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

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POTENTIAL OF CERTIFICATION SCHEMES TO SUPPORT MANAGEMENT AND SCIENTIFIC AUTHORITIES WITH THE IMPLEMENTATION OF CITES APPENDIX II MEASURES FOR MEDICINAL AND AROMATIC PLANT SPECIES

This document has been submitted by Germany at the request of TRAFFIC in relation to agenda items 10.3 and 20 on *Guidance on making non-detriment findings for plants* and *African cherry* (Prunus africana)*: Report of the Secretariat.*[*]

[*] *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

Potential of certification schemes to support Management and Scientific Authorities with the implementation of CITES Appendix II measures for medicinal and aromatic plant species

Stacks of harvested wild Candelilla *Euphorbia antisyphilitica*. Chihuahua Desert, near Torreón, Chihuahua, Mexico

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Table of Contents

I. Introduction

Thousands of wild-sourced plant species are used by humans as food and medicines. The existing and growing market demand for these resources creates an important driver of increased harvesting pressure. International trade in medicinal and aromatic plants (MAPs) of both wild and cultivated origin has been increasing, illustrated for example by analysis of Customs code HS1211[1] of 1999-2015 data. During this period the value of products in trade tripled (an increase of USD4.9 billion[2]) and increased in volume by 1.2 billion kgs (UN Comtrade database). This increase in trade has been placing greater pressures on wild plant populations.

Of the CITES Appendix II listed MAPs, the total amount of wild-sourced species traded between 2006 and 2015 was 25 million kg (or 47% of all trade reported). The attribution of approximately half of all trade to wild-sourced specimens appears fairly stable over the ten-year period, suggesting that wild-sourced MAPs will continue to make up a large proportion of trade in the future.

The medicinal plant trade chains may include multiple stakeholders with the minimal value captured at the level of primary producers. The nature of the processing and trade in these ingredients is complex, as one ingredient may be used in multiple products by multiple manufacturing companies in different sectors. It is not uncommon for trade chains to cross borders and be handled by multiple companies during various stages of processing and consolidation (Lehr & Jaramillo, 2017). It is for reasons such as this that CITES implementation can be difficult for MAP species.

Given the increase in medicinal plant trade, the frequently complex associated trade chains and a lack of capacity and resources hampering Parties making NDFs (Kasterine *et al* 2012), the technical support and third-party auditing that the voluntary certification standards provide could be of assistance. The role that the voluntary certification schemes and standard systems could play in verifying sustainable trade in CITES-listed MAP species has not been thoroughly explored to date. For these reasons, BfN and TRAFFIC have initiated a project that aims to analyse whether existing certification schemes could assist with implementation of CITES for Appendix II listed MAPs.

The paper presents the intermediate state of findings and concludes by highlighting what further areas of research are needed to enable certification schemes to make a relevant contribution to the CITES implementation process.[3] The relevant CITES processes are examined, which could be supported with information from certification schemes, including the non-detriment finding (NDF) process, legal acquisition and traceability of products. An overview of the performance standards/voluntary certification scheme application to CITES Appendix II listed MAPs is presented, together with a case study on trade in *Nardostachys grandiflora*, a wild-sourced CITES Appendix II listed MAP species.

[1] HS1211 – Plants and parts of plants (including seeds and fruits), of a kind used primarily in perfumery, in pharmacy or for insecticidal, fungicidal or similar purposes, fresh, chilled, frozen or dried, whether or not cut, crushed or powdered.
[2] This figure has not been adjusted to account for inflation.
[3] Throughout the paper the term “countries” corresponds to the countries and territories listed in the CITES Trade Database in the relevant exporter and importer fields.

II. CITES implementation of Article IV

Of the 857 MAP species[4] listed in the CITES Appendices, 827 are listed in Appendix II. Under Article IV of the Convention, an export permit for Appendix II listed species will only be granted if:

a) a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species;
b) a Management Authority of the State of export is satisfied that the specimen was not obtained in contravention of the laws of that State for the protection of fauna and flora; and

In order to implement Article IV2(a) effectively, CITES requires Scientific Authorities (SAs) to make a ***non-detriment finding*** **(NDF)**. The general guidance on making NDFs in Resolution Conf. 16.7 (Rev. CoP17)[5] states that the findings are based on ***resource assessment methodologies*** which may include, but are not limited to:

- species biology and life-history characteristics;
- species range (historical and current);
- population structure, status and trends (in the harvested area, nationally and internationally);
- threats;
- historical and current species-specific levels and patterns of harvest and mortality (e.g. age, sex) from all sources combined;
- management measures currently in place and proposed, including adaptive management strategies and consideration of levels of compliance;
- population monitoring; conservation status.

NDFs have been a requirement of the CITES Convention since its inception, but due to the more general outline provided by CITES, many SAs find it difficult to implement this process fully (UNEP-WCMC, 2013).

Efforts have been made to guide SAs on how to make findings with a substantial checklist being produced in 2002 (Rosser & Haywood, 2002) and more taxon specific guidelines are now available. In 2008, a workshop in Cancun brought together SAs and more than 100 experts to discuss further the methods used and guidance to make NDFs. Building on the outcomes of that meeting with regard to MAP species, a nine-step process for producing perennial plant NDFs (see **Error! Reference source not found.**) was developed and published in 2016 (Wolf, Oldfield, Schippmann, & Leaman, 2016)[6], which provides technical guidance including consolidated worksheets and a draft report format.

