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

Seventeenth meeting of the Conference of the Parties
Johannesburg (South Africa), 24 September – 5 October 2016

The applicability of traceability systems for CITES listed non-timber forest plant species listed under Appendices I and II

Key Findings of the preliminary assessment for medicinal and ornamental plant species

This document has been submitted by the Secretariat on behalf of UNCTAD*, in relation to agenda item 45 on *Traceability*.

* *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.*

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- Key Findings of the preliminary assessment for medicinal and ornamental plant species -

UNCTAD, in consultation with CITES Secretariat

This note complements the information provided by UNCTAD on CoP17 Doc. 45 on Traceability, particularly paragraph 12 and its Annex 1 with the draft key findings of the ornamental plants study.

Acknowledgements

This note presents the main findings and recommendations from two UNCTAD studies on assessing the traceability systems of non-timber plant species (ornamental and medicinal plants) under CITES Appendices II and III. The complete studies are available at: http://unctad.org/biotrade and www.biotrade.org

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The draft advance documents benefited from an extensive consultation processes, including a peer review and presentation at CITES SC66 (ornamental study) and discussed during the "Technical workshop on traceability systems for CITES Appendices II and III listed non-timber forest plant species (ornamental and medicinal plants)" on 22 September 2016 in Johannesburg, South Africa. All the valuable inputs provided are included in the final version that will be available in www.biotrade.org and www.unctad.org/biotrade.

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Acronyms

ASYCUDA	Automated System for Customs Data (UNCTAD Programme)
CART	capacity-building requirements table
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
CTEs	Critical Tracking Events
KDEs	Key Data Elements
LAFs	Legal Acquisition Findings
Lao PDR	Lao People's Democratic Republic
MAPs	Medicinal and aromatic plants
Non-Detriment Findings	NDFs
TORs	Terms of reference
UN/CEFACT	United Nations Centre for Trade Facilitation and Electronic Business
UNECE	United Nations Economic Commission for Europe
UNCTAD	United Nations Conference on Trade and Development

1. Background

1.1 What is BioTrade and its relation to CITES and traceability

BioTrade refers to those activities of production, transformation and commercialization of products and services derived from native biodiversity (species and ecosystems) under social, economic and environmental sustainability criteria.

UNCTAD is the United Nations focal point for trade and development, and for interrelated issues in the areas of finance, technology, investment and sustainable development. Its objective is to assist developing countries to integrate beneficially into the global economy. The BioTrade Initiative of UNCTAD is a practical programme that aims to promote the conservation of biodiversity to further sustainable development through its sustainable commercial use in a variety of sectors (see Table 1). UNCTAD, in close cooperation and collaboration with partners, is implementing BioTrade[1] in Africa, Asia and Latin America.

Table 1. BioTrade sectors prioritized by countries and partners in Africa, Asia and Latin America

Sector	Type of product
Personal care	Essential oils, natural dyes, soaps, cream and butters, cosmetics, etc.
Pharmaceutical (Phyto-pharma)	Extracts, capsules and infusions from medicinal plants, etc.
Food	fruits pulps, juices, jams, cookies and sauces, spices, nuts, tuberous, snacks food supplements, meat from caiman and fish, etc.
Fashion	Skin and belts, purses from *Caiman yacare*, etc.
Ornamental flora and fauna	Heliconias, orchids, butterflies, etc.
Handicrafts	Jewelry, decoration objects based on native species, garments, etc.
Textiles and natural fibers	Furniture and decoration objects based on natural fibers, purses, shoes, etc.
Sustainable tourism	Ecotourism, nature-based tourism, community-based tourism, etc.
Forestry-based carbon credit activities.	Reducing Emissions from Deforestation and Forest Degradation, conservation, sustainable management of forests and enhancement of forest carbon stocks (REDD+), GHG mitigation strategies for specific value chains, etc.

1.2 UNCTAD and CITES collaboration

UNCTAD[2] and the CITES Secretariats have a long-standing partnership since early 2000 (Box 1), and was defined by a Memorandum of Understanding signed in 2010. Under this Memorandum, both organizations are committed to ensure the conservation of species, enhance the livelihoods of the poor in remote and marginal areas, and promote business opportunities for entrepreneurs that comply with CITES requirements and national legislation. Particular attention is paid to the role of economic incentives for sustainable management of CITES Appendices II

[1] *For further information, see www.biotrade.org*

[2] *The United Nations Conference on Trade and Development (UNCTAD), is the agency within the UN system dedicated to the interface of on trade and development, thus to promoting the development –friendly integration of developing countries into the world economy. In other words, UNCTAD is the focal point within the United Nations on trade and development. In 1996, UNCTAD launched the BioTrade Initiative with the aim of promoting trade and investment in biodiversity as a means of furthering sustainable development. Through this Initiative, UNCTAD is supporting developing countries to enhance their biodiversity sectors and create businesses that trade sustainably produced value added goods and services to national and international markets.*

and III-listed species and benefit sharing with resource owners. UNCTAD channels its contribution through its BioTrade Initiative. The BioTrade Initiative is concerned with activities of production, transformation and commercialization of products and services derived from native biodiversity (species and ecosystems) under social, economic and environmental sustainability criteria.[3]

In addition, UNCTAD and the CITES Secretariat have also agreed to collaborate on matters related to implementing special automated customs procedures for CITES-listed species of wild fauna and flora within the UNCTAD ASYCUDA system for electronic customs management and, recently, CITES permit management.

Box 1: BioTrade and CITES cooperation

Since 2001, under the BioTrade Initiative, UNCTAD and CITES Secretariats have a long standing partnership to enhance the conservation of CITES-listed species, in order to improve livelihoods of poor people in remote and marginal areas that harvest and trade in these species, and promote opportunities for businesses that comply with CITES requirements and national legislation. The cooperation also encourages consultations between BioTrade partners and CITES authorities when including species listed in the CITES Appendices in BioTrade programmes and value chains; and facilitates capacity-building in developing countries on issues relating to the organization of the value chain for species listed under CITES.

BioTrade Principles and Criteria guide the intervention of activities to be implemented on the ground, for instance in the development of businesses, value chains and sectors. These principles include *inter alia*, the conservation and sustainable use of biodiversity, legal compliance with national and international regulations, respect for the rights of actors, which also go in line with CITES goals.

UNCTAD's BioTrade and CITES Secretariat, as well as selected Parties have implemented concrete actions to support the sustainable management of species in a variety of sectors such as the personal care, pharmaceuticals, food, ornamentals with both flora and fauna, and fashion where CITES-listed species are being supported. CITES-listed species within these sectors include, for example, *Caiman yacare* and vicuña for the fashion industry, paiche (*Arapaima gigas*) for the food sector, orchids and amphibians for the ornamental flora and fauna sectors, among others. In recent years, UNCTAD is also working with CITES on traceability issues such as pythons skins in South-East Asia and non-timber plant species.

This note presents the main findings and recommendations from two UNCTAD studies on assessing the traceability systems of non-timber plant species (ornamental and medicinal plants) under CITES Appendices II and III. The complete studies are available at: http://unctad.org/biotrade and www.biotrade.org

Furthermore, this complements the information provided on CoP17 Doc. 45 on Traceability, particularly paragraph 12 and its annex 1 with the draft key findings of the ornamental plants study:

"12. Notable progress has also been made by UNCTAD, which in cooperation with CITES has launched a project in 2015 to assess the traceability systems for non-timber plant species listed in CITES Appendices II and III. The first assessment study focused on ornamental plants in the Andean subregion, and included an extensive consultation with representatives from government, industry and civil society. The report of the preliminary findings was submitted at SC66 as an information document[9] and also discussed at a side event at SC66. Another study is underway on medicinal plants for the Mekong subregion. Both studies will be submitted for peer review, after

[3] *For further information on UNCTAD BioTrade, please see www.biotrade.org.*

which a consultative workshop will be organized to discuss the main findings with various stakeholder representatives from the two subregions. The draft key findings of the UNCTAD study are attached to this document as Annex 1. The final report will be submitted to CoP17 as an information document."

