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OF WILD FAUNA AND FLORA

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NON-COMPLIANCE WITH CITES CONCERNING ORCHIDS

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INFORMATION DOCUMENT FOR THE 69th MEETING OF THE CITES STANDING COMMITTEE,
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Introduction

1. The aim of this document is to provide additional information to the Standing Committee and the CITES Parties to inform decision-making at the 69th meeting of the CITES Standing Committee, in particular SC69 Doc 30. Review of Significant Trade in Specimens of Appendix-II species.

2. At the 23rd Meeting of the CITES Plants Committee, Parties referred trade of *Dendrobium chrysotoxum* and *D. moschatum* from Lao People's Democratic Republic to the Standing Committee (PC23 Com. 5 (Rev. by Sec.)). However, these are not isolated issues. Although orchids represent the vast majority of all CITES-listed species, there are extensive compliance issues, with cross-border illegal trade documented for medicinal, edible, and ornamental markets.

3. Key points discussed below are:
   - **Paragraphs 4-7** outline the position of orchids within CITES. Orchids are the largest group of CITES-listed species, and one that is traded worldwide, representing a critical test for global implementation of the Convention;
   - **Paragraphs 8-15** present the available evidence relating to trade in *D. chrysotoxum* and *D. moschatum* by Lao PDR, which suggests that wild trade is still occurring;
   - **Paragraphs 16-20** discuss other pressing but often overlooked CITES implementation issues, including trade in edible, medicinal and ornamental orchids worldwide;
   - **Paragraphs 21-28** outline a series of priority actions for strengthening CITES implementation for orchids.

Orchidaceae and CITES

4. Orchids are globally distributed and are one of the largest families of flowering plants. They are harvested, grown, and traded as plants and flowers for ornamental and cultural purposes, as flavourings and other edible food products, and as constituents within cosmetics and traditional medicines in many parts of the world.

5. All species of orchids are listed on CITES, and they represent the vast majority of CITES-listed species (Fig. 1).

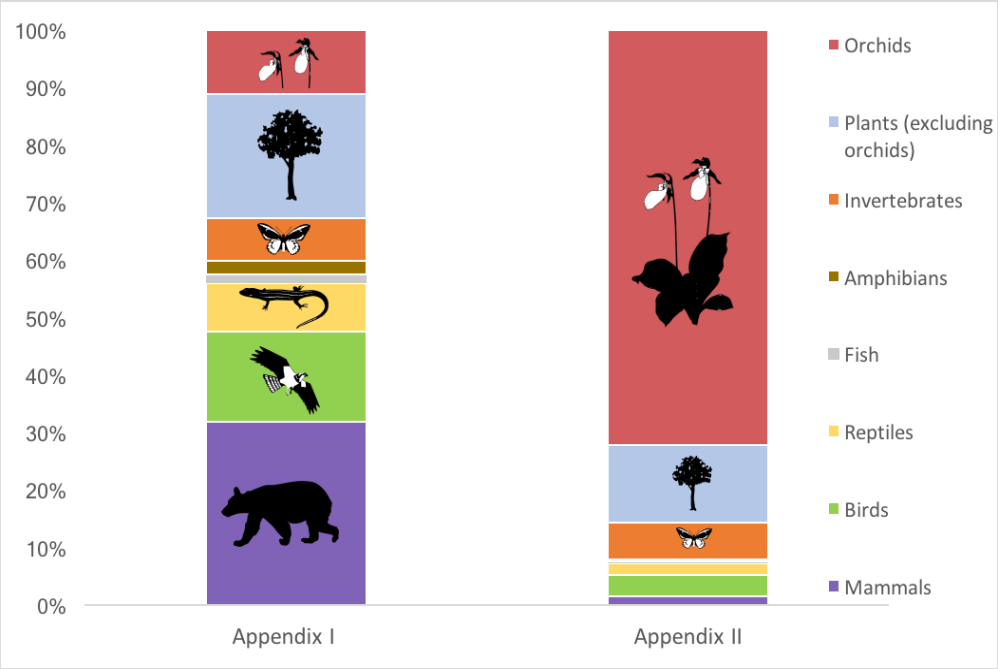

Figure 1 Taxonomic breakdown of CITES Appendices I and II. Adapted from Hinsley (2016) with updated data from UNEP-WCMC (2015) and images from the Integration and Application Network, University of Maryland Center for Environmental Science ian.umces.edu/symbols

6. The majority of global orchid trade consists of legal, artificially propagated cut flowers and plants grown under controlled conditions. However, many orchid species are also harvested from the wild for local, regional and international trade, without the necessary harvest or CITES permits, driving new concern for orchid conservation in many parts of the world (e.g., Davenport & Ndangalasi 2003; Flores-Palacios 2007; Subedi et al. 2013; Phelps and Webb 2015).