[4] Data provided by the International Union for the Conservation of Nature / Species Survival Commission Medicinal Plant Specialist Group (IUCN/SSC MPSG)
[5] Available at: https://www.cites.org/sites/default/files/document/E-Res-16-07-R17.pdf
[6] Available at: https://cites.org/sites/default/files/eng/cop/17/InfDocs/E-CoP17-Inf-45.pdf. A respective NDF guidance for timber producing species is in preparation.

Where there are concerns over whether trade is being undertaken within sustainable limits, the Plants Committee can include a species within the **Review of Significant Trade**. This process assesses whether each range State that is trading a species is making adequate NDFs and if there are concerns, a range State will

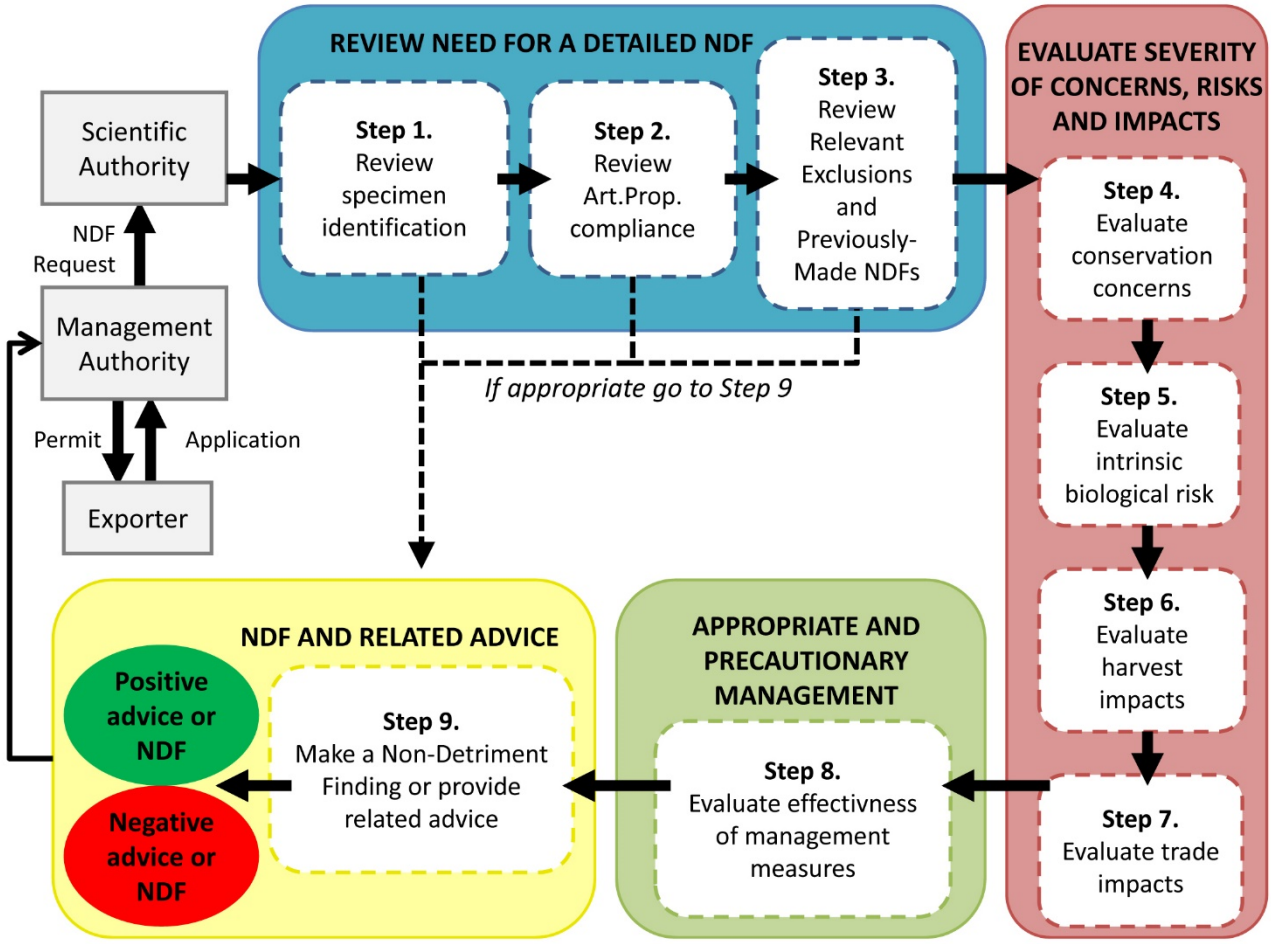

Figure 1 Nine step process on producing an NDF for perennial plants (source: Wolf, Oldfield, Schippmann, & Leaman, 2016)

receive a recommendation to take remedial action. In extreme instances, and where recommendations have not been implemented within the specified timeframe, the Standing Committee may recommend Parties to **suspend trade** with that range State for that species until action is taken. This can potentially cause issues for businesses and their supply chains, reduce potential revenue for exporting range States and cut off income potential for those involved in the trade – often the rural poor. Some of the CITES Appendix II listed MAP species entered into a Review of Significant Trade following the last three Conference of the Parties (CoPs) to CITES and have been subject to export quotas or trade suspensions. For example, *Prunus africana* was the subject of a Review of Significant Trade after CoP16: currently six Parties have export quotas and two Parties are subject to trade suspensions.

