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GUIDELINE FOR NON-DETRIMENTAL FINDING ASSESSMENT ON RAMIN *Gonystylus* spp.

FORESTRY RESEARCH AND DEVELOPMENT AGENCY
IN COOPERATION WITH
ITTO – CITES PROJECT

Bogor, 2010

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PREFACE

Ramin, *Gonystylus* spp.*,* is one of tropical tree species which has been included in CITES Appendix. One of the international trade requirements for trees listed in CITES Appendix II is NDF assessment (Non-Detrimental Finding) that presents the assurance that the harvest will not threaten its habitat and population.

Gonystylus as a genus, consists of more than 30 species, depending on their taxonomic interpretation, but until now, *Gonystylus* that has been commercially logged and traded is *G. bancanus*. *G. bancanus* grows in peat swamp forest in Sumatera and Kalimantan. This species population tends to decrease due to natural disaster and various human activities.

The development of guideline for NDF assessment is one of the efforts to reduce negative impact from ramin logging in natural forest, even if for now, only one concession company (PT. Diamond Raya Timber) is licensed to harvest ramin.

This guideline is arranged based on field condition at present time, especially *G. bancanus*. Some discussion meetings and workshops have been conducted in the development of this guideline that involved parties related to management and trade of ramin, such as CITES-MA, CITES-SA, universities, research institution, NGO, and PT. Diamond Raya Timber. Hopefully, with the involvement of various related parties, this guideline could be accepted as a reference in management and harvest of ramin in the field.

Jakarta, October 2010

Mr. Adi Susmianto, MSc.
Director of CFNCRD-FORDA

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This document "Guidelines of NDF Assessment for Ramin *Gonystylus* spp." is arranged through fair long process and involved discussion with many experts. Our gratitude goes to Dr. Tukirin Partomihardjo (LIPI – CITES Scientific Authority) and Drh. Faustina Ida Hardjanti, M.Sc (PHKA – CITES Management Authority) who have given valuable inputs to this document.

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Hopefully, this document is useful for practitioners of ramin trading, especially those involved in ramin exports. In addition, we also hope that this document could become a primary reference for NDF assessments for other timber species that may face similar problem with ramin and possibility to be included in CITES Appendix.

Author,

Prof. Dr. Ani Mardiastuti

ACKNOWLEDGEMENT, FROM THE EDITORS

This document "Guidelines of NDF Assessment for Ramin *Gonystylus spp.*" is originally in Indonesian language. Later, it is understood that this document is important for other readers, not only those who pay their concern on ramin but also for other forest tree species currently under threat. Regional Project Coordinator, Mr. Thang Hooi Chiew, has given his support to the effort to make english version of this document.

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It is expected that, this document is useful for those who pay attention to the conservation of wildlife, especially species currently under serious threat or becoming threatened by various human disturbances.

Editor, Coordinator in Charge

Tajudin Edy Komar

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ABBREVIATION

AAC	Annual Allowable Cut
BPKH	Regional Office for Forest Status Verification - *Balai Pemantapan Kawasan Hutan*
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of Parties
GIS	Geographic Information System
IUCN	International Union for Conservation of Nature
IUPHHK	Indonesian Harvest Permit - *Ijin usaha Pemanfaatan Hasil Hutan Kayu*
LIPI	Indonesian Institute of Science - *Lembaga Ilmu Pengetahuan Indonesia*
MA	Management Authority
NDF	Non-Detrimental Finding
PHAPL	Sustainable Management FOR Natural Forests – *Pengelolaan Hutan Alam Produksi Lestari*
PSF	Peat Swamp Forests
PT	Corporation - *Perseroan Terbatas*
RIT	Ramin Integrated Team
SA	Scientific Authority
SATS-LN	Transport Permit for export of wildlife - *Surat Angkutan Tumbuhan dan Satwa – Luar Negeri*
SPHAL	Certificate for sustainable Management of Natural Forests - *Sertifikat Pengelolaan Hutan Alam Lestari*
TPTI	Indonesian selective cutting and enrichment planting – *Tebang Pilih Tanam Indonesia*

EXECUTIVE SUMMARY

GUIDELINE ON ASSESSMENT OF NON-DETRIMENTAL FINDING FOR RAMIN *GONYSTYLUS* SPP.

Ramin (*Gonystylus* Teysmann & Binnendijk) is a genus of tree which currently listed in CITES Appendix II. So far, Ramin is the only group of Indonesian timber trees listed in CITES Appendix. The main reason of the inclusion of ramin in the CITES Appendix was because this group of species has been heavily traded, especially in the international market. Ramin has been used for many purposes, including for frames, dowels, baby crib, toys, and some indoor light constructions.

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) – as implies by its name - is a convention that regulates the international trade of endangered species of wild fauna and flora. In the past, regulation of CITES mostly aimed at animal species. However, during the past decade, plant species have been included in the CITES Appendix, meaning that the trade of the species is strictly prohibited (Appendix I) or regulated, usually by a quota system (Appendix II).

As required by CITES, the international trade of species belonging to this genus (*Gonystylus)* must meet the criteria of Non-Detrimental Finding (NDF). Under this criteria, a related party of CITES must conduct an assessment that the trade of a species will not be detrimental to the survival of the species. In other words, the harvest of the species must be in sustainable manner.

CITES has published two documents as guidelines to make NDF assessment, namely 'Guidance for CITES Scientific Authorities: Checklist to Assist in Making Non-Detriment Findings for Appendix II Exports' and 'Principles for Non-Detriment Findings (NDF) for Trees'. These guidelines are meant to be general and, therefore, still need to be worked on further for a specific species or group of species such as ramin.

The objective of this document is to provide guidelines to conduct assessment on Non-Detrimental Finding (NDF) for Ramin. In this document, ramin refers to all species belong to genus *Gonystylus*. In the future there is a probability that other timber species will be included in the CITES Appendix. Therefore, this document can also be used as an exercise for other Indonesian timber species that might be a candidate for CITES Appendix.

This guideline is basically follows the two CITES guidelines mentioned previously, with an intensive modification in such a way to suit with the condition in Indonesia and the biology of

ramin. However, the basic idea is still follows the CITES document mentioned previously. This guideline consists of three parts:

(a) general guideline,
(b) guideline for forest management unit, and
(c) national guideline to create a radar plot.

The general guideline gives list of data and information needed to conduct the NDF assessment and contains five basic elements:

(i) biological characteristics,
(ii) national distribution and population,
(iii) harvest management,
(iv) harvest control and monitoring, and
(v) conservation and protection.

For the biological characteristics, information needed is general characteristics of ramin, regeneration ability, and habitat and edaphic factors. Information needed for the national distribution and protection includes distribution or ramin in various scales (local, national, regional), population structure, and population dynamics. Harvest management includes harvest implementation, silvicultural practices, restoration, and harvest evaluation.

For harvest control and monitoring requires information on monitoring and verification system, and optimization of timber products. As for conservation and protection, information needed basically is whether the species has been given enough protection and conservation actions in its natural habitat.

The list is based on the document entitled 'Principles for Non-Detriment Findings (NDF) for Trees' formulated by Trees Working Group – CITES Plants Committee in Cancun (Mexico, 17-22 November 2008) modified for the condition and situation in Indonesia. The modification is necessary, as there are many parameters not suitable for ramin and for condition in Indonesia.

The guideline for forest management unit is a specific guideline for harvest site (i.e. concession holders). Guideline for the management unit contains more specific steps and general formula to ensure the sustainable harvest. The guideline basically contains necessary steps to ensure sustainability of harvest. Some precautionary measures are in place, involving inventory before harvest, estimation of harvest volume, annual cutting, and harvest quota. A sufficient percentage of unharvested trees are set for a safe cutting. The volume of timber allowed to be harvested is only 50% of the total existing standing volume (minimum diameter of 40 cm), consisted of 30% for the seed tree, 10% for conservation, and additional 10% as safety factor.

For ramin harvesting, the Government of Indonesia has set a regulation that only a concessionaire company that already obtained a certificate of sustainable harvest management is allowed to harvest ramin. In addition, the company required to have annual planning (among other planning documents) before the company allowed to conduct the harvest. All field assessments are conducted by a team of experts, including representatives from the CITES Scientific Authority and Ministry of Forestry.

The national guideline to create a radar plot mainly follows the 'Guidance for CITES Scientific Authorities: Checklist to Assist in Making Non-Detriment Findings for Appendix II Exports' (Rosser & Haywood, 2000). There are 6 components and 26 parameters in this guideline, each parameter having a score of 5 (best) to 1 (worst).

Similar to the general guideline, all 26 parameter have been heavily modified to suit the condition in Indonesia. These parameters are:

(A) Biological characteristics
- (1) adaptation
- (2) regeneration ability
- (3) dispersal efficiency
- (4) habitat type

(B) Distribution and population
- (5) national distribution
- (6) national abundance
- (7) population trend
- (8) quality of information regarding distribution and population
- (9) main threat to this species

(C) Harvest management
- (10) illegal harvest and trade
- (11) history of harvest management
- (12) management plan
- (13) objective of the management plan
- (14) harvest quota

(D) Harvest control and monitoring
- (15) harvest in the licensed area
- (16) harvest at conservation area and protected forest
- (17) harvest in non-forest area
- (18) confidence level in the harvest management
- (19) method to monitor harvest
- (20) confidence level in the harvest monitoring

(E) Impact of harvest to environment and ecology
- (21) benefit of harvest (whether it is more beneficial if the species was left unharvested)
- (22) impact of harvest to the environment
- (23) environment recovery

(F) Conservation and protection
- (24) percentage of unharvested trees
- (25) effectiveness of protection
- (26) effectiveness of harvest regulation

From the scoring of all parameter, a radar plot with 26 polygon is created. A larger polygon is an indication that the trade is not detrimental to the survival of the species. A small polygon means that the trade might not be sustainable and might be detrimental to the survival of the species.

In addition, parameters with small score (i.e. closer to the center) need to be given special attention. Thus, this radar plot can be used by managers as a quick and easy way to decide priority for management of this species.

The 26 parameters for assessment for NDF of ramin in national level were discussed among ramin experts. One species of ramin, namely *Gonystylus bancanus*, was used as a study case to test the application of the parameters. Scoring for each parameter is discussed by the experts and the radar plot was produced.

I. INTRODUCTION

Ramin (*Gonystylus* spp.; Thymelaeaceae) is a species of plant which distributes across Southeast Asia and some Oceania nations (Indonesia, Malaysia, Myanmar, Philippines, Singapore, Brunei Darussalam, Papua New Guinea, Nicobar, Solomon and Fiji Islands). However, this species has not been found in East Java and Nusa Tenggara. The number of Ramin species is approximately 31 species and 1 variety, most of them (27 species) are found in Kalimantan (Komar, 2007).

Generally *Gonystylus* spp. is a medium-sized tree, and some species is categorized as grass. Some of those species, six species are commercial species: *G. affinis, G. forbesii, G. marcophyllus, G. velutinus*, and *G. bancanus* (CITES, 2004). The last species mentioned (*G. bancanus*) is heavily traded with the name '*ramin*'. The name '*ramin*' is now used to name all species on genus *Gonystylus*.

On national level, previously ramin was an important species that produced timber and is an 'export star' from Indonesia. The soft color and interesting pattern of the wood has made this species group preferred for various purposes.

Ramin harvesting to fulfill national and international demands has made significant decrease of population, causing the existence of this species considered dangerous (Soehartono & Mardiastuti, 2002). Therefore, ramin becomes a tree group species that needs high attention, both national and international level.

Many plant and animal species in Indonesia have been included in CITES Appendix (I or II). But, for species group those produce timber, only ramin is listed, therefore, its trade must comply with CITES Convention. Ramin has become a very important species for Indonesia and therefore this timber could be used as lessons learned for other species.

Since ramin was included in CITES Appendix II, various researches and scientific writings on ramin has increased. Scientific meetings are periodically held, inviting Indonesian and International professionals. Various publications also have been produced and widely spread.

The purpose of this document is to give direction to conduct *Non-Detrimental Finding* (NDF) for ramin. NDF is a term used in CITES, equivalent to sustainable harvest. Even in forest management, the principles of sustainability are always used, but CITES has own criteria to ensure ramin sustainability through pre-harvest assessment as described in NDF guidance.

The standard NDF guidelines which have been referred by member countries are presented in this document.

II. RAMIN AND CITES

A. BRIEF OVERVIEW ABOUT RAMIN

As mentioned in previous section, ramin timber is produced by tree species from genus *Gonystylus* and family Thymelaeaceae, subfamily *Gonystyloidae*. Species of *Gonystylus* which has been extensively studied is *G. bancanus* and other species the studies are still limited and therefore, studies on other *Gonystylus* species are still needed.

G. bancanus is a medium-sized tree, its height may reach 40-50 m and diameter may reach to 120 cm. Its stem is generally straight and stem without branch may reach 20-30 m. The skin is fibered, hard and short which may lead to itchy on skin. This type generally grows in peat swamp forest, riverside, and non-salty tidal area.

Ramin timber is categorized into class V of durability, vulnerable to blue stain attack and wet wood powder, but can be easily preserved. Ramin timber is used for furniture, interior decorations such as walls, floors, toys, broom handles, frames, etc., and for light constructions such as doors and window frames, veneer, plywood, block board and particle board (Partomiharjo & Darnaedi, 2007, Argent *et al*., without year).

In Indonesia, ramin forest is managed using the system of Tebang Pilih Tanam Indonesia (TPTI, Indonesian selective cutting and enrichment planting). This system has been expected to be suitable for forest and ramin production sustainability in the future if done based on logging cycle of 35 years, retaining minimal 25 healthy trees, above 15 cm in diameter per ha as core tree or 10% remaining of logged population (Partomihardjo & Darnaedi, 2007; Istomo, 2009).

B. BRIEF OVERVIEW ABOUT CITES

Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES) is an international convention that rules the trade of endangered wild plant and animals. Indonesia has ratified in this convention since 1978. Since then, international trade of these plant and animal species is referred to regulations ruled by CITES as in addition to the existing national laws and regulations.

The member country of CITES is obliged to comply with CITES regulations, such as controlling the distribution of species that included in CITES Appendix, both export and import from and to the country. Therefore, there is a 2-door control system to control the traffic of wild plant and animal trade, in both exporting and importing countries.

CITES system control is executed by using CITES standard licensing system which is published by Management Authority, who is responsible to inspect goods in or out from the country, based on the documents and specimens registered in Appendix I, II and III. CITES protection for wild plant and animal species are categorized into Appendix I, II and III. Specific plant and animal species that ruled by CITES is registered in the list in Appendix of CITES Convention. The text of CITES Convention containing 25 sections is permanent and cannot be changed, but its appendix may be changed to suit needs.

Appendix I is a list of species in threat to extinction, which is affected or may be influenced by trade. Trading (export, import, re-export or introduction from the sea) to this species must be based on tought consideration so it will not increase the threat to extinction and is allowed only for certain purposes, such as research, or if the species can be regenerated to second generation (F2).

Appendix II is a list of species whose population in the wild is not currently in threat to extinction, but may become threatened if its trade is not controlled, or species whose population in the wild is not currently threatened but its use must be controlled to guarantee its pretection. Meanwhile, Appendix III is a certain species requested by specific country to be controlled internationally by CITES mechanism and treated like Appendix II. These requests are usually associated with illegal trade which is difficult to control. If the population of a species is considered endangered because of international trade, the species can be proposed for the inclusion in CITES Appendix list, either by countries those have the species (range states) or by other countries. Conversely, a species that has been included in CITES Appendices may be proposed to be removed from CITES Appendix if the population is considered to be abundant and there is no threat by the trade. In fact, removing a species from the appendix is very difficult because it requires proof that trading will not threaten the species. Currently, there is a possibility that other timber species may also be included into the CITES Appendices, therefore, Indonesia should prepare to make relevant guidelines. Species in Indonesia that is under discussion for being controlled using mechanism like CITES Appendix are *Intsia palembanica, Intsia bijuga, Diospyros celebica*, and *Eusideroxylon zwageri*.

There are many misunderstandings regarding CITES trade control. To avoid misunderstanding on the implementation of CITES, some clarifications are that (a) CITES only regulates International trade (export-import) of species listed under CITES Appendix; while domestic trade is not regulated by CITES rules; (b) the main reason to list a species into CITES appendix is the species is currently under threat to extinction because of International trade; (c) plants and animals those protected by Indonesian law may have not been sufficient as required by CITES Appendix. This is because CITES and species protection are two different things.

C. CITES AND TRADE OF RAMIN

Species included in CITES Appendices are mostly wild animal species. With the increasing scarcity of plant species due to concerns of international trade, various species of plants (ornamental plants, timber plants, medicinal plants, resin-producing plants, and so on) has been widely included in the CITES Appendices. Globally, the timber species which have been included in the CITES appendices are more than 60 species (Appendix I and II) (Schmidt, 2007). Timber species in Indonesia, which has been included in Appendix II is ramin. Until now, ramin is the only species of timber from Indonesia that has been included in Appendix II of CITES. There are some other tree species are also included in CITES Appendix II: the species of agarwood-producing trees of the genus *Aquilaria* and *Gyrinops*. However, in CITES, these agarwood-producing species are classified as a resin-producing species, not timber-producing species.

In 2000s many illegal logging cases of ramin have been reported. While Indonesian government attempted to stop illegal logging in the field (domestic), control of international trade of ramin becomes very important, given that most ramin is intended for export. For these reasons, Indonesian government decided to include all species of ramin in CITES Appendix III. Indonesia requested the CITES secretariat to include Indonesian ramin in Appendix III on 12 April 2001 and the CITES secretariat distributed the request to other CITES range states through a notification to the parties no. 2001/026. The inclusion of ramin from Indonesia into Appendix III is officially implemented since 6 August 2001.