7. Over-harvest is a particular concern because many orchid species are naturally rare, have a limited range and/or occur at low densities, due to interacting factors such as recent speciation, specialised pollination mechanisms, habitat specificity and the restricted distribution of mycorrhizal symbionts (e.g., Dodson and Gentry 1991; Swarts & Dixon 2009; McCormick and Jacquemyn 2014). Available ecological studies on the impacts of wild-collection of epiphytic orchids suggests that they are extremely vulnerable to even low-levels of harvest (Mondragón 2009; Hu et al. 2017).

Trade of *Dendrobium* spp.

8. Orchids are a central part of traditional Chinese pharmacopoeia (Hong 2004; Bulpitt 2005) and contemporary demand for medicinal orchids has surged in recent years (Nijman 2010; Liu et al. 2014; Zhang & Yin 2014).

9. *Dendrobium* spp. are the most widely cited orchids in the pharmacopoeia, used to make the drug *Shih-hu* (particularly *D. catenatum* [including *D. officinale*], *D. loddigesii*, *D. moniliforme*, *D. nobile*). However, a much broader range of orchids are also used, as substitutes and adulterants, including the species *Dendrobium chrysotoxum* and *D. moschatum* referred to at PC23 (Lau et al. 2001; Wu et al. 2009; Phelps pers. obsv.). While plants may be identified to species level when in flower (Figure 2), they are very difficult to distinguish from other *Dendrobium* spp. once they are dried and/or processed for medicinal use (e.g., Fig. 3).

Figure 2. Left: Dendrobium chrysotoxum *(Credit: Stafeno, Flikr); Right:* D. moschatum *(Credit: El Grafo, wikicommons)*

10. With increased demand, wild *Dendrobium* harvest has spread across Southeast Asia, including to Lao PDR (Lamxay 2009; Lovera and Laville 2009; Phelps 2015). Few of these orchid species have been assessed in the IUCN Red List, but anecdotal evidence from both harvesters and experts suggests populations of many orchid species in Lao PDR are in decline due to over-harvest (Schuiteman et al. 2008; Lamxay 2009; Lovera and Laville 2009; Phelps 2013; S.Gale, pers. obs.).

11. Before 2008, Lao PDR reported large-scale trade of wild-sourced *D. chrysotoxum* and *D. moschatum*, with shipments of up to 150 000 kg of live plants recorded for both species. Since 2008, no trade in *D. moschatum* has been reported but the volume of reported *D. chrysotoxum* plants being exported remained high, with the main difference being a shift from wild-sourced to artificially propagated plants (Table 1).

Table 1 All exports of Dendrobium chrysotoxum *from Lao PDR between 2006 and 2015, as reported by importers (Lao PDR did not report any exports during this time). Source: CITES trade statistics derived from the CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK, downloaded 2nd September 2017.*

Year	Importer	Importer reported quantity	Term	Unit	Purpose	Source
2006	China	80 000	live	kg	T	W
2007	China	150 000	live	kg	T	W
2007	China	7 000	roots	kg	T	W
2007	Thailand	5	live		T	W
2008	China	150 000	live	kg	T	A
2009	China	150 000	live	kg	T	A
2010	China	100 000	live	kg	T	A
2011	China	50 000	live	kg	T	A
2012	China	50 000	live	kg	T	A
2014	China	50 000	stems	kg	T	A

12. Based on the available evidence, it is unlikely that the reported, rapid shift to the export of only artificially propagated plants has occurred. Although greenhouses are reported to have been operational in Lao PDR since at least 2009 (Lamxay 2009; Lovera and Laville 2009), the source material for these greenhouses was wild plants that were intensively collected, and illegal international trade of wild medicinal and ornamental orchids continues (Lamxay 2009; Lovera and Laville 2009; Phelps and Webb 2015; Lovera 2017; S.Gale pers. obs.).