Management Authorities have the responsibility of ensuring specimens were not obtained in contravention of the laws of that State (CITES, 1984). This is often called a ***legal acquisition finding*** (LAF) and one of the best ways of supporting a legal acquisition finding is by employing a traceability system. ***Traceability systems*** can also link specimens to their geographic origins and therefore the trade in wild specimens can be monitored and aid SAs with making non-detrimental findings.

CITES already operates traceability systems via the issuance of permits/certificates that trace the origin, purpose, quantity, taxon importing country and exporting country to monitor the trade of species listed in its

Appendices. However, for certain species, additional measures have been implemented to enhance the level of traceability and ensure that trade is sustainable.

The development of traceability systems is now an important matter for a larger number of taxa and Decision 17.152 directed the Standing Committee to establish a working group on traceability to harmonise and prevent any repetition of efforts. At the 69th meeting of the Standing Committee a Working Group on Traceability was created[7].

III. Certification schemes overview

Certification schemes were created to address consumer concerns regarding social, environmental and ethical aspects of a product's production (Shanley, Pierce, Laird, & Robinson, 2008). These schemes exist in many industries to evaluate performance against a set of standards and can be led by governments, third parties or companies themselves.

Third-party voluntary standards — which are the subject of this project — allow for external auditing and tend to require more exacting scientific standards and are able to separate responsible companies from companies that engage in hype surrounding environmental issues (Shanley *et al.*, 2008). Examples of third-party certification schemes include the Marine Stewardship Council (MSC), which certifies sustainable fisheries and the Forest Stewardship Council (FSC) which certifies areas of forest that harvest timber and non-timber forest products (NTFPs) sustainably.

In the context of wild-sourced plants (excluding timber), fungi and lichens, the most comprehensive system currently in use is the FairWild Standard, which sets out key criteria and principles for companies and producers to meet around verifiably sustainable sourcing and equitable trade; compliance is assured through third-party auditing. A selection of certification schemes are backed by laws, such as the EU organic production regulation which came in to force in 2009 (The Council of the European Union, 2007), which sets out the standard for organic certification.

From reviewing literature, the only example found of a CITES Appendix II listed species where a third-party certification scheme had been applied for Big-leaf Mahogany *Swietenia macrophylla* from a FSC certified forest in Brazil run by the company Agrocortex in 2015. Agrocortex is currently the only organisation in Brazil that is authorised to manage and trade in Big-leaf Mahogany. Due to its recent nature, the only document that could be found relating to this certification was Agrocortex's management plan for 2015 (Agrocortex, 2015).

For CITES Appendix II listed MAPs, there are known examples where wild plant ingredients have had organic certification (against the EU organic standards or the United States Department of Agriculture National Organic Programme (USDA NOP).

A recently started, ongoing project by TRAFFIC and The Asia Network for Sustainable Agriculture and Bioresources in Nepal (funded by the UK Government's Darwin Initiative) aims to pilot FairWild certification for the CITES Appendix II listed *Nardostachys grandiflora*. The FairWild Standard's traceability approach in the context of its applicability to the trade in CITES-listed species (Lehr & Jaramillo 2017) is summarized below (see box 1).

[7] Available at: https://cites.org/sites/default/files/eng/com/sc/69/E-SC69-42.pdf

IV. Relevance of certification to CITES implementation of Article IV

The application of appropriate certification schemes for harvest and trade in wild MAPs may provide relevant **field-based resource assessment information** needed to complement and fill-in potentially limited resources and capacities available for conducting NDFs. Also, given the long and complicated nature of MAP supply chains it is valuable to know if **levels of traceability required by certification schemes could help Management Authorities in making LAFs relating to MAPs**.

Given that few examples of certification schemes supporting the CITES process exist, and in order to evaluate how relevant and compliant certification schemes are against the relevant CITES requirements, a matrix was drawn up to compare certification standard requirements against the NDF requirements recommended in *Resolution Conf. 16.7 (Rev. CoP17*) Non-detriment findings[8]. This overview will be presented in a side event at the 24th meeting of the CITES Plants Committee.

Four standards were included in the initial review to assess whether the selected certification schemes can provide sources of data and technical assistance to SAs in their efforts to make accurate, up-to-date NDFs:

- FairWild: FairWild Standard Version 2.0 Performance Indicators[9] (see box 2).
- UEBT/UTZ: Field Checklist for UEBT/UTZ Certified Herbal Tea[10]
- FSC: International Generic Indicators[11]
- Soil Association organic certification: Soil Association organic standards for woodland[12]

To date, the review against the FairWild Standard has been the most complete, and initial results show that it contains all the elements presented in the 9 Steps NDF guidance for perennial plants (Wolf *et al.*, 2016) and *Res. Conf. 16-7 (Rev. CoP 17)*.

Other observations to date include noting that the FSC focus is on the management of an area, rather than specific species, which may be limiting in terms of providing specific data for conducting NDFs. Selected aspects of the analysed schemes' requirements, which would need minor expansions of scope, include the need to expand the monitoring of harvest impact to consider more than just the collection site and a means to assess the magnitude of any illegal trade.

