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

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Sustainable management and scientifically based non-detriment findings

MAKING A NON-DETRIMENT FINDING FOR *SWIETENIA MACROPHYLLA*; QUOTA SETTING

1. This document has been prepared by a consultant under contract with the CITES Secretariat.

INTRODUCTION

2. The primary aim of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is to protect listed species against over-exploitation caused by international trade and to ensure that this trade is sustainable. Determining when international trade is likely to be non-detrimental to the survival of a species is essential to achieving the aims of the Convention. Article IV of CITES sets out provisions for regulation of trade in specimens of species included in Appendix II of the Convention. Article IV, paragraph (2) states that:

> *The export of any specimen of a species included in Appendix II shall require the prior grant and presentation of an export permit. An export permit shall only be granted when the following conditions have been met:*
>
> *(a) a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species;*
>
> *(b) a Management Authority of the State of export is satisfied that the specimen was not obtained in contravention of the laws of that State for the protection of fauna and flora.*

3. The Scientific Authority of the exporting country is thus charged with making a non- detriment finding (NDF) for a species listed in Appendix II prior to the granting of an export permit by the Management Authority. The extent to which Scientific Authorities implement this requirement of the Convention is variable. This partly results from a lack of information regarding how an NDF is undertaken in practice as this is the remit of range States. For timber tree species listed on CITES, no guidance for making NDFs has been developed. The recent listing of big leaf mahogany *Swietenia macrophylla* on Appendix II of CITES therefore represents a new challenge in developing NDFs.

4. The text of the Convention indicates that a non-detriment finding should be made for each export. This is, however, not always necessary. Many countries have voluntarily established annual export quotas. Such a quota means that the country concerned has determined that the export of a certain amount of specimens per year will not be detrimental to the survival of the species. In such cases, the Management Authority does not need to consult the Scientific Authority for each export, although it should have consulted the Scientific Authority before it established an export quota.

5. This paper aims to address the different aspects involved in making a NDF for *Swietenia macrophylla* and to provide advice for range States wishing to export mahogany in accordance with the Convention.

THE ROLE OF THE SCIENTIFIC AUTHORITY

6. As outlined above one of the responsibilities of the Scientific Authority in an exporting country is to make NDFs for CITES Appendix II species, prior to authorization of export by the Management Authority. There is furthermore one other paragraph in Article IV of the Convention that is essential for the functioning of the Scientific Authority, and that is paragraph (3). This task is probably the most frequently ignored one by any of the Parties to the Convention.

7. The text of the paragraph is as follows:

> *A Scientific Authority in each Party shall monitor both the export permits granted by that State for specimens of species included in Appendix II and the actual exports of such specimens. Whenever a Scientific Authority determines that the export of specimens of any such species should be limited in order to maintain that species throughout its range at a level consistent with its role in the ecosystems in which it occurs and well above the level at which that species might become eligible for inclusion in Appendix I, the Scientific Authority shall advise the appropriate Management Authority of suitable measures to be taken to limit the grant of export permits for specimens of that species.*

8. Although it may sometimes be difficult to determine what "consistent with its role in the ecosystems in which it occurs" really means, the purpose of this paragraph is clear: to avoid a species becoming eligible for inclusion in Appendix I as a result of non-sustainable exports. If there is a danger that the magnitude of exports over time is such that the species may be reduced to a level which compromises its role in the ecosystem or it may become eligible for Appendix I, the Scientific Authority has to advise the Management Authority of suitable measures to limit the grant of export permits. Such measures could include reductions in quotas, or halting exports altogether

9. The Scientific Authority is thus required to ensure that an Appendix-II species is managed in such a way as to allow exports on a sustained basis that will not damage the conservation status of the species or its ecological functioning. The management regime for a species may or may not be the responsibility of the Scientific Authority. In the case of mahogany *Swietenia macrophylla* it is likely that the Government agency with responsibility for forest resources will be responsible for implementation of policy relating to management of mahogany stocks.

10. Verification of the legality of harvesting is the responsibility of the CITES Management Authority. Ideally an integrated approach linking the determination of an NDF with checks of the legal status of timber consignments should be developed. The Management Authority must also provide the Scientific Authority with the details on actual exports, so that the Scientific Authority can evaluate the situation and propose appropriate measures where necessary.

THE REVIEW OF SIGNIFICANT TRADE

11. Since the early days of the Convention, Parties have expressed concern that export permits may be granted for Appendix II species to enter trade without the benefit of effective NDFs. Over the years, a process called the Review of Significant Trade has evolved to ensure that the Parties can be confident that the provisions of Article IV are being met and that any trade is sustainable. The Review of Significant Trade process is established in Resolution Conf. 12.8.

