digit HS Codes relevant to specimens of CITES-listed species, which has greatly improved the supervision efficiency of Customs to the specimens of endangered species in international trade (CITES Management Authority of China *pers. comm*. to UNEP-WCMC, 2010).

In PC17 Inf. 10, it was reported that harvest of wild *C. deserticola* was banned in 2000 via a Notification of the State Council, though there were no restrictions on domestic use; however, Chen *et al.* (2002, cited PC17 Inf. 10) noted that harvesting was continuing in large quantities. According to Zhao *et al.* (2002, cited in PC17 Inf. 10), the use of wild Herba Cistanche to manufacture medicines was apparently prohibited through a formal Notification from the State Council by the Ministry of Health. It was noted that incorporation of this notification into the legislation of individual provinces was not automatic, and was thought to be ongoing (Zhao *et al.*, 2002, cited in PC17 Inf. 10). It was also reported that export of Category III species of the Regulations on the Management of Protection of Resources of Wild Medicinal Materials was subject to a quota system; however, there was no information located on the implementation of quotas for *C. deserticola* (PC17 Inf. 10).

Whilst population surveys have been conducted, no information on how the survey results relate to non-detriment findings for the export of wild specimens was provided. The level of exports from wild stocks in 2008 (201 kg of derivatives) may have represented less than 1% of available stocks reported for 2008 (906 tonnes). However, it remains unclear how international trade is affecting wild populations.

MONGOLIA

Distribution in range State: The species was reported to occur in the eastern Gobi Desert, Dzungariin Gobi, Alashan Gobi and Trans-Altai Gobi (Ligaa and Tsembel, 2003). The CITES Management Authority of Mongolia (*in litt*. to UNEP-WCMC, 2010) stated that according to Grubov (2001) it was recorded to occur in the following regions of 16 geobotanical zones (Figure 1): Mongolian Altai, Depressions of Great Lakes (Lake District), Valley of Lakes (Inter-Mountain Depressions), Eastern Gobi, Trans-Altai Gobi, Gashun Gobi, Black Saxaul Valley in Trans-Altai Gobi, and Western Dry Depression in Dzungarian Gobi, Bayan Zag and Ergiin Zag.

Figure 1. Distribution of *Cistanche deserticola* in Mongolia. Orange dots are *Cistanche deserticola*, Yellow areas are Saxaul forest distribution. (Source: CITES Management Authority of Mongolia *in litt*. to UNEP-WCMC, 2010)

Population trends and status: Batargal and Enkhbat (1998) reported that the species was categorized as Endangered in the Mongolian Red Data Book (Shiirevdamba *et al.*, 1997). The CITES Management Authority of Mongolia *in litt*. to UNEP-WCMC (2010) noted that the species status and trend was identified as a threatened species under the category of 'critically endangered'. It was reported that the population density in the Gobi Desert was "very low" (CITES Management Authority of Mongolia *in litt*. to UNEP-WCMC, 2010).

The Botanic Garden of Mongolia has carried out research on rare and native economic plants such as *Cistanche deserticola*, including distribution, biological and industrial use, restoration, ecological and economic aspects, an assessment scheme and production of an information file on its cultivation (Byambaa, 2006). No results of this research were located

Threats: Droughts over many years have led to a lack of soil moisture, and the growth of *Cistanche deserticola* has been degraded in Mongolia (CITES Management Authority of Mongolia *in litt*. to UNEP-WCMC, 2010). Illegal collection for medicinal use has reduced the extent of its distribution (CITES Management Authority of Mongolia *in litt*. to UNEP-WCMC, 2010).

Trade: According to data held in the CITES Trade Database, no trade has been reported in this species originating from Mongolia.

The CITES Management Authority of Mongolia (*in litt*. to UNEP-WCMC, 2010) reported that *Cistanche deserticola* has been collected illegally in Southern Gobi province, especially dried and fresh parts are sold in the black market in Dalanzadgad town. It was also noted that the price ranged from 2,000-2,500 tögrög (1 US$ = 1400 tögrög) per kg in 2006. The Gobiin Undur company in Dalanzadgad town had been found to be producing an alcoholic beverage using the species (CITES Management Authority of Mongolia *in litt*. to UNEP-WCMC, 2010). According to the Customs office report in 2008, 79 kg of *Cistanche deserticola* and in 2009, 171 kg were seized from illegal traders on the border (CITES Management Authority of Mongolia *in litt*. to UNEP-WCMC, 2010).

Mongolia has not published any export quotas for this species.

Management: Measures have been taken under the 1995 Mongolian Law on Natural Plants (www.mongolianriverresources.mn/DOWNLOAD/laws/Natural_Plants.pdf) in which the species is categorized as "Very Rare"), the Mongolian Law on Forests, the National Biodiversity Action Plan, National Action Plan for Special Protected Areas, Governmental Guidelines on Ecology, National Security and other relevant documents to conserve, restore and use in a sustainable manner the plant species of Mongolia. Conditions for 128 vascular and lower plant species to grow and reproduce naturally were maintained by including these species in the Mongolian Red Data Book. Furthermore, 40 per cent of habitats of more than 400 endangered or threatened plant species are covered by the protected areas network (Batjargal and Enkhbat, 1998).

The harvesting of 133 endangered species, including *Cistanche deserticola* is legally prohibited (Batjargal and Enkhbat, 1998). The CITES Management Authority of Mongolia (*in litt*. to UNEP-WCMC, 2010) noted that as *C. deserticola* is described as a Critically Endangered species under plant protection law in Mongolia, it is legally prohibited to collect the species from the wild for medical use. However, illegal collection has been reported (CITES Management Authority of Mongolia *in litt*. to UNEP-WCMC, 2010)

There has been no population monitoring of the species, and the CITES Management Authority of Mongolia (*in litt*. to UNEP-WCMC, 2010) noted that investigation of the natural resource and distribution should be undertaken as soon as possible.

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

Illegal offtake and export has been reported in Mongolia.