2. Traceability-related activities

At the 15th and 16th meetings of the Conference of the Parties (CoP) to CITES, it was decided to consider the possible development of traceability systems to assist with ensuring the sustainable use of CITES-listed species. In response, UNCTAD and the CITES Secretariat have been collaborating in drafting technical documents and organizing workshops on traceability issues to better understand the requirements in developing such systems for species through the supply chain, from sourcing all the way to the market and final consumption by consumers. In 2014, UNCTAD and CITES jointly conducted a study to assess the traceability systems for the sustainable international trade in South-East Asian python skins (Dec16.102c)

Complementing this work, UNCTAD in consultation with the CITES Secretariat, selected CITES Management and Scientific Authorities, and its BioTrade partners, started to work on traceability issues for CITES listed (Appendices II and III) non-timber plant species in 2015. Particularly, two comprehensive studies were developed to facilitate work related to the tracing of CITES-listed non-timber forest plant species, focusing on ornamental and medicinal plants.

The first study **assesses the applicability of traceability systems for ornamental plants in Latin America with emphasis on the Andean subregion**. Its preliminary findings and recommendations were submitted to the CITES Secretariat (document SC66.Inf.16)) at the 66th Standing Committee Meeting (SC66) and discussed in a side event. Additionally, the draft study was further discussed with experts and CITES Parties through bilateral consultations, and peer review process that took place in the summer of 2016. The second study **assesses the applicability of traceability systems for medicinal plants in the Asian region, in particular the Greater Mekong subregion**. It was also developed in consultation with CITES Secretariat, selected Parties, BioTrade partners, and industry. Its findings were also discussed with selected Parties and stakeholders.

Both studies analyze the use of traceability systems as a tool to strengthen existing CITES processes, in particular Legal Acquisition Findings (LAFs) and Non-Detriment Findings (NDFs), for ornamental and medicinal plants, listed under CITES Appendices II and III.

Additionally, through this work UNCTAD aims to contribute to the on-going traceability discussions to provide an umbrella traceability mechanism for CITES-listed species as noted in Standing Committee document SC66 Doc.34.1 (Rev.1) to be considered at CITES COP17. Similarly, this also is in line with the Secretariat's discussions with the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) regarding the possible development of a business requirement specification for international trade in wildlife (AC28 Doc 14.2.1[4], SC66 DOC. 34.1). The terms of reference (TORs) of the studies are highlighted in Box 2.

Box 2: Summary of the TORs and outcomes for the studies on the applicability of traceability systems for CITES-listed non-timber forest plant species listed in Appendices II and III, focusing on ornamental and medicinal plants

- Develop an outline and methodology to carry out the study, which will be discussed and validated with UNCTAD and the CITES Secretariat.
- Discuss with the United Nations and other organizations working on traceability systems, possible standards for use in the development of a CITES traceability system for medicinal and ornamental plants in the Asian Region, with emphasis in the Mekong subregion.
- Carry out an in-depth revision of existing information on the value chains for medicinal and aromatic plants in the selected regions, focusing on CITES-listed species and those being supported by BioTrade partners.
- Identify and review existing traceability systems for medicinal and ornamental plants, and determine those to be further analyzed in the framework of the study.
- Map the value chains for medicinal and medicinal plants in the selected regions. This would include identifying key stakeholders and their role in defining and implementing traceability systems, as well as identifying livelihood benefits

[4] *https://cites.org/sites/default/files/eng/com/ac/28/E-AC28-14-02-01%28Rev1%29.pdf*

obtained by upstream and downstream stakeholders.
- Analyze and assess how the selected systems are being implemented, including their internal control systems (documentation and methodology used, as well as key intervention points and actors throughout the value chain to ensure the system's effectiveness to limit illegal harvesting and trade of the species, etc.) and categorize them according to criteria defined jointly with UNCTAD and the CITES Secretariat.
- Assess the socio-economic implications and benefits of the selected systems, particularly considering the needs of small farmers and land-owners, governments and industries, in order to define their capacity-building needs and a fair distribution of benefits being generated throughout the value chain.
- Provide practical recommendations on how a traceability system should be defined and implemented for non-timber flora species within the CITES framework, taking into account previous technical studies developed by UNCTAD and others.
- Prepare a first draft on the initial findings and recommendations of the study to be peer reviewed and/or discussed with relevant stakeholders, as well as UNCTAD and the CITES Secretariat.
- Present the studies and validate its findings and recommendations with relevant stakeholders involved in traceability systems for CITES-listed species in a regional workshop organized by UNCTAD in consultation with the CITES Secretariat and other stakeholders on 22 September 2016.
- Prepare a short note to be submitted to CITES CoP17 as information document, summarizing the findings and key recommendations on the work undertaken.
- Participate and present the study in UNCTAD dissemination events as required.

The outcome of this study, which is based on international standards and norms, includes, inter alia:
- A technical summary of traceability systems available for medicinal/ornamental plants;
- Recommendations on how a traceability system should be defined and implemented and on how to address the capacity-building requirements for the related small farmers and land-owners, CITES Management and Scientific Authorities; and
- Recommendations for advancing with the studies' outputs and recommendations within CITES (and other relevant intergovernmental bodies).

The findings and recommendations of both studies were discussed and validated during the "Workshop on traceability systems for CITES listed non-timber forest plant species (ornamental and medicinal plants)", on 22 September 2016 in Johannesburg, South Africa. The event was organized in the margins of the 17th meeting of the Conference of the Parties (CoP17) of CITES, held in Johannesburg from 24 September to 5 October 2016. Further information on the workshop is available at: http://unctad.org/en/Pages/MeetingDetails.aspx?meetingid=1182

The results of the studies will not only be available to CITES CoP17 as an information document, but also disseminated at the IV BioTrade Congress on 3 December 2016, in Cancun, Mexico, organized in the context of CoP13 of the Convention on Biological Diversity and its Biodiversity and Business Forum.

3. Main findings of the two UNCTAD studies to assess the applicability of traceability systems for CITES listed ornamental and medicinal plants under Appendices II and III

3.1. Traceability considerations for non-timber forest plant species

Traceability can be defined as "the ability to access any or all the information relating to that which is under consideration, throughout its entire life cycle, by means of recorded identification."[5] In other words, traceability enables one to recover the history of an asset by linking together records taken on its way through the supply chain.

Traceability systems are usually constructed using three different elements:

[5] *Olsen, P., & Borit, M. (2013). How to define traceability. Trends in Food Science & Technology, 29(2), 142–150. http://doi.org/10.1016/j.tifs.2012.10.003*

1) **Unique identification:** used to identify the assets (usually both the product unit and the business operator).
2) **Critical Tracking Events (CTEs):** critical points in time when not recording data about the asset will break traceability. Typically, there are three categories of CTE per entity: reception, processing and dispatch.
3) **Key Data Elements (KDEs):** information elements that must be stored at each CTE. In general, KDEs might include basic description elements, origin and destination, processes applied to the product or legal status. A traceability system will have to define specific KDEs for each CTE.

Within the CITES processes, a traceability system can make concrete contributions to:

- **Legal Acquisition Findings (LAFs):** traceability can provide a link to the production source. This would then allow CITES Management Authorities to make a stronger legal acquisition finding.
- **Non-Detriment Findings (NDFs):** the use of a traceability system could be beneficial for providing improved trade statistics. In this regard, such a system could also contribute to achieving consistent global trade volumes.

3.2 UNCTAD studies on the applicability of traceability systems for medicinal and ornamental plants

The UNCTAD studies provide an analysis on the use of traceability systems as a tool to strengthen existing CITES processes (LAFs and NDFs) for non-timber plant species, particularly medicinal and ornamental plants, listed under CITES Appendices II and III. Additionally, both studies analyzed the trade from the selected countries and species as explained below:

1. Ornamental plants (Cycadaceae, Orchidaceae, Bromeliaceae and Euphorbiacecae) from Andean (Plurinational State of Bolivia, Colombia, Ecuador and Peru) and selected Latin American countries (Argentina, Brazil, Chile, Costa Rica, Guatemala, Mexico, Panama and the Bolivarian Republic of Venezuela); and
2. Medicinal plants (*Aquilaria crassna*, *Gastrodia elata* and *Dendrobium nobile*) from Asian region with emphasis on the Greater Mekong subregion countries Cambodia, China, Thailand, Lao People's Democratic Republic (Lao PDR), Myanmar and Vietnam.

Under these studies, an analysis of the market chain for ornamental and medicinal plants is presented for the selected species and regions. Afterwards, examples of existing traceability and control systems applicable for the CITES-listed non-timber forest plant species are shown. With this information a proposed traceability system for each of the cases is recommended, as well as an assessment of the capacity-building needs of involved stakeholders. It is important to note that the studies considered other potential traceability methodologies and strategies that are internationally accepted and used, and which could be adapted to the species characteristics and countries studied.