CITES Appendix III is a list of species included from the request of a particular country, in this case, Indonesia. Indonesia requests cooperation from other countries to prevent illegal logging and illegal trade that threatens its sustainability. The control of International trade of those species included in Appendix III can only be possible with a system that is recognized by CITES permission or license.

In 2001, Indonesia has stopped the export of ramin (zero export quotas). Logging moratorium has been established through Forestry Minister Regulation (No. 127/KPTS-V/2001), dated 11 April 2001. Exceptions are given for the concessions that have been certified as sustainable management of natural forests (SPHAL). For stocks that have been registered, export was allowed until 31 December 2001. In addition to these decisions, the whole policy of ramin is written in other Forestry Minister Regulations (No. 168/KPTS-IV/2001) dated 11 June 2001, concerning the use and distribution of ramin timber and (No. 1613/KPTS-II/2001), dated 30 October 2001, concerning the prohibition of export of ramin sawn timber.

By listing of ramin species in CITES Appendix, illegal trade, including smuggling will be well controlled so that it helped Indonesia to stop illegal logging. This is true because illegal logging will be followed by illegal international trade of timber products.

Later, Indonesia proposes to register ramin in Appendix II. This proposal was accepted by the 13th meeting of the Parties (COP) in Bangkok, 2004. Ramin has been officially listed in Appendix II CITES, and effective since 15 January 2005.

Timber-producing tree species are generally included in the CITES-Appendix with Annotation 5 or 6, which registers only logs, sawn timber, veneer and plywood. Ramin timber was included in Appendix II of CITES with Annotation 1, which register all parts and derivatives. The reason for determining Annotation I is because in International trade, ramin timber is traded not in the form of timber as defined in Annotation 5 or 6, but in the form of processed products, such as semi-finished molding, dowels, frame, cue stick, and furniture.

D. UNDERSTANDING NDF

NDF stands for Non-Detrimental Finding. The term of NDF is typically used in CITES. Since in the beginning NDF has not been translated into Indonesian, and therefore most formal Indonesian documents are still using NDF as legal term.

NDF is in fact equivalent to sustainable harvest. In the texts of CITES convention, there is no clear elaboration of NDF definition. However, in the chapters related to trade regulation, CITES convention very clearly gives an indication that sustainable harvest is an essential requirement for the trade of plants and animals listing in Appendix of CITES. To give better understanding of the convention, below is presented section IV paragraph 2a regarding the trade regulation. An article in the text of the convention that regulates the trade of species in CITES convention, which regulates the trade of species listing under Appendix II:

> "*The export of any specimen of a species included in Appendix II shall require the prior grant and presentation of an export permit. An export permit shall only be granted when the following conditions have been met: (a) a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species…*"

In the 10th COP in Harare, Zimbabwe, this NDP was specifically discussed and the results were presented in CITES Resolution Conf. 10.3, which recommends that each *Scientific Authority* in each country to do NDF based on scientific observation on available information related to population status, distribution, population tendency, factors related to ecology and harvest methods as well as trade information. Even each country has its own capacity to do NDF assessment, standard procedures is still needed so that the results of NDF can be accepted by Convention and International.

Literally, NDF means findings or evidence that harvest of a species will not endanger the existence of the harvested plant, so that the species would be sustainable. Therefore, NDF is an

important activity that needs to be done to determine the number of individual or percentage of population that may be harvested and traded in International market. Ideally, NDF should be done to all species listed in CITES Appendix II.

At the initial stage, CITES more reserved to animals, in the beginning the concept of NDF was developed for animals. Later, when timber producing plants began to be appended to CITES Appendix, NDF must be applied to timber producing plants species, including ramin.

CITES has given a few guidelines related to NDF. The important guidelins for NDF timber producing species can be seen or downloaded from these sites:

a. Guidance for CITES Scientific Authorities: Checklist to Assist in Making Non-Detriment Findings for Appendix II Exports.
   This document can be downloaded from site:
   http://www.conabio.gob.mx/institucion/cooperacion_internacional/TallerNDF/Links-Documentos/IUCNChecklist/Preliminar.pdf

b. Principles for Non-Detrimental Findings (NDF) for Trees.
   This document can be downloaded from site:
   http://www.conabio.gob.mx/institucion/cooperacion_internacional/TallerNDF/Links-Documentos/WG-CS/WG1-Trees/WG1-FR%20.pdf

III. GUIDELINE FOR NDF ASSESSMENT FOR RAMIN

In this section guide is given to do NDF assessment for ramin. However, this guide may also be used to assess other plant species, especially timber producers. For animal species, there are some modifications to suit general animal characteristic, therefore, an additional reference is needed.

The guideline for NDF assessment for Ramin consists of 3 sections: (a) general part, (b) forest management unit part (site), and (c) national part. Basically, general part contains directions to collect basic data. These data are needed for later discussion. An ideal list of information is given in general part for NDF assessment. Considering that collecting complete data is difficult, hopefully basic data and information can be obtained.

Guideline for forest management units is technical directions, intended to the areas that have been given their harvest permit (IUPHHK-Ijin Usaha Pengusahaan Hasil Kehutanan). This guideline is quantitative, intended to count annual harvest quota to make sustainable harvesting and ensuring that ramin would not becoming rare.

Guideline for national scale is a qualitative guide and is intended to obtain an overview of condition and trade of ramin on national level. This guideline is a standard guide which is recommended by CITES.

According to CITES, the main executive coordinator of NDF assessment is CITES Scientific Authority from each country. For Indonesia, CITES Scientific Authority is Biology Research Center, Indonesian Institute of Science (LIPI). However, LIPI is not working alone, considering that so many information needed to be collected before conducting NDF assessment. In practice, NDF study is conducted by one study team that consists of some experts from various disciplines under coordination of LIPI.

A. GENERAL GUIDANCE

As mentioned in previous section, CITES, since in the beginning has provided several guidelines (including NDF guidance) for various animal species, primarily due to the fact that many animal species have been listed in CITES Appendix. Since many plant species are included in CITES Appendix, a relevant guide need to be made for plants.

In 17-22 November 2008 in Cancun, Mexico, a scientists meeting was held to discuss NDF guideline for plant species. From the results, *Tree Working Group* has formulated NDF principles

for plants (*Principles for Non-Detriment Findings for Trees)*. This guidance consists of five key elements: distribution, population, management system, monitoring, and conservation.

General guidance for data collection for NDF assessment is presented below. This guidance has been modified from the Tree Working Group' document and has been adapted for *Gonystylus spp.* in Indonesia.

Element 1: Biological characteristics

Objective: to get understanding on basic biological data and ecology of ramin, especially charecteristics related to habitat and regeneration capability.

Needed data and information:

- Characteristic of ramin
  - Exact species identification, confirmed with standard herbarium specimen and can be used as International reference.
  - Herbarium data collection (supplied with geographical reference).
  - Addition of herbarium specimen from various different locations and from various habitats.
  - Specific characteristics to differentiate between *Gonystylus* species.
- Regeneration capability
  - Fruit and seed type.
  - Dispersal pattern.
  - Fruit and seed predator.
  - Age or life span.
  - Capacity to produce seed: frequency, number of seed in each fruiting, percentage of fruit becoming seed.
  - Alternative propagation other than seeds (for artificial regeneration).
- Habitat and edaphic factors
  - General habitat type.
  - Growing altitude (minimum, maximum, optimum).
  - Rainfall.
  - Soil type.
  - Peat depth and peat type (PSF habitat).
  - Other plant species that associated with ramin.

Element 2: Geographical distribution and population

Objective: (a) to observe natural distribution of ramin (general distribution including juirisdication boundaries, especially with other range state), and (b) to observe population status of ramin (standing stock and population dynamics) as evaluation standard on the impact of harvesting activities.

Needed data and information:

- Distribution of ramin at national scale (past and present distribution)
  - Vegetation and landcover map.
  - Ecosystem map or eco-zoning (forest function group).
  - National forest inventory.
  - Existing conservation area and area potentially becoming conservation in the future.
- Ramin distribution at island scale or bio-geographic area
  - National database, including database in each Office of Forest Status Verification (BPKH).
  - Forest inventory in each province, island, bio-geographic area or BPKH.
  - Mapping on each province and island (from various sources).
- Local distribution (IUUPHK permit holder)
  - Sample of inventory statistic for forest management plans.
  - Geographic information system (GIS) from logged over area.
  - Census for commercial logging purposes, ideally based on geo-reference data.
  - Knowledge on ramin distribution at local level (on licensed area).
- Population structure of ramin: number of individual, age class distribution or size, tree density, number of trees and volume
  - Ramin inventory by using appropriate statistic methods.
  - Published study results.
  - Trusted data analysis method (e.g. local knowledge, previous data).
- Ramin population dynamics: mortality rate, growth rate, reproduction rate, regeneration rate.
  - Long term study by using proper methods.
  - Modeling approach (e.g. matrix).
  - Published study results.
  - Trusted data analysis methods (eg based on local knowledge, previous data).
  - Information about other factors those may affect ramin population (such as habitat preferent anddisease and other disturbances for ramin.

Element 3: Logging management

Objective: to determine whether management system is suitable for ramin and whether logging sistem could ensure sustainability, based on accurate information on population distribution and parameter.

Needed data and information includes inventory (or description) on commercial and non-commercial species, should use mapping/spacial reference:

- Ramin logging activity

  Identification of locations to be logged, by considering various alternatives logging systems.

  The suitability of tools and methods to be used.

  Efforts to reduce potential damage during logging (direct damage, environmental damage).

  Skidding methods and routes.

  Location of log pond and log yard.

  Identification and protection of areas and core trees.

  Determine the most appropriate time selection (especially in peat swamp habitat that is affected by tidal water and avoiding logging at flower/fruit time.

- Silviculture practices of ramin

  Silviculture activities before and after logging.

  Example: cleaning, core tree selection.

- Restoration activity, increasing quality of retained trees or reducing impact of logging

  Retained core trees.

  Enrichment planting through seed selection (seed quality, genetics variety).

  Cutting cycle (rotation) and fallow period (if any).

  Activity to reduce impact of logging (reduced impact logging; direct impact and environment impact).

- Harvest rate evaluation

  General evaluation: logging intensity (or percent of retained trees), age limit or cutting diameter).

  Quantitative knowledge about population status of ramin by using appropriate statistic methods.

  Expected production (present) and regeneration rate (future production)

  Appropriate measuring methods.

Element 4: Logging supervision and monitoring

Objective: to determine whether appropriate monitoring and verification system has been conducted, to ensure sustainable logging, and to reduce illegal trade and other illegal activities.

- Monitoring and verification system
  - Review mechanism before and after logging to verify management system.
  - Permanent plots to score logging impact to ramin population.
  - Chain of custody since logging to export.
  - Transparent process to increase trade control to logged ramin.
  - Review the function of quota system to ensure sustainable logging.
- Timber and non-timber usage and processed optimization
  - Immersion of raw materials into processed products.

Element 5: Logging impacts to environment and ecology condition

Objective: to assess the impact of logging activity to ecosystem and surrounding environment.

- Efforts to reduce logging impact
  - Logging activity impact and other related activities (skidding, timber collection and landfill).
  - Efforts to reduce impact of logging.
  - Impacts to erosion and soil fertility.
- Environment recovery
  - Assessing the easiness/difficulty of ecosystem to return to normal.
  - Efforts can be done to return ecosystem and environment to normal.

Element 6: Conservation and protection

Objective : to determine whether protection action has been executed, to ensure phenotypes and genetic variation of ramin of non-harvested natural population is still well represented, and to ensure ramin's role in ecosystem can be maintained.

Activities included in conservations and protections are:

- To protect representative area of ramin natural distribution to ensure the conservation of phenotype and genetic variation.
- To conserve all class age and size and ramin species distribution by considering the process of natural succession and regeneration.
- To prevent negative impacts by ramin logging to other species and its ecosystem.
- To establish protection area to protect unlogged population.

To establish protection area to protect unlogged population.

To establsih seed bank and other mechanisms to conserve germplasm.

To include legal and illegal logging impacts in species conservation status of ramin.

To provide incentive to concession holder if ramin was not logged (e.g. instead to establish species/habitat conservation).

B. GUIDANCE FOR FOREST MANAGEMENT UNITS

This guide for forest management unit is a stepwise to determine annual harvest quota which directed to concession holder. Information on annual harvest quota is becoming a pre-requisite for futher steps. To be able to export listed timber species in Appendix II of CITES, CITES Management Authority should ensure that:

(a) The company that is permitted to export ramin is a company that has passed SFM certificate (PHAPL-Pengelolaan Hutan Alam Produksi Lestari). Until today, the company that has ramin in its concession area and passed the SFM certificate is PT. Diamond Raya Timber in Riau.

(b) Annual Allowable Cut (AAC) is determined by Ramin Integrated Team (RIT) led by CITES Scientific Authority after timber cruising, at least 80%. This annual allowable cut is determined one year before logging. Technical counting for annual allowable cut of ramin for PT. Diamond Raya Timber can be studied on Partomiharjo & Darnaedi (2007) and Partomiharjo (2007). Coordination between CITES Management Authority and Scientific Authority in determining annual allowable cut is presented in Figure 1.

(c) Recommendation of annual allowable cut by Scientific Authority is submitted to Management Authority. CITES Management Authority will decide the annual allowable cut quota to the company in m^3.

Annual allowable cut which is determined by Scientific Authority actually is an assessment procedure of Non-Detrimental Finding (NDF). As mentioned in previous sections, NDF assessment must be conducted to ensure that logging on certain timber volume must be still in sustainable level, in this case, ramin. In Indonesia, ramin logging is only carried out by PT. Diamond Raya Timber, which is operating in Riau Province. The export is carried by PT. Uniseraya and there are more company applyng for export permits.

According to current regulation, in principles, forest area to be logged first must be divided into logging blocks that is suitable to the volume and rotation, after considering various aspects related to conservation and logging efficiency. Therefore, every year concession company determines the block of forest area to be logged. More information about logging aspects may refer to Istomo (2009).

A logging plan by concession holder for 1 year period is written on annual work plan (Annual coupe). This logging plan is still a plan and therefore must be prepared a year before. A plan related to NDF must be incorporated into this annual plan by concession company. The flow of setting annual allowable cut is presented in Figure 2.

To maintain the sustainability, in principles the number of trees or timber volume to be cut is only 50% from existing timber potency (diameter minimum of 40 cm), because 30% of the total must be retained for seed trees, 10% for conservation purposes, and 10% for protection factor. In order to obtain transparent and independent result, annual allowable cut is not conducted by concession holders only, but carried out by expert group, such as Ramin Integrated Team. This integrated team is led by Scientific Authority and the members consist of some experts from research institution, university, relevant central and local community group.

Theoretically, annual allowable cut from all concession comapnies is a national quota for ramin. Because only one concession company allowed to harvest ramin (PT. Diamond Raya Timber), automatically this company's annual allowable cut is effectively becoming national quota.

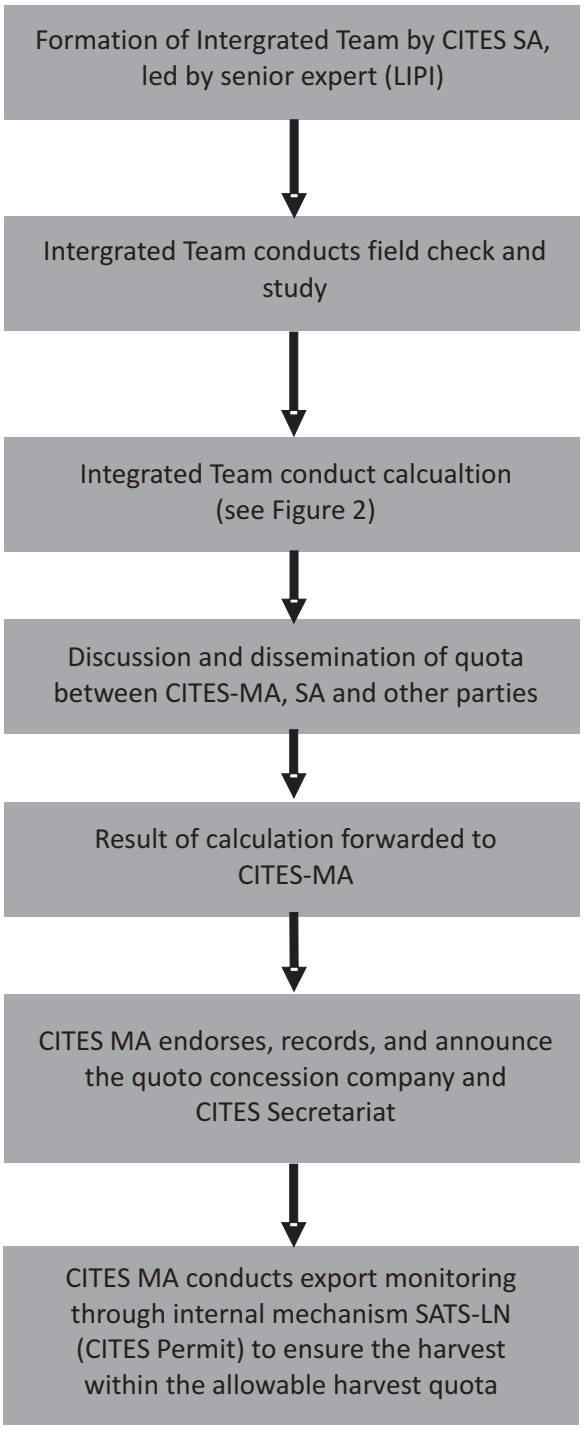

Figure 1. Working flow and coordination in the determination of annual allowable cut (Harvest quota) at management unit level.