Jiang *et al.* (2009) noted that Herba Cistanche was 'officially' prepared from *Cistanche deserticola* or *C. tubulosa* and discussed the extent to which the 'unofficial' species, *C. salsa* and *C. sinensis* could be distinguished chromatographically. Xu *et al.* (2009) noted that *C. deserticola* had been indicated for several decades as the primary source material of the Herba Cistanche (Pharmacopoeia Commission of PRC 1963; 2005). However, other species of the genus have also been used as an adulterant. These alternative species, most of which have more diverse hosts, parasitize different plants. *C. tubulosa*, which parasitizes several kinds of *Tamarix* has its main distribution and cultivation area in southern Xinjiang. *C. salsa* which parasitizes *Kalidium* spp., *Nitraria* spp. and *Salsola passerina* is most similar to *C. deserticola* in its drug effect, but is smaller in size and is used in Japan. *C. sinensis*, which parasitizes *Reaumuria*, *Ammopiptanthus*, and *Potaninia* is only used locally (Xu *et al.*, 2009).

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Beccariophoenix madagascariensis Jumelle & Perrier, 1915: Madagascar

Palmae

Selection for Review of Significant Trade

Beccariophoenix madagascariensis was selected following the 14th Conference of the Parties at the 17th meeting of the Plants Committee (PC17) on the basis of trade data provided in document PC 17 Doc. 8.5.

A. Summary

Provisional category	Summary
Possible concern	Categorized as Critically Endangered and endemic to Madagascar, where the species has a restricted distribution. One population was reported to possibly contain 500 plants, but all others were thought to number less than ten individuals and a continuing population decline was projected. Main threats are felling for palm-heart, harvest of young leaflets for manufacture of 'Manarano' hats, timber harvest, collection of seeds and habitat destruction through mining and bush fires. International trade is predominantly in seeds, the collection of which does not directly affect remaining plants but may affect future regeneration. No information on the basis for non-detriment findings provided and the impact of trade unknown. Therefore, categorised as Possible Concern.

B. Species characteristics

Biology: *Beccariophoenix madagascariensis* was described as a solitary palm with a trunk 2-12 m high and up to 30 cm diameter, up to 30 leaves in the crown that are up to 5 m long, and inflorescence c. 120 cm, several per tree with ovoid fruit (Dransfield and Beentje, 1995). The leaf shape was said to be variable in different populations: those from East Ranomafana have distinctive juvenile leaves with the apex composed of many folds, marginally split into short lobes, and basally split to produce 'windows'. These plants were said to be especially sought after by palm enthusiasts (Shapcott *et al.*, 2007).

The habitat of the species was reported to vary in different areas: the northern populations around Mantadia were reported to occur in evergreen mountain ridge top forest 900-1200 m; those at East Ranomafana were found at lower elevations in the perhumid climate zone on lateritic soils; the southern populations were found to grow on white sand, with those around Tolanaro in littoral forest at c. 20 m, and the population at Vondrozo in lowland humid forest (Shapcott *et al.*, 2007).

C. Country review

MADAGASCAR

Distribution in range State: *B. madagascariensis* was reported to be endemic to Madagascar, where its distribution was said to be very fragmented, with only three subpopulations all near the east coast (CoP15 Prop. 32). In the north, the species was described from Analamazaotra, (18°56'S 48°25'E) Moramanga District, Toamasina Province by Jumelle and Perrier (1915). It was not recorded again in this area until November 1986 when Dransfield (1988) rediscovered it at Mantadia (18°49'S 48°27'E). The furthest north it has been recorded was at 18°19'79"S 48°57'80"E in 1998 (Conservation International Rapid Assessment Program Biodiversity Survey Database, 2010). Nearby, populations were found at East Ranomafana (Rakotoarinivo *et al.*, 2007; Shapcott *et al.*, 2007). In the south-east it was recorded in 1947 at Manentenina, near Ampasimena (24°22'S 47°10'E), Tolanaro District,

Toliara Province, and in 1992 from Sainte Luce (24°76'67"S 47°18'33"E), Tolanaro District (Dransfield and Beentje, 1995); it was also recorded at Mandena, Tolanaro (Lowry *et al.*, 2008). A new population was recently found close to the southern cluster, which has now become the largest known population (Shapcott *et al.*, 2007). Another recent find was in between the northern and southern cluster of localities, near Vondrozo at 22°81'99"S 47°32'E (Shapcott *et al.*, 2007). The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) noted that the species occurred in 11 localities (i.e. two more than detailed above); the total area of occurrence was given as 28731 km^2, and the area occupied as 1152 km^2. See Figure 1 for map of distribution.

Population trends and status: The species was categorized in 1988 as Critically Endangered in the IUCN Red List (Johnson, 1998). The listing is annotated to note that it requires updating.

Jumelle and Perrier (1915) described *B. madagascariensis* to be very rare around Analamazaotra because of exploitation for palm heart; within a radius of 30 km there were very few adult plants but an abundance of young plants. Shapcott *et al.* (2007) provided recent population figures: a total of 125 adult specimens were found at ten locations (this figure excludes the most recently discovered southern population), of which 100 were at Vondrozo, nine in the north and 16 in the south; the number of non-adult specimens was not counted at all locations but a total of 186 were found in five southern localities and the northern localities were found to have significant seedling populations indicating the potential for regeneration if left intact. The population at Mantenina had been reduced to a single seedling following burning.

Dransfield and Beentje (1995) noted that "At the last count there were less than 20 mature trees left in Mantady, as well as some 20 in the southern population on white sand, in an area threatened by strip-mining".

The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) stated that the number of adult plants fluctuated in different populations; it was estimated that there were 500 at Vondrozo, but that all the other populations had been reduced to less than ten plants at each; a future decline of 73% was predicted.

Threats: Many mature trees were reported to have been felled for their palm-heart, which was considered to be a great delicacy (Dransfield and Beentje, 1995). They also noted the threat of strip-mining (noted above), and that the young leaflets were much sought after for the manufacture of 'Manarano' hats, which were formerly exported in quantity; the timber was also used in house construction. The seeds were reported to be collected for export and, in some cases, collectors had apparently taken every seed they could find, making regeneration very difficult (CoP15 Prop. 32). It was also considered to be threatened by annual bush fires (*tavy*), by habitat destruction and by proposed ilmenite mining (CoP12 Prop. 60; CoP15 Prop. 32; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: *B. madagascariensis* was listed in CITES Appendix II on 13/02/2003. An annotation applicable to the species (#1) which exempted seeds, spores and pollen (including pollinia), seedlings or tissue cultures obtained *in vitro*, in solid or liquid media, transported in sterile containers and cut flowers of artificially propagated plants came into force on 13/09/2007. The annotation was amended at CoP15 to the following:

> "All parts and derivatives, except: a) seeds, (including seedpods of Orchidaceae), spores and pollen (including pollinia). The exemption does not apply to seeds from Cactaceae spp. exported from Mexico, and to seeds from *Beccariophoenix madagascariensis* and *Neodypsis decaryi* exported from Madagascar; b) seedling or tissue cultures obtained *in*

vitro, in solid or liquid media, transported in sterile containers; c) cut flowers of artificially propagated plants; d) fruits and parts and derivatives thereof of artificially propagated plants of the genus *Vanilla* and of the family Cactaceae; e) stems, flowers, and parts and derivatives thereof of naturalized or artificially propagated plants of the genera *Opuntia* subgenus *Opuntia* and *Selenicereus* (Cactaceae); and f) finished products of *Euphorbia antisyphilitica* packaged and ready for retail trade." This annotation came into force on 23/06/2010.