The **main common findings** with respect to the applicability of traceability for both ornamental and medicinal plants can be summarized as follows:

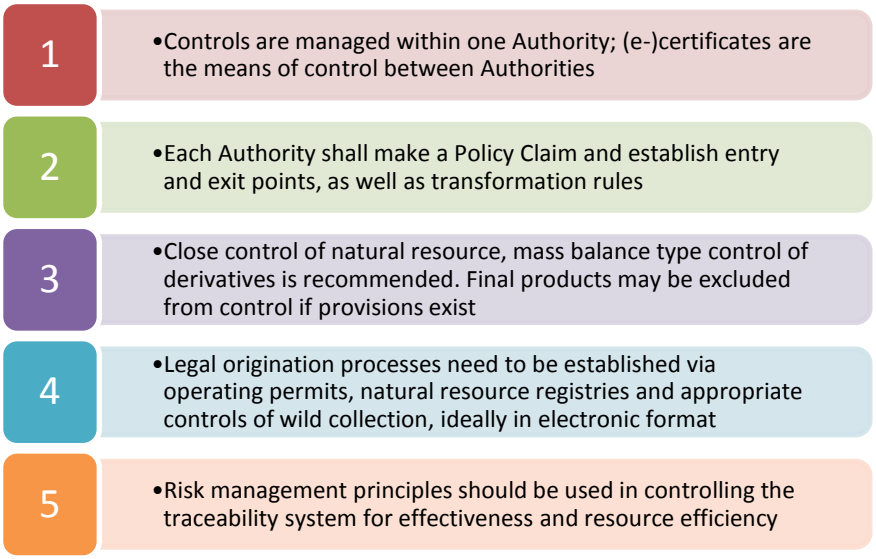
1. Traceability can clearly contribute to the robustness of Legal Acquisition Findings, and may also generate useful trade data to improve Non-Detriment Findings with strong collaborative partnerships between the private and public sectors.
2. Taking into account internationally recognized frameworks and best practices, the study on medicinal plants proposes a traceability system based on the United Nations Economic Commission for Europe (UNECE) traceability framework. The framework is built on definitions of a Policy Claim as over target as overall mandate of the traceability system, and specification of entry/exit points of a supply chain, in addition to an audit process. The framework is used here to support CITES data requirements for the issuance of export permits and certificates.
3. Recording of receptions of plant material at nurseries or plantations, creation of a database of properly identified parental plants and linking export permits to identified parental plants, can

significantly strengthen the CITES Management Authorities permitting process, in particular if coupled with risk management systems in the controls for an operating license and in the issuance of CITES import and export permits and certificates.

4. A traceability architecture is proposed that renders stricter control on the early stages of the value chain where risk for introduction of illegally harvested material is greatest. For later stages in the value chain, controls may be less tight and adapted to the realities of mixing of medicinal plant species in final products. A risk management methodology is proposed, for instance in the ornamental study.
5. The role that private and public sectors play in developing a traceability framework is crucial, and the management of this relationship is one of the keys to the successful implementation of a traceability system. This is also a key principle of the UNECE traceability framework.
6. The possible socio-economic impacts arising from the use of any traceability framework must be properly understood. A practical project to implement the traceability framework may be the most adequate way to further define the socio-economic implications, particularly the costs and benefits for all value chain actors.
7. Building on existing structures such as certification schemes could be an alternative to advance on this regard. For instance, establishing a partnership with a wild-collected plant species standard and certification schemes (FairWild, Union for Ethical BioTrade, etc) or similar might help in facilitating the implementation of traceability system by introducing financial benefits to local stakeholders, particularly small farm holders or local wild collectors (For further information, see sections 5.6., 5.7 and 6.5 from the UNCTAD medicinal plants study).
8. Recommendations for the development of a traceability framework project are made to deepen understanding of the best approach for implementing traceability in non-timber plant species, as well as the right mix of positive and negative incentives.

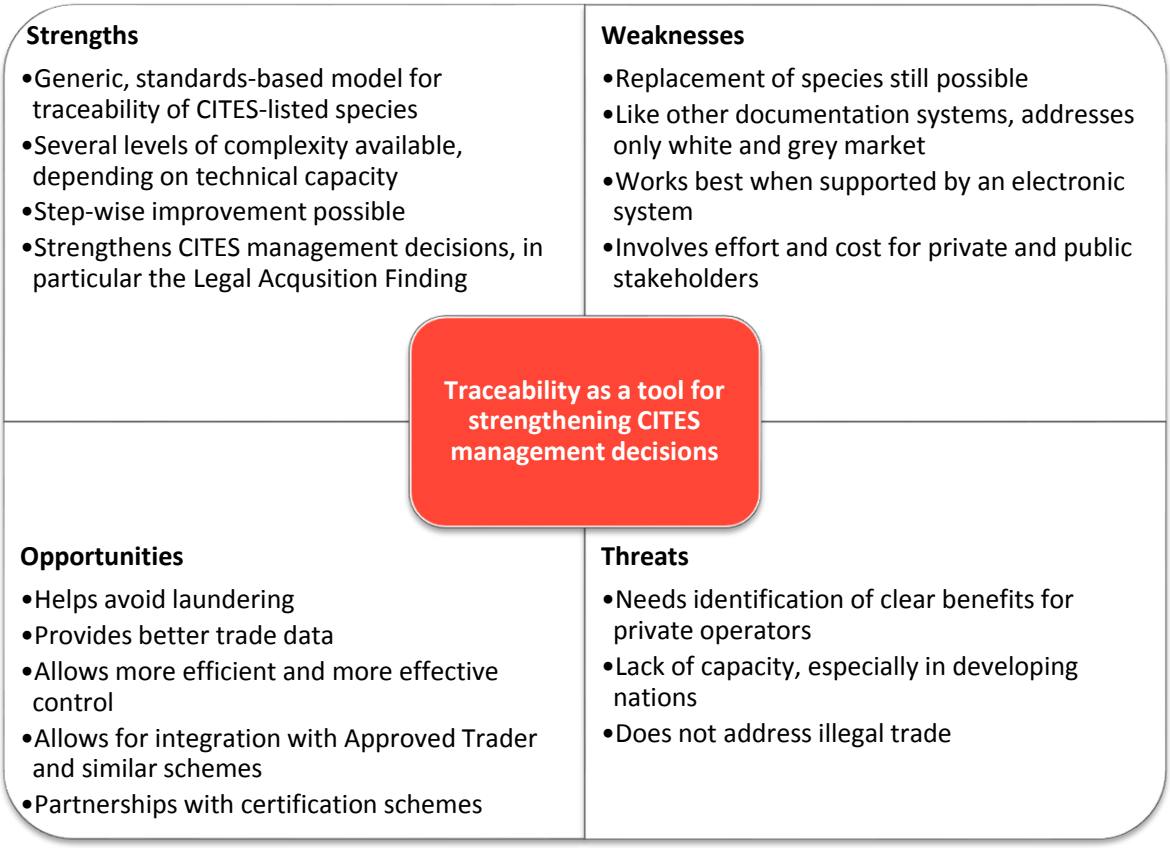
In addition, the studies and particularly a traceability workshop organized on 22 September 2016 provided valuable information to define generic principles for traceability systems for non-timber plant species listed in CITES Appendices II and III (Figure 1), but which can also be applicable to other species.

Figure 1. Generic principles for traceability of CITES-listed species



An additional SWOT analysis of the proposed solutions is presented in Figure 2 below:

Figure 2. SWOT analysis for the traceability system proposed



For each specific study, the main findings are presented below.

3.3 Main findings of the ornamental plants study in the Andean and other Latin American countries

1. The floricultural trade worldwide has experienced a strong growth of 12 per cent per annum in the period of 2001-2014. The total trade in 2014 was USD 21.5 billion.
2. Of the CITES-listed ornamental plants and plant products exported from the considered countries in the time frame of 2010-2014, Cycadaceae represented 62.5 percent with nearly 27 million exported products (only considering leaves, live plants, roots and stems); Cactaceae represented 24 percent with over 10 million plant products (including seeds, live plants and stems), Orchidaceae represented 9.5 percent with 4 million plant products (live plants, leaves, roots and stems) being exported; Bromeliaceae represented 2.7 percent with just over 1 million live plants and Euphorbiaceae together with Zamiaceae represented the 2 percent with just under a million products (live plants, roots, wax).
3. Orchid exports from the chosen countries seem to have grown strongly until 2012, but experienced a slowdown in 2013; this might be true, however, due to an exceptional spike in trade from Brazil in 2012. Costa Rica is the largest exporter in the period of 2010-2014. Main markets are the United States, Japan and the European Union.
4. Trade of CITES-listed Cycadaceae on the contrary seems to be declining. Costa Rica is by far the most important exporter; trade from the only other trader, Guatemala seems to have come to a standstill in 2013. The main markets are the European Union and the United States of America.
5. However, market assessment is made difficult by the inconsistent reporting between exporters and importers. Within the studied period of 2010-2014, exporters reported about 20 per cent more trade than importers in Orchidaceae and even 33 per cent more trade in Cycadaceae.