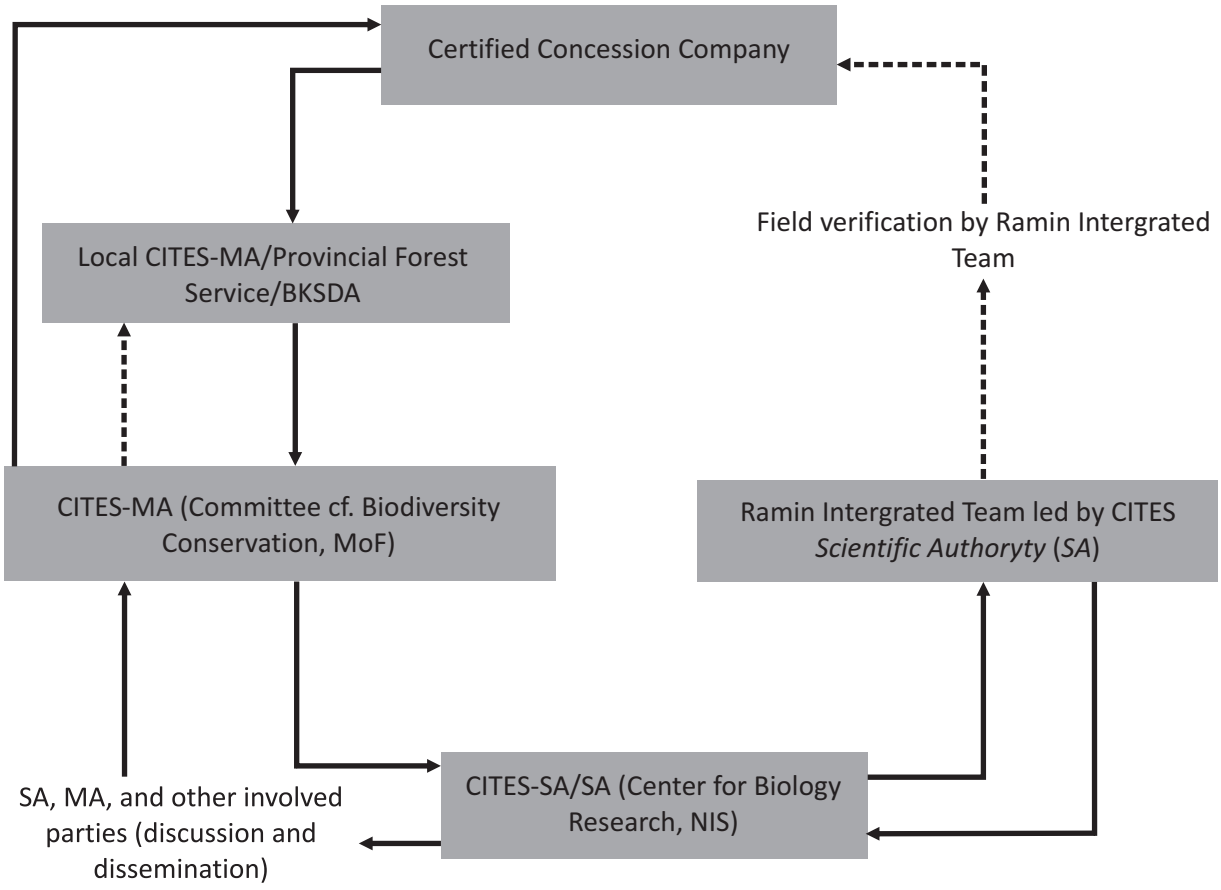

Figure 2. Working flow and coordination in the determination of annual allowable cut (harvest quota) at management unit level.

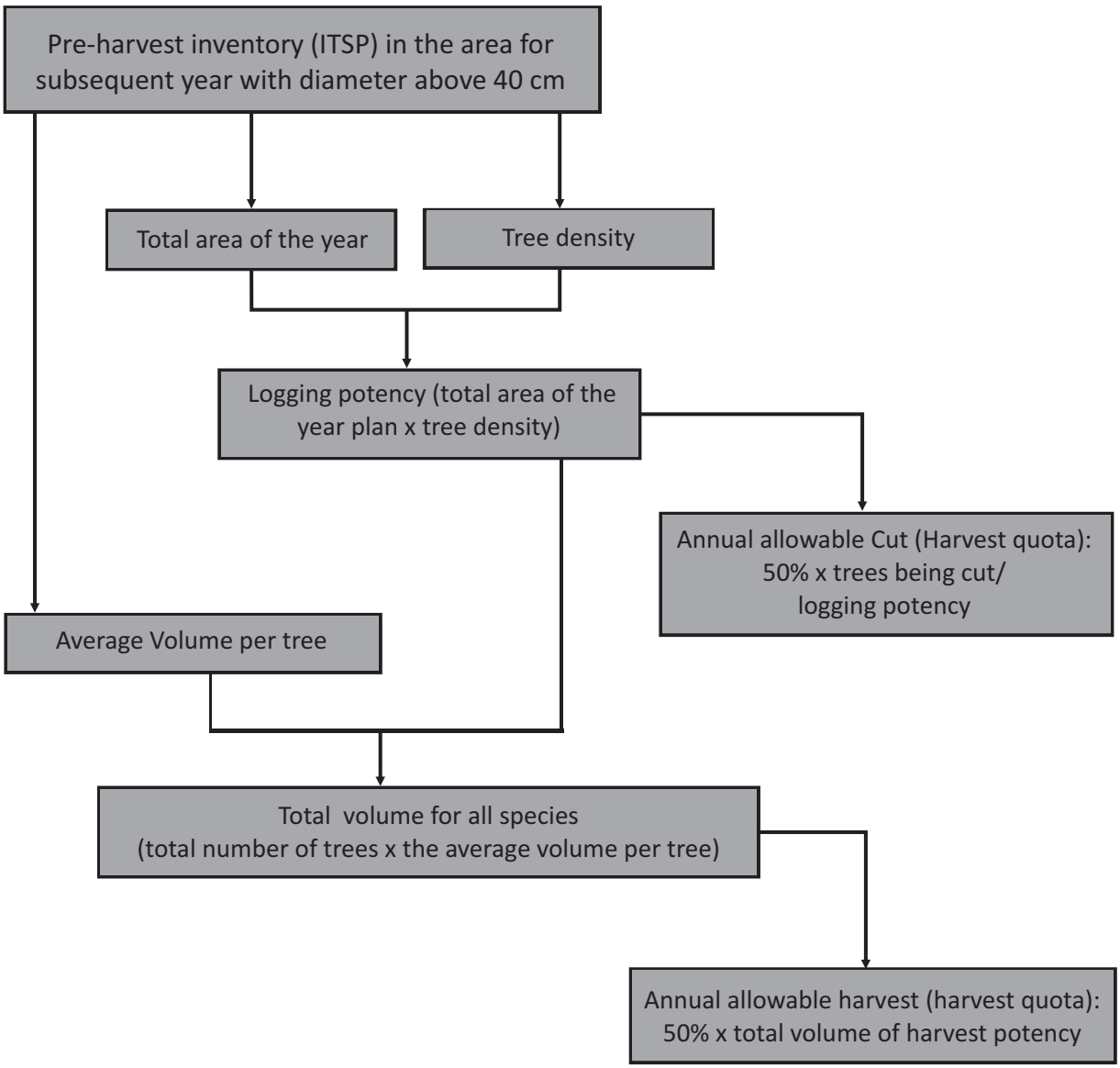

Figure 3. A flow diagram in the determination of allowable harvest quota at management unit level.

C. NATIONAL GUIDELINE

Assessing NDF for national level has been formulated and standardized by IUCN-CITES Secretariat (Rosser & Haywood, 2002). Step to conduct this assessment is described as follows:

a. Collecting the important data and information related to ramin. The list presented in section A (General Guidance) is a primary reference to collect the data;
b. Filling the scores in accordance with the table;
c. Make a radar plot based on the presented score;
d. Do analyses of sustainability;
e. Provide inputs for improving existing management.

Table to give score to species characteristics under study is presented in Table 1. The numbers of chosen parameters are 26 parameters, consisting of parameters related to biological characteristics, national status, logging management, logging supervision, monitoring, logging impact, and protection. Each parameter has a score from 5 (the highest) to 1 (the lowest). To assist in the provision of each score, a short description is provided in each characteristics under study.

This scoring table has been modified specific for *Gonystylus* and also adapted for Indonesian condition. In the original document, for example, there are some questions related to land tenurial system which is unsuitable for Indonesia.

Table 1. Parameter and putting a score for NDF Assessment for *Gonystylus* spp.

No.	Parameter	Species characteristics under study	Score
Biological characteristics			
1	Adaptability: How is the adaptability of the species under study to the variety of habitats?	Easy to grow and adapt to all types of habitats and all types of forest succession	5
		Easy to grow and adapt to some types of habitats and several types of forest succession	4
		Relatively low adaptability, grow in certain habitats and certain succession types	3
		Grow only in certain habitat, with high site requirement (edaphic, temperature, and elevation)	2
		No information available related to adaptability	1
2	Regeneration capacity: How is the regeneration capacity of the species?	Regeneration could be through vegetative propagation, fast	5
		Regeneration could be through vegetative propagation, relatively slow	4
		Regeneration relatively fast, with seed	3
		Regeneration slow, irregular, with seeds	2
		No information available on this aspect	1
3	Dispersal efficiency: How efficient is its seed dispersal mechanism of the species?	Very efficient: seed dispersed to distant area	5
		Efficient: seeds dispersed to surrounding fruiting trees	4
		Moderate: seeds dispersed under the fruiting tree	3
		Bad: seeds undispersed due to natural barriers (i.e. water barrier, predation)	2
		No information available	1
4	Habitat: In what habitat types mostly the species grow ?	Shrub	5
		Secondary forests	4
		Logged-over area	3
		Climax forest	2
		No information available	1
Distribution (distribution range) and population			
5	National Distribution: How is the species nationally dstributes?	Widely distributed, evently to all places	5
		Widely distributed, scattered to all places	4
		Limitedly distributed and scattered	3
		Strictly distributed to certain location	2
		No information avalable	1

Table 1. (Advanced)

No.	Parameter	Species characteristics under study	Score
6	National Abundancy: How is the species abundancy at national level?	Abundance in its habitat	5
		Commonly found	4
		Not commonly found	3
		Rare, hardly found	2
		No information available	1
7	The trends of population to the national level: How is the trends of the population at national level at this time?	National population increases (i.e plantation program)	5
		National population constant	4
		Population decreases, but naturally recovers	3
		Population decreases and may not recover	2
		No information available	1
8	Information quality: How is the quality of information related to the abundancy and trends of the population at national level?	Information on abundancy and trends of population based on quantitaive, recently updated	5
		Information limited to only certain location, good quality	4
		Information on abundancy and population trends based on quantitative data, data out of date	3
		Limited information on abundancy and population trends, but the information unclear	2
		No information available	1
9	Primary threat: What are the current threat to species? (primarily excessive logging, harvesting, habitat conversion, and on how intense is the threat)?	No existing threat to this species	5
		Limited threat to certain areas, population and habitat could be restored	4
		Serious threat, but population and habitat could be eventually restored within the long term period	3
		Serious threat, population and habitat could not be restored	2
		No information available	1
Harvest Management			
10	Illegal harvest and illegal trade: How is the current condition of illegal logging and trade?	No illegal harvest and illegal trade	5
		Limited cases of illegal harvest and illegal trade	4
		Moderate illegal harvest and illegal trade	3
		Serious illegal harvest and illegal trade	2
		No information available on this issue	1

Table 1. (Advanced)

No.	Parameter	Species characteristics under study	Score
11	Harvest Control: How is the history of harvesting ?	Harvest control is in accordance with the existing rules and regulation	5
		Harvest control executed, but still insufficient in accordance with the existing rules and regulation	4
		Harvest control is not implemented in accordcane with the existing rules and regulation	3
		Harvest is on and off	2
		No information available	1
12	Management Plan: Is ther any management plan for ramin?	Document for national management plan is available and implemented accordingly	5
		Dokument for national management plan available, but not fully implemented	4
		Document for management plan available at local level	3
		Document for management plan not available	2
		No information available on this issue	1
13	The objective of management plan: What is the objective of harvesting at national level?	Management is directed for conservation, species has been protected	5
		Management plan and harvest based on the principle of sustainability	4
		Management directed for maximum economic benefit	3
		Harvest based on opportuniistics, without appropriate management plan and harvest	2
		No information available	1
14	Quota: Is the amount of timber harvested based on quota system?	National quota available and determined base on scientific assessment	5
		National quota available, but not based scientific assessment	4
		No national quota available, local quota or based on concession company	3
		Harvest based on market demand, quota is not properly determined or without quota	2
		No information available on this issue	1

Table 1. (Advanced)

No.	Parameter	Species characteristics under study	Score
Supervision and harvesting mointoring			
15	In the area of given permit to harvest: How big is the percentage of harvesting in the designated area at national level?	High: all harvests are conducted the designated areas	5
		Moderate: large portion of harvest conducted in the designated areas	4
		Low: large portion of harvest are not conducted in the designated areas	3
		Most of the harvests are conducted outside the designated areas	2
		No information available on this issues	1
16	Logging at conservation and protected areas: How big is the percentage of harvesting in conservation and protected areas?	None: no logging at protected and conservation areas	5
		Low: illegal logging in protected and conservation areas, but in small scale	4
		Moderate: illegal logging at several conservation and protected areas	3
		High: high intensity of illegal logging in conservation and protected areas	2
		No information available on this issues	1
17	Logging in the area outside forest area: How big is the percentage of harvesting in natural area other than in forest area?(excluding planted forest)	No logging outside forest areas	5
		Low: logging outside forest area, but small portion area	4
		Moderate: logging outside forest areas, with larger portion area	3
		High: logging outside forest area, high intensity and out of control	2
		No information available	1
18	Certainty in Logging management: How certain is the harvesting is appropriately conducted?	Certain: yes, logging could be conducted properly according to the principle of sustainability	5
		Certain: Most of logging activity conducted properly	4
		Uncertain: proper harvest conducted only in small areas (compared to national)	3
		Uncertain: logging plan availabl, but uncertain that the plan is properly implemented	2
		No information available	1
19	Methods used to monitor logging: What is the main method used to monitor the harvest?	Direct monitoring	5
		Using quantitative index	4
		Using qualitative index	3
		National monitoring through export data	2
		No monitoring	1

Table 1. (Advanced)

No.	Parameter	Species characteristics under study	Score
20	Certainty in harvest monitoring conduct. How is the evaluation on the certainty of monitoring?	Highly certain: yes, monitoring could be conducted properly	5
		Certain : Most of monitoring program could be conducted	4
		Uncertain: monitoring could be conducted in the limited area only (compared to national)	3
		Uncertain: logging monitoring plan available, but not fully implemented	2
		No information available	1
Logging impact to environment and ecological condition			
21	Benefit to environment: How is the impact of logging compared to the benefit to the environment?	More beneficial for not to be harvested because this species provides more to environment	5
		Neutral: harvest gives no impacts to environment	4
		Harvets give negative impact to environment	3
		Harvests give severe impact to environment	2
		No information available	1
22	Logging impact to environment damages: How is the direct impat resulted from logging to the nearby environment (including other activity related to logging activity, such as skidding, collecting and storing in logpond and logyard)	Harvest not cause damage to environment and ecology	5
		Harvests cause slight damage to environment and ecology	4
		Harvests cause severe damage to environment with widespread areas	3
		Harvests cause severe damage to all ecosystem	2
		No information available	1
23	Environment recovery: How difficult is the environment recovery if the species is harvesting?	Environment quickly recover after logging	5
		Environment will recover after logging, but takes longer time	4
		Environment could recover with serious efforts and human intervention	3
		Environment could not recover, even change to low quality environment	2
		No information available	1
Conservation and Protection			
24	Protection Percentage: From the natural distribution of ramin distribution, how big is the portion retained?	>15%	5
		5-15%	4
		<5%	3
		All distribution areas are harvested	2
		No information available	1

Table 1. (Advanced)

No.	Parameter	Species characteristics under study	Score
25	Protection effectiveness: How certain is the effectivity of protection effort?	Highly certain: yes, ramin could be protected effectively based on the previously answered percentage	5
		Certain: large portion of ramin could be protected effectively based on the previously answered percentage	4
		Uncertain: only small portion of ramin could be effectively protected according to the previously answered percentage	3
		Uncertain: protection to ramin is totally ineffective	2
		No information available on the effectivity of protection	1
26	Harvest control: How effective is the existing regulation to control the excessive logging?	Highly effective: the existing regulation is effective to control excessive logging	5
		Effective: the existing regulation is sufficient to prevent excessive logging	4
		Not effective: regulation exist, but not fully implemented	3
		No regulation to control logging	2
		No information available	1

After putting appropriate scores to all parameters, from 26 parameters assessed, a radar plot is made, as demonstrated in Figure 3. The interpretation of the polygon in Figure 3 is as follows:

a. The highest scores (5 or 4) will produce wide polygon; conversely, the low scores will produce narrow polygon;

b. The wide polygon indicates that harvest of ramin meets NDF requirement, or the harvest is sustainable; conversely, narrow polygon indicates that the harvest is not sustainable or potentially cause detrimental effects to population.

From the radar plot sample as in Figure 3, it could be concluded that NDF for *Arapaima* (a fish species found in Brazil) has not been achieved. In other words, the harvest and trade of *Arapaima* are not sustainable or could cause detrimental effect to the population. Therefore, conservation actions should be taken immediately to prevent this genus from extinction. In the other hand for American Ginseng, its existence is better than *Arapaima*. However, important data and information that have lowest score need to be collected to ensure that the harvest and trade of this species has fulfilled the NDF criteria.