The literature also suggests that certification schemes could provide support to MAs in making LAFs. Analysis by Lehr & Jaramillo (2017) suggests that this is the case after examining the insights provided by the FairWild Standard traceability framework, designed specifically for wild-harvested plant and plant ingredients, and the Union of Ethical BioTrade standard. All of the other certification schemes assessed in the NDF matrix also have elements relating to traceability in their certification standard requirements which could provide support to MAs in makings LAFs.

The initial findings show that certification schemes could assist SAs in making NDFs, MAs in making LAFs and support the sustainable trade of CITES Appendix II listed MAP species.

***Nardostachys grandiflora* case-study**	**Box 1**

[8] Available at: https://www.cites.org/sites/default/files/document/E-Res-16-07-R17.pdf
[9] Available: http://www.fairwild.org/certification-documents/
[10] Available: http://ethicalbiotrade.org/dl/Field-Checklist-for-UEBT_UTZ-Herbal-Tea-version-1.3-Nov-2016.pdf
[11] Available: https://ca.fsc.org/preview.fsc-std-60-004-international-generic-indicators.a-1011.pdf
[12] Available: https://www.soilassociation.org/media/6310/sa-woodland-standards.pdf

The project reviewed a selection of CITES Appendix II listed species to assess their suitability for certification and whether that could assist SAs and Management Authorities (MAs) in their implementation of CITES. *Nardostachys grandiflora* was selected owing to its importance in trade and its known history of trade restrictions disrupting global trade.

N. grandiflora is wild-harvested and the plants and rhizomes used as antiseptics or to treat ailments such as epilepsy or diabetes. Trade data (see annexe 1) show that Nepal was the only exporter of *N. grandiflora* between 2006 and 2015. Importers vary (over the same time period): 91% of importers were in Europe according to importer reported quantities, whereas more than 99% of imports were by India and Pakistan according to exporter reported quantities. Trade into Europe was affected between 2008 and 2013 due to an EU Negative Opinion preventing imports of *N. grandiflora* into the EU. A Positive Opinion was returned by the EU in 2014, allowing trade in *N. grandiflora* to resume between Nepal and the EU (European Commission, 2014).

Harvesting The harvest season occurs between August and October and rhizomes are collected by hand using a digging tool (CITES Secretariat, 2008). The annual harvesting season frequently only lasts for 8 to 10 days due to snowfall (Amtaya & Sthapit, 1994). Post-harvest processes include distillation in order to separate the oil from the rhizome (Li *et al*., 2009). Unfortunately, due to the increasing commercialisation of *N. grandiflora* former traditional practices (agreed harvest start dates after seed fall, allowed tools and exclusion of outsiders) have disappeared (CITES Secretariat, 2008). This has led to the overexploitation of *N. grandiflora* and practices such as collecting the entire plant (rather than just some of the rhizomes to allow for regeneration) and also the collection of juvenile plants (Pandit & Thapa, 2003).

Livelihood contribution It has been estimated that the annual harvest of *N. grandiflora* contributes between 18 to 30% of annual income to 19,000 households (Olsen, 2005).

Suitability for certification to support CITES implementation Currently there is a lack of knowledge about the population size of *N. grandiflora*, but the literature suggests that populations are declining due to overharvesting and poor harvesting techniques (CITES Secretariat, 2008). Certification could help traders, collectors and management authorities to implement population monitoring and management plans to ensure sustainable harvests and the data generated through third party verification could provide key information upon which robust NDFs could be made. *N. grandiflora* was also the subject of an EU trade suspension. In case certification schemes can help in the implementation of CITES provisions, this may raise the importing Parties' confidence that the harvesting of certified *N. grandiflora* is not detrimental to the survival of the species. A conservation project in its early stages of development is being rolled-out in Nepal to pilot the FairWild certification for this species.

FairWild Standard and certification scheme **Box 2**

The FairWild Standard and certification scheme is a private, third-party scheme that certifies wild collected plant resources. The purpose of the Standard is to ensure the continued use and long-term survival of wild species and populations in their habitats, while respecting traditions, cultures, and supporting the livelihoods of all stakeholders, notably, collectors and workers by providing benefit-sharing throughout the value chain (Lehr & Jaramillo, 2017).

Of relevance to developing NDFs, the FairWild Standard requires the collection operation to define the target species' harvesting area (underpinned by a detailed map), to develop and document the Species and Area Management Plan, which integrates the outcomes of the species resource assessment (inventory), as well as the appropriate monitoring plan. It requires the documentation of the sustainable collection practices at the site/operation-level.

Within the performance indicators of FairWild, Principle 10 relates to applying responsible business standards and more specifically under that heading is section 10.2, which explains performance indicators relating to traceability

(FairWild Foundation, 2010). FairWild certification is based on the principle that certified products require physical traceability and separation of ingredients throughout the whole supply chain until blended in the finished product (FairWild Foundation, 2014). There are a variety of FairWild certified operators certified as "organic wild" good manufacturing practice (GMP)-compliant or certified against hazard analysis and critical control points (HACCP) where traceability is controlled from a processing step.

FairWild also requires and provides for traceability at the harvesting site, which is important in the verification of the sustainability of wild-harvesting practices on the ground, key for the implementation of CITES provisions. There are over 20 certified suppliers of wild-harvested, non-CITES-listed MAPs in Africa, Asia, Europe, and Latin America, including Baobab fruit (*Adansonia digitata*), liquorice root (*Glycyrrhiza* spp.), Peru Balsam (*Myroxylon balsamum*), and Terminalia fruits (*Terminalia* spp).