12. Both the Animals and Plants Committees of CITES have a specific mandate to identify Appendix II species that are subject to significant levels of trade. To do so they are required to consult with range States, the CITES Secretariat and experts to review and assess relevant biological and trade information. If necessary, they can make recommendations for action by the range State with time limits for their implementation to ensure compliance with Article IV. The result of the Significant Trade Review process generally removes the need for importing countries to apply stricter domestic measures (such as import bans or externally-imposed export quotas for range states) on a unilateral basis. It should also ensure that Appendix I listing for the species is not considered necessary.

13. The process can result in punitive or corrective measures, including trade restrictions or bans, where there are problems with the implementation of the provisions of Article IV in particular range States. However, individual exporting countries can also receive assistance to undertake field studies as well as to develop the technical and administrative capacity necessary to implement the requirements of Article IV if these are lacking. Implicit in the process is the fact that the species remains in

Appendix II. This allows the range State to remain in control of trade and recommence or continue the sustainable exploitation of this natural resource.

APPROACHES TO SUSTAINABLE MAHOGANY MANAGEMENT

14. The majority of mahogany entering into international trade is from unmanaged natural forests. Most mahogany-producing countries do have laws and regulations in place to support sustainable forest management and some have specific regulations for mahogany (see Annex 1). Such regulations provide an opportunity for CITES agencies to link the making of NDFs for mahogany with initiatives supporting sustainable forest management. However, many countries encounter difficulties in enforcing the regulations that have been developed, a point that should be considered in developing NDFs.

15. Diligent implementation of the provisions of Article IV is essential for the effectiveness of CITES. Given the importance of mahogany in international trade the development of NDFs for this commercially valuable species will need to satisfy the provisions of the Convention, and the requirements of importing countries (in particular EU countries which have stricter domestic measures for implementing CITES).

16. The basic requirements for sustainable forest management are: 1) a formal approach to land use planning that designates production forests and protected areas as part of the Permanent Forest Estate; 2) management plans for forest management units based on pre-harvest inventory and silvicultural prescriptions that ensure regeneration to replace harvested adults; 3) monitoring of the amounts harvested, the environmental impacts of harvesting, regeneration rates and volumes traded; 4) adjustment of management plans in response to information gained from monitoring (i.e. adaptive management); and 5) enforcement of regulations.

17. In addition, sustainable management of individual timber species may include the requirement for a felling permit and the definition of legally specified minimum felling diameters to ensure the retention of sufficient younger trees. Also prescriptions may be incorporated into forest management plans to limit the amount of harvesting such as the retention of seed trees and determination of an Annual Allowable Cut (AAC). An important issue in sustainable management is the return time – in other words the length of the period that should elapse after logging, before the harvesters return to make another cut. The definition of an appropriate return time will be a function of the mahogany stocks, regeneration, growth rate and harvest intensity. There may also be requirements that log extraction should be carried out during that part of the year when extraction is least likely to cause environmental damage – typically during the dry season. In many mahogany areas, the forests are in fact inaccessible during periods of heavy rain.

18. The two main silvicultural approaches used to regulate which trees should be cut annually for sustained yield within a forest management unit are:

    i) the area method, which consists of dividing a forest area into as many equally productive units as there are years in the planned rotation, and harvesting one unit each year; and

    ii) the volume method, in which the AAC is defined in terms of the volume of wood, based on assessments of current and future growth rate, and the existing and desired volume of growing stock.

19. The volume method usually depends on regulating diameter distributions, assessed by measuring diameter at breast height (dbh) and calculating the size class distribution. The AAC is then allocated among the various diameter classes following comparison of the actual size class distribution with that desired for sustained yield.

20. The area method is considered the most dependable for achieving sustained yield but is not sufficiently flexible for tropical forest with non-uniform stands. Many management schemes, where in place, combine elements of both approaches.

21. It should be noted that requirements for sustainable management of a forest may conflict with the sustainable harvesting of an individual tree species. In the case of mahogany, for example, forest stands may require substantial disturbance to ensure that regeneration takes place. Such a high level of disturbance may not be compatible with the low environmental impacts required for sustainable management of the forest as a whole.