This radar plot employs qualitative approach which enables to make quick assessment. However, there are still many aspects with no standards and therefore need to make own decision on that aspects. The example is in the relative area of polygon. The other question is how much area of polygon (relative area) that could be considered sufficient to determine NDF requirements?

NDF assessment using radar plot system must be elaborated with description for each parameter (26 parameter), supported by sufficient argument in putting the value (scoring) in each parameter. If data and information have been completed, then putting the value in each parameter will be easy. If information about certain parameter is not available, then the given score of course will be very low.

This radar plot could also be used to determine the focus of management actions to be taken. The lower score indicates that parameter should be immediately taken care in order to ensure the sustainability. If the area in the polygon is very narrow, there is a necessary to up-list the conservation status from Appendix II to Appendix I.

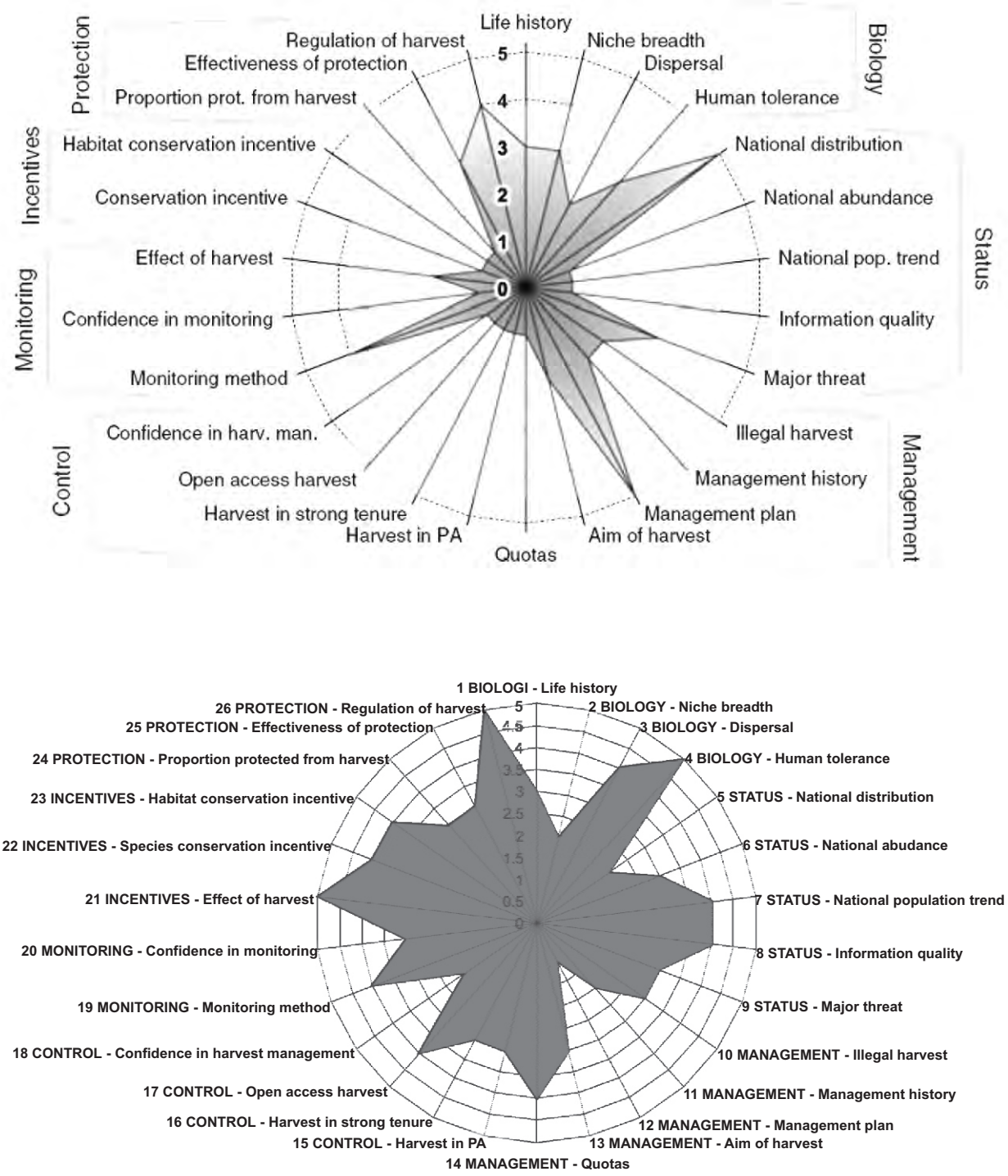

Figure 4. An example in making a radar plot for *Arapaima*, a fish species currently being exported from Brazil (Castello & Stewart, 2009; above) and American ginseng (*Panax quinquefolius),* an herbal species harvested for natural medicine (Rosser & Haywood, 2002).

D. MAKING A RADAR PLOT FOR *Gonystylus bancanus*

As an illustration to make radar plot, below is an example to develop a radar plot for ramin, *Gonystylus bancanus*, as presented below. This radar plot was developed during the technical workshop organized by ITTO-CITES Project dated, 1 June 2010 in Bogor involving various experts of ramin. The development of this radar plot is intended to test the compatibility with parameter and scores for ramin, *G bancanus* and collecting opinion regarding current status of this species based on their current knowledge and understanding as written in Table 2. The result (radar plot) is presented in Figure 5.

Table 2. Parameter and filled score in NDF assessment for *Gonystylus bancanus*.

No.	Parameter	Species characteristics under study	Score
Biological characteristics			
1	Adaptability: How is the adaptability of the species under study to the variety of habitats?	Easy to grow and adapt to all types of habitats and all types of forest succession	5
		Easy to grow and adapt to some types of habitats and several types of forest succession	4
		Relatively low adaptability, grow in certain habitats and certain succession types	3
		Grow only in certain habitat, with high site requirement (edaphic, temperature, and elevation)	(2)
		No information available related to adaptability	1
2	Regeneration capacity: How is the regeneration capacity of the species?	Regeneration could be through vegetative propagation, fast	5
		Regeneration could be through vegetative propagation, relatively slow	4
		Regeneration relatively fast, with seed	3
		Regeneration slow, irregular, with seeds	(2)
		No information available on this aspect	1
3	Dispersal efficiency: How efficient is its seed dispersal mechanism of the species?	Very efficient: seed dispersed to distant area	5
		Efficient: seeds dispersed to surrounding fruiting trees	4
		Moderate: seeds dispersed under the fruiting tree	(3)
		Bad: seeds undispersed due to natural barriers (i.e. water barrier, predation)	2
		No information available	1
4	Habitat: In what habitat types mostly the species grow ?	Shrub	5
		Secondary forests	(4)
		Logged-over area	3
		Climax forest	2
		No information available	1

Table 2. (Advanced)

No.	Parameter	Species characteristics under study	Score
Distribution (distribution range) and population			
5	National Distribution: How is the species nationally dstributes?	Widely distributed, evently to all places	5
		Widely distributed, scattered to all places	4
		Limitedly distributed and scattered	3
		Strictly distributed to certain location	(2)
		No information avalable	1
6	National Abundancy: How is the species abundancy at national level?	Abundance in its habitat	5
		Commonly found	4
		Not commonly found	(3)
		Rare, hardly found	2
		No information available	1
7	The trends of population to the national level: How is the trends of the population at national level at this time?	National population increases (i.e plantation program)	5
		National population constant	4
		Population decreases, but naturally recovers	(3)
		Population decreases and may not recover	2
		No information available	1
8	Information quality: How is the quality of information related to the abundancy and trends of the population at national level?	Information on abundancy and trends of population based on quantitaive, recently updated	5
		Information limited to only certain location, good quality	4
		Information on abundancy and population trends based on quantitative data, data out of date	(3)
		Limited information on abundancy and population trends, but the information unclear	2
		No information available	1
9	Primary threat: What are the current threat to species? (primarily excessive logging, harvesting, habitat conversion, and on how intense is the threat)?	No existing threat to this species	5
		Limited threat to certain areas, population and habitat could be restored	4
		Serious threat, but population and habitat could be eventually restored within the long term period	(3)
		Serious threat, population and habitat could not be restored	2
		No information available	1
Harvest Management			
10	Illegal harvest and illegal trade: How is the current condition of illegal logging and trade?	No illegal harvest and illegal trade	5
		Limited cases of illegal harvest and illegal trade	4
		Moderate illegal harvest and illegal trade	3
		Serious illegal harvest and illegal trade	(2)
		No information available on this issue	1

Table 2. (Advanced)

No.	Parameter	Species characteristics under study	Score
11	Harvest Control: How is the history of harvesting?	Harvest control is in accordance with the existing rules and regulation	(5)
		Harvest control executed, but still insufficient in accordance with the existing rules and regulation	4
		Harvest control is not implemented in accordcane with the existing rules and regulation	3
		Harvest is on and off	2
		No information available	1
12	Management Plan: Is ther any management plan for ramin?	Document for national management plan is available and implemented accordingly	5
		Dokument for national management plan available, but not fully implemented	(4)
		Document for management plan available at local level	3
		Document for management plan not available	2
		No information available on this issue	1
13	The objective of management plan: What is the objective of harvesting at national level?	Management is directed for conservation, species has been protected	5
		Management plan and harvest based on the principle of sustainability	(4)
		Management directed for maximum economic benefit	3
		Harvest based on opportuniistics, without appropriate management plan and harvest	2
		No information available	1
14	Quota: Is the amount of timber harvested based on quota system?	National quota available and determined base on scientific assessment	(5)
		National quota available, but not based scientific assessment	4
		No national quota available, local quota or based on concession company	3
		Harvest based on market demand, quota is not properly determined or without quota	2
		No information available on this issue	1
Supervision and harvesting mointoring			
15	In the area of given permit to harvest: How big is the percentage of harvesting in the designated area at national level?	High: all harvests are conducted the designated areas	(5)
		Moderate: large portion of harvest conducted in the designated areas	4
		Low: large portion of harvest are not conducted in the designated areas	3
		Most of the harvests are conducted outside the designated areas	2
		No information available on this issues	1

Table 2. (Advanced)

No.	Parameter	Species characteristics under study	Score
16	Logging at conservation and protected areas: How big is the percentage of harvesting in conservation and protected areas?	None: no logging at protected and conservation areas	5
		Low: illegal logging in protected and conservation areas, but in small scale	4
		Moderate: illegal logging at several conservation and protected areas	(3)
		High: high intensity of illegal logging in conservation and protected areas	2
		No information available on this issues	1
17	Logging in the area outside forest area: How big is the percentage of harvesting in natural area other than in forest area?(excluding planted forest)	No logging outside forest areas	5
		Low: logging outside forest area, but small portion area	4
		Moderate: logging outside forest areas, with larger portion area	3
		High: logging outside forest area, high intensity and out of control	2
		No information available	(1)
18	Certainty in Logging management: How certain is the harvesting is appropriately conducted?	Certain: yes, logging could be conducted properly according to the principle of sustainability	(5)
		Certain: Most of logging activity conducted properly	4
		Uncertain: proper harvest conducted only in small areas (compared to national)	3
		Uncertain: logging plan availabl, but uncertain that the plan is properly implemented	2
		No information available	1
19	Methods used to monitor logging: What is the main method used to monitor the harvest?	Direct monitoring	(5)
		Using quantitative index	4
		Using qualitative index	3
		National monitoring through export data	2
		No monitoring	1
20	Certainty in harvest monitoring conduct. How is the evaluation on the certainty of monitoring?	Highly certain: yes, monitoring could be conducted properly	(5)
		Certain : Most of monitoring program could be conducted	4
		Uncertain: monitoring could be conducted in the limited area only (compared to national)	3
		Uncertain: logging monitoring plan available, but not fully implemented	2
		No information available	1

Table 2. (Advanced)

No.	Parameter	Species characteristics under study	Score
Logging impact to environment and ecological condition			
21	Benefit to environment: How is the impact of logging compared to the benefit to the environment?	More beneficial for not to be harvested because this species provides more to environment	5
		Neutral: harvest gives no impacts to environment	(4)
		Harvets give negative impact to environment	3
		Harvests give severe impact to environment	2
		No information available	1
22	Logging impact to environment damages: How is the direct impat resulted from logging to the nearby environment (including other activity related to logging activity, such as skidding, collecting and storing in logpond and logyard)	Harvest not cause damage to environment and ecology	5
		Harvests cause slight damage to environment and ecology	(4)
		Harvests cause severe damage to environment with widespread areas	3
		Harvests cause severe damage to all ecosystem	2
		No information available	1
23	Environment recovery: How difficult is the environment recovery if the species is harvesting?	Environment quickly recover after logging	5
		Environment will recover after logging, but takes longer time	(4)
		Environment could recover with serious efforts and human intervention	3
		Environment could not recover, even change to low quality environment	2
		No information available	1
Conservation and Protection			
24	Protection Percentage: From the natural distribution of ramin distribution, how big is the portion retained?	>15%	(5)
		5-15%	4
		<5%	3
		All distribution areas are harvested	2
		No information available	1
25	Protection effectiveness: How certain is the effectivity of protection effort?	Highly certain: yes, ramin could be protected effectively based on the previously answered percentage	5
		Certain: large portion of ramin could be protected effectively based on the previously answered percentage	(4)
		Uncertain: only small portion of ramin could be effectively protected according to the previously answered percentage	3
		Uncertain: protection to ramin is totally ineffective	2
		No information available on the effectivity of protection	1

Table 2. (Advanced)

No.	Parameter	Species characteristics under study	Score
26	Harvest control: How effective is the existing regulation to control the excessive logging?	Highly effective: the existing regulation is effective to control excessive logging	5
		Effective: the existing regulation is sufficient to prevent excessive logging	(4)
		Not effective: regulation exist, but not fully implemented	3
		No regulation to control logging	2
		No information available	1

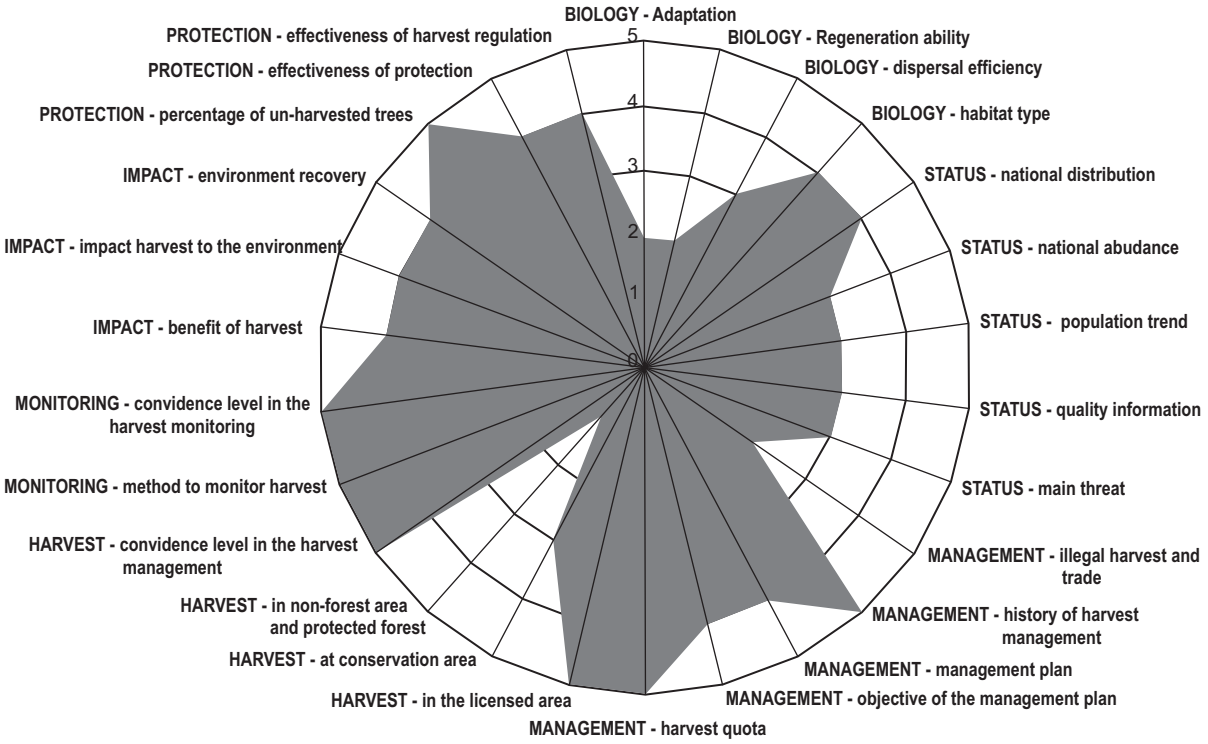

Figure 5. A radar plot for *Gonystylus bancanus*.

IV. CLOSING REMARK

NDF guideline for ramin species provides important directions to score whether current ramin harvest and trade is sustainable. Although, this guideline provides for ramin (*Gonystylus* spp.), this guideline could also be used for other timber producing species, which have not been listed in CITES Appendix but may have chance or pressure to be listed into CITES Appendix.

The result of NDF assessment at national scale could be used as the basis for setting development strategies and plan by the government. At the time of the assessment discussion was made, the exchange of information amongst stakeholders could be possible and could also

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KOMATSU

GUIDELINE
FOR NON-DETRIMENTAL FINDING ASSESSMENT ON RAMIN *Gonystylus* spp.