According to the CITES Trade Database, trade in *B. madagascariensis* from Madagascar 1999-2008 consisted mainly of wild-sourced seeds exported in 2005, 2007 and 2008. According to Madagascar, 202 seeds and 72.2 kg of seeds were exported during this period. According to the importers, 4,000 wild-sourced seeds were imported from Madagascar in 2005 and 2 kg of confiscated seeds were imported in 2003. Seeds of *B. madagascariensis* from Madagascar were subject to CITES controls from 13/02/2003 until 13/09/2007, when an exemption came into force, but have again been subject to the Appendix II listing since 23/06/2010.

In addition to seeds, the majority of which were exported to the United States for commercial purposes, Madagascar reported the export of a small number of dried plants and leaves for scientific purposes to the United Kingdom in 2004 and 2007.

Table 1. Direct exports of *Beccariophoenix madagascariensis* from Madagascar, 1999-2008. (No trade reported 1999-2002).

Source	Term	Units	Reported by	2003	2004	2005	2006	2007	2008	Total
I	seeds	kg	Exporter							
			Importer	2						2
W	dried plants	-	Exporter		4			2		6
			Importer							
	leaves	-	Exporter		39			1		40
			Importer							
	seeds	kg	Exporter			2		30.2	40	72.2
			Importer							
		-	Exporter			200		2		202
			Importer			4000				4000

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Madagascar has not published any export quotas for this species.

Management: The only populations that were reported to be under protection were those in protected areas: the species was reported to occur in Mantadia National Park, Analamazaotra-Périnet Special Reserve and Ranomafana National Park (Anon., 2010; CITES MA of Madagascar *in litt*. to UNEP-WCMC, 2010).

According to the CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010), wild plants may be harvested by plant operators approved by the Malagasy State. The amount harvested is determined by a meeting between the Board of Management of the Madagascar CITES Scientific Authority Flora and the operator. Approval of the amount requested by the operator is based on the Red List and CITES status, and the status of the species in the wild (CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

The CITES Management Authority (Rabesihanaka *pers. comm*. to UNEP-WCMC, 2010) confirmed that no action plans have been developed for this species.

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

None identified.

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Figure 1. Distribution of *Beccariophoenix madagascariensis*, based on information in the Distribution section above, Conservation International Rapid Assessment Program Biodiversity Survey Database (2010), Tropicos (2010).

Lemurophoenix halleuxii Dransfield, 1991: Madagascar

Palmae, red-lemur palm

Selection for Review of Significant Trade

Lemurophoenix halleuxii was selected for review following the 14th Conference of the Parties at the 17th meeting of the Plants Committee (PC17 WG4 Rev. 1). The selection was made on the basis of trade data presented in document PC17 Doc 8.5.

A. Summary

Provisional category	Summary
Possible Concern	Endemic to Madagascar. The species is categorised as Endangered and is currently known from only three fragmented populations in five locations. It occurs within several protected areas. Main threats are deforestation and collection of seeds for trade. Madagascar reported the export of over 8,000 seeds during 2005-2008, plus over 100 kg of seeds, all of wild origin. No information on the basis for a non-detriment finding was provided, and on the basis of considerable numbers of seeds reported in international trade, categorised as Possible Concern.

B. Species overview

Biology: *Lemurophoenix halleuxii* was described as a large-sized palm of the forest canopy, with solitary stems to 20 m tall and c. 1 m diameter at the base that is restricted to tropical rainforest habitat (Anon., 2010a). The inflorescence, to 2 m long, is held below the crownshaft and has over 100 flower-bearing branches (Anon., 2010a). The fruit type is unique in Madagascar to this genus and is distinct due to its relatively large size (50 mm in diameter) and covering of low brown corky warts (Anon., 2010a). Ripe fruit is reported to "accumulate in large numbers under trees (unless harvested by seed collectors), suggesting that there is little, if any, effective dispersal" (Anon., 2010a).

C. Country review

MADAGASCAR

Distribution in range State: Endemic to Madagascar, the species was reportedly known from three small fragmented populations on hills surrounding the Bay of Antongil in the northeast of the country (Anon., 2010a). It was described from specimens collected on 23 October 1986 from a steep-sided valley below a long ridge leading eastwards from the village of Sahavary, northeast of Maraontsetra (15°31'99"S 49°88'E) (Dransfield, 1991) (see Figure 1 for map of distribution). It was subsequently discovered in a deep valley further south on the Masoala Peninsula (Dransfield and Beentje, 1995).

The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported occurrence of the species at Mananara Avaratra and Maraontsetra (both on the Bay of Antongil in the northeast) at altitudes between 200 and 700 m. They also noted that the total area of occurrence of the species was 1,729 km² and that the area occupied by the species was 300 km², with the species occurring at five localities in three subpopulations.

Figure 1. Distribution of *Lemurophoenix halleuxii* **(based on information in the Distribution section above.**

Population trends and status: In 1998, the species was categorised as Endangered in the IUCN Red List (Dransfield and Beentje, 1998), but the listing is annotated as in need of updating (IUCN, 2010).

At the Sahavary site there were about 30 mature individuals and 20 juveniles in various stages of development; seedlings were very scarce (Dransfield and Beentje, 1995). At the second site, there was only a single mature tree (Dransfield and Beentje, 1995). The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) predicted a future decline of 33%.

Threats: The CITES Management Authority of Madagascar (*in litt*. to UNEP-WCMC, 2010) described the main threats to the species as deforestation and collection of seeds for trade. Anon. (2010a) reported that seed collection, even within protected areas was a threat, and noted that in the past felling of trees for the edible palm hearts had occurred.