INFORMATION REQUIREMENTS FOR MAKING AN NDF

22. The information required to make a CITES non-detriment finding has been summarized by Rosser and Haywood (2002). This publication suggests that: *To determine that a harvest of a species is not detrimental to the survival of a species, the Scientific Authority should ideally undertake a thorough review of the whole harvest management system. However in many cases comprehensive information is not available and in others it is not even clear what is meant by the management system.*

23. A checklist is provided by Rosser and Haywood (2002) in order to draw attention to the more important aspects of harvest management systems and to provide a means for compiling information needed to make an NDF. The categories of information are:

    a) Biological characteristics

    b) National Status

    c) Control of harvest

    d) Monitoring of harvest

    e) Harvest management

24. The first category of information listed above is common to all range states of *Swietenia macrophylla* and is covered in the section on Biological and ecological characteristics below (paragraphs 26-29). The other categories are specific to individual range states and are covered in the section on National information below (paragraphs 39-43).

General information

25. Despite the commercial importance of mahogany, detailed information on its distribution, abundance, ecology and management requirements is surprisingly limited. There is however a body of published information of use to Scientific Authorities throughout the range states as background to the development of NDFs. The types of information and potential application are summarized below. The reference list given at the end of this paper includes key references that provide background information of value to Scientific Authorities.

    Biological and ecological characteristics

26. *Swietenia macrophylla* is a large deciduous tree that frequently grows to over 30m and reaches diameters at breast height of over 1.5m. *Swietenia macrophylla* has a wide geographical and ecological range, growing naturally in a broad range of tropical dry and tropical wet forests on a wide variety of soil types.

27. Detailed information on the distribution of mahogany is currently limited. For the Amazon region one source is RADAM - an Amazonian-wide series of forest sample plots carried out mainly in the 1970s. This provides some presence and absence data for mahogany. Given the low abundance of mahogany, however, and the use of 1 ha sample plots the data has restricted value and clearly misses the last three decades of extensive forest conversion. The distribution of mahogany in Brazil has recently been described by researchers at the Oxford Forestry Institute (Brown et al. 2003) and research is continuing to refine modeling of mahogany's distribution in Brazil. In addition, researchers at the Center for Applied Biodiversity Science, Conservation International, are currently compiling information about the density of remaining mahogany populations, logging, and other land uses that affect mahogany forests throughout the natural range of the species.

28. Individual mahogany trees may live for several hundred years. The age of reproductive maturity (i.e. at which viable seed are produced) is relatively young, from 8 years, at least as recorded in plantations (Mayhew and Newton, 1998). *S. macrophylla* is monoecious with unisexual flowers. The species is generally outcrossing. This has management implications, as trees that are isolated (such as those left as seed trees after harvesting), or populations where the density of trees has been severely reduced, may fail to produce much viable seed. Seed production varies from year to year. The seeds are relatively heavy and generally do not disperse far. Seed viability is only retained for a

few months, not long enough for creation of a soil seed bank. Germination is thought to be stimulated by rainfall rather than light availability.

29. Within its natural range, stocking density (i.e. local abundance) of mahogany is extremely variable and its distribution is patchy. Mahogany is sparsely distributed in many forests but high population densities have been recorded in some areas. This clearly has implications for the impact of logging and the sustainability of mahogany extraction at a local scale. In addition, mahogany seedlings are relatively light-demanding. As a result, mahogany does not readily regenerate under a dense forest canopy, as may often be found in undisturbed moist tropical forests. In such cases, large-scale disturbance, such as that caused by fire, flooding or storms, may be required for substantial mahogany regeneration. However, seedlings may be relatively abundant under the more open canopies of dry and transitional forests (Brown et al. 2003).

Silviculture

30. Management of mahogany in natural forests is generally limited to the imposition of simple cutting restrictions, such as the definition of a minimum cutting diameter. For example, in the Chimanes Forest in Bolivia, a minimum cutting diameter of 80 cm was specified, whereas in the Atlantic coast of Honduras, a value of 50 cm has been employed (Newton and Mayhew 1998). Recent research in southeast Pará, Brazil, where forest structure is highly irregular and stature is low, suggests that a minimum felling diameter of 55-60 cm dbh would be appropriate. In the taller forests of Western Amazonia where mahogany occurs at lower densities, appropriate felling limits may be 70-80 cm dbh. (Grogan, 2002).

31. Whether or not the imposition of a minimum diameter will lead to sustainable harvesting depends on the stocking of trees within the forest area, their size distribution and growth rates, the presence of natural regeneration, and the length of the felling cycle. In some areas, the felling cycle may be too short to allow timber to be harvested sustainably, because growth rates or stocks are too low. The presence of natural regeneration will depend on the maintenance of seed trees during harvesting operations; often it is the largest trees that produce the most seed, yet it is these that tend to be harvested. Regeneration of mahogany is often limited in moist forests with infrequent disturbance. Although logging operations can provide the canopy disturbance required to enhance natural regeneration, in practice mahogany regeneration is often poor following harvesting. In such cases, seedlings may need to be established by artificial means, in silvicultural approaches such as enrichment planting.

