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TIMBER ISLAND

The Rosewood and Ebony Trade of Madagascar

Cynthia Ratsimbazafy, David J. Newton and Stéphane Ringuet

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Front cover photograph and credit: *Dalbergia madagascariensis* tree in Masoala National Park. © Julien Noel Rakotoarisoa / MEEF

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TIMBER ISLAND:

Rosewood and Ebony Trade of Madagascar

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Dalbergia madagascariensis **tree in Masoala National Park.**

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WWF

CONSERVATION INTERNATIONAL

WCS

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Hidden stock of rosewood at Ambanizana-Maroantsetra

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PREFACE

This document is the concrete outcome of the Sustainable Conservation Approaches in Priority Ecosystems (SCAPES) programme action 1.1.1 to "*Collect basic information on the harvest and trade of precious wood*" of sub-objective 1.1 *"Improve the available knowledge on the process of harvest and trade of precious timber, represented by Dalbergia and Diospyros species, and the associated socioeconomic factors*" of the "Preserving Madagascar's Natural Resources" project, financed by the United States Agency for International Development (USAID). SCAPES is a programme implemented by a consortium of organizations including WWF, TRAFFIC, Conservation International (CI) and the Wildlife Conservation Society (WCS). The main objective of this programme is to build capacity of Malagasy timber trade stakeholders in combating the illegal exploitation of its natural resources.

The document presents the available information on *Dalbergia* (including the common names palisander and rosewood) and *Diospyros* (ebony) *species* and highlights research and required actions for the issuing of a non-detriment finding (NDF), an integral part of the action plan resulting from Decision 16.152 of the 16th meeting of the Conference of the Parties to CITES to implement the listing of these species in Appendix II of CITES.

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A group of villagers sitting on logs of precious wood at Ambanizana Maroantsetra

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Finally, many woodcutters and lumberjacks, transporters, traders and exporters of precious timber have been kind enough to agree to answer our questions.

ABBREVIATIONS AND ACRONYMS

ACM	*Association des Conservateurs de Madagascar* / Madagascar Conservation Association
AFLEG	Africa Forest Law Enforcement and Governance
ASTA	*Association des Tourneurs d'Antalaha* / Woodturners' Association of Antalaha
AVG	*Alliance Voahary Gasy*
BIANCO	*Bureau Indépendant Anti-Corruption* / Independent Anti-Corruption Bureau
BMCF	*Brigade Mixte de Contrôle Forestier* / Joint Forest Control Brigade
CAJ	*Chef d'Appui Judiciaire* / Head of Legal Support
CARAB	Craftsmen Association for Renovation of Antongil Bay
CAZ	*Corridor Ankeniheny Zahamena*/Ankeniheny Zahamena Corridor
CBD	Convention on Biological Diversity
CEEF	*Circonscription de l'Environnement de l'Ecologie et des Forêts* / Constituency of the Environment, Ecology and Forests
CGM	*Compagnie Générale Maritime* (name of a shipping company)
CI	Conservation International
CIRAD	*Centre de coopération Internationale en Recherche Agronomique pour le Développement* / Centre for International Cooperation in Agricultural Research for Development
CIREF	*Circonscription Régionale des Forêts* / Regional Forestry Constituency
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLP	*Comité Local du Parc* / Local Park Committee
CMA	*Compagnie Maritime d'Affrètement* / Shipping line
COAP	*Code des Aires Protégées* / Protected Areas Code
COBA	*Communauté de Base* / Grassroots community
COFAV	*Corridor Fandriana Vondrozo* / Fandriana Vondrozo Corridor
COMATSA	*Corridor Marojejy Tsaratanana* / Marojejy Tsaratanana Corridor (Forest Corridor in North Madagascar)
COMINT	*Comité Interministériel de lutte contre le trafic de bois de rose* / Interministerial Committee to combat rosewood trafficking
CoP	Conference of the Parties (e.g., to CITES or CBD)
COSAP	*Comité de Soutien aux Aires Protégées* / Protected Areas Support Committee
CPDEA	*Cercle de Planification pour le Développement Economique d'Andapa* / Andapa Economic Development Planning Circle
CPI	Corruption Perception Index (of Transparency International)
CVCRT	*Chef de Volet Conservation, de Restauration et du Tourisme* / Head of Conservation, and Tourism Sector
DBEV	*Département de Biologie et Ecologie Végétale de l'Université d'Antananarivo* / Department of Biology and Plant Ecology of the University of Antananarivo
DBH	Diameter at Breast Height
DCBSAP	*Direction des Conventions sur la Biodiversité et du Système des Aires protégées* / Department of Conventions on Biodiversity and the Protected Areas System
DCF	*Direction des Contrôles Forestiers* / Department of Forest Law Enforcement
DGAT	*Direction de Gestion et de l'Aménagement du Territoire* / Department of Territorial Management and Development
DGD	*Direction Générale des Douanes* / General Directorate of Customs
DGF	*Direction Générale des Forêts* / General Directorate of Forests
DGI	*Direction Générale des Impôts* / Tax Directorate
DLFC	*Direction de la Législation Fiscale et du Contentieux* / Department of Tax Legislation and Litigation

DREEF	*Direction Régionale de l'Environnement, de l'Ecologie, de la Mer et des Forêts* / Regional Directoratet of the Environment, Ecology, the Ocean and the Forests
DRFP	*Département de Recherches Forestières et Piscicoles* (of FOFIFA) / Department of Forestry and Fishery Research
DVRF	*Direction de Valorisation des Ressources Forestières* / Department of Forestry Resources Development
DVRN	*Direction de Valorisation des Ressources Naturelles* (ex. DVRF) / Department of Natural Resources Development (ex. DVRF) Ecology, the Environment, the Sea and the Forests
EIA	Environmental Investigation Agency
ESARO	East and Southern Africa Regional Office (of IUCN)
ESSA	*Ecole Supérieure des Sciences Agronomiques* / National School of Agricultural Sciences
ETHZ-WSL	*Eidgenössische Forschungsanstalt für Wald, Schnee und Landschaft* (Swiss Federal Institute of Technology Zurich – Swiss Federal Institute of Research into forests, snow and landscape*)*
EU	European Union
FAO	United Nations Food and Agriculture Organization
FFN	*Fond Forestier National* / National Forest Fund
FOCAC	Forum on China-Africa Cooperation
FOFIFA	*Foibempirenenamombany Fikarohanaampiharina amin 'ny Fampandrosoananyeny Ambanivohitra* (National Centre for Applied Research in Rural Development)
FTM	*Foibe Taotsaritanin'ny Madagascar* / (Institut Géographique de Madagascar/ Madagascar's Institute for Hydrography and Geography)
GFTN	Global Forest and Trade Network
GIS	Geographical Information System
GNEFM	*Groupement National des Exploitants Forestiers de Madagascar* / National Group of Forest Operators of Madagascar
GSPM	*Groupe des Spécialistes des Plantes de Madagascar* / Madagascar Plant Specialist Group of IUCN SSC (The GSPM comprises specialists in Malagasy plants from the various national and international research institutions)
GW	Global Witness
HIL	High Intensity Labour
ICCWC	International Consortium on Combating Wildlife Crime
IEFN	*Inventaire Ecologique et Forestier National* / National Forest and Ecology Inventory
IIAG	Ibrahim Index of African Governance (of the Mo Ibrahim Foundation)
ILO	International Labour Organization
INSTAT	*Institut National de la Statistique de Madagascar* / Madagascar National Statistics Institute
ISC	Integrity Safeguard Committee
ITTO	International Tropical Timber Organization
IUCN	International Union for the Conservation of Nature
JO	*Journal Officiel* / Official Journal
MA	Management Authority (of CITES)
MadCat	Madagascar Catalogue of Vascular Plants
MaMaBay	Masoala-Makira-Antongil Bay (Landscape in North Eastern Madagascar)
MBG	Missouri Botanical Garden
MED	Minimum Exploitable Diameter
MEEF	*Ministère', de l'Environnement, de l'Écologie et des Forêts* / Ministry of Environment, Ecology and Forests
MFB	*Ministère des Finances et du Budget /* Ministry of Finance and the Budget
MGA	Malagasy Ariary

MNP	Madagascar National Parks
NAP	*Nouvelles Aires Protégées* / New Protected Areas
NDF	Non-Detriment Finding
NDP	National Development Policy
NGO	Non-governmental Organization
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
ONE	*Office National pour l'Environnement* / National Office for the Environment
ONESF	*Observatoire National de l'Environnemental et du Secteur Forestier* / National Observatory of the Environment and the Forest Sector
PA	Protected Area
PCDDBA	*Plateforme de Concertation pour le Développement Durable de la Baie d'Antongil* / Consultation Platform for the Sustainable Development of the Bay of Antongil
PCI	Principles, Criteria and Indicators
PRCF	People Resources and Conservation Foundation
RBG	Royal Botanical Garden
RC	Rural Community
RFF	*Fond Forestier Régional* / Regional Forest Fund
RR	Regeneration Rate
SAMFIN	*Service des Renseignements Financiers* / Financial Intelligence Unit
SAPM	*Système des Aires Protégées de Madagascar* / Madagascar Protected Areas System
SAVA	*Sambava Antalaha Vohémar Andapa* / (one of the 22 regions of Madagascar)
SC	*Standing Committee* (of CITES)
SCAPES	Sustainable Conservation Approaches in Priority Ecosystems
SGFF	*Service de Gestion des espèces de Faune et de Flore* / Department for the Management of species of Fauna and Flora
SGS	*Société Générale de Surveillance* (multinational company headquartered in Geneva, Switzerland which provides inspection, verification, testing and certification services)
SMART	Spatial Monitoring and Reporting Tool
SNGF	*Silo National des Graines Forestiers* / National Silo of Forest Grains
STD	Sexually Transmitted Disease
UAFL	United Africa Feeder Line
UC	Urban Community
UK	United Kingdom
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNODC	United Nations Office on Drugs and Crime
US	United States
USAID	United States Agency for International Development
USD	US Dollar
VOI	Vondron'Olona Ifotony (Grassroots community involved in forest conservation and/or local development)
WB	World Bank
WCO	World Customs Organization
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature
ZOC	*Zones d'Occupation Contrôlée* / Controlled occupation zones
ZUC	*Zones d'Utilisation Contrôlée* / Controlled use zones

EXECUTIVE SUMMARY

Madagascar's precious timber, represented by the genera of *Dalbergia (*rosewood and palisander) and *Diospyros* (ebony), are species of hardwood that have become much sought after in the last few decades for the manufacture of musical instruments in Europe and the US and for the manufacture of furniture in Asia. Starting in late 2008 and early 2009, the moist forests, home to the greatest wealth in species of precious timber have been subject to unprecedented high levels of logging, with hundreds of thousands of trees cut down in protected areas despite their protected status.

Data collected from documents, stakeholder consultations and field surveys has shown that between March 2010 and March 2015 at least 350 430 timber trees (mainly rosewood) have been cut down annually in protected areas, and at least 1 million logs (152 437 t) have been illegally exported from Madagascar.

Various factors serve to explain the anarchy in the management of precious timber, namely:

- Inconsistency between authorization and prohibition of regulations concerning logging of precious timber,
- Alleged collusion of certain State authorities in the illegal trade,
- A deficiency of legislative control of forest operations in general, and those related to precious timber in particular,
- Failure to impose punitive penalties on well-known traffickers, and
- The ineffective implementation of local development plans to manage activities of stakeholders living around the protected areas.

In order to limit this unprecedented degradation, the government enacted Decree no. 2010-141 of 30 March 2010 prohibiting the cutting, transport and export of precious wood. To reinforce this measure and as a Party to CITES, Madagascar requested the listing of precious timber species in Appendix III in 2011 and then in Appendix II in March 2013. This inclusion specifically concerns round log, sawn timber and veneer sheets. The listing of Madagascar's indigenous precious timber in CITES Appendix II requires that controls be put in place to ensure that trade is not detrimental to the species concerned and that permits are issued for any authorized international trade (export). The application for an export permit must therefore be preceded by the issuing of a non-detriment finding (NDF); such a finding should not be issued without having appropriate and adequate information on the status of populations in the wild, quantitative logging data, trade history and associated management systems.

The aim of this document is to inform political decision-makers and public opinion about the trade dynamics of precious timber in Madagascar. This work is based on several approaches, namely:

- The review of literature available on the biology, logging and trade of precious timber.
- Statistical data collection from various State departments and public organizations.
- Consultation with stakeholders involved in the management of precious timber in every district of the Sambava, Antalaha Vohemar and Andapa (SAVA) region and Analanjirofo.
- Consultation with national level stakeholders involved in precious timber management.
- Semi-formal field interviews with villagers directly affected by logging and trade, conducted using a questionnaire.
- Field observations.
- Consultation with experts on the biology and ecology of *Dalbergia* and *Diospyros*.

The examination of precious timber trade revealed the following main results:

- Information on standing timber inventories and bioecological status is at best partial or is non-existent for species examined.
- The nature of information on illegal harvest and trade is general and the available information on harvest at species level is non-existent.
- Neither the real quantities of the trees felled nor the locations where they were logged are known.
- The precious timber management system in general does not make it possible to guarantee that the logging and trade of precious timber will not be detrimental to the survival of the species.
- The precious timber management policy is characterized by a disconnect between management decisions (i.e. political declarations and international commitments) and their implementation on the ground.
- The regulatory framework currently existing at the national level on precious timber is not only fragmented, but also inappropriate in the present context of illegal logging and trade and to Madagascar's international commitments.
- A general governance system undermined by corruption alleged to be present in various sectors at different levels; with the forest sector being no exception.
- Improper application of the criminal procedure by the forest administration.
- The long overdue need to revise and implement sustainable development models for local populations.

As a result, the following recommendations are proposed:

For the attention of the research organizations

Various actions are required to fill the gaps in knowledge on the biological characteristics of *Diospyros* and *Dalbergia* species including their habitat range, national distribution, population trends, threats and harvest dynamic:

- Increase funding to facilitate the evaluation and research into standing stocks of precious timber in Madagascar, especially: i) the abundance of species in their habitat at least for those currently in trade and those with most potential for future trade, ii) the study of forestry ecology and regeneration of species, and iii) the drafting of specific management plans based on the results of the inventories.
- Build the capacity of protected area managers to allow them to identify precious timber species in their protected areas and to collect accurate information on illegal harvest dynamics at their conservation sites through the adoption of a national monitoring system.
- There is a need to fill the gaps in knowledge on biological characteristics of the harvested species, including their habitat type, national distribution, population trends and the threats facing them in the wild.
- Develop research and monitoring programmes to identify the population distribution of *Dalbergia* and *Diospyros* species throughout the country.

For the attention of MEEMF

- Support the establishment of a national monitoring system for *Dalbergia* and *Diospyros* populations by strengthening collaboration with research institutions and to conduct a census of populations of these species.
- Prepare and implement a biodiversity management plan for *Dalbergia* and *Diospyros* prioritizing currently exploited species and those with potential for future exploitation;

- Promote the use of a national timber legality verification system, such as the framework developed by TRAFFIC for Madagascar (Rakotoarisoa *et al*., 2016).
- Put in place a strong communications strategy to disseminate information on the criminal nature of forest offences, by highlighting criminal activities which have resulted in deterrent penalties.
- Urgently enact the Implementation Decree of Order no. 2011-001, punishing offences related to rosewood and ebony.

For the attention of the Government of Madagascar

- Order its intelligence services, e.g. BIANCO and the financial intelligence service SAMIFIN to investigate the traffic in precious timber and money-laundering resulting from trafficking and to actively co-operate with international law enforcement agencies in other countries, especially those through which Madagascar's precious timber transit (for instance, Mauritius, the Comoros, Tanzania [including Zanzibar], and Kenya).
- Formally request ICCWC to ensure that countries involved in the transport, processing and consumption of Madagascar's precious timber (particularly Mauritius, China, the US, Germany and France) provide technical and financial assistance to put an end to the illegal logging of timber and the related trade.
- Follow the recommendations developed by ICCWC following their mission to Madagascar in January 2015 on reinforcing the fight against fraudulent activity in the precious timber trade and strengthening the implementation of laws. Broaden the discussion and implementation of these recommendations amongst competent national organizations responsible for combating fraudulent activity related to wild species in Madagascar.
- Establish co-operation agreements with the transit countries (including, Mauritius, Tanzania [including Zanzibar], and Kenya), destination countries/territories (including, Hong Kong Special Administrative Region (SAR) and China) and international organizations (e.g. ICCWC), which may include i) measures designed to eradicate the transfer of illegal timber originating from Madagascar ii) a memorandum of understanding on the sharing and exchange of information (strategic intelligence); iii) awareness raising among the public; iv) capacity building; v) co-ordination of law enforcement agencies amongst the various signatory countries to CITES, and vi) a memorandum of understanding with neighboring countries in order to co-operate on the implementation of CITES.
- Strengthen bilateral and multilateral co-operation with China in the framework of China-Africa co-operation such as the Forum on China-Africa Cooperation (FOCAC) Johannesburg Action Plan to raise awareness among Chinese operators and consumers about illegal precious timber originating from Madagascar. This could take the form of a campaign dealing with all aspects of illegal logging and the related trade of precious timber in Madagascar.
- Change the status of public organizations working for good governance in order to ensure their independence in carrying out their mission, e.g. BIANCO[1], which depends directly on the office of the President of the Republic, Financial Intelligence Unit (SAMFIN), the Integrity Safeguard Committee (CSI), or the National Observatory of the Environment and the Forestry Sector (ONESF[2]).
- Entrust the co-ordination of maritime surveillance of vessel movements off the east coast of Madagascar to an independent organization in order to avoid any kind of manipulation and criticism originating from the central authority and the logging entities, follow the recommendations developed by the ICCWC team arising from their mission to Madagascar in January 2015 on law enforcement and fraud prevention relating to precious timber.
- Enlarge the Interministerial Committee in charge of rosewood and ebony assessment by including the civil society and conservation NGOs.

[1] BIANCO is the independent anticorruption bureau. However, it should be pointed out that its Director General is appointed by the President of the Republic on whom its operating budget also depends.
[2] In fact, this organization should be independent; however, its operating budget depends on the Ministry responsible for Forests.

- Consider including Palisander timber species in the same category of conservation status and protection as rosewood and ebony to help in closing the loophole with regards to the confusion of enforcement actions and harvesting of the species.

For the attention of technical and financial partners of the forest administration

- Set up a community support campaign for the economic development of areas with precious timber forests. The campaign should comprise a set of short to longer terms activities focused on strengthening alternative livelihoods and may include labor intensive cash crop production or other sources of sustainable income appropriate to the communities. The main aim of this will be to ensure that communities are not tempted by incentives offered by illegal timber operators.

For the attention of the Ministry for Justice

- Revise the regulatory framework of the offences relating in particular to illegal logging and illegal trading in forest resources and take the necessary measures to ensure that these offences are punishable by penalties that are effective, proportional and deterrent in nature;
- Ensure the transparency of prosecution by giving the forest administration the right to access all information pertaining to cases prosecuted by the police and justice departments on their behalf.
- Translate into domestic law the provisions stipulated by international conventions ratified and/or signed by Madagascar, in particular those of the United Nations Convention against Transnational Organized Crime and the United Nations Convention against Corruption;
- Amend or update national legislation in terms of guidance provided by United Nations Office on Drugs and Crime. This will have the effect, amongst others, of illegal trade in Madagascar's protected species of fauna and flora becoming an offence punishable by at least four years' imprisonment.
- Support the capacity of other enforcement agencies in the country to use other relevant laws, such as criminal, anti-corruption, trade, finance, etc. to seek a higher degree of penalties, not just limited to using the forestry laws

For the attention of BIANCO and SAMFIN

- Conduct in-depth investigations into cases of corruption related to precious timber at different levels of the forest, judicial and Customs administration in Madagascar.
- Make public the results of precious wood corruption investigations.

For the attention of the Ministry of Finance

- Establish an accounting system which makes it possible to guarantee transparency for the collection, management and distribution of royalties and taxes levied by the forest sector.
- Establish a government fund to build the capacity and improve equipment of forestry officers and to promote rural development projects in the areas strongly affected by illegal logging of precious timber.
- Establish specialized units of CITES within the Customs Service to provide expertise required to identify *Dalbergia* and *Diospyros* specimens destined for illegal export and ensure that all Customs at the border can have direct communications with relevant specialists in identification at the Forestry Department, Forest research institutes, local academia, and other individual experts who can provide this service on call.
- Build the capacity of the Customs department to identify and seize illegal shipments of wild flora and fauna.

1. INTRODUCTION and BACKGROUND

Introduction

This report gives an overview of the principal outcomes of TRAFFIC's research into available knowledge on the logging and trading of Madagascar's *Dalbergia* (palisander and rosewood) and *Diospyros* (ebony) species.

The results presented here prompt reflection on the issuing of non-detriment findings (NDF) for species in these two genera. The need for this research and report was identified during a national workshop organized by TRAFFIC in collaboration with the Malagasy CITES Scientific and Management Authority entitled "Assessment of the state of scientific knowledge of *Dalbergia* and *Diospyros* species with a view to the formulation of NDF on the species of these two genera" (21-23 September 2014, Antananarivo).

The outcomes of this work follow the 26 principles outlined in the NDF guidance for Scientific Authorities developed by the International Union for the Conservation of Nature (IUCN) (Rosser and Haywood, 2002).

The background section of this report presents a general overview of illegal logging of *Dalbergia* and *Diospyros*, key steps taken to strengthen the protection of the species, as well as research projects focused on their bioecology, harvest and trade. The background is followed by the rationale and main objectives of the report. The methods used in the preparation of this report are succeeded by the presentation of the key outcomes divided into six main sections:

- Information available on the biological and ecological characteristics of the species, with a minimum exploitable diameter (MED) for the two genera;
- Information on the status of *Dalbergia* and *Diospyros species* at the national level;
- Illegal logging and trade in species of precious timber and associated impacts;
- Regulation and its implementation for the management of precious timber by the Malagasy authorities;
- Implementation of the laws on harvest and trade of precious timber, focusing on how offences are dealt with.

Background

The fourth largest island in the world after Greenland, New Guinea and Borneo, and the size of Texas or France, Madagascar is home to about 5% of the world's plant and animal species (Humbert, 1959; Koechlin *et al*., 1974). Madagascar's biodiversity is one of the richest and most unique in the world, with about 14 000 flora species, 90% of which are endemic (Ramananjanahary *et al*., 2010). Its specific species richness and high level of endemism is reflected in many animal taxa including its amphibians, reptiles, birds and primates (cf. Anon., 2014a)[3].

This natural wealth is, however, gravely threatened by a high rate of degradation (Myers *et al*., 2000; Goodman and Benstead, 2005; Harper *et al*., 2007). Deforestation is the chief threat to the biodiversity and endemism of these species. The annual deforestation rates reached 1.2% for the period 2005–2010 and 1.5% for the period 2010–2013. The forest cover (including tropical moist forest, dry forest, spiny forest and mangroves) consequently dropped from 9.45 to 8.48

[3] The total number of species of vertebrates is estimated at 1162, including notably freshwater fish (143 species), amphibians (244 species), reptiles (370 species), birds (209 breeding species) and primates (101 species) (cf. Anon., 2014a).

million hectares between 2005 and 2013, which represents a loss of about 1 million hectares in 8 years (Anon., 2015a).

The chief causes of deforestation include forest degradation by illegal logging, fires, forest clearing for charcoal and the conversion of land to agricultural use (Johnson and Chenje, 2008). Logging of Madagascar's precious timber is escalating land degradation and deforestation, particularly since late 2008 and early 2009[4] marking the upsurge in illegal logging activities.

Madagascar's precious timbers are represented by the genera *Dalbergia* and *Diospyros* which provide both international and domestic markets with high added value products. Increase in international demand has led to an upsurge in illegal logging of Madagascar's rosewood and ebony. The illegal logging of precious timber is not a new phenomenon in Madagascar (Patel, 2007; Schuurman and Lowry, 2009; Randriamalala and Zhou, 2010), and dates from the end of the 1990s and the beginning of the 2000s. However, since 2009, Madagascar has been experiencing numerous political crisies, accompanied by an unprecedented increase in illegal logging of precious timber in protected areas, particularly in north-eastern Madagascar. Thousands of rosewood and ebony trees have been illegally cut in the majority of Malagasy forests (Patel, 2007; Schuurman, 2009; Anon., 2010a; Randriamalala and Zhou., 2010).

Madagascar's government represented by the Ministry of Environment, Ecology and Forest (MEEF) is the institution responsible for forest conservation and development of forest management policy in Madagascar. The General Directorate of Forest (GDF) under the MEEF is the warrantee of the implementation of policies and regulations pertaining to forest conservation and management including national and international regulations. GDF also ensures the coherence and co-ordination of all initiatives aimed at forest conservation and management.

To reinforce the regulatory mechanisms adopted at the national level to protect threatened wild species, Madagascar has signed two important international agreements, namely CITES in 1975 and the Convention on Biological Diversity (CBD) in 1995 (cf. Table 17). These two conventions are fundamental to the conservation of species (P35, A2, personal comment to TRAFFIC, June 2015). Other key agreements signed by Madagascar relevant to governance of natural resources and wild species are the African Union Convention on Preventing and Combating Corruption, and the United Nations Convention against Transnational Organized Crime[5] with three associated protocols[6]. Finally, in June 2015, Madagascar also supported the African Union's Endorsement of the *African Strategy on Combating Illegal Exploitation and Illegal Trade in Wild Fauna and Flora in Africa*. The most important of these is CITES which plays a major role in the conservation and the management of Madagascar's populations of *Dalbergia* and *Diospyros* species as outlined further below.

Listing in Appendix III of CITES

In an effort to conserve the Malagasy populations of *Dalbergia species* and of *Diospyros species* and to control the international trade in their products, Madagascar adopted Decree no. 2010-141 of 24 March 2010, prohibiting the cutting, logging and export of specimens of rosewood and ebony. In 2011, Madagascar listed the Malagasy populations of the species in Appendix III of CITES.

[4] The logging of precious wood in Madagascar goes back to 1899, with the presence of a Malagasy company and an individual foreign operator established in the south of Masoala to exploit and export the precious timber in this area (Botokely, 1902).
[5] Law no. 2014-005 of 19 June 2014 against terrorism and organized cross-border crime.
[6] Protocol intended to prevent, suppress and punish people trafficking, in particular of women and children; Protocol against the illegal trafficking of migrants by land, air and sea; Protocol against the illegal manufacture and trafficking of weapons, their parts, elements and ammunition.

Since the issuing of the exceptional authorization for the export of rosewood and ebony by Decree no. 2009-003 of 28 January 2009, Madagascar has experienced the worst period of deforestation in its entire history (Randriamalala and Zhou., 2010). Despite the enactment of Decree no. 2010-141 of 24 March 2010, illegal logging and export have continued (Randriamalala, 2014; Henri Rabenefitra, D-GAT of the SAVA region, personal comment to TRAFFIC, January 2015).

There were many calls in the leadup to CITES CoP15 by governmental organizations and by national and international NGOs to convince the Malagasy State to propose listing the species of *Diospyros* and *Dalbergia* in Appendix II of CITES. In 2011, at the request of Madagascar to the Standing Committee of CITES, five *Dalbergia* species and 104 *Diospyros* species were listed in Appendix III of CITES (Anon., 2011a). Through this listing in Appendix III[7], Madagascar sought the co-operation of other Parties to CITES to support the initiatives taken at the national level to prevent or limit the logging and export of Malagasy populations of *Dalbergia* and *Diospyros* species.

Listing in Appendix II of CITES

In an effort to strengthen the control of the international trade in these species[8] and following a proposal by Madagascar, the 16th Meeting of the Conference of the Parties (CoP16) to CITES (3-14 March 2013, Bangkok, Thailand) decided to list the Malagasy populations of ebony *Diospyros* species and *Dalbergia* species in Appendix II of the Convention[9]. This effectively means that all endemic species in these genera are listed.

Secondly, CITES CoP16 adopted an Action Plan to facilitate implementation of the listing of Malagasy populations of these species in Appendix II. Linked to Decision 16.152 on "Ebony *Diospyros species*, and Rosewood *Dalbergia species* of CITES, this Action Plan stipulates that Madagascar shall[10]:

1- *Establish, in collaboration with the CITES Secretariat, a science-based precautionary export quota for the listed taxa where an adequate non-detriment finding can be undertaken and clearly documented for any species planned for export*
2- *Establish, as appropriate, and with key partners [including the CITES Secretariat, CITES Plants Committee, International Tropical Timber Organization (ITTO), main importing countries, and national and international research/conservation organizations] a process (research, information gathering and analysis) to identify the main species to be exported. Workshops should be organized for selected species to establish the adequate non-detriment findings required in paragraph 1*
3- *Collaborate, as appropriate, and with key partners, as indicated in paragraph 2 above, to prepare identification material and tests for use in CITES enforcement to identify main taxa as they are traded*
4- *Put in place an embargo on export of stockpiles of these timbers until the CITES Standing Committee has approved the results of a stockpile audit and use plan to determine what component of the stockpile have been legally accumulated and can be legally exported;*
5- *Collaborate, as appropriate, and with key partners, as indicated in paragraph 2 above, to establish enforcement mechanisms to assist in implementation of any export quota,*

[7] In the case of export from the country having listed the species in Annex III, an export licence issued by the management body of that country is required. It is issued only if the specimen has been legally obtained. In the case of export from another country, a certificate of origin, issued by its management body is required. In the case of re-export, certificate of re-export issued by the country of re-export is required.
[8] Cf. CoP16 Proposal 58 for the genus *Diospyros* (Madagascar populations) and CoP16 Proposal 63 for the two categories of the genus *Dalbergia*, i.e. rosewood and palisander (Madagascar populations).
[9] The listings bear the annotation #5, indicating that the only parts and products concerned are the "undressed timber, sawn timber and wood for veneering".
[10] The action plan also stipulates other provisions for the attention of the Plant Committee. The importing countries, in particular the developed countries that are Parties to the Convention and the Secretariat of the Convention.

stockpile control and opening of any legal and sustainable trade utilizing timber tracking systems and other technology as appropriate;

6- *Provide written reports on progress with the implementation of the plan to the Secretariat and Plants Committee, in compliance with document deadlines for meeting of that Committee; and*

7- *Provide a document outlining progress with the implementation and any required adjustments to the Action Plan at the 17th meeting of the Conference of the Parties*

Justification

For all species of *Dalbergia* and *Diospyros* listed in Appendix II of CITES, Article IV of this Convention stipulates notably *"that an export permit is issued only when a scientific authority of the State of export has given its opinion that this export is not detrimental to the survival of the species concerned"*. In this context, CoP10 to CITES (9 to 20 June 1997, Harare, Zimbabwe) adopted Resolution Conf. 10.3[11,12] on the *designation and role of the scientific authorities*, which recommends to the Parties that "*the findings and advice of the Scientific Authority of the country of export should be based on the scientific review of available information on the population status, distribution, population trend, harvest and other biological and ecological factors, as appropriate, and trade information relating to the species concerned*" (cf. item h of the Resolution).

In other words, a NDF is issued to confirm the sustainability of the exports of the species (Johnson, 2007). The data required to issue a NDF must be sufficiently precise, corresponding to the resilience or vulnerability of the species in question.

The CoP16 to CITES adopted decision 16.152 Ebony (*Diospyros* species) and rosewood and palisander (*Dalbergia* species) of Madagascar specifies the adoption of an action plan to facilitate the implementation of listing these species in Appendix II. Paragraph 1 of this action plan stipulates the establishment of a precautionary quota, using a scientific basis, for the listed species, when it is possible to establish clearly documented NDFs for any species which are planned for export.

The establishment of NDFs and the development of future management plans specific to these timber species must be supported by, notably:

- The general biological characteristics of the species.
- Information on the status of the species at national level.
- The aspect of management of logging and related trade.
- The measures taken to control logging and trade.
- The incentives and benefits of harvesting for conservation.

Various studies (Anon., 2009a; Anon., 2010b; Anon., 2011a; Anon., 2012a; Anon., 2013b; Anon., 2014b) have been conducted over the last five years on the biological aspects and harvest of these species, but the studies remain limited in scope and it is still difficult to find information necessary for the establishment of a NDF. The fragmentation of available information makes analysis of the precious timber status difficult to determine, both with respect to the biological and ecological aspects of harvest and trade. However, all of this information is crucial for the issuing of a NDF and development of specific management plans.

Table 1 below presents examples of the research into logging and illegal trade of precious timber of Madagascar. In this context, the aim of this report was to compile all available basic information and to identify data gaps needing to be filled for the establishment of a NDF while

[11]In 1992, CoP8 to CITES had adopted Resolution Conf. 8.3, which was revised – and taken up again in Resolution Conf. 10.3.
[12]Corrected by the Secretariat after the 13th, 14th and 15th sessions of the Conference of the Parties.

consolidating knowledge on the scope and process of the trade in precious timber of Madagascar, represented by the genera *Dalbergia* and *Diospyros*

Table 1 Examples of literature dealing with the problems related to the precious timber of Madagascar

Elements	Title	Publication type	Authors	Year
Illegal harvest	Logging of rare Rosewood and Palissandre (*Dalbergia* species) within Marojejy National Park, Madagascar	Article	Patel, E.R	2007
	Abbatage illégal, transport et exportation de bois précieux de la SAVA	Report	EIA	2009
	Precious trees pay off – but who pays	Poster	Wilmé, L., Schuurman, D., Lowry, II P.P., Raven, P.H.	2009
	The Madagascar rosewood massacre. Madagascar	Article	Schuurman, D., Lowry, II P. P.	2009
Illegal trade	Exportation de bois précieux de la SAVA	Report	EIA	2009
	Rapport d'enquête sur le commerce mondial des bois précieux malgaches : bois de rose, ébène et palissandre.	Report	Global Witness, EIA	2009
	Bois de rose de Madagascar : entre démocratie et protection de la nature	Article	Randriamalala, H et Liu, Z.	2010
	Madagascar rosewood, illegal logging and the tropical timber trade	Article	Innes, JL	2010
	Commerce mondial des bois précieux malgaches	Investigation report	EIA	2010
	Commerce de la Chine en bois illégaux (dont bois précieux de Madagascar)	Repport	EIA	2012
	Chronique du bois de rose	Chronological review	Randriamalala, H.	2014
	Trafic du bois de rose à Madagascar	Report	Lisan, B.	2015
CITES	Proposition d'intégration des espèces de bois précieux de Madagascar dans l'Annexe III de la CITES : *Dalbergia* species et *Diospyros* species	CITES Proposal	DBEV, GSPM, Association Reniala, WWF	2010
	CITES designation for endangered rosewood in Madagascar	Article	Ballett, M. A., Brown, J. L., Morikawa, M. K., Labat, J-N., et Yoder, A. D.	2010
	Revue taxonomique - Liste d'espèces de bois précieux des genres *Dalbergia* species et *Diospyros* species	Report	MBG	2013
	La Capitalisation des Echantillons de *Dalbergia* et de *Diospyros* de Madagascar dans l'Annexe II de la CITES	Report	MBG	2014
Sociology	Sociologie des exploitants de bois de rose de la SAVA	Article	Randriamalala, H.	2013
Biology / Ecology	Evaluation écologique de quelques espèces de bois précieux les plus commercialisées à Madagascar (bois d'ébène, palissandre et bois de rose),	Report	DBEV, WWF	2010
	Statuts écologiques des espèces de bois précieux les plus commercialisées à Madagascar	Report	DBEV, GSPM, WWF.	2011
	Evaluation écologique des bois précieux, provision de données taxonomiques, validation et mise au point de méthodes de quantification pour la gestion durable des bois précieux de Madagascar	Report	DBEV	2013
	Suivi écologique du genre *Dalbergia* dans la région Nord-Est de Madagascar	Article	Razafintsalama *et al.*	2015

Objectives

The principal objective of this report is to contribute to available knowledge on the scope and process of logging and trade in Madagascar's precious timber of the genera *Dalbergia* and *Diospyros* and to examine associated socioeconomic factors.

This report sets out to compile basic available information necessary for the formulation of NDFs, but also to raise awareness among stakeholders involved in conservation and management of these species about the urgent need for specific management plans to ensure the sustainable management of the species.

Sub-Objectives

This report aims to present key results obtained from fieldwork undertaken between January 2015 and July 2015 to provide insight into the following questions about Malagasy precious timber:

- What information is available for the formulation of NDF for the Malagasy populations of species of the genera *Dalbergia* and *Diospyros*, what key information is missing, and what is needed to progress on gathering necessary information?
- What are the standard harvesting and trade processes for these species?
- Which are the most traded species, and consequently particularly vulnerable due to illegal logging and trade?
- How effective is the management system put in place by the forest administration at controlling logging and trade of precious timber?
- What international provisions, national legislation and national regulations are in place to ensure sustainable management of Madagascar's precious timber species?
- What recommendations can be formulated to strengthen conservation and management of Madagascar's precious timber in general and the implementation of CITES provisions conserving these precious timber in particular?

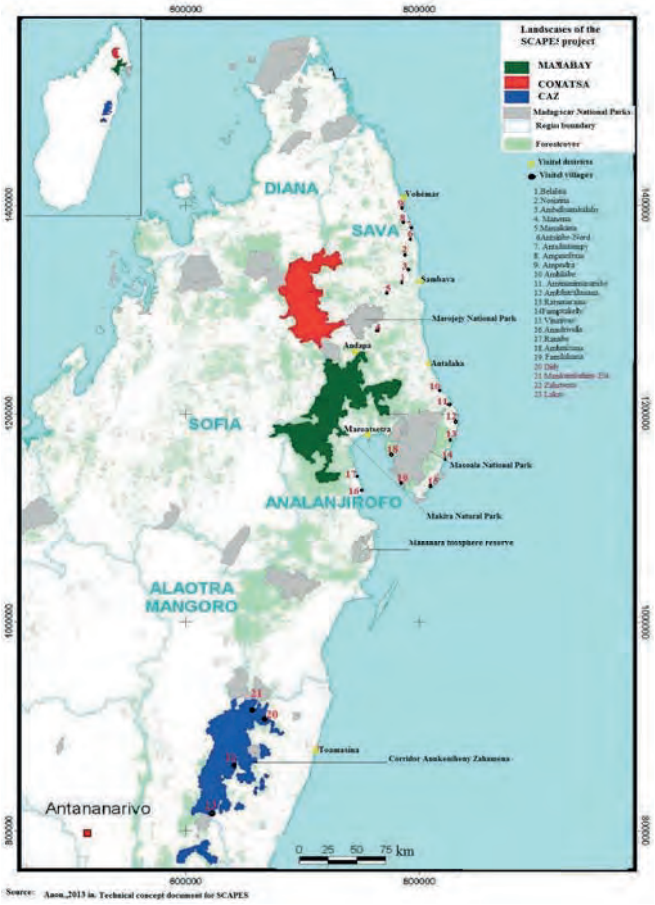
2. METHODS

This report has been developed based on work done by TRAFFIC from April 2014 to July 2015, in Antananarivo and in the three priority timber production landscapes of the SCAPES namely: Masoala-Makira-Antongil Bay (MaMaBay), the Marojejy-Anjanaharibe-Tasaratana Corridor (COMATSA) and the Ankeniheny-Zahamena Corridor (CAZ) (cf. Map 1).

The core tasks of information collection[13] and analysis were based on the IUCN NDF Guidelines (Rosser and Haywood, 2002), covering biology of the *Dalbergia* and *Diospyros* species, planning and management of these resources, their status at national level, and the control and monitoring system for their harvest and trade.

The four development phases of this report covered: i) Evaluation of the state of biological and ecological knowledge of the species of *Dalbergia* and *Diospyros*, ii) Study of the dynamic of harvest and trade iii) Analysis of the perceptions of the stakeholders on timber management and iv) Production of the final report (cf. Table 2).

Map 1: SCAPES intervention landscapes and the principal districts and villages visited during this work



Source: Map prepared by TRAFFIC using the base maps of the SCAPES intervention landscapes (Anon., 2013a).

[13] At present, there are three guides to preparing NDFs, the first prepared by IUCN (Rosser and Haywood, 2002), another by CITES (Rose, 2014) and a third by TRAFFIC (Leaman and Oldfield, 2014).

Table 2: Principal stages of the preparation of the study

Stages	Elements	Methodological steps	Timetable
1	Evaluation of the biological and ecological knowledge of the species of *Dalbergia* and *Diospyros*, Madagascar populations	Bibliographical research	April-May 2014
		Establishment of a summary document of the scientific knowledge available on the species of *Dalbergia* species and *Diospyros species* (Ratsimbazafy and Newton, 2014, unpublished)	June-August 2014
		Organization of a workshop on the establishment of NDFs for the species of precious timber at Antananarivo and identification of the priority research to be conducted for NDFs.	September 2014
		Refinement of the priority research to be conducted and design of the matrix for collection of information from the timber producing regions (SAVA, Analanjirofo, Aloatra Mangoro).	October-November 2014
		Preparation of a questionnaire for the surveys on the process of harvest and trade of *Dalbergia* and *Diospyros.*	November 2014
		Preparation of a questionnaire on the socio-economic impacts of harvest and trade of *Dalbergia* and *Diospyros.*	November 2014
2	Study of the process of harvest and trade species of precious timber	Collection of statistical data on the harvest and trade of timber Semi-directive surveys in pre-selected villages of the SAVA region, Analanjirofo and Aloatra Mangoro.	December 2014-May 2015
		Individual consultation of experts in the timber producing regions. Survey on the process of the trade in undressed precious timber at the national level (Antalaha, Antananarivo, Toamasina, Moramanga).	
3	Analysis of the perceptions of the stakeholders on the management of the precious timber	Consultation meeting of the stakeholders in the four districts of SAVA and the District of Maroantsetra.	December 2014-May 2015
		Individual consultation of the experts at the regional level	
4	Production of this report	Compilation, analysis and production of the final report	June – October 2015

2.1. Evaluation of the biological and ecological knowledge of *Dalbergia* and *Diospyros* species, Madagascar populations

2.1.1. Bibliographical research

TRAFFIC conducted a literature review consulting documents available on the internet, research institution databases such as those of the Directorate General of Forests, and from NGOs. The bibliographical review began on 1 April 2014 at the commencement of the project and ended in September 2014. The principal key words used were: *"precious timber of Madagascar", "Dalbergia", "Diospyros", "Biological and ecological research on Dalbergia and Diospyros species of Madagascar", "Trade in precious timber of Madagascar", "Trade of Madagascar's palisander","Trade of Madagascar's rosewood and ebony", "Madagascar's illegal logging of rosewood and ebony", "Madagascar's Dalbergia and Diospyros biology and ecology", "Madagascar's rosewood seizure" and "Madagascar's Dalbergia, Diospyros CITES.* A supplementary bibliographical review was conducted from March to July 2015 during report preparation.

The authors also based their work on research conducted into the classification and description of *Dalbergia* and *Diospyros* species by Perrier de la Bathie (1952), Schatz (2001), Du Puy *et al.*

(2002), Louppe *et al. (*2008) and Schatz and Lowry II (2011), the Department of Biology and Plant Ecology (MEDV) of the University of Antananarivo, the Missouri Botanical Garden (MBG) and the National Centre for Applied Research in Rural Development (FOFIFA). Data on plant distribution was obtained from the databases of TROPICOS (Anon., 2015b), including nomenclature and bibliographical data, as well as herbarium data on the species' biology and ecology[14].

Data on trade were collected from the Department of Forestry Resources Development (DVRF), the Regional Directorate of Environment, Ecology and Forests (DREEF) and the National Statistics Institute (INSTAT), the Directorate General of Customs (DGD) and from various seaports. Information on logging was collected from protected area management staff (cf. Table 3).

2.1.2. Consultation with experts on biology and ecology of precious timber species.

An initial round of consultation by TRAFFIC focused on the biology and ecology of *Dalbergia* and *Diospyros* species and was conducted between April and September 2014 through direct meetings with experts living in Madagascar. Engagement with experts outside Madagascar was conducted using Skype exchanges during the same period (April and September 2014). Experts consulted (cf. Annex 4) primarily comprised researchers involved in research projects concerning precious timber.

The second round of consultation occurred using a questionnaire (Annex 3) compiled during October and November 2014 based on the IUCN's NDF Guidelines (Rosser and Haywood, 2002). Structured and semi-structured interviews were conducted from 5 June to 10 July 2015 with 24 experts covering the research sector, environmentally interested civil society, forest administrators, key conservation and sustainable management donors, as well as forest operators.

TRAFFIC carried out these interviews to supplement the information collected through the literature review. It must be noted that most of the subjects interviewed wanted to remain anonymous (cf. below paragraph 2.2.3. on the limitations of the study).

[14]Tropicos® is a project of the Missouri Botanical Garden. It concerns a database and a website (http://www.tropicos.org/) on tropical plants, mainly from the neotropical ecozone (Central and South America). This database is accessible to the public and it is possible to consult it remotely. It contains over 453 000 images, and the taxonomic and bibliographical data of 4.4 million herbarium specimens representing more than 1.3 million different species accumulated over the last 30 years. In addition, it contains the data of over 50 000 scientific publications. The database can be consulted using the scientific name and also the popular name in English or Spanish (Anon., 2015c).