Trade: All trade data held within the CITES Trade Database involved specimens of wild origin exported directly from Madagascar from 2005-2008 (Table 1). Apart from six live specimens exported for personal purposes in 2006 and one dried plant exported for scientific purposes in 2008, the remaining trade involved seeds reported either as number or by weight (kg). The United States was the main importer with 8,000 seeds reported imported in 2005 and 3.8 kg seeds in 2006 (although reported by the United States as 3,800 kg) for commercial purposes and 20 seeds for personal purposes, plus 100 kg of seeds in 2007.

Table 1. Direct exports of *Lemurophoenix halleuxii* from Madagascar, 1999-2008. All trade was in wild-sourced specimens. (No trade was recorded prior to 2005).

Term	Units	Reported by	2005	2006	2007	2008	Total
dried plants	-	Exporter				1	1
		Importer					
live	-	Exporter		6			6
		Importer					
seeds	kg	Exporter		3.8	100	0.146	103.946
		Importer		3800	100		3900
	-	Exporter	8010	20			8030
		Importer	8000				8000

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Madagascar has not published any export quotas for this species.

Management: There are no specific conservation measures in place for the species (Anon., 2010a), but *L. halleuxii* occurs within the Masoala National Park, Mananara-Nord National Park and Makira Reserve (Anon., 2010b; CITES Management Authority of Madagascar, *in litt.* to UNEP-WCMC, 2010).

The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that in general, wild plants may be harvested by plant operators approved by the Malagasy State. The amount harvested is determined by a meeting between the Board of Management of the Madagascar CITES Scientific Authority Flora and the operator. Approval of the amount requested by the operator is based on the IUCN Red List category, the CITES Appendix and the status of the species in the wild (CITES Management Authority of Madagascar, *in litt.* to UNEP-WCMC, 2010).

The sites have been monitored in the past (Dransfield and Beentje, 1995), but no information about current monitoring has been located.

The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) did not provide any information on non-detriment findings for this species and confirmed that there is no action plan currently in place for *Lemurophoenix halleuxii* (Rabesihanaka *pers comm.* to UNEP-WCMC, 2010).

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

None identified.

E. References

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Marojejya darianii Dransfield & Uhl, 1984: Madagascar

Palmae

Selection for Review of Significant Trade

Marojejya darianii was selected following the 14th Conference of the Parties at the 17th meeting of the Plants Committee (see PC17 WG4 Rev. 1). The selection was based on trade data presented in document PC17 Doc. 8.5.

A. Summary

Provisional category	Summary
Urgent concern	*M. darianii* is endemic to Madagascar and is categorized by the IUCN as Critically Endangered. It may be limited to only eight localities. The species is threatened by habitat degradation, cutting for palm heart and collection of seeds for trade. International trade is predominantly in seeds, the collection of which does not directly affect remaining plants but clearly will affect future regeneration. No information on the basis for non-detriment findings provided, and any trade is likely to impact the population, therefore categorized as Urgent Concern.

B. Species overview

Biology: *Marojejya darianii* was described as a solitary, medium-sized (8-15 m tall, 15-35 cm diameter) tree palm, with 18-30 entire leaves in the crown, which are 3.5-5 m long; seed obovoid, 20-23 x 12-15 x 10-12 mm, the surface covered with deep grooves (Dransfield and Beentje, 1995). The habitat at one known site (Sahavary) was reported to be peaty upland swamp on flat terrain in a broad valley bottom at 400-450 m; at another (Iketra), the species was recorded to occur on flat terrain, but in very narrow valley bottoms, and at Betampona, the plants were mainly reported to grow on flat terrain close to a stream in slightly degraded primary rain forest (Britt *et al.*, 2004). Several young plants were found growing amongst scrubby vegetation on previously cleared land at the forest edge (Britt *et al.*, 2004).

C. Country review

MADAGASCAR

Distribution in range State: The species is endemic to Madagascar. It was described from hills above Sahavary, near Maraontsetra (15º31'99"S 49º87'E) (Dransfield and Uhl, 1984). It was also collected 10 km north of Sahavary in 1989 (Dransfield and Beentje, 1995). Another two populations were discovered by Philip Guillery of Projet Masoala near to Iketra, also on the Masoala peninsula. In 2005, it was collected near the east coast of the Masoala Peninsula (15º 29'50"S 50º 24'59"E) by Jao Aridy *et al.* (Tropicos, 2010). A further population was discovered in the Réserve Naturelle Intégrale No. 1, Betampona, around 40 km northwest of the city of Toamasina (Britt *et al.* 2004). There were also several specimens from other localities around Toamasina collected by M. Rakotoarinivo: south of Toamasina at 18°81'99"S 49°07'E (Missouri Botanical Garden Tropicos Specimen Database, 2010); west of Toamasina at 18°19'S 48°93'E, and north of Toamasina at 17°7'S 49°46'E (Royal Botanic Gardens Kew, 2010). The Madagascar CITES Management Authority (*in litt.* to UNEP-WCMC, 2010) noted that the species occurred in eight localities; the total area of occurrence was given as 13,304 km², and the area occupied was 1,575 km². See Figure 1 for a map of distribution.

Population trends and status: The species was classified by the IUCN in 1998 as Critically

Endangered (Dransfield and Beentje, 1998). However, this classification is annotated to indicate that it requires updating.

At the type locality, the population was estimated to be 50 mature individuals in 1986. At Iketra, one colony consisted of two mature and a few immature individuals, and the other colony consisted of 20+ mature individuals and an abundance of juveniles and seedlings in 1996 (Britt and Dransfield, 2004). At Betampona, eight mature individuals and numerous young plants were located in 2002 (Britt *et al.*, 2004). The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) predicted a future decline of 37% for the species.

Threats: The species was said to be threatened by cutting for palm heart, at least in the locality near Iketra in the Masoala National Park (Britt *et al.*, 2004). It was also reported to be subject to habitat degradation in all localities and threatened by collection of seeds for trade (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: *M. darianii* was listed in CITES Appendix II on 13/02/03. According to the CITES Trade database, Madagascar reported the export of over 34 kg of seeds, six dried plants, two seeds and one leaf during 1999-2008, with no trade prior to 2004 (Table 1). However, during the same period, imports of over 1,225 kg of wild seeds of the species from Madagascar were reported by importers. Seeds were primarily traded for commercial purposes, yet other derivatives were reported exported for scientific purposes. In addition, Madagascar reported exports of 46 live artificially propagated specimens in 2004 (Table 1).