FORESTRY RESEARCH AND DEVELOPMENT AGENCY
IN COOPERATION WITH
ITTO – CITES PROJECT

Bogor, 2010

Guideline for Non-Detrimental Finding Assessment on Ramin *Gonystylus* spp.

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Activity Document 1 "Improving Inventory Design to estimate Growing Stock of Ramin (G*onystylus bancanus*) in Indonesia"
Additional Activity 1.1.

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PREFACE

Ramin, *Gonystylus* spp.*,* is one of tropical tree species which has been included in CITES Appendix. One of the international trade requirements for trees listed in CITES Appendix II is NDF assessment (Non-Detrimental Finding) that presents the assurance that the harvest will not threaten its habitat and population.

Gonystylus as a genus, consists of more than 30 species, depending on their taxonomic interpretation, but until now, *Gonystylus* that has been commercially logged and traded is *G. bancanus*. *G. bancanus* grows in peat swamp forest in Sumatera and Kalimantan. This species population tends to decrease due to natural disaster and various human activities.

The development of guideline for NDF assessment is one of the efforts to reduce negative impact from ramin logging in natural forest, even if for now, only one concession company (PT. Diamond Raya Timber) is licensed to harvest ramin.

This guideline is arranged based on field condition at present time, especially *G. bancanus*. Some discussion meetings and workshops have been conducted in the development of this guideline that involved parties related to management and trade of ramin, such as CITES-MA, CITES-SA, universities, research institution, NGO, and PT. Diamond Raya Timber. Hopefully, with the involvement of various related parties, this guideline could be accepted as a reference in management and harvest of ramin in the field.

Jakarta, October 2010

Mr. Adi Susmianto, MSc.
Director of CFNCRD-FORDA

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This document "Guidelines of NDF Assessment for Ramin *Gonystylus* spp." is arranged through fair long process and involved discussion with many experts. Our gratitude goes to Dr. Tukirin Partomihardjo (LIPI – CITES Scientific Authority) and Drh. Faustina Ida Hardjanti, M.Sc (PHKA – CITES Management Authority) who have given valuable inputs to this document.

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Hopefully, this document is useful for practitioners of ramin trading, especially those involved in ramin exports. In addition, we also hope that this document could become a primary reference for NDF assessments for other timber species that may face similar problem with ramin and possibility to be included in CITES Appendix.

Author,

Prof. Dr. Ani Mardiastuti

ACKNOWLEDGEMENT, FROM THE EDITORS

This document "Guidelines of NDF Assessment for Ramin *Gonystylus spp.*" is originally in Indonesian language. Later, it is understood that this document is important for other readers, not only those who pay their concern on ramin but also for other forest tree species currently under threat. Regional Project Coordinator, Mr. Thang Hooi Chiew, has given his support to the effort to make english version of this document.

To Mr. Ibrahim Yusuf, who made the translation from Indonesian language to English version is highly appreciated. To Siti Nurjanah, who made the setting both in Indonesian version and English version, also deserve appreciation. Finally, we thank to all who have given their contribution in both Indonesian and English version of this document.

It is expected that, this document is useful for those who pay attention to the conservation of wildlife, especially species currently under serious threat or becoming threatened by various human disturbances.

Editor, Coordinator in Charge

Tajudin Edy Komar

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ABBREVIATION

AAC	Annual Allowable Cut
BPKH	Regional Office for Forest Status Verification - *Balai Pemantapan Kawasan Hutan*
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of Parties
GIS	Geographic Information System
IUCN	International Union for Conservation of Nature
IUPHHK	Indonesian Harvest Permit - *Ijin usaha Pemanfaatan Hasil Hutan Kayu*
LIPI	Indonesian Institute of Science - *Lembaga Ilmu Pengetahuan Indonesia*
MA	Management Authority
NDF	Non-Detrimental Finding
PHAPL	Sustainable Management FOR Natural Forests – *Pengelolaan Hutan Alam Produksi Lestari*
PSF	Peat Swamp Forests
PT	Corporation - *Perseroan Terbatas*
RIT	Ramin Integrated Team
SA	Scientific Authority
SATS-LN	Transport Permit for export of wildlife - *Surat Angkutan Tumbuhan dan Satwa – Luar Negeri*
SPHAL	Certificate for sustainable Management of Natural Forests - *Sertifikat Pengelolaan Hutan Alam Lestari*
TPTI	Indonesian selective cutting and enrichment planting – *Tebang Pilih Tanam Indonesia*

EXECUTIVE SUMMARY

GUIDELINE ON ASSESSMENT OF NON-DETRIMENTAL FINDING FOR RAMIN *GONYSTYLUS* SPP.

Ramin (*Gonystylus* Teysmann & Binnendijk) is a genus of tree which currently listed in CITES Appendix II. So far, Ramin is the only group of Indonesian timber trees listed in CITES Appendix. The main reason of the inclusion of ramin in the CITES Appendix was because this group of species has been heavily traded, especially in the international market. Ramin has been used for many purposes, including for frames, dowels, baby crib, toys, and some indoor light constructions.

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) – as implies by its name - is a convention that regulates the international trade of endangered species of wild fauna and flora. In the past, regulation of CITES mostly aimed at animal species. However, during the past decade, plant species have been included in the CITES Appendix, meaning that the trade of the species is strictly prohibited (Appendix I) or regulated, usually by a quota system (Appendix II).

As required by CITES, the international trade of species belonging to this genus (*Gonystylus)* must meet the criteria of Non-Detrimental Finding (NDF). Under this criteria, a related party of CITES must conduct an assessment that the trade of a species will not be detrimental to the survival of the species. In other words, the harvest of the species must be in sustainable manner.

CITES has published two documents as guidelines to make NDF assessment, namely 'Guidance for CITES Scientific Authorities: Checklist to Assist in Making Non-Detriment Findings for Appendix II Exports' and 'Principles for Non-Detriment Findings (NDF) for Trees'. These guidelines are meant to be general and, therefore, still need to be worked on further for a specific species or group of species such as ramin.

The objective of this document is to provide guidelines to conduct assessment on Non-Detrimental Finding (NDF) for Ramin. In this document, ramin refers to all species belong to genus *Gonystylus*. In the future there is a probability that other timber species will be included in the CITES Appendix. Therefore, this document can also be used as an exercise for other Indonesian timber species that might be a candidate for CITES Appendix.

This guideline is basically follows the two CITES guidelines mentioned previously, with an intensive modification in such a way to suit with the condition in Indonesia and the biology of

ramin. However, the basic idea is still follows the CITES document mentioned previously. This guideline consists of three parts:

(a) general guideline,
(b) guideline for forest management unit, and
(c) national guideline to create a radar plot.

The general guideline gives list of data and information needed to conduct the NDF assessment and contains five basic elements:

(i) biological characteristics,
(ii) national distribution and population,
(iii) harvest management,
(iv) harvest control and monitoring, and
(v) conservation and protection.

For the biological characteristics, information needed is general characteristics of ramin, regeneration ability, and habitat and edaphic factors. Information needed for the national distribution and protection includes distribution or ramin in various scales (local, national, regional), population structure, and population dynamics. Harvest management includes harvest implementation, silvicultural practices, restoration, and harvest evaluation.

For harvest control and monitoring requires information on monitoring and verification system, and optimization of timber products. As for conservation and protection, information needed basically is whether the species has been given enough protection and conservation actions in its natural habitat.

The list is based on the document entitled 'Principles for Non-Detriment Findings (NDF) for Trees' formulated by Trees Working Group – CITES Plants Committee in Cancun (Mexico, 17-22 November 2008) modified for the condition and situation in Indonesia. The modification is necessary, as there are many parameters not suitable for ramin and for condition in Indonesia.

The guideline for forest management unit is a specific guideline for harvest site (i.e. concession holders). Guideline for the management unit contains more specific steps and general formula to ensure the sustainable harvest. The guideline basically contains necessary steps to ensure sustainability of harvest. Some precautionary measures are in place, involving inventory before harvest, estimation of harvest volume, annual cutting, and harvest quota. A sufficient percentage of unharvested trees are set for a safe cutting. The volume of timber allowed to be harvested is only 50% of the total existing standing volume (minimum diameter of 40 cm), consisted of 30% for the seed tree, 10% for conservation, and additional 10% as safety factor.

For ramin harvesting, the Government of Indonesia has set a regulation that only a concessionaire company that already obtained a certificate of sustainable harvest management is allowed to harvest ramin. In addition, the company required to have annual planning (among other planning documents) before the company allowed to conduct the harvest. All field assessments are conducted by a team of experts, including representatives from the CITES Scientific Authority and Ministry of Forestry.

The national guideline to create a radar plot mainly follows the 'Guidance for CITES Scientific Authorities: Checklist to Assist in Making Non-Detriment Findings for Appendix II Exports' (Rosser & Haywood, 2000). There are 6 components and 26 parameters in this guideline, each parameter having a score of 5 (best) to 1 (worst).

Similar to the general guideline, all 26 parameter have been heavily modified to suit the condition in Indonesia. These parameters are:

(A) Biological characteristics
- (1) adaptation
- (2) regeneration ability
- (3) dispersal efficiency
- (4) habitat type

(B) Distribution and population
- (5) national distribution
- (6) national abundance
- (7) population trend
- (8) quality of information regarding distribution and population
- (9) main threat to this species

(C) Harvest management
- (10) illegal harvest and trade
- (11) history of harvest management
- (12) management plan
- (13) objective of the management plan
- (14) harvest quota

(D) Harvest control and monitoring
- (15) harvest in the licensed area
- (16) harvest at conservation area and protected forest
- (17) harvest in non-forest area
- (18) confidence level in the harvest management
- (19) method to monitor harvest
- (20) confidence level in the harvest monitoring

(E) Impact of harvest to environment and ecology
- (21) benefit of harvest (whether it is more beneficial if the species was left unharvested)
- (22) impact of harvest to the environment
- (23) environment recovery

(F) Conservation and protection
- (24) percentage of unharvested trees
- (25) effectiveness of protection
- (26) effectiveness of harvest regulation

From the scoring of all parameter, a radar plot with 26 polygon is created. A larger polygon is an indication that the trade is not detrimental to the survival of the species. A small polygon means that the trade might not be sustainable and might be detrimental to the survival of the species.

In addition, parameters with small score (i.e. closer to the center) need to be given special attention. Thus, this radar plot can be used by managers as a quick and easy way to decide priority for management of this species.

The 26 parameters for assessment for NDF of ramin in national level were discussed among ramin experts. One species of ramin, namely *Gonystylus bancanus*, was used as a study case to test the application of the parameters. Scoring for each parameter is discussed by the experts and the radar plot was produced.

I. INTRODUCTION

Ramin (*Gonystylus* spp.; Thymelaeaceae) is a species of plant which distributes across Southeast Asia and some Oceania nations (Indonesia, Malaysia, Myanmar, Philippines, Singapore, Brunei Darussalam, Papua New Guinea, Nicobar, Solomon and Fiji Islands). However, this species has not been found in East Java and Nusa Tenggara. The number of Ramin species is approximately 31 species and 1 variety, most of them (27 species) are found in Kalimantan (Komar, 2007).

Generally *Gonystylus* spp. is a medium-sized tree, and some species is categorized as grass. Some of those species, six species are commercial species: *G. affinis, G. forbesii, G. marcophyllus, G. velutinus*, and *G. bancanus* (CITES, 2004). The last species mentioned (*G. bancanus*) is heavily traded with the name '*ramin*'. The name '*ramin*' is now used to name all species on genus *Gonystylus*.

On national level, previously ramin was an important species that produced timber and is an 'export star' from Indonesia. The soft color and interesting pattern of the wood has made this species group preferred for various purposes.

Ramin harvesting to fulfill national and international demands has made significant decrease of population, causing the existence of this species considered dangerous (Soehartono & Mardiastuti, 2002). Therefore, ramin becomes a tree group species that needs high attention, both national and international level.

Many plant and animal species in Indonesia have been included in CITES Appendix (I or II). But, for species group those produce timber, only ramin is listed, therefore, its trade must comply with CITES Convention. Ramin has become a very important species for Indonesia and therefore this timber could be used as lessons learned for other species.

Since ramin was included in CITES Appendix II, various researches and scientific writings on ramin has increased. Scientific meetings are periodically held, inviting Indonesian and International professionals. Various publications also have been produced and widely spread.

The purpose of this document is to give direction to conduct *Non-Detrimental Finding* (NDF) for ramin. NDF is a term used in CITES, equivalent to sustainable harvest. Even in forest management, the principles of sustainability are always used, but CITES has own criteria to ensure ramin sustainability through pre-harvest assessment as described in NDF guidance.

The standard NDF guidelines which have been referred by member countries are presented in this document.

II. RAMIN AND CITES

A. BRIEF OVERVIEW ABOUT RAMIN

As mentioned in previous section, ramin timber is produced by tree species from genus *Gonystylus* and family Thymelaeaceae, subfamily *Gonystyloidae*. Species of *Gonystylus* which has been extensively studied is *G. bancanus* and other species the studies are still limited and therefore, studies on other *Gonystylus* species are still needed.

G. bancanus is a medium-sized tree, its height may reach 40-50 m and diameter may reach to 120 cm. Its stem is generally straight and stem without branch may reach 20-30 m. The skin is fibered, hard and short which may lead to itchy on skin. This type generally grows in peat swamp forest, riverside, and non-salty tidal area.

Ramin timber is categorized into class V of durability, vulnerable to blue stain attack and wet wood powder, but can be easily preserved. Ramin timber is used for furniture, interior decorations such as walls, floors, toys, broom handles, frames, etc., and for light constructions such as doors and window frames, veneer, plywood, block board and particle board (Partomiharjo & Darnaedi, 2007, Argent *et al*., without year).

In Indonesia, ramin forest is managed using the system of Tebang Pilih Tanam Indonesia (TPTI, Indonesian selective cutting and enrichment planting). This system has been expected to be suitable for forest and ramin production sustainability in the future if done based on logging cycle of 35 years, retaining minimal 25 healthy trees, above 15 cm in diameter per ha as core tree or 10% remaining of logged population (Partomihardjo & Darnaedi, 2007; Istomo, 2009).

B. BRIEF OVERVIEW ABOUT CITES

Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES) is an international convention that rules the trade of endangered wild plant and animals. Indonesia has ratified in this convention since 1978. Since then, international trade of these plant and animal species is referred to regulations ruled by CITES as in addition to the existing national laws and regulations.

The member country of CITES is obliged to comply with CITES regulations, such as controlling the distribution of species that included in CITES Appendix, both export and import from and to the country. Therefore, there is a 2-door control system to control the traffic of wild plant and animal trade, in both exporting and importing countries.

CITES system control is executed by using CITES standard licensing system which is published by Management Authority, who is responsible to inspect goods in or out from the country, based on the documents and specimens registered in Appendix I, II and III. CITES protection for wild plant and animal species are categorized into Appendix I, II and III. Specific plant and animal species that ruled by CITES is registered in the list in Appendix of CITES Convention. The text of CITES Convention containing 25 sections is permanent and cannot be changed, but its appendix may be changed to suit needs.

Appendix I is a list of species in threat to extinction, which is affected or may be influenced by trade. Trading (export, import, re-export or introduction from the sea) to this species must be based on tought consideration so it will not increase the threat to extinction and is allowed only for certain purposes, such as research, or if the species can be regenerated to second generation (F2).

Appendix II is a list of species whose population in the wild is not currently in threat to extinction, but may become threatened if its trade is not controlled, or species whose population in the wild is not currently threatened but its use must be controlled to guarantee its pretection. Meanwhile, Appendix III is a certain species requested by specific country to be controlled internationally by CITES mechanism and treated like Appendix II. These requests are usually associated with illegal trade which is difficult to control. If the population of a species is considered endangered because of international trade, the species can be proposed for the inclusion in CITES Appendix list, either by countries those have the species (range states) or by other countries. Conversely, a species that has been included in CITES Appendices may be proposed to be removed from CITES Appendix if the population is considered to be abundant and there is no threat by the trade. In fact, removing a species from the appendix is very difficult because it requires proof that trading will not threaten the species. Currently, there is a possibility that other timber species may also be included into the CITES Appendices, therefore, Indonesia should prepare to make relevant guidelines. Species in Indonesia that is under discussion for being controlled using mechanism like CITES Appendix are *Intsia palembanica, Intsia bijuga, Diospyros celebica*, and *Eusideroxylon zwageri*.

There are many misunderstandings regarding CITES trade control. To avoid misunderstanding on the implementation of CITES, some clarifications are that (a) CITES only regulates International trade (export-import) of species listed under CITES Appendix; while domestic trade is not regulated by CITES rules; (b) the main reason to list a species into CITES appendix is the species is currently under threat to extinction because of International trade; (c) plants and animals those protected by Indonesian law may have not been sufficient as required by CITES Appendix. This is because CITES and species protection are two different things.

C. CITES AND TRADE OF RAMIN

Species included in CITES Appendices are mostly wild animal species. With the increasing scarcity of plant species due to concerns of international trade, various species of plants (ornamental plants, timber plants, medicinal plants, resin-producing plants, and so on) has been widely included in the CITES Appendices. Globally, the timber species which have been included in the CITES appendices are more than 60 species (Appendix I and II) (Schmidt, 2007). Timber species in Indonesia, which has been included in Appendix II is ramin. Until now, ramin is the only species of timber from Indonesia that has been included in Appendix II of CITES. There are some other tree species are also included in CITES Appendix II: the species of agarwood-producing trees of the genus *Aquilaria* and *Gyrinops*. However, in CITES, these agarwood-producing species are classified as a resin-producing species, not timber-producing species.