Table 3: Principal information collected by source type

Institutions concerned	Types of documents	Information obtained
Directorate General of Forests	Document of compilation of texts Working document	Regulatory texts on logging Classification of the timber of Madagascar
Department of Development of Forest resources	Database (Excel file) on the export of precious timber	Exports of palisander, rosewood and ebony between 2005 and 2014
Department of Forest Controls	Oral report	Scope of the harvest and export of rosewood between 2009 and 2011
National Statistical Service	Database (Excel file)	Export of timber (inclusive of all species) for the period 2005-2011
DREEF SAVA	Statements / Reports	Volumes of rosewood stockpiles, according to the inventory taken in 2012 and 2013 Report on offences related to rosewood and palisander timber
DREEMG Analanjirofo	Statistical data	Export of palisander and rosewood (from the port of Toamasina)
FREEMF Alaotra Mangoro	Statistical data	Statistics on the export of palisander timber in the Alaotra Mangoro region
Directorate General of customs- Toamasina	Statistical data	Export of palisander timber and rosewood
Directorate general of customs - Ports of Toamasina	Statistical data	Export of palisander timber and rosewood
Madagascar National Parks	Maps Database (Excel file)	Evolution of the illegal logging of rosewood in the parks of Marojejy, Masoala and Mananara Lemur trapping in the parks of Marojejy and Masoala
Wildlife Conservation Society	Map	Evolution of the illegal logging of timber in the Makira Park
Conservation International	Database (Excel file)	Evolution of the illegal logging of timber in the CAZ
Toamasina Court	Court decisions	Statistics of businesses associated with rosewood
Maroantsetra Court	Court decisions, minutes of hearing	Dates, places, charges and decisions
Antalaha Court	Court decisions, minutes of hearing	Statistics of businesses associated with rosewood

2.1.3. Production of an interim summary document

An interim summary document (Ratsimbazafy and Newton, 2014, unpublished) recording the status of available information on the biology and ecology of *Dalbergia* and *Diospyros* species was prepared by TRAFFIC in September 2014. This was presented and discussed at a national consultative NDF workshop (see below).

2.1.4. NDF workshop

A workshop evaluating scientific knowledge and identifying priority research required for the issuing of a NDF was organized by TRAFFIC on 22-23 September 2014 in Antananarivo in co-operation with the CITES Scientific and Management Authorities of Madagascar. The main objective was to allow stakeholders involved in the conservation and management of natural resources of Madagascar to evaluate available information on precious timber and to identify priority research required for a *Dalbergia* and *Diospyros* species NDF. To guide this process, the workshop made use of the IUCN NDF Guidelines, compiled by Rosser and Haywood (2002).

The workshop was attended by government representatives comprising departments responsible for forests, customs, taxes, the police and the gendarmerie. Civil society representatives included technical and financial partners of the Forest Administration, the World Bank (WB), the European Union (EU), WWF, TRAFFIC, MBG, WCS, CI, MNP, the National Group of Forest Operators of Madagascar (GNEFM) and individuals from teaching and research institutions. Annexes 1 and 2 of this report present the agenda and the list of participants, and key recommendations can be found in Annex 7.

2.1.5. Choice of species for bioecological description

The selection criteria for species suitable for commercial export based on currently available research remain to be determined for *Dalbergia* and *Diospyros* species. Therefore, this report focuses on the *Dalbergia* and *Diospyros* species described and accepted by the IUCN SSC Madagascar Plant Specialist Group (GSPM)[15].

The minimum exploitable diameter (MED) was further identified by the authors as a criterion for selecting species that have proven or potential commercial timber use. The national Decree (Decree N°98-782 promulgated on September 16th 1998) on forest harvest fixed the MED at 40 cm. However, due to the scarcity of *Dalbergia* and *Diospyros* trees reaching this diameter, the species categorized as having MED in this report have a breast height diameter of at least 20 cm, following the criteria adopted by MBG (Anon., 2014b).

2.1.6. Collection of Harvest and Trade information in the timber-producing regions

Information on the harvest and trade of precious timber, and associated socio-economic implications, was collected in the timber-producing regions forming part of the SCAPES project target area: MaMaBay, COMATSA and the CAZ. (cf. Map 1).

Information gathering activities included:

- The creation of a matrix with key information collected, data-gathering methods and sources for each data set.
- Preparation of a questionnaire examining biology, logging and export, management, as well as conservation of precious timber in the selected sites mentioned above (cf. Annex 3). This questionnaire was used to interview researchers, conservationnnist, policy makers.
- Preparation of a second questionnaire considering socioeconomic aspects in relation to the logging of precious timber (cf. Annex 6). This questionnaire was used to interview stakeholders in the 19 villages directly interested in and affected by the cutting and illegal shipping of precious timber.

Villages involved with the survey were selected using three criteria, i.e. their proximity to the logging sites, the number of collectors present and the impact of logging of precious timber on the local economy. The information on villages was obtained by prior consultation with local partners (environmentally interested civil society and conservation NGOs) and the Department of Land Management and Planning of the SAVA region.

2.2. Analysis of the perceptions of stakeholders on precious timber management

2.2.1. Consultation meetings with stakeholders involved in the management of the precious timber sector

Between 26 January and 3 March 2015, TRAFFIC organized five meetings in four districts of the SAVA region and in Maroantsetra district in the Analanjirofo region. These meetings were intended to evaluate the perceptions of the various stakeholders on a) the precious timber management policy, and b) the current trend in logging and export, and the socioeconomic and environmental implications of illegal harvesting and trade. There was broad representation from categories of stakeholders involved in the conservation and management of precious timber at each meeting (cf. Table 4).

[15] GSPM comprises specialists in Malagasy plants from the various national and international research institutions (e.g.: MBG, DBEV, FOFIFA, RBG Kew).

Table 4: Summary data on five consultation meetings organized by TRAFFIC between 26 January and 3 March 2015

Districts	Sambava 26 January	Antalaha 26 January	Vohémar 2 February	Andapa 5 February	Maroantsetra 3 March
Public administrators[1]	10	10	10	7	8
Economic operators[2]	13	9	6	3	9
Civil society organizations[3]	6	7	7	15	18
Experts/Researchers[4]	6	4	7	2	5
Total	**35**	**30**	**30**	**27**	**40**

[1] Persons involved in public offices, including: forces of law and order and local, forest, Customs and tax administration
[2] Timber sector operators (loggers, collectors, exporters, sellers and processors)
[3] Local and regional environmental conservation associations, managers of protected areas, civil society platform for the conservation of biodiversity
[4] The four citizen observers with solid historical knowledge of the exploitation and export of precious timber

2.2.2. Survey of the markets

In order to understand the market flow of precious timber TRAFFIC conducted semi-structured surveys in the timber markets of Antananarivo (April and May 2015), Antalaha (January and February 2015), Toamasina and Moramanga (April and July 2015). These towns were selected on the basis of the size of the precious timber trade flows, estimated on the basis of previous studies on the precious timber market (Rasamoelina, 2001; Razafintsalama, 2001; Andriambanona, 2002; Rakotondramanga, 2002; Stasse, 2002; Anon., 2009b; Wilmé *et al*., 2009; Anon, 2010a; Randriamalala and Zhou, 2010) and prior consultations with the members of the National Group of Forest Operators of Madagascar (GNEFM), the Directorate General of Forests (DGF) and environmentally interested civil society.

A key finding is that Antananarivo hosts the greatest number of timber operators of all categories (timber sellers, processing industry, exporters, etc.) while Antalaha is the main port of entry for the rosewood and ebony from the tropical forests of Antsiranana (Anon., 2012a). The city hosts the only rosewood and ebony market supplying the sculptors of Madagascar (the sculptors only use these woods). Moramanga is the exit port for palisander timber originating from the Ankeniheny Zahamena Corridor, which is the chief source of palisander timber on sale in Antananarivo. This wood is exported through the port of Toamasina (P2, E1, personal comment to TRAFFIC, October 2014).

In these surveys conducted with precious timber merchants, information sought related to the origin of timber, the identity of timber logged, the possession of administrative permits to operate, the timber products sold (plank, sleeper and board) and the sale price and volume sold annually from 2010 to 2014.

2.2.3. Study limitations

The issue of precious timber in general, and rosewood in particular, is a taboo subject for different stakeholders in the public administration in the SAVA region (for instance, Customs Service, Tax Service, Trade Service and the courts). It has both historically and in the present study been difficult for TRAFFIC to complete surveys because individuals decline interviews, or agree but with some reluctance, or respond to the questions rather vaguely. In addition, it has been difficult to obtain statistical data on the logging and export of precious timber from the regional public services as they have made it clear that this data is not available at their level.

In total 202 individuals were interviewed during the course of this work (Table 5). Given that the logging and illegal trade of precious timber are allegedly conducted by a very powerful organized crime network (P1, A1, personal comment to TRAFFIC on 23 January 2015), it is impossible to totally remove the risks of reprisals against those persons who have agreed to answer TRAFFIC's questions. Consequently, codes have been created to protect the anonymity of the "sensitive" sources of information. About half of the individuals quoted in this report wished to remain anonymous, and a system of codification was developed for their names and affiliations.

Each anonymous person quoted in this report is introduced by:

- His/her personalized code, including a letter "P" (for the person), followed by a number 1, 2, 3… which corresponds to the order of quotation of the person in the report;
- Each affiliation or organizatial category has its own code, with the letter "A" being used for administrative entities, "C" for conservation entities, "E" for business entities, "O" for an ordinary citizen, followed by a number 1, 2, 3… which corresponds to the order of quotation of the person in the report.

For example, an anonymous personal communication to TRAFFIC quoted in this report will be formulated as follows: P2, A3, personal comment to TRAFFIC, April 2015). To strengthen individuals' anonymity, it should be emphasised the date is limited to the month and the year.

Table 5: Number of persons encountered by category and affiliation or organizatial category

Categories	Affiliation or organizational category	Examples	No.
Public Administration	Regional administration	District Chiefs; Deputy; Mayors; Regional Chiefs; DREEF collaborators; DGAT representatives	22
	Forest administration	Forestry officers; Head of cantonments; DREEF, DGF, DVRF and CEEF representatives;	17
	Justice	Prosecutors	3
	Public security	Gendarme, officer, police officer	11
	Regional public service	Customs officers; Representatives of the Regional Department of Animal Husbandry and Protection; Tax inspectors; Staff from the health service	9
Conservation Stakeholders	Protected Areas Manager	Protected Area directors; officers from local development projects; Research coordinators	12
	Research Institute	Researchers; Lecturers,	3
	Civil society	Representatives from local. Regional associations; Representatives of NGOs	53
Economic stakeholders	Woodcutters and skidders	Woodcutters; Skidder local guide for collectors of precious timber	4
	Precious timber collectors	1; Collectors of precious timber	5
	Forestry company	Timber companies; Charcoal Producers;	17
	Economic operator	Transporters	6
	Timber processor	Carpenters; Owners of timber-processing workshops	17
Observers	Timber seller	Precious timber sellers	2
	Simple citizen observer	Farmers; ex-loggers; local dignitaries; journalists; primary school teachers;	21
		Associations; Consultants	

[1] A collector's guide is a person who identifies the villages where purchase of logs is possible or likely. This is based on different criteria, such as the frequency of movement of logs from forests, ease of transport and the numbers of collectors present in the area, the greater the number of collectors in a given village, the less the interest to buy logs there, as the price will be higher). The collector's guide will thus indicate where it is most rewarding for collectors to focus their efforts

The conducting of interviews in villages close to the sites affected by forest activity presented various challenges. For example, individuals involved with the survey were at times distrustful because of the alleged threats of extortion by the forest administration and by law enforcement officers. They were sometimes fearful that they would be arrested by the latter, as was the case in Ambohitralanana where rosewood stock inspectors allegedly extorted from each of two timber collectors a sum of 10 million MGA (USD 4000) under threat of arrest (P3, A1; P4 and P5, E4, personal comment to TRAFFIC, February 2015). This feeling of fear has on occasion led some individuals interviewed by TRAFFIC to supply false data, or over- or under-estimated data, particularly regarding quantitative data on logging and export of precious timber. The use of these figures needs therefore to be approached cautiously.

In addition, the presence of rosewood collectors crossing the villages on their quad bikes between January and March 2015 made it difficult to conduct the surveys on the ground. These collectors either directly "threatened" the TRAFFIC interviewer by asking him to leave the location immediately, or directly incited the villagers not to take part in TRAFFIC's survey work by giving them alcohol and cigarettes.

Surveys on the logging and illegal export of precious timber were conducted in the SAVA region during 2009 and 2010, in particular by Anon, 2009b; Anon, 2010a; Wilmé *et al*., 2009, and Randriamalala and Zhou, 2010. Following publication of survey results the population of the regions visited have become increasingly distrustful and reluctant to answer interviewers' questions, for fear of being quoted in the results of the surveys and of being the subject of criminal investigations and arrest (P.6, A1, personal comment to TRAFFIC, January 2015; P3, A1, personal comment to TRAFFIC, February 2015). As a result, it only was possible to conduct the surveys on average in two households per village out of an average of five households per village initially scheduled.

2.3. Challenges for identification of species.

To date the means for scientific identification of *Dalbergia* and *Diospyros* species is still far from complete. As a result, little reliable information is available on particular species of *Dalbergia* and *Diospyros* subject to harvest and trade in Madagascar. The existing common names (e.g. palisander and rosewood) used in trade are based loosely on heartwood colour and the quality of the wood itself.

Ebony (Diospyros) species are distinguished by their jet-black heartwood, with little to no variation or visible grain. These species are small to large dioecious hardwood trees and typically have the following characteristics:

- Bark: often thin, black outer bark.
- Sapwood: the sapwood is between 4 to 8 cm in thickness and is clearly differentiated; initially white-coloured becoming lemon-coloured when exposed to the air.
- Leaves: simple leaves alternate or rarely sub-opposite, generally arranged in couplets, with flowers sometimes solitary, small, regular, sometimes sexually dimorphic.

Dalbergia species can only reliably be distinguished from one another by use of taxonomic features, such as flower and fruit characteristics; but even so, expert scientists are sometimes unable to identify all species. As a consequence, the common names "rosewood" and "palisander" referred to in the chapters of this report describing the harvest and trade dynamic, are subjectively and rather inaccurately understood as follows:

Rosewood: The term "rosewood" in this report refers to *Dalbergia* species from Madagascar that display dark red and black patterned heartwood, grey coloured bark and an elliptical form (or sometimes oval-elliptical form) of leaves (Anon., 2013b).

Palisander: The term "palisander" in this report refers to *Dalbergia* species from Madagascar, having lighter and brownish coloured heartwood. Palisander is distinguished from rosewood by its oval leaves and the colour of the bark, which varies between beige and mauve (P42, E3; P46, E3; P44, E3; P43, E3, personal comment to TRAFFIC, January 2015).

It has been noted in the course of this study that there is inaccurate understanding of the common name "palisander" as not being part of the genus *Dalbergia.* It is clear that the CITES *Dalbergia* listing in Appendix II includes both rosewood and palisander.

3. RESULTS

3.1. Biological characteristics of *Dalbergia* and *Diospyros* species.

3.1.1. Summary of existing studies

Taken as a whole, 78 species of *Dalbergia* and *Diospyros* have a Minimum Exploitable Diameter (MED) comprising 28 *Dalbergia species* and 50 *Diospyros* species. Of these 50, 29 are already accepted by taxonomists as Malagasy species, while 21 are newly discovered and still requiring formal taxonomic description (Anon., 2014b). All these MED species are thought to be affected by illegal logging. Information on species physical characteristics regarding height and Diameter at Breast Height (DBH) is available for all identified species of *Dalbergia* and *Diospyros*. However, additional biological and ecological information covers only 15 species of *Dalbergia* and 12 species of *Diospyros,* and which are the subject of bioecological evaluations in one or more study sites (in bold in Table 6).

The biological and ecological information currently available (cf. Table 6) is the product of fieldwork conducted by the taxonomists and researchers of the Department of Biology and Plant Ecology (DBEV) of the University of Antananarivo, in co-operation with its partners (i.e. WWF, ITTO and the CITES Secretariat), and by the taxonomists of MBG and FOFIFA. The research on *Dalbergia* and *Diospyros species.* has been intensified since the upsurge of illegal harvesting and trade in precious timber (Anon., 2013b). The research focuses on the status of timber stockpiles, forest regeneration and the national distribution of some species of these two genera. The bio-ecological evaluations of the species of the two genera, together with the key conclusions of the studies, are summarized in Table 6. The MED species considered in this study are depicted in bold text.

3.1.2 Role of the species in nature

Dalbergia species.

Dalbergia species can be found in various Malagasy ecosystems ranging from the north-eastern rainforest to the south-western spiny forest, with rosewood species tending to be more abundant in north-eastern Madagascar.

Dalbergia species are known for their important role in fixing soil nitrogen, improving soil quality through the presence of nodules and mycorrhiza in their root systems (Rasolomampianina *et al*., 2005). The fruits of these species supply food for some species of lemurs, including *Lepilemur ruficaudatus* and *Propithecus verreuxi* (Ganzhom and Kappeler, 1996). This information was confirmed by the experts consulted at national and regional levels (cf. list in Annex 4) by TRAFFIC during the phase of consultation of stakeholders on the biological aspects of the species.

Table 6: Summary of existing biological and ecological studies on Malagasy *Dalbergia* and *Diospyros* species (MED species depicted in bold)

Studies	Species studied	Topics covered by the studies	Main results
Development plan and management plan for the precious timber of the forest complex of Andranomenahely (Anon. 2009b)	Thirteen species of *Dalbergia:* *D. normandii; D. louvelii;* ***D. viguierii; D. chlorocarpa; D. baronii; D. andapensis; D. chapellieri; D. monticola; D. madagascariensis;*** *D.sp1; D.sp2; D.sp3; D.sp4* Nine species of *Diospyros:* *D. pervillei;* ***D. calophylla;*** *D. subsessifolia;* ***D. toxicaria; D. haplostylis;*** *D. macrosepala; D. lokohensis; D.sp1 and D.sp2*	Densities of populations. Potential for species regeneration. Threats to the species	Relatively low regeneration rate, including 8 *Dalbergia* species that already appear on the IUCN Red List of Vulnerable species threatened with extinction. Disappearance of large diameter trees and certain individuals with Minimum exploitable diameter
Ecological evaluation of some of the most heavily traded precious timber species in Madagascar (rosewood, palisander and ebony). Final report (Anon. 2010b)	Eight species of ebony: ***Diospyros aculeate; D. bernieriana; D. calophylla;*** *D. gracilipes;* ***D. hapostylis; D. perrieri; D. sakalavarum and D. toxicaria*** Five species of rosewood*: Dalbergia louvelii;* ***D. monticola;*** *D. normandii;* ***D. purpurascens*** *and D. xerophila* Six species of palisander: ***Dalbergia abrahamii, D. baronii; D. greveana; D. madagascariensis; D. mollis and D. trichocarpa***	Life forms of the species, species regeneration; phytogeographical distribution, habitats, population densities; population trends, the principal threats	Imbalance at the level of the demographic structure of the populations of the species of precious timber, sometimes taking the form of a deficit in regeneration and a relatively low timber potential.
Final report on the rosewood inventory in Masoala National Park (Anon. 2010c)	Six species of *Dalbergia*: *Dalbergia normandii; D. maritima;* ***D. chapellieri; D. madagascariensis; D. orientalis*** *and D. occulta*	Life forms, densities. Regeneration	Small number of seed-bearing trees (DBH of 20 cm) in the areas affected by logging with good regeneration capacities.
Ecological status of the most heavily traded precious timber species (Anon. 2011e)	Eight species of ebony: ***Diospyros aculeate; D. calophylla;*** *D. gracilipes;* ***D. haplostylis; D. perrieri; D. sakalavarum*** **and** ***D. toxicaria.*** Five species of rosewood: *Dalbergia louvelii;* ***D. monticola;*** *D. normandii;* ***D. purpurascens*** *and D. xerophila.* Six species of palisander: ***Dalbergia abrahamii, D. baronii; D. greveana; D. madagascariensis; D. mollis and D. trichocarpa***	Densities and ecological status	Targeted species presenting a quite widespread distribution, but some have a limited distribution and are known only in certain locations.
Provision of taxonomic data, validation and development of methods of quantification for the sustainable management of the precious timber of Madagascar (Anon. 2013b)	Thirteen species of *Dalbergia:* ***D. baronii; D. chapelieri; D. monticola;*** *D. normandii;* ***D. madagascariensis; D. maritima; D. orientalis; D. greveana; D. purpurascens; D. mollis; D. trichocarpa;*** *D. tsiandalana and* ***D. peltieri*** Twenty-four species of *Diospyros:* ***D. aculeata; D. lanceolata; D. berneriana;*** *D. gracilipes;* ***D. haplostylis;*** *D. macrosepala; D. megasepala;* ***D. perrieri; D. platycalyx;*** *Diospyros sp 1; Diospyros sp 4; D. subsessifolia; D. nigricans; D. stenocarpa;* ***D. toxicaria****; Diospyros sp 3; D. myriophylla;* ***D. tropophylla;*** *D. pervilleana; D. boivinii;* ***D. ferrea;*** *D. gracilipes var; Velupites and* ***D. squamosal***	Life forms; distributions, habitats, population densities; population trends, situation of the stockpiles in the sites studied, regeneration, threats.	Of the 37 species studied, (13 *Dalbergia* species and 24 *Diospyros* species*)* only the populations of 5 *Diospyros* species seem to be in a good general state. The majority of the species do not have any regenerating individuals. High risks of these species disappearing.

Diospyros species.

Diospyros species are widely distributed in different vegetation types in Madagascar. These include humid forest, dry and deciduous forest. These species can even be found in the savannas of the western and south-western part of the country, although they tend to be more abundant in the north-eastern humid forest.

Besides the ecological role fixing nitrogen, the fruits of *Diospyros* species also provide food for lemurs. Stakeholder consultation concerning environmental impacts of illegal logging (cf. section 3.3.7 of the report) highlighted the increase in erosion and river siltation over the last five years in areas affected by the illegal logging of precious timber.

3.1.3 Life form characterisitics

"*The life form of a plant species gives some indication as to its likely sensitivity to harvest. The more long-lived a perennial plant is, the greater impact harvesting that plant may have on the overall population."* (Rosser and Haywood, 2002).

Information on life form is available for the majority of *Dalbergia* species and those species of *Diospyros* which have been described. These characteristics are determined using dendrometric attributes, such as height and DBH available in a few reports and on the TROPICOS website. For species of both *Dalbergia* and *Diospyros*, an individual is defined as a tree once it has reached a height of 5 m with MED of at least 15 cm of DBH (Anon., 2014b).

The most recent available information on life form characteristics can be summarized as follows (cf. Table 7):

- The genus *Dalbergia* has 50 Malagasy species accepted by the scientific community. Of these 50 species, information on life form is available for 49 species and 40 of these, have a tree life form. Secondly, information on DBH is available for 28 species, 24 of these are listed as species with individuals capable of achieving MED. However, for four species listed with MED, there is no information available on their DBH.
- The genus *Diospyros* as it applies to Madagascar has 85 described species and 130 new species in the process of identification. Of the 85 described species, 84 have information on life form and 69 of which are described as trees. Further, 47 species have information available on DBH and 29 of them are capable of attaining MED. It should be noted that four of these 29 species do not have information on DBH.

Table 7: Number of Malagasy *Dalbergia* and *Diospyros* species for which information is available on life form and characterictics such as growth habit and on Minimum Exploitable Diameter (MED)

Genera	No. of described species.	No. of new species.	Heights of the described species with a tree life form		DBH of described species with a tree life form (No. of species)		No. of described species with a tree life form	No. of described species with MED
			Information available	Information not available	Information available	Information not available		
Dalbergia	50	0	36	4	28	12	40	28
Diospyros	85	130	67	2	47	22	69	29
Total	135	130	103	6	75	34	109	57

Source: Anon., 2014b

***Dalbergia* species.**

The list of *Dalbergia* spp. with tree life form (n=40) and MED (n=28) is presented in Annex 8.

Diospyros species.

Ebony is found both as trees (5 to 15 m in height) and shrubs (defined as a plant 3 to 4 m in height). Both the trees and shrubs flower between January and June each year and pollination is carried out by insects. The fleshy fruits have between three and ten seeds, which are dispersed by lemurs. The timber of the trees is black, hard and fine-grained (Rakotovao, personal comment to TRAFFIC, August 2014). Most of the tree species are up to 15m in height, with many branches that have hard, short smooth leaves. The 85 species formally described and the102 species[16] still awaiting formal description[17] are provided in Annex 9a and 9b respectively. Tree life form and/or MED are also provided in these annexes.

3.1.4. Regeneration potential

Natural reproduction

A plant's potential for regeneration defines its capacity to reproduce (Rosser and Haywood, 2002), including by pollination. Studies conducted on this subject for other species most often use regeneration rate to explain the capacity for reproduction (Rothe, 1964, cited in Anon., 2013b). This rate is presented in this report as a measure of regeneration potential for *Dalbergia* and *Diospyros* species having tree life form and MED (Appendices 10 and 11) for the purpose of an evaluation of whether or not a NDF can be issued. A study conducted by the department of plant biology and ecology of the University of Antananarivo in 2013 considered the regeneration rate (RR) in terms of the percentage of individuals reproduced or regenerated (Nr) compared to the number of individuals at the age of reproduction (Ns) (Rothe, 1964, cited in Anon., 2013B). This formula (1) is used to calculate the regeneration rate by reproduction:

$$RR\ (\%) = 100 \times Nr/Ns$$

The results are interpreted as follows:

- If RR lies between [0 – 100%], then the species has a low regeneration rate and has difficulty regenerating; it may reach extinction if the harvests go beyond the regeneration capacity.
- If RR lies between [100 – 1000%], the species is at medium regeneration rate and its survival is certain if the habitat is not distrurbed.
- If RR > 1000%, then the species has a good regeneration pontential, the survival of the species is certain even with some habitat loss (Anon, 2013B).

Various biological studies on *Dalbérgia* and *Diospyros* species have shown that regeneration takes a particularly long time (Anon., 2009a; Anon., 2010b; Anon., 2013b). A period of at least 70 years is necessary before a *Dalbergia* and *Diospyros* tree, growing from seed, can reach a harvestable diameter, (national and regional experts – cf. Annex 4, personal comment to

[16] A list of 130 new or undescribed species has been discovered (Anon., 2013b; Anon., 2014b), this list includes 102 named species species with some information available on their biology and ecology (cf. Anon., 2013b). The 28 other species are in the process of being identified or formulated and no information is available yet for these species (P12, C3, personal comment to TRAFFIC, June 2014).

[17] The term "undescribed" is used by MBG to characterise the new species, i.e. those species which are not yet accepted by the Malagasy plant specialists as Malagasy species. Even if information exists on these species, they are currently regarded as new or undescribed species. Research on undescribed species is in progress with information being updated as research work progresses.

TRAFFIC, June 2014 and January 2015). Recent available data (Anon., 2013b) on regeneration potential comes mainly from two harvest locations.

Dalbergia

Regeneration from seed

Recent studies on regeneration potential of *Dalbergia* species are only available for15 of 28 species capable of achieving MED. Four of these species have a medium potential of over 300% for regeneration (*Dalbergia baronii, D. maritima, D. monticola* and *D. trichocarpa*) (Annex 10).

The time from planting of seed for trees to reach their MED is at least 40 years for humid zone palisander *Dalbergia* species and between 50 and 60 years for arid and semi-arid zone palisander *Dalbergia* species. Rosewood *Dalbergia* species take over 80 years to reach their MED (nurserymen of SAVA region, personal comment to TRAFFIC, January and February 2015).

The regeneration of all these *Dalbergia species* from seed requires specific ecological conditions, notably the presence of strong winds to promote pollination[18]and seed production. Based on the work conducted by MBG and DBEV, the regeneration information for species is valid only for locations where ecological inventories were conducted. This information is available for a maximum of three sites and thus available data cannot be regarded as representative of all populations.

Geographic location plays an important role in influencing regeneration rates. For instance, for *Dalbergia monticola* the regeneration rate in Zahamena is close to zero but is high (666%) in CAZ. Data available on regeneration potential show that the majority (12 out of 15) of species on a given site have a rate lower than or equal to 100%[19]. This rate appears to depend on the ecofloristic region where the species is located.

Vegetative regeneration from post harvest resprouting or coppicing

After selective harvesting and burning, stumps of *Dalbergia* species survive and produce coppice shoots a few weeks after rains have fallen (Harisoa Ravaomanalina, lecturer and researcher at DBEV, personal comment to TRAFFIC, June 2014). However, without forest maintenance, trees never again reach their initial size nor the MED and therefore are unusable for carving and other transformation purposes (Jaosoa Jean Pascal, Director of NGO Ranoala, personal comment to TRAFFIC, February 2015).

Other reports suggest that the first coppice shoots of rosewood and palisander appear after two weeks during the rainy season and up to one month in the dry season (H. Ravaomanalina, personal comment to TRAFFIC, 16 June 2014). This statement was confirmed during surveys conducted by TRAFFIC at local level in Belalona, Antsirabe North, Antsahatompy and Ambodisambalahy. Of ten woodcutters interviewed, eight stated that they had seen the first coppice shoots one week to10 days after harvest during the period from September to January.

[18] Certain nurserymen have gone so far as to suggest that without the event of a cyclone, the pollination of rosewood species would not be possible (Jaosoa Jean Pascal, Chair NGO Ranoala, plant nurseryman in Sambava, personal comment to TRAFFIC, January 2015).
[19] If the regeneration rate (RR) is between [0 – 100%], the species has a problematic rate of replenishment and may disappear if the level of use is high; if the RR stands between [100 – 1000%], the species has an average regeneration potential, with survival certainty if the environment is not disturbed; if the RR is higher than 1000%, the species has good regeneration potential and its survival is assured (Anon., 2013b).

Diospyros

Regeneration from seed

Information on regeneration potential is only available for 12 *Diospyros* species (out of 29 species with MED). This information, resulting from the work of MBG and DBEV, is valid only for locations where ecological inventories were conducted. Such information, being available for a maximum of three sites, cannot be regarded as representative of all populations of *Diospyros* found in Madagascar. Three species (*Diospyros calophylla, D. ferrea* and *D. squamosa)* have a relatively high regeneration potential (i.e. above 300%) (Anon., 2014b). However, the regeneration potential of the same species can vary significantly from one location to another, e.g. from 0 to 100% for *D. haphostylis* (cf. Annex11).

Given that there is a zero regeneration rate for certain species, i.e. *Diospyros aculeata, D. haplostylis, D. lanceolata, D. perrieri* and *D. platycalyx* in certain study sites, survival of the species is uncertain.

Vegetative regeneration

For *Diospyros* species, resprouting after harvesting is not as swift as that of *Dalbergia* palisander species, but swifter than that of *Dalbergia* rosewood species. After harvesting, the first coppice buds of *Diospyros* species begin to emerge 3 to 4 weeks after the rains. However, a period of at least 60 years is needed for the tree to achieve MED if it has been cut back to ground level (Hugues Azhar Said, DREEF SAVA, personal comment to TRAFFIC, January 2015; Jaosoa Jean Pascal, Director NGO Ranoala, personal comment to TRAFFIC, February 2015).

3.1.5. Species distribution and density

The widespread distribution of a species can cushion the effects of excessive harvesting. Data on the presence of seedbearing individuals, regeneration rates, geographical information, as well as the density of individuals per hectare, recorded in expert reports, can give an indication of species resilience to overharvesting.

Distribution is known for only 14 *Dalbergia* species (Annex 12) and 13 *Diospyros* species (Annex 13). Information on the density of individuals is available for all species of *Dalbergia* with MED. These densities can present significant interspecies variations, e.g. 10 individuals/ha for *D. baronii* and 430 individuals/ha for *D. monticola* and inter-site variation for a single species; for example, for *D. monticola* the density varies between 430 individuals/ha in CAZ region and 10 individuals/ha at Zahamena (Annex 12).

For the 16 *Diospyros* species for which density information is available, there can be significant interspecies variations, e.g. 10 individuals/ha for *D. pierreiri* and 320 individuals/ha for *D. squamosa*, or for a single species between different sites (e.g. from 17 to 500 individuals/ha for *D. haplostylis*), or on a specific site (from 10 to 120 individuals/ha for *D. ferrea*).

Information characterising regeneration through seeds is available for only six species of *Dalbergia* and 16 species of *Diospyros*. Only two species*, Dalbergia monticola* and *Diospyros sp1* possess good potential for regeneration. The densities of seedbearing individuals[20] are

[20] This includes the mature individuals with the ability to produce fruit, i.e all trees producing or about to produce seeds.

low (<5 individuals/ha) for five species of *Dalbergia* and four species of *Diospyros* (cf. Annex 12 and 13).

3.2. National status of species.

3.2.1. Habitat and national distribution

It is crucial to consider the distribution of a species at national level as it is indicative of species' sensitivity to potential harvesting (Anon., 2010b). *Dalbergia* and *Diospyros* species are present in both degraded and relatively pristine habitat types. However, habitat is not documented for all known species.

Information on the habitat and national distribution of *Dalbergia* is known for 20 MED species (Annex 14). Information on ecofloristic zones and habitat characteristics is available for 12 and 14 species respectively. Out of the 270 populations identified for nine species, over 78% are to be found outside protected areas (Annex14).

For *Diospyros* species, of 29 species with the potential to achieve MED, information on national distribution is known for 21 species and information on ecofloristic zones and habitat characteristics for 10 species respectively. Out of 85 populations identified 53% are to be found inside protected areas. On the other hand, less than 50% of MED species populations are outside of protected areas (Annex 15).

3.2.2. Abundance of species at the national level

The species that are generally abundant will be less sensitive to exploitation than less common species of a low natural density (Rosser and Haywood, 2002). Consequently, abundance plays a determining role in the evaluation of a NDF. Information on density, basal area and biovolume enable the abundance of a given species to be determined. This information is available for only a small number of species, i.e. 15 *Dalbergia* species (Annex 16) and 15 *Diospyros* species (Annex 17).

***Dalbergia* species.**

Dalbergia species grow at an altitude of less than 1200 m and in a variety of habitats, i.e. humid forests, subhumid forests, dry and sub-arid forests (Anon., 2009a).

The studies conducted by DBEV and MBG (Anon., 2010b; Anon., 2013b; Anon., 2014b) on the abundance of *Dalbergia* species populations emphasises that sites for which information is available, there exists (cf. Annex16) a great variability for a single species on different sites, or between species:

- In the density of species with MED, varying between 10 and 320 individuals to the hectare (ind/ha), with an average of 101 ind/ha (including all species and sites); this density is less than 50 ind/ha in 13 of 21 listed sites;
- In the basal area[21], varying from 0.35 to 11.06 m^2/ha; this basal area is small (≤ 2 m^2)[22] on 12 sites (out of 19 sites listed), including all species;

[21] The *basal area* of a tree is defined as the area of a given section of land that is occupied by the cross-section of tree trunks and stems at the base this is usually a measurement taken at the diameter at breast height (1.3m or 4.5 ft) of a tree above the ground and includes the complete diameter of every tree, including the bark. Measurements are usually made for a plot and this is then scaled up for 1 hectare of land for comparison purposes to examine a forest's productivity and growth rate.

[22] A small basal area is ≤ 2 m^3 (Anon., 2010b).

- In biovolume varying between 0.41 and 40.33 m^3/ha; this biovolume is small (≤ 10 m^3)[23] on 12 sites (out of 19 sites listed).

Diospyros species.

Diospyros species are found in a variety of vegetation formations in Madagascar (Schatz *et al.*, 2010). Some species have a broad geographical distribution compared to others (Schatz and Lowry II., 2010).

A gradual decline has been recorded in Madagascar's ebony populations (Anon., 2010b). For example, almost all the mature trees of *D. perrieri* have disappeared in the western part of Madagascar (Rabarison, 2000). The potential for regeneration is generally low (see table 11, Anon., 2010b) and the species essentially survives in protected areas.

For the sites for which information is available, (Anon., 2010b; Anon., 2013b; Anon., 2009a) studies conducted on the abundance of *Diospyros* species emphasise that there is great variability in:

- The density of the species with MED, varying between 10 and 500 individuals per hectare with an average of 107 ind/ha;
- The basal area, varying between 0.02 and 4.88 m^2/ha; this basal area is small (≤ 2 m^2)[24] over 14 sites out of the 15 sites inventoried. Biovolume which varies between 0.06 and 23.35 m^3/ha; this biovolume is small (≤ 10 m^3) [25] on 14 sites out of the 16 sites listed (including all species).

3.2.3. Population trend of species at national level and principal threats

It is important to understand the effects of selective harvesting on *Dalbergia* and *Diospyros* habitat in Madagascar. Selective timber harvesting constitutes the beginning of a process of degradation affecting not only harvested species but also the surrounding habitat. Most often, the harvest of mature trees promotes and intensifies land clearing activities by local populations (Anon., 2013b). The dense dry forests host the majority of precious timber species, but as they are burnt every year for *hatsake* (a maize crop), the forest is placed under pressure from human activities (e.g. slash and burn farming, burning practices and charcoal production) and becomes degraded (Anon., 2013b).

Studies conducted on the use of Madagascar's precious timber (Rasamoelina, 2001; Rakotondramanga, 2002), note that rosewood, palisander and ebony are used locally to build houses, in cabinet making and creating sculptures. However, none of the studies consulted during this work made a connection between the national use of precious timber and the threat that this use poses to the survival of precious timber species in Madagascar. Furthermore, slash and burn farming, grazing and charcoal burning are most often quoted as the main threats from subsistence activities to Madagascar's species of precious timber (Anon., 2010b; Anon., 2011e).

[23] A small biovolume is ≤ 10 m^3 (Anon., 2010b; Rakotoarisoa, DBEV, personal comment to TRAFFIC, November 2015).
[24] A small basal area is ≤ 2 m^3 (Anon., 2010b).
[25] A small biovolume is ≤ 10 m^3 (Anon., 2010b; Rakotoarisoa, DBEV, personal comment to TRAFFIC, November 2015). [25] IUCN. 2001. IUCN Red List Categories and Criteria: Version 3.1. IUCN Species SurvivalCommission. IUCN, Gland, Switzerland and Cambridge, UK.

To assess the extinction risk for all MED species, the DBEV and the MBG used the IUCN Red List Categories and Criteria (Anon., 2013b). In order to red list a species, at least one of the five criteria (A-E) set by the IUCN should be assessed (Willis *et al*., 2003). At the same time, the conservation status of the species is temporarily assigned, based on version 3.1 of the IUCN redlist categories and criteria[26].

Dalbergia species

Three attempts were made between 2000 and 2012 to assess the conservation status of *Dalbergia* species (Du Puy *et al.*, 2002; Bosser and Rabevohitra, 2010; Anon, 2012a). Of the 28 species of *Dalbergia* with MED, no information on threats is available for 19 species. For the nine other species, illegal harvesting, selective harvesting, slash and burn farming and charcoal production activities have been identified as the key threats (Annex 18). To this day, illegal harvesting tends to lead to slash and burn farming and charcoal production (personal observation, January, February 2015). In fact, after the departure of illegal loggers from harvest areas, charcoal burners go in to collect abandoned branches and take the opportunity to cut more woodof the same species.

The nine species for which information is available show declining populations. However, the scale, irreversibility and impacts of threats has not yet been determined. Regarding the known status of conservation of *Dalbergia* species with MED, 11 species are classified as Vulnerable (VU), eight as Endangered (EN), two Critically Endangered (CR), and six species identified as Least Concern (LC) (Annex 18).

Diospyros species

The genus *Diospyros* in Madagascar has been the subject of two workshops to assess the conservation status of key species, held in May 2010 (Shatz and Lowry II, 2011), and in October 2012 (Anon., 2012a). The evaluations in 2012 mainly concerned MED species.

Of the 29 known MED *Diospyros species*, no information on threats is available for around 95% of them. Illegal harvesting, selective logging, slash and burn farming and fire-clearing are the chief threats facing eight species and consequently their populations are declining (Annex 19). This decline has been dramatically increasedsince 2009 (Pete Lowry, taxonomist at MBG, personal comment to TRAFFIC, June 2014). For example, mature trees of *D. perrieri* have disappeared in the western part of Madagascar (Rabarison, DBEV, personal comment to TRAFFIC, July 2014) and this species has virtually disappeared in the timber harvest zones (Julien Rakotoarisoa, personal comment to TRAFFIC, July 2014). In addition, illegal logging of timber is also taking place in protected areas (Pete Lowry, taxonomist at MBG, personal comment to TRAFFIC, June 2014; Julien Rakotoarisoa, personal comment to TRAFFIC, July 2014).

Concerning the known conservation status of the MED *Diospyros* species, 13 species are classified as Vulnerable (VU), 11 as Endangered (EN) and one species is Near Threatened (NT) (Annex 19).

3.3. Illegal logging and trade at the national level

3.3.1. Scale of logging and associated illegal or unmanaged trade

In January 2009, at the beginning of the Malagasy political crisis, the illegal logging of precious timber of Madagascar experienced an unprecedented growth (Anon., 2010b; Anon., 2013b; Randriamalala, 2014). Tonnes of rosewood were harvested in almost every Malagasy forest, affecting approximately 14 000 ha of forest (Randriamalala, 2014). Skyrocketing international demand is considered to be the main cause, with 90% of the logs being destined for international trade and a mere 10% for supply to local markets (Anon., 2010a).

Following the increase in demand, precious timber and rosewood in particular became increasingly expensive, with prices reaching around 6 000 euros per tonne in 2009 (Anon., 2010a). As a result, instances of illegal logging of precious timber became increasingly prevalent, both outside and inside Protected Areas (PA). In 2009, precious timber logging and export in Madagascar represented at least 52 000 t of precious timber from about 100 000 rosewood and ebony trees, with more than 60 000 of these trees being harvested inprotected areas (Anon., 2009b; Randriamalala and Liu, 2010).

The value of traffic in rosewood into international markets was at that time estimated at Euro 400 000 per day (Anon., 2009b). In 2009 alone, 1114 containers of rosewood with a total market value of about USD 218 million were obtained by illegal logging in the north-east region of Madagascar (Wilmé *et al*., 2009). Five species of rosewood *Dalbergia*, two of palisander *Dalbergia* species and 22 species of ebony *Diospyros* species from Madagascar are generally mentioned as being the most heavily traded species at international market (Rakotovao *et al.*, 2012; Anon., 2010b).

For the period 2009 to 2011, between 65% and 88% of precious timber (all categories) harvested had no supporting administrative documentation (Randriamalala, 2014). Despite the official ban on harvesting and export of Madagascar's precious timber, during the period from January to June 2014 alone, a total of 70 000 logs of rosewood were seized, including over 50 000 outside the country (Butler, 2014; Randriamalala, 2014).

Spatial and temporal dynamics of the harvesting of precious timber in the main areas affected

The literature reviews and consultations with national and regional stakeholders reveal that MED rosewood and ebony trees have disappeared from unprotected areas, i.e. from the production areas and unprotected State-owned forests (P7, A2, personal comment to TRAFFIC, 12 July 2014; P11, A2, personal comment to TRAFFIC, 1 February 2015). Since 2008, when mass logging of precious timber began, the logging of rosewood and ebony in particular has moved into protected areas and illegal logging areas have moved from low to high altitudes (TRAFFIC survey of Protected Area managers and at the local level, January 2015).

Harvesting of rosewood and ebony has taken place relentlessly in natural forest with the most impacted forests being those of Masoala National Park, Mananara Biosphere Reserve, Ankeniheny Zahamena Corridor, Marojejy National Park and a section of the Makira Nature Reserve (Raoel 2005; Rasarely *et al.*, 2005; Blondel and Salava, 2006; Patel, 2007; Blondel and Salava, 2008; Anon., 2009b; consultations between TRAFFIC and various categories of stakeholders at national, regional and local levels, February 2015). The section below examines the logging process in protected areas forming part of this study.