6. In the studied countries, Orchidaceae represent an important family within the trade in ornamental plants; the traded plants are practically all artificially propagated.
7. Regarding existing control systems, the interviewed CITES Management Authorities operate a comprehensive control system based on issuance and control of operating licenses[6] and control of exported quantities/specimens via CITES import and export permits and certificates. However, determining the species of exported plants is very difficult. This affects both the controls for operating licenses as well as the export control. Some private operators have internal traceability systems.

3.4 Main findings of the medicinal plants study in the Greater Mekong subregion/Asia region

1. There are globally over 60,000 species of plants mainly collected from the wild that are used for their medicinal properties.
2. 33 CITES-listed medicinal plants were identified originating in the Greater Mekong region countries. CITES trade data analysis was conducted for these. Two species: *Aquilaria crassna* and *Gastrodia elata* were selected for the in-depth study, while *Dendrobium nobile* was selected for desktop review.
3. Medicinal plants are a source of many traditional and modern medicines, and make an important contribution to rural livelihoods, as well as having cultural value. Harvesters are often among the poorest and most vulnerable members of society. Wild plants can provide a supplementary source of income for households, providing seasonal work for villagers in rural areas.
4. The wild harvesting that occurs for medicinal plants is difficult to track back to its source and estimate the value due to long trade chains. Trade can be illegal, unregulated and/or unreported and is sometimes known as the "hidden harvest". Tracking is more complex by the different forms that species are traded in and their aggregation in export codes.
5. Of the selected CITES-listed medicinal plants (*Aquilaria crassna*, *Gastrodia elata* and *Dendrobium nobile)*, and its derived plant products exported (mainly for commercial use) from the considered countries in the Greater Mekong subregion in the time frame of 2005-2014, *Aquilaria crassna* represented 99% of global trade in this species with 3,547,666 specimens; *Gastrodia elata* 91% of global trade with 80,140 specimens and *Dendrobium nobile* 26% of global trade with 215,626 specimens registered.
6. Trade of CITES-listed *Aquilaria crassna* has been consistent since 2011 with varying fluctuations in quantities traded. Thailand and Vietnam have been the major exporters with produce destined mainly to Indonesia, China, Lao PDR and Myanmar. The question and complexity on the legality of wild-harvested agarwood suggests that under current definitions, some trade may be deemed illegal. Seizure data shows an increase in the illegal trade of agarwood products for wild harvested *Aquilaria crassna*. Difficulties in distinguishing between wild and propagated harvesting makes enforcing compliancy with laws difficult.
7. Trade of CITES-listed *Gastrodia elata* shows export fluctuations: the data suggests a shift in either trading commodity or reporting practices over the period. 90% of exports of this species are from the Greater Mekong subregion with more than 99% of exports originating from China which are mainly for commercial purposes. In China, declarations of suspicion in illegal harvesting lead to additional authorization processes. The Republic of Korea was the main destination (82%) followed by Japan (9%). Mismatches in trade data are reported which complicates assumptions made about trade analysis of *Gastrodia elata*.
8. Trade of CITES-listed *Dendrobium nobile* has increased slightly each year in the chosen countries, though again with varying fluctuations reported. Most exports originate from China, Thailand and Vietnam for a majority of trade in propagated live plants. Of particular note were the years 2009 and 2013 where two extraordinary export records were registered, showing a sharp spike in trade above the general average. The major importers were the Republic of Korea and Singapore.
9. Market assessment is complex due to the inconsistent reporting between exporters and importers. Within the studied period of 2005-2014, for example, only 13% of *Dendrobium nobile* imports were recorded from exports shipped.

[6] *A license that allows a company to legally operate and is often renewed on an annual basis*

10. In the studied countries, *Dendrobium nobile* represents an important family within the trade of medicinal plants; the traded plants are practically all artificially propagated with 88% reported as live exports.
11. Regarding existing control systems, the interviewed CITES Management Authorities in Thailand have just implemented a control system based on the issuance and control of operating licenses.
12. Importing nations have a significant role to play in refusing the purchase of illegal and unsustainable agarwood and other medicinal plants by encouraging the sourcing of sustainable and legal products/ingredients.

4. Capacity-building requirements

Capacity-building is an important cog in a supply chain towards supporting the development of a traceability system. Key stakeholders (including small farmers and land-owners, CITES Management and Scientific Authorities) along the supply chain need to have their capacity building gaps identified so that plans can be made to improve or fix those gaps. This is also true for developing nations who lack the basic infrastructure to support the implementation of a traceability system. Various capacity-building gaps have been identified during the research of this document, particularly during the interviews conducted with stakeholders. Below is a list of those gaps identified so far:

- Awareness of CITES-listing and requirements and documentation, between and among government agencies, companies and other relevant stakeholders (producers, collectors, etc.) in the trade chains;
- Available tools and identification materials;
- Skills to support primary producing communities and develop sustainable value chains;
- Available financing for capacity-building activities for wild-collectors, collection operations and farmers (access to development services and processing equipment)**;**
- Value-addition (processing equipment), control and systems improvement;
- Awareness in industry associations of their role in supporting members to carry out their business legally, and in particular, source raw materials from legal sources;
- The application of standards in production of medicinal and ornamental plants in a systematic way;
- Awareness in importing nations of their significant role in refusing the purchase of illegal and unsustainable non-timber forest plant species such as agarwood;
- Training of Customs officers to identify species and legally and illegally sourced goods; and
- Training of law enforcement officials in countries involved in the trade of medicinal and ornamental goods.

Other capacity-building gaps that are directly related to the functioning of a traceability system are:

- Developing Project Management communication skills to identify and communicate stakeholder benefits and reach private sector buy-in in traceability;
- Training in how traceability functions along a supply chain;
- Training in appropriate record keeping and product tagging (as required);
- Understanding supply chain actors in a one step up/down view;
- Clarification of legal/illegal sourcing of plants, particularly medicinal plants; and
- Education on supporting the implementation of sustainable development practices, for both environmental and business needs.

At a project level, the capacity-building requirements identified could be outlined in an adapted capacity-building requirements table (CART) as demonstrated in Table 2. The CART is used to show requirements under what are considered critical dimensions for a project. Each row focuses on a primary objective (in this case a stakeholder) which can be tracked across various capacity-building dimensions. This helps to ensure that all ramifications are taken into account even if weaker gaps are not considered. In this case, each stakeholder in the supply chain is identified and reviewed against each dimension, so that the capacity gap that needs to be addressed is identified.

A project coordinator or manager can review the CART and make the appropriate project plans to ensure that the key dimensions are being addressed so that a traceability project will be implemented successfully. As has been mentioned in previous sections, traceability projects more often than not fail. This is partly due to the stakeholders involved in a traceability supply chain not having the skills or resources to enable them to succeed,

nor understand and clearly identify its benefits to support their implementation. The ultimate aim should be to ensure that all identified stakeholders capacity-building needs are addressed reducing their risk to potentially undermine the success of a traceability project.

Table 2. A Capacity Building Requirements Table (CART)

Capacity Building Dimensions						
Objective: developing a Traceability Architecture	*Financial Support*	Institutional Reform	Skills Training	Business Benefits	Personnel Resourcing	Value addition
Wild collector	X		X			X
Nursery			X	X		X
Customs		X	X		X	
Transportation			X	X		
Supply Chain		X				
Public Authority		X	X		X	
Private Business	X			X		X
Project Management			X		X	
Law enforcement		X	X		X	

5. Key issues to consider for working on traceability frameworks for CITES-listed non-timber plant species

This section details the main issues discussed at the workshop organized during 22 September 2016, and at bilateral meetings organized with selected CITES Parties and BioTrade partners, as well as regional organizations and civil society.

5.1 The role of traceability within CITES

The objective of traceability within CITES is to support management decisions such as the Legal Acquisition Findings. Traceability is not a means in itself and it should not be used to "fix" the implementation of CITES processes within a country. It should not be considered as a panacea either. Traceability is a supporting tool that has the capacity to strengthen managerial decisions, but also to discover areas of necessary improvement in the implementation of CITES processes at the national level.

