

**A MALAYSIAN
ASSESSMENT OF
THE WORLD LIST OF
THREATENED TREES**

By
CHEN HIN KEONG

A TRAFFIC SOUTHEAST ASIA REPORT

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Front cover photograph: Logged lowland dipterocarp forest, Segama Forest Reserve Sabah, Malaysia.

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Credit: WWF-Canon, Edward Parker

Mist rising through typical dipterocarp forest in northern Malaysia: over two hundred of these valuable Malaysian timber species are included in *The World List of Threatened Trees*

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The author is responsible for any errors and mistakes in this report.

Chen Hin Keong

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EXECUTIVE SUMMARY

Malaysia is a significant producer and exporter of tropical timber and other forest products. It ranks third among exporters of sawn tropical timber wood in the world, after Indonesia and Brazil. This position has been achieved as a result of concerted development of Malaysia as a nation since independence from the British in 1957. Poverty alleviation has been the major driving force pushing the country towards rapid economic growth and promotion of the timber industry has been a major contributor to Malaysia's development plans. In 2001, forestry was ranked third among commodities generating income for the country, after petroleum and palm oil. As a result of this, forest cover in Malaysia has diminished - from 72% cover in 1970, to some 60% in 1998 - but Malaysia has developed criteria for the sustainable management of forests and schemes for the certification of timber from sustainably managed sources are operating in Malaysia. The Malaysian Government defends its forest exploitation policy vigorously, in the light of the country's growth plans and its actions for sustainable management of forests. From the Malaysian perspective, the use of natural resources is necessary to bring the Malaysians to a standard of living comparable with that which developed countries have achieved by exploitation of their own natural resources.

When *The World List of Threatened Trees* and the accompanying *Tree Conservation Database* (hereafter referred to together as the *Threatened Trees* list) were published in 1998, they were not well received by the Malaysian Government and timber industry. The *Threatened Trees* list records 925 tree species for Malaysia, 197 of them as Critically Endangered, 106 as Endangered and 434 as Vulnerable, according to IUCN Categories and Criteria. Dipterocarpaceae, the family of trees with the most valuable timber species in Malaysia, is recorded as the family with the highest number of threatened species. The high number of prized timber species classed as globally threatened was a significant cause of concern for the forest sector and Government in Malaysia.

In 1999, WWF Malaysia undertook to explore the Malaysian reaction to the findings of the *Threatened Trees* list and TRAFFIC Southeast Asia co-ordinated development of this project. A consultant extracted information from the *Threatened Trees* list relevant to Malaysia and interviewed experts from the timber industry, academic and research institutions and the Forestry Department in Malaysia, to gauge and record their opinions of its findings. Over 20 senior Malaysian forestry officers, botanists, taxonomists, silviculturists, timber traders, forest managers and foreign forestry experts working on projects in Malaysia were consulted, in person, by email, or telephone, in late 1999 and early 2000. The views and comments so collected are recorded in this report, together with explanations of the particular contextual situations in Malaysia which are likely to have shaped such views, and an attempt at objective assessment of the validity of these views.

In assessing the global conservation status of tree species, the *Threatened Trees* list used the *1994 IUCN Red List Categories and Criteria*. Of the 779 traded tree species in Malaysia included in the *Threatened Trees* list, 618 species were considered to be under serious threat (in IUCN Categories Critically Endangered, Endangered or Vulnerable). Two hundred and sixty-

four of these are dipterocarps, which are by far the most important group of commercial tropical timbers in Malaysia in terms of quality and quantity of timber produced.

The prime causes of threat to tree species in Malaysia, as recorded in the *Threatened Trees* list, are expansion of human settlement, clear-felling and logging of habitats, tourism/leisure activities and extensive agriculture, in order of importance.

In critically assessing the *Threatened Trees* list, those interviewed for this study focussed on several aspects, as outlined below. Points to consider in evaluating their comments are provided.

- It was felt there had been a **lack of consultation with local experts** involved in forestry. *Points for consideration:* This view should be heeded, but it should be pointed out that exhaustive collection of stakeholders' views would create a huge burden on the production of any future edition of the *Threatened Trees* list.
- The **quality of data used** was questioned, as it was recognized that the assessors could not have visited all the dipterocarp forests before categorizing such species and that, therefore, their evaluations of conservation status were thus based on unverified, secondary data. *Points for consideration:* There is very little chance of any study carrying out an exhaustive status check of tree species on the ground and the IUCN Red List Criteria do not require that every population of a species is assessed.
- **Several aspects of the IUCN Red List Criteria were questioned.** Those interviewed believed that these Criteria (used to assess the status of tree species included in the *Threatened Trees* list) were quite restrictive, for example taking no account of conservation measures in progress or of a country's need to develop. They also noted that many slow-growing tree species fell under the Critically Endangered, Endangered and Vulnerable categories, because their populations were judged to have declined "over the last 10 years or three generations", whichever was the longer. They therefore queried the validity of applying one set of criteria to all species. Finally, it was thought that the Criteria could not cope adequately with a range of interpretations from different assessors. *Points for consideration:* While it is understood that Malaysia's forest policy has to foster development based on natural resource use, it is necessary that the Red List Criteria are used unwaveringly, so that the whole purpose of following a set of rules is not undermined. The three-generation period used for assessing population reduction was devised precisely to take account of longer-lived species and is correctly applied as a biological criterion when looking at extinction risk. Finally, the IUCN Criteria are designed to cope with divergent views of different assessors, for example by identifying and acknowledging any assumptions as part of documentation requirements.
- **The justification for a publication on the world's threatened trees was called into question**, as it was felt that the majority of users would need information only on a regional or national basis. It was also reported that the database and compact disc associated with *The World List of Threatened Trees* were difficult to use.

Points for consideration: It should be noted that production of separate national reports was not the aim of the *Threatened Trees* list and that the *Tree Conservation Database* acknowledges some inherent weaknesses.

- It was felt that **weaknesses related to data collection were not sufficiently highlighted** in the *Threatened Trees* list.

Points for consideration: The list does acknowledge these, but clearly this did not allay concerns that some readers would be inclined to accept the list as absolute truth, thus potentially exacerbating conflicts between users and managers of forest resources, on the one hand, and conservationists on the other.

- **The *Threatened Trees* list's ranking of "felling" as the major threat to the conservation of globally threatened tree species was queried.** It was felt that other threats, especially conversion of land ("agriculture"), were just as significant, if not more so. Related to this, the category "felling" was considered too broad, since clear felling, which is mainly associated with land conversion, and selective felling were indistinguishable within the term.

Points for consideration: It is possible that those questioned were unduly conscious of the national situation in Malaysia, where "expansion of human settlement" is the prime threat, when they questioned the global ranking of threats. Equally, they may have been swayed by the fact that there is evidence from Malaysia to show that some forest regeneration following logging does occur. Similarly, they may have been influenced by the fact that Malaysia does require those in charge of forestry to draw up forest management plans and that it has pioneered practices to reduce logging damage. On the question of lack of specificity of the term "felling", it should be noted that the *Threatened Trees* list categorizes threats from land conversion separately from felling (as "agriculture" and "expansion of settlement"), so it is clear that these threats are not included under "felling".

- It was noted that **verification of the findings of the *Threatened Trees* list for commercial timber species would create a considerable impact on the financial and manpower resources of Malaysia.** There was also concern over the additional costs that may accrue for concessionaires, contractors and Forestry Departments, if a Malaysian assessment determined that extra protection of certain species were required, in addition to the creation of a network of protected areas in Malaysia.

Points for consideration: The Malaysian Government considers the risks of reducing competitive edge for timber products from Malaysia in the international market very seriously, but whether or not the competitive edge of Malaysian timber companies would be affected by the wider application of protective measures to Malaysian tree species is a matter which would need investigation outside the scope of this study.

- **There was concern that the *Threatened Trees* list would lead to an increase in the listing of commercially important Malaysian timber species in the CITES Appendices.** This stemmed from several perceptions. Firstly, the Malaysian Government and timber industry believed that, if the *Threatened Trees* list were substantially adopted by the Parties to

CITES, this would adversely affect the timber industry through the application of trade restrictions: some thought that CITES was a convention aiming to ban trade in wild species of fauna and flora. Secondly, it was believed that there would be burdensome costs for Malaysia associated with implementing CITES if additional Malaysian tree species were listed in its Appendices. Thirdly, many of those canvassed appeared to believe that timber products could only be identified in traded forms at the generic or group level, not at species level. They were therefore anxious that some unthreatened species may be included in the CITES Appendices under the "look-alike" criterion because their timber products could not be distinguished from those of threatened species.

Points for consideration: These concerns are based, at least to some extent, on misconceptions. To begin with, there is no direct link between the inclusion of a species in the *Threatened Trees* list and a CITES listing. They result from two completely separate and independent processes, using separate and independent assessment criteria, but it appears that the respondents did not always appreciate this. Moreover, CITES is not a convention for banning trade in fauna and flora. It is certainly true that any new listing of a species under CITES carries with it the costs associated with implementing the Convention for that taxon, however, the willingness to take on such costs is assumed when a country undertakes to join CITES. Regarding the view that some timber species were likely to be listed in CITES according to the "look-alike" criterion, while this is a possibility, sophisticated identification resources exist and such judgements may be premature.

Conclusion

Forestry and agriculture have both been major contributors to Malaysia's development plans and both have had an impact on forest cover, through felling for the timber industry and land conversion.

The *Threatened Trees* list has attempted to assist in the conservation of tree species, laying the foundations for the use of in-country resources, knowledge and expertise, to ensure that the natural resource heritage of countries such as Malaysia can be conserved.

This study has ascertained that there is disaffection among some Malaysian Government representatives and others concerned with forestry with respect to the findings of the *Threatened Trees* list for Malaysia. In the light of this, action should be taken to ensure that any future assessment of the status of and threats to tree species in Malaysia takes full account of the comments made by those interviewed. Additionally, efforts should be made to disabuse many of the same of their misconceptions regarding the *Threatened Trees* list, CITES, and the relationship between the two. Only then can the main aspiration of the *Threatened Trees* list begin to be fulfilled, namely that it should be used to stimulate conservation action on the ground. The final responsibility for this rests with the Government of Malaysia, for, ultimately, no such conservation action will happen without a commitment to procuring the necessary financial and other resources to enable it. In this way, it is hoped that Malaysian stakeholders, having critically assessed the *Threatened Trees* list, may benefit from its strengths and use it as a tool to build on existing tree conservation in Malaysia, specifically for the management of tree resources at species level, not only at forest level.

Recommendations

The recommendations resulting from this study provide information that could assist Malaysia in enhancing the sustainability of its timber trade and the conservation of its tree species.

Recommendations for improving knowledge of Malaysia's tree species

- Conduct a review of the conservation status of Malaysian species identified as threatened by the *Threatened Trees* list.
- Conduct a review to determine the sustainability of harvest of Malaysian timber species.
- Establish a procedure for carrying out non-detriment findings for Malaysia's CITES Appendix II-listed tree species.
- Research schemes for the identification of timbers to species level.

Recommendations for improving understanding of the IUCN Red Listing process and of CITES among those concerned with forestry in Malaysia

- Provide training to improve understanding of CITES among key decision-makers and implementers, forestry workers and non-governmental organizations.
- Conduct a workshop involving Malaysian representatives and international non-governmental organizations, especially IUCN/SSC, to discuss and improve understanding of the IUCN Red Listing process and of CITES.

INTRODUCTION

The World List of Threatened Trees (Oldfield *et al.*, 1998) and the accompanying *Tree Conservation Database* (Anon., 1998a) present the results of the first survey of the conservation status of tree species worldwide. They list 925 tree species found in Malaysia. Of these, 737 species were classed as Vulnerable, Endangered or Critically Endangered, according to IUCN Categories of Threat (see **Appendix 1**). The tree family Dipterocarpaceae, which comprises a particularly high number of valuable timber species, contained the highest number of Critically Endangered and Endangered species. The reporting of so many valuable commercial timber species from Malaysia as threatened was the cause of some alarm in Malaysia: *The World List of Threatened Trees* and *Tree Conservation Database* were not well received by the Malaysian Government, industry and various other stakeholders.

This report distills information from *The World List of Threatened Trees* and the *Tree Conservation Database* relating to Malaysia and records the reactions to these of various Malaysians and others concerned with the Malaysian timber industry. It attempts to explain those reactions in the context of the social, economic and political environment that is influencing the development of Malaysia as a nation, while balancing them with an interpretation of the aims of the *Threatened Trees* list, where applicable. Information that could assist Malaysia in enhancing the sustainability of its timber trade and species conservation is provided in recommendations resulting from this study.

BACKGROUND

Malaysia - brief description of development history and forestry resources

This section attempts to provide an insight to the Malaysian economic and political environment within which *The World List of Threatened Trees* will have been received by those surveyed for this report.

Malaysia is a Federation of 13 States and is divided into two regions: Peninsular Malaysia, with 11 States and a Federal Territory (Kuala Lumpur), and East Malaysia, comprising the States of Sabah and Sarawak. The total population of Malaysia, according to the census of 2000, was 23.27 million people.