Table 1. Direct exports of *Marojejya darianii* from Madagascar, 1999-2008. (No trade was reported prior to 2004, following the species listing in Appendix II in 2003.

Source	Term	Units	Reported by	2004	2005	2006	2007	2008	Total
A	live	-	Exporter	46					46
			Importer	46					46
W	dried plants	-	Exporter				4	2	6
			Importer						
	leaves	-	Exporter				1		1
			Importer						
	seeds	kg	Exporter		0.167	34.245		0.021	34.433
			Importer		0.167	1225.044			1225.209
		-	Exporter				2		2
			Importer						

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Madagascar has not published any export quotas for this species.

Management: The species was reported to be not legally protected, and most localities were outside protected areas; however, one site was said to lie within Masoala National Park (Britt *et al.*, 2004) and others in Betampola Integral Natural Reserve and Mangerivola Special Reserve (Anon., 2010; CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010). The CITES Management Authority confirmed that there is no action plan currently in place for *Marojejya darianii* (Rabesihanaka *pers. comm.* to UNEP-WCMC, 2010).

The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that in general, wild plants may be harvested by plant operators approved by the Malagasy State. The amount harvested is determined by a meeting between the Board of Management of the Madagascar CITES Scientific Authority Flora and the operator. Approval of the amount requested by the

operator is based on the Red List and CITES status and the status of the species in the wild (CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

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

None identified.

E. References

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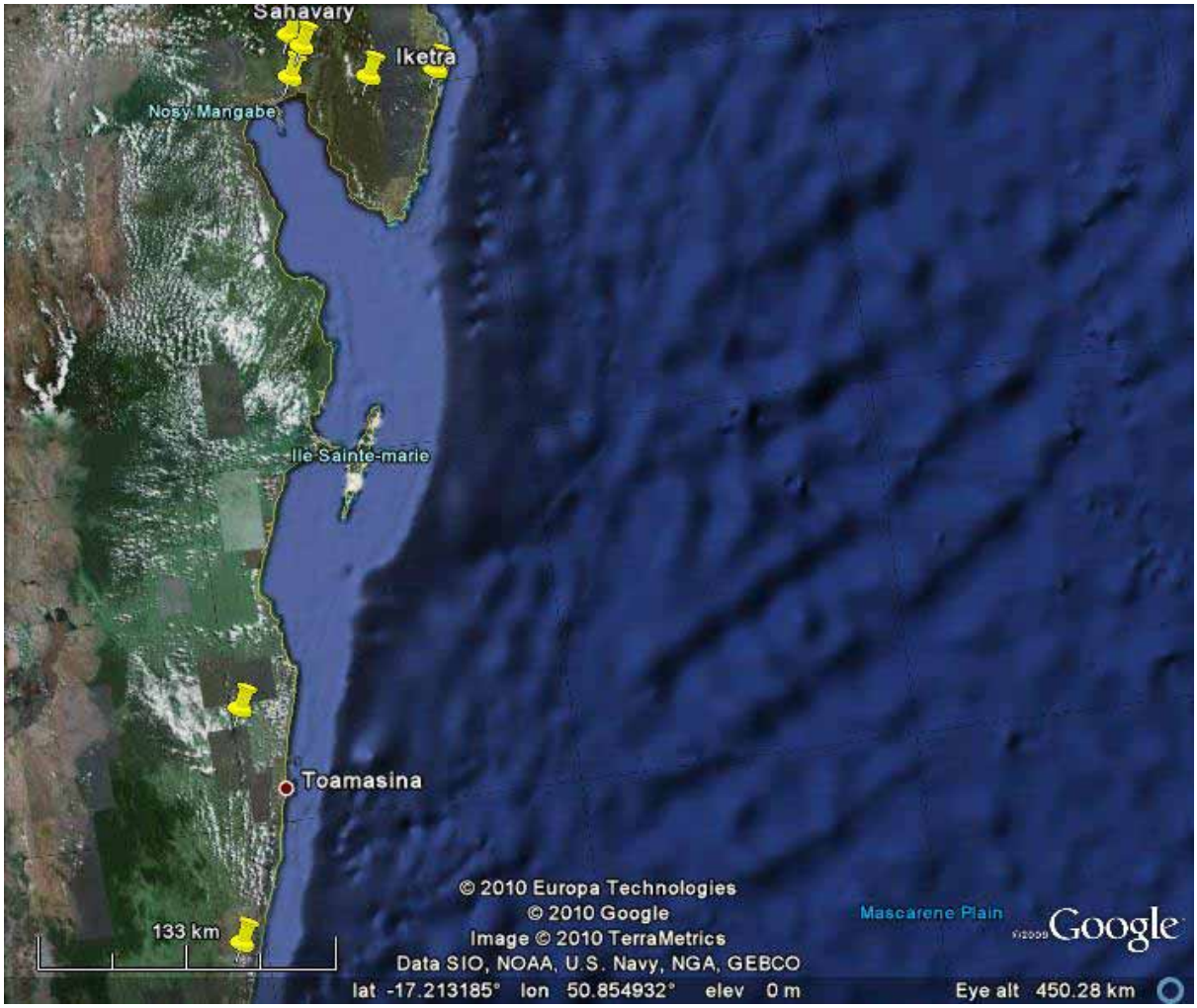

Figure 1. Distribution of *Marojejya darianii* (based on information in the Distribution section above).

Ravenea rivularis Jumelle & H. Perrier, 1913: Madagascar

Arecaceae, Majesty palm

Selection for Review of Significant Trade

Ravenea rivularis was selected following CoP14 at PC17 (PC17 WG4 Rev. 1) based on trade data presented in document (PC17 Doc. 8.5).

A. Summary

Provisional category	Summary
Possible Concern	Endemic to Madagascar, where the distribution of the species is restricted. Categorized as Vulnerable and most populations occur outside of protected areas and therefore have no legal protection. Main threats are considered to be mineral exploitation and collection of seeds for trade. International trade is predominantly in seeds, which was reported at relatively high levels. The collection of seeds does not directly affect remaining plants but may affect future regeneration. Future declines have been projected by the Madagascan CITES Management Authority. However, no information on the basis for non-detriment findings provided and the impact of trade unknown. Therefore, categorized as Possible Concern.