5.2 Need and feasibility of traceability for the selected species

The need for traceability is increasing for a variety of reasons. Supply chains of CITES-listed species are implementing traceability systems (e.g. reptiles, sharks, timber, etc.), including those led by private stakeholders. This is done to (a) ensure sustainable supply of raw materials, and (b) answer to the increasing number of environmentally and socially conscious consumers. Global traceability systems have been implemented for a variety of commodities, such as tea, coffee, palm oil, cotton, soya and fish. Major importing regions, such as the European Union and the United States of America require exporting nations to have traceability (at least for some products). Therefore, traceability might come for species listed under CITES anyway and starting to discuss this issue further seems crucial. Another topic highlighted the interest to implement a Single Window for Sustainable Trade in Wildlife (or for Wildlife Trade).

5.3 CITES, traceability and sample experiences with CITES-listed plants

Currently, there is an opportunity to guide the discussion of traceability before definitions and uncoordinated implementations that are not aligned or even incompatible proliferate. Laying out common traceability principles with the CITES Parties may ensure that traceability frameworks implemented employ a common language and are or can be made compatible. The use of international standards is very important in this context. For example, the

United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) of UNECE provides standards that may be useful for traceability of CITES-listed species.

Within the ornamental and medicinal plants, there are two interesting experiences being implemented with traceability systems in Peru and Thailand, illustrating not only the feasibility but some of the benefits that can be generated. Peru has implemented a limited traceability system for orchids under its National BioTade Programme, and the experience has helped to organize nurseries better, increase control over parental stock and identify good business practices. Peru hopes to extend these practices to other operators that currently do not reach the international markets; the benefits for the operators are increased efficiency and access to higher value markets. Thailand reported on the successful experience with the recently implemented fully electronic system that issues operating permits, registers parental stock and links exports permits to it. Thailand has also started to geo-reference plantations in order to comply with its forest law that prohibits trade with specimens extracted from the wild, such as orchids and agarwood.

5.4 Traceability, and domestic and international trade

CITES is primarily a trade convention and aims also to ensure that sustainable trade is not disrupted. Strong CITES processes contribute significantly to ensuring the sustainability of trade in CITES-listed species. However, successful implementations of traceability-based control systems, such as in Costa Rica, Thailand and Peru, have shown that systems are most effective when they are not limited to specimens destined for international trade only.

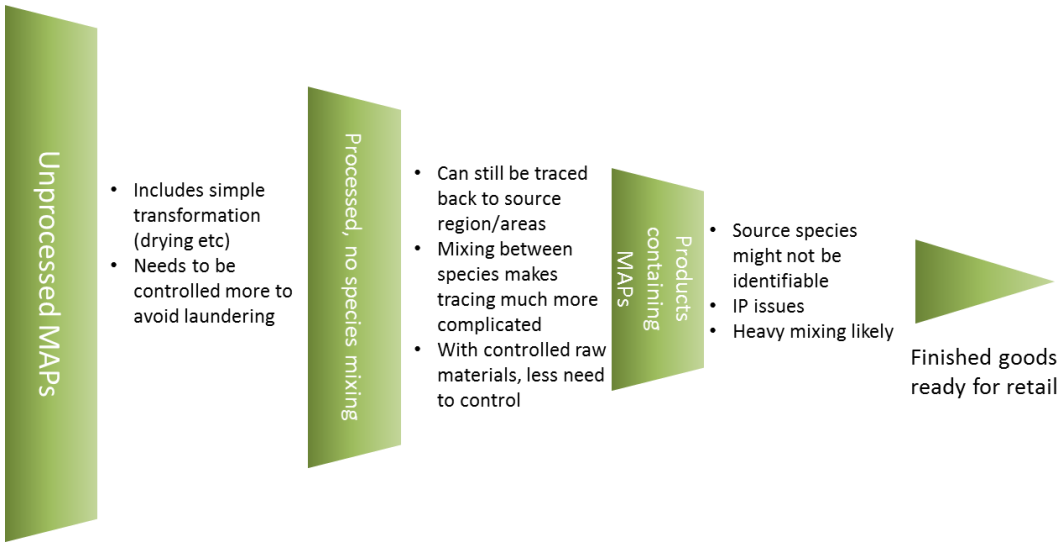
Based on those experiences and the discussions, a successful implementation of traceability-based control systems may require national legislation applicable to all trade whether cross-border or internal/domestic, which goes beyond CITES mandate. However, suggestions were given on CITES' role to provide Parties with a framework, implementation guidelines and processes and standards for their consideration in implementing or improving internal and cross-boarding processes related to the Convention. This also provides the opportunity to adopt traceability as a supporting technology.

5.5 Level of control over products of CITES-listed species

In order not to disrupt sustainable trade, controls cannot place an undue burden on those operators trading legally with CITES-listed species and products thereof. Naturally, finding the exact right balance is difficult, in particular as it also depends on the concrete benefits that can be found for private operators. Premiums have been identified as the clearest foundations for a business case, and these can potentially be achieved when partnering with certification schemes (where traceability is then shared).

In general, raw materials need to be controlled more closely. Whereas for derivatives, simpler control mechanisms have been well accepted; mass balance or even chain of custody-like systems are more appropriate in this case than full batch traceability. Figure 3 shows how the control in traceability can be done in products containing CITES-listed non-timber plant species, which is simpler to do with unprocessed medicinal and aromatic plants (MAPs) than when these are processed and mixed.

Figure 3. Recommended levels of control in traceability of products containing medicinal and aromatic plants (MAPs) listed under CITES



5.6 The cost of traceability

In early stages of production, and in particular small-scale operators, are concerned about the cost of implementing traceability. Clearly, costs increase with the precision of the traceability system[7] and the level of control, as shown in Figure 4. . Consequently, costs can become significant if too close control is attempted and if the precision of the system is not adjusted correctly. A comprehensive cost and benefit analysis should be done in order to find that balance.

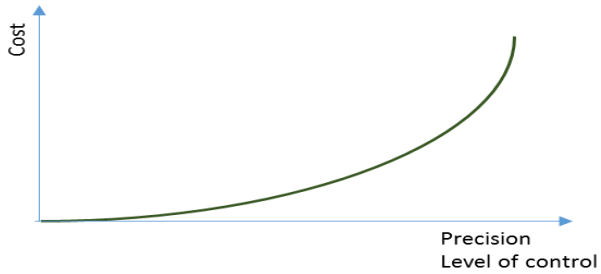


Figure 4. Relationship of cost to precision of the traceability system and level of control

For example, UNEP-WCMC (United Nations Environment Programme/World Conservation Monitoring Centre) reported the Ecuadorian experiences on traceability with a variety of flora and fauna species listed in CITES. Particular reference was made to difficulties regarding tagging of plants and plant parts, as well as to concerns about costs expressed by private stakeholders in the country. This is consistent with the general experience in implementing traceability globally.

Traceability in its simplest form is based on simple record keeping. It just requires supply chain partners to consistently record information on paper, at practically no cost. Implementation of computerized systems can be

[7] *Precision here refers to the specificity of the identification system: a system where specimens are uniquely identified is considered more precise than a system with batch identification*

costlier, but generally available mobile technology together with professional databases free to use for non-commercial purposes drive down the cost for such projects.

Experiences are reported in the sense that providing too many options in Information Technology systems related to CITES may lead to confusion, the need to make decisions and resulting in a lower adoption rate. Key to controlling both costs and driving adoption is to keep the system simple and balanced between costs and benefits. Within the Information technology (IT) industry, the costs of IT systems are very often driven by attempting to do too much with a single tool.

It should also be mentioned that UNCTAD ASYCUDA has elaborated a draft CITES management module which is available free of charge to Parties; this module could cover raw material traceability (i.e. registration of receptions, mother plants and link to CITES permits) quite easily, provided the availability of funds.

5.7 Traceability and tagging

Traceability systems and tagging (i.e. physical identification) systems are part of the traceability framework. A tagging system does not establish traceability. Traceability is achieved under two conditions[8]:

(a) unique identification of (a collection of) traceable assets, such as barks, flowers, seeds of agarwood; and

(b) recording of key information elements[9] at critical points[10] in the (supply) chain (e.g. by recording the supplier, supply date, product and quantity at raw material reception).

Tagging satisfies – if properly done – the first condition, but not the second.