In 2000s many illegal logging cases of ramin have been reported. While Indonesian government attempted to stop illegal logging in the field (domestic), control of international trade of ramin becomes very important, given that most ramin is intended for export. For these reasons, Indonesian government decided to include all species of ramin in CITES Appendix III. Indonesia requested the CITES secretariat to include Indonesian ramin in Appendix III on 12 April 2001 and the CITES secretariat distributed the request to other CITES range states through a notification to the parties no. 2001/026. The inclusion of ramin from Indonesia into Appendix III is officially implemented since 6 August 2001.

CITES Appendix III is a list of species included from the request of a particular country, in this case, Indonesia. Indonesia requests cooperation from other countries to prevent illegal logging and illegal trade that threatens its sustainability. The control of International trade of those species included in Appendix III can only be possible with a system that is recognized by CITES permission or license.

In 2001, Indonesia has stopped the export of ramin (zero export quotas). Logging moratorium has been established through Forestry Minister Regulation (No. 127/KPTS-V/2001), dated 11 April 2001. Exceptions are given for the concessions that have been certified as sustainable management of natural forests (SPHAL). For stocks that have been registered, export was allowed until 31 December 2001. In addition to these decisions, the whole policy of ramin is written in other Forestry Minister Regulations (No. 168/KPTS-IV/2001) dated 11 June 2001, concerning the use and distribution of ramin timber and (No. 1613/KPTS-II/2001), dated 30 October 2001, concerning the prohibition of export of ramin sawn timber.

By listing of ramin species in CITES Appendix, illegal trade, including smuggling will be well controlled so that it helped Indonesia to stop illegal logging. This is true because illegal logging will be followed by illegal international trade of timber products.

Later, Indonesia proposes to register ramin in Appendix II. This proposal was accepted by the 13th meeting of the Parties (COP) in Bangkok, 2004. Ramin has been officially listed in Appendix II CITES, and effective since 15 January 2005.

Timber-producing tree species are generally included in the CITES-Appendix with Annotation 5 or 6, which registers only logs, sawn timber, veneer and plywood. Ramin timber was included in Appendix II of CITES with Annotation 1, which register all parts and derivatives. The reason for determining Annotation I is because in International trade, ramin timber is traded not in the form of timber as defined in Annotation 5 or 6, but in the form of processed products, such as semi-finished molding, dowels, frame, cue stick, and furniture.

D. UNDERSTANDING NDF

NDF stands for Non-Detrimental Finding. The term of NDF is typically used in CITES. Since in the beginning NDF has not been translated into Indonesian, and therefore most formal Indonesian documents are still using NDF as legal term.

NDF is in fact equivalent to sustainable harvest. In the texts of CITES convention, there is no clear elaboration of NDF definition. However, in the chapters related to trade regulation, CITES convention very clearly gives an indication that sustainable harvest is an essential requirement for the trade of plants and animals listing in Appendix of CITES. To give better understanding of the convention, below is presented section IV paragraph 2a regarding the trade regulation. An article in the text of the convention that regulates the trade of species in CITES convention, which regulates the trade of species listing under Appendix II:

> "*The export of any specimen of a species included in Appendix II shall require the prior grant and presentation of an export permit. An export permit shall only be granted when the following conditions have been met: (a) a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species…*"

In the 10th COP in Harare, Zimbabwe, this NDP was specifically discussed and the results were presented in CITES Resolution Conf. 10.3, which recommends that each *Scientific Authority* in each country to do NDF based on scientific observation on available information related to population status, distribution, population tendency, factors related to ecology and harvest methods as well as trade information. Even each country has its own capacity to do NDF assessment, standard procedures is still needed so that the results of NDF can be accepted by Convention and International.

Literally, NDF means findings or evidence that harvest of a species will not endanger the existence of the harvested plant, so that the species would be sustainable. Therefore, NDF is an

important activity that needs to be done to determine the number of individual or percentage of population that may be harvested and traded in International market. Ideally, NDF should be done to all species listed in CITES Appendix II.

At the initial stage, CITES more reserved to animals, in the beginning the concept of NDF was developed for animals. Later, when timber producing plants began to be appended to CITES Appendix, NDF must be applied to timber producing plants species, including ramin.

CITES has given a few guidelines related to NDF. The important guidelins for NDF timber producing species can be seen or downloaded from these sites:

a. Guidance for CITES Scientific Authorities: Checklist to Assist in Making Non-Detriment Findings for Appendix II Exports.
   This document can be downloaded from site:
   http://www.conabio.gob.mx/institucion/cooperacion_internacional/TallerNDF/Links-Documentos/IUCNChecklist/Preliminar.pdf

b. Principles for Non-Detrimental Findings (NDF) for Trees.
   This document can be downloaded from site:
   http://www.conabio.gob.mx/institucion/cooperacion_internacional/TallerNDF/Links-Documentos/WG-CS/WG1-Trees/WG1-FR%20.pdf

III. GUIDELINE FOR NDF ASSESSMENT FOR RAMIN

In this section guide is given to do NDF assessment for ramin. However, this guide may also be used to assess other plant species, especially timber producers. For animal species, there are some modifications to suit general animal characteristic, therefore, an additional reference is needed.

The guideline for NDF assessment for Ramin consists of 3 sections: (a) general part, (b) forest management unit part (site), and (c) national part. Basically, general part contains directions to collect basic data. These data are needed for later discussion. An ideal list of information is given in general part for NDF assessment. Considering that collecting complete data is difficult, hopefully basic data and information can be obtained.

Guideline for forest management units is technical directions, intended to the areas that have been given their harvest permit (IUPHHK-Ijin Usaha Pengusahaan Hasil Kehutanan). This guideline is quantitative, intended to count annual harvest quota to make sustainable harvesting and ensuring that ramin would not becoming rare.

Guideline for national scale is a qualitative guide and is intended to obtain an overview of condition and trade of ramin on national level. This guideline is a standard guide which is recommended by CITES.

According to CITES, the main executive coordinator of NDF assessment is CITES Scientific Authority from each country. For Indonesia, CITES Scientific Authority is Biology Research Center, Indonesian Institute of Science (LIPI). However, LIPI is not working alone, considering that so many information needed to be collected before conducting NDF assessment. In practice, NDF study is conducted by one study team that consists of some experts from various disciplines under coordination of LIPI.

A. GENERAL GUIDANCE

As mentioned in previous section, CITES, since in the beginning has provided several guidelines (including NDF guidance) for various animal species, primarily due to the fact that many animal species have been listed in CITES Appendix. Since many plant species are included in CITES Appendix, a relevant guide need to be made for plants.

In 17-22 November 2008 in Cancun, Mexico, a scientists meeting was held to discuss NDF guideline for plant species. From the results, *Tree Working Group* has formulated NDF principles

for plants (*Principles for Non-Detriment Findings for Trees)*. This guidance consists of five key elements: distribution, population, management system, monitoring, and conservation.

General guidance for data collection for NDF assessment is presented below. This guidance has been modified from the Tree Working Group' document and has been adapted for *Gonystylus spp.* in Indonesia.

Element 1: Biological characteristics

Objective: to get understanding on basic biological data and ecology of ramin, especially charecteristics related to habitat and regeneration capability.

Needed data and information:

- Characteristic of ramin
  - Exact species identification, confirmed with standard herbarium specimen and can be used as International reference.
  - Herbarium data collection (supplied with geographical reference).
  - Addition of herbarium specimen from various different locations and from various habitats.
  - Specific characteristics to differentiate between *Gonystylus* species.
- Regeneration capability
  - Fruit and seed type.
  - Dispersal pattern.
  - Fruit and seed predator.
  - Age or life span.
  - Capacity to produce seed: frequency, number of seed in each fruiting, percentage of fruit becoming seed.
  - Alternative propagation other than seeds (for artificial regeneration).
- Habitat and edaphic factors
  - General habitat type.
  - Growing altitude (minimum, maximum, optimum).
  - Rainfall.
  - Soil type.
  - Peat depth and peat type (PSF habitat).
  - Other plant species that associated with ramin.

Element 2: Geographical distribution and population

Objective: (a) to observe natural distribution of ramin (general distribution including juirisdication boundaries, especially with other range state), and (b) to observe population status of ramin (standing stock and population dynamics) as evaluation standard on the impact of harvesting activities.

Needed data and information:

- Distribution of ramin at national scale (past and present distribution)
  - Vegetation and landcover map.
  - Ecosystem map or eco-zoning (forest function group).
  - National forest inventory.
  - Existing conservation area and area potentially becoming conservation in the future.
- Ramin distribution at island scale or bio-geographic area
  - National database, including database in each Office of Forest Status Verification (BPKH).
  - Forest inventory in each province, island, bio-geographic area or BPKH.
  - Mapping on each province and island (from various sources).
- Local distribution (IUUPHK permit holder)
  - Sample of inventory statistic for forest management plans.
  - Geographic information system (GIS) from logged over area.
  - Census for commercial logging purposes, ideally based on geo-reference data.
  - Knowledge on ramin distribution at local level (on licensed area).
- Population structure of ramin: number of individual, age class distribution or size, tree density, number of trees and volume
  - Ramin inventory by using appropriate statistic methods.
  - Published study results.
  - Trusted data analysis method (e.g. local knowledge, previous data).
- Ramin population dynamics: mortality rate, growth rate, reproduction rate, regeneration rate.
  - Long term study by using proper methods.
  - Modeling approach (e.g. matrix).
  - Published study results.
  - Trusted data analysis methods (eg based on local knowledge, previous data).
  - Information about other factors those may affect ramin population (such as habitat preferent anddisease and other disturbances for ramin.

Element 3: Logging management

Objective: to determine whether management system is suitable for ramin and whether logging sistem could ensure sustainability, based on accurate information on population distribution and parameter.

Needed data and information includes inventory (or description) on commercial and non-commercial species, should use mapping/spacial reference:

- Ramin logging activity

  Identification of locations to be logged, by considering various alternatives logging systems.

  The suitability of tools and methods to be used.

  Efforts to reduce potential damage during logging (direct damage, environmental damage).

  Skidding methods and routes.

  Location of log pond and log yard.

  Identification and protection of areas and core trees.

  Determine the most appropriate time selection (especially in peat swamp habitat that is affected by tidal water and avoiding logging at flower/fruit time.

- Silviculture practices of ramin

  Silviculture activities before and after logging.

  Example: cleaning, core tree selection.

- Restoration activity, increasing quality of retained trees or reducing impact of logging

  Retained core trees.

  Enrichment planting through seed selection (seed quality, genetics variety).

  Cutting cycle (rotation) and fallow period (if any).

  Activity to reduce impact of logging (reduced impact logging; direct impact and environment impact).

- Harvest rate evaluation

  General evaluation: logging intensity (or percent of retained trees), age limit or cutting diameter).

  Quantitative knowledge about population status of ramin by using appropriate statistic methods.

  Expected production (present) and regeneration rate (future production)

  Appropriate measuring methods.

Element 4: Logging supervision and monitoring

Objective: to determine whether appropriate monitoring and verification system has been conducted, to ensure sustainable logging, and to reduce illegal trade and other illegal activities.

- Monitoring and verification system
  - Review mechanism before and after logging to verify management system.
  - Permanent plots to score logging impact to ramin population.
  - Chain of custody since logging to export.
  - Transparent process to increase trade control to logged ramin.
  - Review the function of quota system to ensure sustainable logging.
- Timber and non-timber usage and processed optimization
  - Immersion of raw materials into processed products.

Element 5: Logging impacts to environment and ecology condition

Objective: to assess the impact of logging activity to ecosystem and surrounding environment.

- Efforts to reduce logging impact
  - Logging activity impact and other related activities (skidding, timber collection and landfill).
  - Efforts to reduce impact of logging.
  - Impacts to erosion and soil fertility.
- Environment recovery
  - Assessing the easiness/difficulty of ecosystem to return to normal.
  - Efforts can be done to return ecosystem and environment to normal.

Element 6: Conservation and protection

Objective : to determine whether protection action has been executed, to ensure phenotypes and genetic variation of ramin of non-harvested natural population is still well represented, and to ensure ramin's role in ecosystem can be maintained.

Activities included in conservations and protections are:

- To protect representative area of ramin natural distribution to ensure the conservation of phenotype and genetic variation.
- To conserve all class age and size and ramin species distribution by considering the process of natural succession and regeneration.
- To prevent negative impacts by ramin logging to other species and its ecosystem.
- To establish protection area to protect unlogged population.

To establish protection area to protect unlogged population.

To establsih seed bank and other mechanisms to conserve germplasm.

To include legal and illegal logging impacts in species conservation status of ramin.

To provide incentive to concession holder if ramin was not logged (e.g. instead to establish species/habitat conservation).

B. GUIDANCE FOR FOREST MANAGEMENT UNITS

This guide for forest management unit is a stepwise to determine annual harvest quota which directed to concession holder. Information on annual harvest quota is becoming a pre-requisite for futher steps. To be able to export listed timber species in Appendix II of CITES, CITES Management Authority should ensure that:

(a) The company that is permitted to export ramin is a company that has passed SFM certificate (PHAPL-Pengelolaan Hutan Alam Produksi Lestari). Until today, the company that has ramin in its concession area and passed the SFM certificate is PT. Diamond Raya Timber in Riau.

(b) Annual Allowable Cut (AAC) is determined by Ramin Integrated Team (RIT) led by CITES Scientific Authority after timber cruising, at least 80%. This annual allowable cut is determined one year before logging. Technical counting for annual allowable cut of ramin for PT. Diamond Raya Timber can be studied on Partomiharjo & Darnaedi (2007) and Partomiharjo (2007). Coordination between CITES Management Authority and Scientific Authority in determining annual allowable cut is presented in Figure 1.

(c) Recommendation of annual allowable cut by Scientific Authority is submitted to Management Authority. CITES Management Authority will decide the annual allowable cut quota to the company in m^3.

Annual allowable cut which is determined by Scientific Authority actually is an assessment procedure of Non-Detrimental Finding (NDF). As mentioned in previous sections, NDF assessment must be conducted to ensure that logging on certain timber volume must be still in sustainable level, in this case, ramin. In Indonesia, ramin logging is only carried out by PT. Diamond Raya Timber, which is operating in Riau Province. The export is carried by PT. Uniseraya and there are more company applyng for export permits.

According to current regulation, in principles, forest area to be logged first must be divided into logging blocks that is suitable to the volume and rotation, after considering various aspects related to conservation and logging efficiency. Therefore, every year concession company determines the block of forest area to be logged. More information about logging aspects may refer to Istomo (2009).

A logging plan by concession holder for 1 year period is written on annual work plan (Annual coupe). This logging plan is still a plan and therefore must be prepared a year before. A plan related to NDF must be incorporated into this annual plan by concession company. The flow of setting annual allowable cut is presented in Figure 2.

To maintain the sustainability, in principles the number of trees or timber volume to be cut is only 50% from existing timber potency (diameter minimum of 40 cm), because 30% of the total must be retained for seed trees, 10% for conservation purposes, and 10% for protection factor. In order to obtain transparent and independent result, annual allowable cut is not conducted by concession holders only, but carried out by expert group, such as Ramin Integrated Team. This integrated team is led by Scientific Authority and the members consist of some experts from research institution, university, relevant central and local community group.

Theoretically, annual allowable cut from all concession comapnies is a national quota for ramin. Because only one concession company allowed to harvest ramin (PT. Diamond Raya Timber), automatically this company's annual allowable cut is effectively becoming national quota.

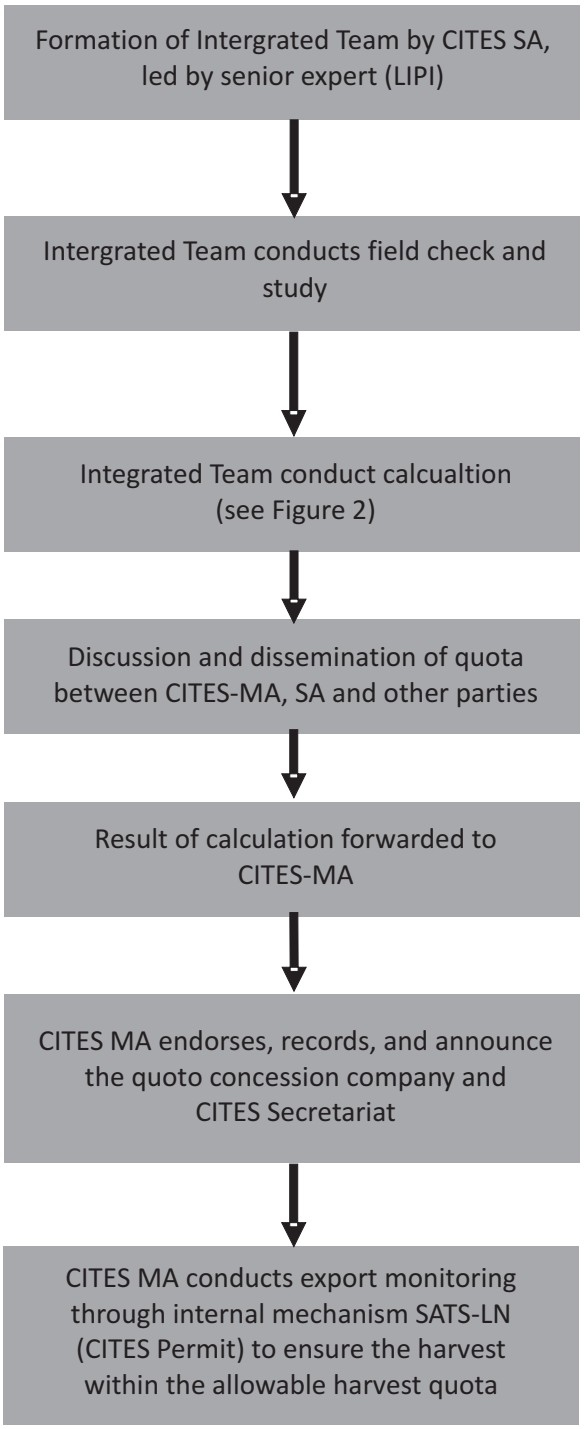

Figure 1. Working flow and coordination in the determination of annual allowable cut (Harvest quota) at management unit level.