B. Species overview

Biology: *Ravenea rivularis* was described as a large palm (5-22 m tall, 36-50 cm diameter), leaves 16-25, 1.2-1.7 m long, and fruit bright red, globose to slightly ellipsoid, 7.5-9 x 7-8.5 mm, 1-seeded. It was reported to grow in shallow standing water on riverbanks, swampy valley bottoms, either in deciduous forest or in gallery forest; 350-1000 m; gregarious, often forming stands (Dransfield and Beentje, 1995). No information on the number of fruits per plant or frequency of fruiting was located.

C. Country review

MADAGASCAR

Distribution in range State: *Ravenea rivularis* was reported to be endemic to Madagascar (Dransfield and Beentje, 1998).

The species was described from Manera, Androy Region, Toliara Province based on a collection made in 1924 by Perrier (Jumelle and Perrier, 1913). Perrier also collected it at 22°42'S 45°28'E on the upper Imaloto River, Ihorombe Region, Fianarantsoa Province (Missouri Botanic Garden Tropicos Specimen Database, 2010). In 1992 it was collected from two further localities in Ihorombe Region: Ilakaka (22°7'S 45°23'E), and a site 40 km E of Ranohira (22°82'S 45°12'E) (Royal Botanic Gardens Kew, 2010). It was also photographed at Ankazomarefo, near the Zombitse Forest, Toliara Province (Dransfield and Beentje, 1995). The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) estimated the area of occurrence as 2088 km^2 and the area occupied as 434 km^2; they gave the number of localities as four, but named only three: Isalo, Ilakaka and Sakalama, the last apparently additional to the above. See Figure 1 for a map of distribution records.

Population trends and status: According to the CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010), the total number of individuals in the wild was not known. The species was categorized as Vulnerable in the IUCN Red List (Dransfield and Beentje, 1998). This classification is annotated to indicate that it requires updating.

Dransfield and Beentje (1995) noted that some 60 trees were seen in two populations but did not name the populations. The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) estimated a future decline of 80%.

Threats: The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) considered mineral exploitation at Ilakaka, and collection of seeds for trade to be the main threats to the species. In CoP12 Prop. 12.60, it was noted that the region in which the species occurs "has been suffering rapid and irreversible degradation owing to unbridled prospecting for sapphires, and the bush fires which race through the savannas every year".

Trade: *R. rivularis* was listed in CITES Appendix II on 13/02/2003. According to the CITES Trade Database, all trade in *R. rivularis* from Madagascar 2003-2008 (Table 1) involved wild collected specimens and mainly related to seeds exported to the United States of America. Madagascar reported the export of around 19,000 kg of seeds 2003-2008, while the importers reported the import of around 22,000 kg of seeds during this period.

Table 1. Direct exports of *Ravenea rivularis* from Madagascar, 1999-2008. All trade was in wild-sourced specimens (No trade reported prior to the species listing in Appendix II in 2003).

Term	Units	Reported by	2003	2004	2005	2006	2007	2008	Total
Live	-	Exporter							
		Importer		3					3
Seeds	kg	Exporter	1500		3475	1350	8925	3675	18925
		Importer	1500	4058	3475	4570	4925	3575	22103

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Madagascar has not published any export quotas for this species.

Management: The species was reported to not be legally protected in Madagascar (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010. It was reported to occur just within the limits of Isalo National Park (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

The CITES Management Authority confirmed that there is no action plan currently in place for *Ravenea rivularis* (Rabesihanaka *pers. comm.* to UNEP-WCMC, 2010). The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) reported that in general, wild plants may be harvested by plant operators approved by the Malagasy State. The amount harvested was reported to be determined by a meeting between the Board of Management of the Madagascar CITES Scientific Authority Flora and the operator. Approval of the amount requested by the operator was reportedly based on the Red List and CITES status and the status of the species in the wild (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

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

None identified.

E. References

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Figure 1. Distribution of *Ravenea rivularis* (based on information in the Distribution section above.

Satranala decussilvae Dransfield & Beentje, 1995: Madagascar

Palmae

Selection for Review of Significant Trade

Satranala decussilvae was selected for review following the 14th Conference of the Parties at the 17th Plants Committee meeting (PC17 WG4 Rev. 1) on the basis of trade data provided in PC17 Doc. 8.5. Madagascar responded to the Secretariat's request for information on implementation of Article IV (PC18 Doc. 8.4); however, the Plants Committee recommended that the species continued in the Significant Trade Review process.

A. Summary

Provisional category	Summary
Possible Concern	Endemic to Madagascar, where the species has a restricted distribution, with few remaining adults in the wild. Categorised by the IUCN as Endangered. Most localities are within the boundaries of protected areas. The collection of seeds for trade is one of the main threats to the species, in addition to leaf collection for roofing and habitat destruction through deforestation and mineral exploitation. Moderate levels of international trade were reported since 2005. Whilst seed collection does not directly affect remaining plants, it will impact future regeneration. Future declines have been projected by the Madagascan CITES Management Authority. No information on the basis for non-detriment findings provided, and on this basis, categorised as Possible Concern.

B. Species overview

Biology: "A solitary tree palm, 8-15 m tall, and 15-18 cm in diameter. Leaves 20-24 in the crown, fan-like, blade 110-180 cm long and 240-260 cm wide, with 54-57 segments. Fruit globose to ovoid, to 5.6 x 5 cm, epicarp smooth, purple-black, shiny; seed 30 x 32 mm. At Mananara Avaratra it grows in wet forest on shallow soils overlying ultramafic rock, in a steep-sided valley rich in pandans and palms, at 250-285 m" (Dransfield and Beentje, 1995a). Ravololonanahary (1999) reported that seedlings were always found close (i.e. within a few meters) to a mature female plant, which the author presumed to be their mother, suggesting that dispersal is poor in this species. The poor seed dispersal observed was thought to support the theory that the seeds of this species were once dispersed by the now extinct *Aepyornis* (a large flightless bird) (Dransfield and Beentje 1995b).

C. Country review

MADAGASCAR

Distribution in range State: *S. decussilvae* was reported to be endemic to Madagascar (Dransfield and Beentje, 1995a).