At the time of independence (1957), there was no significant manufacturing industry in Malaysia. Road transport and rail were in formative stages and the economy depended heavily on agriculture and mining, with rubber and tin being especially important. Poverty levels were high. After independence, exploitation of natural resources and land was intensified, as Malaysia depended on agricultural commodities for its initial rapid economic growth as an independent nation. As a result, conversion of forest for developing government agricultural land schemes was carried out. Monoculture of oil palm, rubber and other crops was practised and trade in petroleum and timber products was stimulated. During the 1970s and 1980s, the

main engine for growth and development of Malaysia was from the exploitation of forest for timber, from agriculture to supply commodities like palm oil and rubber, and from oil and gas. While the contribution from agriculture to the Gross Domestic Product (GDP) has declined, it still remains an important sector of the Malaysian economy.

Poverty-alleviation has been the major driving force behind the quest for economic growth which has altered the rate of exploitation of natural resources in Malaysia. In 1965, coincident with the cessation of Singapore, the country's only deep port, from the Federation of Malaysia, the Government of Malaysia formulated a plan for development. In the 1990s, under the direction of the then Prime Minister Yang Amat Berbahagia Tun Dr Mahathir Mohamad, this took the form of a plan for a "fully developed country by the year 2020", known as *Vision 2020*. *Vision 2020* incorporates a set of challenges, one of which is to establish "a prosperous society, with an economy that is fully competitive, dynamic, robust, and resilient". To achieve this, the plan set out to raise Malaysia's GDP to eight times its 1990 level by 2020, from MYR115 billion (USD42 billion) to MYR920 billion (USD340 billion), "in real (1990 ringgit) terms" (Anon., 2004a).

Forestry in Malaysia

At the turn of the 19th century, over 90% of the land in Peninsular Malaysia was covered with native primary forest. With such a rich supply of timber resources, forest exploitation constituted a vital part of Malaysia's development, as mentioned above. According to the Deputy Prime Minister of Malaysia in his speech on the occasion of the Forestry Department's 100th anniversary, the livelihood of one million Malaysians depends on the forest (Anon., 2001a). The importance of the forestry sector to the Malaysian economy is best reflected by the fact that it contributed MYR14.33 billion (USD3.77 billion) to national revenue in 2001, making it the third-highest earning sector among commodities after petroleum and palm oil. Forestry directly employs a workforce of 225 826 people (about three per cent of the total labour force in the country) (Anon, 2001b).

Malaysia ranked third, after Indonesia and Brazil, among International Timber Trade Organization producers of tropical sawn wood in 2002, producing 4.6 m³ in that year (Anon., 2003a). The value of Malaysia's total exports of forestry products in 2003 amounted to MYR16 315 319 687 (USD4293 million) or five per cent of total export earnings (Anon, 2004b). Malaysia's exports of forestry products in 2003 comprised logs (MYR2000 million/USD526 million); sawn timber (MYR2306 million/USD607 million); plywood and veneer (MYR4422 million/USD1164 million); mouldings and joinery (MYR1398 million/USD368 million); medium density fibreboard (MYR1081 million/USD284 million); wooden furniture (MYR4670 million/USD1229 million) (Anon., 2004b).

As a result of this exploitation, natural forest, which covered 72% of Malaysia in 1970 (Sani, 1998), covered some 60% (about 20 million ha) by 1998 (Shaharuddin, 1999; Anon., 2004c). This natural forest was composed of 17.83 million ha (88.1%) of dipterocarp forest, 1.63 million ha (8%) of swamp forest and 0.56 million ha (2.8%) of mangrove forest. Most of the

forest land used for development in the 20th century was lowland forest, rich in commercial timber species and other biological resources. This conversion of lowland forest caused forestry to move to the hills, where natural regeneration is often poor (Yong, 1990), and the targeting of lesser-known timber species, owing to a shortage of traditionally preferred species. As an example of this, almost all dipterocarp species can now be found in trade, whereas previously this was not the case.

Forest inventories have been conducted in Malaysia since the late 1960s, sometimes with foreign aid and technical support from the Food and Agriculture Organization of the United Nations (FAO). In 1978, the National Forestry Policy was implemented with the aim of achieving a stable forest resource base. Under this policy, the system of Permanent Forest Estates (PFEs) was set up and these have been the cornerstone of Malaysia's policy for sustainable forest management. PFEs are areas of forest set aside for the purposes of production, protection, provision of amenities or research and education and these estates cover 14.19m hectares or 43.2% of Malaysia's total land area (Anon., 2004c). All logging operations on PFEs and State land must have approval from the State Forestry Department. In 1993, the National Forestry Policy was revised to take into account the emerging issues of conservation of biological diversity, sustainable use of genetic resources and involvement of local communities in forest development (Shaharuddin, 1999). Recent amendments in State forest laws (*Sabah Forest Enactment [1992]*; *Sarawak Forest Ordinance [1996]*; *National Forestry Act [1993]*) contain provisions for curbing and controlling forest crimes, including illegal logging and laundering of timber. They allow the imposition of much higher fines and penalties for forest crimes than previously. (It should be noted that the *National Forestry Act* applies only to Peninsular Malaysia and that forestry legislation is not, therefore, under centralized, nationwide control.)

Certification of sustainably managed forest products was initiated in Malaysia in 1996 when a joint working group of Dutch and Malaysian researchers carried out a pilot study on timber certification. Certification criteria were based on the *Criteria, Indicators, Activities and Management Specifications for Forest Management Certification in Peninsular Malaysia* (MC&I), which in turn were based on 1992



Credit: WWF-Canon, Edward Parker

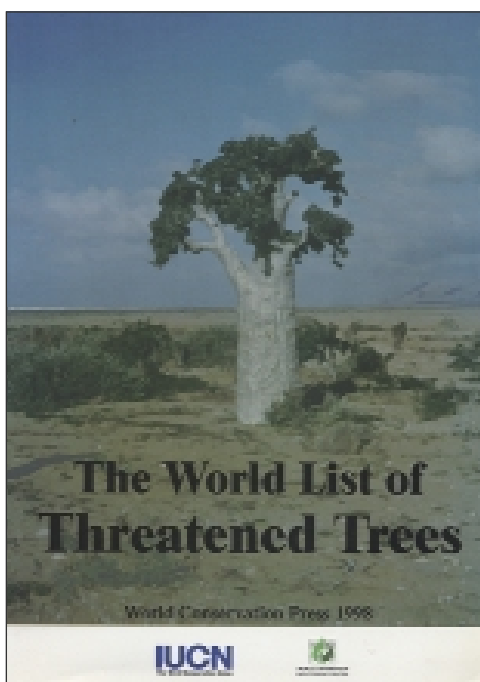
Meranti (Dipterocarpaceae) timber from FSC-certified forest in Malaysia, being used to make parasols for the European market

ITTO criteria and indicators. The development of the MC&I is co-ordinated by the Malaysian Timber Certification Council, which was established in 1997 to plan and operate a timber

certification scheme in Malaysia and to encourage sustainable forest management, as well as to facilitate the country's timber trade.

Malaysia's forestry industry, managed according to certain national laws and systems, including those outlined above, makes a valuable contribution to the country's economy. Given the national impetus for development, the Malaysian Government contests vigorously any force that it believes might affect its forestry industry adversely. In particular, Malaysian officials find it difficult to accept pressure to safeguard tropical forests from further harm and loss from groups based in developed countries. The recently retired Prime Minister, Yang Amat Berbahagia Tun Dr Mahathir Mohamad, expressed this in his speech on launching the Science, Technology and Environment Ministry's Silver Jubilee celebrations at Putra World Trade Center, saying that while the developed countries had destroyed their forests, it was "not fair for them to ask us to earn less from our forests. Malaysians and local non-governmental organizations should not get carried away with the so-called environmental consciousness of the foreigners until we are forced to sacrifice our forests' economic importance for their comfort" (*New Straits Times*, 3 July 2001).

The World List of Threatened Trees and the Tree Conservation Database



The World List of Threatened Trees, Oldfield et al., 1998.

an electronic supplement to *The World List of Threatened Trees*. A standardised data collection form was designed specifically to provide a framework for experts to provide data on threatened tree species. Over 300 experts completed several thousand copies of this data form.

The *World List of Threatened Trees* report and the associated *Tree Conservation Database* were developed by the World Conservation Monitoring Centre (WCMC) in collaboration with the IUCN Species Survival Commission (SSC) and other experts worldwide, as part of the *Conservation and Sustainable Management of Trees* project funded by the Netherlands Government. The FAO, the Centre for International Forestry Research (CIFOR), the International Centre for Research in Agro-Forestry (ICRAF) and the International Plant Genetic Resources Institute (IPGRI) are just some of the specialist bodies consulted during the project. *The World List of Threatened Trees* provides information on the conservation status of over 7300 tree species of global conservation concern. The *Tree Conservation Database* provides more detailed information on these species and as such is an

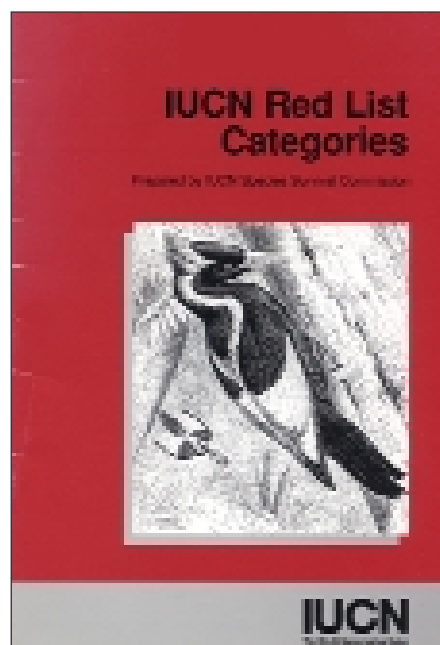
Information on distribution, uses, ecology and threat level is provided for every threatened tree species listed in the report. Threat categories were evaluated using the *1994 IUCN Red List Categories and Criteria* (see **Appendix 1**). In collating records of the conservation status of the world's threatened trees, the *Threatened Trees* list provided information that had been previously unavailable, scarce or scattered. In developing *The World List of Threatened Trees* and the *Tree Conservation Database* (hereafter referred to jointly as the *Threatened Trees* list), an exercise was carried out to assess potential user needs. Over 500 organizations and individuals, including some from Malaysia, were sent questionnaires. Amongst 80 potential user organizations that responded, 72% placed national conservation status of species as a priority information requirement. Not only is information on the threat status of individual species essential for planning conservation policy for those species, but it is also useful as an indicator of ecosystem status. The *Threatened Trees* list compiled information in a way that is particularly useful in reflecting overall species diversity in the forest ecosystem and is a potentially valuable tool, therefore, for the support of national forest conservation policy and management objectives, such as sustainable timber production and the designation of protected natural forests.

The *Threatened Trees* list makes a number of recommendations for political, scientific and educational actions for the conservation of threatened trees. It urges that the primary focus for action needs to be at a national level and that international conservation instruments should reinforce these national efforts.

The IUCN Red List Categories and Criteria

As already mentioned, the *Threatened Trees* list used the *1994 IUCN Red List Categories and Criteria* for evaluating the conservation status of each species it listed. These categories and criteria are described briefly below, as background information for the main findings of this study.

The IUCN system for categorizing threat is intended to provide an explicit, objective framework for the classification of species according to their extinction risk. The 1994 version of the IUCN Red List Categories and Criteria specified six categories of threat: Extinct (EX), Extinct In The Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), and Lower Risk (LR), indicating a descending order of seriousness of threat. The last-mentioned was also differentiated to include the categories Conservation Dependent (CD), Near Threatened (NT) and Least Concern (LC).



The 1994 IUCN Red List Categories and Criteria

Two further categories, without threat indication, were Data Deficient (DD) and Not Evaluated (NE). These categories were applicable to any taxonomic unit at or below species level. Sets of associated criteria determined which category of threat was applicable (see **Appendix 1**).

The IUCN Red List Categories and Criteria underwent extensive review at the end of the 20th century, which resulted in the development and adoption of the *2001 IUCN Red List Categories and Criteria*. These have replaced the *1994 IUCN Red List Categories and Criteria* and are described by IUCN as “clearer, more open and easy-to-use” than the 1994 version (Anon., 2003b). The categories “Lower Risk/Least Concern” and “Conservation Dependent” do not exist in the *2001 IUCN Red List Categories and Criteria*.