Sustainable forestry initiatives

32. Firm links between sustainable forest management and sustainable harvesting of individual timber species have rarely been demonstrated, because sustainable forest management tends to focus very much at the forest ecosystem level, rather than at the species level. It is however generally understood that sustainable forest management should ensure the conservation of rare and threatened tree species.

33. The Forest Principles and Chapter 11 of Agenda 21, agreed in 1992, called for the identification of criteria and indicators (C&I) for evaluating progress in national efforts to practice sustainable forest management. As a result, a large number of national, regional and international initiatives have been developed, including the International Tropical Timber Organization (ITTO), the Lapaterique Process of Central America on Criteria and Indicators for Sustainable Forest Management (LEP), and the Tarapato Proposal of Criteria and Indicators for Sustainability of the Amazon Forest (TARA) each of which have generated sets of C&I. These all make provisions for the conservation of rare and threatened species. The importance of these initiatives has been further emphasized by the United Nations Forum on Forests which is responsible for taking forward the work of the Intergovernmental Panel on Forests (IPF)/ Intergovernmental Forum on Forests (IFF). Many of the IPF / IFF proposals for action refer directly to engagement in C&I processes as a key step towards sustainable forest management.

34. C&I are in some countries being incorporated into forestry legislation such as in Costa Rica where forest operations must have a management plan and must be ‘certified’ by a ‘certified forester’ under the Costa Rican government training scheme. A government National Forest Certification Commission made up of scientists and qualified foresters defines the standards, criteria and

indicators that must be applied in the management plans. Generally however, in most countries the practical application of C&I to support sustainable forest management is at an early stage.

35. Indicators are also often used to assess the sustainability of forest management, as a basis for certification of timber, for example, by the Forest Stewardship Council (FSC). The goal of FSC is to promote environmentally responsible, socially beneficial and economically viable management of the world's forests, by establishing a worldwide standard of recognized and respected Principles of Forest Stewardship. The FSC has been the predominant forest certification scheme applied in Latin America (ITTO, 2002). National FSC initiatives have been developed in Bolivia, Brazil and Colombia. In addition Brazil has developed a national forest certification scheme. Certification is already significant as a proportion of mahogany production in certain countries for example in Guatemala where mahogany is the second major timber species exported in terms of volume and value.

36. The development of C&I for sustainable forest management in mahogany producing countries, and the existence of processes aimed at certifying sustainable timber supplies are of value in relation to the development of NDFs. Scientific Authorities may therefore wish to remain aware of sustainable forestry initiatives as background to the management of the forest ecosystems of which mahogany forms a part. In particular, Scientific Authorities may find it useful to identify the C&I process in which the range State is participating, and to consult the C&I identified by the relevant process.

37. With regard to independent certification of sustainable natural forest management, the FSC principles that must be demonstrably complied with in order for a forest to be certified are given in Annex 2. These provide a valuable context for identifying the conditions under which mahogany harvesting is likely to be sustainable.

International trade information

38. Information on the trade demand and trends is important for developing forest management systems, predicting production requirements and setting appropriate quotas. Sources of trade data, in addition to CITES trade monitoring, include ITTO, Customs statistics, and national and regional trade associations. Comparisons of import and export statistics will give some indication of the level of unauthorized exports indicating for example where NDFs have not been made.

National information

39. The CITES Mahogany Working Group (MWG) meeting held in Bolivia in 2001 emphasized the need for information exchange between the Management and Scientific Authorities, the forestry sector, Customs and other enforcement agencies on matters relating to mahogany and CITES. To this list could be added universities and other research organizations, forest certification bodies, the private sector and NGOs. Typically, information relating to mahogany will be scattered among different institutions and individuals, and therefore there may be a need to collate or integrate such information as a prelude to developing robust NDFs. As procedures for NDFs are developed and NDFs are determined the Scientific Authority will build up a body of information that will be valuable for monitoring sustainable production for export supporting implementation of Article IV, paragraph (3) of the Convention.

Pre Convention stocks

40. In the initial stages of CITES Appendix II implementation for mahogany, CITES Authorities will ideally need to be aware of the quantities of felled mahogany timber that are available for export.

Status of species

41. At a national level the most important information about *Swietenia macrophylla* on which to base NDFs is that relating to the distribution, abundance and population trends of the species within its natural habitat. This information will often be available primarily through forest inventories, typically undertaken by state forest departments, but also sometimes undertaken by the private sector, community organizations, NGOs or academic researchers. The abundance, density or stocking of mahogany trees is of particular importance in defining the potential impact of harvesting on populations of the species. Countries with only a few localized populations of *Swietenia macrophylla,* or with mahogany populations occurring only at low density, will need to be particularly cautious regarding development of NDFs.