Spatial and temporal evolution of precious timber logging in study areas

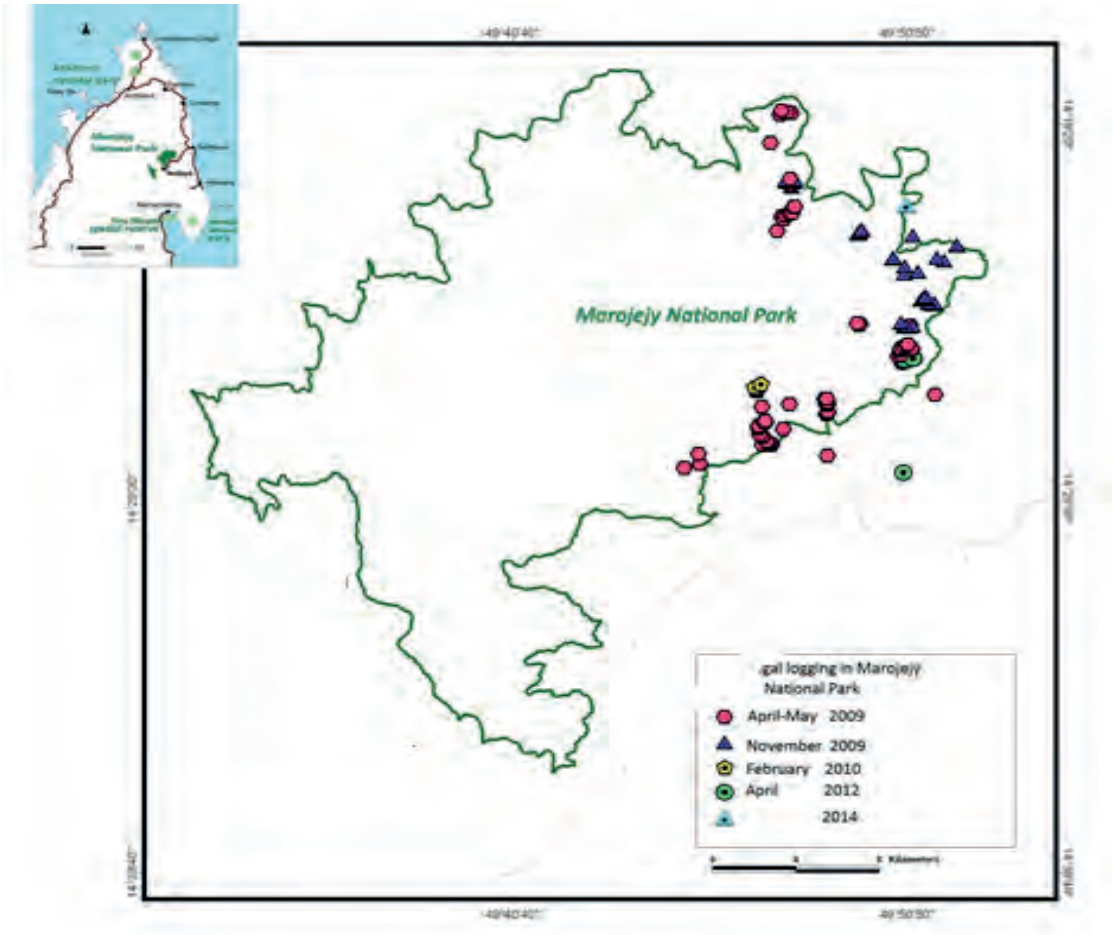
Marojejy National Park

The Marojejy National Park (PNM) was founded in 1952 as a Strict Nature Reserve, category Ia of IUCN, before becoming a National Park in 1998 (Decree no. 98-375). This park covers 92 140 ha in the north-east of Madagascar, in the SAVA region, between the towns of Andapa and Sambava. About 187 000 people live in and around this park which is one of the most majestic massifs in Madagascar, consisting of a range of mountains reaching an altitude of 2132 m (Anon., 2015c).

Between January and September 2009 at the outset of the precious timber illegal logging crisis, PNM was the subject of illegal harvesting by hundreds of people from every region of Madagascar (Anon., 2010a; Anon., 2012b; P13, C1, personal comment to TRAFFIC, 3 February 2015).
Map 2 shows the location of cases of illegal harvesting in PNM and on its periphery during the period from April 2009 to December 2014. The map is based on the results of patrols conducted by the park manager during this period. Sixty-three illegal cutting sites were identified by the patrols; with incidents all being concentrated in the north-eastern sector of the Park towards its border. Over 90% of cases of illegal harvesting took place between April and November 2009, with about 38 cases identified in April and May alone. Between 2010 and 2014, two cases of illegal harvesting were identified in 2010 and 2012 in the Park, with only one case being noted on the border of the park in its north-eastern sector in 2014 (cf. Map 2) thus suggesting a decline in incidents. It must be reiterated that these incidents fell within patrolled areas and, as a result, they cannot be considered a complete picture of the extent of illegal harvesting at that time in this reserve. Compared with the scale of illegal harvesting in other protected areas (Makira Nature Reserve, Masoala National Park, Mananara Biosphere Reserve) (cf. above), that of Marojejy is far more limited as a result of the complete closure of the park in April 2010. Two major factors made it possible to chase out the illegal harvesters and gain control of the park, namely:

- Taking control of the protected area by law enforcement agencies (P13, C1, personal comment to TRAFFIC, February 2015);
- The mobilization and unwavering support of the local population, including through the formation of local vigilance committees who conduct surveillance in various parts of the Marojejy Park (P13, C1, personal comment to TRAFFIC, January 2015).

Map 2: Locations of cases of illegal harvesting of precious timber in and arround the Marojejy National Park (2009-2014)

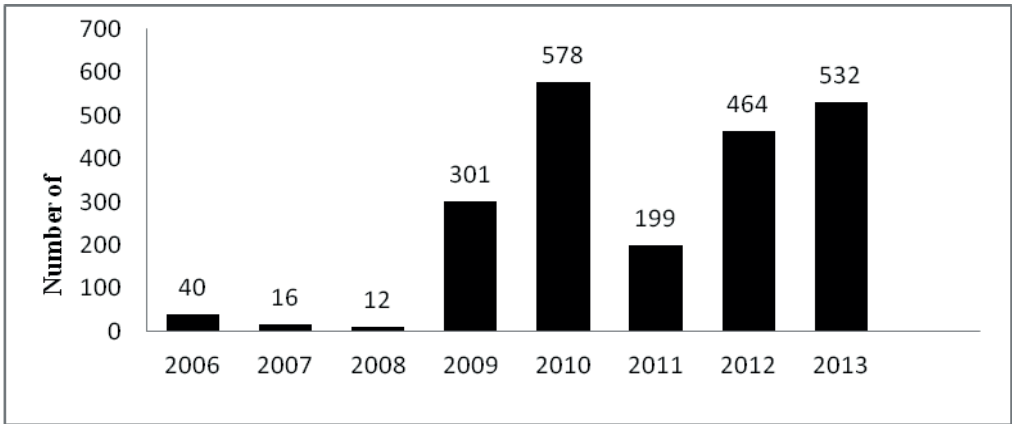


Source: P13, C1, *in litt.* to TRAFFIC, 2014

The most heavily logged precious timber in the Marojejy Park were determined using the catalogue of vascular plants of Madagascar (MADCAT) and data on distribution of plant species of Madagascar in the TROPICOS databases and on the basis of consultations with experts in taxonomy and plant biology (Harisoa Ravaomanalina, DBEV, personal communication to TRAFFIC, June 2014). The species found to be most heavily logged (Anon., 2015b) were:

- In the genus *Dalbergia*: *D. louvelii, D. baronii, D. madagascariensis, D. chapelieri*;
- In the genus *Diospyros*: *D. platyrachis, D. toxicaria, D. gracilipes, D. haplostylis and D. myriophylla*.

Figure 1: Number of *Dalbergia species* stumps identified in the Marojejy National Park (2009-2014)



Source: P13, C1, in litt. *to TRAFFIC, January 2015*

Masoala National Park

Created in 1997 and with a population of about 117,000 people (Anon., 2015d), the Masoala National Park (category II of IUCN) is situated in north-eastern Madagascar in the province of Diego-Suarez on the granitic peninsula of Masoala. This Park is the largest of the island's protected areas with its 235 000 ha of humid tropical forest, (Scales, 2014).

Masoala is regarded as an exceptional region because of its biodiversity reflected in its high levels of endemic flora and fauna (Anon., 2011b). This park was included in the world heritage list[27]in 2007. Despite its globally recognized status as a protected area, illegal logging has continued there until at least February 2015 (P11, A2; P1, A1, personal comment to TRAFFIC, January 2015; personal observation, January, February 2015).

After the passage of successive cyclones (including Gafilo, Elita, Manou and Hudah) between 2000 and 2002, which ravaged the forests of the eastern slopes of the Masoala peninsula, the forestry companies of SAVA region put pressure on the government and on the forest administration to obtain permits to collect precious timber as a form of compensation for losses caused by the destruction of the vanilla and clove crops (P1, A1; P6, A1, personal comment to TRAFFIC, February 2015). Interministerial Order no.17939/2004 of 30 December 2004 therefore authorized the collection of rosewood and ebony logs felled by the cyclones and their export in semifinished or finished form within three months of the date of signature of that order, i.e. until the end of March 2005. In 2007, the loggers requested that the forest administration grant a new permit so that they could export the stockpiles which they had not been able to export during the three months of authorization in 2004.

In January 2009, the operators won their case through Interministerial Order no. 003/2009 of 28 January 2009 which authorized, on an extraordinary basis, 13 operators in the SAVA region to export undressed rosewood and ebony and Interministerial Order no. 38244/2009 of 21 September 2009 authorizing the export of undressed precious timber until 30 November 2009. This last order authorized a quota of 25 containers per operator against payment of MGA72 million (USD 36 000) per container. However, this authorization led to widespread cutting of standing trees in forests of the SAVA region (P1, A1; P6, A1; P11, A2,

[27] The other national parks included in this application are those of Marojejy, Zahamena, Mantadia, Ranomafana, Andringitra, Befotaka-Midongy and Andohahela. On 26 June 2007, all these parks (including that of Masoala) were listed in the world heritage list in terms of the humid forests of Atsinanana (Anon., 2007).

personal comment to TRAFFIC, January 2015) since no measure had been put in place to prevent abuse of this loophole (P11, A2, personal comment to TRAFFIC, January 2015). About a hundred offences related to the illegal collection of rosewood were recorded for 2010 alone in Masoala National Park (P14 and P5, C1; P11, A2, personal comment to TRAFFIC, January 2015).

Map 3 illustrates the development of precious timber harvesting, the majority being rosewood, in the Masoala National Park. This information is based on patrols conducted in the park between 2010 and 2015. During the period 2009 to 2015, patrol reports identified 779 harvesting areas (pressure points) (Map 3). More than two-thirds of these harvesting areas were found in 2010. Since March 2015, five new harvesting areas have been identified in the park.

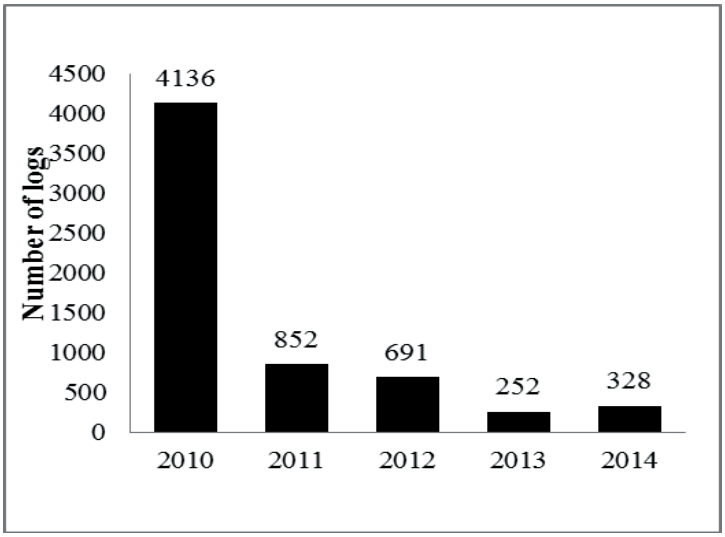
Decreasing numbers of harvested rosewood logs found in the National Park by patrollers from 2010 to 2014 confirms the observed decrease in the number of offences noted between 2010 and 2015. For example, over 4100 logs were found in 2010, about five times more than in 2011 and 2012 and about 14 times more than in 2013 and 2014. The presence of 328 rosewood logs found in the park in 2014 nevertheless underlines persistant illegal activities in the park. Furthermore, from January to April 2015, at least 50 logs were found during patrols conducted by park rangers (P15, C1, personal comment to TRAFFIC, October 2015).

Places along the coast of Cap Est to Cap Masoala in the Bay of Antongil serve as locations to ship timber illegally harvested from the Masoala forest. From these informal beach loading points, dhows supply foreign cargo vessels anchored in the open sea. Timber stockpiles are located along the coast of Masoala and the Bay of Antogil (P11, A2; P1, A1, personal comment to TRAFFIC, January 2015; P16, C3; P15, C3, personal comment to TRAFFIC, February 2015).

Map 3: Illegal harvest of precious timber in Masoala National Park (2010-2015)

Source: Anon., 2015e

Figure 2: Number of *Diospyros* species logs found in Masoala National Park (2010-2014)



Source: P14, C1 in litt. *to TRAFFIC, February 2015*

Based on information contained in the TROPICOS database and communications with taxonomy and plant biology experts (Harisoa Ravaomanalina, personal comment to TRAFFIC, June 2014), the species of precious timber most heavily logged in Masoala Park during the period 2009 and 2011 were *Dalbergia louvelii, D. madagascariensis, D. chapelieri and Diospyros maritima.*

Makira Nature Reserve

Makira Nature Reserve (IUCN category II) covers 372 km^2 straddling three regions, i.e. SAVA, Analanjirofo and Sofia and with a population of about 150 000 people living in and around the park. It is considered to be one of the most species rich protected areas of Madagascar, owing to the number of species and its high level of endemism. Makira is the biggest intact block of dense humid evergreen forest at low and medium altitude in Madagascar (Anon., 2015f). Compared with the parks of Masoala and Marojejy, the Makira Nature Reserve has much more rugged terrain, making access more difficult for transporting logs. Nevertheless, this park has not been spared from illegal rosewood harvesting.

From October 2009, the harvesting of timber, in particular of palisander *Dalbergia* species has been ongoing in Makira Park (Randriamalala, 2014). TRAFFIC surveys on the ground using semi-formal questionnaires and consultation with stakeholders of Maroantsetra district and the villages of Anandrivola, Ambanizana and Rantabe[28] reveal the scale of this illegal logging. Illegal logging peaked in 2011, with 300 to 500 people who were conducting liiegal logging in the forest. An average of three shipments of logs went per day between the months of December 2010 and February 2011 (woodcutters from the villages visited[29], personal comment to TRAFFIC, 27 February, 2015; P17, A1, personal comment to TRAFFIC, March 2015)[30]. Each woodcutter could at that time fell up to two rosewood trees daily (woodcutters from the villages visited, personal comment to TRAFFIC, February, 2015; P17, A1; P18, A1, personal comment to TRAFFIC, February 2015). At least 200 woodcutters were able to get

[28]These three villages are regarded as the main ports of exit from the Makira forest (P22, A2; P23, C3, personal comment to TRAFFIC, much 2015).
[29] It should be noted that the woodcutters questioned took part in the illegal felling of rosewood and wish to remain anonymous.
[30] "The invasion:" by hundreds of people from the southern part of Makira, between December 2010 and February 2011, was confirmed by the gendarmerie of the outpost of Rantabe (personal comment to TRAFFIC, March 2015).

into the forest for a period of two weeks (P17, A1; P18, A1, personal comment to TRAFFIC, February 2015).

Therefore, if there was a minimum number of two hundred woodcutters, each with a two-week operation period, an estimated minimum of at least 5600 trees were illegally cut down in that period alone[31]. This illegal logging continued between the end of 2012 and beginning of 2013, then between the end of 2013 and beginning of 2014 (P17, A1; P18, A1, personal comment to TRAFFIC, February and March 2015). This latter revival of illegal logging occurred deeper into the heart of the forest, requiring at least a three-day walk from the village of Rantabe[32] to get to the sites where there are still some large diameter trees (P17, A1; P19, C3; P20, C3; P21, C3, personal comment to TRAFFIC, February 2015). Waves of shipments of precious timber continued in the mouth of the Ambanizana River and also off Ambodiforaha (P17, A1, personal comment to TRAFFIC, March 2015). At a minimum, 600 logs per week, with the average weight of a log being 150kg, were shipped from the Bay of Antongil mainly from the informal beach ports of Rantabe and Anandrivola (P18, A1; P19, C3; P20, C3, personal comment to TRAFFIC, February 2015; Aurélien, camp head at Maroantsetra, personal comment to TRAFFIC, March 2015). This totals at least 2400 logs[33] (i.e. 350 t[34]) shipped between December 2013 and February 2014.

Map 4 produced by P26 on the basis of patrol observations[35] reveals that illegal logging burgeoned in the park and its periphery during the period 2013 to 2015. From July 2013 to March 2015, 646 stumps were identified with about 60% recorded in 2014 and 20% in 2015 (cf. Table 8).

This illegal logging of timber has affected all sectors of the Park (cf. Map 4). It should be noted that information presentedon the map concerns the illegal harvesting of all timber species including non-precious timbers (P26, C1, personal comment to TRAFFIC, August 2015). Information relates only to areas that were being patrolled and consequently, the results cannot be considered exhaustive.

Table 8: The number of stumps resulting from illegal harvsting observed in the Makira Nature reserve from 2013 through 2015

Year	Jan-Mar	April-June	July-Sept	Oct.-Déc.	Total
2013	na*	na	44	87	**131**
2014	124	105	82	77	**388**
2015	127	na	na	na	**127**

* na: information not available

Source: P26, C1, in litt. *to TRAFFIC, August 2015*

[31] One tree =3 to 4 logs 2 m long, 30 cm in diameter and weighing 150 kg (Anon., 2009b; Randriamalala and Liu, 2010).

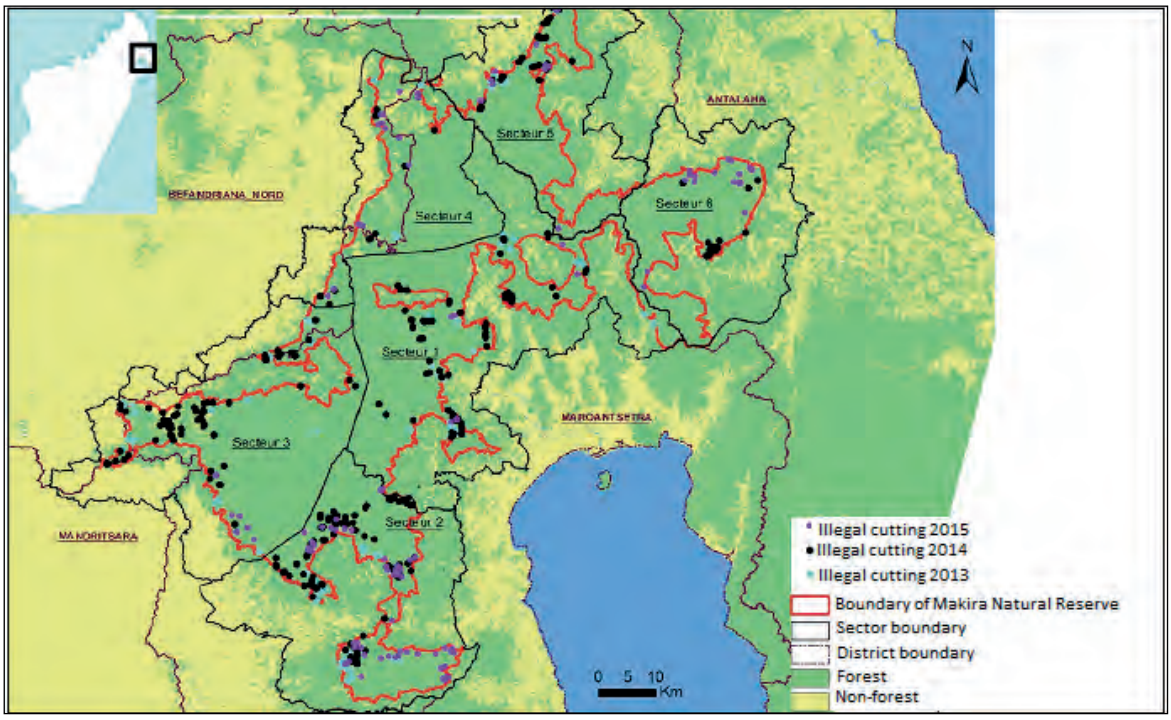
[32] Rantabe is a Malagasy urban municipality situated in the northern part of the region of Analanjirofo. Its population was estimated at 19 500 inhabitants in 2001 (Anon., 2001).

[33] This quantity corresponds to 800 rosewood and ebony tree trunks, given that one tree produces three logs (Wilmé *et al*., 2009; Randriamalala and Zhou, 2010; rosewood collectors, woodcutter's groups, personal comment to TRAFFIC, January and February 2015).

[34] The average weight of a rosewood log is 145 kg (rosewood collectors, woodcutter's groups, personal comment to TRAFFIC, January and February 2015).

[35] Results obtained using SMART (Spatial Monitoring and Reporting Tool). This software is much more than simply a tool for collecting and storing data. It is a series of best practices, whose goal is to help Protected Area managers to follow-up, evaluate and appropriately manage their patrol activities better (Anon., 2015g).

Map 4: Location of illegal logging areas in the Makira Natural Park (2013-2015)



Source: P26, C1 in litt. *to TRAFFIC, August 2015*

Mananara Biosphere Reserve

This reserve was created by Decree no. 89-216 of 25 July 1989 with the support of the UNESCO Man and Biosphere Programme. Part of the eastern Malagasy ecoregion and bounded by the Indian Ocean on its eastern border, this reserve is situated in the north-eastern part of Madagascar, in the Analanjirofo region and Mananara North district and covers seven rural municipalities.

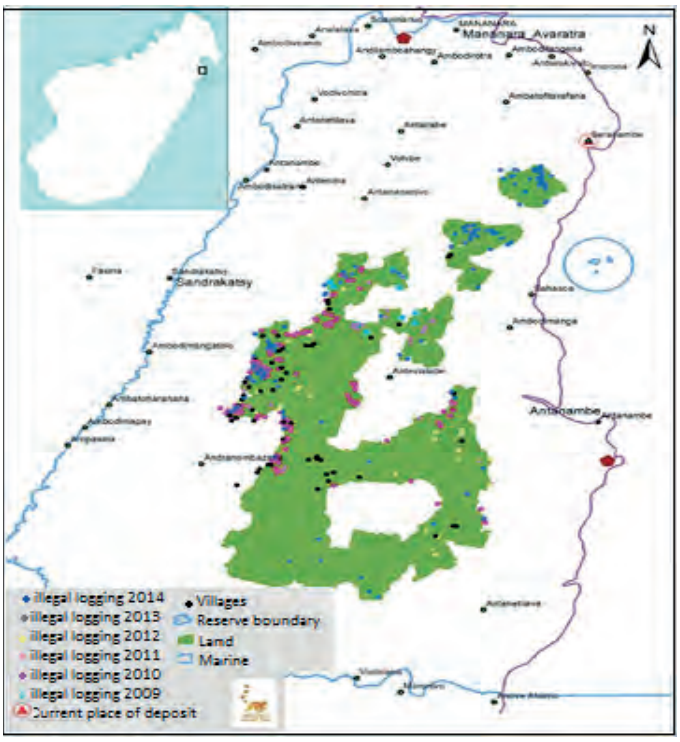
This reserve totalling 140 000 ha includes a central conservation core of 24 000 ha with National Park status, and 1000 ha marine reserve area. The population located on the outskirts of the parkin the Biosphere Reserve amounts to 174 000 inhabitants, including 30 000 people who depend directly on the park for income earned through tourism and forest resource use (Anon., 2011b; P27, A2, personal comment to TRAFFIC, February 2014).

About 330 illegal logging sites have been identified within or in close proximity to the reserve by patrols conducted between 2009 and 2014 (cf. Map 5). Over 55% of the illegal logging sites were listed between 2013 and 2014. In 2009 illegal logging was concentrated in the northern part of the reserve, but by 2014 every area of the reserve, both its core and its periphery, was affected. It should be noted that information provided in Map 5 concerns the illegal harvesting of all species of timber incuding non-precious species (P54, C1, personal comment to TRAFFIC, October 2015), and refers only to those zones that were patrolled. Consequently, the results presented here cannot be regarded as representative of all illicit harvesting of timber in the Mananara Biosphere Reserve.

Map 5 below illustrates the development of illegal logging areas in the Mananara reserve between 2009 and 2014. The surveys conducted by TRAFFIC at DREEF head of the Analanjirofo region revealed that illegal logging seemed to decrease after January 2015; however, the movement of seized stockpiles and those held by individuals was ongoing.

About two illegal shipments took place in Mananara between December 2014 and February 2015 (P27, A2; P28, A1, personal comment to TRAFFIC, March 2015).
There is no published information on the most heavily harvested species. However, information on the distribution of *Dalbergia species* highlights the presence of *D. louvelii*, *D. maritima* and *D. chapelieri* in the Mananara Reserve, these species also being among the most heavily logged in the Masoala Park.

Map 5: Surveys of illegal logging areas in Mananara Biosphere Reserve (2009-2014)

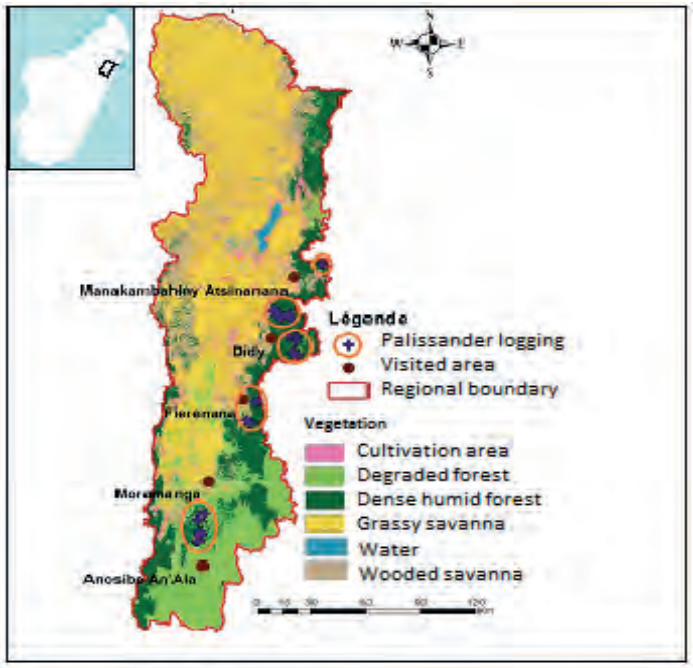


Source: Anon., 2015d

Ankeniheny Zahamena Corridor

The Ankeniheny Zahamena Corridor (CAZ) is located in the eastern Madagascar and consists of four protected areas, i.e. Zahamena National Park, Mangerivola Special Reserve, Strict Nature Reserve of Betampona and the Analamazaotra-Mantadia National Park. Formed by a dense humid evergreen forest with an area of 384 000 ha, CAZ is one of the largest rainforest bloc in Madagascar (Anon., 2008). Local communities living in this corridor rely heavily on natural resources, with slash and burn farming and the ongoing traditional practice of itinerant farming putpressure on the environment. Unsustainable forest harvest and mining are also major causes of the destruction of the forest ecosystem and this is to the detriment of local communities (P29, A2, personal comment to TRAFFIC, April 2015).

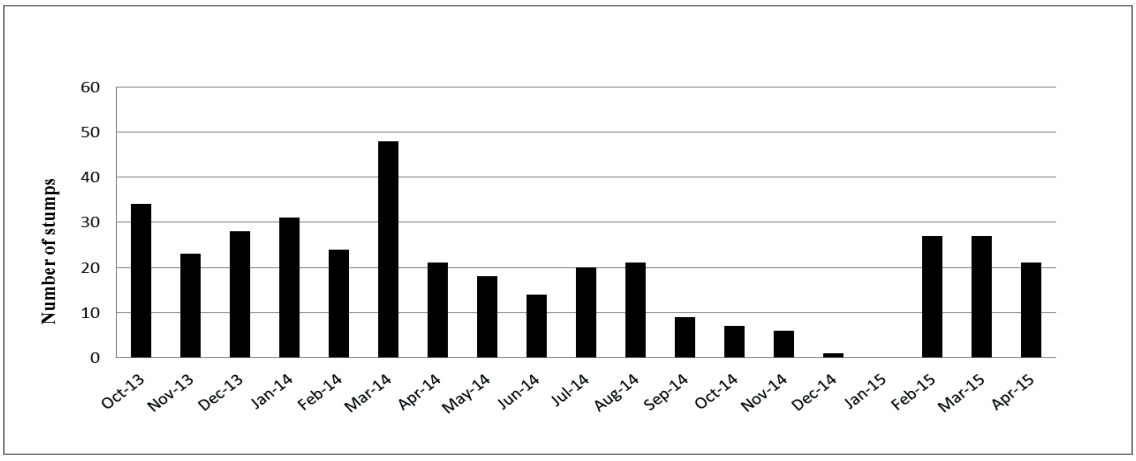
Map 6: Illegal palisander logging sites in the new protected area of CAZ in 2015



Source: TRAFFIC, 2015. The map is based on a document of the CAZ Development Plan (Anon., 2010c)

During the survey conducted by TRAFFIC in CAZ, interviewed people shared observations about the upsurge in illegal logging of palisanders at Didy[36] situated south-east of Ambatondrazaka inside the Zahamena Reserve (P29, A2; P30 & P31, C3, personal comment to TRAFFIC, June 2015). Trucks heavily loaded with freshly cut palisander logs were seen between Ambatondrazaka and Didy. The number of trucks on this route has increased three fold since 2010 (P29, A2; P3 and P30, C3, personal comment to TRAFFIC, June 2015).

Figure 3: The changing numbers of stumps resulting from illegal logging identified in the new protected area of CAZ (October 2013-April 2015)



Source: Anon., 2015h

Dalbergia monticola and *D. baronii* are the two species that are most heavily logged in the forested area of Didy (Rakoto *et al.*, 2013).

[36] Didy is a municipality in the Ankeniheny Zahamena Corridor (CAZ).

3.3.2. National precious timber trade

Palisander Timber

The high value of timber from palisander trees has been known in Madagascar since the 16th century (Razafintsalama, 2001). Industrial logging and trade of this precious timber began in 1713 (Randriamalala, 2013). Among other species of precious timber from Madagascar, species of palisander have long been the most prized by forestry companies and national consumers, (Rasamoelina, 2001). Owning furniture in palisander or using palisander timber in construction is a symbol of high social status (Rakotondramanga, 2002).

These species of precious timber could disappear in the next three decades, assuming a conservative national annual increase in demand of 10%. of (Rasamoelina, 2001). The markets of Antananarivo and Toamasina are supplied with illegal palisander timber coming notably from the Ankeniheny-Zahamena Corridor[37], i.e. mainly corresponding to the towns of Moramanga, Andasibe, Ambatondrazaka, Andilamena and Nosibeanala (P2, E1, personal comment to TRAFFIC, October 2014).

Antananarivo Market

It was mentioned in the biological characteristics of species section of this report (see Section 3.1) that there are 43 species of palisander in Madagascar (Bosser and Rabevohitra, 2005), although when it arrives at the market, it is difficult to distinguish between species. In all the local and national timber markets, palisanders are mainly sold in the form of planks, sleepers or boards (cf. photos below)[38]. Prices vary according to the form and volume of timber (cf. Table 9). Consequently, prices for sawn planks[39] are higher than those of other products, ranging from MGA100 000 to MGA180 000 (USD40 to 72[40], exchange rate of 2015). The prices of products also vary depending on the quality of timber and season.

The timber is said to be of good quality if:

It is properly measured into planks, sleepers of flat board
planks are completely straight (P2, E1, personal comment to TRAFFIC, October 2014).

Good quality timber (premier grade) is in high demand and is sold as soon as it arrives on the market (P2, E1, personal comment to TRAFFIC, October 2014; personal observation April 2015).

Lastly, prices may be higher during the rainy season (from October to February), because of the decrease of supply caused by seasonal deterioration of the road (P2, E1, personal comment to TRAFFIC, October 2014). Sleepers are still the most popular timber on the market.

[37] With its surface area of 384 000 ha, the Ankeniheny-Zahamena Corridor is one of the largest vestiges of the humid dense evergreen forest of eastern Madagascar (Anon., 2015i). Conservation International has been rolling out conservation and local development projects in this area for more than ten years.
[38] Palisander trees (*Dalbergia* spp.) are destined for high-end use, cabinet making, fine luxury joinery, marquetry, luxury flooring, string instruments, etc. (Rajemison, 2013).

[39] One palisander tree 40 cm in diameter can produce three planks (TRAFFIC surveys conducted with the woodcutters of Didy between 20 and 25 April 2015).
[40] , 1USD equal to 2500 MGA, (average rates for 2015), this rate is used throughout the report

Table 9: Cost in MGA of timber in the markets of Andravoahangy and Mahazo (Antananarivo)

Products	Width (cm) x Thickness (cm) x Length (cm) x	Price (MGA)	Number of pieces sold/ month
Plank	30 x 10 x 4.0 25 x 10 x 2.5	100 000 – 180 000	50-80
Sleeper	20 x 22 x 2.5 20 x 20 x 2.5 20 x 15 x 2.0	60 000 – 90 000	200-500
Flat board	40 x 15 x 3.0	60 000 – 90 000	100-200

Source: Personal observation, Andravoahangy and Mahazo timber markets, April 2015

Figure 4: Palisander sawn wood stock from CAZ awaiting transport to Antananarivo

Planks (1), Sleepers (2) and Boards (3)
© TRAFFIC April 2015, palisander stock at Didy, Ambatondrazaka

Surveys conducted for this report at timber markets in Andravoangy, Isotry, Ambodivona and at the main collection sites of these timbers such as Didy, reveal that the illegal palisander timber products sold in Antananarivo generally come from unprotected State-run forests located alongside the private owned land of Didy[41] and its surrounding areas. The products are most often concealed under loads of charcoal or other forest products such as square poles or planks of eucalyptus and pine (personal observation, April 2015).

[41] Didy is a rural municipality of 15,000 people located in the Province of Toamasina. It belongs to the Alaotra Mangoro region and the district of Ambatondrazaka (Anon., 2015j).

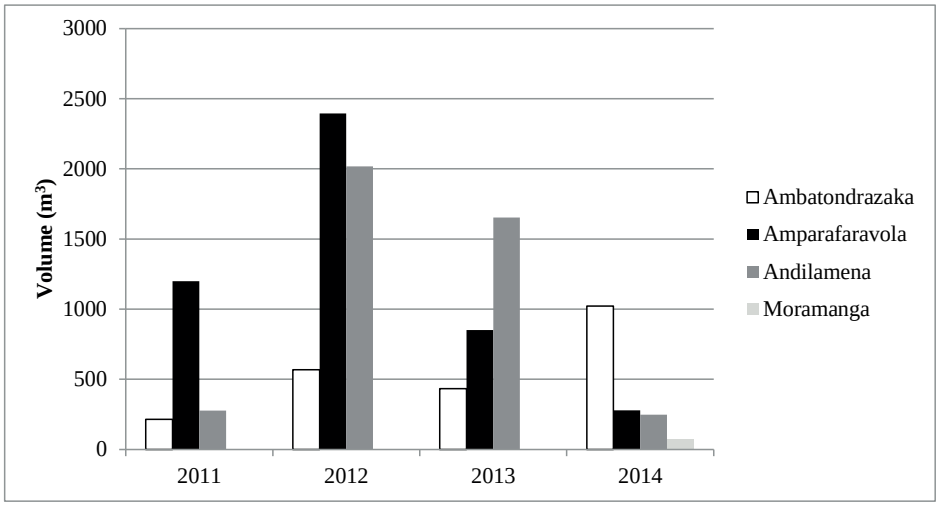
CAZ: Principal source of supply of palisander timber for Antananarivo

Unlike rosewood *Dalbergia* and ebony *Diospyros* whose logging is banned, a local Malagasy misunderstanding of the CITES Appendix II listing, irregularly allowed the logging of palisander *Dalbergia* by permitted operators to continue on the boundaries of specific Protected Areas, such as CAZ. Eighty percent of palisander timber stocks visited by TRAFFIC (Antananarivo, April to July 2015) came from the Alaotra Mangro region, and more specifically from the forest region within the CAZ protected area. This was confirmed by statistical data from the DREEFof Alaotra Mangoro. Figure 4 shows the quantity of timber logged between 2011 and 2014.

More than 11 000 m^3 of palisander were thus harvested in CAZ from 2011 to 2014 in all categories, namely plank, sleeper and board (Figure 5). During this period, the greatest volumes were to be found at Amparafaravola (4723 m^3) and Andilamena (4193 m3), volumes twice as high as those at Ambatondrazaka (2238 m^3).

The total volume of logged palisander almost tripled between 2011 and 2012 (1690 m^3 compared with 4980 m^3) before decreasing in the following two years, with an overall volume nearly the same as that of 2011 (1622 m^3). This trend can also be seen in the towns of Amparafaravola and Andilamena and was also significant for the town of Ambatondrazaka, but only until 2013. In fact, Ambatondrazaka is the only town where the volume of palisander increased (over twice as much) in 2014 in relation to the preceding year.

Figure 5: Volumes (m3) of legally logged palisander in CAZ from 2011 to 2014



Source: P31, C3, in litt*. to TRAFFIC, June 2015*

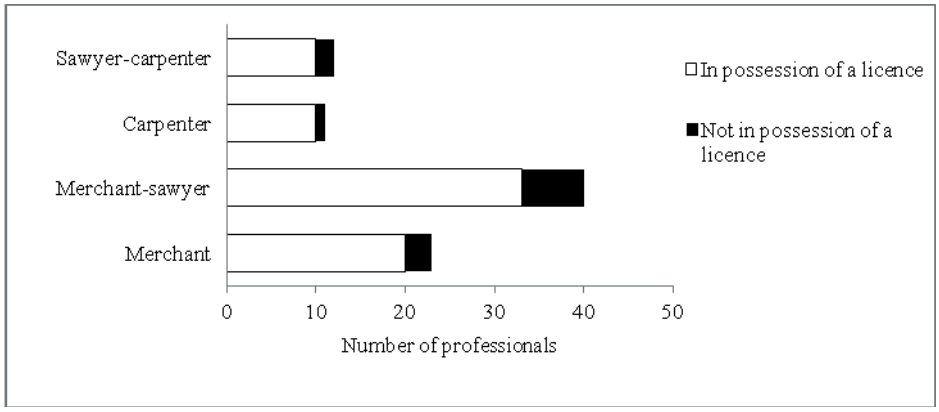
Processing at national level

Highly prized throughout the country, palisander timber is processed in every town within Madagascar. However, the majority of companies processing this timber cannot produce documents proving its legality (personal observation April 2015; P2, E1, personal comment to TRAFFIC, May 2015). Since the adoption of "permits by tender", the number of operators holding operating permits has dropped, with only 14 operators in 2014 compared to 214 in 2005 (P2, E1, personal comment to TRAFFIC, October 2014).

Despite the "permits by tender" system the survey conducted in the timber markets of Andravoahangy and Isotry in the capital Antananarivo in April 2015 revealed that:

- Of the 30 timber vendors visited (i.e. sawyer-carpenters, carpenters, merchant-sawyers and merchants), 80% had no legal documentation (including laissez passer, operating permit, known as a licence[42] and record books) in their possession (cf. Figure 6);
- None of the palisander on sale in the markets was accompanied by supporting documents proving its origin and transport (laissez passer, logging permit and record book);
- All operations associated with palisander timber (logging, transport, sale of raw product on the market and processing) are facilitated by close co-operation with enforcement authorities (Timber sellers of the Andravoahangy and Isotry markets, personal comments to TRAFFIC, April 2015);
- 80% of palisander sold on the market is illegal (P2, E1, personal comment to TRAFFIC, October 2014).

Figure 6: Numbers of timber traders in possession of a licence or not in possession of licence in the timber markets of Ambodivona and Andravoahangy (Antananarivo)



Source: TRAFFIC survey, April 2015

Ebony *Diospyros* species and rosewood *Dalbergia* species.

Although palisander timber is highly prized on the national market, ebony and rosewood timber are sought after for the construction of huts, the manufacture of furniture but most especially for sculpture and marquetry (P7, A2, personal comment to TRAFFIC, January 2015)[43].

The main users of rosewood and ebony are concentrated in the Amoronimania[44] and SAVA regions where there are, for instance, there are sculptors that make a living exclusively from working with these precious woods (personal observation, April 2015). The survey conducted by TRAFFIC from 20 August to 24 December 2014 in Ambositra[45], handicraft capital and home of Malagasy sculptors, revealed the existence of 1,200 households living[46] exclusively from the proceeds of marquetry and/or statuette and vase sculpturing.

[42] Licence: Professional card issued by the Ministry of Commerce to any operator engaged in a commercial activity
[43] Ebony timber (*Diospyros* spp.) and rosewood timber (*Dalbergia* spp.) are sought after for the manufacture of musical instruments, objets d'art, marquetry and sculpture (Rajemison, 2013).
[44] This region is situated in Fianarantsoa province in the centre of the island of Madagascar.
[45] Ambositra is a Malagasy urban district, capital of the district of Ambositra, situated in the south-eastern part of the Amoron'i Mania region.
[46] Each household includes a sculptor.

Given conditions favourable to a supply of wood and the advent of tourists, a sculptor may acquire a supply of rosewood and ebony of at least 2 t of timber per month (P32, E5, personal comment to TRAFFIC, December 2014). Prior to the political crisis in Madagascar which commenced in January 2009, about 2400 t of precious timber was processed each month (28 800 t of timber per annum) for the town of Ambositra alone (cf. Table 10). The Malagasy capital is home to 800 processors of rosewood and ebony. Before the political crisis, each operator used a tonne of timber per month (P34, E5, personal comment to TRAFFIC, May 2015). It is worth noting that the 50 processors of precious timber of the SAVA region use the same quantities as their colleagues in the capital, i.e.one tonne per processor per month, in total, the 50 processors used an estimated 50 t per month or 600 t annually on average (P33, E5, personal comment to TRAFFIC, February 2015).

Up to January 2009, at least 39 000 t per annum of rosewood and ebony were required to fulfil the needs of the wood-workers processing rosewood and ebony in the three main cities of the country (Antananarivo, Ambositra and Antalaha). Over 80% of the rosewood and ebony processed in Madagascar is destined for international clients (P32, E5, personal comment to TRAFFIC, January, 2015; P33, E5, personal comment to TRAFFIC, February 2015). It should be noted that this volume of 39 000 t corresponds to the quantity of rosewood and ebony legally exported by the timber operators [i.e. between 28 January and 30 April 2009 and between 21 September and 30 November 2009] following the issuance of two authorizations based on an exemption adopted for a particular trader from March to September 2009[47] (Anon., 2009b; Randriamalala and Zhou, 2010).

Since 2009, the processors mentioned above experienced a large drop in their production for two main reasons:

- In the post-crisis period, there was a sharp decrease in the number of tourists, i.e 156 000 tourists in 2008 compared with 86 000 in 2010 (Anon., 2011b).
- The enactment of legislation (Order no. 2010-141 of 24 March 2010 and Ordinance no. 2011-001 of 8 August 2011) prohibiting the harvest, logging, transport, marketing and export of timber reduced supplies to the processors.

Since 2010 and up to the present, the above-mentioned ban has been maintained, although the number of processors still remains equivalent to that of 2009 for the three cities studied (P32, E5, personal comment to TRAFFIC, December 2014; P33, E5, personal comment to TRAFFIC, February 2015). Consequently, the processing of rosewood and ebony is being done clandestinely, the raw timber coming from harvesters in the SAVA region, are mixed with other commodities to "facilitate" transport. Since the political crisis of 2009 and the prohibition on harvesting, logging and export, the rosewood and ebony needs of the three cities represents on average less than 4% of the total pre-crisis requirements (P32, E5, personal comment to TRAFFIC, December 2014; P33, E5, personal comment to TRAFFIC, February 2015) (Table 10).

[47] Interministerial order no. 003/2009 of 28 January 2009 giving approval for export to 13 rosewood forestry companies of the SAVA region; Interministerial order no. 38 244/2009 of 21 September 2009 on exceptional export, authorizing named parties to export on an exceptional basis ebony, rosewood and palisander using the previous inventory; this applied to those operators whose situation was in order regarding taxation and the forest administration; maximum quota of 25 containers allocated to 42 companies.

As a result, the processors are opting for other species, such as kohu (or merbau) *Intsia bijuga*[48] or ocotea (*Ocotea trichophlebia*) (P32, E5, personal comment to TRAFFIC, December 2014).

Table 10: Number of processor and volumes of rosewood used annually in the main transformation regions

Regions	Towns	No. of processors	Monthly volumes. (t)/processor	Monthly needs (t)/town	Annual needs per town (t)
Analamanga	Antananarivo	800	1	800	9600
SAVA	Antalaha	50	1	50	600
Amoron'i Mania	Ambositra	1200	2	2400	28 800
Total	**-**	**2050**	**4**	**3250**	**39 000**

Source: TRAFFIC survey, 2015

3.3.3. Export of precious timber

Background

Even before the colonial period, Madagascar's species of precious timber were already coveted by operators, generally of foreign origin from places such as Reunion and Portugal (Rakotondramanga, 2002; Randriamalala and Zhou, 2010). Until the end of the 1990s, the main destinations of Madagascar's precious timber were Mauritius, Reunion and metropolitan France followed by India, Pakistan and Singapore (Rasamoelina, 2001). The last three decades were marked by an upsurge in illegal export of precious timber which can be linked to various sociopolitical and natural events (P35, A2, personal comment to TRAFFIC, October 2014; P 1, A1, personal comment to TRAFFIC, January 2015).

Palisander *Dalbergia* timber

Palisander timber used to be exported mainly in the form of finished or semi-finished products. Only rarely were small quantities exported as a raw product at high prices for specific purposes such as for musical instruments (Ravoninala, DREEF Aloatra Mongoro, personal comment to TRAFFIC, June 2015). Since the mid-1990s, following the listing of Brazilian palisander *Dalbergia nigra* in Appendix I of CITES on 11 June 1992[49], Madagascar's palisander has replaced Brazilian palisander in the manufacture of musical instruments and other luxury timber products (Louppe *et al.*, 2008).