13. As early as 2009, Lamxay reflected on the need for new regulation of, and quotas for the wild harvest of medicinal orchids for greenhouse propagation suggesting that “companies can export seedlings from gardens at least 3-5 years after starting their growth.” Based on observations of greenhouses in Xiangkhouang Province, she further suggested that “in propagation the wild mother plants were collected from the forest but were only planted on the rocks or bark of trees. Yet during this time the company was exporting orchid stems, which, given the above, could have only been sourced from the wild” (Lamxay 2009). This indicates that laundering of wild plants via greenhouses is likely to have been occurring.

14. A 2009 scoping study of greenhouse-based artificial propagation orchids in Lao PDR offers similar insights (Lovera and Laville 2009). Across Lao PDR, they observed both the indiscriminate wild-harvest of orchids to supply greenhouses, and sale of wild-collected plants to Vietnamese and Chinese traders (Ibid.; Fig. 3, 4).

Figure 3 Live plants of Dendrobium *spp. (likely* D. chrysotoxum*) harvested from the wild in Phongsaly Province, Lao PDR (Credit: Lovera 2009).*

Figure 4 Warehouse for storing dry orchid stems (likely Dendrobium *spp.), Oudomxai Province, Lao PDR (Credit. Lovera 2009).*

15. A recent survey of Lao PDR's 5 northern provinces identified three greenhouses cultivating orchids (*D. chrysotoxum*, *D. moschatum, D. fimbriatum*) for export to China with CITES permits, one in Oudomxay Province and two in Xiangkhouang Province (Lovera 2017). There is reportedly no *in vitro* propagation taking place but all plants for export are produced vegetatively from plants collected from the wild 10-15 years ago (Lovera 2017). Although these companies were reported to be exporting only plants from their own greenhouses, there is also an ongoing trade of wild plants from collectors in Lao PDR to Vietnamese and Chinese intermediaries. Interviews were carried out with 11 professional plant collectors, who reported significant depletion of local orchid stocks over the past 2 years, as represented by lower harvests despite increased collecting effort. In addition, during recent botanical trips in Lao PDR, botanists reported when visiting villages that "Chinese or Vietnamese traders have already been there to ask the villages to collect all long-stemmed Dendrobiums; accordingly, it is very difficult to see certain species that we would expect to be there" (S. Gale Pers. obs.). This mirrors earlier reports (Schuiteman et al. 2008; Phelps 2013).

Priority compliance issues globally

16. The trade of wild *Dendrobium* spp. from Lao PDR is not an isolated case, but is rather indicative of widespread challenges in applying CITES to orchid trade globally. We highlight 5 categories of international trade in wild orchids, where evidence suggests the Convention is not being strongly applied and there is non-reporting of listed species (based on Hinsley et al. *in press*). For each we identify key evidence of the current situation, however, these topics also represent critical data gaps, for which CITES Trade Database information is largely unavailable.

17. **Middle Eastern *salep***
    - **Context:** *Salep* is a powder made from the ground tubers of wild terrestrial orchids, used to make a hot beverage (*salep*) and an ice cream (*maraş dondurma*) (Kasparek & Grimm, 1999). Salep is traded predominantly in Turkey, with illegal harvesting for trade also reported from Greece, Iran and Albania (Ghorbani et al., 2014; Kreziou et al., 2016; Quave & Pieroni, 2015). At the Iran-Iraq and Iran-Turkey borders, *salep* is reportedly transported with no paperwork in bags labelled as almonds (A. Ghorbani & H. de Boer, pers. obs.). There is also some resurgent concern about *salep* trade from Turkey to Germany (Unpublished data).
    - **Species:** At least 35 species of orchids are used to make salep across the genera *Anacamptis Dactylorhiza*, *Himantoglossum*, *Ophrys, Orchis, Serapias* and *Steveniella* (Ghorbani et al., 2016; Kasparek & Grimm, 1999; Kreziou et al., 2016).
    - **Conservation impacts:** In 2002, collection in Turkey was reported to involve an estimated 30-120 million orchid plants annually (Kreutz, 2002; Sezik, 2002), an increase over historical estimates of 10-20 million (Read & Groves 1994 in Kasparek & Grimm 1999) and 9.8-19.6 million (Kasparek & Grimm 1999). More recent reports estimate that 80 tonnes of orchid tubers are collected annually in Turkey (Kızılkaya, 2013 in Hattam, 2013). The depletion of resources in Turkey has reportedly caused traders to look abroad, fuelling the harvest in neighbouring Iran of 5.5-11.0 million orchids annually, mainly for export to Turkey (Ghorbani *et al.*, 2014). Kreziou et al. (2016) also reported salep trade in Greece, and informants reported a renewed interest in salep consumption as a natural product.