In discussing the application of the IUCN Red List Categories, the *Threatened Trees* list noted several important points:

- The category of threat is not necessarily sufficient to determine priorities for conservation action. The *1994 IUCN Red List Categories and Criteria* state this, adding that “The category of threat simply provides an assessment of the likelihood of extinction under current circumstances, whereas a system for assessing priorities for action will include numerous other factors concerning conservation action such as costs, logistics, chances of success, and even perhaps the taxonomic distinctiveness of the subject.”
- The *1994 IUCN Red List Categories and Criteria* state that “The criteria for determining a category of threat are most appropriately applied to whole taxa at a global scale”. IUCN was then in the process of developing guidelines for the use of national Red List categories. These guidelines are now published (see <http://www.iucn.org/themes/ssc/redlists/regional-guidelines.htm>). There is also a detailed set of guidelines on how to apply the Red List Criteria, which is available from the IUCN Species Survival Commission website (see <http://www.iucn.org/themes/ssc/red-lists.htm>).
- Although the *1994 IUCN Red List Categories and Criteria* were considered much more likely to produce objective results than previous versions of the same, there was still considerable scope for subjectivity in their use. For example, the same species was classed by one assessor using these Criteria as “Data Deficient” and as “Critically Endangered” by another. In such cases of divergent views, the compilers of the *Threatened Trees* list acted as referees and applied the Category that appeared more appropriate, in consultation with the assessors. To reduce the possibilities of such conflicting interpretations, rules have now been developed for addressing such uncertainty and a software package called *RAMAS Red List* has been developed to assign Red List Categories to taxa according to the rules of the IUCN Red List Criteria. This software has the advantage of being able to handle uncertainty in the data. There is an underlying premise of “erring on the side of conservation” in dealing with uncertainty according to the *1994* and *2001 IUCN Red List Categories and Criteria* - but assessment also needs to be credible and all assessments are also open to review through a petition process (Anon., 2003b).

- The listing of species should be seen as a dynamic process that allows re-evaluation based on new information and further debate on categorization.

CITES - the Convention on International Trade in Endangered Species of Wild Fauna and Flora

In view of the fact that those surveyed for this study frequently made a strong link between the *Threatened Trees* list and CITES, background information on CITES is provided here.

CITES is an international agreement between governments that aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. It entered into force in 1 July 1975 and, at the time of writing, had 166 member countries, or Parties. CITES works by subjecting international trade in specimens of selected species to certain controls. These require that all international trade of species covered by the Convention has to be authorized through a licensing system. The species covered by CITES are listed in three Appendices, according to the degree of protection they need. Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances. Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid use incompatible with their survival and Appendix III contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade.

CITES has strict procedures for voting before any species can be included in either Appendix I or II. A proposal to list a new species in the Appendices, or to amend the existing Appendices, is normally made at a meeting of the Conference of the Parties (or “CoP”) and is only successful when supported by a two-thirds’ majority of Parties present and voting. Such proposals contain biological and trade information relating to the species in question. The criteria according to which a species is judged suitable for listing in the Appendices are listed in **Appendix 4** of this report. These criteria are periodically reviewed and, at CoP12, in Chile, in November 2002, CITES Parties agreed terms of reference for review of the criteria before CoP13, taking place in Thailand in October 2004.

Malaysia has been a CITES Party since 1977.

METHODOLOGY

TRAFFIC Southeast Asia co-ordinated development of this project and contracted a consultant to analyse information from the *Threatened Trees* list. The consultant also conducted interviews in person, by email, or telephone, with 21 experts from Forestry Departments, the timber industry, academic and research institutions and others in Malaysia concerned with forestry, and with a few foreign forestry experts working on projects in Malaysia. The interviews, conducted in late 1999 and early 2000, were designed to gauge reactions to, and views on, the *Threatened Trees* list.

The review of a draft version of this report by one of the compilers of *The World List of Threatened Trees* and by the IUCN/SSC Red List Programme Officer, in order to allow responses to queries raised during interviews in Malaysia, was instrumental in shaping the final version.

Although the IUCN Red List Categories and Criteria have been updated since the *Threatened Trees* list was prepared, this study refers to the 1994 Categories and Criteria unless otherwise mentioned, as these were used by the *Threatened Trees* list.

Exchange rates for the Malaysian ringgit were derived from <http://www.oanda.com/>.

RESULTS

Analysis of information from the *Threatened Trees* list relating to Malaysia

Summary of threat categories assigned to tree species in Malaysia

The *Threatened Trees* list includes 925 tree species for Malaysia under varying categories of threat and 958 tree species in total for Malaysia (**Table 1**). *Mangifera rubropectata* and *Shorea cuspidata* are classified as Extinct in the Wild and Extinct, respectively. In these and the Critically Endangered, Endangered or Vulnerable categories, there are 739 species; the other 186 tree species are considered less threatened or, in the case of 33 species, impossible to evaluate owing to insufficient data (Data Deficient).

Table 1

Summary of threat categories (including Data Deficient) for the 958 tree species listed for Malaysia in the *Threatened Trees* report

EX	EW	CR	EN	VU	LRcd	LRnt	DD	Total
1	1	197	106	434	116	70	33	958

Note: EX=Extinct; EW=Extinct in the Wild; CR=Critically Endangered; EN=Endangered; VU=Vulnerable; LRcd=Lower Risk/conservation dependent; LRnt=Lower Risk/near threatened; DD=Data Deficient

Source: Anon., 1998a.

Malaysian tree taxa listed in the Threatened Trees list, grouped by category of threat

Sixty-six tree families in Malaysia are included in the *Threatened Trees* list (see **Appendix 3**). These include both timber species and non-commercial tree species. Of the 958 species found in Malaysia included in the *Threatened Trees* list (see **Table 1**), 175 species were considered to be non-commercial and not in trade. Of the species in Malaysia that were placed in the Critically Endangered category, 187 are used commercially and 10 are non-commercial species. Of those in the Endangered category, 98 are traded species and eight species are non-commercial, while of those in the Vulnerable category, 333 species are traded and 101 species are non-commercial (Anon., 1998a). In other categories, 78 traded species were placed in the Lower Risk/conservation dependent category, 59 traded species were Lower Risk/near threatened and 24 traded species were categorized as Data Deficient (Anon., 1998a). In summary, out of the 779 traded tree species in Malaysia included in the *Threatened Trees* list, 618 species were considered to be under serious threat while 137 species were considered to be at low risk of threat. The main types of traded timber species in the Critically Endangered, Endangered and Vulnerable categories of threat in the *Threatened Trees* list are shown in **Table 2**.



Credit: WWF-Canon Gerald S. Cubitt

Dipterocarp rainforest in Taman Negara National Park, Peninsular Malaysia

The most prominent tree families in Malaysia listed in the *Threatened Trees* list are given below, with the number of species listed for each family in brackets.

Dipterocarpaceae (264 species);
Myristicaceae (99 species);
Myrtaceae (40 species);
Euphorbiaceae (37 species);
Burseraceae (30 species);
Rutaceae (22 species);
Leguminosae (22 species).

For a list of all tree families in Malaysia listed in the *Threatened Trees* list, together with the number of species listed for each and timber trade names, where applicable, see **Appendix 3**.

Table 2

Principal traded timber species in the Critically Endangered, Endangered and Vulnerable categories of threat in the *Threatened Trees* list

Species (by trade name)	Categories of threat	Number of species
Keruing	<i>Dipterocarupus</i> spp. CR, EN	25, 4
Red Meranti	<i>Shorea</i> spp. CR, EN	23, 6
Light Red Meranti	<i>Shorea</i> spp. EN	4, 6
Yellow Meranti	<i>Shorea</i> spp. CR, EN	18, 2
White Meranti	<i>Shorea</i> spp. CR, EN	8, 8
Meranti	<i>Shorea</i> spp. CR	6
Resak	<i>Vatica</i> spp. CR, EN	23, 16
Merawan	<i>Hopea</i> spp. CR, EN	21, 9
Balau	<i>Shorea</i> spp. CR, EN	14, 8
Giam	<i>Hopea</i> spp. CR, EN	9, 3
Kapur	<i>Dryobalanops</i> spp. CR, EN	1, 4
Mersawa	<i>Anisoptera</i> spp. CR, EN	4, 4
Kelat	CR, EN, VU	4, 4, 18
Medang	CR, VU	4, 12
Kedondong	EN, VU	1, 19
Kayu Malam	EN, VU	1, 7
Nyatoh	EN, VU	1, 6
Machang	EN, VU	3, 6
Penerahan	VU	36
Penarahan	VU	34
Ramin/Melawis	VU	14
Delek	VU	10
Sengkurat	VU	9
Samak	VU	8
Durian, Mata Ulat and Mempoening	VU	6 spp. each
Others	CR	1-4 spp. each

Note: Trade names used follow those used in the *Tree Conservation Database* and additional common/trade names were obtained from the *Pocket Check List on Timber Trees* (Wyatt-Smith, 1999). In many cases, trade names, which may encompass a number of different species or even genera, do not readily correlate with scientific nomenclature.

Sources: Anon., 1998a and Wyatt-Smith, 1999.

Two hundred and fifty of the total of 264 Malaysian dipterocarp species in the *Threatened Trees* list are classified in the two most serious threat categories (Critically Endangered and Endangered) (see **Table 3**). While there are 172 dipterocarp species classified as Critically Endangered, for the other tree families the number of species in this category ranged from only one to four species each. The dipterocarps also have the highest number of species (78) in the

Endangered category, while the other 65 tree families listed have only one to three species each in this category. The dipterocarps are by far the most important group of commercial tropical timbers in Malaysia in terms of quality and quantity produced and the perceived degree of threat for such an important group of tree species clearly points to a need for enhanced forest management, to mitigate any negative consequences for Malaysia's timber industry and forests.

Table 3

Malaysian dipterocarp species (by trade name) in the *Threatened Trees* list, showing category of threat

Trade name	Species	EX	CR	EN	VU	Total
Keruing	<i>Dipterocarpus</i> spp.		25	4	2	31
Red Meranti	<i>Shorea</i> spp.		23	6	2	35
Light Red Meranti	<i>Shorea</i> spp.		4	6		10
Dark Red Meranti	<i>Shorea</i> spp.		2	2		4
Yellow Meranti	<i>Shorea</i> spp.	1	18	2		21
White Meranti	<i>Shorea</i> spp.		8	8		18
Meranti	<i>Shorea</i> spp.		6			6
Meranti bakau	<i>Shorea uliginosa</i>				1	1
Melantai	<i>Shorea macroptera</i>		2	2		4
Resak	<i>Vatica</i> spp.		23	16	3	42
Merawan	<i>Hopea</i> spp.		21	9	2	32
Balau/Selangan batu/red balau	<i>Shorea</i> spp.		18	9		27
Giam	<i>Hopea</i> spp.		9	3	2	14
Kapur	<i>Dryobalanops</i> spp.		1	4		5
Mersawa	<i>Anisoptera</i> spp.		4	4		8
Gerutu	<i>Parashorea</i> spp.		2	2		4
Penyau	<i>Upuna borneensis</i>			1		1
Chengal	<i>Neobalanocarpus heimii</i>				1	1
Total dipterocarps		1	172	78	13	264
All species in Malaysia in the <i>Threatened Trees</i> list		1	197	106	434	958
% of all species in Malaysia in the list which are dipterocarps		100	87.3	73.6	3	27.6

Note: Trade names used follow those used in the *Tree Conservation Database* and additional common/trade names were obtained from the *Pocket Check List on Timber Trees* (Wyatt-Smith, 1999). In many cases, trade names, which may encompass a number of different species or even genera, do not readily correlate with scientific nomenclature.

Sources: Anon., 1998a and Wyatt-Smith, 1999.

Causes of threats to tree species in Malaysia

From the *Tree Conservation Database*, it is possible to compile information on the causes of threat to tree species in Malaysia (**Table 4**). As can be seen from **Table 4**, expansion of human settlement, clear-felling and logging of habitats, tourism/leisure activities and extensive agriculture are the prime threats. All other threat types affected a significantly lower number of tree species.

Table 4

Causes of threat to tree species in Malaysia, as identified in the *Threatened Trees* list¹

Causes	CR	EN	VU	LRcd	LRnt	DD	Total
Expansion of human settlement	9	16	123	52	10	5	215
Felling/logging of the habitat	25	21	97	19	9	2	173
Tourism/leisure activities	1	6	23	30	2	1	63
Extensive agriculture	8	3	29	14	3	2	59
Forest management ²	0	0	9	1	0	2	12
Commercial use	0	1	9	0	0	0	10
Mining/exploration	1	0	6	1	0	1	9
Intensive agriculture	0	0	3	0	0	0	3
Local use	0	0	2	1	0	0	3
Burning	0	1	2	0	0	0	3
Commercial plantation development	0	1	1	0	0	0	2
Infrastructural development	0	1	1	0	0	0	2
Charcoal/fuel wood production	1	0	0	0	0	0	1
Poor regeneration	0	1	0	0	0	0	1
Total	45	51	305	118	24	13	556

Note: ¹ The various causes of threat were not further defined in the *Threatened Trees* list. Not all tree species in Malaysia in the *Threatened Trees* list are included ² Presumably this threat type includes inefficient and otherwise inadequate forest management.

Source: Anon., 1998a.

Malaysian commentary on the *Threatened Trees* list

The reactions of those consulted for their views on the *Threatened Trees* list (report and database - see **Methods**) ranged from technical and methodological concerns to policy and political considerations. In general, the respondents were supportive of the *Threatened Trees* list and felt that it was a good attempt to identify threatened tree species in a systematic and comprehensive manner. All those interviewed acknowledged that it represented a laudable effort. The respondents agreed that the list served as a “wake up call” for all who were concerned with conservation. Its publication had served to inform everyone concerned with

forestry, conservation and biodiversity issues. However, the *Threatened Trees* list was otherwise not well received and all respondents were of the opinion that the report was by no means perfect and needed re-examination and confirmation of information used, including ground-truthing of data.