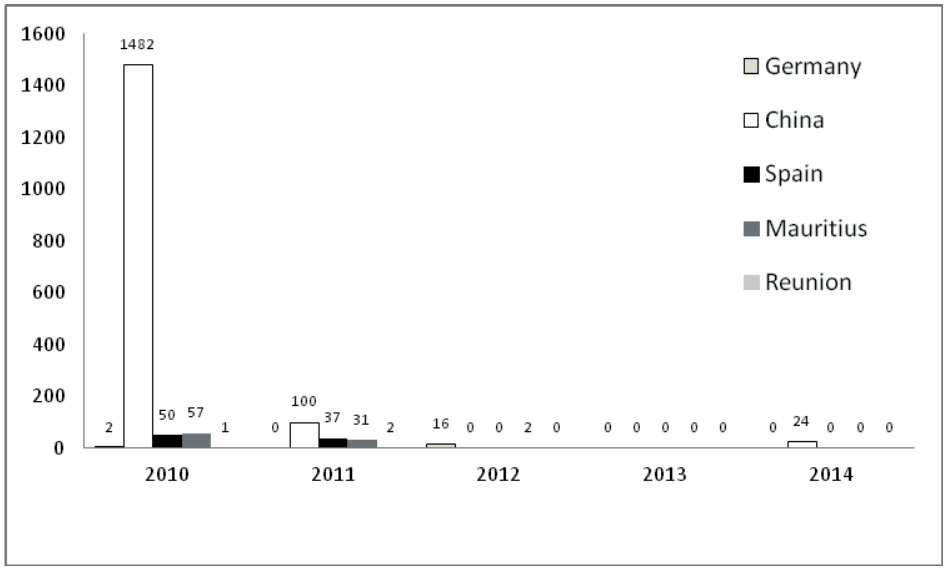
In 1999, Madagascar officially exported only about 1,500 m^3 of palisander timber (Anon, 2015m), but it is estimated that the country in reality exported some 3200 m^3 of palisander timber that year (P35, A2, *in litt.* à TRAFFIC, June 2015; P29, A2, *in litt.* to TRAFFIC, June 2015). From 2010 to 2014, Madagascar exported about 1 800 t of palisander timber, mainly to China (89% of exports volumes) and to a lesser extent to Mauritius, Spain and Reunion (cf.

[48] *Intsia bijuga* (known in Madagascar as "hintsy") is a very widespread species on the coasts of the islands of the Indian and Pacific Oceans, including in eastern Madagascar and the Seychelles. In Madagascar, *Intsia bijuga* wood ("hintsy") is particularly sought after for heavy carpentry, construction, notably shipbuilding, parquet flooring, carpentry, doors, furniture, railway sleepers, vats and tanks, shingles and for decorative purposes. In the mid-2000s there was considerable trade in merbau trees (several species of *Intsia*, especially *Intsia bijuga* and *Intsia palembanica*) with Indonesia, Malaysia and Papua New Guinea as the main producers and China, India and the European Union as the main importers (Anon., 2015k). Denmark and the Netherlands submitted to the 8th Conference of the Parties to CITES (2-13 March 1992, Kyoto, Japan) a proposed amendment for the listing of the genus *Intsia* in Annex II (Anon., 1992), a proposal that was rejected. According to a review of the profiles of some timber-producing and consumer countries (Anon., 2015l), exports of *Intsia bijuga* to China are regarded as high risk when they come from Indonesia, Malaysia, Papua New Guinea or the Solomon Islands. However, the case of Madagascar was not considered in this review.

[49] The listing was done following a proposal from Brazil (cf. CoP8 Prop. 91) at the 8th session of the Conference of the Parties of CITES (2-13 March 1992, Kyoto, Japan).

Figure 7). About 88% of these exports occurred in 2010 and about 9% in 2011. It should be noted that no information is available for the year 2013. In 2014, 24 t of palisander timber was exported to China (Figure 7).

Figure 7: Volumes (in t) of palisander timber exported from Madagascar (2010-2014)



Source: Anon., 2014c

Rosewood *Dalbergia* and Ebony *Diospyros*

Before the 1990s, rosewood and ebony were used as firewood and construction material for huts on the Malagasy coast. International trade in Malgasy rosewood and ebony began in the 1990s, the number of operators and exporters of these timbers being limited to a maximum of four (P36, E1; P37, E1, personal comment to TRAFFIC, 29 January 2015). From 1998, foreign buyers (of Chinese and Mauritian nationality) began to trawl the north-east of the island in search of rosewood suppliers, thereby contributing to the rapid expansion of harvest of these species of precious timber (P38, O1, personal comment to TRAFFIC, January 2015; P39, A2, personal comment to TRAFFIC, June 2015). Unlike the palisander species[50], the rosewood harvest and trade are banned by national regulation, yet the illegal harvest and trade flourished from 2000, (P39, A2, personal comment to TRAFFIC, January, 2015). Figure 8 shows the volume of rosewood and ebony exported from Madagascar from 1998 to 2014.

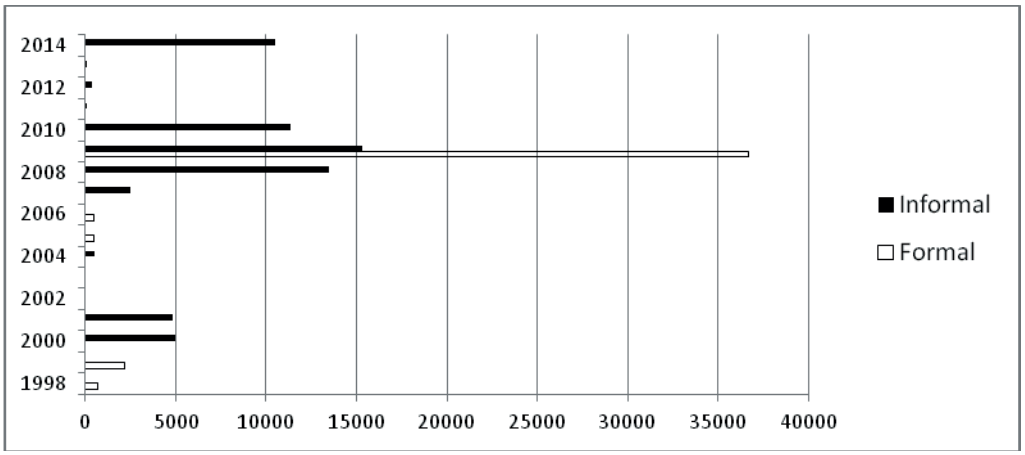
Madagascar exported about 104,000 t of rosewood and ebony[51] between 1998 and 2014, 50% of which was exported in 2009 alone (52 000 t[52]). About 39% of the volume of this exported timber was legal (40 550 t) (Anon., 2014c). Illegal rosewood exports represent a total volume of 64105 t between 1998 and 2014, with 62% of this volume of exports conducted during the period 2008, 2009 and 2010.

Illegal rosewood exports rose to over 10 500 t in 2014, (Anon, 2009b; Wilmé et al., 2009; Randriamalala and Zhou., 2010, Randriamalala, 2014, Butler, 2015) i.e. 16 times more than

[50] Palisander *Dalbergia* species were harvested in terms of logging permits by mutual agreement (between forest administration and timber company) until 2001 and then from 2001, the harvest permit is acquired by tender (Rose Razanarisoa, Chairperson of GNEFM, personal comment to TRAFFIC, October 2014).
[51] The volume of ebony represented only 1% of the total (P1, A1; P11, A2, personal comment to TRAFFIC, January 2015).
[52] These 52 000 t of precious wood came from 100 000 rosewood trees (and ebony trees), including over 60 000 trees cut down in the Protected Areas (Anon., 2009b; Randriamalala and Liu, 2010). The value of the illegal trade in rosewood was then estimated at EUR400 000 per day, supplying the international markets (Anon., 2009b).

the total of illegal volumes exported during the three previous years, i.e. from 2011 to 2013 (cf. Figure 8).

Figure 8: Volumes (in t) of rosewood and ebony of formal and informal origin exported from Madagascar (1998-2014)



Sources: Anon., 2012c; Randriamalala (2014); Mangabey (2014) and Caramel (2015) and TRAFFIC survey, 2015.

Thus, for the period from January to June 2014 alone, at least 70 000 logs of rosewood were exported illegally, including more than 50 000 logs seized outside the country (Butler, 2014; Randriamalala, 2014), a rosewood log of 150 kg being worth at least USD2600 in 2014 (Randriamalala, 2014).

Allegedly 90% of the logs seized during these last two years were marked either red or white in colour (P11, A2, personal comment to TRAFFIC, June 2015; personal observation of stocks seized in the SAVA region, January and February 2015), which, if accurate, would indicate they had been stolen between 2013 and 2015 from stocks seized and located in the precincts of regional administrative offices, the gendarmerie and Customs, as had been rumoured (P11, A2; P39, A2, personal comment to TRAFFIC, February, 2015).

The increased international demand for rosewood is regarded as the main cause of the crisis as 90% of raw timber is destined for the international market and only 10% to supply local markets (Anon., 2010a).

In 2009 alone, 1114 containers of rosewood with a total commercial value of about USD217 800 000 originated from illegal logging operations in the north-east region of Madagascar (Wilmé *et al.*, 2009). It was found that during the period 1998-2015, the equivalent of 58 405 ha of forest was legally and illegally exploited. This finding is based on estimated export volume, volume of declared stocks and volume of seized logs within and outside of the country.; 68% of this area (40 098 ha) can be directly attributed to the formal and informal exports[53] of these timber (Table 11).

[53] Formal exports refer to authorized exports for operators preselected by the forest administration between 1998 and 2009. The last formal export dates back to 2009. Informal exports refer to all exports that were not permitted, fell beyond the authorized volume, or took place beyond the authorized period.

Table 11: Minimum quantitative estimates of the scope of the harvest and export of rosewood

Operator	Quantity of rosewood harvested (tonnes)	Equivalent in logs[1]	Equivalent in rosewood trees[2]	Equivalent in ha of forest harvested[3]
Formal export 1991-2014[4]	40,550	279,655	93,218	15,536
Informal export 2010-2014[5]	64,105	422,103	147,368	24,561
Stock declared in 2011[6]	41,114	283,545	94,515	15,752
Timber seized in Madagascar (situation in March 2014)[7]	6,668	45,986	15,329	2,555
Total	**152,437**	**1,051,290**	**350,430**	**58,405**

**Sources:[1] on the basis of 145 kg per log (Anon, 2009b; Wilmé* et al.*, 2009; Randriamalala* and *Zhou., 2010);*
[2] on the basis of 3 logs per tree (Anon, 2009b; Wilmé et al.*, 2009; Randriamalala et al., 2010; Rakotoarisoa, personal comment to TRAFFIC, July 2014);*
[3] on the basis of 6 trees per hectare (Wilmé et al.*, 2009, Anon., 2011b; Anon., 2013b)*
[4]. Following exemption orders (Anon, 2010a);
[5] Anon., 2012d; Randriamalala (2014) Butler (2014); Caramel (2015); P1, A1 and P11, A2, personal comment to TRAFFIC, January 2014;
[6] P11, A1, personal comment to TRAFFIC, 2015;
[7] P40, C3, personal comment to TRAFFIC, 2014.

The most heavily harvested species.

Since 2009 a number of studies have been conducted to identify the most harvested and traded species (Anon., 2010b; Anon., 2009b; Anon., 2010a) (cf. Table 12). A study commissioned by WWF Madagascarcarried out by the DBEV found that legal and illegal precious timber logging focused principally on 19 species (Anon., 2010b). The majority of these species were the same as those already identified in 2005 by the National Office for the Environment (ONE).

A 2009 survey on trade in precious timber in Madagascar identified four palisander species (*Dalbergia baronni*, *D. greveana*, *D. madagascariensis* and *D. monticola*) and two rosewood species (*D. louvelii* and *D. maritima*) to be the most exploited (Anon., 2009b). Preliminary results emerging from TRAFFIC's collection of timber samples from 21 January to 8 February 2015 show also that that the four species of palisander and the two species of rosewood mentioned above were among the most heavily traded species of precious timber (Dyer, 2015). The samples gathered in four districts of the SAVA region) identified the species by anatomical features.

Overall, the most heavily logged and traded species of timber include a dozen species of ebony, eight species of palisander and two species of rosewood (Table 12).

Table 12: The 20 most heavily traded species of precious timber of Madagascar

Ebony	Palisander	Rosewood
Diospyros aculeata[1]	*Dalbergia abrahamii*[1]	*Dalbergia louvelii*[1,2,3]
Diospyros bernieri[1]	*Dalbergia baronii*[1,2,3]	*Dalbergia maritima*[2,3]
Diospyros colophylla[1]	*Dalbergia greveana*[2,3]	
Diospyros gracilipes[1]	*Dalbergia madagascariensis*[3]	
Diospyros greveana[1]	*Dalbergia monticola*[1,3]	
Diospyros haplostylis[1]	*Dalbergia normandii*[1]	
Diospyros mollis[1]	*Dalbergia purpurascens*[1]	
Diospyros sakalavarum[1]	*Dalbergia xerophila*[1]	
Diospyros toxicaria[1]		
Diospyros trichocarpa[1]		

Sources: [1] Anon., 2010a; [2] Anon., 2010b; [3] Results of the identification of the timber samples collected by TRAFFIC; Stephanie Dyer of the Timber Information Service, personal comment to TRAFFIC, May 2015.

Prices in the supply chain: example of rosewood

The rosewood supply chain extends from the producers to the end users, via all intermediaries (including woodcutters, collectors, transporters and distributors). As shown in Figure 9, the price of rosewood increases along the supply chain by a factor in excess of 1000 times. This equates to about USD26/t sold as standing stock to over USD 30 000/t once the stock is in China (Anon., 2014; P40, C3; P36, E1, personal comment to TRAFFIC, January 2015).

Rosewood supply chain prices can be described as follows:

- *In the forest:*

Between 2009 and 2011 in Masoala Park (SAVA region), a so-called "forest owner" sells one rosewood tree to local collectors for between MGA20 000 and 50 000 (between USD7 and USD15) (P1, A1; P16, C3; P41, A1, personal comment to TRAFFIC, February 2015). This is the equivalent of USD21 to USD35 per t The price is a minimum of 1.4 to 2.3 times higher than the wages paid to woodcutters[54]. The latter are paidan amount between MGA15 000 and 20 000 (USD5 and USD7) per day by their supervisor (P4, E4; P5, E4; P42, E3; P43, E3; P44, E3, personal comment to TRAFFIC, February 2015);

- *At the first collection point (village 1 in Figure 8):*

In Masoala National Park, the primary collector sells a rosewood log at MGA3000 (USD1) per kg with one log weighing an average of 150 kg (P4, E4; P5, E4; P45, E4, personal comment to TRAFFIC, February 2015). The skidding[55] of logs costs MGA 50 000 (USD 20) per person per day, given that it generally needs four people in a team to transport three logs. Between 2009 and 2012, the average duration of the walk between the logging area and first log depot was

[54] One woodcutter can fell on average between 3 and 5 trees a day (depending on the density of the trees, the topography, etc.). Working on the lowest estimate felling of 3 trees per day (the equivalent of one tonne), the wages of the woodcutter come to about USD 15-USD 21 per t.

[55] Skidding is a type of forestry operation which consists of transporting the felled trees from where they were cut down to a road or a place of temporary deposit. This is generally conducted by a group of four people dragging the log across the ground from the site of harvest to the nearest informal beach loading points or to the nearest road reachable by tracks

two days (a distance of about 100km). Since 2013, the time taken to the depot is estimated at three to four days walking because of the increased remoteness of the logging areas (P42, E3; P43, E3; P44, E3; P46, E3, personal comment to TRAFFIC, February 2015).

- *At the second collection point (village 2 in Figure 9):*

The second collection depot is generally a shipping point for dhows transporting rosewood logs, with each kilogram worth between MGA 5000 and MGA 6500 (USD 2-USD 2.5). The price depends on the quality of the timber and the number of buyers (P4, E4; P5, E4, P36, E1; P47, E4, personal comment to TRAFFIC, February 2015).

- *Off the Bay of Antongil, on arrival at the transshipment point (FOB to Madagascar in Figure 8)*

When logs are transferred from dhows to big international transport vessels, a kilogram of rosewood costs between MGA 30 000 and MGA 40 000 (between USD 13 and USD 18 at 2015 rates) (P48, C3; P49, C3; P22, A2, personal comment to TRAFFIC, February 2015).

- *At the final Chinese destination*

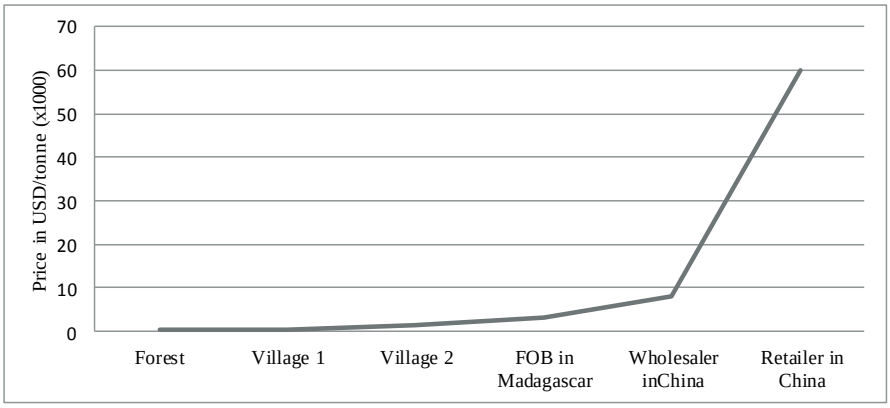
From 2000 to 2010, the minimum price of rosewood logs from Madagascar in the Chinese market increased by 450%, a price that continued to rise and escalated to 700% between 2010 and January 2015. The main explanation for this is the increase in the number of wealthy Chinese with a strong interest in traditional decoration (Anon., 2010; *Wenbin* and *Xiufang*, 2013; Schmidt, 2014 Caramel, 2015; P50, C3, personal comment to TRAFFIC, January 2015)[56]. This minimum price was ten times higher in 2014 than in 2000 (Anon., 2014; P37, E1; P36, E1, personal comment to TRAFFIC, January 2015).

In Shanghai and Hang Zhou, one tonne of rosewood at a wholesaler was sold for an average price of between USD 25 000 and USD 35 000 and at a retailer up to USD 60 000 for the period 2010 to January 2015 (P40, C3; P36, E1, personal comment to TRAFFIC, July 2015). In the town of Xian (TRAFFIC China, *in litt*. to C. Ratsimbazafy, November 2015), a retailer of raw timber sold a log of 150kg for at least 2 500 USD (P36, E1, personal comment to TRAFFIC, January 2015; P40, C3, personal comment to TRAFFIC, July 2015).

The price of rosewood in China decreased by 32% in mid 2015 compared to the previous four years (2010-2014), with one tonne being sold for no more than USD 17 000 at a wholesaler (Ke Zhang, TRAFFIC China, *in litt*. to C. Ratsimbazafy, November 2015).

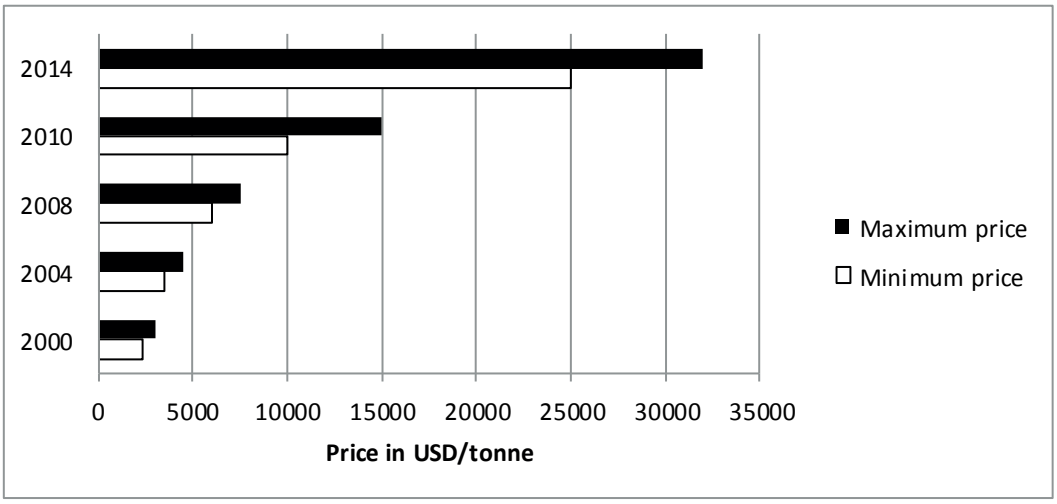
[56] Rosewoods (Hong Mu in Chinese) are prized raw materials in the traditional furniture industry, valued for its high quality and its ability to fulfil technical requirements of certain aesthetic furniture styles. The royal furniture in the Forbidden City Museum tells the old story of the first shipment of MG timber exported to China after explorer Zhenghe's visit to Africa nearly 600 years ago. MG rosewood was once considered a special gift to ancient China from Madagascar.During the Ming and Qing dynasties, rosewood utensils were given to emperors by dignitaries (Anon., 2010a; Schmidt, 2014; Caramel, 2015; Petera Loyn-Lung, economic operator, personal comment to TRAFFIC, January 2015). The continued demand for MG rosewood today is proof of the sustained interest in the furniture and art craft in traditional Chinese culture, which had first blossomed during the Ming Dynasty.

Figure 9: Price trend along the supply chain (USD/t)



Sources: Anon., 2010a; Randriamalala and *Zhou, 2010; Caramel, 2015; TRAFFIC Survey, 2015*

Figure 10: Evolution of the price of rosewood logs in China (USD/t) from 2000 to 2014



Sources: Anon., 2010a; Weibin et al.*, 2013; Petera Loyn-Lung, economic operator, personal comment to TRAFFIC, January 2015).*

Trade routes in Madagascar

Principal shipping points

Up until 2009, Toamasina was the principal port for export of precious timber from Madagascar (P35, A2, personal comment to TRAFFIC, March 2015). In 2009, following Decree no. 2009-003 authorizing 13 exporters of the SAVA region to export undressed rosewood, the port of Vohémar became the principal port for shipping containers of rosewood. The port of Toamasina occasionally used for transshipments (P51, E6; P52, A1, personal comment to TRAFFIC, February 2015).

Beside Vohemar and Toamasin which are already well known ports for their timber shipments, other clandestine ports[57] including Ampamolahambe, Ampanavoana,

[57] There are, however, seventeen (17) ports: Toamasina, Antsiranana, Nosy Be, Mahajanga, Toliara, Antalaha, Vohémar, Morondava, Tolagnaro, Port Saint Louis, Morombe, Manakara, Antsohihy, Maintirano, Sainte Marie, Maroantsetra and Antalaha. Only four of them (Antsiranana, Toliara, Vohémar and Toamasina) have adequate port infrastructures: wharf, deep draft, quayside surfaces, warehouses and stevedores, enabling commercial operations of loading and unloading of merchandise on the wharf. In seven ports (Nosy Be, Mahajanga, Morondava, Tolagnaro, Port Saint Louis, Manakara and Mananjary), the commercial operations are done in the harbour by

Ratsianarana are also used to ship rosewood logs. Because these secret ports generally do not have adequate infrastructure to receive large vessels, logs are transported out to sea by coastal vessels, dhows[58], where transshipments are carried out (P53, A1; P22, A2, personal comment to TRAFFIC, March 2015).

Map 7 illustrates the 20 illegal shipment ports and the 28 places where rosewood is deposited along the coastal surrounding the Masoala Forest. The Bay of Antogil (see bay in map 7 below) is especially suitable for the shipping of timber, because not only is the sea very deep there, but there are places where ships can take refuge from any potential checks by coastguards (P53, A1; P22, A2, personal comment to TRAFFIC, March 2015).

Map 7: Shipping points and deposit locations for illegal rosewood and ebony at Cap Masoala between 2010-2015*

Source: Anon., 2015e

From the forest to the first shipping ports

Between 2008 and 2010, the national parks of Marojejy, Masoala and Mananara-North (which is also a biosphere reserve) were the principal rosewood and ebony logging sites (P35, A2; P27, A2, personal comment to TRAFFIC, March 2015). The same modus operandi was observed at all these sites. For each tree felled, three logs are produced on average. They are then skidded towards the closest riverbanks or coasts, before being transshipped onto bigger vessels off the Malagasy coast (P48, C3; P49, C3, personal comment to TRAFFIC, March 2015).

During the two waves of export of rosewood and ebony authorized by the transitional government in March and September 2009, the port of Vohémar was the principal shipping port. The authorizations at that time related only to existing stocks and not to freshly-cut timber (Ministerial Order 2009-003 of 28 January 2009). However, due to the failure of

barge navigation and access to the port with a wharf is achieved by straddling a shallow river. In the other ports, access is limited to the traditional small boats which ply a regional route or those boats which only require a shallow draft and limited facilities (Maro, 2008).

[58] The term "boutre" (dhow) is generic and designates a whole variety of vessels that are quite different from each other. Their common element is that they are made of wood and equipped with one or two masts, each with a trapezoidal sail, known as "an Arab sail", similar to the Latin sail, with the difference that its forward point is truncated. The name of boutre or dhow is also given to little cargo boats of traditional Arab construction which ply the coastal areas of the Red Sea and the Indian Ocean from Madagascar to the Gulf of Bengal. These are motorized vessels capable of carrying loads of 300 to 500 t, with a very slender wooden hull.

authorities to regulate exported timber, freshly-cut timber was also included in "existing stocks" (P41, A1; P16, C3, personal comment to TRAFFIC, February 2015). Timber from the forests of Masoala and Marojejy were further shipped at the port of Vohémar, while timber from Mananara reserve was shipped from beach ports along the coast of Mananara or else transported to Toamasina port via Fénerive-Est (P35, A2; P27, A2, personal comment to TRAFFIC, March 2015).

Key commercial routes of precious timber originating in Madagascar

Until the mid-2000s, Madagascar's precious timber was exported to the US and Europe, with Mauritius, Reunion and the Netherlands being the main transit countries. (Anon., 2009a; P36, E1, personal comment to TRAFFIC, January 2015). However, since the amendment of the Lacey Act[59] by the U.S. Congress on 22 May 2008, orders from American and European companies have become increasingly rare or non-existent since 2012 (P36, E1; P37, E1, personal comment to TRAFFIC, January 2015). In addition, all Malagasy populations of precious timber species were listed in Appendix II of CITES in 2013. Awareness-raising onthe need to boycott Malagasy precious timber escalated, which discouraged buyers to a limitedextent. From 2008 to 2015, 90% of timber legally and illegally exported from Madagascar was destined for mainland China (Anon., 2009b, 2010a; Randriamalala and Zhou, 2010; P1, A1; P36, E1, personal comment to TRAFFIC, January 2015).

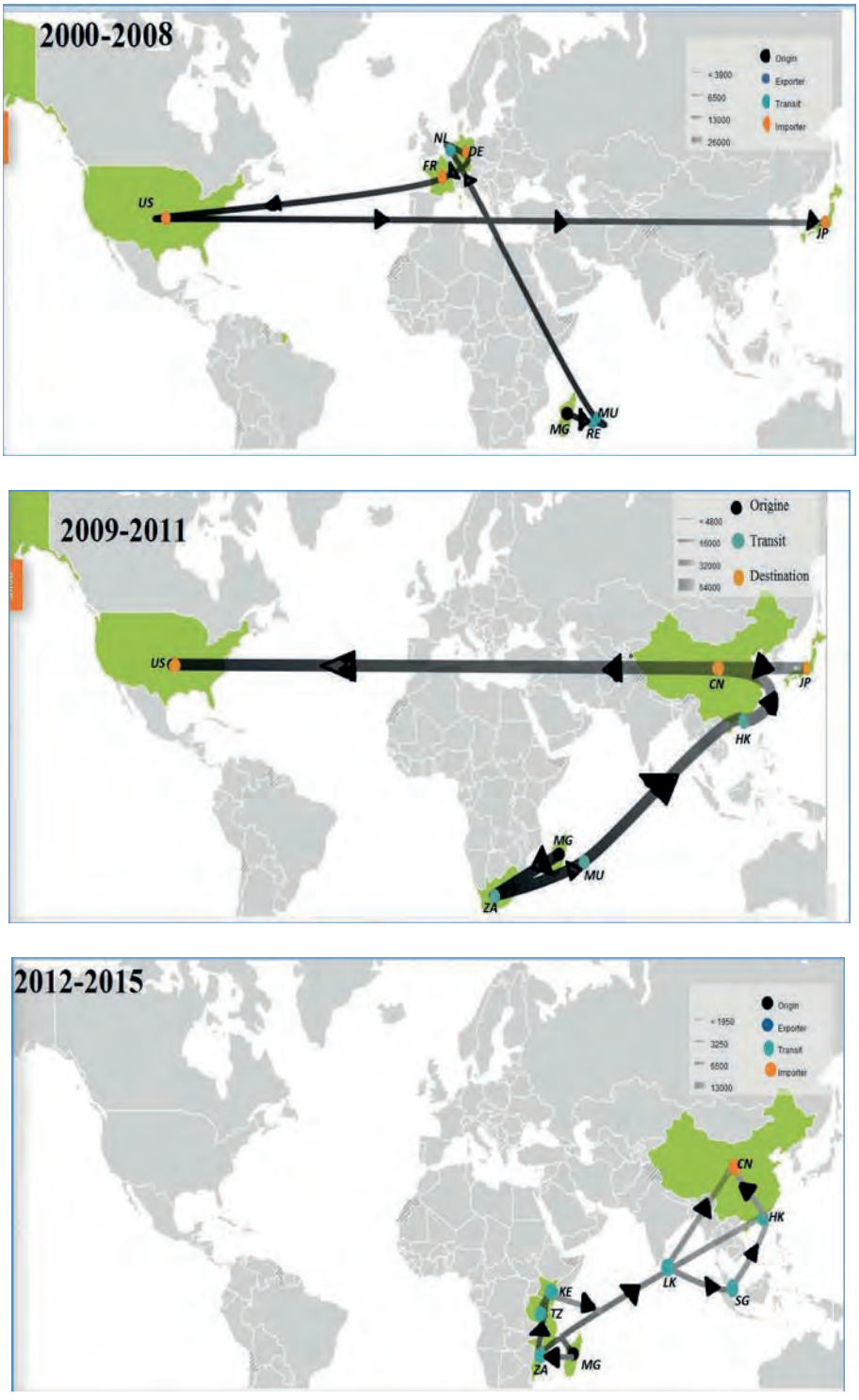
The shift of exports of precious timber towards China has engendered changes in transport routes, as illustrated in Figure 10. New routes appeared in 2009 in East African countries including Kenya and Tanzania (). These countries became the transshipment locations for Malagasy precious timber en route to China via Hong Kong SAR, Singapore or Sri Lanka (Anon., 2014e; Butler R., 2014; P36, E1; P51, E1, personal comment to TRAFFIC, January 2015).

The Zanzibar part of Tanzania and Hong Kong SAR, have also been alleged to be the main "laundering"[60] countries for rosewood species listed on CITES (Anon., 2014d).

[59] The Lacey Act is an American law adopted in 1900 which protects wildlife from trafficking. The amendment to this law in 2008 to include plant products was the first prohibition on trade in illegally sourced timber products. In terms of the amended law, it is illegal to import, export, transport, sell, receive, acquire and purchase, in the framework of international trade or trade between American States, any plant acquired or marketed in violation of the laws of the United States, of any American State, the tribal territories and foreign countries. The Lacey Act concerns the entire supply chain. Any illegal activity at any point of the chain means that the product cannot be legally marketed in the United States. All parties, and not only the party introducing the product into the American market, share equal responsibility before the law (Anon., 2013e).

[60] False documents certifying the legality of Malagasy timber are created in Hong Kong SAR, thus enabling the timber to enter China (Ndrato Razalamanarina, President of AVG, personal comment to TRAFFIC, April 2015). Changing the certificate of origin is another technique used (P40, C3, personal comment to TRAFFIC, April 2015).

Figure 11: Volumes (/t) and export routes to their countries of destination of Malagasy precious timber



Source: TRAFFIC, 2015 – Map created using information on the formal export of precious timber (2000-2009), seizures (2009-2015) and through information collected by TRAFFIC from exporters of the SAVA region

3.3.4. Management of precious timber stocks (rosewood and ebony)

Paragraph 4 of the action plan adopted by the 16th Conference of the Parties to CITES (Bangkok, March 2013) (through Decision 16.152, "Ebonies (*Diospyros* species) and palisanders (*Dalbergia* species) of Madagascar)" stipulates that "*Madagascar puts in place an embargo on the export of the stocks of these timber until the Standing Committee of CITES has approved the findings of an audit and a plan for the use of the stocks in order to determine what part of the stocks has been legally constituted and can therefore be the subject of export"*. It should be noted here that there are three categories of stocks: seized stocks, stocks declared by operators and unidentified stocks.

Seized stockpiles

According to experts consulted by TRAFFIC (cf. Annex 4), seized stockpiles consist of rosewood and ebony confiscated during missions to control and secure protected areas. These missions were conducted by the Task Force, the forest administration, or by joint missions comprising gendarmerie, MNP and other protected area managers. The stockpiles were acquired after the MEEF publication of Decree[61] banning harvesting, logging and exporting of rosewood and ebony in Madagascar[62]. The stockpiles are located in various DREEF government agencies at the regional and district level such as district forest services and regional and district gendarmerie.

To date, at least three series of stockpile inventories have been conducted, with the first in 2010 at the request of the MEEF (Directorate of Forest Control, 2010, unpublished report). A second inventory in 2011 was conducted through an inventory mission commissioned by the GDF in the district of Antalaha and Sambava (Directorate of Forest Controls, 2011, unpublished report). A third inventory was conducted by a FAO consultancy team in 2012 (Anon., 2012c). Based on these inventories, a database was prepared by the Directorate of Forest Control of the DGF to record seized and declared stockpiles (Anon., 2010d; Anon., 2011d; Anon., 2012c).

The outcome of the inventory of stocks of DREEF SAVA of 2013 was published in a World Bank consultancy report (Anon, 2014f). Despite the inventories, it is still difficult to have an exact estimate of stocks seized (P55, A2, personal comment to TRAFFIC, May 2015). Two suggestions were put forward by stakeholders consulted by TRAFFIC in the SAVA region explaining this difficulty, namely, i) following the control missions carried out by the forest administration resulting in seizures, new stocks are accumulating as time passes, and ii) the stocks are being stolen from certain locations where they are being held.

Declared stockpiles

In 2011, the MEEF urged those operators holding stockpiles of precious timber to make a declaration of their stocks to the DREEF of SAVA, omitting to clarify what would happen to stocks that were declared (P7, A2, personal comment to TRAFFIC, May 2014). This step was undertaken following the issuing of Ordinance on the regulation and penalties of offences related to rosewood and ebony[63]. Although 105 operators declared their stocks (Anon., 2011d), only 26 of them (about 25%) were able to supply supporting documents as proof of legality (for instance, a certificate of origin of the stocks, transport licence or laissez passer) of

[61] Decree no. 2010-141 of 24 March 2010
[62] Article 2 of this decree stipulates that "henceforth the logging, harvesting, transport, marketing and export of rosewood and ebony are prohibited".
[63] Ordinance n'2011-001 of 8 August 2011

their stocks (P11, A2, personal comment to TRAFFIC, February 2015). No legal action was taken against the 79 operators that were holding stocks without proof of their legality. It is assumed that a large proportion of declared stocks were fictitious (P7, A2, personal comment to TRAFFIC, February 2015; P1, A1; P11, A2, personal comment to TRAFFIC, February 2015; Henri Rabenefitra, DGAT SAVA, personal comment to TRAFFIC, February 2015).

It should be noted that the number of operators rose from 13 to 105 from 2009 to 2011, comprising an eight-fold increase over 3 years. This is despite Decree no. 2010-141 of 24 March 2010 which prohibits all operations (harvesting, transport, trade, export) related to rosewood and ebony, as well as Ordinance 2011-001 of 8 August 2011 which increases criminal penalties.

Clandestine or wild-derived stockpiles

Wild stockpiless are *"stocks of timber which have already been cut and warehoused without authorisation or declaration in hiding places within the forest, along the beaches or in any other place used by the traffickers as temporary warehouses awaiting the sale and export of these timbers"* (Anon., 2014e). Wild-derived stockpiles are, by their nature, illegal. Such clandestine stocks supply at least 75% of the illegally exported stocks (P11, A2; P1, A1, personal comment to TRAFFIC, February 2015).

Estimated volumes of seized and declared stockpiles

Although four inventories of seized and declared stockpiles have been conducted (Anon., 2010c; Anon., 2011d; Anon., 2012c; Anon., 2014e) (cf. Table 13), it is still difficult to pinpoint the exact volumes of existing stockpiles, as figures available for seized stockpiles differ between inventories.

In an exchange with journalists on 21 July 2015 (Anon., 2015n) concerning management of seized timber stocks, the MEEF stated, "*we are still in the cleaning-up phase, i.e. the inventory, electronic marking and securing of the logs. When this work is finished, the number of logs seized will no longer be elastic".* The Interministerial Committee for rosewood assessment, through financing from the World Bank, is securing and conducting a national inventory of seized and declared stockpiles (P55, A2, personal comment to TRAFFIC, November 2015). It is anticipated that after the process is completed, the exact volume of the stockpile will be known.

Table 13: Inventory data relating to seized and declared rosewood and ebony stocks (2010-2015)

Year of inventory	In charge	Source of information	References	District inventoried	Period under consideration	Number of reports	Seized stocks (number of logs)		Declared stocks (number of logs)	
							Rosewood	Ebony	Rosewood	Ebony
2010	DREEF SAVA	DREEF SAVA (unpublished data)	Anon., 2010c	Antalaha	nd	1	732	nd	NA	NA
				Sambava	nd	nd	1324	nd	NA	NA
				Vohémar	nd	nd	nd	nd	NA	NA
					Total	**-**	**2056**	**nd**	**NA**	**NA**
2011	DREEF SAVA	DREEF SAVA (unpublished data)	Anon., 2011d	Antalaha	2 April to 8 July	45	1835	0	205098	6528
				Sambava		2	1978	0	23774	0
				Vohémar		39	1360	0	32368	0
					Total	**86**	**5173**	**0**	**261240**	**6528**
2012	DREEF SAVA	FAO (2012) (unpublished data)	Anon., 2012d	Antalaha	22 March to 17 December	9	3134	nd	243801**	6528
				Sambava		4	1978	nd		0
				Vohémar		33	1360	nd		0
					Total	**46**	**6472**	**nd**	**243801**	**6528**
2013	DREEF SAVA	Agrer (2014) (World Bank Consultant)	Anon., 2014e	Antalaha	19 February to 12 August	39	5758	0	160030	nd
				Sambava		9	1882	0	3056	nd
				Vohémar		4	1265	0	16819	nd
					Total	**52**	**8905**	**0**	**179905**	**nd**
2015	COMINT*	NA	NA	Antalaha	Pending	Pending	Pending	**nd**	**nd**	**nd**
				Sambava	Pending	Pending	Pending			
				Vohémar	Pending	Pending	Pending			

nd: information not available
NA: no declaration made
* Interministerial Committee for Reform of the Rosewood and Ebony Sector
** This is the total for three districts only; information for each individual district was not available

Grey areas in the verification of stockpiles

Surveys conducted by TRAFFIC amongst operators in the SAVA and Analanjirofo regions highlight extortion of money occurring during stock inventories. According to the operators consulted[64] who wished to remain anonymous, a few days before each operation for stockpile verification, some government officials allegedly with high level connections are in the habit of requesting large sums of money from operators, in compensation for which control officials allegedly refrain from carrying out any physical inventory of their stocks. Because they do not have any documentation to prove the legality of their stockpiles, these operators have no choice but to "co-operate" by paying the requested amount. This sum was reported to range from MGA 20 million to 100 million (USD 8000 to USD 40 000; at 2015 rates). Of the 10 operators interviewed, eight had already been allegedly subjected to this modus operandi[65] and had had to pay an average of MGA 30 million (USD 6000, at 2015 rates). This practice started during the first stock inventory in 2011 and allegedly remains common practice in 2015.

Movement of seized stockpiles

During consultation meetings on precious timber management problems organized by TRAFFIC in the SAVA and Analanjirofo regions, all 135 participants had known about the movement of seized rosewood stockpiles in these regions since November 2013, yet no official document reports such movement. Harbor workers interviewed by TRAFFIC in January 2015 confirmed that they had been requested to load stockpiled logs onto vessels by night from a facility in Sambava. These logs were later unloaded at the informal beach "port" of Ampasy (Vohémar) where containers already loaded with rosewood logs were awaiting arrival of the vessels.
The lots gone from the stockpiles were alledged to be replaced with pqinted ordinary timber (eucaly, pin) (P11, A2; P1, A1, personal comment to TRAFFIC, February 2015).
The absence of any serious investigation by the Malagasy authorities makes it impossible to estimate the quantities of stockpiles that have been moved and replaced in this manner.

3.3.5. Stakeholders involved in logging and illegal trade in Madagascar

Guides and self-proclaimed forest owners

The guides and individuals who declare themselves to be "forest owners" are most often part of the indigenous population. These people have a good knowledge of precious timber locations and population densities. The main role of these guides is to show woodcutters, who often come from outside, the harvest areas. Their remuneration depends on their role, with a low-level guide's daily earnings between MGA 20 000 and 50 000 (USD 7 and USD 10), while the self-proclaimed "forest owners" earn on average MGA 50 000 (about USD 18) per tree found (P56, O1, personal comment to TRAFFIC, January 2015).

Woodcutters

Tasks
The woodcutters have many tasks, such as locating trees, clearing, opening of paths, delimbing, cutting up into logs, removal of sapwood, felling and debarking - the latter two activities being the hardest tasks (P42, E3; P46, E3, personal comment to TRAFFIC, January 2015; P43, E3; P44, E3, personal comment to TRAFFIC, February 2015).

[64] Illegal operators with no supporting documentation to prove the legality of their wood.
[65] This refers principally to extortion of money by intimidation.

Felling, cutting up, squaring off and pitsawing are summarized as follows (P42, E3; P46, E3, personal comment to TRAFFIC, January 2015; P43, E3; P44, E3, personal comment to TRAFFIC, February 2015):

- Felling: the time taken to fell a rosewood tree with a diameter exceeding 25 cm varies according to the experience of woodcutters but ranges from thirty minutes to an hour for experienced woodcutters and up to 2 hours for apprentices.
- Cutting / dressing: one tree can be cut into two or four logs, depending on the size and diameter of the tree. This activity could take up to 4 hours of work.
- Squaring off: this operation consists of transforming an undressed log into a piece with facets. It will usually be cut square or into rectangular form[66]. One hour of work per log would be needed to complete this operation.
- Pitsawing: which consists of sawing up tree trunks along their length using a saw.

Other operations (for instance, skidding of logs and sale to primary collectors) can be accomplished by woodcutters, but that depends on the terms of the contract that each has agreed with his supervisor (P42, E3; P46, E3, personal comment to TRAFFIC, January 2015; P43, E3; P44, E3, personal comment to TRAFFIC, February 2015).

Remunerations and contracts
Table 14 presents data on remuneration of woodcutters per activity. For example, for squaring off and sawing activities, the daily wage is about MGA 15 000 (USD 5.3), which doubles if skidding activities are included. If the woodcutter is also engaged to sell timber to primary collectors, he may be paid up to about MGA 200 000 (USD 71.4) per log.

It should be noted that a woodcutter (or a group of woodcutters) is paid on a daily basis to carry out the above-mentioned tasks. In addition, the woodcutter may be asked to conduct skidding and transport of logs (up to four days) from the harvest site to the nearest river where transshipment onto small vessels takes place (e.g. a boat constructed with truck tyres) (P36, E1: P37, E1; P42, E3; P46, E3, personal comment to TRAFFIC, January 2015; P43, E3; P44, E3, personal comment to TRAFFIC, February 2015).

Table 14: Woodcutters' income in MGA depending on their type of contract

Activities conducted	Type of remuneration	Income (MGA) by type of remuneration per person	Income in USD by type of remuneration per person	Number of persons performing tasks
Felling, squaring off, sawing	Daily	15 000	6	2 to 3
Felling, squaring off, sawing, skidding	Daily	30 000	12	4 to 6
Felling, squaring off, sawing, skidding and sale to primary collectors	Per log sold	100 000 200 000	40 80	4 to 6

Source: TRAFFIC Survey, 2015

Primary collectors

Primary collectors are located in villages in the vicinity of harvesting sites. These collectors act as middlemen between woodcutters and the district operators (cf. Figure 12 below). The primary collector may be under contract with a single operator or supervisor who provides the necessary funds to purchase logs, the operator and collector reaching an agreement at that time on a purchase price per kilo (P4, E4; P5, E4; P36, E1, personal comment to TRAFFIC, January 2015). The primary collector can also work for several supervisors. In such a case,

[66] This rids the piece of wood of all or part of its sapwood, reduces its weight and facilitates its layout with other pieces to make a framework or a structure (http://deshommesetdesarbres.fr/equarissage.html).

the collector buys the logs with his own money before reselling them to the supervisors - the profit margin for the collector is higher in such cases (P 36, E1; P37, E1, personal comment to TRAFFIC, March 2015).

Secondary collectors or main operators

The secondary collectors or main operators mainly reside in the district of Antalaha, Madagascar's vanilla capital, in the province of Diego-Suarez. They can be divided into three categories (Randriamalala, 2013; personal observation, January, February and March 2015):

- 13 historical operators who had been granted rosewood and ebony collection permits by the government following the cyclones in 2002 and 2004 (Anon., 2009b; Wilmé *et al.,* 2009).
- 32 operators emerged from the issuing of the exceptional export permit in 2009[67]
- Another 100 operators without whatsoever permit have taken advantage of the lack of controls and alleged corruption at every level.