18. **African *chikanda* cake**
    - **Context:** Terrestrial orchids are used in several African countries (primarily Zambia, also Malawi, Democratic Republic of Congo, Cameroon) to make *chikanda* cake (Kaputo 1995; Bingham 2009). Originally a household scale harvest, chikanda has increased in popularity and is now sold at local markets, supermarket and some restaurants (Davenport & Ndangalasi 2003; Bingham 2009). At the Tanzania-Zambia border, traders report that they transport chikanda marked as potatoes in 100-150 kg bags (S. Veldman & H. de Boer, pers. obs.).
    - **Species:** *Chikanda* involves trade in several orchid species, primarily in the genera *Disa*, *Habenaria* and *Satyrium* (Davenport & Ndangalasi 2003; Bingham 2003; Nyomora 2005; Hamisy 2007; Challe & Struik 2008; Challe & Price 2009). However, surveys have shown use of species from the genera *Brachycorythis*, *Eulophia* and *Roeperocharis* (Bingham et al. 2003; Hamisy 2008; Challe and Price 2009) because of local scarcity of the other taxa (Veldman et al. 2017).
    - **Conservation impacts:** Few of the species (2 species) are assessed by the IUCN Red

List, and none of this trade is documented in the CITES database. However, orchids for *chikanda* have reportedly become so depleted in Zambia that traders now import tubers from several neighbouring countries (Davenport & Ndangalasi, 2003; Veldman, 2014). Market surveys and interviews with collectors show that demand outstrips supply and that intermediaries and collectors now report sourcing tubers from as far afield as Mozambique, Malawi, DR Congo, and Angola (Veldman et al., 2014). In 2003, between 2.2-4.1 million tubers were reportedly exported from Tanzania (Davenport & Ndangalasi 2003), a trade volume estimate that was verified in 2014 (Veldman et al. 2014). Artifical propagation is difficult but a Darwin Initiative project at the Royal Botanic Gardens, Kew is now working to develop and gather expertise to start a cultivation programme (Masters, 2016).

19. **Traditional Medicines**

- **Context:** Orchids are used extensively in medicinal preparations globally; the "CITES-listed medicinal plant species" report (PC23 Inf 10) identified 195 orchid species in the global medicinal trade, making them the most diverse group of CITES-listed medicinal plants. It noted that many species are traded online, and probably largely under-represented in CITES annual trade reports (PC23 Inf. 10). Indeed, the literature highlights wild unreported orchid trade to China for Traditional Chinese Medicine, often via Vietnam, for *Dendrobium* spp. from Lao PDR (described above), Myanmar, Nepal and Vietnam (Zhang et al. 2008; Lamxay, 2009; Subedi et al., 2013; Liu et al. 2014; Phelps 2015; Pant et al. 2016). Unreported medicinal orchid exports are also reported for use in Ayurvedic Medicine, from Nepal to India (Subedi et al. 2013) and to the United Kingdom (TRAFFIC, 2017; see Nic Lughadha et al. 2017; pers. comms.). Medicinal orchids are also traded much more widely around the world, including to Europe as various traditional medicines and health supplements (Brinkmann 2014; PC23 Inf. 10). At least some of this trade breaches CITES regulations, as evidenced by recent enforcement actions (e.g., Operation Cobra III).
- **Species:** The most prominent orchids used in Traditional Chinese Medicine are various *Dendrobium* spp, particularly *D. catenatum* (including *D. officinale*), *D. loddigesii*, *D. moniliforme* and *D. nobile* (Leon & Lin, 2017; Teoh, 2016). In addition, *Dactylorhiza hatagirea*, *Gastrodia elata*, *Bletilla striata*, *Cremastra appendiculata*, *Pleione bulbocodioides*, *P. yunnanensis* and several *Anoectochilus* spp. are all used (Subedi et al. 2013; Leon & Lin 2017; Teoh 2016). Ayurvedic medicinal orchid species include *Crepidium acuminatum*, *Habenaria intermedia*, *H. pubescens, Herminium edgeworthii, Malaxis muscifera, Eulophia dabia*, *E. spectabilis*; (Hossain 2009; Dhyani et al. 2010; Pant & Rinchen 2012; Jalal et al. 2014; Khajuria et al. 2017), and the CITES Appendix I-listed *Paphiopedilum druryi* (Maridassa et al. 2008; Rankou and Kumar 2015).
- **Conservation impacts:** Few medicinal orchid species are assessed by the IUCN Red List, although several are of particular concern, including *Dendrobium officinale* (Critically Endangered), *Gastrodia elata* (Vulnerable), *Malaxis muscifera* (Vulnerable) and *Paphiopedilum druryi* (Critically Endangered). The literature also reports a wide range of evidence of broader conservation impacts. For example, increased demand for orchid-containing medicinal products is reportedly unsustainable in China and has driven orchid harvest to neighbouring countries (see above). In addition, increased demand has led traders to target many different wild-collected *Dendrobium* spp. as adulterants in traditional medicine (Lau et al. 2001; Wu et al. 2009; Heubl 2010; Williamson et al. 2013). Unsustainable wild harvest is also reported in South Asia, where field estimates suggest that 6,200-31,000 kg of *Dactylorhiza* spp. are harvested annually within northeast Himalayan region of Sikkim (Rai et al. 2000; Uniyal et al. 2002), with each kilo comprised