The species was described from Mananara Avaratra, Analanjirofo Region, Toamasina Province (16°43'S 49°83'E) from a specimen collected in 1991 (Dransfield and Beentje, 1995a; 1995b). It was subsequently collected from four localities in Masoala National Park and from four localities to the south of the type locality (Missouri Botanical Garden Tropicos Specimen Database, 2010; Royal Botanic Gardens Kew, 2010). The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010) stated that the species occurred at seven localities, of which they named five: Soanierana Ivongo, Ampotaka and at localities in the eastern and western parts of Masoala National Park; the total area of occurrence was given as 3248 km², and the area occupied as 700 km². Figure 1 provides a map of distribution records.

Population trends and status: The species was categorized as Endangered by the IUCN (Dransfield and Beentje, 1998). Dransfield and Beentje (1995b) noted 30 trunked trees, 40 young ones and many seedlings at Mananara Avaratra in 1984. Ravololonanahary (1999) considered the species to be "somewhat threatened" in the Ianobe valley (Masoala Park), where the author located eight sub-populations scattered over an area of ca. 100 km², with populations often isolated from their nearest neighbour by several kilometers. According to Ravololonanahary (1999), 616 plants were counted, most of which were in the smallest size-classes; only 44 mature plants were recorded, of which 70.5% were male and only two fertile plants were seen. The CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010) recorded about 60 adult trees at Soanierana Ivongo, with less than 30 at the other localities and they predicted a future decline of 40% in populations of the species.

Threats: Main threats were reported to include deforestation, mineral exploitation at Ampotaka, use of leaves for roofing, collection of seeds for trade (CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010) and exploitation of palm hearts (Ravololonanahary, 1999).

Trade: *S. decussilvae* was listed in CITES Appendix II on 13/02/2003. According to the CITES Trade Database, the majority of the trade in *S. decussilvae* reported by Madagascar 1999-2008 involved wild-sourced seeds (207 kg of seeds and 10 seeds) exported 2005-2008 (Table 1). The majority of these seeds were exported to the United States of America for commercial purposes. During the same period, importers reported the import of 94 kg of seeds and 200 seeds.

Table 1: Direct exports of *Satranala decussilvae* from Madagascar, 1999-2008. All trade was in wild-sourced specimens. (No trade reported prior to 2005. The species was listed in Appendix II in 2003).

Term	Units	Reported by	2005	2006	2007	2008	Total
dried plants	-	Exporter				1	1
		Importer					
live	-	Exporter		6			6
		Importer					
seeds	kg	Exporter	0.09	205	0.18	1.75	207.02
		Importer			94		94
	-	Exporter	10				10
		Importer	200				200

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Madagascar has not published any export quotas for this species.

Management: The species is not legally protected, but it was reported to occur in Masoala and Mananara-Nord National Parks (Tropicos, 2010; CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010). The CITES Management Authority confirmed that there is no action plan currently in place for *Satranala decussilvae* (Rabesihanaka *pers. comm*. to UNEP-WCMC, 2010).

According to the CITES MA of Madagascar (*in litt*. to UNEP-WCMC, 2010), wild plants may be harvested by plant operators approved by the Malagasy State. The amount harvested is reportedly determined by a meeting between the Board of Management of the Madagascar CITES Scientific Authority Flora and the operator. Approval of the amount requested by the operator was reportedly based on the Red List category, CITES listing, and the status of the species in the wild (CITES MA of Madagascar, *in litt*. to UNEP-WCMC, 2010).

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

None identified.

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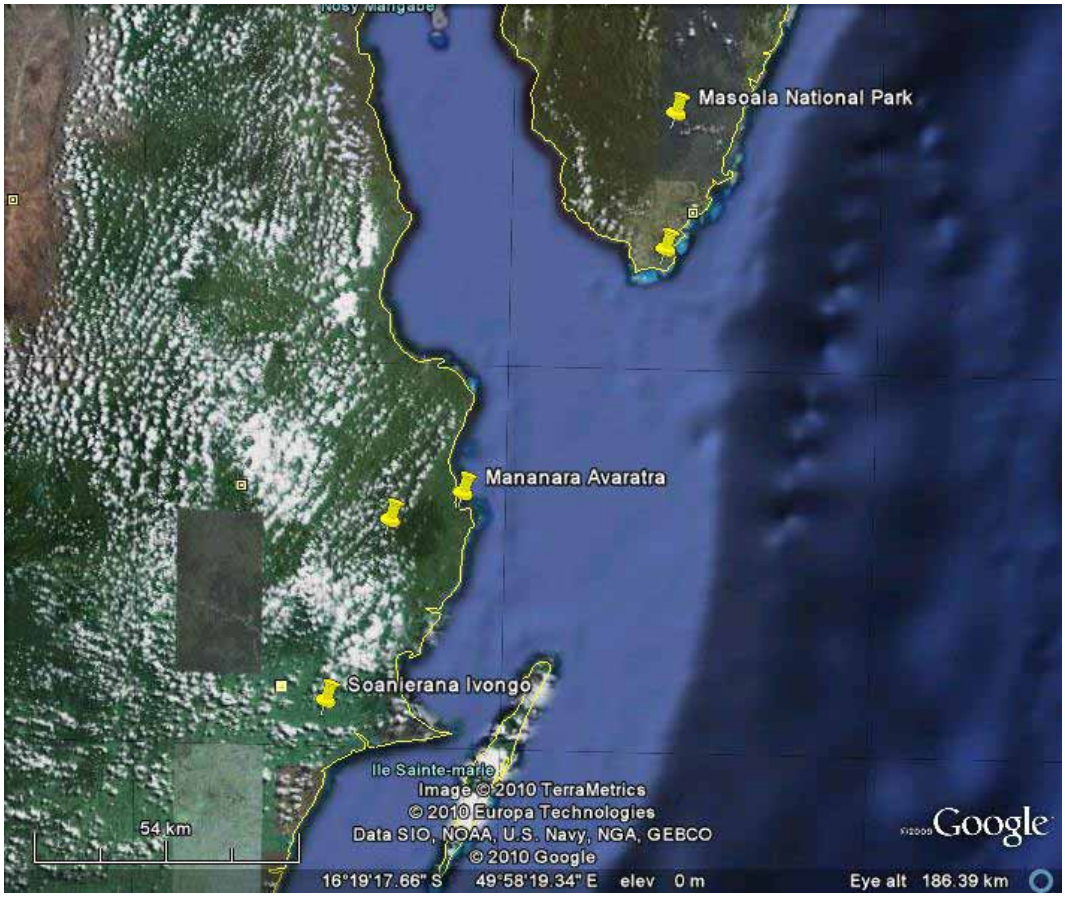

Figure 1. Distribution of *Satranala decussilvae* (based on information in the Distribution section above.