Regardless of whether historical or newcomers, all operators allegedly seek to legitimize their operations and achieve social acceptability through a combination of corruption, lobbying at regional, district or communal level and engaging in charitable work (P1, A1; P57, O1, personal comment to TRAFFIC, January 2015).

The national exporters of SAVA

According to the survey conducted by TRAFFIC in the SAVA region, the exporters of this region consist of two categories of operators:

- Those who have been involved in forestry operations and the export of precious timber since the 1990s, and
- Those who have taken advantage of the the exceptional authorization of 2009, and the explosion in illicit logging, and have become involved in collection, harvest, transport and export of rosewood and ebony.

Foreign exporters, temporary residence in the SAVA region

Certain companies that import rosewood from Madagascar into China send their agents to Antalaha or to Sambava to closely monitor the collection and export of rosewood. Their main tasks are to ensure the quality of the logs exported and more specifically to ensure that their Malagasy partners (timber collectors) respect the export clauses[68] (P1, A1, personal comment to TRAFFIC, February 2015).

The surveys conducted by TRAFFIC in the SAVA region during January and February 2015 revealed that Chinese buyers are once again present in Madagascar[69]. They prepay their rosewood orders by up to 50%, which suggests that these buyers view the risks of having their timber seized or blocked in situ as being minimal (P16, C3, personal comment to TRAFFIC, February 2015).

[67] Decree no. 38244/2009 of 21 September 2009;
[68] i.e. the export conditions, e.g. packaging (if there is any), the quantity exported in relation to the sum of money paid, etc.
[69] According to the information collected by TRAFFIC in the SAVA region, the Chinese buyers were more or less absent between 2013 and 2014, which does not, however, mean that they did not import Malagasy rosewood and ebony, but rather that they trusted their local partners. From the end of 2014, the quality of the timber exported from Madagascar seemed to deteriorate, which brought the Chinese back to Madagascar to take care of the selection of wood to be exported to China themselves (P11, A2; P16, C3; P1, A1, personal comment to TRAFFIC, January 2015).

At the beginning of 2015, the price of rosewood increased from USD 10 to USD 12 per kilo (P36, E1; P50, C3, personal comment to TRAFFIC, February 2015) at the offshore embarkation points off Masoala. In fact, eyewitnesses told TRAFFIC of the presence of a large Chinese vessel out at sea, while smaller faster boats transported several rosewood logs on each trip from the beach to this larger ship. Reportedly, when the authorities arrive, everyone disappears (P1, A1; P11, A2, personal comment to TRAFFIC, January 2015).

International transport companies

A French maritime transport company, namely Delmas CMA-CGM, and two South African maritime transport companies, namely i.e. United Africa Feeder Lines (UAFL) and Safmarine, transported over 70% of the rosewood containers exported from Madagascar for the period from 2009 to 2010 (Anon., 2010a, Randriamalala and Zhou., 2010). Under pressure from Malagasy conservation NGOs and international NGOs (including EIA and Global Witness), Delmas stopped transporting precious timber from Madagascar from December 2009 (Ramambazafy, 2010). UAFL and Safmarine continued to transport illegal timbers from Madagascar until December 2010, nine months after enactment of Decree 2010-141 of 24 March 2010 prohibiting the harvesting, logging and export of rosewood and ebony (P1, A1, personal comment to TRAFFIC, January 2015; P48, C3, personal comment to TRAFFIC, March 2015). These two companies voluntarily stopped transporting rosewood after becoming aware of the "doubtful" origin of the timber transported (UAFL to Schuurman *in litt*. 23 October 2009).

Since January 2011, companies of African origin (South Africa and East Africa) and Asian origin (Chinese) have frequently been spotted on the Malagasy north-east coast loading precious wood logs (P1, A1, personal comment to TRAFFIC, January 2015; P48, C3, personal comment to TRAFFIC, March 2015). However, local witnesses have not provided any evidence nor company names[70].

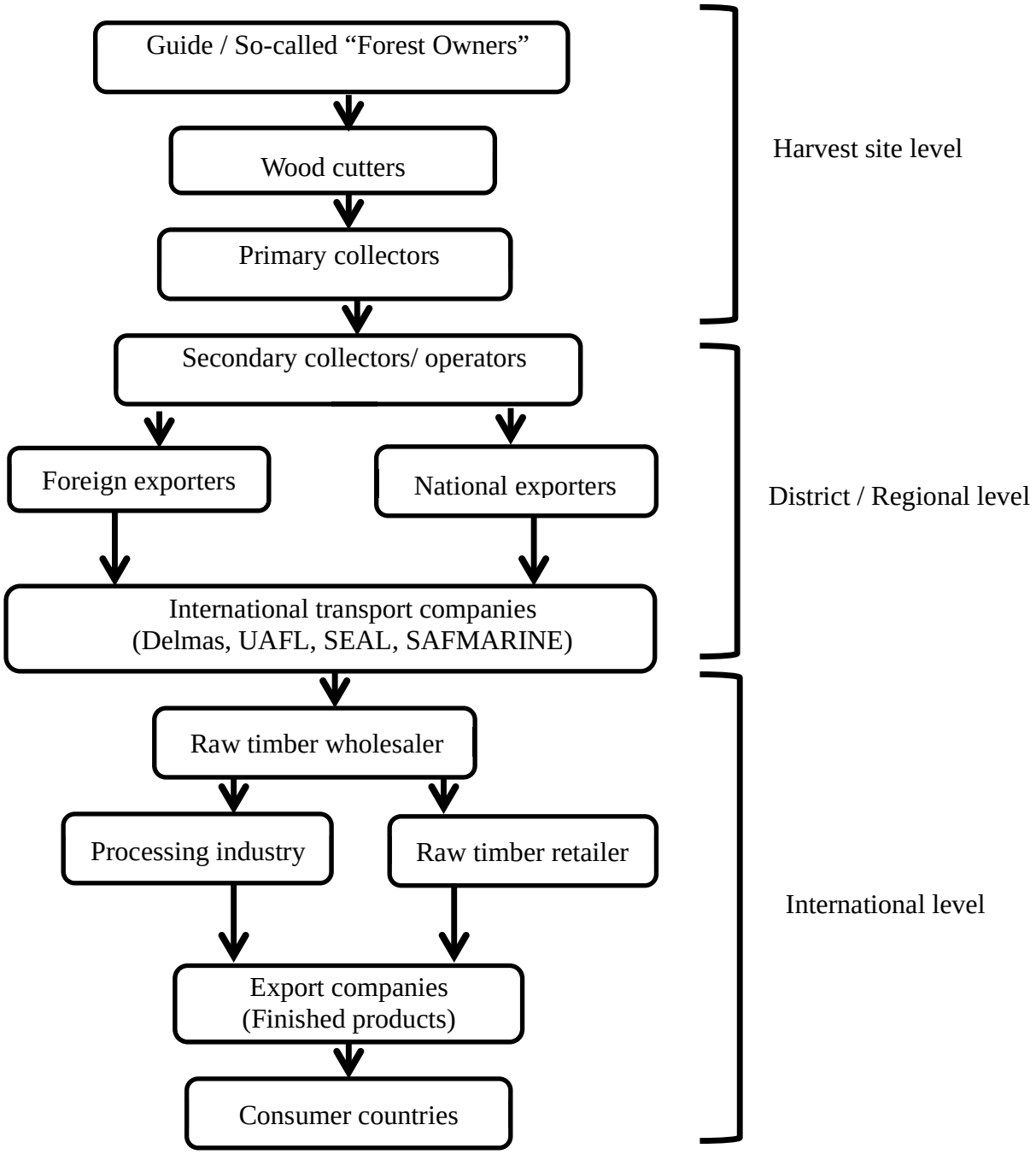
Chinese timber wholesalers

Between 15 and 20 major Chinese companies are actively involved in purchasing illegal precious timber from Madagascar (Anon., 2009b; Anon., 2010a; Anon., 2014d; Randriamalala and Liu, 2010). These companies have bought more than 95% of the timber illegally exported from the country. These importers have their direct representatives based in Madagascar, either Chinese citizens temporarily living in Madagascar or Malagasy exporters (P1, A1; P38, O1, personal comment to TRAFFIC, February 2015; personal observation, February 2015).

It is still difficult to comprehend the scale and structure of the Malagasy precious timber trade in China. The information available is limited to the names and addresses of the Chinese importers and volumes that they imported from Madagascar during the two periods of authorized exports in 2009 (Anon., 2009b; Randriamalala, 2013). An investigation conducted by a team from the French newspaper "le Monde" in January 2015, revealed that precious timber from Madagascar, especially rosewood, is still arriving in China despite the CITES export ban. The surveyed companies confirmed they had no difficulty in obtaining supplies of raw materials from Madagascar (Caramel, 2015).

[70] These local witnesses insisted that they had no information on the name of the boat or the identity of the company. According to these witnesses (personal comment to TRAFFIC, March 2015), the crews of the vessels transporting the illegal timbers wouldpaint the vessels before landing, so that the name of the vessel was obscured.

Figure 12: Trade flowchart listing stakeholders involved in the Madagascar timber trade



Source: TRAFFIC Survey, 2015

Local populations

The local populations living in the vicinity of precious timber production areas are traditionally subsistence farmers (rice, bananas, beans cultivation) and in some cases, farm cash crops (vanilla and cloves). Consequently, villagers living in the area affected by illegal cutting of precious timber are not directly involved in the activity (Anon., 2010a; Randriamalala and Liu, 2010; Anon., 2012d).

Woodcutters taking part in illegal harvest of precious timber rarely originate from communities adjacent to the resource (P1, A1, personal comment to TRAFFIC, January 2015). For example, in the case of the Cap Est[71] area and more specifically in Masoala, of the 10 woodcutters that TRAFFIC interviewed, none were from Cap Est, but from Antsirabe North, and from areas to the north of SAVA, i.e. Belalona[72] or Manakana (personal observation, February 2015).

Table 15 presents the results of surveys conducted by TRAFFIC in SAVA, Analanjirofo and Alaotra Mangoro regions concerning involvement of the local population in activities associated with the harvest and export of precious timber[73]. Out of 86 households surveyed, 27% (23 households) were directly involved in the harvest and / or export of precious timber, either as guides, woodcutters, stevedores[74] or timber transporters. Thirty-one percent of households surveyed (27 households) were involved in at least one commercial activity related to the harvest and export of timber, such as catering, sale of foodstuffs, running of small grocery stores, bars or restaurants and rental of dhows connected with the harvest or export of precious timber. This means that 42% of the households surveyed (36 households) responded that they had never been involved in the activities related to the harvest or export of precious timber.

Table 15: Estimated number of households engaged in activities related to the harvest and export of precious timber in 2015

Districts	Villages	No. of households surveyed	No. of households involved in activities associated with timber harvest			No. of households not involved
			Commercial	Transport	skidding, felling, guide	
Antalaha	Ambalabe	10	3	3	0	4
	Ambohitralanana	8	3	1	2	2
Andapa	Ampanavoana	8	4	1	1	2
	Mandena	6	2	0	1	3
	Maroambihy	6	2	0	1	3
Maroantsetra	Rantabe	10	6	0	2	2
	Anandrivola	6	3	0	1	2
	Ambanizana	8	3	0	1	4
Ambatondrazaka	Manakambahiny Est[75]	6	0	0	2	4
	Didy	12	0	0	4	8
	Fierenana	6	1	0	3	2
Total		**86**	**27**	**5**	**18**	**36**

Source: TRAFFIC Survey, 2015

[71] Cap Est is one of the most important harvest sites (important in terms of harvest volume)
[72] The village of Belalona is situated on route 3B connecting the coastal town of Sambava with Andapa, a small town at the entrance to the Marojejy National Park. The distance from Belalona to Sambava is 45 km and 62 km to Andapa (http://www.madacamp.com/Belalona).
[73] Unlike the logging of rosewood and ebony, which occurs from time to time, the logging of palisander is permanently ongoing in the CAZ countryside; consequently, the link between an upsurge in harvest and development of illegal trade remains difficult to establish (Fidy Andriamananoro, DGF, personal comment to TRAFFIC, October 2014).
[74] Stevedores are group of men that loading or unloading timber logs from or into the tracks or vessels
[75] Manakambahiny Atsinanana is a rural community situated in the central eastern part of the Alaotra-Mangoro region. It belongs to the district of Ambatondrazaka

3.3.6 Factors underlying illegal harvest and related trade

The illegal trade in precious timber is characterized by fraudulent activity along the supply chain from harvesting to export. This fraud may relate in particular to concealing information on the origin of timber, the size and/or weight of logs, taxation at the time of export and falsification of currency repatriation documents. For example, during the two waves (28 January 2009 and 21 September 2009) of exceptional authorizations to export rosewood and ebony, the country reportedly lost an estimated USD 4.6 million and USD 52 which was not repatriated (Anon., 2010a; Randriamalala, 2014).

Fraud and lack of transparency concerning the origin of timber

As mentioned above, the export licences issued in the 2000s refer mainly to the timber felled by cyclones. In fact, between 2000 and 2007, four violent cyclones struck the SAVA region, i.e. Hudah (April 2000), Manou (May 2003), Gafilo (March 2004) and Indlala (March 2007), to mention only the most intense (Meteorology Service, 2000). These natural disasters damaged the economy of the SAVA Analanjirofo and Antsinanana regions by destroying harvests (including vanilla) that were under way. The government therefore agreed to the request by timber operators to recover fallen trees for export (e.g.: Interministerial Order no. 11832/2000 following Cyclone Hudad). However, the majority of trees exported following the cyclones were not actually felled by it, but were rather as a result of illegal activities (Stasse 2002; Anon., 2009b). In fact, the UN joint UNEP / OCHA Environment Unit 2007, quoted by Anon., (2009b), Birkinshaw and Randrianjanahary (2007) demonstrated that cyclones had had little impact on the trees of Masoala, particularly mature specimens.

Furthermore, it is alleged that some agents went so far as to copy permits for the export of specific containers and to use them fraudulently on several occasions (P11, A2; P39, A2 ; P58, A2 ; P59, A2, personal comment to TRAFFIC, January 2015).

Corruption

The roleplayers encountered by TRAFFIC in the SAVA region and Maroantsetra are unanimous that corruption has become a generalized attitude over the last five years. Corruption in Madagascar can be assessed in the light of the Corruption Perceptions Index of Transparency International (CPI)[76]. For 2014, Madagascar was awarded 28/100, which ranks it 133rd out of the 175 countries examined. In 2013 the CPI was 28/100 and 32/100 in 2012 (Anon., 2015o). It is reported that almost every public sector is affected by corruption (Anon, 2015p).

According to the Mo Ibrahim Foundation[77], Madagascar is one of the worst governedand most corrupt African countries. Out of 52 African countries, Madagascar dropped from 9th in 2000 to 37th in 2012. The country recorded a major regression in the following categories: civic participation, human rights and sovereignty of law (Anon., 2014f). This same agency stated that: *"The Malagasy State is faced with a politicisation of the Public Administration and Law Enforcement Agencies, inefficient management of public affairs and an ineffective control mechanism*" (Anon., 2014f). This generalized poor governance reportedly also affects forest

[76] The CPI varies on a scale from 0 (country perceived as extremely corrupt) to 100 (country perceived as not at all corrupt). This CPI classifies countries depending on the perception of the level of corruption.

[77] In 2007, the Mo Ibrahim Foundation developed the Ibrahim Index of African Governance (IIAG) forming the most complete set of quantitative data on the state of governance in Africa. Compiled using different sources and in partnership with the experts of a number of African institutions, IIAG provides an annual evaluation of the state of governance in each of the countries of the continent. It enables citizens, governments, institutions and actors in the private sector to assess the capacity of the State authorities to provide public goods and services and the effectiveness of public policies in each of the continent's countries. The indicators are divided into four main categories: Security and sovereignty of the law, Civil participation and human rights, Sustainable economic development and Human development (cf. http://www.moibrahimfoundation.org/iiag/press/).

governance (cf. Raonintsoa *et al*., 2012). Corruption seems to be operating at every level of the forestry sector – in the forest, during transport of illegal timber, completion of administrative formalities, controls and even during trials of offenders (P1, A1; P16, C3; P38, O1, personal comment to TRAFFIC, January 2015).

At the beginning of the rosewood crisis in the SAVA region, the government organized an emergency mission during which a special team called the "Task Force[78]" was set up to secure protected areas, rosewood and ebony stocks in the SAVA region (P39, A2, personal comment to TRAFFIC, January 2015). Of the 50 people surveyed by TRAFFIC in the SAVA region and in Maroantsetra, 35 (i.e. 70%) challenged the effectiveness of this Task Force in securing the protected areas, with some of them alleging the complicity of the majority of these officials with the traffickers (P1, C1; P16, C3; P41, A1, comment to TRAFFIC, January 2015, P48, C3; P49, C3, personal comment to TRAFFIC, February 2015).

The transport of ebony and rosewood has been banned since 2011 (Ordinance no. 2011-001 of 8 August 2011), yet every time timber of illegal origin passed through the security checkpoint erected by members of the Task Force at Ambohitralanana and Ratsianarana, the latter did not confiscate the timber but allegedly systematically extorted from the transporter a sum of MGA 20 000 per log which they called a "toll fee" (P4, E4; P5, E5; P16, C3; P3, A1, personal comment to TRAFFIC, February 2015), and it was essentially impossible to negotiate this "tax" (P4, E4 ; P5, E5, personal comment to TRAFFIC, February 2015).

Some members of the Task Force posted to Ambohitralanana had no hesitation (and were even very proud) reporting that they let the logs pass through in exchange for MGA 200 000 for each batch of 5 to 10 logs, adding that "*precious timber area resource like any other, originally not well known, but now have great market value; consequently, everyone needs to get their slice of the cake in this business"* (P60, A3, personal comment to TRAFFIC, February 2015).

Due to a lack of motivation and frustration in fulfilling their role, officials from the forest administration are allegedly tempted to become involved in corrupt activities promted bytheir low salaries. For example, the surveys conducted by TRAFFIC in January and February 2015 revealed that the monthly salary of a park official (non-executive staff) varies between MGA 300 000 (USD 120) and MGA 400 000 (USD 180), while that of the senior official varies between MGA 600 000 (USD 240) and MGA 1million (USD 400). Since one rosewood log of 150 kg at the Bay of Antongil fetches MGA 4.5 million (USD 1 500) this means that the monthly salary of a park official is the equivalent of only 10 kg of rosewood.

Abuse and usurping of power

Groups of individuals introducing themselves as "responsible for timber stock legality verification", came to the villages to extort the sum of MGA 10 million (USD 4000) per collector, or else the collectors would see their stocks seized and become the subject of legal proceedings. The same type of extortion allegedly took place in almost all of the places where the primary collectors reside, e.g. Ambohitralanana, Ambanizana, Rantabe, Ampanefena, Antanandavahely and Ampanavoana (P4, E4; P5, E4; P47, E4, personal comment to TRAFFIC, February 2015).

Law enforcement agents situated close to informal beach-based shipping points in SAVA and Analanjirofo provinces were also alleged to have forced operators (e.g. local traders and wood collectors) to pay at least MGA 200 000 (USD 80) to each of them and also to provide

[78] Interministerial mission responsible for regaining control of the illegal exploitation of precious wood.

food during their "mission" (P4, E4; P5, E4; P47, E4, personal comment to TRAFFIC, February 2015).

3.3.7 Ecological impact of the illegal logging of precious timber

Decrease in the size of trees

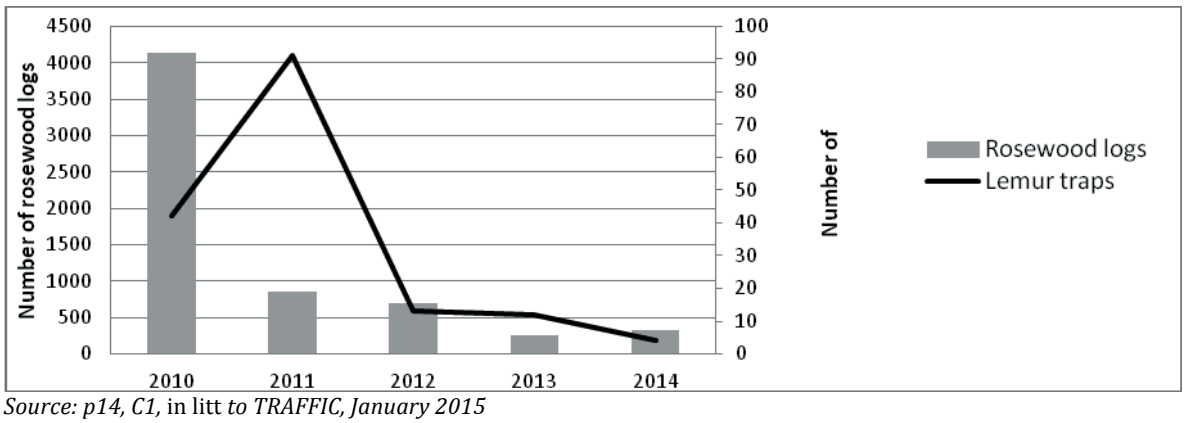
As a result of considerable illegal harvest of precious wood and excessive harvesting of forest products, forests are diminishing in number and size. The significant decrease in the average weight of the rosewood logs taken to Antalaha is an interesting indicator demonstrating this trend. For example, the average weight of a log has halved between 2005 (200 kg) and 2015 (100 kg)[79] (P36, E1; P37, E1, personal comment to TRAFFIC, January 2015). The overharvest of precious timber is also taking the form of increased distances between villages and large mature trees. For example, in 2003-2004, at the watershed of the Onive River, the harvest area used to be a one hour walk from Antanandavahely village compared with the two day walk it has been since 2014. Similarly, at the watershed of the Ratsianarana River, the harvest area was an eight hour walk from Ratsianarana village compared with the day and a half walk it has been since 2014 (P4, E4; P5, E4; P47, E4, personal comment to TRAFFIC, February 2015).

Impact on wildlife

The national parks are home to a remarkable wealth of animal life such as lemurs and birds. The opening of the protected areas (e.g. the Masoala National Park, the Mananara Biosphere Reserve) to precious timber harvest and mining has reduced these animal populations. The harvesting of precious timber can harm lemurs either indirectly through the opening of forest tracks which destroy the habitats, or directly through poaching (P4, C1, personal comment to TRAFFIC, January 2015). For example, between 2010 and 2014, 162 lemur traps (an average of 32 traps per year) were identified in the Masaola National Park with a maximum of 91 traps for 2011 alone (Figure 13).

Thus poaching has become a recurrent problem in national parks; however, it has become more serious during the period of precious timber harvest when no control or forest patrolling were conducted (Anon., 2012b).

Figure 13: Relationship between illegal harvesting of rosewood and lemur traps in the Masoala National Parks



Source: p14, C1, in litt *to TRAFFIC, January 2015*

[79] This average weight was 150 kg between 2005 and 2007 (P36, E1; P37, E1, personal comment to TRAFFIC, March 2015).

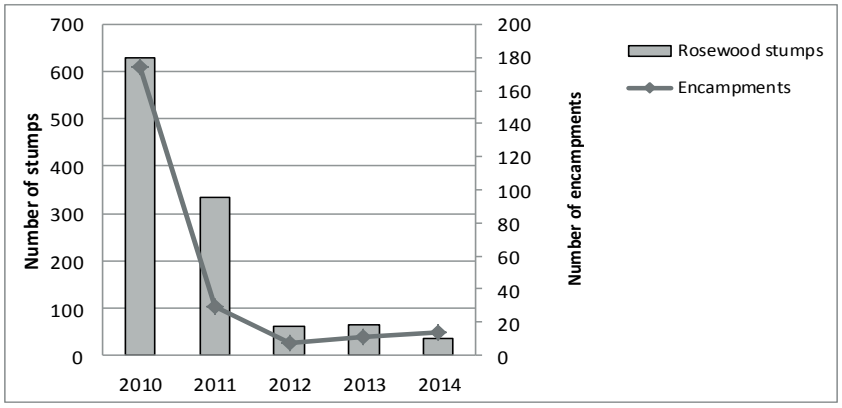
Silting of rivers and sedimentation of coral reefs

The change of land use, mainly deforestation, and Madagascar's increased population density have been identified as the main causes of coral sedimentation in the Bay of Antongil (Grove *et al.*, 2012; see also Maina *et al.*, 2012), thereby also increasing coral diseases and slowing their growth (Anon., 2012d). Some reports indicate that this sedimentation is caused by soil originating from Masoala as a consequence of deforestation and rain (P16, C3; P1, A2, personal comment toTRAFFIC, January 2015).

Upsurge in clearing, encampment and mining

At all the illegal rosewood, ebony and palisander logging sites, even in the protected areas, selective harvesting and skidding of logs results in forest clearance thus improving access (paths and tracks) and in turn facilitating further vegetation clearing, the manufacture of charcoal, and establishment of camps (P11, A2, personal comment to TRAFFIC, January 2015). For example, between 2010 and 2014, 235 illegal encampments were identified in the Masoala National Park. The increase in the number of encampments over this period seems to correlate closely with the increasing number of rosewood stumps identified (Figure 14).

Figure 14: Relationship between the number of rosewood stumps and illegal encampments in Masoala National park (2010-2014)



Source: p14, C1, in litt *to TRAFFIC, January 2015*

Areas cleared by precious timber operators are also used to grow crops (rice, cassava, banana trees) after having cleared the "undergrowth" using fire. In some instances, cleared areas may simply be abandoned. They may never recover their original state as the soil is likely to be colonized by invading species that are very prolific and exceedingly adaptable, forming a veritable carpet, thereby depriving the endemic plants of any light and which therefore no longer have any chance of growing (Brown and Gurevitch 2004).

3.3.8 Socioeconomic impacts of the illegal trade of precious timber: the case of rosewood and ebony

Financial implications of the precious timber trade

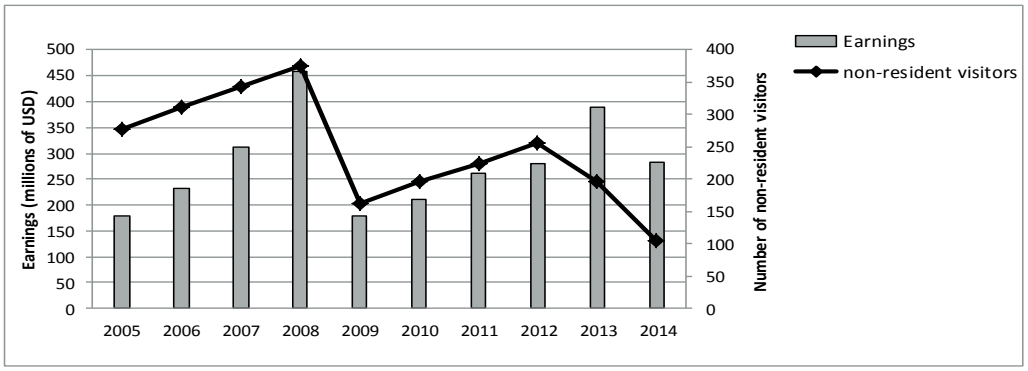
Following the two waves of exceptional authorizations to export rosewood in 2009, 1 570 containers of rosewood were exported legally from Madagascar, i.e. 1 320 containers from Vohémar and 250 containers from Toamasina, for a total value of USD 220 million, including 5% Customs duty (TRAFFIC, 2015: compilation of Customs statistics). It should be pointed out that the central government and the regional administration had agreed to allocate to SAVA region a minimum of 20% of the total revenues from the sale of precious timber (i.e.

about MGA 600 million or USD 220 000); the region would then distribute these funds for the development of infrastructures in the communes where the rosewood had been collected (P6, A1; P62, A1; P3, A1, personal comment to TRAFFIC, January 2015). By February 2015, the SAVA region had received none of these funds (P6, A1, personal comment to TRAFFIC, January 2015).
Revenues from the illegal export of precious timber remain outside the regional economic flow of the SAVA region. In most cases, exporters prefer to launder money by purchasing real estate in the capital or abroad, land in the SAVA region, or investing in building hotels in the main tourist sites of the country (P1, A1, personal comment to TRAFFIC, January 2015).

Loss of income from the tourist sector

Apart from enrichment of timber traffickers and their associates (Wilmé *et al*., 2009), among the visible economic impact of this selective deforestation and associated insecurity lies the marked decline in ecotourism in 2009. It is worth noting that ecotourism in protected areas is the main tourist attraction for Madagascar. The number non-resident visitors in Madagascar therefore dropped by 56% in 2009 compared with 2008. The latter had been a record year for tourist numbers (cf. Figure 15). Consequently, tourist revenues plummeted from about USD 460 million to slightly under USD 180 million during the same period. In the period 2005 to 2013 (for which there is comparable available data), 2009 remains the worst tourist year in terms of non-resident visitors and foreign exchange earnings (cf. Figure 15). Travel agencies discouraged tourists from visiting Madagascar following the political disturbances and insecurity which prevailed in the country (P14, C1, personal comment to TRAFFIC, January 2015).

Figure 15: Trends in the number of non-resident visitors at the borders and tourism earnings in USD



* January to June 2014 only
Source: Anon., 2014g

Inflation at the local and regional levels

Since 2010, agricultural production has decreased considerably in the SAVA region. Numerous rice paddies providing staple food supply for this region have been abandoned in favour of illegal but lucrative precious timber trade activities (P1, A1; P38, O1; P16, C3, personal comment to TRAFFIC, January 2015). These illegal activities have in turn caused increased demand and therefore a significant increase in the price of basic commodities in both the SAVA and Analanjirofo regions. For instance, the price per kilogram of rice tripled in 2011 (Analanjirofo region, unpublished report, 2012), and the price of a live chickens rose from MGA 7 000 (USD 3,) to MGA 20000 (USD 8) (P38, O1; P16, C3, personal comment to TRAFFIC, January 2015).

Thus although the SAVA region was previously almost self-sufficient in food, the "rosewood crisis" disrupted the agricultural development strategy that had been developed by the region in co-operation with the Ministry of Agriculture in 2008 (P1, A1, personal comment to TRAFFIC, January 2015). Every time there was an upsurge in illegal harvest and export of rosewood, the available agricultural labour force was significantly reduced, with the young producers focusing on alternative businesses involving exploitation of rosewood. The cost of agricultural labour remained stable until March 2009, i.e. MGA 3 000, before quintupling to reach MGA 15 000 per day (USD 6 per day) during the "heady" periods of rosewood logging, i.e. between January 2009 and September 2011 and between December 2013 and February 2014. Between 2009 and 2013, the SAVA region therefore experienced a series of rice shortages, production having declined severely through the lack of an available labour force (P1, A1, personal comment to TRAFFIC, January 2015).

Social acceptance of illegal exploitation

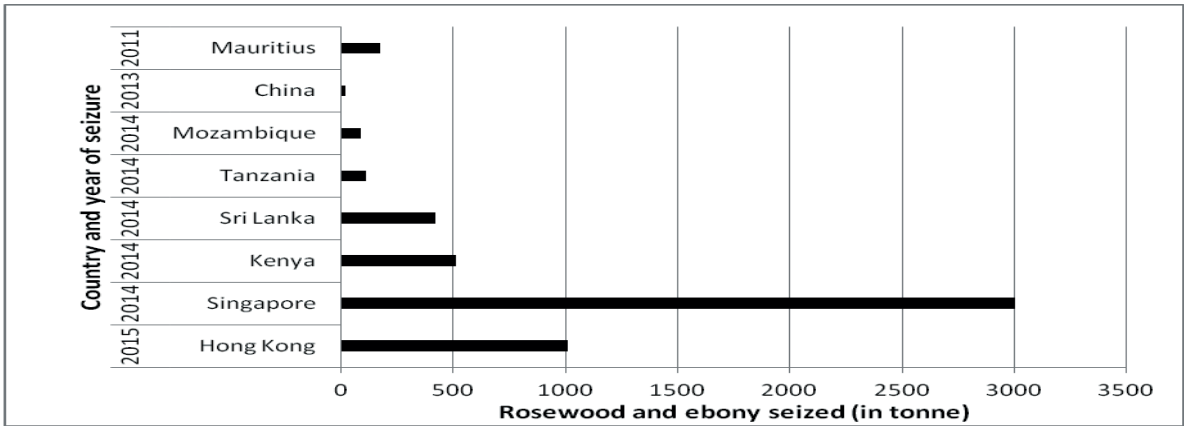
At the beginning of the upsurge in illegal logging in 2009, the illegal harvest of precious timber and its main stakeholders were regarded as enemies of society. This perception has changed over time as the number of stakeholders involved in illegal timber has increased and further, through the majority of powerful operators becoming part of political circles. Operators now enjoy a certain authority and prominence in the administration and among the population (P1, A1, personal comment to TRAFFIC, January 2015). However, the main reason for this social acceptance is that most timber operators perceive the harvest and trade of precious wood as a legal activity, similar to any other business, which enables them to conduct their activities undisturbed and in the public eye. Furthermore, these operators are implementing social and economic development activities in their areas, and consequently, the social acceptance of the illegal activity related to precious timber is gradually becoming established (P1, A1; P38, O1; P16, C3; P41, A1, personal comment to TRAFFIC, February 2015).

Loss of earnings due to the illegal export of precious timber

From November 2013 to October 2015, close to 5 000 t of rosewood and ebony originating from Madagascar were seized in various locations in the world (Figure 16). Slightly less than 80% of the volume of seizures took place in 2014, the timber seized in Singapore in May 2014 alone constituting 70% of the total volume of rosewood and ebony seized outside Madagascar in that year. However, the Singaporean justice system decided on 13 November 2015 to return a cargo of 30 000 rosewood logs seized in March 2014 originating in Madagascar (Butler, 2015) to its Chinese-nationality importers on the grounds that "*Singapore is not the final destination of these timbers and no permit is required for transit*" (Butler, 2015).

The loss of earnings (corresponding to these volumes seized) to the Malagasy State treasury is estimated at USD 200 million (P3, C3, personal comment to TRAFFIC, July 2015).

Figure 16: Volume of rosewood and ebony seized outside Madagascar from 2011 to 2015



Sources: Compiled by TRAFFIC using data from Anon, 2011d; Anon, 2014e and Butler, 2015.

Social impacts: the case of the SAVA region

Sexually transmitted diseases (STD)

In "normal" times (i.e. outside the period of illegal exploitation of precious timber), a doctor would see an average of 10 patients per quarter suffering from an STD. This figure rose to 30[80] patients per quarter during each period of upsurge in harvest and export of precious timber, the majority of the patients coming from Cap Est, the epicentre of illegal rosewood logging (P63, A6, personal comment to TRAFFIC, February 2015). This increase was due to the proliferation of prostitution in the villages surrounding the export and shipping sites (P41, A1; P16, C3; P3, A1, personal comment to TRAFFIC, January 2015). In the commune of Ambohitralanana, about one third (3 out of 10) of the girls aged over 14 became prostitutes during the periods of heightened timber exploitation. However, it is difficult to arrive at an exact figure given the great number of migrants that are not registered in the municipalities; nor has there been a census of prostitutes (P3, A1, comm. pers. à TRAFFIC, January 2015).

Pulmonary diseases

The lack of sanitation at the harvest sites (food shortages, open-air accommodation, water shortages) could explain why over 40% of timber workers, in particular stevedores that move logs from forests to the seashore, have pulmonary diseases (such as tuberculosis) (P42, E3; P43, E3; P44, E3, personal comment to TRAFFIC, February 2015). During each illegal trade upsurge, the number of young men suffering from pulmonary disease rose by 30% at the Antalaha hospital (P63, A6, personal comment to TRAFFIC, February 2015).

Mortality of adults

The mortality rate of young men killed during timber cutting and/or skidding in the SAVA region is very high[81]. For example, of 100 young men moving to Cap Est to cut and/or skid the precious timber logs, between 20 and 30 have died. Their places of origin were Belalona (Sambava), Antsirabe Nord (Vohemar), Manankana (Andapa), Ambodikakazo (Antalaha), Andasibe (Antalaha).

[80] These figures were provided by a doctor verbally, but he was not willing to send TRAFFIC an existing written document containing these statistics.

[81] It is difficult to estimate the total number of young people involved in wood cutting, as this number can vary over time. A very rough estimate by the authors of the total number of these young men for all of the sites (given that some woodcutters move from one site to another) would be in the order of 2 000 men.

The causes of this increase in the mortality rate among adults could be influenced by several factors, namely:

i) Heavy alcohol consumption, particularly among woodcutters and stevedores. During the "rosewood harvest", a bar owner in Ambohitralanana can sell about 100 times more crates of beer per week[82], 70 times more bottles of whisky[83] (P1, A1; P3, A1, personal comment to TRAFFIC, 2015), and the makers of the traditional local rum "betsabetsa" can sell about 40 times more of it[84] (P1, A1; P3, A1, personal comment to TRAFFIC, 2015). This alcohol abuse can cause violent fights, which occasionally lead to death. No census has been conducted on the total number of deaths caused by alcohol consumption.
ii) Accidents during tree felling and skidding (P3, A1, personal comment to TRAFFIC, February 2015).
iii) Disease, fever and blinding headaches, aggravated by fatigue and malnourishment in the forest.
iv) Settlement of scores associated with the harvest and illegal trade in precious timber. This phenomenon mainly concerns the collectors (P4, E4; P5, E4; P3, A1; P1, A1, personal comment to TRAFFIC, 2015). For example, in the municipality of Ambohitralanana, between June and September 2013, three collectors were killed[85] as a result of the settlement of a score between collectors or between collectors and exporters (P4, E4; P5, E4; P3, A1, personal comment to TRAFFIC, February 2015).

It is rare for the bodies of these woodcutters and stevedores to be sent back to their families and it has been suggested that they were buried in the forest or thrown into rivers (P42, E3; P43, E3; P44, E3, personal comment to TRAFFIC, January 2015). Reportedly none of the victims' families have dared to complain following the death of their relatives (P64, A3; P65, A3; P66, A3; P67, A3; P68, A3, personal comment to TRAFFIC, January 2015), knowing that the export of rosewood and ebony is prohibited and for fear of reprisals from employers of these woodcutters and stevedores (P64, A3; P65, A3; P66, A3; P67, A3; P68, A3, personal comment to TRAFFIC, 2015).

An increase in the mortality of adults has been observed, in particular in villages close to harvest sites. (P4, E4; P5, E4; P3, A1, P67, A3; P68, A3, personal comment to TRAFFIC, February 2015

Abandoned education

During each "rosewood harvest", increase in the rate of absence and truancy from school has been recorded at the primary and secondary schools of villages close to the harvest and shipment sites. This has resulted in the temporary closure of schools around Cap Est (Ambohitralanana, Ampanavoana, Ratsianarana) (P3, A1, personal comment to TRAFFIC, February 2015).

Temporary migration

Before 2009, the number of migrants in the municipality of Ambohitralanana situated in the vicinity of Masoala Park never exceeded 20 people per year (P3, A1, personal comment to TRAFFIC, February 2015). Between 2009 and 2011, this municipality recorded a 200% to 300% increase in migrants and tripling of small grocery stores, bars and hotels[86]. During the

[82] Two crates of beer per week outside of the "rosewood harvest" compared with 30 crates per day during the "rosewood harvest".
[83] One bottle of whisky per week outside of the "rosewood harvest" compared with 10 bottles per day during the "rosewood harvest".
[84] 5 litres of rum per week outside of the "rosewood harvest" compared with 30 litres per day during the "rosewood harvest".
[85] The reporters of this information were not sure if there were three collectors or two collectors and a woodcutter as they had some difficulty in identifying these people who came from outside the village.
[86] Outside of the timber logging periods, the municipality of Ambohitralanana has only three groceries, two bars and a hotel.

low season's precious timber harvest, over 80% of the migrants would return to their places of origin, while the other 20% chose to remain in the expectation that precious timber activities would continue (P3, A1, personal comment to TRAFFIC, 2015).

Between October 2013 and January 2014, the illegal harvest in the Masoala Park and a section of the Makira Park was accompanied by the arrival of thousands of migrants arriving from all over Madagascar into the municipalities of Ambohitralanana and Ampanavoana in particular. The same scenario recurred between June and September 2014. These temporary migrations increased the level of insecurity and criminal activity directed against the local populations, e.g. increased drug and/or alcohol consumption among boys, rape of girls or increase in prostitution. For example, between 40% and 50% of girls over 12 years of age dropped out of school to become prostitutes paid between MGA 20 000 and MGA 400 000 (USD 10-20) (P3, A1, personal comment to TRAFFIC, 2015).

Socioeconomic impacts: example of local grassroots communities[87] (VOI)[88]

The majority of local populations in areas of timber export are made up of farmers. Some of the local grassroots communitiesVondron'Olona Ifotony, VOI) involved in forest management stand to benefit from the sustainable harvest of palisander. This is the case in the local community of Didy situated in CAZ where a community can earn between MGA 5 000 (USD 2) and MGA 7500 (USD 3) per palisander plank. The price varies according to the VOI in question and all funds are paid into the communities "trust fund" and used to carry out patrols[89] in the area co-managed by the local community and a delegated PAS manager. In the case of the Didy municipality, VOI funds are used to buy office supplies, movable assets for the municipality and motorcycle parts for the forestry agents (P30, C3; P31, C3, personal comment to TRAFFIC, June 2015). In the rural district of Manakambahiny Atsinana, timber companies maintain the road connecting Manakambahiny Atsianana and Ambatondrazaka. This maintenance improves local transport and creates short-term jobs for the local population through highly labour-intensive construction work (HIMO[90]).

3.4. Legal framework for precious woods

3.4.1. The hierarchy of legislation in Madagascar

The hierarchy of legislative statutes in Madagascar is pyramid-shaped, as follows: At the top of this pyramid is the Constitution, followed by international treaties and laws, the domestic law and implementing regulations, then ordinances, decrees and orders. At the base of the pyramid are administrative decisions or agreements between private parties (Anon., 2008).

[87] A grassroots community consists of any voluntary group of individuals united by the same interests and obeying the rules of a shared life. It includes, depending on the case, the inhabitants of a hamlet, a village or a group of villagers. The grassroots community has a legal personality and operates as an NGO in accordance with the regulations in force (Art. 3 of Law no 96-025 of 30 September 1996 on the local management of renewable natural resources).

[88] Vondron'Olona Ifotony or Local Grassroots Community.

[89] These patrols carry out various activities which relate to both antipoaching and anti-bushfires, and also to recording slash and burn farming, illegal exploitation, mining activities, etc.

[90] The term HIMO ("highly labour-intensive public works") used by the International Labour Organization (ILO) designates the methods which combine light equipment with labour in an optimum mix to ensure quality and minimize costs in creating or refurbishing infrastructures (Tajgman and Veen, 2000). In Madagascaar, the State construction programmes provide short-term employment at low wages for qualified and unqualified workers in highly labour-intensive projects such as road construction and rehabilitation of irrigation infrastructures, reforestation and soil conservation, and allow the poor to earn a minimum wage by enabling the unemployed to join the labour market (Subbarao, 2003). This terminology has been globally adopted by the "Safety Net" unit of the World Bank and in the strict sense of the term includes any work which incorporates a heavy labour cost and whose objective is to make a rapid transfer of income to workers. In practice, this definition has been extended to the State construction programmes, certainly those that are highly labour-intensive, but with other goals, longer duration, and other modes of payment (in provisions, for example) (Andrianjaka and Millazo, 2008).

Consequently, an order or decree must respect all the texts of a higher level and at the same time should ensure the implementation of these same texts.

A new statute must respect the earlier statutes of a higher level, but can modify earlier statutes of the same or lower level. A law at a lower level cannot create new rights and obligations without the modification or repeal of contradictory statutes at the same or higher level. This system means that each level in the statutory hierarchy can only improve the legislative situation depending on how it has been defined by the upper levels (P71, A5; P72, A5, personal comment to TRAFFIC, December 2015). This legal order is imposed on all legal persons (P71, A5; P72, A5, personal comment to TRAFFIC, December 2015). Governement agencies therefore cannot ignore the principle of legality; a decision which does not respect the legislative hierarchy should result in a legal penalty.

The existence of a hierarchy of statutory norms constitutes one of the most important guarantees of the rule of law. In this context, the precisely defined competencies of the different bodies of the State and the norms that they decree, are valid only on condition that they comply with higher legal norms.

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.3.4.2. Regulation and policy on timber harvest

The legislation on forest harvest has existed since 1930, with the adoption of the decree for the reorganization of the forest regime of Madagascar on 25 January 1930. After this, the Ordinance no. 60-127 of 3 October 1960 dealing with procedures for forest clearing and wildfires was promulgated. In addition, Ordinance no. 60-128 on 3rd October 1960 provides guidance on penalties for breaches of legislation pertaining to forests, hunting, fishing and the protection of nature.

In 1997, the first policy on forest was adopted by the promulgation of the law no. 97-017 of 8 August 1997 and by its implementing Decree no. 98-782 on harvest modalities. Article 5 of the forest harvest modalities stipulates that "*no one may take possession of any forest product subject to the forest regime without being authorized to do so by an operating agreement, an operating license, a logging license, a collection license or a management contract* and the harvesting of forest resources for commercial purposes can take place only in the production areas". The same legislation stipulates the mandatory requirement of a management plan for all timber harvest activities and the definition of quota for each species subjected to harvest on the basis of the results of a forest inventory conducted before the logging permit is granted (Article 21). In practice however, inventories are resource and time consuming, so are rarely conducted. This is evidenced at a national level, where the latest national forest inventories are dated 1996 (National Inventory of Ecology and Forest (*IEFN*)).