V. Discussion and further questions

Trade in CITES Appendix II listed species can be a complicated process that is often hard to monitor for MAs and SAs. This paper aims to start to investigate if certification schemes could help with the implementation of CITES for the international trade of MAP species, and what are the likely benefits and costs of the certification of CITES Appendix II listed MAPs.

CITES is currently researching different traceability schemes and has established a working group on traceability to help with LAFs, which can only be issued if MAs are satisfied specimens have not been obtained illegally. An initial review of a selection of certification schemes demonstrates they have traceability requirements built into their requirements which would help MAs to make LAFs.

CITES trade in Appendix II listed species also requires SAs to advise that an export will not be detrimental to the survival of a species. Making NDFs may be hampered by a lack of capacity and resources, where the technical support and regular third-party auditing that certification provides could be of assistance. Importing Parties may also have more confidence in trading CITES Appendix II listed specimens if a third party has also audited wild collection to ensure that it is legal and sustainable. A preliminary review was carried out of the FairWild Standard against elements provided in *Res Conf. 16.7 (Rev. CoP17*[13]*)* and in the 9 Steps NDF guidance for perennial plants (Wolf *et al*., 2016) to assess whether it could help SAs with their implementation of CITES through NDFs. Results of the review showed that FairWild Standard certification closely mirrored the guidance for NDFs and would only require minor modifications to its performance standards to help support the CITES process for Appendix II listed species.

A number of Appendix II listed MAPs have been the subject to trade bans and restrictions. The detailed management plans required by certification schemes that ensure sustainable harvests and provide basis for continuous monitoring of populations, may help preventing the trade bans or restrictions in future. This may also positively influence the producers and companies along the supply chains, as the associated costs caused by interrupted business (e.g. waiting for shipments to be given an export permit because of delays in making NDFs or LAFs or supply interruptions from trade bans/restrictions) would not be incurred.

Additionally, the certification schemes tend to have principles relating to benefit sharing, customary rights and ensuring benefits for collectors and their communities. Such principles go further than is required for trade in CITES Appendix II listed species, but fit with the mandate of the *CITES working group on livelihoods*

[13] Available at: https://www.cites.org/sites/default/files/document/E-Res-16-07-R17.pdf

which aims to mitigate the negative impacts and enhance the positive opportunities for rural communities (*Res. Conf. 16.6 (Rev. CoP17)* CITES and livelihoods[14]).

From a business perspective, a number of pre-conditions need to be met, in order for the benefits of the certification of CITES Appendix II listed MAPs to outweigh the financial and administrative costs. Such pre-conditions include, among others, the availability of receptive markets available for certified products. This may mean that some CITES Appendix II listed MAPs are likely to be more suitable for certification than others. The activities are ongoing to develop a set of key relevant factors for this, for example the degree to which a species is wild-harvested and traded internationally, the availability of a market receptive to certified products and an industry willing or able to absorb the costs of certification, and the likelihood of CITES MAs and SAs to use the findings of certification schemes to support their making of NDFs and LAFs for products that have been certified. The overview of the CITES Appendix II listed wild sourced MAPs trade (presented in Annexe I) is instrumental in the initial development of these factors.

Further consultation with the CITES MAs and SAs of the most important exporting and importing countries is needed to address such issues. It would also be needed to identify relevant processes for appropriate certification schemes to be accepted as technical support for NDFs. This study will continue to assess relevant certification schemes and the likelihood of MAs and SAs to utilise them for CITES Appendix II listed MAPs, the benefits to businesses and willingness to bear the costs, as well as the suitability criteria for certification to assist CITES implementation.

A CITES Plants Committee side-event is planned to receive feedback from the participants, as well as a workshop in the second half of 2018.

CITES Plants Committee Side-Event

CITES and certification of medicinal and aromatic plants

Tuesday, 24 July 2018 12:30 - 14:00

Location: Room 5 - Level 3

Side event description: Voluntary standard systems and certification schemes that verify the sustainability of harvesting practices on the ground using rigorous methodology can play a complementary role in enabling the implementation of CITES requirements. In particular, the conducting of Non-Detriment Findings and the demonstration of full traceability of ingredients in trade. The event will present a summary of trade in wild-harvested CITES Appendix II listed medicinal and aromatic plant species, set out the context in which voluntary certification can play a role in safeguarding plant resources and improving trade practices, and outline how a selection of voluntary standards compare against the appropriate NDF requirements. It will open the floor for discussion, focussing on whether certification can provide such a supporting role to CITES Management and Scientific Authorities in implementation CITES provisions, what are the costs and benefits of certification, and what relevant factors there are to determine whether particular wild-harvested species are suitable to the application of voluntary standard systems.

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[14] Available at: https://cites.org/sites/default/files/document/E-Res-16-06-R17.pdf

Abbreviations and Acronyms

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

CoP – Conference of the Parties

CTE – Critical Tracking Event

EU – European Union

FSC – Forest Stewardship Council

IUCN – International Union for the Conservation of Nature

KDE – Key Data Element

LAF – Legal Acquisition Finding

Lao PDR – Lao People's Democratic Republic

LAS – Legal Assurance System

MA – Management Authority

MAPs – Medicinal and Aromatic Plant Species

NDF – Non-Detriment Finding

IUCN/SSC MPSG – International Union for the Conservation of Nature / Species Survival Commission Medicinal Plant Specialist Group

SA – Scientific Authority

UEBT – Union for Ethical Biotrade

UI – Unique Identification

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Annexe 1 - Overview of CITES MAPs trade

According to the IUCN/SSC MPSG, there are 827 MAP species listed in CITES Appendix II. The CITES Trade Database[15], was used to analyse the global commercial trade in these species sourced from the wild, including the quantities in trade, commodities, and the major importing and exporting nations.