Furthermore, investment in a particular tagging solution is not generally recommendable, unless embedded in a traceability framework and balanced with the benefits for private operators. It is highly unlikely that a particular tagging solution can be found that is generic enough to cover a large variety of products made from CITES-listed species.

At this point, it was recommended that the discussion of specific tagging solutions should be reconsidered in favour of a discussion about a generic traceability framework, in particular a common definition, an elaboration of recommendable governance models, a common description of a traceability architecture, guidelines on the process of implementing traceability as well as clear indications of benefits for the private sector, potentially in collaboration with other schemes, such as certification or benefit sharing schemes. For instance, the UN/CEFACT framework could be an interesting methodology to consider as shown with the medicinal plants example.

Overall, the traceability framework would be essential to demonstrate its feasibility and to assess costs and benefits for the private sector.

[8] *Also called the two principles of traceability; see e.g. H. Lehr, "Communicating Food Safety, Authenticity and Consumer Choice. Field Experiences.," Recent Pat. Food. Nutr. Agric., vol. 5, pp. 19–34, 2013.*

[9] *Also called Key Data Elements (KDEs)*

[10] *Also called Critical Tracking Events (CTEs)*

6. Conclusions

The implementation of traceability is a very detailed and often complex process, but it can be straightforward and successful when the private sector and government join forces and establish win-win frameworks that benefit all stakeholders involved. In other cases, implementation has proven to be lengthy and complicated, with mixed results at best.

CITES supply chains, particularly when the final product includes mixture of several species, are complex due to (a) the number and type of stakeholders involved; (b) the high processing degree of some products containing CITES-listed species; and (c) the fact that there is still illegal or poorly controlled wild harvesting of Appendix II plant species for medicinal and ornamental purposes due to constraint capacities.

The traceability framework proposed in the studies aims to balance the need to control the legality of the raw material source and the practicalities of businesses. It recommends stricter control of raw materials using operating permits, registries of natural resources, records of collection and inputs for artificial propagation and annual reports about raw material receptions and product dispatched. For later stages in the supply chain, it suggests less strict controls, in the form of mass balance systems, using operating permits and annual reports about materials received and dispatched. For heavily processed goods, one recommendation is to consider a chain of custody type of system where only the supply chain partners are reported, but not necessarily quantities of materials. The system may include the possibility to exclude finished products ready for retail from CITES controls, if the former states are adequately controlled and documented.

7. Recommendations

A combination of public and private sector support is absolutely essential for success, and an open and collaborative discussion between them is highly recommended, e.g. in the form of national traceability roundtables.

A robust, generic traceability system could be implemented to support CITES policy claims, trade data collection and better documented non-detriment findings. The use of international standards is highly recommended; particularly for the assessment of traceability systems for medicinal plants it was found useful to employ the UNECE traceability architecture.

Given the complexity of the system for fully processed goods containing CITES-listed species, its implementation has to be approached carefully and be embedded in a more general framework of activities, such as improving trade data collection, capacity-building and awareness creation of stakeholders, and information dissemination, especially to smaller players, on market prices and other relevant data.

To ensure that all stakeholders in the supply chain see direct benefit and advantage of participation, consideration should be given to work with existing structures or establish partnerships with sustainability certification and benefit-sharing schemes.

Additionally, the following elements are considered essential to successfully implement traceability systems:

- Be a demand-driven process, starting from the Parties interest and request to strengthen CITES processes through the use of traceability systems;
- Carry out a local assessment of the recommended traceability framework with respect to technical, economic and conservational aspects, for instance by conducting a socio-economic impact analysis;
- Validate if the proposed traceability architecture is generic enough to be adapted to different types of supply chains in different countries and regions, i.e. not only to non-timber forest plant species but to other species;
- Develop a traceability toolkit (or integration into the CITES e-permitting toolkit), so that traceability is easier to implement, yet meaningful to CITES Management and Scientific Authorities;
- Provision capacity-building initiatives and dedicate funds to implement the traceability framework, particularly for countries lacking adequate infrastructure to implement and use it;

- Within each country, identifying a strong project management team that can work collaborative with the public and private sectors to ensure that both of their standards and requirements are considered;
- Design the right mix of positive and negative incentives for the private industry to participate in traceability;
- Improve the cross-border reporting of exports and imports to ensure a better understanding of the traded volumes of medicinal species for effectively managing the reporting of endangered medicinal plant resources;
- Improve identification procedures for plant species sourced, either wild collected or artificially propagated; and
- Adhere to international standards and norms when available, including joint work with traceability framework (e.g. UNECE) and standard-setting organizations. Furthermore, analyze the benefits and costs to partner with certification and good practices schemes to ensure benefits for the small stakeholders in the supply chain.

The work undertaken by UNCTAD is a starting point to identify the right approach to develop a uniform umbrella traceability framework for CITES-listed species. Further development is needed through a practical implementation on the ground, e.g. through a traceability framework project to confirm the approach, identify costs and benefits, test the implementation methodology and seek partnerships with other stakeholders that can generate further benefits to the private sector operators and sourcing communities.

Ideally such a project could be built considering existing structures and projects that are already promoting the sustainable trade of biodiversity-derived products, such as within the BioTrade programmes and partners.

This project should have, *inter alia,* the following criteria:

- Large and long enough to have a measurable impact.
- Parties participating should be willing to collaborate and share information, and ideally already have a control system in place, i.e. they would also support electronic recording of traceability records and the use of risk-based methodologies in control systems.
- It should involve at least one developing country, with a further enriching exercise if it is a country and/or supply chain with low technological capacity, in order to be replicated further.
- Carry out an in-depth socio-economic impact assessment, and define how stakeholder´s needs be addressed and opportunities seized.
- It should attempt to quantify the amount of illegal and unreported trade using local expert knowledge.
- It should involve a trading partner with a history of strong interest in sustainable use of biological resources to provide better motivation to business operators.

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Annex 1: Persons and institutions consulted

Organization	Country	Individual
CITES		
CITES Secretariat	Switzerland	Tom de Meuleunaer Haruko Okusu Milena Sosa Schmidt Markus Pikart Daniel Kachelriess Dave Henson Mrigesh Kshatriya Karen Gaynor
CITES Management Authorities		
Division of Flora Affairs	China	Yue Zhang
Ministerio de Ambiente y Desarrollo Sostenible	Colombia	Diego Higuera Antonio José Gómez
Ministerio del Ambiente y Energía	Costa Rica	José Joaquín Calvo
Ministerio del Ambiente	Ecuador	David Veintemilla
Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO)	Mexico	Isabel Camarena Osorno
Ministerio del Ambiente	Peru	Mirbel Epiquién Rivera Isela del Carmen Arce Castañeda Harol Gutiérrez Peralta Vanessa Ingar Elliott
National Institute of Biological Resources	Republic of Korea	Byoung Yoon Lee Tae-Kwon Noh
Federal Food Safety and Veterinarian Office	Switzerland	Ursula Moser Mathias Lörtscher
Department of Agriculture	Thailand	Duangduen Sripotar Paweena Taraksa Sumalee Thongdonae
Other international organizations		
Florida International University	United States	Hong Liu
ITC	Switzerland	Joe Wozniak
UNCTAD	Switzerland	Bonapas Onguglo Lorena Jaramillo Lalen Lleander Mariona Cusi Neiva Rosa David Vivas Jina Choi
UNEP-WCMC	United Kingdom	Pablo Sinovas Kelly Malsch
UNECE - UN/CEFACT	Switzerland	Markus Pikart
Private sector stakeholders		
Orquivalle	Colombia	Andrea Niessen Juan Carlos Uribe
Centro De Rescate De La Flora Amazónica	Ecuador	Omar Tello
Klaus Duerbeck Consulting	Germany	Klaus Duerbeck
Agro Oriente Viveros S.A.C	Peru	Karol Villena
Migros	Switzerland	Franziska Staubli
NuHerbs Ltd	United States	Wilson Lau
Traditional Medicinals Ltd	United States	Josef Brinckmann
BioTrade Implementation Group (BIG)	Vietnam	Son Ta Minh
Center for plant conservation (CPC)	Vietnam	Nguyễn Tiến Hiệp
NGOs - iNGOs		
FairWild Foundation	United Kingdom	Bryony Morgan
GS1 Global	Belgium	Jim Bracken
GS1 Switzerland	Switzerland	Anders Grangard
IUCN -Global Species Programme	United Kingdom	Daniel Challender

		Richard Jenkins
TRAFFIC	United Kingdom	Anastasiya Timoshyna Thomasina Oldfield James Compton Chen Hin Keong
TRAFFIC	China	Zhou Fei Zeng Zhi
TRAFFIC	Vietnam	Thuy Nguyen
Union for Ethical BioTrade	Amsterdam	Rik Kutsh Lojenga
Winrock International	United States	Joel Jurgens
Experts		
Marcos Regis da Silva (ACTO, former-CITES staff)	Brazil	
Plant experts		
Kadoorie Farm & Botanic Garden	Hong Kong	Stephan Gale
Xishuangbanna Tropical Botanic Garden, Chinese Academy of China	China	Gao Jiangyun
University of Florida	United States	Lorena Endara
Tradmed	United States	Josef Brinckmann
Royal Botanic Garden Sydney	Australia	Nathalie Nagalingum
Royal Botanic Gardens – KEW	United Kingdom	Noeleen Smyth
Lancaster University	United Kingdom	Jacob Phelps
University of Kent	United Kingdom	Amy Hinsley

Annex 2: Traceability recommendations from the ornamental plants study

It is recommended that parental stock at each nursery is registered. Ideally parental plants are identified uniquely; alternatively, batches of parental plants can be grouped together. All additions to the parental stock must be recorded together with the source of the material. Ideally, this register is available online.