In the synopsis of views that follows, those consulted for their views on the *Threatened Trees* list are referred to as “respondents”. An attempt has been made to group comments of a similar vein (*Commentaries*) and a discussion of each group of comments follows its presentation (*Points to consider*).

Lack of consultation with Malaysian stakeholders

Commentary

Most respondents felt there had been little or no consultation or discussion between the assessors working on the *Threatened Trees* list and the local experts and forest managers. As such, the whole exercise was perceived to be very much based on judgement and decision-making of a unilateral nature. Specifically, the respondents from the Forestry Departments in Malaysia stated that they felt that the *Threatened Trees* list represented a unilateral endeavour, though they were as concerned about the conservation of tree species as IUCN. Respondents felt that the accuracy of the threat categories for different tree species needed to be re-examined because of this. Forest Management Authorities in Malaysia felt they were not given the chance to make an effective response to the assessments of Malaysian tree species contained in the *Threatened Trees* list. The fact that the State of Sabah had banned the export of Belian *Eusideroxylon zwageri* before the report listed the species as Vulnerable was given as an example of information that it was felt was not reflected in the report. Respondents also pointed out that efforts being made in improving forestry management in Malaysia (for example, the Sustainable Forest Management (SFM) promoted by the Forestry Departments of Malaysia), which could contribute to the survival of species, had not been taken into account.

Some officials expressed concern about a possible "hidden agenda" in publishing this long list of threatened timber species without extensive discussion and "ratification" by the countries concerned. They indicated one of the possible beneficiaries would appear to be the timber plantation industry in some temperate regions.

Points for consideration

Assessment of the tree taxa endemic to Peninsular Malaysia and that of a few other groups of trees was carried out for the *Threatened Trees* list under contract by the Forest Research Institute of Malaysia (FRIM). Despite this, respondents clearly felt that there had been insufficient consultation with Malaysian stakeholders and this view should be heeded and taken into account in any update of the *Threatened Trees* list. Indeed, there is now a more rigorous peer review system in place for Red List assessments, which encourages assessors to consult as widely as possible through a system of Red List Authorities that have signed up to fixed terms

of reference. There is also a National Level Working Group to encourage and develop better communication between activities at the national level and the global level. Further, if stakeholders disagree with a particular listing, there is a petition process in place whereby they can challenge the categorization of a species in the IUCN Red List (C. Hilton-Taylor, IUCN/SSC Red List Programme, *in litt.*, 19 November 2003). The author did not come across any evidence that Malaysia had provided information to challenge any of the listings in the *Threatened Trees* list.

Notwithstanding the above, it should be pointed out that exhaustive collection of stakeholders' views would create a huge administrative burden that would seriously impact on the production of any future edition of the list. Moreover, in the final analysis, in the interests of scientific credibility and the independence of the list, these views may not necessarily sway assessments of conservation status according to the IUCN Red List Criteria.

Regarding the concern that efforts being made to improve forestry management in Malaysia had not been taken into account by the *Threatened Trees* list, respondents should be reassured that any positive effects of such efforts would be captured through application of the IUCN Criteria.

Quality of information used as the basis for deciding threat categories

Commentary

Respondents recognized that the assessors could not have visited all the dipterocarp forests before categorizing these species and some respondents believed evaluations of their conservation status were therefore based on dubious data. For example, where no better information was available, assessors were allowed to make preliminary evaluations using indirect means. This could mean using information on historical distribution of taxa to estimate current distribution, to determine, in turn, the rate of loss of the taxa. The respondents were convinced that this "intelligent inference" was encouraged and used more often as a method of assessing the conservation status of taxa than were fully quantifiable data.

Points for consideration

It is perhaps self-evident that there is very little probability for any study to carry out an exhaustive status check of tree species on the ground. The financial and manpower resources needed would make it near impossible to do. The IUCN Red List Criteria do not require that every population of a species is assessed - the use of estimation, extrapolation and inference is perfectly acceptable provided it is justified - and indeed the Malaysian inventory system follows similar methods to extrapolate data from sample plots. For example, at the Forest Research Institute of Malaysia (FRIM), an attempt has been made to use inventory data to assess the conservation status of timber species (L. G. Saw, FRIM, pers. comm., November 2000). By using these data, Saw assessed the number of different species of trees per hectare and estimated the total number of standing trees of a particular species for different categories of forest (logged-over, production, protected) and ultimately for whole of Malaysia. The pitfalls of such

methods of assessment are recognized (i.e., it is a relatively “blunt tool”), but the approach on which the *Threatened Trees* list is based would seem appropriate to arrive at preliminary status information, at least, which could be used to guide further studies.

Studies underway in Malaysia may be used to complement findings from the *Threatened Trees* list. FRIM and the Forest Research Centre at Sepilok, Sabah, are in the process of preparing a database of all the herbaria in the country (L.G. Saw, FRIM, pers. comm., November 2000). The Botanical Research and Herbarium Management System, or BRAHMS, is used to process the data. With this system, it is possible to prepare a distribution map for a particular species, showing where the species exists or used to exist. If a current land use map is laid over the species distribution map prepared from BRAHMS, then any land use change will indicate whether a species is still likely to be found in a particular habitat. This exercise should be helpful in measuring threat categories at the national level against the global threat categories assigned in the *Threatened Trees* list. Similarly, inventory data, such as those provided by national forest inventories and inventories being carried out in all the Virgin Jungle Reserves in Peninsular Malaysia (L.G. Saw, FRIM, pers. comm., November 2000) could also be useful sources of information for complementing or refining information for Malaysian trees in the *Threatened Trees* list.

Perceived inadequacy of the IUCN Red List Criteria

Commentary

Respondents noted that use of the IUCN Red List Criteria to assess the conservation status of species evaluated in the *Threatened Trees* list was unwavering. While there was general agreement that the Criteria seemed to be the best available at present for assessing the conservation status of fauna and flora, they questioned several particular aspects of the Criteria, as outlined below.

- Respondents believed that the Criteria were quite **restrictive in scope**. In other words, they took no account of conservation measures underway or of a country’s need to develop, for example.
- Respondents questioned the reason for only one set of Criteria for all species of flora and fauna. They wondered whether it were not possible to have a separate set, for example, for longer-lived tree species. They were concerned that the most frequently used criterion used for assessing species was Criterion A, namely that relating to population reduction in the form of “an observed, estimated, inferred or suspected reduction....over the last 10 years or three generations, whichever is the longer”. Respondents were aware that, for slow-growing trees, three generations could mean at least 150 years. As a result, many such species fall under the Critically Endangered, Endangered and Vulnerable categories and it was felt that, **for assessing long-living timber trees, the IUCN Red List Criteria should be re-examined** and adapted.

- It was felt that **the Criteria could not cope adequately with a range of interpretations** from different assessors regarding the level of threat. It was thought that this could lead to inconsistency in categorization. For example, while one assessor might consider a species “safe”, because a certain number of mature trees of the species were extant, another assessor might consider the same number of living trees insufficient. It was not clear how these divergent views were taken into account in designing the 1994 Criteria. Respondents stated that they would like to see subjective scoring methods replaced with more objective methods, based on actual inventory data. Moreover, some of them believed that scoring of conservation status should be carried out by a panel of experts, rather than by a single expert, especially when a large group of important commercial timber species, such as the dipterocarps, was being assessed.

Points for consideration

Strict - “unwavering” - application of the Criteria regardless of national context is exasperating to some in Malaysia, in view of Malaysia’s forest policy which has to foster development, based on natural resource use. Moreover, respondents were aware that Malaysia had not been blind to conservation issues and that it had undertaken management and conservation measures for its forests. For example, about 14 million hectares (43% of Malaysia’s total land area) had been set aside as PFE (Permanent Forest Estate) lands, i.e. kept under permanent forest cover by law (Anon., 2004c). Of these, an estimated 3.6 million ha were classified as protected forest (with the balance of 10.5 million ha as production forest) (Anon., 2004c). Additionally, Malaysia has a network of national parks, wildlife sanctuaries and Virgin Jungle Reserves which account for a further 1.8 million ha of forest that is given full protection from exploitation (Anon., 2004c). Clearly, however, these measures were not sufficient to deflect the applicability of the Criteria for threatened status to many Malaysian tree species and it is necessary that the Red List Criteria are used unwaveringly, so that the whole purpose of following a set of rules is not undermined.

Respondents questioned the reasons for only one set of criteria for all species of flora and fauna. They queried whether it would not be possible to have a separate set for longer-lived trees. However, the IUCN Red List Categories and Criteria are accepted as an international standard and have been endorsed by the Convention on Biological Diversity (C. Hilton-Taylor, IUCN/SSC Red List Programme, *in litt.*, 19 November 2003). The three-generation period (see *Commentary* above) is used precisely to take account of these longer-lived species and, although for these trees three generations could mean at least 150 years, the three-generation rule is nonetheless correctly applied as a biological criterion when looking at extinction risk. Over 250 dipterocarp species of South-east Asia have been classified as Critically Endangered, owing to very rapid rates of forest loss and land clearing for development over the past 45 years, which has indeed meant that some commercially used tree species have shown a decline in much less than three generations. As the IUCN Red List Criteria are for evaluating risk of extinction - and not the need for countries to develop and industrialize - there is no reason for the time frame for assessing extinction risk to be tied to political or economic conditions and, indeed, to do so would be indefensible biologically. Criterion A of the *1994 Red List Categories and Criteria* (see *Commentary* above) has been revised in the *2001 Red List Categories and*

Criteria, but it is unlikely that reassessment of the same tree species evaluated in the *Threatened Trees* list, based on the same information but using the new Red List Categories and Criteria, would result in modification of the original results.

On the question of how the divergent views of different assessors were taken into account, respondents should be reassured that the Red List Criteria are designed to cope with such problems, for example by identifying and acknowledging any assumptions as part of documentation requirements. The *2001 IUCN Red List Categories and Criteria*, which have replaced the *1994 IUCN Red List Categories and Criteria*, state that any assumptions must be “appropriate and defensible and the data used and the uncertainty in the data or quantitative model must be documented” (Anon., 2003b). As noted above, the likelihood is that reassessments of the trees assessed in 1997-1998 using the 2001 Criteria but the same data would result in the same categorization for most of the species (C. Hilton-Taylor, IUCN/SSC Red List Programme, *in litt.*, 19 November 2003). Some might be more threatened, given the addition of Criterion A4, but there could be a few species, used under a controlled management programme, that might be listed as less threatened under criterion A1 (C. Hilton-Taylor, IUCN/SSC Red List Programme, *in litt.*, 19 November 2003).

Format of Threatened Trees list

Commentary

Respondents questioned the necessity for such a voluminous publication on the world's threatened trees and felt that the majority of users of the *Threatened Trees* list, especially those in developing countries, including Malaysia, would only need information on a regional basis or, at most, on a national basis. This appeared to be borne out by the “needs assessment”, conducted in preparation for the *Threatened Trees* list, which found that 72% of 80 potential users placed information on species' national conservation status as a priority requirement. Respondents believed that those using information contained in the *Threatened Trees* list, i.e., organized on a global basis, were in the minority and that it therefore might have been more practical, useful, and cheaper, to produce national or regional reports.

The respondents were of the opinion that the development of the database had been made unnecessarily complicated and that it was very tedious and difficult to try to retrieve the required data and information unless one was well versed in computer skills. The compact disc produced to accompany the *Threatened Trees* list was not thought to be particularly “user-friendly”.

Points for consideration

The production of separate national reports was not the aim of the *Threatened Trees* list. Inherent weaknesses of any database are acknowledged in **Box 1** and these, while not directly related to ease of use, point to the difficulties entailed in creating a universally acceptable database.

Weaknesses of data collection methods used for the Threatened Trees list not sufficiently prominently acknowledged

Commentary

Respondents felt that the weaknesses of the data collection methods of the *Threatened Trees* list had not been sufficiently highlighted and that this could lead to some users accepting the list as absolute truth if they were not aware of these shortcomings. This, it was feared, could polarize further the conflict between the users and managers of forest resources, on the one hand, and conservationists, on the other. This is partly because Malaysia was a target of the anti-tropical timber trade lobby in Europe during the 1980s and 1990s and support for this lobby by consumers has the potential adversely to affect the demand for Malaysian timber. At the same time, a movement of consumers away from Malaysia might simultaneously benefit its competitors, including those countries which are facing problems in the administration and management of their forest resources, hence creating opportunities for unscrupulous businesses in such countries to undercut prices.

Box 1

Possible weaknesses of data used for the *Threatened Trees* list

During development of the *Tree Conservation Database*, much emphasis was placed on harmonization of data from various sources, as well as on management of data quality. Despite these efforts, possible weaknesses of the database - of any database - are acknowledged (Sneary, 1998) and are summarized below:

- There can be no absolute measure of the quality of a dataset. Data considered as high-quality for regional planning may become low-quality for localised planning because of different requirements for scale, detail and accuracy.
- Datasets may not be 100% accurate because data are often based on subjective observation (e.g., decisions over the boundary of a habitat), incomplete sampling or indirect measurement (e.g., remote sensing).
- Even if it were theoretically possible to collect complete and accurate data, it is not practical to do so because it takes too much time and incurs high expenditure. Therefore, datasets will generally contain an element of error and uncertainty.
- "Quality" and "fitness for use" of the datasets are relative to the proposed or intended use. This is a very important consideration when datasets are integrated and applied beyond the original purpose of data collection.