Data from the ten years between 2006 and 2015 were analysed using kilograms as the unit of mass and results are based on quantities reported by importers. All analyses (unless otherwise stated), use the 'W' (wild sourced) source code and the 'T' (commercial) purpose code. Other units (such as bags or sets) were not included as they constituted a minority of the overall trade and are unquantifiable.

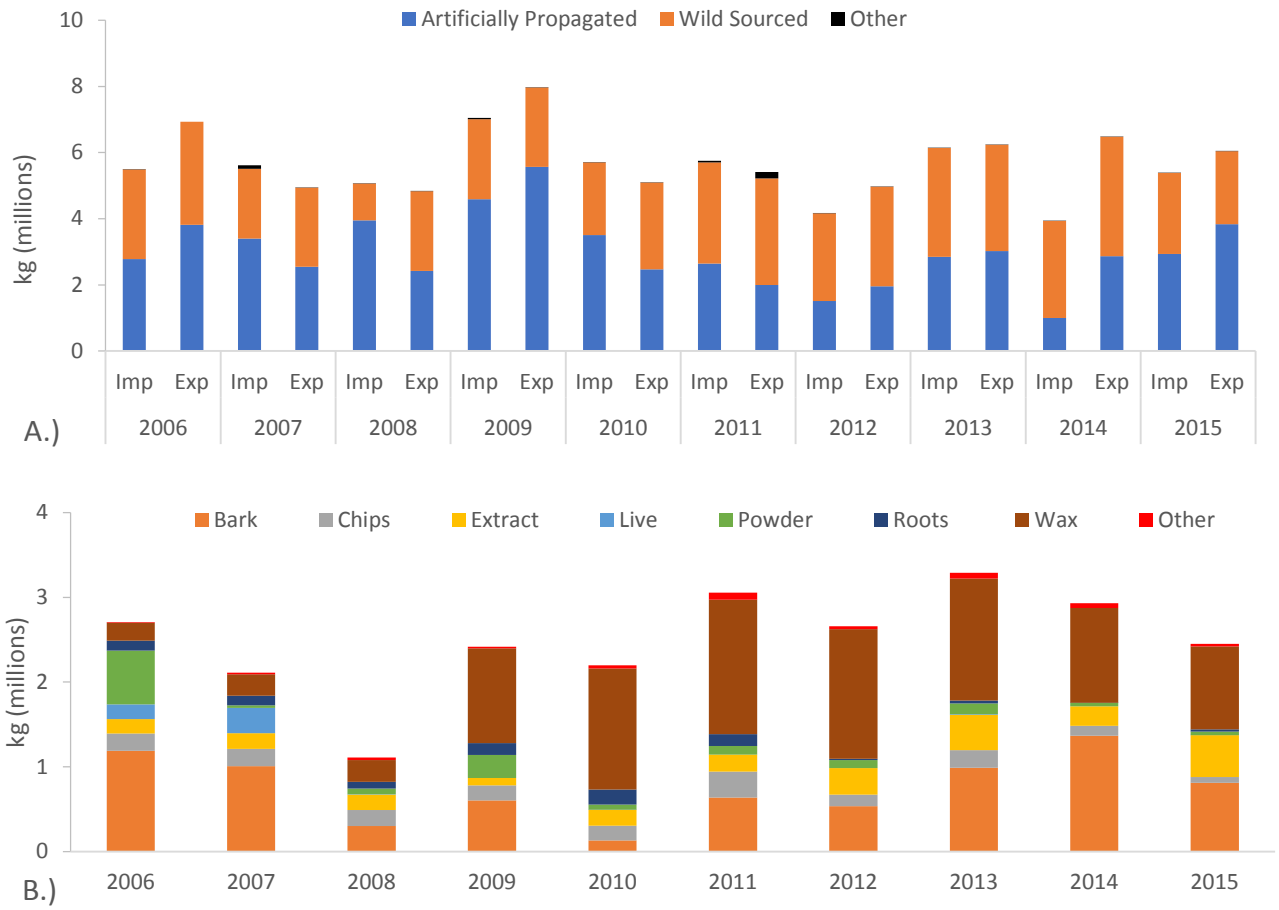

Figure 2 Importer and exporter reported quantities in kilograms of wild sourced (W), artificially propagated (A) and other (all remaining source codes combined) of Appendix II listed MAPS between 2006 and 2015 (A). Reported trade in CITES-listed, wild collected MAP commodities between 2006 and 2015 as reported by importers in kilograms (B).

The total amount of wild-sourced CITES MAPs, traded between 2006 and 2015 was 25 million kg (or 47% of all trade reported).

During the ten-year period between 2006 and 2015 there has been a variable trade in MAP species reported in kilograms, of which, almost half of the total (47%) is made up of wild harvested specimens. In total, 43 MAP species listed in CITES Appendix II were reported by both importers and exporters as traded during this

[15] Available at: https://trade.cites.org/

period. Overall, the data suggest that the major importing continents are Europe, Asia and North America with most exports originating in Africa, Asia and North America.