42. Given the patchy distribution and variable stocking density of *Swietenia macrophylla* local level information will be required to make a robust NDF relating to an individual export license application. As far as possible this should take into account local information on the extent of regeneration as well as population density of mature trees.

Production areas

43. It will be important for Scientific Authorities to have access to information on areas of approved harvesting for *Swietenia macrophylla,* through for example the allocation of concessions. The designation of the area from where the mahogany is being harvested is of key importance for determining the sustainability of harvesting. Sustainable sources of mahogany are restricted to those areas that have been designated as production forests, and for which those involved in harvesting have an established legal right to both access the land and harvest the mahogany timber. Much mahogany that enters international trade has been harvested illegally, and therefore there is a widespread need to check the point of origin and the legal status of timber consignments.

APPROACHES FOR DEVELOPING AN NDF FOR MAHOGANY

44. NDFs for *Swietenia macrophylla* should be based as far as possible on national forest policy and legislation in order to harmonize CITES and forestry requirements. Given the current status of natural forest management in the countries where *Swietenia macrophylla* occurs it would seem appropriate for make NDFs in a progressively refined way. In each country the NDF may initially be a pragmatic determination based on known mahogany stocks and levels of trade, and this is fully acceptable. As increased information becomes available and sustainable forest management policies, monitoring mechanisms and controls are institutionalized, more detailed NDFs could be made. It is recommended that three components should form the basis for developing NDFs for mahogany:

    a) National or regional level stock assessment as a basis for determining overall quantities for export, for example through an annual export quota.

    b) Requirement for management plans for forest management units from which mahogany is harvested for export. Management plans should demonstrate provisions for sustainable management of the forest unit and mahogany stocks as a prerequisite for determining that export will be non-detrimental.

    c) Monitoring of mahogany harvesting in the forest management units and timber exports against the overall export quota.

National level

45. The priority at the national level will be to provide an assessment of the status of the mahogany resource within the range state. Information on the distributional range of the species can be combined with information on the abundance or stocks of the species in different areas, to provide an overall assessment of the total mahogany resource available. The primary source of this information will be forest inventories, supported by research assessments where available. Increasingly, satellite remote sensing data are proving valuable for determining the extent of forest resources.

46. Information on threats to mahogany forests, such as the incidence of fire, conversion to agricultural land, development of infrastructure, and evidence of illegal exploitation, could also be drawn upon to provide an assessment of the current status of mahogany. Trends in population size can also potentially be inferred from trade statistics and historical information on the exploitation of forest resources. The size of the mahogany population included within the national network of protected areas, and the effectiveness of these areas in conserving mahogany, might also usefully form part of the resource assessment.

47. In order to export any consignments of mahogany after the CITES Appendix II listing becomes operational the Scientific Authority of the exporting country should initially be satisfied that there are sufficient stocks of the species in place within the country for export to be non-detrimental to the survival of the species. Several countries have currently made a legal determination that this is not the case, for example, Ecuador and El Salvador (see Annex 1).

48. Determination of sufficient stocks to allow exports will require information on the distribution, abundance and production at a national level. Initially it may be sufficient to demonstrate through a preliminary general NDF that mahogany is taken from approved and specified production forest areas, and to indicate what proportion of the overall national range of mahogany, within the national forest estate, these areas represent.

49. One tool that could potentially be used to regulate the harvesting of mahogany at the national level is the setting of a quota, or the maximum harvest that may be permitted given the current status of the resource. Export quotas have generally become increasingly common for use in species management in compliance with CITES. The optimum situation is one in which a national quota is based on local quotas designed to prevent local overexploitation and where the quota is based on knowledge of the biology, life history, demographics and reproductive capacity of the species. An example of how to develop an export quota as a basis for an NDF is given in Annex 3. This example relates to animal species but elements of the approach i.e. taking into account estimates of abundance, habitat availability and protected areas are applicable to mahogany.

50. "Cautious" national quotas are those which are small in relation to the likely national population size, and are likely to pose little or no risk to the conservation status of the species concerned.

51. The annual export quota sets the baseline against which quantities in individual applications for export are recorded. Once a national export quota for mahogany has been set, this could then be implemented by issuing export permits to trade specified volumes of timber. The quotas can be revised annually in response to any changes to the status of the resource, or to additional information becoming available.