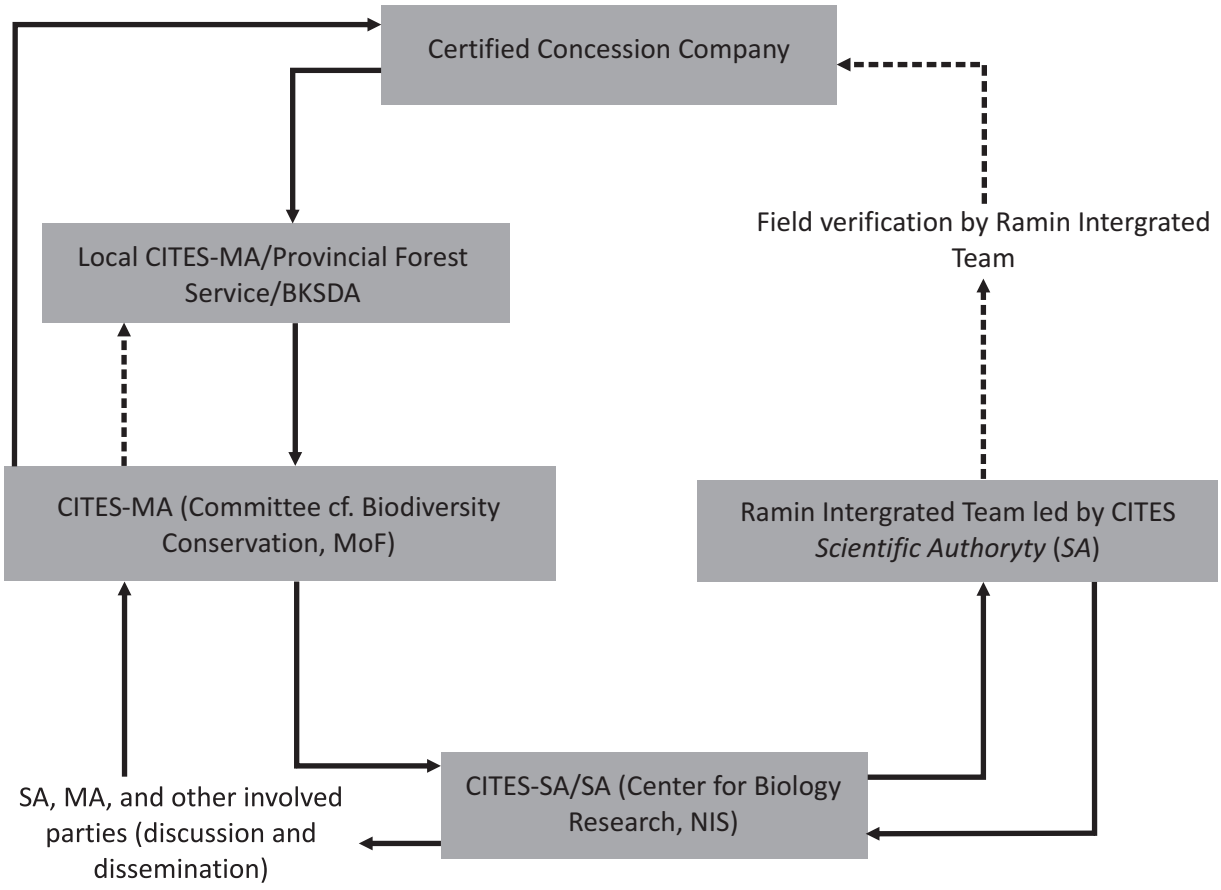

Figure 2. Working flow and coordination in the determination of annual allowable cut (harvest quota) at management unit level.

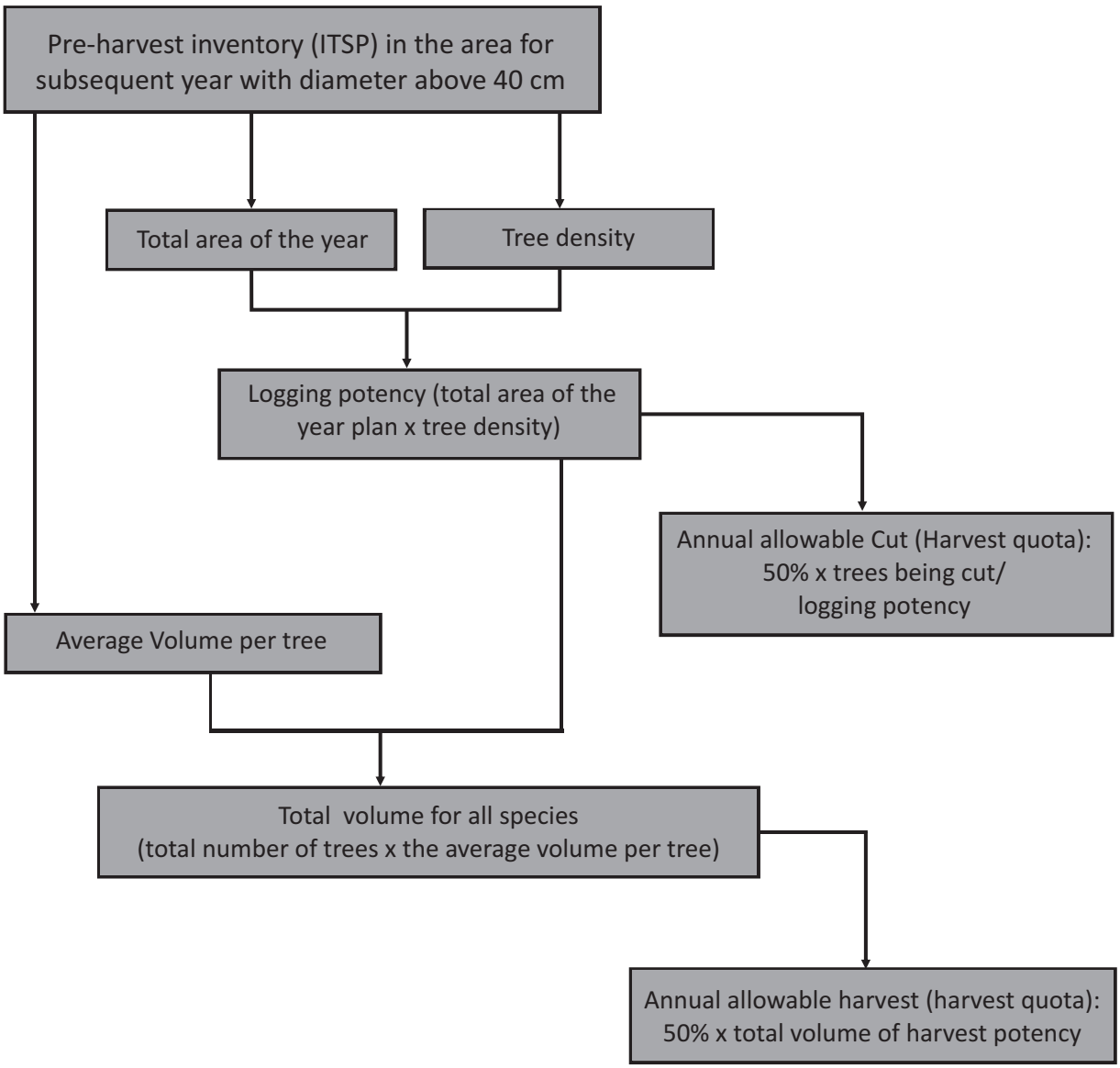

Figure 3. A flow diagram in the determination of allowable harvest quota at management unit level.

C. NATIONAL GUIDELINE

Assessing NDF for national level has been formulated and standardized by IUCN-CITES Secretariat (Rosser & Haywood, 2002). Step to conduct this assessment is described as follows:

a. Collecting the important data and information related to ramin. The list presented in section A (General Guidance) is a primary reference to collect the data;
b. Filling the scores in accordance with the table;
c. Make a radar plot based on the presented score;
d. Do analyses of sustainability;
e. Provide inputs for improving existing management.

Table to give score to species characteristics under study is presented in Table 1. The numbers of chosen parameters are 26 parameters, consisting of parameters related to biological characteristics, national status, logging management, logging supervision, monitoring, logging impact, and protection. Each parameter has a score from 5 (the highest) to 1 (the lowest). To assist in the provision of each score, a short description is provided in each characteristics under study.

This scoring table has been modified specific for *Gonystylus* and also adapted for Indonesian condition. In the original document, for example, there are some questions related to land tenurial system which is unsuitable for Indonesia.

Table 1. Parameter and putting a score for NDF Assessment for *Gonystylus* spp.

No.	Parameter	Species characteristics under study	Score
Biological characteristics			
1	Adaptability: How is the adaptability of the species under study to the variety of habitats?	Easy to grow and adapt to all types of habitats and all types of forest succession	5
		Easy to grow and adapt to some types of habitats and several types of forest succession	4
		Relatively low adaptability, grow in certain habitats and certain succession types	3
		Grow only in certain habitat, with high site requirement (edaphic, temperature, and elevation)	2
		No information available related to adaptability	1
2	Regeneration capacity: How is the regeneration capacity of the species?	Regeneration could be through vegetative propagation, fast	5
		Regeneration could be through vegetative propagation, relatively slow	4
		Regeneration relatively fast, with seed	3
		Regeneration slow, irregular, with seeds	2
		No information available on this aspect	1
3	Dispersal efficiency: How efficient is its seed dispersal mechanism of the species?	Very efficient: seed dispersed to distant area	5
		Efficient: seeds dispersed to surrounding fruiting trees	4
		Moderate: seeds dispersed under the fruiting tree	3
		Bad: seeds undispersed due to natural barriers (i.e. water barrier, predation)	2
		No information available	1
4	Habitat: In what habitat types mostly the species grow ?	Shrub	5
		Secondary forests	4
		Logged-over area	3
		Climax forest	2
		No information available	1
Distribution (distribution range) and population			
5	National Distribution: How is the species nationally dstributes?	Widely distributed, evently to all places	5
		Widely distributed, scattered to all places	4
		Limitedly distributed and scattered	3
		Strictly distributed to certain location	2
		No information avalable	1

Table 1. (Advanced)

No.	Parameter	Species characteristics under study	Score
6	National Abundancy: How is the species abundancy at national level?	Abundance in its habitat	5
		Commonly found	4
		Not commonly found	3
		Rare, hardly found	2
		No information available	1
7	The trends of population to the national level: How is the trends of the population at national level at this time?	National population increases (i.e plantation program)	5
		National population constant	4
		Population decreases, but naturally recovers	3
		Population decreases and may not recover	2
		No information available	1
8	Information quality: How is the quality of information related to the abundancy and trends of the population at national level?	Information on abundancy and trends of population based on quantitaive, recently updated	5
		Information limited to only certain location, good quality	4
		Information on abundancy and population trends based on quantitative data, data out of date	3
		Limited information on abundancy and population trends, but the information unclear	2
		No information available	1
9	Primary threat: What are the current threat to species? (primarily excessive logging, harvesting, habitat conversion, and on how intense is the threat)?	No existing threat to this species	5
		Limited threat to certain areas, population and habitat could be restored	4
		Serious threat, but population and habitat could be eventually restored within the long term period	3
		Serious threat, population and habitat could not be restored	2
		No information available	1
Harvest Management			
10	Illegal harvest and illegal trade: How is the current condition of illegal logging and trade?	No illegal harvest and illegal trade	5
		Limited cases of illegal harvest and illegal trade	4
		Moderate illegal harvest and illegal trade	3
		Serious illegal harvest and illegal trade	2
		No information available on this issue	1

Table 1. (Advanced)

No.	Parameter	Species characteristics under study	Score
11	Harvest Control: How is the history of harvesting ?	Harvest control is in accordance with the existing rules and regulation	5
		Harvest control executed, but still insufficient in accordance with the existing rules and regulation	4
		Harvest control is not implemented in accordcane with the existing rules and regulation	3
		Harvest is on and off	2
		No information available	1
12	Management Plan: Is ther any management plan for ramin?	Document for national management plan is available and implemented accordingly	5
		Dokument for national management plan available, but not fully implemented	4
		Document for management plan available at local level	3
		Document for management plan not available	2
		No information available on this issue	1
13	The objective of management plan: What is the objective of harvesting at national level?	Management is directed for conservation, species has been protected	5
		Management plan and harvest based on the principle of sustainability	4
		Management directed for maximum economic benefit	3
		Harvest based on opportuniistics, without appropriate management plan and harvest	2
		No information available	1
14	Quota: Is the amount of timber harvested based on quota system?	National quota available and determined base on scientific assessment	5
		National quota available, but not based scientific assessment	4
		No national quota available, local quota or based on concession company	3
		Harvest based on market demand, quota is not properly determined or without quota	2
		No information available on this issue	1

Table 1. (Advanced)

No.	Parameter	Species characteristics under study	Score
Supervision and harvesting mointoring			
15	In the area of given permit to harvest: How big is the percentage of harvesting in the designated area at national level?	High: all harvests are conducted the designated areas	5
		Moderate: large portion of harvest conducted in the designated areas	4
		Low: large portion of harvest are not conducted in the designated areas	3
		Most of the harvests are conducted outside the designated areas	2
		No information available on this issues	1
16	Logging at conservation and protected areas: How big is the percentage of harvesting in conservation and protected areas?	None: no logging at protected and conservation areas	5
		Low: illegal logging in protected and conservation areas, but in small scale	4
		Moderate: illegal logging at several conservation and protected areas	3
		High: high intensity of illegal logging in conservation and protected areas	2
		No information available on this issues	1
17	Logging in the area outside forest area: How big is the percentage of harvesting in natural area other than in forest area?(excluding planted forest)	No logging outside forest areas	5
		Low: logging outside forest area, but small portion area	4
		Moderate: logging outside forest areas, with larger portion area	3
		High: logging outside forest area, high intensity and out of control	2
		No information available	1
18	Certainty in Logging management: How certain is the harvesting is appropriately conducted?	Certain: yes, logging could be conducted properly according to the principle of sustainability	5
		Certain: Most of logging activity conducted properly	4
		Uncertain: proper harvest conducted only in small areas (compared to national)	3
		Uncertain: logging plan availabl, but uncertain that the plan is properly implemented	2
		No information available	1
19	Methods used to monitor logging: What is the main method used to monitor the harvest?	Direct monitoring	5
		Using quantitative index	4
		Using qualitative index	3
		National monitoring through export data	2
		No monitoring	1

Table 1. (Advanced)

No.	Parameter	Species characteristics under study	Score
20	Certainty in harvest monitoring conduct. How is the evaluation on the certainty of monitoring?	Highly certain: yes, monitoring could be conducted properly	5
		Certain : Most of monitoring program could be conducted	4
		Uncertain: monitoring could be conducted in the limited area only (compared to national)	3
		Uncertain: logging monitoring plan available, but not fully implemented	2
		No information available	1
Logging impact to environment and ecological condition			
21	Benefit to environment: How is the impact of logging compared to the benefit to the environment?	More beneficial for not to be harvested because this species provides more to environment	5
		Neutral: harvest gives no impacts to environment	4
		Harvets give negative impact to environment	3
		Harvests give severe impact to environment	2
		No information available	1
22	Logging impact to environment damages: How is the direct impat resulted from logging to the nearby environment (including other activity related to logging activity, such as skidding, collecting and storing in logpond and logyard)	Harvest not cause damage to environment and ecology	5
		Harvests cause slight damage to environment and ecology	4
		Harvests cause severe damage to environment with widespread areas	3
		Harvests cause severe damage to all ecosystem	2
		No information available	1
23	Environment recovery: How difficult is the environment recovery if the species is harvesting?	Environment quickly recover after logging	5
		Environment will recover after logging, but takes longer time	4
		Environment could recover with serious efforts and human intervention	3
		Environment could not recover, even change to low quality environment	2
		No information available	1
Conservation and Protection			
24	Protection Percentage: From the natural distribution of ramin distribution, how big is the portion retained?	>15%	5
		5-15%	4
		<5%	3
		All distribution areas are harvested	2
		No information available	1

Table 1. (Advanced)

No.	Parameter	Species characteristics under study	Score
25	Protection effectiveness: How certain is the effectivity of protection effort?	Highly certain: yes, ramin could be protected effectively based on the previously answered percentage	5
		Certain: large portion of ramin could be protected effectively based on the previously answered percentage	4
		Uncertain: only small portion of ramin could be effectively protected according to the previously answered percentage	3
		Uncertain: protection to ramin is totally ineffective	2
		No information available on the effectivity of protection	1
26	Harvest control: How effective is the existing regulation to control the excessive logging?	Highly effective: the existing regulation is effective to control excessive logging	5
		Effective: the existing regulation is sufficient to prevent excessive logging	4
		Not effective: regulation exist, but not fully implemented	3
		No regulation to control logging	2
		No information available	1

After putting appropriate scores to all parameters, from 26 parameters assessed, a radar plot is made, as demonstrated in Figure 3. The interpretation of the polygon in Figure 3 is as follows:

a. The highest scores (5 or 4) will produce wide polygon; conversely, the low scores will produce narrow polygon;

b. The wide polygon indicates that harvest of ramin meets NDF requirement, or the harvest is sustainable; conversely, narrow polygon indicates that the harvest is not sustainable or potentially cause detrimental effects to population.