A total trade (including wild-sourced and artificially propagated sources) volume of 54 million kg of MAPs was exported globally during the 10-year period whilst annual trade varied over the same period, ranging from 3.9 million kg in 2014 to 7.1 million kg in 2009 (Figure 3A).

The attribution of approximately half of all trade to wild-sourced specimens appears fairly stable over the entire study period, suggesting that wild-sourced MAPs will continue to make up a large proportion of trade in the future.

When investigating individual **commodities**, 87% of all wild-sourced trade reported in kilograms comprised bark, chips, extract, powder and wax over the ten-year period (Figure 3B). Between 2006 and 2008 wax accounted for 12% of this trade, whereas between 2009 and 2015 this figure increased to 48% (Figure 3B). Trade in wax is dominated by *Euphorbia antisyphilitica* wax, which accounted for 99.5% of all trade in wax. Bark accounted for 30% of the total MAP trade reported in kilograms: all, except 4 kg, was from *Prunus africana.*

40 countries (Figure 4) reported importing wild-sourced MAPs for commercial purposes using the unit kilograms. Five countries were responsible for 77% of all such imports: France (26%), USA (16%), Japan (15%), Germany (11%) and Spain (7%).

Many of the largest exporting countries of wild MAPs are in tropical Africa and Asia. In total, 42 countries exported MAPs between 2006 and 2015 (Figure 4). The **top three exporting countries—according to importer reported quantities—are responsible for 75% of all wild sourced MAP exports using kg as unit**.

- Mexico is responsible for 47% of such global exports of MAPs, 99% of Mexico's trade is of *Euphorbia antisyphilitica*.
- Cameroon is the second highest exporter (17% of global MAP exports) and 100% of Cameroon's exports are of *Prunus africana*.
- South Africa's MAP exports belong to three species in the *Aloe* genus and South Africa is responsible for 11% of global exports of MAP species.

Table 1 summarises the trade in the top five most traded CITES Appendix II listed wild-sourced MAP species exported for commercial purposes based on importer reported quantities and including their history of CITES listing. The trade (reported in kilograms) of MAP species is dominated by *Euphorbia antisyphilitica* and *Prunus africana*, accounting for 73% of the commercial trade in wild-sourced MAPs. Additionally, the trade in some MAPs genera rather than single species is significant. For example,

- Genus *Aloe* is represented by five species, with similar medicinal uses. Their combined reported trade volume was 2,661,067 kg (importer reported) / 5,100,029 kg (exporter reported).
- Six species of orchids from the genus *Dendrobium* are regularly used in traditional Asian medicine. Trade from Nepal and Lao PDR to China, Thailand and South Korea totalled 521,994 kg based on importer figures.
- The genus *Aquilaria* is represented in the trade by three species, more commonly grouped together and known as agarwood (in addition to *Gyrinops* spp). The combined total traded for the three species was 2,218,382 kg, with a range of products from oil, wood chips and powder.