The USAID funded JARIALA project (2005) has also estimated the national forest cover, but information on the status of species remains scarce. There is no national system of surveillance for forest exploitation in Madagascar (P7, A2, personal comment to TRAFFIC, May 2014). Article 5 of Law no. 97-017 revising, stipulates in its Article 35 that "*the State will conduct an inventory of all existing forests on national territory. Each private owner must at the same time conduct an inventory of his forests under the conditions fixed by decree. Every ten years there shall be prepared by each forest owner an inventory of his forests*". Despite this requirement, no report on the findings of the inventories is available and everyone consulted by TRAFFIC in the Forest Administration confirmed that these inventories were not conducted due to lack of financial and human resources (P70, A2, personal comment to TRAFFIC, 11 October 2014).

3.4.3. Specific regulations pertaining to rosewood and ebony

The laws that govern the harvest and export of precious timber in Madagascar fluctuate between authorization and prohibition. The principal regulations on the harvest and trade of Malagasy precious wood are captured in Table 16 below. The first legislation regarding rosewood and ebony was adopted in 2000 by order no. 2000-11832 banning the harvest and export of rosewood and ebony, except in the form of finished or processed products such as craft products. The same order suspended for three years any consideration of applications for licences to log in the north-eastern region. This order was supplemented by another order in 2003 (51/03/MINENVEF of January 24th, 2003) prohibiting the export of precious and exotic timber and all raw timber. These were developed in response to the increase of illegal export of high value timber.

Following the strong lobbies of timber operators from SAVA region, in 2005, the ministry in charge of forests issued a note (no. 923-05 of 6 October 2005) authorizing certain timber operators to export their existing stocks of ebony and rosewood. In 2009, an order was issued to authorize 13 timber operators to export rosewood and ebony within three months following the issuing of export permits (Order no. 003/2009 of 28 January 2009). In the same year, another order was issued authorizing 45 operators to export rosewood and ebony within two months from the signature of the export permit (Order no.38/244/2009 of 21 September 2009).
In reponse to pressure from conservation NGOs and International donors, in 2010, decree 2010-141 of 24 March 2010 prohibited harvest and export of rosewood and ebony, while ordinance no. 2011-001 of 8 August 2011 supplements this decree making provision for a prison sentence ranging from two to five years for persons involved in the illegal trade in rosewood and ebony.

These regulatory provisions have not succeeded in curbing illegal harvesting, which has continued to expand in recent years in every region that still has standing stocks (Ballet *et al.,* 2010; Innes, 2010; Randriamalala, 2013; Randriamalala, 2014; P11, A2, personal comment to TRAFFIC, January 2015; personal observation January, February and March 2015). Export permits are often motivated by internal pressure from the operators, whereas the prohibitions on export are the fruit of external pressures, notably from donors. The authorizations align with events such as elections (presidential, parliamentary, municipal) and the advent of cyclones (Randriamalala and Liu, 2010; P1, A1, personal comment to TRAFFIC, 23 January 2015).

3.4.4. The CITES listing of *Dalbergia* species and the loophole on palisander at a national level

As mentioned earlier in this report, in 2013, the CITES Conference of the Parties adopted Decision 16.152 for the inclusion of Madagascar's *Dalbergia* species (rosewood and palisander) and *Diospyros* species (ebony) in CITES Appendix II (all species without exception). The listings indicated that parts and derivatives included are "logs, sawn wood and veneer sheets". The accompanying internationally agreed action plan (Decision 16.152 annex 3) set a zero export quota for specimens of *Diospyros* species and *Dalbergia* species However, at a national level, Decree no. 2010-141 of 24 March 2010 prohibiting felling, harvest and export of rosewood and ebony excluded reference to the common name palisander. This exclusion has opened palisander to abuse on the misunderstanding that it was not a rosewood and hence open for harvest and trade under permit in some regions of Madagascar. This palisander "loophole" at a national level has caused contraventions of the CITES listing and all trade since the listing in 2013 has essentially been contrary to the terms of the CITES action plan.

Table 16: Principal regulations on the harvest and trade of Malagasy precious wood

Year	Permissions	Prohibitions	Remarks
1930		Decree on the reorganization of the forest regime of Madagascar of 25 January 1930.	fine of francs 50 to 1000 and a prison term of 15 days to three months (Art. 49); text repealed by earlier texts.
1960		**Ordinance no. 60-128** of 3 October 1960 fixes the procedures to be enforced for violations of Forest Law on hunting, fishing and the protection of nature.	
1997		**Law no. 97-017** of 8 August 1997 revising forest law (Art. 28-37, rules concerning forest exploitation).	Administrative regulation for forest exploitation, no penal clauses.
2000		**Order no. 2000-11832** of 30th October banning the export of rosewood and ebony except in the form of finished processed products such as craft products and suspends for three years any consideration of applications for licences to log in the Cap Est region.	
2003		**Note-Instruction no. 51/03/MINENVEF/Mi** of 24 January 2003 prohibiting the export of precious timber, exotic timber and all natural forest timber in its raw state.	
2005	Service note no. 923-05 of 6 October 2005 authorises the export of the existing stocks of ebony and rosewood "following the complaints of the operators and exporters of Antalaha, Mahajanga and Taolagnaro".	**Order 2005-7204** temporarily suspending logging and collection of deadfall and the export of rosewood and ebony. **Law no. 2005-018** on international trade in species of wild flora and fauna (introduction of CITES convention into Malagasy law). **Decree no. 2005-849** of 13 December 2005 revising the general conditions of enforcement of Law no. 97-017 of 8 August 1997 revising Forest Law.	Service note no. 923-05 contradicts the preceding notes. In its section 12, Art. 29 to 34, the law deals with the violations and penalties on the importation or export of protected species. Repeals in its article 40 decree no. 98-781of 16 September 1998 fixing the general conditions of enforcement of Law no. 97-017.
2006		Service Note no. 001 MINENVEF/Mi of 15 February 2006 declares illegal all stocks of ebony and palisander other than those mentioned in the annex to Service Note no. 923-05. Order no. 20006-16030 on the modalities of exploitation, marketing of ebony, rosewood and palisander prohibits all harvest of rosewood and ebony and export of rosewood and ebony; export of rosewood, ebony and palisander solely in the form of finished products; seizure of all stock without supporting documents.	Legalisation of the products of certain forestry companies. Return of the prohibition on the export of unprocessed precious timber.
2007		IM Order No.2007-10885 suspending exports of timber from natural forests, regardless of category, only finished products are permitted for export	Confirmation of Orders nos. 11832/2000 and 16030/2006
2008		Ministerial Note no.03/08 of 10 January 2008, cancels all export permit and suspends all exports until the publication of new regulation	
2010		Decree no. 2010-141 of 24 March 2010 prohibiting felling, harvest and export of rosewood and ebony in Madagascar.	

2011		Ordinance no.2011-001, punishing illegal activities related to rosewood and ebony, prohibits the felling, harvest, transport, marketing and export of rosewood and ebony. MEF Instruction Note of 21 September 2011, suspension of felling authorisations or operating permit within management transfers.	Makes provision for a prison term of 2 to 5 years and a fine for the equivalent amount of double the market value in case of violation. The co-authors, accomplices and buyers are punished with the same penalties as the principal authors. Dispensation from articles no. 40 and ff. of Ordinance no. 60-128, the violations cannot be the subject of any negociation. This Ordinance was published in the OJ (3398 of 12 December 2011) but has not been ratified either by the government, or by the newly elected National Assembly; the question of the constitutionality of the prison sentences may therefore be posed.
2013		Listing of rosewood and ebony of Madagascar in Appendix II of CITES at the 16th Conference of the Parties with effect from 12 June 2013	Coverss unprocessed timber, sawn timber & timber veneers. For trade permit, the CITES scientific authority must first certify that the trade is not detrimental to the species survival.
2014		Decree no.2014-906 creating the Interministerial Committee for rosewood and ebony assessment.	

Table 17: Principal international conventions, declarations and resolutions on the conservation of precious timber, signed or ratified by Madagascar

Conventions, Resolutions and Declarations	Place and date	Date of ratification/ implementation by Madagascar
CITES	Washington, 3 March 1973	5 August 1975
African convention on the conservation of nature and natural resources and the coastal zones of the East Africa region	Nairobi, 21 June 1985	24 March 1998
United Nations Convention against Transnational Organized Crime or the Palermo Convention	New York, 15 November 2000	15 September 2005
African Union Convention on Preventing and Combating Corruption	Maputo, 11 July 2003	6 October 2004
Ministerial Declaration – Ministerial Conference on Forest Law Enforcement and Governance in Africa (AFLEG)	Yaoundé, 16 October 2003	Not yet implemented
CBD	Rio, 4 June 1993	9 August 1995
Nagoya Protocol on Access to Genetic Resources and Fair and Equitable Sharing of benefits arising from their utilization to the Convention on Biological Diversity	Nagoya, 29 October 2010	Not yet ratified
African Strategy on Combating Illegal Exploitation and Illegal Trade in Wild Fauna and Flora in Africa	Johannesburg, 12 June 2015	Not yet implemented
United Nations General Assembly Resolution on Tackling the Illicit trafficking in Wildlife	New York, 15 July 2015	Not yet implemented
Zanzibar Declaration on illegal trade in timber timber and other forest products	Durban, 9 September 2015	Signed but not yet implemented at national level
Forum on China-Africa Cooperation (FOCAC) Johannesburg Action Plan	Johannesburg, 5 December 2015	Signed but not yet implemented at national level

3.5. Implementation of the legal framework

3.5.1. Protection against harvesting

Since the enactment of Order 11832-2000 of 30 April 2000, the harvest of precious timber from Madagascar has been prohibited. Yet, as documented throughout this report, illegal harvest still occurs in some areas (P1, A1; P39, A2, personal comment to TRAFFIC, January 2015). To strengthen controls on illegal harvest in protected areas (ministerial note no. 596/2011 of 11 May 2011), the "Task Force" was deployed in the north-eastern region of Madagascar to secure protected areas and to combat all activities pertaining to rosewood and ebony harvest and trade. However, the effectiveness of the Task Force was questioned by both local and national opinion and the Ministry of National Defense decided to dissolve this entity in May 2015 (Anon., 2015q).

The stakeholders consulted and interviewed by TRAFFIC during this work are unanimous in highlighting the ineffectiveness of the harvesting controls. Stakeholders have also emphasized the underlying budgetary and human factors contributing to the lack or absence of control, thus facilitate the activities related to illegal harvesting and the associated trade.

3.5.2. Harvesting in areas with strong resource tenure or ownership and in protected areas:

The Decree no. 98-782 on the forest harvesting regime prohibits any form of forest exploitation in protected areas. The Protected Areas code, newly amended in February 2015, stipulates in Articles 12, 14 and 16 that "tree felling, hunting and the capture of animals and the destruction or collection of plants are prohibited throughout the entire extent of a Strict Nature Reserve, National Park or Nature Reserve, except for scientific purpose". Despite this decree, 80% of the illegally logged timber comes from protected areas, in particular those of the north-east region of Madagascar (Anon., 2009b; Randriamalala and Liu, 2010).

3.5.3. Harvest Monitoring

In principle, the monitoring of precious timber harvest should be the responsibility of forest administration (Decree no. 98-782). However, there is no systematic monitoring of harvest, resulting in a lack of information on harvested species (P55, A2, personal comment to TRAFFIC, 17 October 2014). The absence of data could be explained by the fact that, no specific management measures currently exist for palisander, rosewood or ebony. The registration of palisander harvest within the sustainable use areas of protected areas (these are managed by the grassroots communities) is included with all timber coming from a private concession or a harvest area (P70, A2, personal comment to TRAFFIC, October 2014). Consequently, it is difficult for the GDF, the DREEF and the grassroots communities managing harvest sites to estimate quantities of palisander wood harvested within or surrounding protected areas.

3.5.4 Stakeholders involved in the management of Madagascar's precious timber

The traditional conservation stakeholders recognize that it is difficult to contain the illegal harvest of precious timber in the context of existing resources and mandates (P54, C1, personal comment to TRAFFIC, June 2015). The arrival of thousands of people invading protected areas for harvest of precious timber has highlighted the limits of conservation strategies and the ability of conservation stakeholders to implement them. Since the upsurge in illegal harvest and export of precious timber in 2009, initiatives are being developed either to combat illegal logging, or to combat the related illegal trade, but rarely both at the same time.

The interventions of these stakeholders can be categorized into three "types" of approach:

- Coercive approaches: securing the protected areas and seized timber stocks and conducting regular patrols in the protected areas.
- Preventive approach: research on the populations of the species of the genera *Dalbergia* and *Diospyros*, creation of protected areas and provision of equipment to surveillance patrol members attempting to curb illegal practices in protected areas.
- Alternative approach: creation of income-generating activities to improve the standard of living of the local populations in order to deflect their attention from the illegal export of precious timber and the other natural resources in the protected areas.

Examples of coercive measures

Securing the protected areas using military troops

Due to a lack of material resources, protected area guards cannot protect the reserves effectively and combat the illegal forest exploiters on equal terms even though they may not

necessarily be armed, but whose numbers greatly exceed those of the patrollers (P11, A2, personal comment to TRAFFIC, January 2015). To secure the protected areas of Marojejy and Masoala, 120 troops of the Task Force and a helicopter were deployed to secure the main areas of illegal timber harvest (P65, A3; P66, A3, personal comment to TRAFFIC, May 2015). Although the Directorate General of Forests was responsible for the implementation and co-ordination of the security operations, the logistical and material support was provided by conservation NGOs (WWF, WCS, etc.), while the funding was mainly provided by international donors (WB, UNESCO, etc.).

Equipment and capacity building of law enforcement staff
In the matter of protected area management, all conservation stakeholders seem to regard it as a priority to launch campaigns to provide equipment and build the capacity of protected area staff (P54, C1, personal comment to TRAFFIC, March 2015). Existing training focuses on methods of recording illegal logging and other forms of criminal activity inside protected areas, particularly by using SMART (Spatial Monitoring and Reporting Tool) to evaluate the effectiveness of the patrols in protected areas, but also to assist these patrols in more swiftly identifying felling sites. This tool thus makes it possible to measure the results of anti-poaching/ anti-logging patrols to monitor, evaluate and adapt management efforts to maximize positive results.

Since October 2013, WCS has been providing training on the use of SMART to officials in parks managed by CI, MNP, WCS and WWF. Training is also provided to members of the local population involved in patrolling protected areas managed by the above-mentioned organizations. Such training also aims to develop networks of informers in order to track down offenders.

Capacity building of civil society involved in enforcement and advocacy
Since 2009, the beginning of the upsurge in the harvest and illegal trade in precious timber, the number of civil society groups engaged in environmental work has continued to increase, all with the same goal of eradicating improper practices relating to natural resource exploitation (P69, C3, personal comment to TRAFFIC, June 2014). In co-operation with the local population, and often organized as a coalition, environmental groups play an advocacy and lobbying role at MEEMF and the Ministry of Justice on matters of environmental justice. Civil society is very active in the denunciation of illegal practices through their networks at precious timber harvest sites and illegal export points (P69, C3, personal comment to TRAFFIC, June 2014).

Example of a preventive measure

Building of knowledge about the Malagasy populations of Dalbergia *and* Diospyros species
The lack of information on populations remains an important handicap for the decision making process on *Dalbergia* and *Diospyros* species conservation and management. (P35, A2, personal comment to TRAFFIC, November 2014). To supplement the work conducted by research institutes (DBEV, MBG and FOFIFA) on *Dalbergia* and *Diospyros* species, international NGOs such as WWF, amongst others have increased financial resources to support researchers. CITES and ITTO have also provided financial assistance to DBEV and to MBG for improving knowledge about relevant species. However, these resources remain insufficient for a complete assessment of the range of all populations.

Example of alternative forest conservation measures

To generate an incentive for forest conservation and minimize the risk of local peoples' involvement in illegal harvest activities, conservation projects continue to support income-generating activities at the local level. These activities include: the development of

ecotourism (WCS), the promotion of natural resource utilization and the sustainable management of timber in community managed areas (CI) as well as the implementation of infrastructure projects, such as hydro-electric or solar energy (WWF). As, such, local people are beneficiaries of the conservation projects either by direct remuneration (patrolling activities, forest restoration) or from the development project (infrastructure, capacity building etc.). However, the development projects suggested by donors are not always appropriate to the local context (P23, C3, personal comment to TRAFFIC, March 2015). For example, in March 2013, a poultry project was launched in a community located in the Makira Nature Reserve even though they had no background in raising poultry. According to the local community, 70% of the poultry provided by the project had died within six months as a result of bacterial disease (Pierrot Rakotoniaina, World Bank consultant, personal comment to TRAFFIC, March 2015). This example illustrates the limitations of development projects and their potential to mitigate the unsustainable exploitation of natural resources in general and of the illegal felling of timber in particular.

Table 18: Examples of stakeholders and initiatives attempting to combat the illegal harvest and trade of precious timber

Categories of stakeholders	Level of involvement[1]	Types of intervention[1]	Roles/initiatives (examples)
Governmental			
DREEF	L.R.	C. P.	Conduct periodic missions to apprehend the illegal loggers of timber in protected areas Promotion of reforestation activities
Armed forces	L.R.N. I	C	Secure stocks of precious timber
National gendarmerie	L.R.N. I	C	Securing stocks of precious timber and protected areas in the red zones (sensitive) against illegal logging Control transport of timber
MEEMF	L.R.N. I	C. P.	Direct implementation of the CITES action plan on the species in the genera *Dalbergia* and *Diospyros* Co-ordinate interventions to combat the illegal logging of precious timber and the securing of the seized stocks
Ministry of Justice	L.R.N.	C	Judgement of the litigation related to precious timber Technical assistance to the process of implementing the special court on traffic of natural resources
Prime Minister's Office	N	C. P.	Direct the Interministerial Committee for the rehabilitation of the stocks of precious timber
Conservation NGOs			
CI	L.N.	P. A.C.	Provide technical and financial assistance to the Forest administration in implementing international conventions and related negotiations Build the capacities of investigative journalists working on environmental offences
EIA	N.I.	P. C.	Conduct investigations and production of documents on the exploitation and international market of Madagascar's precious timber Advocacy at the international level on the implementation of the laws concerning the illegal trade in Madagascar's precious timber
Global Witness	N.I.	P. C.	Conduct investigations and production of documents on the exploitation and international market of Madagascar's precious timber Advocacy at the international level on the implementation of the laws concerning the illegal trade in Madagascar's precious timber
TRAFFIC	N,I	P,C	Support Malagasy Governement in different initiatives aimed at implementing national and international regulations on species conservation and management, produce actionable information on species trade
WCS	L.N.I.	P. A. C.	Introduce and implement the SMART tool Develop community projects around protected areas Participate in joint missions to apprehend illegal logging
WWF	L.N.I.	P. C.	Finance research projects on precious timber species Build the capacities of civil society in combating illegal logging

			Technical and financial assistance to the forest administration during the international negotiation stages on the management of wild species Support anti-poaching patrols in protected areas Support community development projects in protected areas
Civil society			
AVG	L.N.	P. C.	Develop **information networks to strengthen the implementation of laws** Engage in advocacy at various levels to improve **implementation of laws** Build the capacities of state stakeholders on the **implementation of national and international legislation**
International institution			
CITES	N.I.	P	Support implementation of the CITES action plan
INTERPOL	N.I.	P. C.	Support efforts made by the Government to confront illegal logging and trafficking of rosewood and other species of precious timber Make recommendations to Madagascar to combat fraud relating to wild species
ITTO	N.	P	Finance the work of inventorying standing stocks of *Dalbergia* and *Diospyros*
UNODC	N.I.	P. C.	Support Madagascar in using the Analysis Tool of criminal activity related to wild species and forests Examine with the Malagasy authorities' ways and means to combat corruption effectively Make recommendations to improve legal texts to combat fraud and corruption related to wild species, and forests
WCO	I.	P. C.	Evaluate the measures put in place by Malagasy Customs to combat the illegal trade in protected species and recommend the implementation of supplementary measures Organize in Seoul (Korea) on 19 and 20 May 2014 a workshop on combating timber trafficking from Madagascar to Asia Establishment of the web-based **application** Customs Enforcement Network Communication, called CENcomm Rosewood, to facilitate the secure sharing of information between the countries of **origin, transit and destination**
Organizations attached to the President's Office or the Government			
BIANCO	L. R. N.	C	Investigate cases of corruption Conduct enquiries and ensure the transfer of the cases to court
MNP	L.N.	P. A. C.	Reinforcement of patrols in protected areas Implementation of local development projects around protected areas
ONESF	N.	P	Ensure good governance of the environmental and forestry actions Collect, analyse and distribute environmental and forestry information
SAMFIN	N.	C	Control financial flows Investigate following complaints and transfer cases to court
National Forest Seed Silo	L. N.	P. A,	Production of forest seeds and seed nurseries, research on the species that can substitute for *Dalbergia* and *Diospyros*
Research Institute			
DBEV	N	P	Engage in research on species of the genera *Dalbergia* and *Diospyros*
FOFIFA	N	P	Engage in research on species of the genera *Dalbergia* and *Diospyros*
MBG	N	P. A.	Engage in research on species of the genera *Dalbergia* and *Diospyros* Support local development in protected areas
RBG Kew	N	P	Engage in research on identification of *Dalbergia* and *Diospyros* species
Donors			
AFD/FFEM	L	P. A.	Finance community forest management projects in the Alaotra Mangoro region
World Bank	N	P. A. C.	Support implementation of the CITES action plan (action plan on the stocks of precious timber) Provide financial support for the control missions Finance projects to strengthen controls around Malagasy coasts Finance local development projects around protected areas
BMZ/GIZ	L. N.	P. A.	Finance projects to re-establish forest governance Finance conservation projects
FAO	L. N.	P	Finance projects to improve forest governance in Madagascar's forestry sector
USAID	L. N.	P. A.	Finance capacity building projects of civil society in combating the illegal exploitation of wild species
EU	L	P	Finance a project to establish the traceability of the logging of timber in the Alaotra Mangoro region
UNESCO	L. N.	P	Provide financial support to combat illegal logging in the forests of Antsinanana

[1] Local (L), Regional (R), National (N) and International (I)
[2] Preventive (P), Alternative (A) and Coercive (C)

Preparation of a timber legality verification framework

TRAFFIC has prepared a document presenting the regulatory framework for forest governance in Madagascar based on the Global Forest & Trade Network (GFTN). TRAFFIC's framework consists of Principles, Criteria and Indicators (PCI) for verification of the legal sourcing of timber (Rakotoarisoa *et al*., 2016). This initiative was designed to support the implementation of national and international policy on the sustainable use of forest, the elimination of illegal exploitation and to make improvements to forest management.

TRAFFIC has consequently made a survey of all the existing Malagasy legal texts that govern forest exploitation, from the harvest site to export, via the transport and processing of timber. All national legislation governing forest activities, protection of the environment, land ownership, workers' rights, health and safety and trade have been taken into account (Rakotoarisoa *et al*., 2016).

3.5.5 Progress of the CITES Action plan implementation

Following the listing of the species of these two genera in Appendix II of CITES (CoP16, March 2013), an action plan consisting of seven principal action points was adopted by Decision 161.45, Annex 3. Since the adoption of this action plan, Madagascar has been committed to implement initiatives designed to adopt the plan and must report to CITES on the status of progress of this implementation (cf. in particular Anon., 2014h). On the seven points of the plan, some stages have already been launched, in particular concerning the preparation and formulation of NDFs and inventories of stocks have been conducted by the team from DBEV and MBG in 2013 and 2014 (Anon., 2013b, Anon., 2014b), this research made it possible to substantiate the biological and ecological information about *Dalbergia* and *Diospyros species* required for the formulation of NDFs (cf. Table 19).

As far as the preparation of materials for species identification is concerned, work on samples has been carried out, contributing to the finalisation of the first Atlas of the anatomical characteristics of 19 species of *Dalbergia* and 31 species of *Diospyros*. However, additional work still needs to be done in the laboratory in order to be able to ratify this Atlas.

Despite all these advances (cf. Table 19), the implementation of the action plan is encountering some problems as follows:

- First point of the action plan - Identification of species liable to be exported: required data including ecological information has not yet been gathered.
- Second point of the action plan - Implementation of systems to trace timber and other appropriate technologies to combat fraud: Two missions[91] from the International Consortium on Combating Wildlife Crime (ICCWC) led to some recommendations for the attention of the Malagasy government. However, since these two missions, nothing seems to have changed on the ground (P55, A2, personal comment to TRAFFIC, November 2015).

In addition to the technical and financial resources needed to implement this tracing system, it became clear that the lack of Malagasy political will was the principal point of deadlock in its implementation (P35, A2; P55, A2, personal comment to TRAFFIC, November 2015).

[91] These two missions took place respectively between 19 and 23 January 2015 and 9 and 13 March 2015. The objective of the first mission was to assess the effisciency of the system in place to detect the illegal shipment of protected species. The second mission aimed at assessing the progress made by the Government of Madagascar to combat illegal harvesting and export of precisous timber. Following these missions, the assessment team from ICCWC issued a list of of recommendations for the attention of the Government of Madagascar (P55, A2, personal comment to TRAFFIC, November 2015).

Table 19: Examples of the progress made by Madagascar in implementing the CITES action plan for *Diospyros* and *Dalbergia*

Paragraph	CITES Decision 16.152 Annex 2	Progress of Madagascar as at 7 July 2014 (SC 65 Doc 48.2) Summary	Principal advances as at 1 November 2015	Stumbling blocks and/or major weaknesses
1	Establish, in collaboration with the CITES Secretariat, a science-based precautionary export quota for the listed taxa where an adequate non-detriment finding can be undertaken and clearly documented for any species planned for export	• Organization of a workshop (Antananarivo, August 2013) on the NDFs to build the capacities of the members of the CITES Scientific and Management Authorities • Development of a method to assess standing stocks using satellite images and evaluation of the population status of 13 species of *Dalbergia* and 24 species of *Diospyros*.	Workshop to evaluate the scientific knowledge on the species of precious wood of Madagascar with a view to the preparation of the NDF (workshop organized by TRAFFIC, Antananarivo, September 2014).	The evaluation of the standing stocks remains inadequate. Financial resources remain a major problem in conducting standing stock inventories.
2	Establish, as appropriate, and with key partners [including the CITES Secretariat, CITES Plants Committee, International Tropical Timber Organization (ITTO), main importing countries, and national and international research/conservation organizations] a process (research, information gathering and analysis) to identify the main species to be exported. Workshops should be organized for selected species to establish the adequate non-detriment findings required in paragraph 1	• Phylogenetic and molecular analysis of the *Dalbergia*s of Madagascar by a team from the University of Zürich (Alex Wilmer and Sonja Hassold). • Taxonomic review of *Diospyros species*by the National Museum of Natural History (Pete Lowry, Paris), and by the Missouri Botanical Garden (George Schatz).	Phylogenetic and taxonomic studies were conducted for the species of *Diospyros* by Pete Lowry (MNHN) and George Schatz (MBG).	Although the taxonomic review of *Diospyros species* began in 2010, with 85 described species and 130 newly, financial resources are still needed in order to conduct research on population in order to identify the species potentially traded
3	Collaborate, as appropriate, and with key partners, as indicated in paragraph 2 above, to prepare identification material and tests for use in CITES enforcement to identify main taxa as they are traded	• Funds received from ITTO-CITES tor species identification work and for the establishment of a conservatory/xylotheque for Madagascar *Dalbergia* and *Diospyros species*. • Launch of several identification studies of the specimens of *Diospyros* and *Dalbergia* of Madagascar, coordinated by Madagascar's CITES Scientific Authority and the CITES Secretariat. • Anatomical identification to prepare an Atlas of the timber of *Dalbergia* and *Diospyros* of Madagascar (in cooperation with WSI (Zürich, Switzerland). • Speices Identification conducted by a team from the Royal Botanical Garden Kew (United Kingdom) using isotopic analysis • Updating of the CD-ROM WoodID by the CITES Scientific Authority of Germany, including the most heavily marketed species of Madagascar. • Capacity building for the CITES Scientific Authority on database management and macroscopic identification of timber species ().	Publication of a first Atlas based on the anatomical characteristics of the timber of 19 species of *Diospyros* (Harisoa Ravaomanalina, ETHZ-WSI, Zürich, 2014). These species are now described both macroscopically and macroscopically. However, the validation of the identification keys requires an in-depth analysis with several repetitions of samples per species and an extension to various species.	Although the DBEV has the knowledge and equipment necessary for the anatomical identification of the species, no infrastructure exists for the installation of such equipment. The lack of financial resources is also undermining the research work, including the collection of specimens and the performance of the identification work.

		• The Suitzerland CITES Management Authority donated equipment for the laboratory of wood anatomy of the University of Antananarivo		
4	Put in place an embargo on export of stocks of these timbers until the CITES Standing Committee has approved the results of a stockpile audit and use plan to determine what component of the stockpile have been legally accumulated and can be legally exported.	• Embargo from 13 August 2013 to 13 February 2014. This embargo was extended by two months with effect from 14 February 2014 (document no.501-14/MEF/SG/DGF/DVRN/SGFF of 11 April 2014 and the subject of the Notification to the Parties no.2014019). • Establishment of the Interministerial Committee for the management of precious timber (*Diospyros* species and *Dalbergia* species*)* responsible for the management and rehabilitation of the precious timber sector, under the Interministerial Committee, was created, the Executive Secretariat.	An audit and securing of the stocks of precious timber is being conducted by the Executive Secretariat responsible for the assessment of precious timber sector and financed by the World Bank. The embargo is maintained until the 67th session of the Standing Committee	Despite the request for validation made several times (June 2014, December 2014 and February 2015, January 2016, the stockpile evacuation plan has not been validated by CITES and the securing of the stocks remains complicated, given that there are still some hidden stocks.
5	Collaborate, as appropriate, and with key partners, as indicated in paragraph 2 above, to establish enforcement mechanisms to assist in implementation of any export quota, stockpile control and opening of any legal and sustainable trade utilizing timber tracking systems and other technology as appropriate.	• Funding secured for the acquisition of satellite images to monitor the movements of vessels in north-east Madagascar. • Optimisation of patrol vessels in the North East sector between Vohémar and Toamasina.	Signature of a memorandum of understanding of cooperation between the Malagasy Customs department and that of Hong Kong SAR, in order to strengthen exchanges of information and reinforce the control capacities of the Malagasy Customs officers	The continued seizures of precious timber (e.g. seizure of over 7 000 logs in Hong Kong SAR, on 8 October 2015) from Madagascar highlights the current limitations and difficultiesof controlling the coastal and maritime space.
6	Provide written reports on progress with the implementation of the plan to the Secretariat and Plants Committee, in compliance with document deadlines for meeting of that Committee; and	• Report produced on the progress of the action plan implementation, including the report from the stockpile assessment conducted by the rosewood committee.	Report on the state of progress of the implementation of the action plan to the Plants Committee (Tbilisi, Georgia, 19-23 October 2015, cf. PC22 Doc.17.3.2). However, no major progress has been made since the last report to the Secretariat (SC65 Doc.48.2).	The lack of political will of the parties involved and of financial resources remain the principal stumbling blocks to the implementation of the action plan in general.
7	Provide a document outlining progress with the implementation and any required adjustments to the Action Plan at the 17th meeting of the Conference of the Parties	• Amendement of the proposal for one off sell of the stockpile. • More rosewood and ebony smuggling cases recorded at the courts as result of the strict control of stocks (stock owned by operators)		

3.5.6. Penalization of offences related to rosewood and ebony

TRAFFIC collected statistical information from the courts of Toamasina, Antalaha and Maroantsetra[92] so as to develop a table of the implementation of the ordinance that regulates and penalizes offences related to rosewood and ebony (Ordinance no. 2011-001 of 8 August 2011). The data make it possible to estimate the number of cases brought before these courts from 2009 to 2015 and the judgements (conviction versus release) of cases of offences relating to the exploitation and illegal trade of precious timber in particular, actually brought before the courts (cf. Table 20).

A total of 316 people have faced charges in these three courts since 2009, amounting to approximately 45 people per year. Of the 225 people charged and whose cases went to trial, 34% were convicted. The conviction rate handed down by the Antalaha court (51%) is three times greater than those of the other two courts, both of which have a 17% conviction rate.

Table 20: Offences related to illegal harvest and trade of precious timber: cases heard in the courts of Antalaha, Maroantsetra and Toamasina (2009-2015)

Courts	No. of cases	No. of persons charged	No. of persons charged and convicted	No. of persons charged and released	Pending decision[1] (no. of persons)	Charges under review (no. of persons)[2]
Maroantsetra	26	76	10	48	18	inf. not available[3]
Toamasina	13	111	10	48	18	35
Antalaha	26	129	56	53	inf. not available	inf. not available
Total	**65**	**316**	**76**	**149**	**36**	**35**

*for the year 2015, data available up to March 2015

[1] Number of persons with case files requiring additional investigations to seek out either any possible complicity, or clarifications on the circumstances of the offence, or information on the accused's record or on any other point that can shed some light for the court (cf. Ordinance no. 62-052 of 20 September 1962 and published in Official Journal no. 246 of 05/10/62, p. 2050).

[2] Number of persons whose case is under review, i.e. whose case is the subject of examination by the judges and on which a decision is being made. (Georg Jaster, jurist of the civil society platform Alliance Voahary Gasy, personal comment to TRAFFIC, December 2015).

[3] nd: information not available.

Sources: Antalaha Court, 2015; District Court of Toamasina, 2015; Maroantsetra Court (information provided by the prosecutors of the courts to TRAFFIC, March 2015)

It should be noted that over 50% of the cases of offences related to precious timber (harvest, transport, trade and export) dealt with in the District Court of Toamasina between March 2009 and March 2015, ended in the case being dropped or in dismissal (P71, A5, personal comment to TRAFFIC, March 2015).

[92] These courts were selected because the cases of logging and export of precious wood in the timber production areas which are the subject of this study are dealt with in these three courts.

Table 21: Offences relating to the illegal harvest and trade in precious timber: case registered at the court of Toamasina (2009-2015)

Years	Violations	No. of cases	Evolution of Judicial procedures
2009	Illegal transport	3	Case closed[1]
	Illegal harvest	2	Case ruled with detention warrant[2]
2010	Illegal transport	1	Charge dismissed[3]
		1	Charge dismissed
	Illegal harvest	1	Charges under review[4]
	Illegal harvest	1	Charge dismissed
	Theft of logs	1	Pending[3]
	Illegal harvest		
2011	Illegal transport	inf. not available	inf. not available
	Theft of logs	inf. not available	inf. not available
	Illegal harvest	inf. not available	inf. not available
	Illegal harvest	inf. not available	inf. not available
2012	Illegal transport	inf. not available	inf. not available
	Theft of logs	inf. not available	inf. not available
	Illegal harvest	inf. not available	inf. not available
	Illegal harvest	inf. not available	inf. not available
2013	Illegal harvest	1	Pending
2014	Illegal harvest	1	Pending
2015	Illegal harvest	1	Charges under review

[1] The decision "to drop the charges" is given if the magistrate considers that, for reasons of fact or law, there are no grounds for legal proceedings; he gives a decision of no case to answer in the forms provided for in Article 99 and orders the discharge of the detention warrant, where appropriate […]. cf. Art. 236. (Law no. 66-008 of 5.7.66) of Ordinance no. 62-052 of 20 September 1962 and published in the Official Journal (JO) no. 246 of 05/10/62, p. 2050.
[2] Judgement with a detention warrant is the judgement followed by an order given by a judge, a court or a magistrate of the public ministry to the chief warden of the prison to receive and detain an accused or a defendant […]. cf. Art. 100 and Art. 103 of the Malagasy criminal procedure enacted by Ordinance no. 62-052 of 20 September 1962 and published in JO no. 246 of 05/10/62, p. 2050.
[3] For definition, cf. Art. 287, Art. 288 and Art. 289 of the Malagasy criminal procedure enacted by Ordinance no. 62-052 of 20 September 1962 and published in JO no. 246 of 05/10/62, p. 2050.
[4] cf. definition (Table 32).
[5] cf. definition (Table 32).

Source: District Court of Toamasina, 2015 (information supplied to TRAFFIC, March 2015)

Few cases of offences relating to the logging and/or the illegal trade of precious timber get as far as the courts. For the period of 2009 to 2015, 24% of the persons charged by the courts of Antalaha, Maroantsetra and Toamasina were sentenced to prison terms (between one week and a maximum of 6 months). The number sent to prison stands at 9% for the District Court of Toamasina.

Of the 23 exporters licenced to export rosewood and ebony in 2009 (following Decree no. 2009-003 of 28 January 2009), 13 of them have already been brought before one of these three courts for forest offences. Two of these exporters have been sentenced to jail terms of a maximum of two months and have completed their sentences, and the 11 others were released due to "lack of evidence". It must be noted that five of these exporters charged in the courts have already been released for "lack of evidence" on several occasions (P71, A5, personal comment to TRAFFIC, March 2015).

The relatively high rate of dropped charges and dismissals can be explained to a large extent by procedural errors committed by the forest administration, which in most cases makes it impossible to conclude the criminal procedure undertaken.

In fact, deficiencies of process or substance (e.g. on the contents of the indictment, etc.) of the Statements drawn up by the forest administration, frequently result in charges that are not held up before the courts due to instances including:

- The Statement can envisage offences stipulated in the Protected Areas Code (COAP) but refer to the penalties provided for by the Forest Decree of 25 January 1930 on the reorganization of the forest regime in Madagascar[93].
- The person preparing the Statement is not a sworn-in official[94] and therefore the statement is not admissible in court.
- Many references to the Criminal Code on Forest Offences refer back to Ordinance no. 60-128 of 3 October 1960 that determines the procedure applicable to penalties of offences against the legislation covering forestry, hunting, fishing and the protection of nature. This Ordinance has to be read in conjunction with Decree no. 61-078 of 8 February 1961 that proscribes modalities of implementation. The content of this decree explains to a large extent the "weakness" of the sanctions applied to these offences because it stipulates that "*breaches of the regulations of this Ordinance will be punished by a fine of MGA 10 000 (5USD) to 200 000 (100USD) and a prison sentence of one month to two years or only one of the two penalties.*" (Art. 45)[95].

It should be noted that Ordinance no. 60-128 deals with hunting and trading in animal species (birds, game…), but does not deal with the logging of timber at all. Neither is reference made to Ordinance no. 2011-001 of 8 August 2011 on the penalties of offences related to rosewood and ebony, given that no implementation decree exists.

In addition to deficiencies in penalties, there is a general lack of transparent governance within the various public services in charge of prosecutions relating to logging and trade of precious timber, at both local and national level (P38, O1; P1, A1, personal comment to TRAFFIC, January 2015). According to Transparency International (Gyre, 2013), the judicial sector is alleged to be the most corrupt public organization, closely followed by the police and the civil service; 57% of the people surveyed, particularly those from the poorer classes, stated that corruption is a recurrent problem in the public sector, especially in the justice system, the police and the State authorities.

The issue of the lack of transparency in the treatment of litigation in the courts was also highlighted by the forest administration (P59, A2, personal comment to TRAFFIC, January 2015; P27, A2, personal comment to TRAFFIC, March 2015). The latter administration is not in a position to follow up offences that they have taken to court, since the judges refuse to communicate with the forest administration on the pretext of maintaining case confidentiality. Even for cases where decisions have been made, the forest administration is not informed of these decisions (P59, A2, personal comment to TRAFFIC, January 2015; P27, A2, personal comment to TRAFFIC, March 2015).

[93] Heading VII (Penalties of offences) Section II (Offences and Penalties) of this Decree stipulates, for example, that "*whoever shall exploit forest products, without having been authorised to do so, or without enjoying right of use, shall be penalized by a fine of 50 to 1000 francs and a prison sentence of between 15 days and 3 months or one of the two penalties alone […]."* (Art. 50) or that "*the sale and trade [prohibited] of products arising from special permits, logging licences or rights of usage, shall be punished by a fine of 50 to 500 francs and in the case of a re-offence, a prison sentence of between 15 days and 3 months […]."* (Art. 52).

[94] The Agents authorized to take statements can only be appointed after having taken an oath before the Court (Article 48 of the Protected Areas Code of 7 August 2001).

[95] Implementation Decree no. 61-078 uses in the same terms the content of article 45 of Ordinance no. 60-128.

Towards specific judicial bodies to deal with wildlife smuggling cases?

Experience has shown tthat the fight against trafficking of species of wild fauna and flora, including precious timber, is supported by the effective conviction and sentencing of transgressors found guilty in terms of the law. Since 2009, members of civil society interested in environmental affairs have requested the establishment of a special court to deal with environmental matters and issues related to precious timber. The reason for this request is based on the ineffective prosecution of timber related cases at district and regional level. As an example in the district of Antalaha, out of 26 cases concerning illegal harvest and trade of rosewood and ebony between 2009 and 2015, only two case files were transferred for prosecution to the central court in Antananarivo. However, these two cases, involving 20 suspects, were not ultimately prosecuted because the physical files were not transferred to Antananarivo due to lack of funds (P72, A5, personal comment to TRAFFIC, February 2015).

Although subsequent governments have not been hostile to the fulfilment of such a project, it has not yet been realized. A bill proposing the establishment of a special court to deal with offences related to illegal harvest and trade of natural resources, notably rosewood, was introduced by the Government to the National Assembly in June 2015 and was adopted by parliament on 17th December 2015. The implementation decree has been promulgated but the implementing judicial body is yet to be established.

4. DISCUSSION and CONCLUSION

This study presents the key information available on factors affecting harvest management of Malagasy MED *Dalbergia* and *Diospyros* species, these factors being defined in accordance with IUCN's guide to the issuing of NDF's (Rosser and Haywood). Through the review of these factors, this study attempts to respond to the following question: *Is biological, ecological, logging and trade information available on Dalbergia and Diospyros* species *and will the system of control and management in place enable an export quota to be defined for the species of these two genera?* In asking this question, the authors have tried to make an assessment of the information available on biology and ecology of *Diospyros* and *Dalbergia species* creating a general "NDF balance sheet" of national policy and actions for the control and management of trade in these species (see Tables 22 and 23 below).

This process is aimed at identifying information gaps which may block the issuing of a NDF. It also highlights the need to strengthen knowledge on biology and ecology of *Dalbergia* and *Diospyros species*, and the importance of setting up a national monitoring system for the genera. Establishment of monitoring sites should be based on a representative presence of *Dalbergia* and *Diospyros* species and covering total area of distribution as far as possible. Monitoring would make it possible to confirm available information and to strengthen our knowledge about numerous species and habitats. This will provide an invaluable scientific basis to guide and strengthen forest resource management (including precious timber species) ensuring rational exploitation through issuing of NDF's.

In drawing up a general overview of the problem of precious timber harvest and trade in Madagascar and by highlighting inadequacies and/or deficiencies in data, knowledge, management, control and monitoring frameworks of precious timber, this report emphasises the following points:

- The inadequate information on standing stocks of timber for certain species and the absence of information for others.
- Insufficiently detailed information on illegal harvest and trade and the absence of available information on species level exploitation.
- Lack of transparency in the management of seized stocks.
- The major discrepancy between political decisions (political declarations, international undertakings) and their implementation on the ground.
- The ineffectiveness of management systems in guaranteeing that the logging and trade of precious timber are not prejudicial to the survival of species.
- The instability and inconsistency of the regulatory framework which only serves to amplify illegal logging and export.
- A government challenged by pockets of corruption in various national and regional departments and divisions.
- The long overdue need to revise and implement sustainable development models.

4.1. Information on timber standing stocks is partial or non-existent for some species

There is insufficient biological and ecological data currently available on precious timber of Madagascar for the issuing of a NDF for the export of MED tree species. Gaps in essential information include species abundance, regeneration and population trends, particularly since data are only available from a few sites thus making it difficult to extrapolate reliably.

Many of the components of the CITES action plan for Malagasy *Diospyros* and *Dalbergia species*, require a sound knowledge of population status. Since 2009, biological, ecological and taxonomic studies have been conducted by research institutions, such as DBEV and MBG, to provide data in support of applications for listing of Malagasy precious timber on CITES. However, the current knowledge available on the biology and ecology of most species is still too incomplete to be able to make informed conservation management decisions.

The Malagasy species of *Dalbergia* and *Diospyros* have never been the subject of a systematic taxonomic evaluation. Furthermore, biological and ecological information is missing for 52.6% of the described species of *Dalbergia* and *Diospyros* [96] and little is known about the conservation status of these species.

Existing forest inventories providing the information required for the issuing of a NDF are few in number, hard to access or incompatible with more recent data, making it difficult to put forward reliable figures on the standing stocks of timber in forests. Neither the real quantities of the trees felled nor the locations where they were logged are known, consequently there is an almost complete lack of scientific knowledge on timber production levels. In addition, experts consulted by TRAFFIC throughout this work are not in a position to estimate the regeneration capacity of key species. The lack of knowledge on regeneration is a considerable handicap in developing management plans for these species.

4.2. Information available on illegal logging and related trade is limited, and no information on logging is available at the species level

Through its ground patrols, the system of surveillance existing in the protected areas and sites managed by the local communities enables identification and handling of all types of offences committed in the monitored areas (bushfires, poaching, illegal woodcutting etc). However, monitoring and control focused on harvest of precious timber remains limited. Throughout this study, only Madagascar National Parks was able to produce information on the harvest of precious timber at genus level in the protected areas of Marojejy, Masoala and Mananara. For the protected areas that have been the subject of this study (Makira, CAZ), the information recorded on illegal logging of timber did not contain information even on genera level. Consequently, data resulting from patrols (using SMART) do not make it possible to estimate the volume of precious timber logged in these landscapes.