From the radar plot sample as in Figure 3, it could be concluded that NDF for *Arapaima* (a fish species found in Brazil) has not been achieved. In other words, the harvest and trade of *Arapaima* are not sustainable or could cause detrimental effect to the population. Therefore, conservation actions should be taken immediately to prevent this genus from extinction. In the other hand for American Ginseng, its existence is better than *Arapaima*. However, important data and information that have lowest score need to be collected to ensure that the harvest and trade of this species has fulfilled the NDF criteria.

This radar plot employs qualitative approach which enables to make quick assessment. However, there are still many aspects with no standards and therefore need to make own decision on that aspects. The example is in the relative area of polygon. The other question is how much area of polygon (relative area) that could be considered sufficient to determine NDF requirements?

NDF assessment using radar plot system must be elaborated with description for each parameter (26 parameter), supported by sufficient argument in putting the value (scoring) in each parameter. If data and information have been completed, then putting the value in each parameter will be easy. If information about certain parameter is not available, then the given score of course will be very low.

This radar plot could also be used to determine the focus of management actions to be taken. The lower score indicates that parameter should be immediately taken care in order to ensure the sustainability. If the area in the polygon is very narrow, there is a necessary to up-list the conservation status from Appendix II to Appendix I.

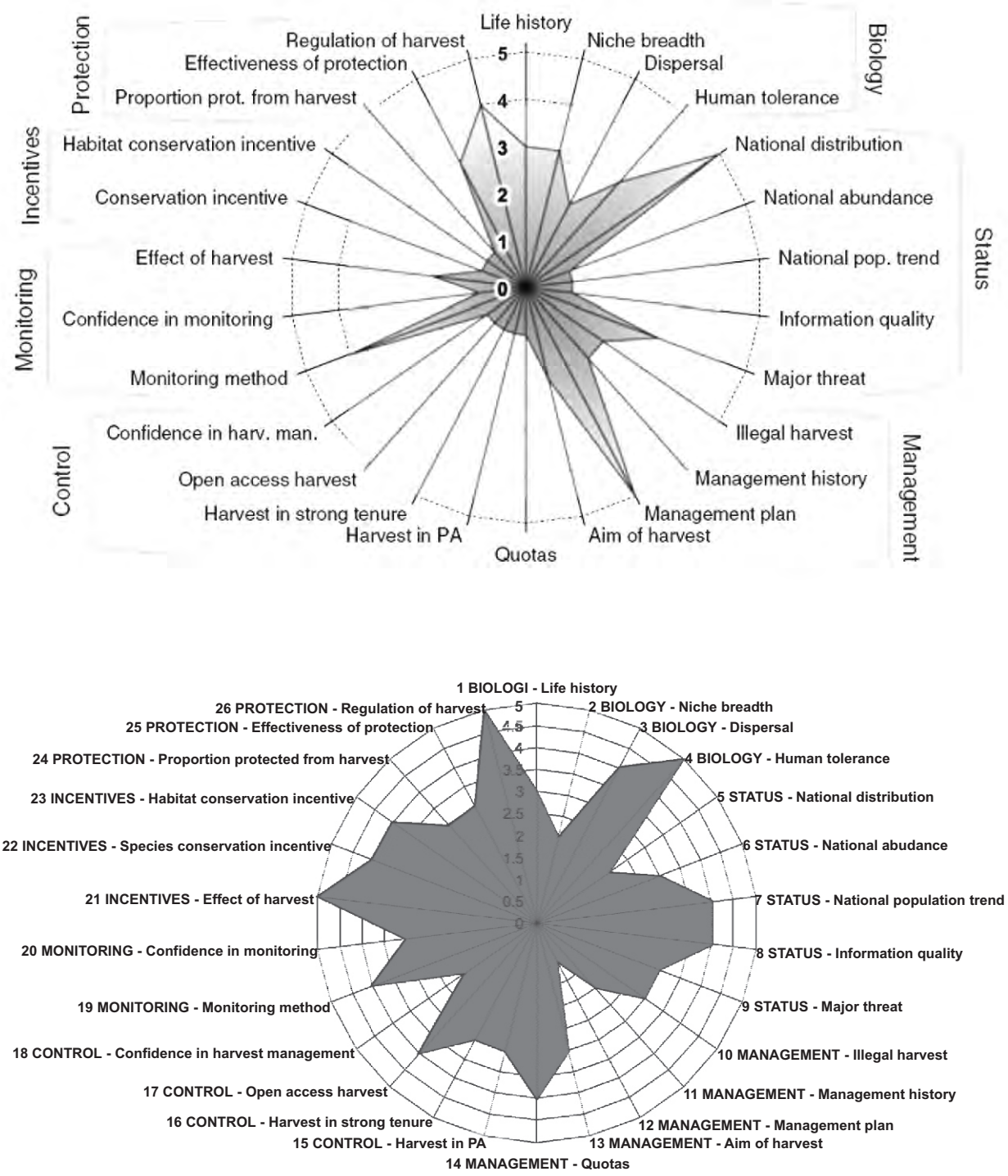

Figure 4. An example in making a radar plot for *Arapaima*, a fish species currently being exported from Brazil (Castello & Stewart, 2009; above) and American ginseng (*Panax quinquefolius),* an herbal species harvested for natural medicine (Rosser & Haywood, 2002).

D. MAKING A RADAR PLOT FOR *Gonystylus bancanus*

As an illustration to make radar plot, below is an example to develop a radar plot for ramin, *Gonystylus bancanus*, as presented below. This radar plot was developed during the technical workshop organized by ITTO-CITES Project dated, 1 June 2010 in Bogor involving various experts of ramin. The development of this radar plot is intended to test the compatibility with parameter and scores for ramin, *G bancanus* and collecting opinion regarding current status of this species based on their current knowledge and understanding as written in Table 2. The result (radar plot) is presented in Figure 5.

Table 2. Parameter and filled score in NDF assessment for *Gonystylus bancanus*.

No.	Parameter	Species characteristics under study	Score
Biological characteristics			
1	Adaptability: How is the adaptability of the species under study to the variety of habitats?	Easy to grow and adapt to all types of habitats and all types of forest succession	5
		Easy to grow and adapt to some types of habitats and several types of forest succession	4
		Relatively low adaptability, grow in certain habitats and certain succession types	3
		Grow only in certain habitat, with high site requirement (edaphic, temperature, and elevation)	(2)
		No information available related to adaptability	1
2	Regeneration capacity: How is the regeneration capacity of the species?	Regeneration could be through vegetative propagation, fast	5
		Regeneration could be through vegetative propagation, relatively slow	4
		Regeneration relatively fast, with seed	3
		Regeneration slow, irregular, with seeds	(2)
		No information available on this aspect	1
3	Dispersal efficiency: How efficient is its seed dispersal mechanism of the species?	Very efficient: seed dispersed to distant area	5
		Efficient: seeds dispersed to surrounding fruiting trees	4
		Moderate: seeds dispersed under the fruiting tree	(3)
		Bad: seeds undispersed due to natural barriers (i.e. water barrier, predation)	2
		No information available	1
4	Habitat: In what habitat types mostly the species grow ?	Shrub	5
		Secondary forests	(4)
		Logged-over area	3
		Climax forest	2
		No information available	1

Table 2. (Advanced)

No.	Parameter	Species characteristics under study	Score
Distribution (distribution range) and population			
5	National Distribution: How is the species nationally dstributes?	Widely distributed, evently to all places	5
		Widely distributed, scattered to all places	4
		Limitedly distributed and scattered	3
		Strictly distributed to certain location	(2)
		No information avalable	1
6	National Abundancy: How is the species abundancy at national level?	Abundance in its habitat	5
		Commonly found	4
		Not commonly found	(3)
		Rare, hardly found	2
		No information available	1
7	The trends of population to the national level: How is the trends of the population at national level at this time?	National population increases (i.e plantation program)	5
		National population constant	4
		Population decreases, but naturally recovers	(3)
		Population decreases and may not recover	2
		No information available	1
8	Information quality: How is the quality of information related to the abundancy and trends of the population at national level?	Information on abundancy and trends of population based on quantitaive, recently updated	5
		Information limited to only certain location, good quality	4
		Information on abundancy and population trends based on quantitative data, data out of date	(3)
		Limited information on abundancy and population trends, but the information unclear	2
		No information available	1
9	Primary threat: What are the current threat to species? (primarily excessive logging, harvesting, habitat conversion, and on how intense is the threat)?	No existing threat to this species	5
		Limited threat to certain areas, population and habitat could be restored	4
		Serious threat, but population and habitat could be eventually restored within the long term period	(3)
		Serious threat, population and habitat could not be restored	2
		No information available	1
Harvest Management			
10	Illegal harvest and illegal trade: How is the current condition of illegal logging and trade?	No illegal harvest and illegal trade	5
		Limited cases of illegal harvest and illegal trade	4
		Moderate illegal harvest and illegal trade	3
		Serious illegal harvest and illegal trade	(2)
		No information available on this issue	1

Table 2. (Advanced)

No.	Parameter	Species characteristics under study	Score
11	Harvest Control: How is the history of harvesting?	Harvest control is in accordance with the existing rules and regulation	(5)
		Harvest control executed, but still insufficient in accordance with the existing rules and regulation	4
		Harvest control is not implemented in accordcane with the existing rules and regulation	3
		Harvest is on and off	2
		No information available	1
12	Management Plan: Is ther any management plan for ramin?	Document for national management plan is available and implemented accordingly	5
		Dokument for national management plan available, but not fully implemented	(4)
		Document for management plan available at local level	3
		Document for management plan not available	2
		No information available on this issue	1
13	The objective of management plan: What is the objective of harvesting at national level?	Management is directed for conservation, species has been protected	5
		Management plan and harvest based on the principle of sustainability	(4)
		Management directed for maximum economic benefit	3
		Harvest based on opportuniistics, without appropriate management plan and harvest	2
		No information available	1
14	Quota: Is the amount of timber harvested based on quota system?	National quota available and determined base on scientific assessment	(5)
		National quota available, but not based scientific assessment	4
		No national quota available, local quota or based on concession company	3
		Harvest based on market demand, quota is not properly determined or without quota	2
		No information available on this issue	1
Supervision and harvesting mointoring			
15	In the area of given permit to harvest: How big is the percentage of harvesting in the designated area at national level?	High: all harvests are conducted the designated areas	(5)
		Moderate: large portion of harvest conducted in the designated areas	4
		Low: large portion of harvest are not conducted in the designated areas	3
		Most of the harvests are conducted outside the designated areas	2
		No information available on this issues	1

Table 2. (Advanced)

No.	Parameter	Species characteristics under study	Score
16	Logging at conservation and protected areas: How big is the percentage of harvesting in conservation and protected areas?	None: no logging at protected and conservation areas	5
		Low: illegal logging in protected and conservation areas, but in small scale	4
		Moderate: illegal logging at several conservation and protected areas	(3)
		High: high intensity of illegal logging in conservation and protected areas	2
		No information available on this issues	1
17	Logging in the area outside forest area: How big is the percentage of harvesting in natural area other than in forest area?(excluding planted forest)	No logging outside forest areas	5
		Low: logging outside forest area, but small portion area	4
		Moderate: logging outside forest areas, with larger portion area	3
		High: logging outside forest area, high intensity and out of control	2
		No information available	(1)
18	Certainty in Logging management: How certain is the harvesting is appropriately conducted?	Certain: yes, logging could be conducted properly according to the principle of sustainability	(5)
		Certain: Most of logging activity conducted properly	4
		Uncertain: proper harvest conducted only in small areas (compared to national)	3
		Uncertain: logging plan availabl, but uncertain that the plan is properly implemented	2
		No information available	1
19	Methods used to monitor logging: What is the main method used to monitor the harvest?	Direct monitoring	(5)
		Using quantitative index	4
		Using qualitative index	3
		National monitoring through export data	2
		No monitoring	1
20	Certainty in harvest monitoring conduct. How is the evaluation on the certainty of monitoring?	Highly certain: yes, monitoring could be conducted properly	(5)
		Certain : Most of monitoring program could be conducted	4
		Uncertain: monitoring could be conducted in the limited area only (compared to national)	3
		Uncertain: logging monitoring plan available, but not fully implemented	2
		No information available	1

Table 2. (Advanced)

No.	Parameter	Species characteristics under study	Score
Logging impact to environment and ecological condition			
21	Benefit to environment: How is the impact of logging compared to the benefit to the environment?	More beneficial for not to be harvested because this species provides more to environment	5
		Neutral: harvest gives no impacts to environment	(4)
		Harvets give negative impact to environment	3
		Harvests give severe impact to environment	2
		No information available	1
22	Logging impact to environment damages: How is the direct impat resulted from logging to the nearby environment (including other activity related to logging activity, such as skidding, collecting and storing in logpond and logyard)	Harvest not cause damage to environment and ecology	5
		Harvests cause slight damage to environment and ecology	(4)
		Harvests cause severe damage to environment with widespread areas	3
		Harvests cause severe damage to all ecosystem	2
		No information available	1
23	Environment recovery: How difficult is the environment recovery if the species is harvesting?	Environment quickly recover after logging	5
		Environment will recover after logging, but takes longer time	(4)
		Environment could recover with serious efforts and human intervention	3
		Environment could not recover, even change to low quality environment	2
		No information available	1
Conservation and Protection			
24	Protection Percentage: From the natural distribution of ramin distribution, how big is the portion retained?	>15%	(5)
		5-15%	4
		<5%	3
		All distribution areas are harvested	2
		No information available	1
25	Protection effectiveness: How certain is the effectivity of protection effort?	Highly certain: yes, ramin could be protected effectively based on the previously answered percentage	5
		Certain: large portion of ramin could be protected effectively based on the previously answered percentage	(4)
		Uncertain: only small portion of ramin could be effectively protected according to the previously answered percentage	3
		Uncertain: protection to ramin is totally ineffective	2
		No information available on the effectivity of protection	1

Table 2. (Advanced)

No.	Parameter	Species characteristics under study	Score
26	Harvest control: How effective is the existing regulation to control the excessive logging?	Highly effective: the existing regulation is effective to control excessive logging	5
		Effective: the existing regulation is sufficient to prevent excessive logging	(4)
		Not effective: regulation exist, but not fully implemented	3
		No regulation to control logging	2
		No information available	1

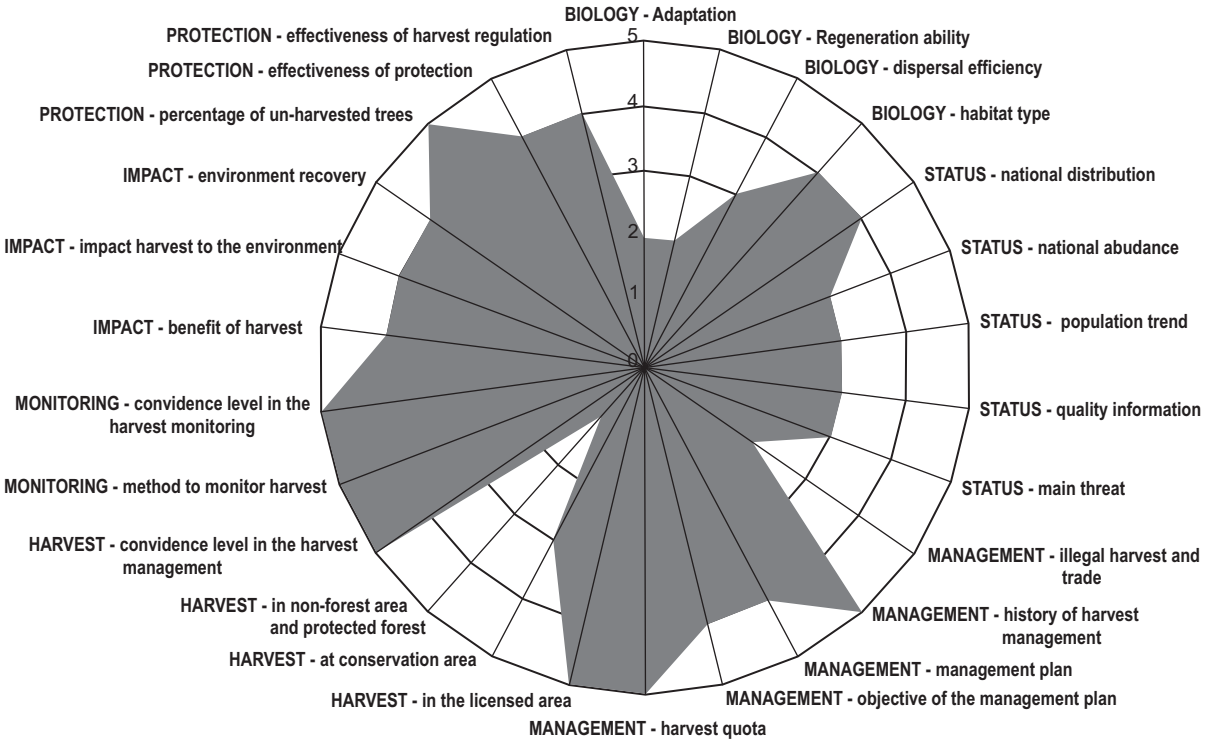

Figure 5. A radar plot for *Gonystylus bancanus*.

IV. CLOSING REMARK

NDF guideline for ramin species provides important directions to score whether current ramin harvest and trade is sustainable. Although, this guideline provides for ramin (*Gonystylus* spp.), this guideline could also be used for other timber producing species, which have not been listed in CITES Appendix but may have chance or pressure to be listed into CITES Appendix.

The result of NDF assessment at national scale could be used as the basis for setting development strategies and plan by the government. At the time of the assessment discussion was made, the exchange of information amongst stakeholders could be possible and could also

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