Forest Management Unit level

52. In order for an NDF to be made at the local level, for example for a specific forest management unit (FMU), the criteria listed below should be considered:

    a) The existence of a management plan for the FMU that demonstrates a sustainable approach to harvesting, based on an adequate inventory of the resource and appropriate monitoring of harvesting impacts

    b) The presence of adequate regeneration, either from natural sources, or using artificial means that have been demonstrated to be successful within the area in question.

    c) A policy of retaining sufficient seed trees to ensure adequate regeneration following harvesting.

    d) Demonstration that legal rights to access and harvest the timber are established.

    e) The adoption of harvesting and timber extraction approaches that minimize environmental damage (e.g. directional felling, extraction along well-constructed logging roads etc.).

53. It should be noted that information regarding some or all of these criteria may be collected as part of an assessment of sustainable forest management undertaken in support of one of the C&I processes, or as part of the process of certifying a timber source as sustainable.

54. The minimum requirement for making a non-detriment finding should be that evidence is provided that the timber has been harvested in accordance with an agreed management plan based on pre-harvest forest inventory. Such a management plan should be designed to ensure sustainability of harvest at a local level. Where a forest management unit has been certified by an independent forest certification body this will demonstrate that an acceptable management plan is in place.

55. A requirement could be made by the Management Authority that an application for a permit to export mahogany be accompanied by reference to the forest management plan and where appropriate copy of certification of sustainable forest management. As an example of initial use of forest management plans, the CITES Scientific Authority of Belize has requested interested persons or parties to present forest management plans through the Forest Department to enable the Scientific Authority to determine whether trade of mahogany originating from these forests will be detrimental to the survival of the species in the wild.

Monitoring against export quota

56. For the national quota to be effective, the volume of mahogany timber exported will need to be accurately monitored. It would also be useful; to monitor the level of harvesting. If there is a risk of illegal harvesting occurring, as in many mahogany range States, then there may be a need for an assessment of the Chain of Custody, namely the sequence that occurs as ownership or control of the timber is transferred from one custodian to another along the supply chain. Some form of labeling may be required to indicate the way in which the timber has been produced and transported along the chain of custody to identify the point of origin. Increasingly, technology such as electronic tagging or bar coding is being applied to tracking the origin and destination of harvested timber. There may also be a need for a Verification of Legality, namely a measure to guarantee that the products concerned have been produced in complete accordance with relevant laws, such as CITES. This could take the form of a license attached to consignments verifying their legal production.

CAPACITY BUILDING AND RESEARCH NEEDS

57. In general current problems with making NDFs result from lack of capacity and of resources to implement monitoring schemes across the wide range of species in international commercial trade (Rosser & Haywood, 2002). In the specific case of mahogany, an immediate problem may be the lack of experience of the Scientific Authorities in the range states in dealing with timber species. This should be overcome through discussions between the various agencies involved in forest management and CITES implementation at a national level and through the dissemination of materials and information to support Scientific Authorities.

58. The lack of baseline information on the distribution and status of *Swietenia macrophylla,* and the impact of harvesting on population viability, is a further impediment to the determination on non-detriment findings. The CITES Mahogany Working Group (MWG) meeting held in Bolivia in 2001 drew attention to the need for field studies to assess the occurrence of mahogany and to determine the levels at which the species can be exploited sustainably. Furthermore the meeting drew attention to the need for information on the status of regeneration, management programmes and conservation of the species.

59. Current estimates of how much mahogany remains, and how rapidly the stocks are declining, are very imprecise. Yet this information is critical to the assessment of whether mahogany is threatened, or specifically to assess the impacts of international trade. Inventory data is the basic requirement and a priority for research effort, utilizing remote sensing techniques, ground truthing and GIS. As mentioned in the section on Biological and ecological characteristics above (paragraphs 26-29) and in the section on Regional know-how and international collaboration in the making of NDFs below (paragraphs 61-64) there are current efforts towards meeting this need. A second priority would be an assessment of the extent of regeneration in logged over stands as this is a key indicator of whether harvesting is sustainable. Further consideration of techniques to set appropriate national export quotas for mahogany is also likely to be of considerable importance in the practical implementation of Article IV, paragraph (2) of CITES.

60. The ability to manage spatial and statistical data on production, trade and conservation of mahogany may also need to be developed with information management systems designed to incorporate data from diverse sources. Developing the capacity of range states to track and monitor the origin and movements of mahogany timber may also be considered a priority.

REGIONAL KNOW-HOW AND INTERNATIONAL COLLABORATION IN THE MAKING OF NDFS

61. Various international and regional initiatives have been developed to support the sustainable production of mahogany and examples are given below. Exchange of information on the development of procedures for Mahogany NDFs will be very valuable both within the CITES arena and the wider forestry and conservation communities.