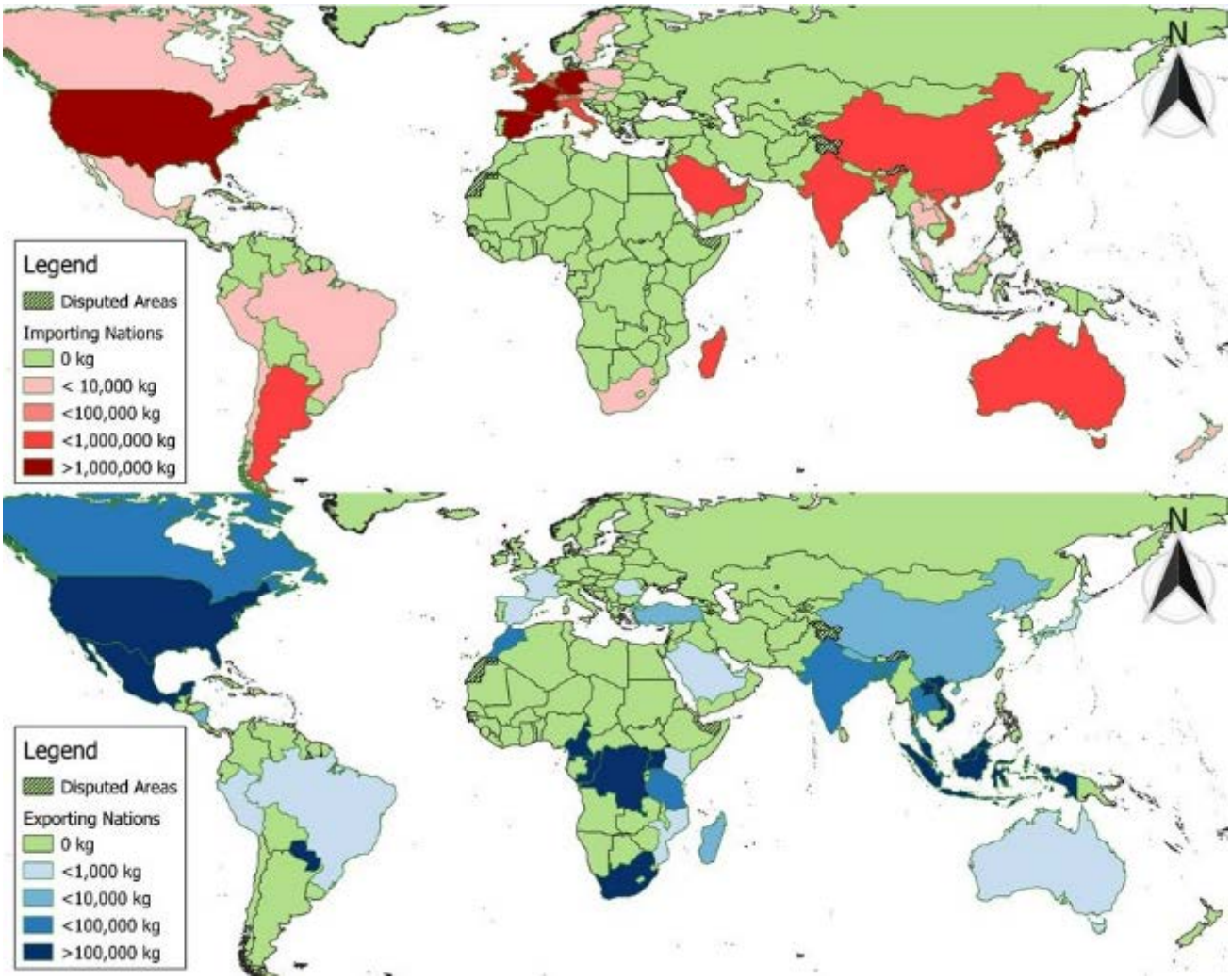

Figure 3. Above: Heat map of imports of wild sourced, Appendix-II MAPs based on importer reported quantities (in kilograms) for commercial purposes between 2006-2015. Below: Heat map of largest exporting nations (in kilograms) of wild-sourced, CITES Appendix II medicinal and aromatic plants for commercial purposes between 2006-2015. Data from the CITES Trade Database, available at: https://trade.cites.org/.

Table 1 Top five traded CITES Appendix II wild sourced MAP species exported for commercial purposes based on importer reported quantities and including CITES history. Data sourced from the CITES Trade Database (https://trade.cites.org/) for the ten-year period between 2006 and 2015.

Name / Common Name / Year Listed in CITES Appendix II	Total Importer Reported Quantity (kg)	Commodities (% of Total Trade)	Top Importer (% of Total Trade)	Top Exporter (% of Total Trade)
Euphorbia antisyphilitica / Candelilla / 1975	9,931,024	Wax - 99% Extract – <1% Dried plants – <1% Derivatives – <1%	USA – 33% Japan – 28% Germany – 22% France – 15%	Mexico – 99% USA – <1% Indonesia – <1% Japan – <1%
Prunus africana / African Cherry, Red	8,166,858	Bark – 93%	France – 69% Spain – 22%	Cameroon - 66% Uganda - 15%

Name / Common Name / Year Listed in CITES Appendix II	Total Importer Reported Quantity (kg)	Commodities (% of Total Trade)	Top Importer (% of Total Trade)	Top Exporter (% of Total Trade)
Stinkwood, Kanda Stick / 1995		Powder – 7% Extract – <1%	Madagascar – 4% Belgium – 23%	Dem. Rep. of the Congo - 14% Equatorial Guinea - 2%
Aloe ferox / Aloe, Cape Aloe, Lucid Aloe / 1975	2,657,661	Extract - 81% Powder - 17% Leaves – 1% Derivatives – 1%	Argentina – 28% Italy – 25% Germany – 20% Australia – 8%	South Africa – 100%
Aquilaria malaccensis / Agarwood, Agar, Aloewood / 1995	2,191,691	Chips – 81% Powder – 19% Live – <1% Oil – <1%	Singapore – 48% United Arab Emirates – 16% Viet Nam – 15% Saudi Arabia – 14%	Malaysia – 45% Indonesia – 42% Singapore – 9% Bangladesh – 4%
Cibotium barometz / Lamb of Tartary / 1977	554,851	Roots – 99% Dried Plants – 1%	South Korea – 99% France – 1%	Viet Nam – 98% China – 1% Indonesia – 1%

Table 2 presents the trade data for *Nardostachys grandiflora*, which did not make the top five traded MAPs based on importer reported quantity (total amount traded 552 kg), but when exporter reported quantities were included, trade totalled 906,268 kg. Based on importer reported trade, Europe was the main importer, but when exporter reported trade was considered, a much larger volume of *N. grandiflora* was reported as imported by India and Pakistan.

Table 2. Trade information for Nardostachys grandiflora*, exported for commercial purposes based on exporter reported quantities and including CITES history. Data sourced from the CITES Trade Database(https://trade.cites.org/) for the ten-year period between 2006 and 2015.*

Name / Common Name / Year Listed in CITES Appendix II	Total Exporter Reported Quantity (kg) / % +/- Compared with Importer Reported Quantity	Commodities (% of Total Trade)	Top Importers (% of total trade)	Top Exporters (% of Total Trade)
Nardostachys grandiflora / Jatamansi, Spikenard / 1997	906,268 / (+164,079%)	Derivatives - 81% Roots - 18% Oil - 1%	India - 67% Pakistan - 33% Bangladesh - <1% Belgium - <1%	Nepal - 100%