Subsequent to the *1994 IUCN Red List Categories and Criteria*, an improved approach has been put in place to deal with uncertainty in data. As a result, the comments on the weaknesses of data collection methods used for the *Threatened Trees* list have mostly been addressed.

Points for consideration

The *Threatened Trees* list acknowledged its weaknesses related to data collection and management (see **Box 1**). It does not purport to be a comprehensive and definitive authority on the status of the world's tree species but rather, as it puts it, "a first survey". Despite this, the concern that some readers may be inclined to accept the list as absolute truth was strongly felt. As outlined in **Background**, any movement which could negatively affect Malaysia's Gross Domestic Product is strongly questioned by officials in Malaysia.

Questionable ranking of "most frequently recorded threats to globally threatened tree species" in the Threatened Trees list

Commentary

Respondents were concerned about the report's perception that the major threat to the conservation of globally threatened tree species was "felling". They felt that other threats, especially conversion of land ("agriculture"), were just as significant, if not more so. They noted that, as Malaysia was developing rapidly, activities to convert forest areas to other forms of land use, especially use for agriculture and forest plantation, were still very active. Related to this, it was felt that the category "felling" was too broad, since clear felling, which is mainly associated with land conversion, and selective felling were indistinguishable within the term.

Points for consideration

It is perhaps not surprising that respondents questioned the ranking of "felling" as the prime threat to globally threatened tree species, since when threats are ranked for Malaysia only, as opposed to globally, "Expansion of human settlement" is the most prominent threat, not felling (**Table 3**). It is possible, therefore, that respondents were unduly conscious of the threat from land conversion ("expansion of human settlement") in Malaysia when they questioned the global ranking of threats.

The feeling among respondents that the threat from conversion of land, for example for agricultural use, was just as significant as "felling" may be better understood if considered in the context of Malaysia's development policy, including forest policy, over recent decades (see **Background**). These policies and corresponding strategies have ushered in intensive conversion of forest land for a variety of uses, including industrial, agricultural and urban uses and for infrastructural development. In the initial years of growth, the country's economic dependence was on agriculture, pending the in-flow of foreign investments to build the secondary and tertiary industries, including manufacturing. Land is designated by each State for use in support of development and this land can be converted for agriculture or other use. In 2000, according to the Malaysian Palm Oil Board, the total land area under tree crop (comprising oil palm (3376 million ha); rubber (1.43 million ha); paddy (667 000 ha); and cocoa, coconut, pepper, pineapple, tobacco, coffee, tea and sugarcane) amounted to 5.76 million ha. In many cases, these lands, if forested, will be logged before land conversion is carried out.

While Malaysia has developed rapidly and activities to convert forest areas to other forms of land use are still very active, once Malaysia's rate of development steadies, the rate of conversion may be less rapid, at least in Peninsular Malaysia, and this category of threat may decline in prominence as a result. However, there are large areas of forested land still available for conversion to plantations in Sarawak and possibly Sabah.



Credit: WWF-Canon, Sylvia Jane Yorath

Felled forest cleared to plant a first crop of oil palm, Sabah

Regardless of Malaysia's high rate of land conversion, respondents may also have questioned the prominence of "felling" as a threat since there is evidence from Malaysia to show that forest regeneration following logging does occur. Samin (2001), in a study in Sabah, Malaysia, found that water turbidity, colour, pH, electrical conductivity and suspended solids were high after logging activities, but reverted to normal four months after logging operations had stopped. Inventory work carried out recently using a computer simulation programme (DIPSIM Simulation Model) for the three Forest Management Units (FMUs) in Sabah, covering about 400 000 ha, was able to show that the severely logged-over forests in question could recover in 20-30 years to become rich timber production areas again, although not necessarily with similar proportions of species as before (C.L. Ong, pers. comm., July 2000). Subsequent harvests in these cases may be based on fewer species or on a different mix of species and non-timber tree species could have been lost through the process (K.M. Wong, pers. comm., November 2000). Indeed, there are many other studies which report that logging operations affect forest regeneration (Adbulhadi *et al.*, 1981; Lee *et al.*, 2001), to say nothing of forest fauna.

Finally, in querying the degree of threat represented by felling, respondents may have taken into account the fact that the preparation and implementation of forest management plans is compulsory in Malaysia and that such plans have been adopted and implemented by each of the States in Malaysia. These plans outline the annual allowable cuts (AAC) and silviculture

prescriptions for forests, the minimum cutting limits for harvestable species and also specify the species that can be removed. Moreover, since 1978, forestry authorities in Malaysia have followed a system for logging - the Selective Management System (SMS) - that is in general use in forest management (Thang, 1988). The SMS was designed for logging hill forests and carries out selective felling according to a 30-year cutting cycle. For dipterocarp species the cutting limit is >50cm dbh (diameter at breast height) and >45cm dbh for non-dipterocarp species. The treatment which is applied to logged-over forests is dependent on stand condition, the criteria for securing an economic cut and on determining the most feasible way in which the stock may be replenished, either naturally or through planting.

Malaysia has also pioneered practices to reduce logging damage. These include tree marking for felling, timber tagging for identification and log removal, directional felling to reduce negative impact on residual stand, and reduced impact logging (RIL) harvesting technology. RIL was developed in response to concerns over the ecological and economic sustainability of harvesting natural tropical forest stands. RIL systems use an array of best harvesting techniques that reduce damage to residual forests, create fewer roads and skid trails, reduce soil disturbance and erosion, protect water quality, mitigate fire risk and potentially help maintain regeneration and protect biological diversity (Holmes *et al.*, 1999). Research on RIL in Malaysia has been intensified



Credit: WWF-Canon, Edward Parker

Controlled directional felling in a tropical rainforest in north Malaysia certified by the Forest Stewardship Council and producing Meranti timber for use in garden furniture.

and Sabah has already formulated standards and guidelines for RIL operations (Anon, 2001d). However, RIL has yet to be implemented State-wide or nation-wide, although some States have implemented aspects of RIL at selected sites.

Although respondents found the term “felling” unhelpful in its lack of specificity, the *Threatened Trees* list categorizes threats from land conversion separately from felling (as “agriculture” and “expansion of settlement”), so it is clear at least that these threats are not included in its categorization of “felling”. However, the *Threatened Trees* list does note that the relative importance of different threats implied by its ranking should be read with a degree of caution, since the threats “were recorded according to personal observations and assumptions” and there would be a “bias according to the geographical areas where most species information has been collected”.

In conclusion, respondents are right that land conversion is a major threat in Malaysia and also globally. However, the fact that Malaysia has taken steps to limit damage from felling and to balance development priorities with conservation requirements does not alter the fact that the *Threatened Trees* list may well be accurate in recording felling as the prime threat to globally threatened tree species.

Costs of verifying, and acting on, the findings of the Threatened Trees list

Commentary

Respondents indicated that a country such as Malaysia would have to make considerable effort to gather reliable data, in order to verify the findings of the *Threatened Trees* list for commercial timber species and that this would create an impact on the financial and manpower resources of such countries. Looking beyond these costs, there was concern over the additional costs that may accrue for concessionaires, contractors and Forestry Departments if a Malaysian assessment determined that extra protection of these species were required.

Points for consideration

The Malaysian State of Trengganu provides an example of the additional costs that may accrue for concessionaires, contractors and Forestry Departments where extra protection of tree species is required. The cost of harvesting timber in Trengganu has been estimated at MYR3952/ha (USD1032/ha) or MYR117/m³ (USD31/m³) - a cost which would increase to MYR6426/ha (USD1678/ha) or MYR199/m³ (USD52/m³), if conditions for sustainable forest management according to the Malaysian Criteria, Indicators, Activities and Standards of Performance for Forest Management Certification (MC&I) had to be met (see **Table 5**). Because of such increased costs for fulfilling MC&I conditions, the Malaysian Government is concerned that the competitive edge of Malaysian companies would be reduced, were such conditions to be more widely applied to Malaysian tree species. Whether or not this would be the case is a matter which would need investigation outside the scope of this study.

Table 5

Average total cost of harvesting activities per ha of timber production in Malaysia, for conventional practice and for practice in compliance with Malaysian Criteria and Indicators for certification of forest management

Activity	Conventional practice		Practice in compliance with Malaysian Criteria & Indicators	
	MYR/m3	%	MYR/m3	%
Management plan	8.10 (USD2.11)	0.21	37.92 (USD9.90)	0.59
Pre-felling activities	157.70 (USD41.17)	3.99	572 (USD149.35)	8.91
Road construction	130.24 (USD34.01)	3.30	1086.54 (USD283.69)	16.91
Felling and related operations	1860.26 (USD485.71)	47.07	2545.30 (USD664.57)	39.61
Taxation	1795.42 (USD468.78)	45.43	2174.26 (USD567.69)	33.84
Additional training on MC&I compliance	0	0	9.51 (USD2.48)	0.15
Total	3951.70 (USD1031.78)	100	6425.52 (USD1677.68)	100

Source: Mohd Shahwahid *et al.*, 2001

Concern that the Threatened Trees list will lead to an increase in the listing of Malaysian timber species in the CITES Appendices

Commentary

A large number of commercially important dipterocarp species have been included in the *Threatened Trees* list. There was concern from some respondents, including from the Forestry Departments in Peninsular Malaysia, Sabah and Sarawak, that this could lead to the listing of some of these species in the CITES Appendices (see **Background, CITES**). Respondents were aware that a report compiled for the CITES Management Authority of the Netherlands (Anon., 1998b) suggests using the *Tree Conservation Database* to identify potential candidates for the CITES Appendices and the *Threatened Trees* list itself cites the CITES Timber Working Group's recommendation that range States should "pay particular attention to internationally traded timber species within their territories for which knowledge of biological status and silvicultural requirements indicates concern".

The respondents' concern that commercially important Malaysian timber species might be listed under CITES stemmed from several quarters.

- Firstly, if the *Threatened Trees* list were substantially adopted by the Parties to CITES, then respondents from the timber industry and Government of Malaysia believed this would **adversely affect the timber industry through the application of trade restrictions**. In particular, representatives of the Malaysian Government feared that the listing of commercially valuable Malaysian tree species in Appendix I of CITES would mean a loss of income for the timber industry and Government of Malaysia. There was a belief among some respondents that CITES was a convention to ban trade in wild specimens of species.
- Secondly, respondents believed that there would be **burdensome costs for Malaysia** associated with implementing CITES if additional Malaysian tree species were listed under the Convention. They were reluctant that Malaysia should take on this extra financial liability. They believed, for example, that the extra research that would be necessary to support a CITES listing would require the diverting of resources (to fund such research), away from other pressing socio-economic issues, such as poverty-alleviation and development. They noted, as an example, that after many years of research and compilation of data in Sabah and Sarawak, only three out of eight volumes of the *Tree Flora of Sabah and Sarawak* had been published (Paul Chai, *in litt.*, 27 July 2001). Timber companies noted that CITES requirements would necessitate extra costs which would not have been factored into balance sheets. Of these extra costs, the most serious was assumed by the timber industry to be the higher costs involved with exporting.
- Thirdly, many respondents appeared to believe that timber products could only be identified in traded forms at the generic or group level, not at species level. They expressed concern, therefore, that there was every likelihood that some species may be included in the CITES Appendices under **the "look-alike" criterion** because their timber products could not be distinguished from those of threatened species (see **Appendix 4**).

Points for consideration

The respondents' concerns over the possible CITES-listing of some commercially important timber species may be considered to be based, at least to some extent, on misconceptions. Firstly, there is no direct link between an IUCN Red List assessment (i.e., those in the *Threatened Trees* list) and a CITES listing. They are two completely separate and independent processes, using separate and independent assessment criteria, but it appears that the respondents did not always appreciate this. (**Appendices 1 and 4** show the full IUCN Red List Categories and Criteria and the CITES listing criteria, respectively.) In the six years since the *Threatened Trees* list was published, no CITES listing has arisen directly as a result of the list (C. Hilton-Taylor, IUCN/SSC Red List Programme, *in litt.*, 19 November 2003) so the perception that the inclusion of species in the *Threatened Trees* list leads to their incorporation in the CITES Appendices is not borne out by reality. Secondly, and therefore, it is by no means certain how many of the species in the *Threatened Trees* list may become CITES-listed. The question has been addressed, by the report *Contribution to an evaluation of tree species using new CITES Listing Criteria* (Anon., 1998b), but the project which generated this report is still underway (Anon., 2000). None of the Critically Endangered or Endangered Malaysian tree

species prominent in trade and listed in the *Threatened Trees* list (see **Table 2**) are included in the version of *Contribution to an evaluation of tree species using new CITES Listing Criteria* available on the internet (Anon., 2004d).

The respondents' specific concerns relating to the CITES-listing of some commercially important Malaysian timber species are looked at point-by-point below.

“CITES-listing of commercially important Malaysian tree species would adversely affect the country's timber industry by the application of trade restrictions.”

The idea that CITES is a convention for banning trade is a misconception. Moreover, Malaysian Government and forestry officials concerned about the possibility of more CITES-listed Malaysian tree species are potentially empowered to forestall this through the adequate provision of conservation measures for such species.