62. At its 9th Session the FAO Panel of Experts on Forest Gene Resources recommended that FAO take steps to catalyze further action and to coordinate already ongoing work in the conservation and sustainable use of mahogany species. As a follow-up to this recommendation, the FAO Forestry Department has prepared reports describing the ecology, silviculture, management, utilization and conservation of mahogany species in the region. The reports also list on-going activities and gaps in current knowledge and activities, and propose programmes of collaborative activities in the region.

The reports, all in Spanish, are available from the Forest Resources Division of FAO (http://www.fao.org/forestry/).

63. The International Union of Forest Research Organizations (IUFRO) is an important international network of forest scientists; Unit 1.07.00 focuses on tropical silviculture, and has in the past been involved in supporting networking and technical exchange on mahogany silviculture (http://iufro.boku.ac.at/).

64. CIFOR is an international research and global knowledge institution committed to conserving forests and improving the livelihoods of people in the tropics. CIFOR has undertaken a great deal of research into sustainable forest management, including the development and testing of criteria and indicators (http://www.cifor.cgiar.org/).

SUMMARY

65. Summarizing the factors which should be taken into account in making an NDF the following are likely to be the most important:

    a) Availability of information on mahogany distribution and abundance at a national level and in relation to size of areas of production and protection forest.

    b) Levels of legal and as far as possible illegal trade

    c) Threats to the forests where mahogany occurs and to the species itself

    d) Provisions of national forest legislation and administrative procedures

    e) Location and size of harvesting operation

    f) Local forest type and characteristics

    g) Requirement and development of a management plan

66. The information currently available is incomplete and scattered and should be compiled both on a national and regional level. It is recommended that procedures for NDF development for mahogany be developed and refined in an incremental way as approaches are tested, sustainable forest management more generally is developed and information is built up. It is recommended that three components should form the basis for developing NDFs for mahogany:

    a) National or regional level stock assessment as a basis for determining overall quantities for export, for example through an annual export quota

    b) Requirement for management plans for forest management units from which mahogany is harvested for export. Management plans should demonstrate provisions for sustainable management of the forest unit and mahogany stocks as a prerequisite for determining that export will be non-detrimental.

    c) Monitoring of mahogany harvesting in the forest management units and timber exports against the overall export quota.

REFERENCES AND FURTHER SOURCES OF INFORMATION

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SUMMARY OF NATIONAL FORESTRY LEGISLATION AND LEGAL ARRANGEMENTS FOR MAHOGANY HARVESTING FOR EXPORT

Country	**National forest policy and framework legislation**	**Basis for mahogany management for export**
Belize	Forest Act of 1927 Chapter 213 of the Laws of Belize, revised edition 2000	A permit is required prior to felling mahogany. The permit form requires name and address of company/person, location of harvest, and quantity to be removed. Only legally harvested mahogany, originating from forests being managed on a sustainable basis, will be allowed to enter into trade.
Bolivia	Ley Nº 1.700 - Ley Forestal 1996	Timber operations require a management plan. Forest management operations must be in harmony with the international agreements to which Bolivia is a signatory, including CITES.
Brazil	National Forestry Law No. 4771, 1965	Exploitation, transport and trade in mahogany suspended since 2001 (Instrução Normativa (IN)17). Pre-conditions for future exploitation established in IN22. Forest certification is a prerequisite for legalized mahogany extraction. Mahogany for export must be from forests with approved Sustainable Forestry Management Plans. National export quotas have been established for mahogany.
Colombia	Código Nacional de los Recursos Naturales Renovables y de Protección al Medio Ambiente, Decree No. 2811 of 18 December 1974	Management plans required for natural forests held in the public domain & those on private property which must include a statistical inventory for all of the species at greater than 10cm dbh. Acuerdo No 0029: Harvesting of mahogany banned in some regions and controlled in all regions. Export of logs, sawn wood and veneer sheets prohibited.
Costa Rica	Ley Nº 7.575 - Ley Forestal, 1996 as amended	Forest operations require a management plan which must meet the standards and criteria laid out by the government National Forest Certification Commission.
Ecuador	Acuerdo Nº 131 - Normas para el manejo forestal sustentable para aprovechamiento de Madera, 2000.	Exploitation and transport of timber is subject to Sustainable Forestry Exploitation Programme. Minimum felling diameter. Mahogany is considered to have been overexploited and there is a national ban on the harvest/management of the species for five years. Export of the timber or of products is therefore prohibited.
El Salvador	Ley del Medio Ambiente 1998	Timber operations are required to submit an environmental impact assessment. Decreto 852: mahogany is on official list of threatened species. No exports
Guatemala	Decreto Nº 101/96 - Ley Forestal.	Forest operations require a management plan which includes site description, area of intervention, area of protection, volume to be extracted, silvicultural system, plans for recovery of the forest, time of execution of the plan. Decreto 4-89 establishes legal mechanisms to permit the sustainable management of forests inside protected areas - there is inter-institutional coordination to develop a judgement on non-detrimental extraction of mahogany.
Honduras	Acuerdo Nº 634/84 - Reglamento General Forestal	Timber operations require a management plan. Decreto 323: Mahogany exports restricted to finished goods, furniture and other value added items.