Voanioala gerardii Dransfield, 1989: Madagascar

Palmae, Forest coconut

Selection for Review of Significant Trade

Voanioala gerardii was selected for review following the 14th Conference of the Parties at the 17th meeting of the Plants Committee (PC17) on the basis of trade data provided in document PC17 Doc. 8.5. Madagascar has previously been subject to a country based review, and as part of that process a research proposal was submitted to Conservation International to cover a study on *V. gerardii* (PC17 Doc 8.2). Madagascar responded to the Secretariats' request for information on implementation of Article IV (PC18 Summary record, Annex 2; PC18 WG3 Doc. 1).

A. Summary

Provisional category	Summary
Possible Concern	*V. gerardii* is endemic to Madagascar and restricted to the north-east, with few remaining adults in the wild. The IUCN Red List assessment (1998) categorized the species as Critically Endangered. Main threats are deforestation, mineral exploitation, palm heart exploitation and collection of seeds for trade. Relatively high levels of international trade were reported 1999-2008 originating from Madagascar; however no commercial exports have been reported since 2005. No information on the basis for a non-detriment finding was provided, and impacts of trade unknown, therefore categorised as Possible Concern.

B. Species overview

Biology: A robust, solitary unarmed monoecious tree palm, 15-20 m tall, about 35 cm in diameter, but with a large basal root boss about 1 m in diameter. There about 15-20 leaves in the crown, which are about 5 m long. The ripe fruit is rich red-brown, 7-8 x 4-5 cm, covered with dense chestnut-brown scaly indumentum, one-seeded, somewhat irregularly ellipsoid; seed irregularly ellipsoid, 4 x 2 cm (Dransfield and Beentje, 1995). In the type locality the species was reported to grow in primary forest rich in palms and pandans in a swampy valley bottom and on gentle slopes at about 400 m (Dransfield and Beentje, 1995). Little appears to be known about the natural history of the species, however ripe fruit was reported to accumulate in large numbers under trees (if not collected) suggesting absence of effective dispersal (Dransfield and Rakotoarinivo, 2010).

C. Country review

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Distribution in range state: The species is endemic to Madagascar, where it was reportedly confined to the north-east, with a very small number of populations around Antongil Bay (Dransfield and Beentje, 1995). It was described from specimens collected on the Masoala Peninsula inland from Antalavia, Sava Region, Antsiranana Province, at 15°77'S 50°05'E and 15°78'S 50°02'E in October 1986 (Dransfield, 1989a; 1989b; 1992). It was recorded again in this area in April 1987 by Schatz and Suzon (Tropicos, 2010), and nearby at 15°76'S 50°04'E in May 2008 (Tropicos, 2010). In November 1989 it was recorded from two sites further north in the Masoala National Park: 15°64'S 49°97'E (NMNH Botany Collections, 2010) and 15°48'S 50°15'E (Tropicos, 2010), and in May 2005 it was recorded at 16°38'S 49°72'E near Mananara Avaratra, Analinjorofo Region, Toamasina Province (Tropicos, 2010), and in September 2005 at 15°93'S 49°53'E NW of Mananara Avaratra (Royal Botanic Gardens Kew, 2010). See

Figure 1 for a map of distribution.

Population trends and status: *V. geradrii* was categorized as Critically Endangered by the IUCN (Dransfield and Beentje, 1998). However this classification is annotated to indicate that it requires updating. Dransfield and Beentje (1995; 1998) knew of less than ten trees of this species in the wild. The CITES Management Authority of Madagascar (*in litt.* to UNEP-WCMC, 2010), with information available from additional localities, reported that there were less than 25 adult individuals. Three of the circa ten known mature trees at the type locality were reportedly felled for palm heart in 2003, and only one remaining mature palm was seen by Dransfield and Rakotoarinivo (2010).

Threats: Deforestation, mineral exploitation, cutting for palm hearts (see above), and collection of seeds for trade were reported to be the main threats (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

Trade: *V. gerardii* was listed in CITES Appendix II on 13/02/2003. According to data within the CITES Trade Database, reported trade in this species mainly involved seeds from wild-collected sources. Madagascar reported the export of 9120 live wild seeds, the majority of which were reported exported in 2005 to the United States of America for commercial purposes (Table 1). However, the United States reported only 4800 as imports (Table 1). No exports for commercial purposes have been reported since 2005. Madagascar reported exports of ten seeds to the United States for personal purposes in 2006; 162 gm of seeds to Switzerland for scientific purposes in 2007, and one dried plant to Switzerland for scientific purposes in 2008.

Madagascar has not published any export quotas for this species.

Table 1: Direct exports of *Voanioala gerardii* from Madagascar, 1999-2008. All trade was in wild-sourced specimens

Term	Units	Reported by	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
dried plants	-	Exporter										1	1
		Importer											
seeds	g	Exporter									162		162
		Importer											
	-	Exporter							9110	10			9120
		Importer							4800				4800

Source: CITES Trade Database, UNEP-World Conservation Monitoring Centre, Cambridge, UK

Management: The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) did not mention any legal protection measures for this species and confirmed that there is no action plan currently in place for *Voanioala gerardii* (Rabesihanaka *pers. comm.* to UNEP-WCMC, 2010). It was reported to occur in the Masoala National Park (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010), and in Mananara-Nord National Park (Anon., 2010).

According to the CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010), wild plants may be harvested by plant operators approved by the Malagasy State. The amount harvested is determined by a meeting between the Board of Management of the Madagascar CITES Scientific Authority Flora and the operator. Approval of the amount requested by the operator was reported to be based on the IUCN Red List category, CITES listing and the status of the species in the wild (CITES MA of Madagascar, *in litt.* to UNEP-WCMC, 2010).

The CITES MA of Madagascar (*in litt.* to UNEP-WCMC, 2010) did not provide any information on population monitoring or the basis for non-detriment findings.

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

None identified.

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Figure 1. Distribution of *Voanioala gerardii* (based on information in the Distribution section above.