“There would be burdensome costs for Malaysia associated with any CITES-listing of Malaysian tree species.”

Malaysia already has two tree species listed in CITES Appendix II - Agarwood *Aquilaria malaccensis* and Yellow Wood *Podocarpus neriifolius*. In theory, therefore, the cost of implementing CITES provisions for Malaysian tree species can be modelled on experience with these two species. It is certainly true that any new listing of a species under CITES inevitably carries with it the costs associated with implementing the Convention for that taxon. As such, should some Malaysian tree species listed in the *Threatened Trees* list become CITES-listed, the Government of Malaysia, as a Party to CITES, would have to take on the additional work and related expense necessary to implement CITES procedures for the newly listed species - for example, permit issuance. For any species placed in CITES Appendix II, the costs would also include those of carrying out “non-detriment findings”. This is a CITES requirement whereby the designated CITES Scientific Authority of a country may only grant an export permit for Appendix-II specimens if it is satisfied that trade will not be to the detriment of the species. Some of the extra costs resulting from new CITES listings of tree species would be met by the timber industry itself, a point which is linked to the last-mentioned concern (adverse impact of CITES listings on the timber industry). For example, there would be additional administrative and enforcement controls associated with a CITES Appendix-II listing. Obtaining an export permit is an example of one such regulation which would add to the cost of production. The current charge for a CITES permit issued by the Department of Wildlife and National Parks (PERHILITAN) in Peninsular Malaysia is MYR5 (USD1.30). In Malaysia, a royalty fee and/or additional levy is imposed for log exports. There are fears that these charges could be increased in the event of further CITES listings of tree species, to reflect the need for the additional administrative and enforcement controls that such listings would necessitate. These fees vary according to species: for Balau/Selangau Batu *Shorea* spp., for example, the royalty in Sarawak is MYR135/m³ (USD35.50/m³), but less (MYR100/m³ (USD26.31/m³)) for other, minor commercial species. It is not necessary that such added charges be passed on to buyers, but the Malaysian Government considers the risks of reducing the competitive edge for timber products from Malaysia in the international marketplace very seriously.



Credit: Dr A. K. Gupta/TRAFFIC India

Agarwood *Aquilaria malaccensis*, one of Malaysia's CITES-listed tree species

While the fact is recognized that there would be cost implications of an increase in the number of CITES listings of Malaysian tree species, as described above, the willingness to take on such costs is assumed when a country undertakes to join CITES and indeed Malaysia has already nominally taken on this responsibility for Agarwood and Yellow Wood, the two CITES Appendix-II tree species found in Malaysia. (Of these, only the former was included in the *Threatened Trees* list, by which time it had already been CITES-listed for three years.) In practice, Malaysia has not yet completed non-detriment findings for these two species, although there are steps to attempt an inventory of Agarwood resources in Peninsular Malaysia, at least as part of the established forest inventory regime. Therefore, although it is considered that the setting up of research programmes to carry out non-detriment findings for Appendix-II species would incur significant expense for Malaysia, it is possible that some of the costs associated with this may be offset against existing or independent management measures, such as research and inventory programmes in Peninsular Malaysia, Sabah and Sarawak and the establishment of certification schemes for forests.

“There is every likelihood that some Malaysian tree species may be included in the CITES Appendices under the "look-alike" criterion”

It is true that visual identification of processed timber products to species level is considered difficult and that the cost of producing identification manuals to assist in this would be high. There are a number of books on timber identification for sawn timber, veneer, and logs and some of the uniquely grained species can be identified readily. Sarawak, in collaboration with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), has developed a computerised software system called CSIROID, to aid in identification of timber species. The software will assist foresters to check using a hand-held lens for defining structural features in wood, for comparison against images from the software programme. Further examination using

a laboratory microscope can distinguish timbers that are not readily identifiable in the field. According to CSIRO, the main benefit of the system currently is to ensure only permitted species are harvested. For CITES tropical tree species, Environment Canada published an identification guide in 2002 called *Tropical Woods – Guide to the identification of tropical woods controlled under the Convention on International Trade in Endangered Species of Wild Fauna and Flora*. This has already been delivered to all CITES Management Authorities and further copies are obtainable. In summary of this CITES-related concern, respondents' views that some timber species were likely to be listed in CITES according to the "look-alike" criterion are understandable, but sophisticated identification resources exist and such judgements may be premature.

CONCLUSION

Development has been a priority for Malaysia in the decades since independence, with the aim of improving living standards for its citizens. Forestry and agriculture have both been major contributors to the country's wealth and both have had an impact on natural forest cover, through felling for the timber industry and land conversion.

The *Threatened Trees* list has attempted to assist in the conservation of tree species, laying the foundations for the use of in-country resources, knowledge and expertise, to ensure that the natural resource heritage of countries such as Malaysia can be conserved.

Those surveyed in Malaysia represented Government and forestry officials in the country. As such, their interests included maintenance and further development of Malaysia's economic position and the protection of its timber industry. They were nonetheless able to point to the fact that, at the end of the 20th century, some 60% of Malaysia's total land area was under natural forest, that PFEs covered over 40% of Malaysia's total land area, and that Malaysia had adopted sustainable forest management practices for the conservation of economically valuable tree species in recent years.

In critically assessing the *Threatened Trees* list, those interviewed for this study focussed on several aspects of the project, including:

- perceived lack of consultation with Malaysian stakeholders;
- the quality of information used as the basis for deciding threat categories;
- perceived inadequacy of the IUCN Red List Criteria;
- the format of the *Threatened Trees* list;
- the *Threatened Trees* list's acknowledgement of its weaknesses;
- the questionable ranking of the "most frequently recorded threats to globally threatened tree species" in the *Threatened Trees* list;
- the costs of verifying the *Threatened Trees* list; and
- the concern that the *Threatened Trees* list would lead to an increase in listings of Malaysia timber species in the CITES Appendices.

This study has ascertained that there is disaffection among some Malaysian Government representatives and others involved in forestry with respect to the findings of the *Threatened Trees* list for Malaysia. In the light of this, action should be taken to ensure that any future assessment of the status of and threats to tree species in Malaysia takes full account of the comments made by those interviewed and examines ways to improve chances of its greater acceptance in Malaysia.

While the concerns voiced by those surveyed for this study should be minded, efforts should be made to disabuse many of the respondents of their misconceptions regarding the *Threatened Trees* list, CITES, and the relationship between the two. Only then can the main aspiration of the *Threatened Trees* list begin to be fulfilled, namely that it should be used to stimulate conservation action on the ground. Without such a global assessment, local people, as the *Threatened Trees* list puts it, may not otherwise appreciate that a species they harvest has a narrow geographic distribution and is wholly dependent on local wise use for its conservation.

If this study can contribute to a better appreciation of the obstacles to receptiveness of the *Threatened Trees* list among those surveyed in Malaysia, and if it helps to answer some of the criticisms levelled against the list and explain misapprehensions connected with it, then the final responsibility for translating the findings of the *Threatened Trees* list into conservation on the ground in Malaysia rests with its government. Ultimately, no such conservation action will happen without a commitment to procuring the necessary financial and other resources to enable it. There must be political will to achieve this at the highest level and this may be possible only after strong efforts to improve awareness of conservation issues and awareness of how they can be served alongside other government responsibilities. In this way, it is hoped that Malaysian stakeholders, having critically assessed the *Threatened Trees* list, may benefit from its strengths and use it as a tool to build on existing tree conservation in Malaysia, specifically for the management of tree resources at species level, not only at forest level.

RECOMMENDATIONS

It is intended that the results and recommendations of this study should help all concerned to adopt policies for the conservation and sustainable use of Malaysia's tree species based on objective information and a co-operative approach.

Recommendations for improving knowledge of Malaysia's tree species

- **Conduct a review of the conservation status of Malaysian species identified as threatened in the *Threatened Trees* list.**

Given that the conservation status of Malaysian tree species, as reported in the *Threatened Trees* list, was questioned by those interviewed for this study, a Malaysian-based research study should provide information to help resolve some of the controversies surrounding the conservation status of these species, as highlighted in this report. Such a study should consult a variety of Malaysian experts to refine and re-evaluate the status of each Malaysian species that has been included in the list. Research should be nationwide, using established

scientific methods which preclude the need to visit every single forest area. The forest inventories already carried out by forest authorities in Malaysia could provide a good basis for beginning this evaluation. The use of existing inventories in this way is preferable to spending effort and money on designing new tools for monitoring the status of tree species. For the conservation of a particular species, the minimum population of mature individuals needs to be known - at present, these minimum populations are not known. To obtain these numbers, in-depth study of the reproductive biology of individual species needs to be carried out. Genetic variation and distribution of species also need to be studied. The feasibility of using BRAHMS database profiles to establish more accurately the current conservation status of the important timber species should be tested in a more systematic manner.

Non-governmental organizations could work together with UNEP-WCMC, IUCN-The World Conservation Union, the Forestry Departments in Peninsular Malaysia, Sabah and Sarawak, the Sarawak Forestry Corporation, universities and FRIM, to provide consolidated and up-to-date information and support for on-the-ground implementation of any conservation measures decided upon. The absence of complete information - for example, comprehensive information on the minimum population of mature individuals of a species - should not preclude conservation and management actions being taken, where appropriate.

- **Conduct a review to determine the sustainability of the harvest of Malaysian timber species.**

Research divisions of forestry departments and other research institutes should determine the best way forward in conducting scientific studies to determine sustainability of harvests of timber species. The actions proposed in the first recommendation (above) should go a long way towards meeting this recommendation. At the national level, the National Science Academy and committee on the Convention on Biological Diversity (CBD) (for example) could work together with the Ministry of Natural Resources and Environment (MNRE) to co-ordinate this research, to ensure that Malaysia is in a position to manage its tree resources effectively, for conservation and livelihoods.

- **Establish a procedure for carrying out non-detriment findings for Malaysia's CITES Appendix-II listed tree species.**

As Malaysia is obliged to carry out non-detriment findings for trade in any species in CITES Appendix II, the need for establishing a protocol and funding for this process for Agarwood *Aquilaria malaccensis* and Yellow Wood *Podocarpus neriifolius* is urgent.

- **Research schemes to support identification of timbers to species level.**

Governments, forest departments and enforcement agencies are encouraged to develop systems that allow for timber identification to species level. Such systems could help ensure that Malaysia could more fully profit from the economic benefits of logging while supporting conservation of tree species, since enhanced enforcement would be made possible.

Recommendations for improving understanding of the IUCN Red Listing process and of CITES among those involved in forestry in Malaysia

- **Provide training to improve understanding of CITES among key decision-makers and implementers, forestry workers and non-governmental organizations.**

While Malaysia has been a Party to CITES since 1977, there is a lack of knowledge of what CITES is and how it works among some of the key decision-makers in the government, forest industry and non-governmental organizations. It is imperative that communication between relevant government agencies and relevant experts is promoted, to ensure a common understanding of CITES. The funds, resources and prioritization necessary to do this on a scale that would make a strong and effective impact are lacking at present, but Malaysia needs to understand the full implications of any CITES-listings of Malaysian tree species. Only in this way can it make informed decisions about its relationship with CITES and assess the potential of this tested international mechanism to assist the sustainable use and conservation of its natural resources for the benefit of its people. The current widespread misconception that CITES means a trade ban is obstructing the possibility of using CITES in support of the sustainable management of tree species in trade.

- **Conduct a workshop involving Malaysian representatives and international non-governmental organizations, especially IUCN/SSC, to discuss and improve understanding of the IUCN Red Listing process and of CITES.**

The workshop should be used for further dissemination of information and knowledge relating to the IUCN Red List Categories and Criteria and CITES. It should involve all Forestry Departments of Malaysia, foresters, members of the timber industry, non-governmental organizations, researchers and others working on forestry issues in Malaysia.

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APPENDIX I

1994 IUCN Red List Categories and Criteria

The text below gives summary definitions of the *1994 IUCN Red List Categories and Criteria*, as used in the *Threatened Trees* list. These have now been superseded by the *2001 IUCN Red List Categories and Criteria*.

EXTINCT (EX) A taxon is Extinct when there is no reasonable doubt that the last individual has died.

EXTINCT IN THE WILD (EW) A taxon is Extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR) A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the criteria A to E.

A) Population reduction in the form of either of the following:

1) An observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:

- a) direct observation
- b) an index of abundance appropriate for the taxon
- c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
- d) actual or potential levels of exploitation
- e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.

2) A reduction of at least 80%, projected or suspected to be met within the next ten years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d) or (e) above.

B) Extent of occurrence estimated to be less than 100 km² or area of occupancy estimated to be less than 10 km², and estimates indicating any two of the following:

1) Severely fragmented or known to exist at only a single location.

2) Continuing decline, observed, inferred or projected, in any of the following:
a) extent of occurrence

- b) area of occupancy
- c) area, extent and/or quality of habitat
- d) number of locations or subpopulations
- e) number of mature individuals.

3) Extreme fluctuations in any of the following:

- a) extent of occurrence
- b) area of occupancy
- c) number of locations or subpopulations
- d) number of mature individuals.