Mexico	9-25-98 Reglamento de la Ley Forestal.	Timber operations require a management plan, which must include measures for the conservation and protection of the habitat of those species in danger of extinction, rare or threatened and under legal protection.
Nicaragua	Decreto Nº 50/01 - Política de desarrollo forestal de Nicaragua, 2001	Various recent Decrees relate to the felling of mahogany and other precious timbers. Harvesting subject to forest management plans
Panama	Ley No 1 – Legislación Forestal de la República de Panamá - 03 February 1994.	Ley No 1 - Forestry operations subject to a management plan, which must include mitigation or avoidance plans for environmental impacts and maintenance of forest cover must be ensured.
Peru	Forestry & Wild Fauna Law 27308, 2000	Logging of mahogany banned in some areas. Exports from other forests restricted to finished products, wood pieces and parts. An export quota has been developed.
Venezuela	Ley Forestal de Suelos y Aguas Gaceta Oficial N° 1.004 Extraordinario de fecha 26 de enero de 1966	Harvesting subject to forest management plans. Forest products may not be circulated nor moved outside of their harvest location without appropriate documentation providing evidence of origin.

FSC PRINCIPLES WHICH MAY RELATE TO FINDINGS FOR CITES EXPORTS

Principle 1: Compliance with laws and FSC principles	1.1 Forest principles shall respect all national and local laws and administrative requirements 1.3 the provisions of all binding international agreements such as CITES shall be respected
Principle 6: Environmental impact	6.1 Assessment of environmental impacts shall be completed 6.2 Safeguards shall exist which protect rare, threatened and endangered species 6.3 Ecological functions and values shall be maintained intact, enhanced or restored
Principle 7: Management Plan	7.1 The Plan will provide: management objectives; description of forest resources; description of silvicultural and/or other management system; rationale for rate of annual harvest and species selection; provisions for monitoring forest growth and dynamics; provision for protection of rare, threatened and endangered species; maps; description and justification of harvesting techniques and equipment to be used
Principle 8: Monitoring and assessment	8.2 Forest management should include the research and data collection needed to monitor; yield of all forest products harvested; growth rates, regeneration and condition of the forest; composition and observed changes in the flora and fauna; environmental impacts of harvesting and other operations
Principle 9: Maintenance of high conservation value forests	Management activities in high conservation value forests shall maintain or enhance the attributes which define such forests.

CALCULATING EXPORT QUOTAS: AN EXAMPLE FROM THE CHAMELEON TRADE

Increasing levels of exports of live chameleons from Madagascar led to concerns in the late 1990s about the sustainability of the trade. In order to address these concerns, a status assessment was conducted to collect basic population estimates for several species. National population estimates were calculated by multiplying estimates of minimum and maximum density by estimates of the area of suitable habitat remaining. For most species, there was at least a ten-fold difference between the minimum and maximum population density estimate. Such extrapolations based on the area of suitable habitat, may over estimate the number of chameleons if populations have been locally extirpated from parts of the remaining habitat. In addition, the habitat estimates include protected areas where collection is prohibited by law. To calculate the population size that is available to manage for sustainable harvest, would require subtraction of the area of suitable habitat that is covered by protected areas where use of living natural resources is prohibited.

However, in the case of *C. brevicornis*, harvesting a potential 1% of the minimum national adult population, would produce an annual harvest of 8000 individuals. Then if 80% of the harvested individuals are lost through post capture mortality, 1600 individuals might be available for export annually. In reality, although a harvest of 1% of the minimum population would probably be a very conservative level of harvest, this has to be offset by the fact that the national population size estimate includes protected areas where harvest is prohibited. Consequently, the population outside these protected areas and available for harvest is likely to be somewhat lower than either the minimum or maximum estimated national population size. However, with GIS technology, the size of population available for harvest could be calculated and from this a precautionary export quota established for certain more abundant species. Working to calculate and establish such quotas, would require ensuring that adequate monitoring and regulatory systems are in place locally and nationally.

Source: Document prepared by the IUCN/SSC Wildlife Trade Programme for a CITES workshop held in Madagascar in May 2003.