[96] Of the 28 species of *Dalbergia* with MED, information is available only for 15 species (53.5% of the species with MED). Of the 29 species of *Diospyros* described, information is available for only 41.4% of the species with MED; in total, there is information for 27 species of *Dalbergia* and *Diospyros* (47.4% of the total).

Table 22: General comments on factors affecting harvest management of *Dalbergia* species

Factors affecting the management of the harvesting system (according to Rosser & Heywood, 2002)		General comments
Biological characteristics		
2.1	Life forms	Out of 28 species with MED, height not available for 7 species and DBH not available for 4 species. Information available on the life form of the species with MED (height and DBH) of *Dalbergia* which allows the sensitivity of the species in relation to pressure to be evaluated.
2.2	Regeneration potential	Information not available for over half the species with MED. Information available for the 15 species with MED is limited on a maximum of 4 locations; they cannot be regarded as representative of all habitats where these species are present; when it is known, the average regneration rate is between 100 and 1000%.
2.3	Effectiveness of dispersal	Information on dispersal capacity is available for only half the species with MED (n=14). Information characterising the seedbearing and regenerating individuals is available for only six species. Only two species have good regeneration potential. The density of a single species varies greatly from one site to another; thus, partial information, from only a few sites, makes it difficult to achieve any standardisation for all populations of the species concerned.
2.4	Habitat	The habitat characteristics are known for about 15 species. Information available suggests a strong concentration of the population in the eastern ecofloristic zones outside the protected areas (78% outside PA). Information available does not cover half the possible distribution areas of the species with MED.
Status at national level		
2.5	Distribution at national level	Information is available for 20 of the 28 species with MED.
2.6	Abundance at national level	Information is available for 15 of the 28 species with MED.
2.7	Population trends at national level	Information on the population trend is available for only 9 species with MED. On the other hand, information on the IUCN conservation status of 27 species is available. Overall, available information suggests a general decline in populations.
2.8	Quality of information	Information available is most often limited to a few sites which cannot reflect the extent and heterogeneity of the geographical region of the distribution of the species with MED.
2.9	Principal threats	Information is available for only 9 of the 28 species with MED. When information is available, charcoal burning, slash and burn farming and illegal logging are the main threat identified.
Harvest management		
2.10	Illegal harvesting or trade	Overall, the most heavily traded species are known. However, information on the level of harvesting and trade of the species remains unavailable. The level of current knowledge on the identification of the species does not allow harvesting and trade, at the specific level, to be determined.
2.11	Management history	Management "swings" between prohibition & temporary authorisation of trade.
2.12	Management plan or equivalent	No management plan exists for the species of the genus *Dalbergia.*
2.13	Objective of the harvesting system in the management plan	None
2.14	Quotas	None
Control of harvesting		
2.15	Harvesting in the protected areas	Information available is limited to rosewood.
2.16	Harvesting in the regions under land tenure or ownership regime	Information not available
2.17	Harvesting in open access zones	Information not available
2.18	Reliability of harvesting management	No management in place
Harvesting supervision		
2.19	Methods used to supervise harvesting	No method in place, except in the protected areas (patrols) and securing of the protected areas by military troops.
2.20	Reliability of harvesting supervision	N/A*
Incentives and advantages of harvesting		
2.21	Use compared to other threats	No information available.
2.22	Incentives for the conservation of the species	N/A for Madagascar's current situation.
2.23	Incentives for the conservation of habitat	N/A for Madagascar's current situation.
Protection against harvesting		
2.24	Fully protected proportion	No information available.
2.25	Effectiveness of the full protection measures	Doubtful effectiveness given the upsurge in illegal exploitation in the protected areas.
2.26	Regulation of harvesting attempts	N/A for Madagascar's current situation.

* N/A: Not applicable

Table 23: General comments on factors affecting the management of *Diospyros* species

Factors affecting the management of the harvesting system		General comments
Biological characteristics		
2.1	Life forms	Information on height is generally available (26/29 species) and for DBH (24/29species). The existing information on the life form of *Diospyros* species enables their sensitivity to pressures and threats to be evaluated.
2.2	Regeneration potential	Information available for only 12 of the 29 described species with MED. Informations on regeneration rate remains very limited to certain locations which have been the subject of ad hoc studies. The information currently available shows that the average regeneration rate of the species varies between 100 – 1000%.
2.3	Dispersal effectiveness	Information is available for the majority of the described species with MED (21/29), the densities being known locally for just over half the species (16/29). Information on the dispersal capacity of the species shows a strong variation from one site to another for a single species (variation in the order of 17 to 500 individuals/ha for a single species.
2.4	Habitat	Information is known for 19 species but remains unavailable for 20 species with MED. Information available covers only 100 populations of 9 species. 54% of these populations have been found outside the protected areas.
Status at national level		
2.5	Distribution at national level	Information not available for the majority of the described species with MED (21/29).
2.6	Abundance at national level	Information not available for the majority of the described species with MED (15/29).
2.7	Population trends at national level	Population trends are gradually declining for the eight species for which information is available.
2.8	Quality of information	Information remains more limited than for the *Dalbergia* species, not only in the number of species which are the subject of studies, but also in the number of locations studied per species.
2.9	Principal threats	No information on threats is available for 95% of the species with MED (including both described and undescribed). This information is available for only eight species. When the information is available, illegal logging and slash and burn farming are the main threats identified.
Management of harvesting		
2.10	Illegal harvesting or trade	There is partial information for the traded species. The results of the inventories of illegal logging do not show the situation of the harvesting of these species. Data on the trade of *Diospyros* species is very scarce. The scale of the exploitation and trade of ebony remains difficult to evaluate accurately.
2.11	Management history	Management that "swings" between prohibitions and temporary authorization of trade.
2.12	Management plan or equivalent	No management plan exists for *Diospyros* species.
2.13	Objective of the harvesting system in the management plan	None
2.14	Quotas	None
Control of harvesting		
2.15	Harvesting in the protected areas	No information available.
2.16	Harvesting in regions under land tenure or ownership system	No information available.
2.17	Harvesting in open access areas	No information available.
2.18	Reliability of harvesting management	No management plan in place.
Supervision of harvesting		
2.19	Methods used to supervise harvesting	No method in place, except in the protectd areas (patrols) and securing of the protected areas by military troops.
2.20	Reliability of supervision of harvesting	N/A*
Incentives and advantages of harvesting		
2.21	Use compared to other threats	No information available.
2.22	Incentives for conservation of habitat	N/A for Madagascar's current situation.
2.23	Incentives for conservation of habitat	N/A for Madagascar's current situation.
No information available.		
2.24	Fully protected proportion	No information available.
2.25	Effectiveness of the full protection measures	Doubtful effectiveness given the upsurge in illegal exploitation in the protected areas.
2.26	Regulation of harvesting attempts	N/A for Madagascar's current situation.

* N/A: Not applicable

4.3. Lack of transparency in the management of seized stockpiles

The lack of transparency in the management of seized stockpiles of precious timber was raised by stakeholders consulted by TRAFFIC in the timber-producing regions. Little information is available on the volumes of stockpiles seized. Furthermore, the decision by the government (Decree no. 2014-906 of 24 June 2014) to set up an interministerial committee tasked with rehabilitating the rosewood and ebony sector, excluded civil society and NGOs from the decision-making process. Thus the transparency of the rosewood stockpile assessment (i.e. the inventories, electronic tagging and securing of the logs of these stocks[97]) is doubtful. Headed by the Prime Minister's office with the support of the office of the President of the Republic, this interministerial committee is composed exclusively of members of the Government, including representatives of eleven ministries[98].

However, even though there is awareness of this problem at the highest State level, it has not been able to prevent the continued illegal harvest and trade of precious timber. Apart from this, the Malagasy authorities provide no information about cases of illegal logging and export or about seizures of precious timber outside Madagascar. The speeches of the national authorities always extol the virtues of[99] State control, and the near non-inexistence of illegal logging, whereas the information coming from the Protected Areas proves the contrary, and emphasises the fact that illegal logging of timber is ongoing.

The lack of transparency in the management is also demonstrated by the absence of communication concerning the decisions and initiatives made by the authorities.

4.4. An ineffective timber harvest and trade management system

The management of precious timber falls into the general framework of forestry policy but is not the subject of any specific attention, unlike such issues such as slash and burn farming or bushfires which are dealt with in some detail. It has not been possible to adopt any specific (or generic) management plan on precious timber, notably because of the lack of knowledge on regeneration capacity of species and due to the upsurge in the illegal harvest and export of precious timber. The establishment of such a plan is dependent on knowing the available standing stock, as well asthe mechanism of their harvest and trade. Madagascar does not have a monitoring system for precious timber harvest covering the entire area of *Dalbergia* and *Diospyros* distribution. Even inside the Protected Areas where there is a certain amount of monitoring and management, the level of harvest is not closely monitored. The regular monitoring of precious timber harvest across all species that is undertaken does not currently make clear distinction between the number, distribution and species identity of stumps illegally cut.

[97] The interministerial committee (consisting solely of representatives of the Ministries) has replaced a steering committee consisting of the government institutions and environmental civil society.
[98] The Ministry of National Defence, the Ministry of Foreign Affairs, the Ministry of Justice, the Ministry of Finance and the Budget, the Ministry of the Interior, Decentralisation and Public Security, the Ministry of Environment, Ecology, and Forests, the Ministry of Commerce and Consumption, the Ministry of Tourism, the Ministry of Transport and Meteorology, the Ministry of Culture and Craft and the State Secretariat to the Ministry of National Defence responsible for the Gendarmerie.
[99] http://www.madagascar-tribune.com/Zero-Tolerance-declare-le-ministre,19869.html
http://www.rfi.fr/afrique/20140210-bois-rose-engagements-president-malgache
http://www.rfi.fr/afrique/20140907-madagascar-le-trafic-bois-rose-mobilise-politiques
http://www.lexpressmada.com/blog/actualites/administration-ravelonarivo-rappelle-la-tolerance-zero-40560/
http://www.lemonde.fr/planete/article/2015/01/24/bolabola-le-bois-qui-saigne_4562855_3244.html

4.5. Inadequate resources to cope with the scale of the problem: example of Masoala National Park

In the SAVA region, the fight against illegal exploitation has taken place in in the face of rampant destruction of the forests, accompanied by the total frustration of officials involved in the control and seizure of precious timber. Masoala National Park reflects this situation where one of the acute problems in 2009 was the lack of material and financial resources. When the funding for an international project came to an end, State budgets were not allocated to, or did not reach, the forest administration units at the regional and local levels. In the majority of cases, the park officials no longer have proper uniforms, transport is often in a bad state of repair and there is no budget for their vehicle maintenance. The frustration of these officials consequently manifests itself in a lack of zeal and motivation in fulfilling their role, some having openly stated to TRAFFIC that they are tempted to accept the kickbacks offered by traffickers. Apart from material resources, comparatively low salaries accentuate the frustration of enforcement staff who feel powerless in the face of a heavily corrupt justice system given to releasing the offenders apprehended by these agents.

In their battle against illegal felling, the park staff make great efforts to maximise the ground patrols (in terms of the area covered by the patrols and frequency of monitoring) and to expel the illegal operators from the park or prevent their illegal intrusion. However, the Masoala National Park team does not have sufficient human resources withonly ten officers in place. Material and financial resources are also inadequate for controlling the exploitation of precious timber. Field staff[100] cannot conduct a "continuous" surveillance of this territory of 2 355 km^2, characterized by very difficult field conditions with rugged terrain, many watercourses andrainfall almost all the year round. Added to this is a level of discouragement on the part of these officials who, conscious of the weakness of the sanctions applied to the offenders arrested, see the same offenders increasingly confident of their impunity.

4.6. Instability and inconsistency of the regulatory framework amplifies illegal exploitation and export

4.6.1. Inconsistency of regulation on timber harvest and trade

Despite the hierarchy in Malagasy legislation, the in practice management of the forestry sector, in particular of the precious timber sector, deviates from this hierarchy. It has become almost commonplace for an order to cancel or contradict exisiting decrees or even more often, an ordinance. For example, Interministerial Order no. 11832/2000 of 30 October 2000, prohibiting the export of rosewood and ebony and memorandum no. 923/05/MINENVEF/Mi of 6 November 2005 enabling the marketing and export of stocks of ebony and rosewood declared officially authorised without the prior repeal of Interministerial Order no. 11832/2000 of 30 October 2000 comprising a prohibition.

As mentioned above, the lack of political will of the legislative authority constitutes a major obstacle to legal implementation, and in turn encourages illegal logging and trade of wild protected species.

[100] 15 field officers of the Masoala National Park were recruited in 2010 and 10 others are in progress (P14, C1, personal comment to TRAFFIC, March 2015).

4.6.2. Outmoded legislation

Ordinance no. 2011-001 of 8 August 2011 deals with penalties for offences relates to rosewood and ebony. This constitutes the only legal reference to penalties imposed for the exploitation and trade of precious timber in Madagascar and yet to date no decree implementing this Ordinance has been enacted. Consequently, applicable regulatory framework on the issuing of penalties is still that which dates back over half a century, i.e. Ordinance no. 60-128 of 3 October 1960.

Further, he existing criminal procedure requires that only accredited law enforcement officers of the forest administration can prepare a criminal docket and that the charges must be sufficiently robust for the case to be admissible in court. However, in the majority of cases, the Protected Area staff who are present at the scene of an indicent, but are not appropriately accredited officers of the forest administration, draw up the first statement of offence thus rendering it invalid. The correct procedure is that the initial statement must be prepared by the accredited officers of the forest administration using the facts provided by the Protected Area staff concerned. This lapse in procedure undermines the success of criminal prosecutions. Further, poor quality of information contained in dockets (for instance, charges not explained or poorly explained) often leads to a refusal by the courts to prosecute a case.

The low penalties in the form of fines and/or jail terms implemented by the courts on the basis of Ordinance no. 60-128 of 3 October 1960 and its Implementing Decree no. 61-068, means that it is not possible to have a deterrent effect on stakeholders involved in illegal harvest and trade. In cases prosecuted by the Toamasina court, the maximum penalty imposed for the illegal harvest, transport and trade of precious timber has never exceeded six months in jail.

4.7. Governance undermined by corruption

Corruption allegedly remains the major factor that undermines the establishment of good governance in Madagascar, with none of the public sectors in Madagascar seemingly exempt (Gyre, 2013). This corruption undermines good management of the precious timber trade from local level at harvest sites through to export. It occurs at all stages of the trade chain. During the issuing of temporary export permits, some officials are allegedly bribed by timber operators in order to get permits, even though stockpile verification was not carried out. Some operators allegedly bribe officials to get permission to exceed export limits, and yet other timber operators allegedly provide private vehicles and motorbikes to the law enforcement officers that are supposed to control the transport of their timber.

The corruption may take the form of political influence so as to bypass the formal permitting system required for transportation of precious timber. Enforcement officials may at times be bribed to turn a blind eye to trucks or canoes carrying illegal logs. When regulatory violations are found, judicial corruption occurs to prevent prosecution and accountability, leaving citizens without legal recourse.

4.8. Need to revise Madagascar's community conservation development model

Among the 30 woodcutters interviewed by TRAFFIC in the course of this work, 28 responded that the lack of income and the scarcity of exploitable natural resources[101] are the main reasons motivating them to get involved with timber traffickers. To counter such problems, all the

[101] For these woodcutters, a large part of the natural forests are protected and their access to the natural resources remains limited to the sustainable use zones of the Protected Areas (which constitute at most 20% of the total surface area of the Protected Areas). In fact, they state that their resources, (yams, honey, wood…) are rapidly running out.

Protected Area managers in Madagascar implementing local development projects, including the construction of common infrastructure, the promotion of income-generating activities, income management capacity building of the local population[102], sustainable use of firewood and the introduction of production techniques.

The development projects aim principally to reduce man-made pressure on forest resources by putting in place alternatives to the unsustainable exploitation of these resources. The desire to earn money quickly, without too much effort and with very little risk, is very widespread among young people particularly in the towns and often takes priority over the desire for education.

Without a strong local development system in place, strict conservation policy (that includes penalties) will make local people more vulnerable. Moreover, strict conservation will not mitigate the risk of local people becoming involved in illegal harvest and trade of timber. This is particularly pertinent in areas where cyclones have destroyed crops and infrastructure, and where income is replaced by involvement in the illegal export of timber, as in the case of Cap Est region. This area has been subject to several cyclones since 2000.

[102] As for example on income management, the sustainable use of firewood and the introduction of production techniques.

5. RECOMMENDATIONS

Strengthen knowledge on *Dalbergia* and Diopyros species with a view to the issuing of NDFs for export

For the attention of the research Organizations

Various actions (Table 24) are required to fill the gaps in knowledge on the biological characteristics of *Diospyros* and *Dalbergia* species including their habitat range, national distribution, population trends, threats and harvest dynamics. The table below presents the main recommendations and the stakeholders responsible for their implementation.

- Increase funding to facilitate the evaluation and research into standing stocks of precious timber in Madagascar, especially: i) the abundance of species in their habitat at least for those currently in trade and those with most potential for future trade, ii) the study of forestry ecology and regeneration of species, and iii) the drafting of specific management plans based on the results of the inventories.
- Build the capacity of protected area managers to allow them to identify precious timber species in their protected areas and to collect accurate information on illegal harvest dynamics at their conservation sites through the adoption of a national monitoring system.
- There is a need to fill the gaps in knowledge on biological characteristics of the harvested species, including their habitat type, national distribution, population trends and the threats facing them in the wild.

Table 24 - Recommendation to fill knowledge gaps for NDF making

NDF Headings	Recommendations	In charge
Biological characteristics of the species	Conduct genetic studies to improve taxonomic knowledge of the species of precious timber, especially those of the *Diospyros* genus	MBG and DBEV
	Prepare a species identification system, prioritizing the most traded species	Regional Forestry Services
	Conduct regular monitoring of post-harvest recovery and regeneration rate of each *Dalbergia* and *Diospyros* species with known MED	Regional Forestry Services, managers of parks and new protected areas.
	Develop research and monitoring programmes to identify the population distribution of *Dalbergia* and *Diospyros* species throughout the country	MBG, DBEV and protected areas managers
Habitat dispersal and national distribution	Enhancing research on dispersal capacity for the potentially traded species	DBEV and MBG
	Strengthen population monitoring activities of *Diospyros* and *Dalbergia* species in protected areas, given that the majority of mature seed-bearing individuals are found there.	MEEF, managers of the protected areas
Population trends and threats	Conduct regular monitoring activities to assess the scale of threats and species population trends.	Regional Forestry Services, managers of the protected areas, TRAFFIC, SGFF and CITES Scientific Authority.
	Complete the IUCN Red List assessment for all *Dalbergia* and *Diospyros* species that are potentially traded	MBG and DBEV
Harvest monitoring	Conduct in-depth studies of harvest rates impact on populations at the different production sites	Regional Forestry Service

For the attention of MEEMF

- Support the establishment of a national monitoring system for *Dalbergia* and *Diospyros* populations by strengthening collaboration with research institutions and to conduct a census of populations of these species.
- Prepare and implement a biodiversity management plan for *Dalbergia* and *Diospyros* prioritizing currently exploited species and those with potential for future exploitation;
- Promote the use of a national timber legality verification system, such as the framework developed by TRAFFIC for Madagascar (Julien Noel Rakotoarisoa *et al*., 2016).
- Put in place a strong communications strategy to disseminate information on the criminal nature of forest offences, by highlighting criminal activities which have resulted in deterrent penalties;
- Urgently enact the Implementation Decree of Order no. 2011-001, punishing offences related to rosewood and ebony.

For the attention of the Government of Madagascar

- Order its intelligence services, e.g. BIANCO and the financial intelligence service SAMIFI to investigate the traffic in precious timber and money-laundering resulting from trafficking and to actively co-operate with international law enforcement agencies in other countries, especially those through which Madagascar's precious timber transit (for instance, Mauritius, the Comoros, Tanzania [including Zanzibar], and Kenya).
- Formally request ICCWC to ensure that countries involved in the transport, processing and consumption of Madagascar's precious timber (particularly Mauritius, China, the US, Germany and France) provide technical and financial assistance to put an end to the illegal logging of timber and the related trade.
- Follow the recommendations developed by ICCWC following their mission to Madagascar in January 2015 on reinforcing the fight against fraudulent activity in the precious timber trade and strengthening the implementation of laws. Broaden the discussion and implementation of these recommendations amongst competent national organizations responsible for combating fraudulent activity related to wild species in Madagascar.
- Establish co-operation agreements with the transit countries (including, Mauritius, Tanzania [including Zanzibar], and Kenya), destination countries/territories (including, Hong Kong SAR, and China) and international organizations (e.g. ICCWC), which may include i) measures designed to eradicate the transfer of illegal timber originating from Madagascar ii) a memorandum of understanding on the sharing and exchange of information (strategic intelligence); iii) awareness raising among the public; iv) capacity building; v) co-ordination of law enforcement agencies amongst the various signatory countries to CITES, and vi) a memorandum of understanding with neighboring countries in order to co-operate on the implementation of CITES;.
- Strengthen bilateral and multilateral co-operation with China in the framework of China-Africa co-operation to raise awareness among Chinese operators and consumers about illegal precious timber originating from Madagascar. This could take the form of a campaign103 dealing with all aspects of illegal logging and the related trade of precious timber in Madagascar.

[103] China, the main destination for Madagascar's illegal timber, has launched several campaigns to crack down on the international trade in African species. These campaigns have focused on different aspects of the illegal trade in wild species (trafficking, international transfers and illegal processing). With the aid of three telecommunications companies, reminder messages were being sent to Chinese citizens travelling abroad in order to dissuade them from engaging in illegal hunting, purchasing and transporting of wild species and the products derived from them (p.40, C3, personal comment to TRAFFIC, June 2014).

- Change the status of public organizations working for good governance in order to ensure their independence in carrying out their mission, e.g. BIANCO104, which depends directly on the office of the President of the Republic, Financial Intelligence Unit (SAMFIN), the Integrity Safeguard Committee (CSI), or the National Observatory of the Environment and the Forestry Sector (ONESF105).
- Entrust the co-ordination of maritime surveillance of vessel movements off the east coast of Madagascar to an independent. Organization in order to avoid any kind of manipulation and criticism originating from the central authority and the logging entities, follow the recommendations developed by the ICCWC team arising from their mission to Madagascar in January 2015 on law enforcement and fraud prevention relating to precious timber.
- Enlarge the Interministerial Committee in charge of rosewood and ebony assessment by including the civil society and conservation NGOs.
- Consider including Palisander timber species in the same category of conservation status and protection as rosewood and ebony to help in closing the loophole with regards to the confusion of enforcement actions and harvesting of the species.

For the attention of technical and financial partners of the forest administration

- Set up a community support campaign for the economic development of areas with precious timber forests. The campaign should comprise a set of short to longer terms activities focused on strengthening alternative livelihoods and may include labor intensive cash crop production or other sources of sustainable income appropriate to the communities. The main aim of this will be to ensure that communities are not tempted by incentives offered by illegal timber operators.

For the attention of the Ministry for Justice

- Revise the regulatory framework of the offences relating in particular to illegal logging and illegal trading in forest resources and take the necessary measures to ensure that these offences are punishable by penalties that are effective, proportional and deterrent in nature.
- Ensure the transparency of prosecution by giving the forest administration the right to access all information pertaining to cases prosecuted by the police and justice departments on their behalf.
- Translate into domestic law the provisions stipulated by international conventions ratified and/or signed by Madagascar, in particular those of the United Nations Convention against Transnational Organized Crime and the United Nations Convention against Corruption;
- Amend or update national legislation in terms of guidance provided by United Nations Office on Drugs and Crime. This will have the effect, amongst others, of illegal trade in Madagascar's protected species of fauna and flora becoming an offence punishable by at least four years' imprisonment.
- Support the capacity of other enforcement agencies in the country to use other relevant laws, such as criminal, anti-corruption, trade, finance, etc. to seek a higher degree of penalties, not just limited to using the forestry laws

For the attention of BIANCO and SAMFIN

[104] BIANCO is the independent anticorruption bureau. However, it should be pointed out that its Director General is appointed by the President of the Republic on whom its operating budget also depends.
[105] In fact, this organization should be independent; however, its operating budget depends on the Ministry responsible for Forests.

- Conduct in-depth investigations into cases of corruption related to precious timber at different levels of the forest, judicial and Customs administration in Madagascar;
- Make public the results of precious wood corruption investigations.

For the attention of the Ministry of Finance

- Establish an accounting system which makes it possible to guarantee transparency for the collection, management and distribution of royalties and taxes levied by the forest sector;
- Establish a government fund to build the capacity and improve equipment of forestry officers and to promote rural development projects in the areas strongly affected by illegal logging of precious timber.
- Establish specialized units of CITES within the Customs Service to provide expertise required to identify *Dalbergia* and *Diospyros* specimens destined for illegal export and ensure that all Customs at the border can have direct communications with relevant specialists in identification at the Forestry Department, Forest research institutes, local academia, and other individual experts who can provide this service on call.
- Build the capacity of the Customs department to identify and seize illegal shipments of wild flora and fauna.

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ANNEXES

Annex 1: Agenda of the workshop to evaluate the scientific knowledge on precious timber (22-24 September 2014, Antananarivo)

Dates and Times	Sessions	Responsables
22 September 2014		
8h30 – 09h00	Reception of participants	TRAFFIC
09h00 – 09h05	Welcoming address	SG MEEF/ DGF
09h05 – 09h10	Workshop opening speech	USAID
09h10 – 09h40	What is CITES? Role of the CITES scientific authority and management authority CITES decisions for Madagascar; perspectives of the Plants Committee, Standing Committee and the Conference of the Parties	CITES scientific authority and management authority
09h40 – 09h50	Objectives of the workshop	Julien Rakotoarisoa
09h50 – 10h10	Results of research on precious timber (*Dalbergia* spp. and *Diospyros* spp.)	MBG
10h10 – 10h45	Overview of the procedures to establish a Non-Detrimental Finding	CITES Scientific Authority
10h45-11h00	Coffee break	
11h00 – 11h15	The Malagasy populations of *Dalbergia spp. and Diospyros spp.*: Summary of available knowledge	TRAFFIC
11h15 – 11h45	Working groups – Use of NDF guide on the species	Julien Rakotoarisoa
11h45 – 12h30	Formation of groups and beginning of work	All participants
12h30 – 14h00	Lunch break	
14h00 – 15h00	Resumption of group work	All participants
15h00 – 15h20	Report group by group	All participants
15h20 – 16h00	Discussion on the differences between the radar charts of each group	All participants
16h00 – 17h00	Working groups * Identification of the species exploited by the forestry industry in order to use them as model species for NDF exercizes * Formation of two working groups, one for the species of the northern region and the other for the species of the southern region ** Use of the 27 species cited in the working document for prepare the NDF ** Identification of the names of the species depending on their exploitation location, use of maps to identify the harvest locations. Formulation of radar charts by each group (maps will be available to mark the harvest areas)	All participants
23 September 2014		
09h00 – 09h10	Recap of instructions for the working groups	Moderator
09h10 – 10h45	Working groups	All participants
10h45 – 11h00	Coffee break	
11h00 – 11h30	Report of the working groups Presentation of radar charts for each group and plenary discussion.	All participants
11h30 – 12h00	Finalisation of radar charts	
12h30 – 14h00	Lunch break	
14h00 – 14h10	Description of the new task for the working group: research priorities: identification of the research priorities based on the NDF results illustrated by radars, the questions which will lead the discussion will be: * What is the information required? * How is this information to be obtained? * Who will be involved in the collection of information? What will be the timeframe for this research and collection of information?	Moderator
14h10 – 17h00	Working group	All participants
24 septembre 2014		
09h00 – 12h00	Working groups (finalisation of the action plan)	All participants
12h30 – 14h00	Lunch break	
14h00 – 15h30	Working groups (contd.)	All participants
15h30 – 16h30	Feedback from each working group	All participants
16h30 – 17h00	Closure	USAID / DGF

Annex 2: List of participants in the workshop to evaluate scientific knowledge on precious timber (22-24 September 2014, Antananarivo)

Noms	Prénoms	Institutions	Fonctions
ANDRIAMBOLOLONERA	Sylvie	MBG	Coordinatrice de Recherche
ANDRIAMIALISON	Lanto	DREEF	Menabe
ANDRIANARIJAONA	Jean Joseph	DREEF	Anosy
ANDRIANARIVELO	Soafara N	MBG	Assistant de projet
AZIHAR	Saïd Hugues	DREEF	DREEF SAVA
BOTOVAVY	Dieu Donné	DREEF	DREEF Antsinanana
CAMARA	Christian	MBG	Représentant permanent
CHANG KUON	Alain	MEEMF	Directeur de Cabinet
DAULLFUS	André	Consultant Individuel	Consultant
NADIA	Ralinivo	AVG	Responsable de Communication
NEWTON	David	TRAFFIC	E/S Africa
RABARIJAONA	Romer	RGB Kew	Chercheur
RABEATOANDRO	Marcellin	MEEMF	SG
RABESIHANAKA	Sahondra	DGF	Point focal CITES
RABESISOA	Lalaina	MEEMF	Cabinet
RAFAEL	Corrine	USAID	Legal and Policy Manager
RAJEARINTSIRA	Fred M	sg/SCE/EN	Divisional commissioner of police
RAKOARIMAMONJY	Josette	DREEF	DREEF Boeny
RAKOTOARISOA	Solofo E	RBG Kew	Programme Head
RAKOTOARISON	Fenonirina	DBEV	Biologist
RAKOTOMALALA	Olivia	Banque Mondiale	Environmental specialist
RAKOTOSON	Georges	GNEFM	CA
RALAMBOMANANA	Bakoly	MFB/DGI/DLFC	Tax Inspector
RAMANANANTOANDRO	Tahiana	ESSA-Forêts	Lecturer and researcher
RAMANGASON	Guy Suzon	Madagascar Nationa Parks	DG
RAMAROSANDRATANA	A V	UNIV Tana	CITES Scientific Authority Flora
RAMBELOARISOA	Gerard	WWF	Director of Conservation
RANARIVELO	Valencia	WWF	IFS PC
RANDRIAMANAMPISOA	Hasina	Durell	Programme Coordinator
RANDRIAMANANA	Dafison José	MEEF	DCF
RANDRIAMANANORO	Fidy José	MEEF	DGF
RANDRIAMANTENA	Fanja Olga	CUEE/MNP	CUEE
RANDRIAMANTSOA	Jean Joseph	GNEFM	Treasurer
RANDRIANARIFETRA	Hysaima	CAJ/MNP	CAJ
RANDRIANARIMISA	Aristide	WCS	Research coordinator
RANDRIANASOLO	Harison	CI	Coordinateur of the research on the species
RANIVOARISOA	Pascaline	DGE	I/C Flora/DVRN
RARINIRINA	Miora Lalaina	CITES Flora	SP
RASOAVAHINY	Laurette	MEEF/DCBSAP	DCBSAP
RASOLONIRINA	Ramenason	DREEF	DREEF Alaotra Mangoro
RATSIMBAZAFY	Cynthia	TRAFFIC	Programme Officer
RAVAOMANALINA	Harisoa	DBEV	CITES Scientific Authority Flora
RAZAFIMAMONJY	Nivo	DBEV	Biologist
RAZAFINIMARO	Tantely	DREEF	DREEF Analanjirofo
RAZAFINTSALAMA	Claudie	GNEFM	Chairperson GNEFM
RAZANARISOA	Rose	GNEFM	Chairperson
VIA	Sabine Marie D.	DREF	Diana
RAVELOSON	Lovanirina Joël	Consultant TRAFFIC	Freelance consultant

Annex3: Questionnaire used in consulting national experts

QUESTIONNAIRE

Biology and Ecology of the species of the genera *Dalbergia* and *Diospyros* and implementation of CITES

I. INFORMATION ON THE PERSON INTERVIEWED

- Name of the person:……..
- Address (telephone, email):……..
- Position:……
- Name & address of his/her Organization/institution:……..

II. QUESTIONS

Information on the harvesting and conservation of the genera *Dalbergia* and *Diospyros*

✓ ***Populations and Conservation Status of the species of the genera* Dalbergia *and* Diospyros**

1. What is the role of the "species" in its ecosystem and its conservation status?
2. Do any population evaluations for these species exist? If yes, by whom? What methodology/ies is (are) used?
3. Is there a national surveillance system for the populations of these species?
4. What are the principal issues in conducting a full evaluation of these species?
5. What practices are put in place for the management of these species?
6. What are the threats to the survival of these species?

✓ ***Intensity of collection and regeneration of the species***

7. Is the volume of harvesting known and monitored (for example, trade studies, harvesting monitoring results)?
8. Is there a study or are there studies on the regeneration of these species?
9. What type of information is available to describe the abundance and population trend at the national level?
10. In the last 10 years, what is the percentage of illegal harvesting in the protected areas compared with the total harvest?

Laws, regulations and administrative requirements

11. Can you give details of the national and international legislation on the conservation of these species?
12. What is the permit system used for the harvesting and trade of these species?
13. Is there a problem in relation to the existing permit system?
14. If yes, are there ways to improve the existing permit system?

Trade of species of *Dalbergia* and *Diospyros*

✓ ***Trade Structure***

15. What is the structure of the trade of the species of the genera *Dalbergia* and *Diospyros* of Madagascar?
16. What is the land tenure system in the areas where *Dalbergia* and *Diospyros* species are harvested (communal land, private land, etc.)?
17. What stakeholders are involved in the commercial sector?
18. Could you describe the main stages in the supply chain of precious timber from harvesting to export?
19. What institutions are involved in the control of the timber trade? Specify the role of each institution.

✓ **Volumes and prices**

20. What are the volumes of *Dalbergia* and *Diospyros* harvested and exported over the last ten years?
21. What is the variation in price of *Dalbergia* and *Diospyros* along the supply chain?
22. How is this price defined?
23. What is the FOB price?

✓ **Location and number of forestry companies/operators**

24. Where are the main harvesting sites of *Dalbergia* and *Diospyros* in Madagascar?
25. What is the total number of authorised operators in the sites?
26. What is the percentage of authorised operators, compared with the total number?

✓ **Training and other support services**

27. Does the Forest Administration offer training to build the capacities of the operators? What training is given? (Scale of training, number of people trained, etc.)
28. Are there other Organizations which supply this training?

✓ **Permit system**

29. What permit system is used to exploit the species of the genera *Diospyros* and *Dalbergia*?
30. Does the current permit system enable the species to be sustainably managed?
31. The management of the precious timber is linked to the political circumstances of the country. What suggestions could you make to ensure that the decisions taken on these timber species are motivated more by technical than political considerations?
32. In your opinion, what is the chief impact of the prohibitions (harvest, transport, trade/export of precious timber) in relation to the volume of illegal trade?

✓ **Illegal logging and trade**

33. In your opinion, what has been the relative importance of the illegal trade (compared to the total authorised volume) over the special authorisation period which was given to selected operators?
34. What are the principal characteristics of this illegal trade?

✓ **Strengths and weaknesses**

35. What are the strengths and weaknesses of the Forest Administration in exercising its role of controlling the harvest and trade of *Diospyros* and *Dalbergia*? What improvements could be made?

✓ **CITES**

36. In 2013, at the 16th meeting of the Conference of the Parties to CITES, the species of the genera *Diospyros* and *Dalbergia* were listed in Appendix II of the Convention. What is the opinion of the forest administration concerning this listing? And, in your opinion, what needs to be done so that Madagascar complies with the action plan?

37. In your opinion, is the implementation of the CITES action plan is well on its way?
38. In your view, what are the principal issues in going forward with the CITES action plan and complying with the CITES requirements? What do you suggest?

Note: the anonymity of the person interviewed will be respected, if that person so chooses.

Annex 4: List of experts consulted

Place of consultation	Date	Name and first nam	Function/Entity	Entity
Antananarivo	16-Jun	Andry RANDRIAMANGA	Coordinateur National AVG	Civil Society
Antananarivo	16-Jun	Ndranto RAZAKAMANARINA	Chairperson AVG	Civil Society
Antananarivo	16-Jun	Georg JASTER	Lawyer AVG	Civil Society
Antananarivo	04-Jun	Jean Claude RABEMANANTSOA	Ex DGF	Forest administration
Antananarivo	10-Jun	Sahondra RABESIHANAKA	Focal point CITES /DGF	Forest administration
Antananarivo	19/09/2014	Fidy ANDRIAMANANORO	DGF	Forest administration
Antananarivo	10/10/2014	Eric RABENASOLO	DVRF/DGF	Forest administration
Antananarivo	04/06/2014	Giovanni RUTA	Senior Economist World Bank	Donor
Antananarivo	10/06/2014	Milena SOSA SCHMIDT	Scientific Support Unit Sec. CITES	International Organization
Antananarivo	10/06/2014	Marcelli YATER	Law enforcement Officer CITES	International Organization
Antananarivo	11/07/2014	Solofo RAKOTOARISOA	Researcher Royal Botanical Garden Kew	Research Institute
Antananarivo	12/06/2014	Vonjy RAMAROSANDRATANA	Head of Department DBEV	Research Institute
Hamburg	18/06/2014	Harisoa RAVAOMANALINA	Lecturer and Researcher at DBEV, CITES Scientific Authority	Research Institute
Antananarivo	04/11/2014	Sylvie ANRIAMBOLOLONERA	Research coordinator MBG	Research Institute
Antananarivo	04/11/2014	Soafara ANDRIANARIVELO	Researcher MBG	Research Institute
Antananarivo	04/11/2014	Richard RANDRIANAIVO	Researcher MBG	Research Institute
Antananarivo	19/10/2014	Rose RAZANARISOA	Chairperson GNEFM	Forestry company
Antananarivo	19/10/2014	Claudie RAZAFINTSALAMA	National coordinator GNEFM	Forestry company
Hamburg	18.06.2014	Elizabeth GROVES	Royal Botanical Garden Kew	Research Institute
Paris	23/06/2014	Pete LOWRY	Regional Director MBG	Research Institute
Antananarivo	14/06/2014	Julien Noel RAKOTOARISOA	Ex DGF	Forest administration
Antananarivo	28/08/2014	Etienne RASARELY	Coordinator ONESF	Forest administration
Antananarivo	08/07/2014	Gerard RAMBELOARISOA	Director of Conservation WWF MG	Conservation NGO
Antananarivo	08/08/2014	Tiana RAMAHALEO	Research coordinator WWF Madagascar	Conservation NGO
Antananarivo	08/10/2014	Dafison José ANDRIAMANANA	Director of Forest Controls	Forest administration

Annex 5: Matrix of the SAVA and ANALANJIROFO mission (21 January - 4 March 2015)

Broad outlines of the mission	Methods	Target stakeholders	Sequence of events
Collection of statistical data on the harvesting and trade of precious timber	Questionnaires Copy of database	Customs, DREF, Gendarmerie, Taxes, MNP and NGOs	Presentation of the mission and its objectives Presentation of the information sought Identification of the information available to the stakeholders Surveys or interviews Invitation to stakeholders meeting organised by TRAFFIC in the districts
Quest for information on the socioeconomic factors related to the harvesting and trade of precious timber	Questionnaires for the local populations Group discussions	Local population, NGO, forest administration and local administration	Presentation of the mission and its objectives Evaluation of the knowledge of interviewees in relation to the information requested Socioeconomic questionnaire
Quest for information on the harvesting, price and export of precious timber	Questionnaires Group discussions	Local population, civil society and MNP	Presentation of the mission and its objectives Evaluation of the knowledge of interviewees in relation to the information requested Questionnaires
Consultation of the stakeholders on the management of precious timber and their perceptions concerning the harvesting of the species of precious timber	Consultation meetings Working groups with 4 major questions/themes tackled	Operators of the forest sector, civil society, DREF and the Government	Presentation of the mission and its objectives Comments around the table Explanation of group work Group work Feedback from each group Conclusion

Annex 6: Local survey questionnaire given to villagers in vicinity of protected areas and precious timber logging sites by TRAFFIC January and March 2015

QUESTIONNAIRE

Socioeconomic implications of the upsurge in the harvest and export of precious timber

I. INFORMATION ON THE PERSON INTERVIEWED

- Name of the person:……
- Address (telephone, email):……..
- Position:……
- Name & address of his/her Organization/institution:……..

II. QUESTIONS

Involvement of the local populations in the harvest of precious timber

1. What is the number of persons involved in the activities related to the harvest of precious timber?
2. What percentage of the adult population of your village do you estimate to be directly or indirectly involved in the harvest of precious timber during the last five years?
3. Do you know that the harvest of timber in the protected areas is prohibited?
4. What would be the indicators of the existence of exploitation in the forest?

Impact of the exploitation of *Dalbergia* and *Diospyros* on the standard of living of the local population

5. In view of the rapid increase of logging, have you experienced a positive change in your standard of living?
6. In your view what has been the principal change?

7. Has there been a change in terms of security?
8. Has there been a change in social relations?
9. Has there been an impact on health?
10. Has there been an impact on the mortality rate?

Note: the anonymity of the interviewee will be respected, if that person so chooses.