C) Population estimated to number less than 250 mature individuals and *either*:

- 1) An estimated continuing decline of at least 25% within 3 years or one generation, whichever is longer *or*
- 2) A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
 - a) Severely fragmented (*i.e.* no subpopulation estimated to contain more than 50 mature individuals)
 - b) all individuals are in a single subpopulation.

D) Population estimated to number less than 50 mature individuals.

E) Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or 3 generations, whichever is the longer.

ENDANGERED (EN) A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the criteria A to E.

A) Population reduction in the form of either of the following:

- 1) An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:
 - a) direct observation
 - b) an index of abundance appropriate for the taxon
 - c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
 - d) actual or potential levels of exploitation
 - e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.

- 2) A reduction of at least 50%, projected or suspected to be met within the next ten years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d), or (e) above.

B) Extent of occurrence estimated to be less than 5000 km² or area of occupancy estimated to be less than 500 km², and estimates indicating any two of the following:

- 1) Severely fragmented or known to exist at no more than five locations.
- 2) Continuing decline, inferred, observed or projected, in any of the following:
 - a) extent of occurrence
 - b) area of occupancy
 - c) area, extent and/or quality of habitat
 - d) number of locations or subpopulations
 - e) number of mature individuals.
- 3) Extreme fluctuations in any of the following:
 - a) extent of occurrence
 - b) area of occupancy
 - c) number of locations or subpopulations
 - d) number of mature individuals.

C) Population estimated to number less than 2500 mature individuals and *either*:

- 1) An estimated continuing decline of at least 20% within 5 years or 2 generations, whichever is longer, *or*
- 2) A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
 - a) Severely fragmented (*i.e.* no subpopulation estimated to contain more than 250 mature individuals)
 - b) all individuals are in a single subpopulation.

D) Population estimated to number less than 250 mature individuals.

E) Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or 5 generations, whichever is the longer.

VULNERABLE (VU) A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the criteria A to E.

A) Population reduction in the form of either of the following:

- 1) An observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations, whichever is the longer,, based on (and specifying) any of the following:
 - a) direct observation
 - b) an index of abundance appropriate for the taxon
 - c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
 - d) actual or potential levels of exploitation
 - e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.
- 2) A reduction of at least 20%, projected or suspected to be met within the next ten years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d) or (e) above.

B) Extent of occurrence estimated to be less than 20,000 km² or area of occupancy estimated to be less than 2000 km², and estimates indicating any two of the following:

- 1) Severely fragmented or known to exist at no more than ten locations.
- 2) Continuing decline, inferred, observed or projected, in any of the following:
 - a) extent of occurrence
 - b) area of occupancy
 - c) area, extent and/or quality of habitat
 - d) number of locations or subpopulations
 - e) number of mature individuals.
- 3) Extreme fluctuations in any of the following:
 - a) extent of occurrence
 - b) area of occupancy
 - c) number of locations or subpopulations
 - d) number of mature individuals.

C) Population estimated to number less than 10,000 mature individuals and *either*:

- 1) An estimated continuing decline of at least 10% within 10 years or 3 generations, whichever is longer, *or*
- 2) A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:

- a) Severely fragmented (*i.e.* no subpopulation estimated to contain more than 1000 mature individuals)
- b) all individuals are in a single subpopulation.

D) Population very small or restricted in the form of either of the following:

- 1) Population estimated to number less than 1000 mature individuals.
- 2) Population is characterised by an acute restriction in its area of occupancy (typically less than 100 km²) or in the number of locations (typically less than 5). Such a taxon would thus be prone to the effects of human activities (or stochastic events whose impact is increased by human activities) within a very short period of time in an unforeseeable future, and is thus capable of becoming Critically Endangered or even Extinct in a very short period.

E) Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.

LOWER RISK (LR) A taxon is Lower Risk when it has been evaluated, but does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:

- 1) Conservation Dependent (cd). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
- 2) Near Threatened (nt). Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.
- 3) Least Concern (lc). Taxa which do not qualify for Conservation Dependent or Near Threatened.

DATA DEFICIENT (DD) A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat or Lower Risk. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

NOT EVALUATED (NE) A taxon is Not Evaluated when it is has not yet been assessed against the criteria.

Source: Anon., 1994.

APPENDIX 2

Frequency of use of the various IUCN Criteria in *The World List of Threatened Trees*

Criteria	EX	EW	CR	EN	VU	LR/cd	LR/nt	DD	Total
	1	1				116	70	33	221
A1c			4	15	54				73
A1c+2c			1	6	11				18
A1c+2c, B1+2c			2						2
A1c+2c, B1+2c, C1, D1			1	1	1				3
A1c+2c, D2					1				1
A1c, B1+2abc				1					1
A1c, B1+2c			11	3	1				15
A1c, B1+2c, C1			1						1
A1c, B1+2c, C1, D1			1						1
A1c, B1+2c, C2a				1					1
A1c, B1+2c, C2a, D1					1				1
A1c, C2a			9						9
A1c, C2a, D1			1						1
A1c, D1			4						4
No. of times A1c used			35	27	69				131
A1cd			42	33	15				90
A1cd+2cd			15	13	10				38
A1cd+2cd, B1			1						1
A1cd+2cd, B1+2c			18	3	1				22
A1cd+2cd, B1+2c, C1, D1			4						4
A1cd+2cd, C2a			2	1					3
A1cd+2cd, D1			1						1
A1cd, B1+2bde, C2a			1						1
A1cd, B1+2c			7	3	2				12
A1cd, B1+2c, C1, D1			2						2
A1cd, B1+2c, C2a			2						2
A1cd, C2a			38	3					41
A1cd, C2a, D1			1						1
A1cd, D1					1				1
No. of times A1cd used			134	56	29				219
A1d					4				4
B1					1				1
B1+2a					18				18
B1+2c			23	18	109				150
B1+2c, C2a, D1			1						1
B1+2c, D1			1						1
B1+2e, D1				1					1
No. of times B1 used			25	19	128				172
C2a					1				1
C2a, D1			1						1
D1			2	4	1				7
D2					202				202

Source: Anon., 1998a.

APPENDIX 3

Categories of threat for Malaysian tree families listed in *The World List of Threatened Trees*

Family name	Trade name	EX	EW	CR	EN	VU	LR/cd	LR/nt	DD	Total
Dipterocarpaceae	Balau			14	8					22
Dipterocarpaceae	Chengal					1				1
Dipterocarpaceae	Dark Red Meranti			2	2					4
Dipterocarpaceae	Gerutu			2	2					4
Dipterocarpaceae	Giam			9	3	2				14
Dipterocarpaceae	Kapur			1	4					5
Dipterocarpaceae	Keruing			25	4	2				31
Dipterocarpaceae	Light red meranti			4	6					10
Dipterocarpaceae	Dark red meranti			4						4
Dipterocarpaceae	Melantai			2	2					4
Dipterocarpaceae	Meranti			6						6
Dipterocarpaceae	Meranti bakau					1				1
Dipterocarpaceae	Merawan			21	9	2				32
Dipterocarpaceae	Mersawa			4	4					8
Dipterocarpaceae	Penyau				1					1
Dipterocarpaceae	Red Balau			4						4
Dipterocarpaceae	Red Meranti			23	6	2				31
Dipterocarpaceae	Resak			23	16	3				42
Dipterocarpaceae	Selangan batu				1					1
Dipterocarpaceae	White Meranti			8	8					16
Dipterocarpaceae	White Seraya			2						2
Dipterocarpaceae	Yellow meranti	1		18	2					21
Dipterocarpaceae	Total	1	0	172	78	13				264
Actinidiaceae	Non commercial						2	1		3
Alangiaceae	Mentulang					3				3
Anacardiaceae	Machang		1		3	6			3	13
Anacardiaceae	Pelanjau								1	1
Anacardiaceae	Rengas					2				2
Anisophylleaceae	Delek					10				10
Anisophylleaceae	Keruntum					1				1
Annonaceae	Mempisang			3		3	2		2	10
Annonaceae	Non commercial			3		7	3	1		14
Apocynaceae	Jelutong					1				1
Apocynaceae	Jelutong pipit				1	1				2
Apocynaceae	Non commercial					5	1		3	9
Apocynaceae	Pulai					1				1
Aquifoliaceae	Mensirah				1	2	5			8
Araliaceae	Non commercial			1	1	7	4		1	14
Araucariaceae	Damar Minyak					5		1		6
Avicenniaceae	Api-api					1				1
Bignoniaceae	Tuik-tuik hutan						1			1
Bombacaceae	Durian					6			1	7
Bombacaceae	Non commercial					1				1
Burseraceae	Non commercial					1				1
Burseraceae	Kedondong				1	19	3			23
Burseraceae	Non commercial					6				6
Celastraceae	Mata ulat					6				6
Celastraceae	Non commercial					13	1			14

APPENDIX 3

Categories of threat for Malaysian tree families listed in *The World List of Threatened Trees* (continued)

Family name	Trade name	EX	EW	CR	EN	VU	LR/cd	LR/nt	DD	Total
Celastraceae	Perupok					1				1
Chrysobalanaceae	Merbatu				1	1				2
Chrysobalanaceae	Non commercial					2				2
Clethraceae	Non commercial							1		1
Connaraceae	Non commercial					2				2
Cornaceae	Tetebu					2				2
Ebenaceae	Kayu malam				1	7	2			10
Elaeocarpaceae	Sengkurat					9	9			18
Ericaceae	Non commercial				1					1
Erythroxylaceae	Cinta mula					1				1
Euphorbiaceae	Arau					4	1			5
Euphorbiaceae	Balik angin			1						1
Euphorbiaceae	Kayu asam							1		1
Euphorbiaceae	Mahang						1			1
Euphorbiaceae	Mendaroh					1				1
Euphorbiaceae	Non commercial			4		9	5	2		20
Euphorbiaceae	Pokok melaka						1			1
Euphorbiaceae	Tampoi						3			3
Euphorbiaceae	Ubah					4				4
Fagaceae	Berangan			1		3		1		5
Fagaceae	Mempening					6	2	1		9
Flacourtiaceae	Non commercial					2	1		2	5
Flacourtiaceae	Senumpul				1	3	1	1		6
Flacourtiaceae	Telur buaya				1	2				3
Goodeniaceae	Non commercial					3				3
Guttiferae	Bintangor					1				1
Guttiferae	Kandis					4	2			6
Guttiferae	Non commercial					1				1
Guttiferae	Penaga					2	1			3
Hamamelidaceae	Non commercial					1				1
Icacinaceae	Dedaru					1				1
Illiciaceae	Non commercial					1	2			3
Ixonanthaceae	Tualang/Mengaris				1					1
Juglandaceae	Dungun Paya					3				3
Lauraceae	Belian					1				1
Lauraceae	Medang			4		12	8		1	25
Lecythidaceae	Non commercial					2				2
Lecythidaceae	Putat					1				1
Leguminosae	Ipil					1				1
Leguminosae	Kekatong					1				1
Leguminosae	Kempas						1			1
Leguminosae	Keranji							1		1
Leguminosae	Merbau					1				1
Leguminosae	Merbau kera					4			1	5
Leguminosae	Non commercial					8	2			10
Leguminosae	Sena/angsana					1				1
Leguminosae	Sepetir								1	1
Leguminosae	Tualang						1			1
Leguminosae	Tualang daing					4				4
Lythraceae	Bungor				1	1				2

APPENDIX 3

Categories of threat for Malaysian tree families listed in *The World List of Threatened Trees* (continued)

Family name	Trade name	EX	EW	CR	EN	VU	LR/cd	LR/nt	DD	Total
Melastomataceae	Nipis kulit					5	2			7
Meliaceae	Non commercial					2				2
Meliaceae	Pasak			1		16		29		46
Myristicaceae	Non commercial					2		1		3
Myristicaceae	Penarahan			1		70	4	19	2	96
Myrsinaceae	Non commercial							1	1	2
Myrtaceae	Kelat			4	2	18	7	3	3	37
Myrtaceae	Non commercial				1					1
Myrtaceae	Pelawan				1		1			2
Ochnaceae	Non commercial							1		1
Olacaceae	Petaling								1	1
Oleaceae	Non commercial					1	2			3
Oxalidaceae	Non commercial					1		1		2
Oxalidaceae	Pupoi					3				3
Palmae	Non commercial					3	2	2	2	9
Pittosporaceae	Non commercial					2				2
Podocarpaceae	Podo					3	1		4	8
Podocarpaceae	Sempilor				1	2	2			5
Polygalaceae	Nyalin/Minyak berok					2	2			4
Proteaceae	Sawa luka				1	2	2			5
Rhamnaceae	Udok udok					1				1
Rhizophoraceae	Meransi							1		1
Rosaceae	Pepijat				1	2	1		1	5
Rutaceae	Fruit tree					1				1
Rutaceae	Limau hantu					1				1
Rutaceae	Non commercial			1	2	10	4			17
Rutaceae	Pepauh					1	1			2
Rutaceae	Rawang					1				1
Sapindaceae	Non commercial			1						1
Sapindaceae	Non commercial					1		1		2
Sapindaceae	Rambutan					2				2
Sapotaceae	Bitis					1				1
Sapotaceae	Non commercial							1		1
Sapotaceae	Nyatoh				1	6	4	1	2	14
Staphyleaceae	Non commercial					1				1
Sterculiaceae	Kembang semangkok					1				1
Styracaceae	Kemayan					2				2
Symplocaceae	Non commercial				1	1	1			3
Taxaceae	Non commercial							1		1
Theaceae	Non commercial					3	3			6
Theaceae	Samak					8	3			11
Thymelaeaceae	Karas/Gaharu					2			1	3
Thymelaeaceae	Ramin/Melawis					14				14
Tiliaceae	Bayur bukit				1	1	1			3
Tiliaceae	Melunak					4	3			7
Tiliaceae	Non commercial				2	3	2			7
Verbenaceae	Leban					2				2

Note: Trade names used in **Appendix 4** were obtained by matching the scientific names used in the *Tree Conservation Database* list with commonly used trade names, as verified using Wyatt-Smith (1999). In many cases, trade names, which may encompass a number of different species or even genera, do not readily correlate with scientific nomenclature. *Sources:* Anon., 1998a; Oldfield *et al.*, 1998 and Wyatt-Smith, 1999.