In a CITES permit application for the export process, a link will have to be established between the exported specimen(s) to the parental plants stock. For whole plants, it would be expected on an individual level. Alternatively, batches of plants from the same parental plant can be grouped together. For other products, such as plants parts, multiple source parental plants are possible. The corresponding CITES Management Authority (MA) can then run consistency checks to support the Legal Acquisition Finding. Since species identification is difficult, adding pictures to the registry would further help ensuring that the material going through the export process is indeed the species for which the permit is valid.

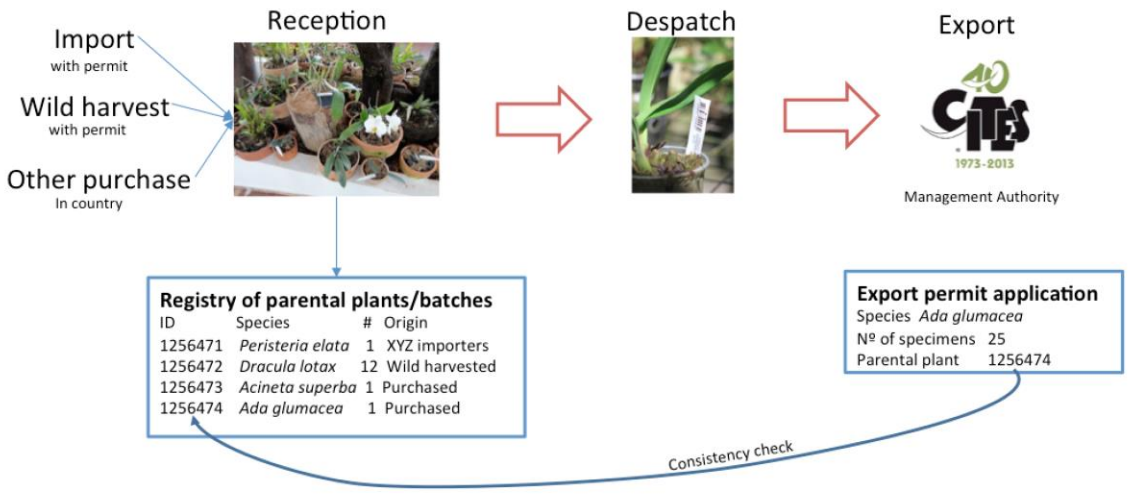
A legal origination process for ornamental plants will consist of the following steps and shown in Figure 5:

1) All receptions of CITES-listed ornamental plants, plant parts and seeds are recorded with:
   - Date
   - Supplier (name, business registration number or similar)
   - CITES permit information (if applicable)
   - Species
   - Number of specimens
   - Identification codes (see point 2)

2) Registration of parental plants, i.e. specimens collected from the wild and plants purchased for propagation.
   - Plants of the same species can be registered as a batch if their origin is the same (i.e. they come from the same supplier under the same CITES permit).
   - This also applies to seeds and plants parts.
   - Preferentially, however, whole plants are individually identified.
   - All identifiers should to be globally unique and must be unique within the context of the operator.

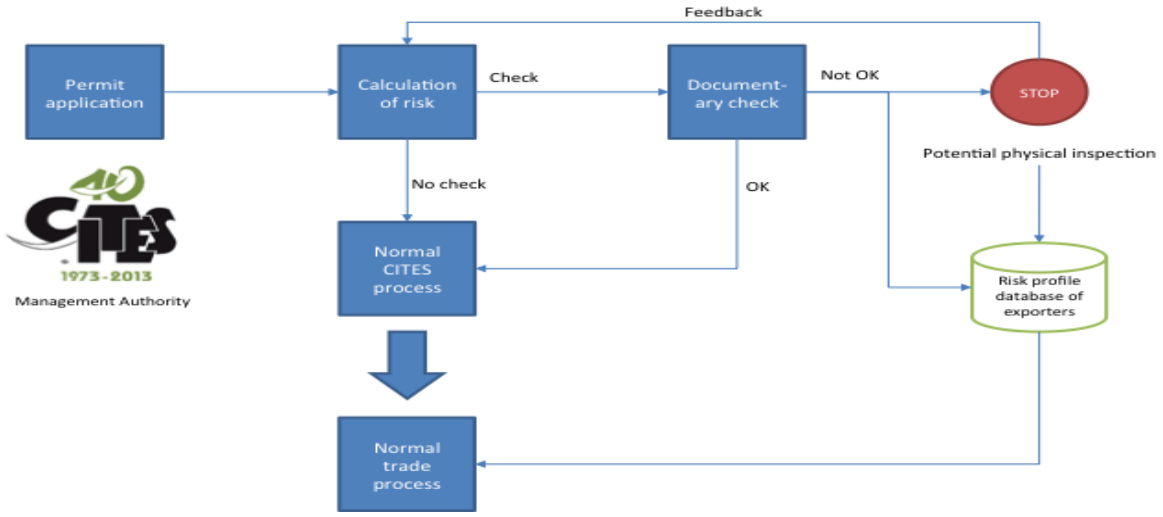
3) The inventory of parental plans, seeds and plant parts will be registered, ideally in an electronic system. It seems technically possible to identify these plants by using a plastic tag or printable label on the plant's cup. This tag or label then contains all relevant information either explicitly or through an identification code that links to an entry in the online registry.

Figure 5: Recommendations of a traceability system for ornamental plants under CITES II and III



Moreover, in order to further strengthen the CITES process, the traceability system could be combined with a risk management methodology to define whether to check or not a particular shipment or exporter (see Figure 6). This means that authorities would need to calculate the risk for the export processes considering different factors, as for example the exporting history of that particular exporter (see Table 3). This could foster exporters to be legal and, at the same time, uses control resources efficiently. This could also contribute to creating a risk profile database for exporters that can be shared with border controls for their own risk management and control processes.

Figure 6. Risk management-based process to decide verification level



Source: UNCTAD study on traceability for ornamental plants

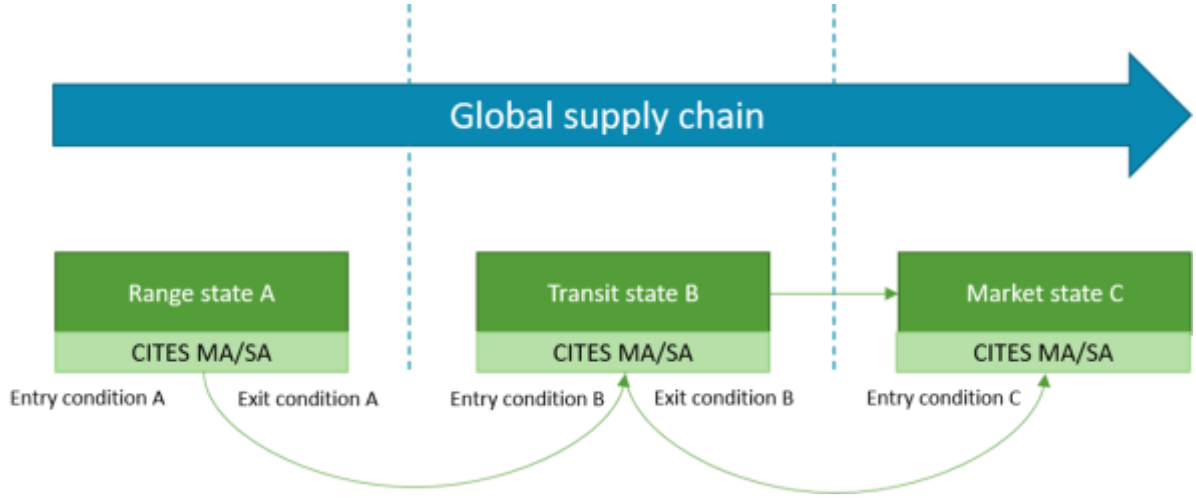
Table 3. Example of quality assurance using a risk-based control methodology