Annex 7: Recommendations of the NDF workshop organized by TRAFFIC (22-24 September 2014, Antananarivo)

Research actions (by order of priority)	Responsible institutions	Management and control activities (by order of priority)	Responsible institutions
Evaluation of the stocks, updating of the national data to have knowledge of forest production and to fix a prudent quota. Inventories of all the existing stocks, even in difficult-to-access areas. Inventories of species with MED. Compilation of the data, building on studies already done. Compilation of the data on forest production and forest degradation (SIG). Feasibility study of harvesting in the new protected areas (category 5 or 6). Compilation of information on harvesting at the DREEF. Research on the occupation areas and the ecological requirements of the species.	University, MEEF Managers of Protected Areas. MBG, Kew.	Strengthening of monitoring and controls in the whole sector. Amendments and improvement of controls. Compilation of legal documents for harvesting. Proposal for the improvement of all tools (specifications, site workbook, laissez passer, etc). Improvement in the control structure. Strengthening of the information system on forest control. Widespread distribution of forest control guide. Capacity building for all the stakeholders of the monitoring of the enforcement of the specifications and the loggers to familiarise themselves with the specifications. Improvement of the mechanism for financing at the administration level (use of FFR and FFN) for monitoring and control. Strengthening of the activities of the administration for follow-up and control. Follow-up of the site workbook. Professionalisation of the forest operators. Proving the protection and control in the New Protected Areas (NAP) and the existing Protected Areas (NAP managers).	MEEMF, Office of the judicial police. Regional and local authorities. Forest operators. Customs
Identification/authentication of timber specimens. Development of simple tools for the identification of the species of timber. Capacity building in the identification of species and timbers for the stakeholders concerned (Customs, forestry companies, administration, etc).	University, MBG, TRAFFIC, MEEF	Strengthening cooperation between Customs and police with the transit countries of Madagascar's precious timber.	MEEF, (OG CITES) INTERPOL, WCO
Research on the substitutions species for precious timber.	University, SNGF MBG, COBA	Protection and extension of habitat. Preserving the state of the forest. Conducting restoration and enrichment work. Control of the factors disrupting the soil conditions of the environment.	University, MEEF
Research on the forestry behaviour of the species. Studies and monitoring of instances of natural regeneration. Studies of instances of germination and phenological studies. Attempt to grow trees, establishment of seed nurseries.	University, MEEF, managers of protected areas (PA) MBG, Kew.	Ensure management of the massifs after exploitation. Establishment of a development plan for the massif. Restoration. Transfer of management of the sites after exploitation (to be exploitable again after ten years). Putting Koloala into practice.	MEEF, DREF, Forest operators, Protected Areas Managers
Multiplication in situ and ex situ. Transplantation of wild trees over the entire exploited surface.	SNGF	Development of traceability at the national level. Standardising, to the maximum extent, the presentation of the product which has just emerged from the forest (to have an idea of traceability). Maximum use of the various parts of the trunk. Making traceability accessible to the forest operators and administration: promotion of traceability, introduction of labelling systems and/or certification.	MEEF, Forest operators, CIRAD
Research on the dynamic of supply and demand in precious timber.	MEEF, Customs, TRAFFIC	Promotion of the alternatives to precious timber. Development of incentive measures for the exploitation of other alternative species to precious timber.	University, SNGF, Protected Areas Managers
Feasibility study on harvesting in the NAPs. Research into the forestry behaviour of the species.	PA managers, lawyers, MEEF	Social aspect: cooperation with the community. Development of existing structures (Komity, VOI, Brigade: inventory, revitalisation and creation).	MEEF, Protected Areas Managers

Annex 8 List of *Dalbergia* species having a tree life form and capable of achieving a minimum exploitable diameter (Species able to achieve a MED are listed in bold

Species	Tree life form	Height (m)	Minimum exploitable diameter (MED)	Diameter at height (cm) DBH
Dalbergia abrahamii[3]	**x**	**7-16**	**x**	**10-18**
Dalbergia andapensis[3]	x	**8-13**	**x**	**13-30**
Dalbergia aurea[2]	x	6	nl[2]	8-17
Dalbergia baronii[3]	x	**3-30**	**x**	**8-40**
Dalbergia bathiei[3]	x	**2,5-30**	**x**	**10-22**
Dalbergia bojeri[1]	nl1	3	nl[2]	na
Dalbergia brachystachya[1]	nl[1]	na	nl[2]	na
Dalbergia bracteolata[3]	**x**	**2-7**	**x**	**na**
Dalbergia campenonii[1]	nl[1]	na	nl[2]	na
Dalbergia capuronii[1]	nl[1]	nl	nl[2]	12
Dalbergia chapelieri[3]	x	**4-5**	**x**	**11-22**
Dalbergia chlorocarpa[3]	x	**6-20**	**x**	**10-30**
Dalbergia davidii[3]	x	**20-25**	**x**	**30**
Dalbergia delphinesis[1]	nl[1]	2,5-4	nl[2]	9
Dalbergia emirnensis[3]	x	**11-15**	**x**	**na**
Dalbergia erubescens[2]	x	na	nl[2]	na
Dalbergia gautieri[1]	nl[1]	4	nl[2]	na
Dalbergia glaberrima [2]	x	8-12	nl2	na
Dalbergia glaucocarpa [2]	x	10-12	nl[2]	na
Dalbergia greveana[3]	x	**3-20**	**x**	**15-80**
Dalbergia hildebrandtii [2]	x	4-10	nl[2]	na
Dalbergia hirticalyx[3]	x	**na**	**x**	**20**
Dalbergia humbertii[3]	x	**10-20**	**x**	**25**
Dalbergia lemurica[3]	x	**6-10**	**x**	**20-100**
Dalbergia louvelii [2]	x	8-10	nl[2]	18
Dalbergia madagascariensis[3]	x	**5-20**	**x**	**20-45**
Dalbergia madagascariensis subsp. madagascariensis[3]	x	**na**	**x**	**na**
Dalbergia madagascariensis subsp. antongilensis[3]	x	**2-15**	**x**	**30-50**
Dalbergia manongarivensis[1]	nl[1]	na	nl[2]	na
Dalbergia maritima[3]	**x**	**4-15**	**x**	**8-30**
Dalbergia masoalensis[1]	nl[1]	1,5	nl[2]	na
Dalbergia mollis[3]	x	**2-20**	**x**	**22**
Dalbergia monticola[3]	x	**7-30**	**x**	**20-73**
Dalbergia neoperrieri[3]	**x**	**8-25**	**x**	**15-50**
Dalbergia normandii [2]	x	5-15	nl[2]	na
Dalbergia occulta[2]	x	na	nl[2]	na
Dalbergia orientalis[3]	**x**	**7-15**	**x**	**25-40**
Dalbergia peltieri[3]	**x**	**5-12**	**x**	**5-60**
Dalbergia pervillei[3]	**x**	**3-15**	**x**	**12-40**
Dalbergia pseudobaronii[3]	**x**	**8-20**	**x**	**30-50**
Dalbergia pseudoviguieri[1]	nl[1]	1,5	nl[2]	Na
Dalbergia purpurascens[3]	x	**8-25**	x	**20-80**
Dalbergia suaresensis[3]	x	**6-12**	x	**na**
Dalbergia trichocarpa[3]	**x**	**4-25**	x	**15-40**
Dalbergia tricolor[2]	x	2-15	nl[2]	na
Dalbergia tsaratananensis[2]	x	8-10	nl[2]	na
Dalbergia tsiandalana[2]	x	4-6	nl[2]	na
Dalbergia urschii[2]	x	10-12	nl[2]	na
Dalbergia xerophila[1]	nl[1]	3-4	nl[2]	na
Dalbergia viguieri[3]	**x**	**6-12**	**x**	**20**

[1] Species not listed as species with tree life form; [2] Species with tree life form not listed as species capable of achieving **MED;** [3] Species with tree life form and capable of achieving MED; nl[1]: not listed as species with tree life form; nl[2]: not listed as being capable of achieving MED; x: species whose tree life form and/or capability of achieving MED are known; nd = na: information not available

Source: Anon., 2014

Annex 9a: List of formally described *Diospyros* species. (Species able to achieve a minimum exploitable diameter are listed in bold)

Species	Tree life form	Height (m)	Minimum Exploitable Diameter (MED)	Diameter at Breast Height (cm) DBH
Diospyros aculeata[3]	**x**	**3-8**	**x**	**20-30**
Diospyros analamerensis[3]	**x**	**4-15**	**x**	**6**
Diospyros ankifiensis[3]	**x**	**6-10**	**x**	**na**
Diospyros anosivolensis[2]	x	4-7	nl[2]	12
Diospyros baroniana[3]	**x**	**6-10**	**x**	**5-25**
Diospyros bemarivensis[3]	**x**	**5-13**	**x**	**26**
Diospyros bernieriana[3]	**x**	**2-15**	**x**	**5-30**
Diospyros bezofensis[3]	**x**	**5-10**	**x**	**8-30**
Diospyros boinensis[2]	x	1-8	nl[2]	10-15
Diospyros boivini[2]	x	3-10	nl[2]	12
Diospyros calophylla[3]	**x**	**2-15**	**x**	**4-30**
Diospyros cinnamomoides[2]	x	2-15	nl[2]	10-15
Diospyros clusiifolia[3]	**x**	**7-25**	**x**	**20-30**
Diospyros conifera[2]	x	4-15	nl[2]	8
Diospyros coursiana[2]	x	8	nl[2]	na
Diospyros cupulifera[2]	x	4-12	nl[2]	5-15
Diospyros danguyana[2]	x	2-6	nl[2]	10
Diospyros decaryana[3]	**x**	**5-20**	**x**	**20**
Diospyros discorypheoides[1]	nl[1]	1,5-4	nl[2]	na
Diospyros ebenifera[2]	x	12	nl[2]	na
Diospyros enervis[1]	nl[1]	1-2	nl[2]	na
Diospyros erinacea[3]	**x**	**15**	**x**	**20**
Diospyros erythrosperma[2]	x	4-12	nl[2]	4-11
Diospyros ferrea[3]	**x**	**1-10**	**x**	**6-20**
Diospyros filipes[2]	x	1-11	nl[2]	na
Diospyros fuscovelutina[3]	**x**	**2-17**	**x**	**3,5-40**
Diospyros geayana[2]	x	6	nl[2]	na
Diospyros gracilipes[2]	x	3,5-9	nl[2]	6-18
Diospyros greveana[1]	nl[1]	3-4	nl[2]	7
Diospyros haplostylis[3]	**x**	**2-30**	**x**	**3-43**
Diospyros hazomainty[2]	x	8-10	nl[2]	na
Diospyros heterosepala[1]	nl[1]	nd	nl[2]	na
Diospyros humbertiana	**x**	**1,5-12**	**x**	**10-25**
Diospyros implexicalyx[1]	nl[1]	7-8	nl[2]	na
Diospyros ketsensis[1]	nl[1]	nd	nl[2]	nl
Diospyros lanceolata[3]	**x**	**3-12**	**x**	**20-60**
Diospyros latispathulata[1]	nl[1]	nl	nl[2]	na
Diospyros leucocalyx[2]	x	3-7	nl[2]	2-6
Diospyros lokohensis[2]	x	4-12	nl[2]	nd
Diospyros louvelii[2]	x	20	nl[2]	15
Diospyros madecassa[2]	x	6-7	nl[2]	na
Diospyros manampetsae[1]	nl[1]	nd	nl[2]	na
Diospyros mangabensis	**x**	**4-18**	**x**	**10-60**
Diospyros mangorensis[1]	nl[1]	na	nl[2]	na
Diospyros mapingo[3]	**x**	**8-25**	**x**	**4-24**
Diospyros masoalensis[3]	**x**	**12-24**	**x**	**16-20**
Diospyros mcphersonii[1]	nl[1]	3-5	nl[2]	na
Diospyros meeusianal[1]	nl[1]	3	nl[2]	na
Diospyros microrhombus[2]	x	4-5	nl[2]	na
Diospyros myriophylla[2]	x	2,5-9	nl[2]	9-15
Diospyros myrtifolia[2]	x	4-5	nl[2]	10
Diospyros nidiformis[2]	x	2-8	nl[2]	na
Diospyros obducta[1]	nl[1]	2	nl[2]	na
Diospyros occlusa[3]	**x**	**7-25**	**x**	**12-30**
Diospyros olacinoides[2]	x	6-10	nl[2]	13
Diospyros parifolia[2]	x	2-10	nl[2]	8-10
Diospyros parvifolia[1]	nl[1]	na	nl[2]	na
Diospyros perglauca[1]	nl[1]	5	nl[2]	6
Diospyros perreticulata[2]	x	na	nl[2]	na
Diospyros perrieri[3]	**x**	**15-25**	**x**	**na**
Diospyros pervilleana[2]	x	4-9	nl[2]	4-9
Diospyros pervillei[2]	x	8-15	nl[2]	na
Diospyros platycalyx	**x**	**3-10**	**x**	**3-40**
Diospyros pruinosa[2]	x	2-12	nl[2]	3-15
Diospyros quercina[2]	x	5-6	nl[2]	na
Diospyros sakalavarum[3]	**x**	**10-30**	**x**	**13-50**

***Diospyros sclerophylla*[3]**	**x**	**5-12**	**x**	**30**
Diospyros sphaerosepala[2]	x	3-10	nl[2]	7-16
***Diospyros squamosa*[3]**	**x**	**10-20**	**x**	**15-28**
Diospyros stenocarpa[2]	x	4-12	nl[2]	7-16
Diospyros subacuta[1]	nl[1]	4-13	nl[2]	15
Diospyros subenervis[2]	x	6-10	nl[2]	5-18
Diospyros subfalciformis[2]	x	2-12	nl[2]	na
Diospyros subsessilifolia[2]	x	5-10	nl[2]	na
Diospyros subtrinervis[2]	x	7-13	nl[2]	21
Diospyros tampinensis[2]	x	4-12	nl[2]	na
Diospyros tetraceros [2]	x	na	nl[2]	na
Diospyros tetrapoda [2]	x	10-12	nl[2]	na
Diospyros thouarsii[2]	x	3-12	nl[2]	na
Diospyros torquata[1]	nl[1]	3-4	nl[2]	2
***Diospyros toxicaria*[3]**	**x**	**5-20**	**x**	**10-60**
Diospyros tropophylla	**x**	**2-14**	**x**	**3-50**
***Diospyros urschii*[3]**	**x**	**3-18**	**x**	**20-25**
Diospyros velutipes[2]	x	5-12	nl[2]	5-10
***Diospyros vescoi*[3]**	**x**	**4-12**	**x**	**na**

[1] Species not listed as species with tree life form; [2] Species with tree life form not listed as species capable of achieving MED; [3] Species with tree life form and capable of achieving MED; nl[1]: not listed as species with tree life form; nl[2]: not listed as being capable of achieving MED; x: species whose tree life form and/or capability of achieving MED are known; nd: information not available. *Source: Anon., 2014b*

Annex 9b: Lists of "species" not yet formally described as being part of the genus *Diospyros*. (Species able to achieve a MED are listed in bold)

Species	With tree life form	Minimum. Exploitable Diameter[4] (MED)	Height (m)	Diameter at Breast Height (cm) DBH
***Diospyros acutiflora*[4]**	**x**	**x**	**4-12**	**na**
Diospyros ravelonarivoi [1]	x	nl	3-9	3,5
Diospyros sp.8 [1]	x	nl	10	na
Diospyros anjanaharibensis [1]	x	nl	4-4,5	na
Diospyros antongiliensis [1]	x	nl	2-10	na
***Diospyros quadrangularis*[4]**	**X**	**x**	**7-9,5**	**na**
Diospyros ambrensis [1]	X	nl	2-9	18
Diospyros birkinshawii [1]	X	nl	2-15	1-10
Diospyros brevipedicellata [1]	X	nl	8-10	na
Diospyros bullata [1]	X	nl	6	5
Diospyros capuronii	Nl	nl	na	na
Diospyros gautieri sp.	X	nl	10	9
Diospyros gautieri [1]	X	nl	3-10	6-9
Diospyros gracilipes sp.1	Nl	nl	5	na
***Diospyros gracilipes*[1]**	**x**	**x**	**3-10**	**5-12**
***Diospyros gracilipes group indet.*[4]**	**x**	**x**	**5-10**	**na**
Diospyros gracilipes sp.2	na	na	na	na
Diospyros gracilipes group sp.3	**x**	**x**	**na**	**na**
Diospyros gracilipes sp.4	na	na	na	na
Diospyros latinervis [1]	x	nl	3-12	na
***Diospyros lecomtei*[5]**	**x**	**x**	**2-10**	**5-20**
Diospyros longipedicellata [1]	x	nl	3-10	8
Diospyros maba group sp.1 [5]	**x**	**x**	**20-25**	**25**
Diospyros maba group sp.11 [1]	x	nl	7	8
Diospyros maba group sp.12[2]	x	x	4,5-7	15-20
Diospyros maba group sp.2 [1]	x	nl	4-7	na
Diospyros maba group sp.3 [1]	x	nl	9-10	9
Diospyros maba group sp.4 [1]	x	nl	5	nd
Diospyros maba group sp.5 [5]	**x**	**x**	**3-15**	**13-35**
Diospyros maba group sp.7 [1]	x	nl	2-8	na
Diospyros maba group sp.8 [1]	x	nl	2-12	10
Diospyros maba group sp.9 [1]	x	nl	4-5	3
Diospyros mahaboensis [1]	x	nl	5-12	4-18
Diospyros megaphylla [1]	x	nl	7-20	na
Diospyros mucronata sp.1	na	na	na	na
Diospyros mucronata group sp.10 [5]	**x**	**x**	**10**	**12-20**
Diospyros mucronata group sp.11	na	na	na	na
Diospyros mucronata group sp.3 [1]	x	nl	5-14	na
Diospyros mucronata group sp.4 [1]	x	nl	13-25	10
***Diospyros nitida*[5]**	**x**	**x**	**5-13**	**15-30**

Diospyros plicata [1]	x	nl	2-7	2-6
Diospyros ranomafanensis [1]	x	nl	3-8	na
Diospyros undulata [1]	**x**	**x**	**8**	**20**
Diospyros velutipes [1]	x	nl	4-10	5-10
Diospyros lewisae	nl	nl	4-6	na
Maba group sp.2 [1]	x	nl	7	nd
mcphersonii [1]	x	nl	12	nd
Mucronata group sp.6 [5]	**x**	**x**	**18**	**20**
Mucronata group sp.7 [1]	x	nl	14	nd
Mucronata group sp.9 [1]	x	nl	20	na
nana	nl	nl	1-3	na
patricel	nl	nl	4	na
Platycalyx group sp. Indet. [1]	x	nl	6-7	na
Platycalyx group sp.1 [1]	x	nl	5-12	na
Platycalyx group sp.3 [1]	x	nl	22	na
Platycalyx group sp.4 [2]	nl	nl	2-5	na
Platycalyx group sp.5 [1]	x	nl	5-8	na
Pruinosa group sp.3	nl	nl	3	na
rostrata [5]	**x**	**x**	**2-18**	**10-26**
sambiranensis	nl	nl	3	na
Sclerophylla group sp.1 [1]	x	nl	4-15	na
Sclerophylla group sp.14 [1]	x	nl	6	na
rostrata [5]	**x**	**x**	**2-18**	**10-26**
sambiranensis	nl	nl	3	na
Sclerophylla group sp.1 [1]	x	nl	4-15	na
Sclerophylla group sp.14 [1]	x	nl	6	na
Sclerophylla group sp.18 [1]	x	nl	10	na
Sclerophylla group sp.19 [5]	**x**	**x**	**20**	**53**
Sclerophylla group sp.2 [1]	x	nl	10	na
Sclerophylla group sp.3 [1]	x	nl	4	na
Sclerophylla group sp.5 [1]	**x**	**x**	**3**	**na**
Sclerophylla group sp.6 [1]	x	nl	30	na
Sclerophylla group sp.7 [1]	x	nl	12	na
Sclerophylla group sp.8 [1]	x	nl	5-10	9
rostrata [5]	**x**	**x**	**2-18**	**10-26**
sambiranensis	nl	nl	3	na
Sclerophylla group sp.1 [1]	x	nl	4-15	na
Sclerophylla group sp.14 [1]	x	nl	6	na
rostrata [5]	**x**	**x**	**2-18**	**10-26**
sambiranensis	nl	nl	3	na
Sclerophylla group sp.1 [1]	x	nl	4-15	na
Sclerophylla group sp.14 [1]	x	nl	6	na
sp.1 [1]	x	nl	4-13	na
sp.10 [1]	x	nl	16	na
sp.12 [2]	na	na	na	na
sp.13	nl	nl	1,5	3
sp.16 [1]	x	nl	6	10
sp.17 [1]	x	nl	12	8
sp.18 [1]	x	nl	3-8	na
sp.19 [2]	nl	nl	1-3	na
sp.2"feuilles marbrées" [5]	**x**	**x**	**2-20**	**20-25**
sp.20 [1]	nl	nl	7	7
sp.21 [1]	nl	nl	7	7-10
sp.24 [1]	nl	nl	14	16
sp.26 [1]	x	nl	14	16
sp.29 [5]	**x**	**x**	**10-12**	**20**
sp.3 [1]	x	nl	7	15
sp.30 [1]	x	nl	7	15
sp.30 bis [2]	nl	nl	5-10	15
sp.32 [1]	x	nl	3-8	10
sp.31 [2]	nl	nl	6	na
sp.33 [1]	x	nl	16-18	na
sp.37 [2]	nl	nl	3-5	nl
sp.4 [5]	**x**	**x**	**2-20**	**9-25**
sp.40 [1]	x	nl	7	8
sp.5 [5]	**x**	**x**	**7-12**	**9-23**
sp.6 [1]	x	nl	2-12	5-12
sp.8 [1]	x	nl	2,5-10	na
sp.9 [2]	nl	nl	4	na
Subsessilifolia group sp. Indet [1]	x	nl	5	na
Subsessilifolia group sp.4 [1]	x	nl	na	na
Subsessilifolia group sp.5 [1]	x	nl	9	na

tropophylloides[1]	x	nl	2-10	12
Diospyros chitoriophora[3]	**x**	**x**	**na**	**na**
Diospyros impressinervis[3]	**x**	**x**	**na**	**na**

[1] Species with tree life form not listed among those which are with MED; [2] MED species not listed with tree life form and not listed; [3] MED species listed with tree life form (x); [4] MED species listed with tree life form and on which DBH information is not available; [5] MED species listed with tree life form and on which information is available; nl: Species not listed as species with tree life form and/or with MED; x: Species whose tree life form and/or MED are known; nd: Information not available
Source: Anon., 2014b

Annex 10: Regeneration potential of 28 MED *Dalbergia spp*.

Species	Regeneration rate (%)
Dalbergia abrahamii	28,70 (Montagne de Français)[1]
Dalbergia andapensis	100 (Andranomenahely)[2]
Dalbergia baronii	500 (Manombo)[1]; 200 (Kianjavato)[3]
Dalbergia bathei	na
Dalbergia braceolata	na
Dalbergia chapelieri	228,57 (Kianjavato)[1]
Dalbergia chlorocarpa	50 (Andranomenahely)[2]
Dalbergia davidii	na
Dalbergia emirnensis	na
Dalbergia greveana	24 (Complexe Bongolava)[1]; 336,30 (Analabe)[3]
Dalbergia hirtycalyx	na
Dalbergia humbertii	na
Dalbergia lemurica	na
Dalbergia madagascariensis	50 (Manombo)[1]; 112 (Kianjavato)[3]
Dalbergia suous esp antongilensis	na
Dalbergia madagascariensis sous esp.madagascariensis	na
Dalbergia maritima	700 (Kianjavato)[3]
Dalbergia mollis	16 (Beroroha)[1]; 30 (Nord Bongolava)[3]
Dalbergia monticola	666 (CAZ) [1]; 20 (Zahamena)[3]
Dalbergia neoperrieri	na
Dalbergia orientalis	300 (Kianjavato)[3]
Dalbergia peltieri	35 (Ankarafantsika)[3]
Dalbergia pervellei	na
Dalbergia pseudobbaronii	na
Dalbergia purpurascens	40 (Beroroha), 150 (Betioky sud)[1]
Dalbergia suaresensis	na
Dalbergia trichocarpa	480 (Complexe Bongolava) [1]; 65 (Ankarafantsika)[3]
Dalbergia viguieri	100 (Andranomenahely)[2]

na: information not available
Source: [1] Anon., 2010b; [2] Anon., 200a; [3] Anon., 2013b

Annex 11: Regeneration potential of the 29 formally described MED *Diospyros sp*p.

Species	Regeneration rate (%)
Diospyros aculeata	250 (Montagne des Français)[1]; 0 (Betioky)[2]
Diospyros analamerensis	na
Diospyros ankifensis	na
Diospyros baroniana	na
Diospyros bemarivensis	na
Diospyros bernieriana	300 (COFAV)[3]
Diospyros bezofensis	na
Diospyros calophylla	380 (Ambilalemaitso)[2]
Diospyros clusiifolia	na
Diospyros decaryana	na
Diospyros erinacea	na
Diospyros ferrea	250 à 810 (Mahabo Manarivo)3
Diospyros fuscovelutina	na
Diospyros haplostylis	100 (Andevoranto)[2], 0 (Anarafantsika)[3]
Diospyros humbertiana	na
Diospyros lanceolata	0 (Zahamena)[3]
Diospyros mangabensis	na
Diospyros mapingo	na
Diospyros masoalensis	na
Diospyros occlusa	na
Diospyros perrieri	0 (Montagne des Français) [2]
Diospyros platycalyx	0 (Kianjavato)[3]
Diospyros sakalavarum	150 (Complexe Bongolava)[2]
Diospyros sclerophylla	na
Diospyros squamosa	3100 (Mahabo Manarivo)[3]
Diospyros toxicaria	200 (Complexe Bongolava)[2]; 200 (COFAV)[3]
Diospyros tropophylla	84,50 (Ankarafantsika)3
Diospyros urschii	na
Diospyros vescoi	na

na: information not available
Sources: [1] Anon., 2010b; [2] Anon., 2013b; [3] Anon., 2009a

Annex 12: Dispersal efficiency of MED *Dalbergia spp*. with information on densities

Species	Densities (individuals/ha)	Seedbearing or regenerating individuals[3]
Dalbergia abrahamii	120 (Montagne des francais)[1]	na
Dalbergia andapensis	31,4 (Andranomenahely)[2]	na
Dalbergia baronii	10 (Manombo)[1]; 30 (Kianjavato)[3]	na
Dalbergia chapelieri	12 (Kianjavato)[3]	na
Dalbergia chlorocarpa	10 (Andranomenahely)[2]	na
Dalbergia greveana	310 (Complexe Bongolava)[1]; 39,44 (Analabe)[3]	Low density *
Dalbergia madagascariensis	250 (Manombo)[1]; 10 (Kianjavato)[3]	na
Dalbergia maritima	80 (Kianjavato)[3]	na
Dalbergia mollis	220 (Beroroha)[1]; 30 (Nord Bongolava)[3]	Low density
Dalbergia monticola	430 (orientale de moyenne altitude); 200 (CAZ)[1]; 10 (Zahamena)[3]	Good regeneration potential
Dalbergia orientalis	40 (Kianjavato)[3]	na
Dalbergia peltieri	46 (Ankarafantsika)[3]	Low density
Dalbergia purpurascens	320 (Beroroha)[1]; 40 (Betioky sud)[1]	Low density
Dalbergia trichocarpa	300 (Complexe Bongolava)[1]; 25,38 (Ankarafantsika)[3]	Low density

na: information not available; * Low-density: the number of individuals identified per hectare is fewer than 5
Sources: [1] Anon., 2010b; [2] Anon., 2009a; [3] Anon., 2013b

Annex 13: Dispersal efficiency and densities of described MED *Diospyros* species

Species	Densities (individuals/hectare)	Seedbearing or regenerating individuals [3]
Diospyros aculeata	70 (Montagne des Français)[1]; 10 (Betioky)[3]	na
Diospyros bernieriana	40 (COFAV)[3]	Irregular **
Diospyros calophylla	450 (Ambilalemaitso)[1]	na
Diospyros ferrea	50-120 (Mahabo Manarivo)[2]	Irregular
Diospyros haplostylis	500 (Andevoranto) [1]; 16,60 (Anarafantsika)[3]	Absent
Diospyros lanceolata	20 (Zahamena)[3]	Low density* and bad regenration at mid altitude
Diospyros perrieri	10 (Montagne des Français)[1]	No seed-bearing individuals
Diospyros platycalyx	22,50 (Kianjavato)[3]	na
Diospyros sakalavarum	50 (Complexe Bongolava)[1]	na
Diospyros squamosa	320 (Mahabo Manarivo)[2] (COFAV)[3]	Irregular
Diospyros toxicaria	30 (Complexe Bongolava)[1]; 30 (COFAV)[3]	Irregular
Diospyros tropophylla	72,70 (Ankarafantsika)[3]	Low density
Diospyros velutipes	na	Irregular

na: information not available; ** Irregular means that the seed-bearing individuals spread themselves irregularly (i.e. dispersed); * Low density means that the number of individuals catalogued per hectare is fewer than 5
Sources: [1] Anon., 2009a; [2] Anon., 2010b; [3] Anon., 2013b.

Annex 14: Characteristics of habitat and national distribution of 28 MED *Dalbergia* spp.

Species	National distribution	Ecofloristic zone	Habitat Characteristics	No. of populations in the Protected Areas	No. of populations outside the Protected Areas
Dalbergia abrahamii	Localized[1]	Dry deciduous forest at low altitude	Dry deciduous forest at low altitude[1]	1	2
Dalbergia andapensis	na	Eastern low altitude	Dense humid forest at low altitude, found mainly along the eastern coast	na	na
Dalbergia baronii	na	Eastern low altitude	Dense humid forest at low altitude, degraded with multi-layered vegetation and a broken forest canopy[2]	8	20
Dalbergia bathiei	Limited and fragmented[2]	na	na		na
Dalbergia bracteolota	Widely distributed, near-continuous across the country[2]	na	na		na
Dalbergia chapelieri	Widely distributed, contiguous in the country	na	Dense humid forest at low altitude, medium degradation level, with a significant degree of openness of about 50%	na	na
Dalbergia chlorocarpa	na	na	na	na	na
Dalbergia davidii	na	na	na	na	na
Dalbergia emirnensis	Widely distributed[2]	na	na	na	na
Dalbergia greveana	Widely distributed, contiguous in the country[2]	Eastern low altitude	Dense dry deciduous forest, dry semi-deciduous, open forests[1], open formations with about 60% degree of openness	13	66
Dalbergia hirtycalyx	na	na	na	na	na
Dalbergia humbertii	na	na	na	na	na
Dalbergia lemurica	Limited and fragmented[2]	na	na	na	na
Dalbergia madagascariensis	Limited and fragmented[2]	Eastern low altitude	Dense humid forest, formation medium level of degradation with closed canopy[2]	6	20
Dalbergia madagascariensis subsp. Antongilensis	Localised[1]	na	na	na	na

Dalbergia madagascariensis madagascariensis	na	na	na	na	na
Dalbergia maritima	Widespread, fragmented[2]	Eastern low altitude	Humid forest formation at low altitude with medium level of degradation, with a significant level of openness, of about 50%	na	na
Dalbergia mollis	Localised[2]	Western low altitude	Deciduous forest seasonally dry and open forest[1] with plant formation with broken canopy reaching a degree of openness of 60-70%	8	24
Dalbergia monticola	Widely distributed, contiguous in the country[2]	Eastern, medium and low altitude	Dense humid forest at medium altitude, low level of openness, little or not degraded[3]	6	10
Dalbergia neoperrieri	Widespread, fragmented[2]	na	na	na	na
Dalbergia orientalis	Widespread, fragmented[2]	Eastern low altitude	Relatively primary forest formation. The structure of the vegetation is multi-layered[3]	na	na
Dalbergia peltieri	Widely distributed, contiguous in the country[2]	Western low altitude	Dense dry deciduous forest relatively intact[3]	na	na
Dalbergia pervillei	Widespread, fragmented[2]	na	na	na	na
Dalbergiq pseudobaronii	na	na	na	na	na
Dalbergia purpurascens	Widespread[2]	Western low altitude	Very diversified habitat of a slightly degraded dense dry deciduous forest with dense humid forest[3]	8	21
Dalbergia suaresensis	Localised[2]	na	na	na	na
Dalbergia trichocarpa	Widespread[2]	Western low altitude	Dense deciduous forest. From a primary little degraded forest to a very open degraded forest, with 70-80% openness and even in the wooded savannas[3]	8	45
Dalbergia viguieri	Widely distributed, contiguous in the country[2]	na	na	na	na

na: information not available

Sources: [1] Anon., 2010b; [2] Anon., 2014b; [3] Anon., 2013b

Annex 15: Characteristics of habitat and national distribution of MED *Diospyros spp.*

Species	National distribution	Characteristics	Habitat Ecofloristic zone	No. of populations in Protected Areas	No. of populations outside Protected Areas
Diospyros aculeata	Limited and fragmented[1]	Dry rocky forest[2], dense dry intact deciduous forest	na	1	15
Diospyros analamerensis	Localised[1]	na	na	na	na
Diospyros ankifiensis	Limited and fragmented[1]	na	na	na	na
Diospyros baroniana	na	na	na	na	na
Diospyros bernarivensis	na	na	na	na	
Diospyros bernierana	Limited and fragmented[1]	Dense humid low altitude forest[2] with closed canopy & a degree of openness of 10-30%	Eastern low altitude	0	1
Diospyros calophylla	Widespread, fragmented in the country[1]	na	Dense humid forest	7	1
Diospyros clusiifolia	Limited and fragmented[1]	na	na	na	na
Diospyros decaranya	na	na	na	na	na
Diospyros ferrea	Widespread, fragmented in the country[1]	Dense humid low evergreen forest, more or less intact[1]	Eastern low altitude	na	na
Diospyros fuscovelutina	Widespread, fragmented in the country[1]	na	na	na	na
Diospyros haplostylis	Widespread, fragmented in the country[1]	From a dense humid forest[2] to a dense dry forest, slightly degraded with closed canopy and low degree of openness[3]	Eastern and Western low altitude	20	22
Diospyros humbertiana	Limited and fragmented[1]	na	na	na	na
Diospyros lanceolota	Limited and fragmented1	Dense humid forest of medium altitude, closed canopy, low degree of openness[3]	Eastern medium altitude	na	na
Diospyros mangabensis	Widely distributed, contiguous in the country[1]	na	na	na	na
Diospyros mapingo	na	na	na	na	na
Diospyros masoalensis	na	na	na	na	na
Diospyros occlusal	Widely distributed, contiguous in the country[2]	na	na	na	na
Diospyros platycalyx	Widely distributed, contiguous in the country[1]	na	na	na	na
Diospyros sakalavarum	Widespread, fragmented in the country[2]	Dense humid forest[2]	na	12	1
Diospyros sclerophylla	Widespread, fragmented in the country[1]	na	na	na	na
Diospyros squamosal	Widely distributed, contiguous in the country[1]	Degraded coastal forest[3]	Eastern low altitude	na	na
Diospyros toxicaria	Widely distributed, contiguous in the country[1]	Dense humid forest[2], quite degraded, situated at the top of the slope. The vegetation presents a degree of openness of 30% and is multilayered[3]	Eastern low altitude	na	na
Diospyros tropophylla	Widely distributed, contiguous in the country[1]	Dense dry deciduous forests, quite open and multilayered[1]	Western low altitude	na	na
Diospyros urschii	na	na	na	na	na
Diospyros velutipes	Widespread, fragmented in the country[1]	Dense degraded very open humid evergreen forest	Eastern low altitude	na	na
Diospyros vescoi	Localised[1]	na	na	na	

na: information not available. *Sources: [1] Anon., 2014b; [2] Anon., 2010b; [3]Anon., 2013b*

Annex 16: The national abundance of described MED *Dalbergia spp.*

Species	Regeneration rate (%) per site	Densities (individuals/ha) per site	Basal areas (m^2/ha) per site	Biovolumes (m^3/ha) per site
Dalbergia abrahamii[1]	28,70 (Montagne de Français)[1]	120 (Montagne des francais)[1]	1.88 (Montagne des francais)[1]	6.63 (Montagne des francais)[1]
Dalbergia andapensis	100 (Andranomenahely)[3]	31.4 (Andranomenahely)[3]	na	na
Dalbergia baronii	500 (Manombo)[1]; 200 (Kianjavato)[2]	10 (Manombo)[1]; 30 (Kianjavato)[2]	1.50 (Manombo)[1]; 0.78 (Kianjavato)[2]	5.70 (Manombo)[1]; 6.61 (Kianjavato)[2]
Dalbergia bathei	na	na	na	na
Dalbergia braceolata	na	na	na	na
Dalbergia chapelieri	228.57 (Kianjavato) [2]	12 (Kianjavato)[2]	0.48 (Kianjavato)[2]	2.87 (Kianjavato)[2]
Dalbergia chlorocarpa	50 (Andranomenahely)[3]	10 (Andranomenahely)[3]	na	na
Dalbergia davidii	na	na	na	na
Dalbergia emirnensis	na	na	na	na
Dalbergia greveana	24 (Complexe Bongolava)[1]; 336 (Analabe)[2]	310 (Complexe Bongolava)[1]; 39 (Analabe)[2]	4.69 (Complexe Bongolava)[1]; 0.30 (Analabe)[2]	34.70 (Complexe Bongolava)[1]; 1.60 (Analabe)[2]
Dalbergia hirtycalyx	na	na	na	na
Dalbergia humbertii	na	na	na	na
Dalbergia lemurica	na	na	na	na
Dalbergia madagascariensis	50 (Manombo)[1] ; 112 (Kianjavato)[2]	250 (Manombo)[1]; 10 (Kianjavato)[2]	4.1 (Manombo)[1]; 0.60 (Kianjavato)[2]	16.50 (Manombo)[1]; 4.62 (Kianjavato)[2]
Dalbergia sous-esp. antongiles	na	na	na	na
Dalbergia madagascariensis sous-esp. Madagascariensis	na	na	na	na
Dalbergia maritima	700 (Kianjavato)[2]	80 (Kianjavato)[2]	0.79 (Kianjavato)[2]	5.9 (Kianjavato)[2]
Dalbergia mollis	16 (Beroroha)[1]; 30 (Nord Bongolava)[2]	220 (Beroroha)[1]; 30 (Nord Bongolava)[2]	2.56 (Beroroha)[1]; 1.02 (Nord Bongolava)[2]	24.7 (Beroroha)[1]; 3.76 (Nord Bongolava)[2]
Dalbergia monticola	666 (CAZ)[1]; 0 (Zahamena)[2]; 430 (Kianjavato)[2]	200 (CAZ)[1]; 10 (Zahamena)[2]	3.17 (CAZ)[1]; 0 (Zahamena)[2]	12.89 (CAZ)[1]; 0.61 (Zahamena)[2]
Dalbergia neoperrieri	na	na	na	na
Dalbergia orientalis	300 (Kianjavato)[2]	40 (Kianjavato)[2]	0.44 (Kianjavato)[2]	2.84 (Kianjavato)[2]
Dalbergia peltieri	35 (Ankarafantsika)[2]	46 (Ankarafantsika)[2]	2.35 (Ankarafantsika)[2]	18.34 (Ankarafantsika)[2]
Dalbergia pervellei	na	na	na	na
Dalbergia pseudobaronii	na	na	na	na
Dalbergia purpurascens	40 (Beroroha); 150 (Betioky sud)[1]	320 (Beroroha)[1]; 40 (Betioky sud)[1]	6 (Beroroha); 0.03 (Betioky sud)[1]	50 (Beroroha)[1]; 0.41 (Betioky sud)[1]
Dalbergia suaresensis	na	na	na	na
Dalbergia trichocarpa	480 (Complexe Bongolava)[1]; 65 (Ankarafantsika [2]	300 (Complexe Bongolava)[1]; 25.38 (Ankarafantsika)[2]	11.06 (Complexe Bongolava) [1]; 0.32 (Ankarafantsika) [2]	40.33 (Complexe Bongolava) [1]; 1.55 (Ankarafantsika)[2]
Dalbergia viguieri	100 (Andranomenahely)[3]	na	na	na

Sources*: [1] Anon., 2010b; [2] Anon., 2013b; [3] Anon., 2009a,* na: information not available

Annex 17: Characteristics of the national abundance of described MED *Diospyros* spp.

Species*	Regeneration rate	Densities (individuals/ha)	Basal areas (m2/ha)	Biovolume(m^3/ha)
Diospyros aculeata	250 (Montagne des Français)[1]; 0 (Betioky)[2]	70 (Montagne des Français)[1]; 10 (Betioky)[2]	0.38 (Montagne des Français)[1] ; 0.40 (Betioky)[2]	0.96 (Montagne des Français)[1]; 0.09 (Betioky)[2]
Diospyros analamerensis	na	na	na	na
Diospyros ankifensis	na	na	na	na
Diospyros baroniana	na	na	na	na
Diospyros bemarivensis	na	na	na	na
Diospyros bernieriana	300 (COFAV)[2]	40 (COFAV)[2]	0.52 (COFAV)[2]	2.76 (COFAV)[2]
Diospyros bezofensis	na	na	na	na
Diospyros calophylla	380 (Ambilalemaitso)[1]	450 (Ambilalemaitso)[1]	1.95 (Ambilalemaitso)[1]	7.71 (Ambilalemaitso)[1]
Diospyros clusiifolia	na	na	na	na
Diospyros decaryana	na	na	na	na
Diospyros erinacea	na	na	na	na
Disopyros fuscovelutina	na	na	na	na
Diospyros ferrea	250 à 810(Mahabo Manarivo)[3]	50-120 (Mahabo Manarivo)[3]	0.95 (Mahabo Manarivo)[3]	2,55 (Mahabo Manarivo) [3]
Diospyros haplostylis	100 (Andevoranto)[1]; 0 (Anarafantsika)[2]	500 (Andevoranto)[1]; 16,60 (Anarafantsika)[1]	4.88 (Andevoranto)[1] ; 0.17 (Anarafantsika)[2]	23,35 (Andevoranto); 0,44 (Anarafantsika)[2]
Diospyros humbertiana	na	na	na	na
Diospyros lanceolata	0 (Zahamena)[2]	20 (Zahamena)[2]	na	na
Diospyros mangabensis	na	na	na	na
Diospyros mapingo	na	na	na	na
Diospyros masoalensis	na	na	na	na
Disopyros occlusa	na	na	na	na
Diospyros perrieri	0 (Montagne des Français)[1]	10 (Montagne des Français)[1]	0.90 (Montagne des Français)[1]	2.88 (Montagne des Français)[1]
Diospyros platycalyx	0 (Kianjavato)[2]	22,50 (Kianjavato)[2]	na	na
Diospyros sakalavarum	150 (Complexe Bongolava)[1]	50 (Complexe Bongolava) [1]	0.56 (Complexe Bongolava) [1]	1.59 (Complexe Bongolava)[1]
Diospyros sclerophylla	na	na	na	na
Diospyros squamosa	3100 (Mahabo Manarivo)[1]	320 (Mahabo Manarivo)[1] (COFAV)[2]	0.02 (Mahabo Manarivo)[1], (COFAV)[2]	0.06 (Mahabo Manarivo)[1] (COFAV) [2]
Diospyros toxicaria	200 (Complexe Bongolava)[1]; 200 (COFAV)[2]	30 (Complexe Bongolava)[1]; 30 (COFAV)[2]	0.08 (Complexe Bongolava)[1] ; 0.17 (COFAV)[2]	0.17 (Complexe Bongolava) [1] ; 0.93 (COFAV)[2]
Diospyros tropophylla	84,50 (Ankarafantsika) [2]	72.0 (Ankarafantsika)[1]	0.84 (Ankarafantsika)[2]	3.39 (Ankarafantsika)[2]
Diospyros urschii	na	na	na	na
Diospyros vescoi	na	na	na	na

na: information not available

Sources: [1] Anon., 2010b; [2] Anon., 2013b; [3] Anon., 2009a

Annex 18: Population trend and principal threats to MED *Dalbergia spp*.

Species	Population trend	Threats	IUCN Categories[3]
Dalbergia abrahamii	Decline[1]	Illegal logging, slash and burn farming [2]	EN B1ab (ii, iii, v)
Dalbergia andapensis	na	na	EN B2ab (iii, v)
Dalbergia baronii	Decline[1]	Selective logging,	VU A1(cd) + A2(cd)
Dalbergia bathiei	na	na	EN A1cd; B2ab (iii, v); C1a+C2a
Dalbergia bracteolata	na	na	LC
Dalbergia chapelieri	na	na	VU A1(cd)+ A2 (cd)
Dalbergia chlorocarpa	na	Selective logging, [2]	LC
Dalbergia davidii	na	na	CR B2ab(iii)
Dalbergia emirnensis	na	na	EN B1ab (i, ii, iii, iv) +2ab (i, ii, iii, iv)
Dalbergia greveana	Decline[1]	slash and burn farming [2]	LC
Dalbergia hirticalyx	na	na	CR B2ab (i, ii, iii, iv, v)
Dalbergia humbertii	na	na	VU A4cd
Dalbergia lemurica	na	na	EN B2ab (ii, iii, iv, v) ; A2cd
Dalbergia madagascariensis	Decline[1]	charcoal burning [2]	VU B2ab (ii, iii, iv, v)
Dalbergia madagascariensis subsp. antongilensis	na	na	VU A1(cd)+2cd
Dalbergia madagascariensis subsp. Madagascariensis	na	na	na
Dalbergia maritima	na	na	EN A1(cd)+A2(cd)
Dalbergia mollis	Decline[1]	Illegal logging, slash and burn farming [2]	VU A2(cd)
Dalbergia monticola	Decline[1]	Illegal logging	VU A1(cd) + A2(cd)
Dalbergia neoperrieri	na	na	VU A1(cd) + A2(cd); B2ab (ii, iii, iv, v)
Dalbergia orientalis	na	na	VU B2ab (iii, v)
Dalbergia peltieri	na	na	LC
Dalbergia pervillei	na	na	LC
Dalbergia pseudobaronii	na	na	VU A4c
Dalbergia purpurascens	Decline[1]	Illegal logging [2]	VU A1(cd)+A2(cd)
Dalbergia suaresensis	na	na	EN, B1ab (i, ii, iii, iv) +2ab (i, ii, iii, iv)
Dalbergia trichocarpa	Decline[1]	Illegal logging, slash and burn farming[2]	LC
Dalbergia viguieri	na	na	EN B1ab(iii)+B2ab(iii)

na : information not available; IUCN Red List Categories : CR (in critical danger of extinction), EN (endangered), VU (vulnerable); LC (lesser concern)

Sources: [1] Anon, 2013b; [2] Anon, 2010b; [3] Anon, 2013c

Annex 19: Population trend and principal threats to the known MED *Diospyros* spp.

Species	Population trend	Threats	IUCN Category[4]
Diospyros aculeata	Decline[1]	Illegal logging, slash and burn farming[3]	NT
Diospyros analamerensis	na	na	na
Diospyros ankifensis	na	na	na
Diospyros baroniana	na	na	na
Diospyros bemarivensis	na	na	na
Diospyros bernieriana	Decline[1]	slash and burn farming, Selective logging[3]	VU B2ab (ii, iii, v), EN A4c
Diospyros bezofensis	na	na	EN B1ab (ii, iii, iv, v) + 2ab (ii, iii, iv, v)
Diospyros calophylla	Decline[1]	Illegal logging[3]	VU B2ab (ii, iii, iv, v)
Diospyros clusiifolia	na	na	EN B2 ab (iii, v)
Diospyros decaryana	na	na	na
Diospyros erinacea	na	na	na
Diospyros ferrea	na	na	VU B2ab (ii, iii, iv, v)
Diospyros fuscovelutina	na	na	NT
Diospyros haplostylis	Decline[1]	Illegal logging, slash and burn farming [3]	LC
Diospyros humbertiana	na	na	VU A3c
Diospyros lanceolata	na	Illegal logging[3]	EN B2 ab (ii, iii, iv, v)
Diospyros mangabensis	na	na	VU B2 ab (ii, iv)
Diospyros mapingo	na	na	Na
Diospyros masoalensis	na	na	EN B1ab (iii, v) + 2ab (iii, v)
Diospyros occlusa	na	na	VU A2ad; B2 ab (ii, iii, iv)
Diospyros perrieri	Decline[1]	Illegal logging, slash and burn farming[3]	VU B2 ab (iii, v) or EN A4cd
Diospyros platycalyx	na	na	EN B2 ab (iii, v)
Diospyros sakalavarum	Decline[1]	Illegal logging, slash and burn farming[3]	NT
Diospyros sclerophylla	na	na	EN B2ab (iii, iv, v)
Diospyros squamosa	na	na	VU B2ab (iii, v)
Diospyros toxicaria	Decline[1]	slash and burn farming [3]	VU B2ab (ii, iii, v)
Diospyros tropophylla	na	na	VU B2ab (iii, v) ; A4c
Diospyros urschii	na	na	EN B2ab (ii, iii, v)
Diospyros vescoi	na	na	Na

na: information not available
IUCN Red List Categories: EN (endangered), VU (vulnerable); LC (lesser concern), NT (near-threatened).
Sources: [1] Anon., 2013b; [2] Anon., 2010b; [3] Anon., 2013d.

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TRAFFIC, the wildlife trade monitoring network, is the leading non-governmental organization working globally on trade in wild animals and plants in the context of both biodiversity conservation and sustainable development.

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