APPENDIX 4

CITES listing criteria, according to *Resolution Conf 9.24*

ANNEX 1

Biological criteria for Appendix I

The following criteria must be read in conjunction with the definitions, notes and guidelines listed in Annex 5.

A species is considered to be threatened with extinction if it meets, or is likely to meet, *at least one* of the following criteria.

- A. The wild population is small, and is characterized by *at least one* of the following:**
- i) An observed, inferred or projected decline in the number of individuals or the area and quality of habitat; or
 - ii) Each sub-population being very small; or
 - iii) A majority of individuals, during one or more life-history phases, being concentrated in one sub-population; or
 - iv) Large short-term fluctuations in the number of individuals; or
 - v) a high vulnerability due to the species' biology or behaviour (including migration).
- B. The wild population has a restricted area of distribution and is characterized by *at least one* of the following:**
- i) fragmentation or occurrence at very few locations; or
 - ii) large fluctuations in the area of distribution or the number of sub-populations; or
 - iii) a high vulnerability due to the species' biology or behaviour (including migration); or
 - iv) an observed, inferred or projected decrease in any one of the following:
 - the area of distribution; or
 - the number of sub-populations; or
 - the number of individuals; or
 - the area or quality of habitat; or
 - reproductive potential.
- C. A decline in the number of individuals in the wild, which has been *either*:**
- i) observed as ongoing or as having occurred in the past (but with a potential to resume); **or**
 - ii) inferred or projected on the basis of any one of the following:
 - a decrease in area or quality of habitat; or
 - levels or patterns of exploitation; or
 - threats from extrinsic factors such as the effects of pathogens, competitors, parasites, predators, hybridization, introduced species and the effects of toxins and pollutants; or
 - decreasing reproductive potential.

- D. The status of the species is such that if the species is not included in Appendix I, it is likely to satisfy one or more of the above criteria within a period of five years.**

ANNEX 2A

Criteria for the inclusion of species in Appendix II in accordance with Article II, paragraph 2 (a)

The following criteria must be read in conjunction with the definitions, notes and guidelines listed in Annex 5.

A species should be included in Appendix II when either of the following criteria is met.

- A. It is known, inferred or projected that unless trade in the species is subject to strict regulation, it will meet at least one of the criteria listed in Annex 1 in the near future.**
- B. It is known, inferred or projected that the harvesting of specimens from the wild for international trade has, or may have, a detrimental impact on the species by *either*:**
- i) exceeding, over an extended period, the level that can be continued in perpetuity; *or***
 - ii) reducing it to a population level at which its survival would be threatened by other influences.**

ANNEX 2B

Criteria for the inclusion of species in Appendix II in accordance with Article II, paragraph 2 (b)

Species should be included in Appendix II in accordance with Article II, paragraph 2 (b), if they satisfy *one* of the following criteria.

- A. The specimens resemble specimens of a species included in Appendix II under the provisions of Article II, paragraph 2 (a), or in Appendix I, such that a non-expert, with reasonable effort, is unlikely to be able to distinguish between them.**
- B. The species is a member of a taxon of which most of the species are included in Appendix II under the provisions of Article II, paragraph 2 (a), or in Appendix I, and the remaining species must be included to bring trade in specimens of the others under effective control.**

ANNEX 3

Special cases

Split-listing

Listing of a species in more than one Appendix should be avoided in general in view of the enforcement problems it creates. When split-listing does occur, this should generally be on the basis of national or continental populations, rather than subspecies. Split-listings that place some populations of a species in the Appendices, and the rest outside the Appendices, should normally not be permitted.

For species outside the jurisdiction of any State, listing in the Appendices should use the terms used in other relevant international agreements, if any, to define the population. If no such international agreement exists, then the Appendices should define the population by region or by geographic coordinates.

Taxonomic names below the species level should not be used in the Appendices unless the taxon in question is highly distinctive and the use of the name would not give rise to enforcement problems.

Higher taxa

If all species of a higher taxon are included in Appendix I or II, they should be included under the name of the higher taxon. If some species in a higher taxon are included in Appendix I or II and all the rest in the other Appendix, the latter species should be included under the name of the higher taxon, with an appropriate annotation.

ANNEX 4

Precautionary measures

- A. **When considering proposals to amend the Appendices, the Parties shall, in the case of uncertainty, either as regards the status of a species or as regards the impact of trade on the conservation of a species, act in the best interest of the conservation of the species.**
- B. **1. No species listed in Appendix I shall be removed from the Appendices unless it has been first transferred to Appendix II, with monitoring of any impact of trade on the species for at least two intervals between meetings of the Conference of the Parties.**
2. Species included in Appendix I should only be considered for transfer to Appendix II if they do not satisfy the relevant criteria in Annex 1. Even if such species do not satisfy the relevant criteria in Annex 1, they should be retained in Appendix I unless they satisfy one of the following criteria:

- a) the species is not in demand for international trade, nor is its transfer to Appendix II likely to stimulate trade in, or cause enforcement problems for, any other species included in Appendix I; or
- b) the species is likely to be in demand for trade, but its management is such that the Conference of the Parties is satisfied with:
 - i) implementation by the range States of the requirements of the Convention, in particular Article IV; and
 - ii) appropriate enforcement controls and compliance with the requirements of the Convention; or
- c) an integral part of the amendment proposal is an export quota approved by the Conference of the Parties, based on management measures described in the supporting statement of the amendment proposal, provided that effective enforcement controls are in place; or
- d) an integral part of the amendment proposal is an export quota approved by the Conference of the Parties for a specified period of time, based on management measures described in the supporting statement of the amendment proposal, provided that effective enforcement controls are in place; or
- e) a ranching proposal is submitted consistent with the applicable Resolutions of the Conference of the Parties and is approved.

3. No proposal for transfer of a species from Appendix I to Appendix II with an export quota shall be considered from a Party that has entered a reservation for the species in question, unless that Party agrees to remove the reservation within 90 days of the adoption of the amendment.

4. No species should be deleted from Appendix II if such deletion would be likely to result in it qualifying for inclusion in the Appendices in the near future.

C. The following review procedures shall apply when a species is transferred to Appendix II pursuant to paragraphs B 2 c) and B 2 d) above.

1. Where the Plants Committee, the Animals Committee or a Party becomes aware of problems in compliance with the management measures and export quotas of another Party, the Secretariat shall be informed and, if the Secretariat fails to resolve the matter satisfactorily, it shall inform the Standing Committee which may, after consultation with the Party concerned, recommend to all Parties that they suspend trade with that Party in specimens of CITES-listed species, and/or request the Depository Government to prepare a proposal to transfer the population back to Appendix I.

2. If, on review of a quota and its supporting management measures, the Animals or Plants Committee encounters any problems with compliance or potential detriment to a species, the relevant Committee shall request the Depository Government to prepare a proposal for appropriate remedial action.

- D. If the proponent Party wishes to renew, amend or delete a quota established pursuant to paragraph B2d) above, it shall submit an appropriate proposal for consideration at the next meeting of the Conference of the Parties. In anticipation of there being no such proposal submitted, the Depositary Government shall submit a proposal for consideration at the next meeting of the Conference of the Parties to impose a zero quota.**
- E. Species that are regarded as possibly extinct should not be deleted from Appendix I if they may be affected by trade in the event of their rediscovery; these species should be annotated in the Appendices as ‘p.e.’ (i.e. possibly extinct).**

ANNEX 5

Definitions, notes and guidelines

Area of distribution

Area of distribution is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of occurrence, excluding cases of vagrancy (though inferring and projecting area of occurrence should be undertaken carefully, and in a precautionary manner). The area within the imaginary boundary should, however, exclude significant areas where the species does not occur, and so in defining area of distribution, account should be taken of discontinuities or disjunctions in the spatial distribution of species. For migratory species, the area of distribution is the smallest area essential at any stage for the survival of that species (e.g. colonial nesting sites, feeding sites, etc.). For some species in trade where data exist to make an estimate, a figure of less than 10,000 km² has been found to be an appropriate guideline (not a threshold) of what constitutes a restricted area of distribution. However, this figure is presented only as an example, since it is impossible to give numerical values that are applicable to all taxa. There will be many cases where this numerical guideline does not apply.

Decline

A decline is a reduction in the number of individuals, or a decrease of the area of distribution, the causes of which are either not known or not adequately controlled. It need not necessarily still be continuing. Natural fluctuations will not normally count as part of a decline, but an observed decline should not be considered part of a natural fluctuation unless there is evidence for this. A decline that is the result of a harvesting programme that reduces the population to a planned level, not detrimental to the survival of the species, is not covered by the term ‘decline’.

For some species in trade where data exist to make an estimate, a decrease of 50% or more in total within 5 years or two generations, whichever is the longer, has been found to be an appropriate guideline (not a threshold) of what constitutes a decline. A guideline (not a threshold) of what constitutes a decline in a small wild population could be 20% or more in total within ten years or three generations, whichever is the longer. However, both these figures are presented only as examples, since it is impossible to give numerical values that are applicable to all taxa. There will be many cases where these numerical guidelines do not apply.

Extended period

The meaning of the term extended period will vary according to the biological characteristics of the species. Selection of the period will depend upon the observed pattern of natural fluctuations in the abundance of the species and on whether the number of specimens removed from the wild is consistent with a sustainable harvesting programme that is based on these natural fluctuations.

Fragmentation

Fragmentation refers to the case where most individuals within a taxon are found in small and relatively isolated sub-populations, which increases the probability that these small sub-populations will become extinct and the opportunities for re-establishment are limited. For some species in trade where data exist to make an estimate, an area of distribution of 500 km² or less for each sub-population has been found to be an appropriate guideline (not a threshold) of what constitutes fragmentation. However, this figure is presented only as an example, since it is impossible to give numerical values that are applicable to all taxa. There will be many cases where this numerical guideline does not apply.

Generation

Generation is measured as the average age of parents in the population; except in the case of species that breed only once a lifetime, this will always be longer than the age at maturity.

Large fluctuations

Large fluctuations occur in a number of species where the population size or area of distribution varies widely, rapidly and frequently, with a variation greater than one order of magnitude. For some species in trade where data exist to make an estimate, a figure of two years or less has been found to be an appropriate guideline (not a threshold) of what constitutes a short-term fluctuation. However, this figure is presented only as an example, since it is impossible to give numerical values that are applicable to all taxa. There will be many cases where this numerical guideline does not apply.

Population

Population is measured as the total number of individuals of the species (as defined in Article I of the Convention). In the case of species biologically dependent on other species for all or part of their life cycles, biologically appropriate values for the host species should be chosen. For some species in trade where data exist to make an estimate, a figure of less than 5,000 individuals has been found to be an appropriate guideline (not a threshold) of what constitutes a small wild population. However, this figure is presented only as an example, since it is impossible to give numerical values that are applicable to all taxa. There will be many cases where this numerical guideline does not apply.

Possibly extinct

A species is presumed extinct when exhaustive surveys in known and/or suspected habitat, and at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Before a species can be declared possibly extinct, surveys should take place over a time frame appropriate to the species' life cycle and life form.

Sub-populations

Sub-populations are defined as geographically or otherwise distinct groups in the population between which there is little exchange. For some species in trade where data exist to make an estimate, a figure of less than 500 individuals has been found to be an appropriate guideline (not a threshold) of what constitutes a very small sub-population. However, this figure is presented only as an example, since it is impossible to give numerical values that are applicable to all taxa. There will be many cases where this numerical guideline does not apply.

Threatened with extinction

Threatened with extinction is defined by Annex 1. The vulnerability of a species to threats of extinction depends on its population demographics, biological characteristics, such as body size, trophic level, life cycle, breeding structure or social structure requirements for successful reproduction, and vulnerability due to aggregating habits, natural fluctuations in population size (dimensions of time and magnitude), residency/migratory patterns. This makes it impossible to give numerical values for population size or area of distribution that are applicable to all taxa.

Source: CITES Resolution Conf. 9.24 (as amended at CoP12). Criteria for amendment of Appendices I and II. Viewed at http://www.cites.org/eng/resols/9/9_24.shtml, 15 January 2003.

TRAFFIC, the wildlife trade monitoring network, works to ensure that trade in wild plants and animals is not a threat to the conservation of nature. It has offices covering most parts of the world and works in close co-operation with the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

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