Factor	Inspection	Documentary check	Control frequency	
			Higher	Lower
Total number of exported plants higher than expected	Yes	Yes		
Number of plants inconsistent with inventory	Yes	Yes	X	
High number of imported plants	No	Yes		
Main exported species of exporter	No	No	X	
Any certificate issues in last 12 months	No	No	X	
Last control favourable	No	No		X
Parent plants identified individually	No	No		X
…				

Annex 3. Traceability recommendations from the medicinal plants study

The recommended traceability system for medicinal and aromatic plants (MAPs) first of all confirms the view expressed in the study of ornamental plants that the supply chain should be broken down into management units pertaining to a CITES Management Authority, as shown in Figure 7.

Figure 7. Break-down of the supply chain into units managed by one CITES Management/Scientific Authority



Source: adapted from the UN ECE, 2016.

This means that traceability information is collected only within the realm of a CITES Authority and not exchanged or made available with other Authorities. The aim of the traceability system is to support CITES managerial decision and to strengthen CITES permits and certificates.

The recommended traceability system differentiates between four different Traceable Assets:

i. Unprocessed MAPs;
ii. Processed MAPs without mixing species;
iii. Products containing MAPs; and
iv. Finished products packaged and ready for retail.

It proposes to exercise different levels of control over the four different types of assets; raw materials, i.e. unprocessed MAPs are to be closely controlled in the same fashion as specified above for ornamental plants. All operators will have to obtain an operating permit. Wild collectors will have to record collection dates, areas and amounts. Nurseries will have to document receptions (from collectors or other nurseries), keep a record of parent plants and link any exports to their corresponding parental plants.

First-level processed MAPs (i.e. where species are not mixed) are recommended to be controlled via a mass balance system, i.e. operators will need an operating permit and file an annual report detailing amounts of unprocessed MAPs purchased (per species) and amounts of processed products produced. Issuance of a renewed operating license will depend on reasonable values of that ratio[11].

Further processed MAPs, e.g. in the form of recipes, i.e. where mixing occurs naturally and different species of MAPs, including several CITES-list species might occur, are to be controlled via a chain of custody type of system.

[11] *Sometimes called "transformation factors"*

Operators will need an operating license and need to file an annual report detailing their suppliers. All of these suppliers need to have a valid operating license. Voluntarily, operators may specify volumes purchased from their suppliers.

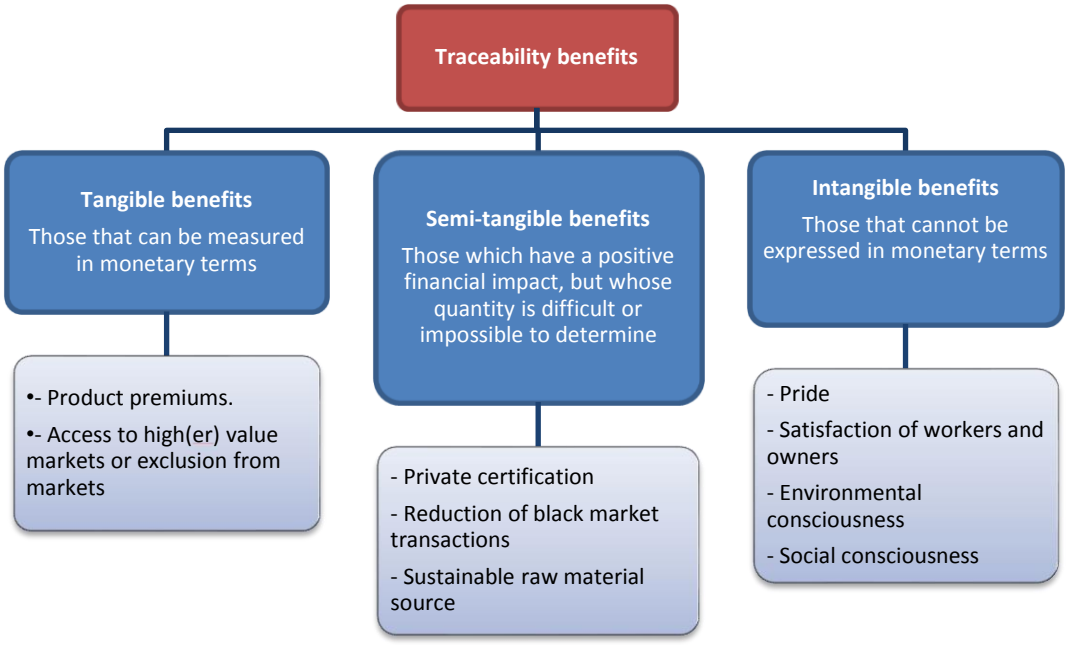
Finally, products ready for retail might receive a different treatment. It will be discussed during CITES CoP17 whether to change the annotation for orchids and exempt finished goods ready for retail; this is a very difficult and complex issue to be considered. For some CITES-listed species this annotation already exists. The traceability system allows for the possibility to exempt Consumer Goods Manufacturers from control; for species to which such an annotation does not exist, rules for assets of type iii apply, i.e. operators would need an operating permit and file an annual report about their suppliers.

Special arrangements are considered for small-scale collectors or nurseries. Small-scale primary producers will not have to keep records; instead their purchasers will have to document individual receptions from them (date of collection, area of collection, amount). It is recommended that such small-scale collectors and nurseries are excluded from international trade, since they will not be able to document legal origin of their materials. If such small-scale operators wish to export, they will have to subject themselves to the dispositions laid out above.

The system is summarized in Table 4.

The proposed system attempts to find a good balance between control and burden to the supply chain. Sustainable trade in MAPs should not be disrupted by too much control; on the other hand, illegal and informal trade in MAPs diminishes the livelihood of local communities. The potential benefits of a traceability system for private operators can be seen in Figure 8.

Figure 8. Potential benefits of private operators participating in the traceability system



In order to implement such a relatively complex system successfully, the motivation of the private sector is essential. For this it is of paramount importance that the system provides clear benefits to the operators. In general, benefits can be differentiated into tangible (i.e. monetary benefits), semi-tangible benefits (i.e. those where measuring the exact monetized impact is difficult) and finally intangible benefits which appeal to other than economic sentiments. Ideally, a system would have all three such benefits.

In order to understand the full socio-economic impacts arising from the use of this traceability system, a practical pilot project is necessary, since costs and benefits are not easily estimated based on theoretical deliberations. Forming partnerships with a wild-collected plant species standard (FairWild, Union for Ethical BioTrade or similar) and certification or similar scheme might also help to facilitate the implementation of traceability system by introducing financial benefits to local stakeholders, particularly small farm holders or local wild collectors.

Table 4. Summary of the proposed traceability system

	Asset type	Type of traceability	Entry condition	Transformation rule	Exit condition (LAF)
i	Unprocessed MAPS	Batch	Operating permit All receptions recorded: **From wild:** collection date, species and quantities recorded **From other entities:** Date, species and quantity	**Artificially propagated**: Registry of parent plants Propagated plants linked to parent Annual report with total quantity harvested or sold	Trader holds a valid operating permit Has filed the annual report the year before Can demonstrate upon request purchase records
i	Unprocessed MAPS (small-scale operators)	Batch	No operating permit No record-keeping requirements		Small-scale traders are not eligible for export permits
ii	Processed MAPs without mixing species	Mass balance	Operating permit	Annual report of total purchased quantity per species and total quantity of products produced	Trader holds a valid operating permit Has filed the annual report the year before The exported quantities can reasonably be substantiated
ii	Processed MAPs (from small-scale operators)	Reception control Mass balance	Record sales date, species, weight and price.	Annual report of total quantity per species from small-scale collectors.	
iii	Products containing MAPs	Chain of custody	Annual list of suppliers fulfilling dispositions above	Voluntary: annual report of purchased and produced quantities	
Iv	Finished products packaged and ready for retail	Potentially excluded from control; else chain of custody			