of approximately 100 individuals (Pant & Rinchen 2012). Medicinal orchids such as *Habenaria intermedia* and *H. pubescens* have been extirpated from parts of their native ranges (Chauhan et al. 2007), and populations of *Eulophia dabia* and *Dactylorhiza hatagirea* are declining in the Indian Himalayan Region due to over-harvest (Kala 2000; Jalal et al. 2014).

20. **SE Asian ornamental orchids**
    - **Context:** Most contemporary ornamental trade involves artificially propagated plants and cut flowers, often of hybrids in a small number of genera. However, international trade of ornamental orchids for horticultural trade also includes wild, often illegally harvested and traded plants. Anecdotally documented from many regions, Southeast Asia is a recognised hotspot for commercial illegal trade in wild-collected orchids (Subedi et al. 2013; Phelps and Webb 2015). This includes trade for domestic consumers, a large international trade among the countries in the region (Phelps 2015; Hinsley et al. 2016). The region also hosts an active online trade in wild plants, including via platforms such as Facebook (Phelps 2015; Hinsley et al. 2016). For example, endemic Indonesian species are available for sale online from nurseries in other SE Asian countries, with no reported CITES exports (Hinsley & Roberts, *in press*). There are recorded cases of illegal exports to Europe (Honigsbaum, 2006), and widespread anecdotal reports of illegal exports to Singapore, Japan and the United States (Phelps 2015; see Nic et al. 2017; A.Hinsley and J.Phelps pers. comm.).
    - **Species:** SE Asian ornamental trade affects hundreds of species of Appendix I and II species. For example, field-based studies in Thailand indicate commercial international trade in 347 wild-collected ornamental orchid species, primarily collected from Lao PDR and Myanmar (Phelps and Webb 2015). Phelps and Webb (2015) conservatively estimated that 22% of Lao PDR's and 15% of Myanmar's known orchid flora was found in trade within Thailand.
    - **Conservation impacts:** Few of these species have been assessed for the IUCN Red List (outside the genus *Paphiopedilum*). However, international trade is negatively impacting wild populations of many species at local and regional scales, based on reports from harvesters themselves, who report dramatically declining populations (Schuiteman et al., 2008; Phelps et al., 2015; S.Gale pers. obs.; P. Lovera pers. obs.). Trade has resulted in large-scale decline of some species, and often targets newly discovered species which are often found traded in markets/online even before these species are formally described (see Vermeulen et al. 2014; e.g., Averyanov et al. 2014; Gruss et al. 2014; Metusala 2017). For example, newly-discovered Vietnamese species, *Paphiopedilum canhii*, which suffered commercial harvest of 99.5% of its population (Averyanov et al., 2014). In addition, of 347 species identified in ornamental trade in Thailand, 58 were either endemic or classified as domestically threatened in Thailand (Phelps 2015).

Recommendations

21. Priority actions for strengthening CITES implementation for orchids are presented below. The development of an inter-sessional working group on "Orchid Implementation", may be the most appropriate avenue through which to explore these issues in greater detail.

22. **Targeted scientific support to countries and species facing CITES implementation challenges**, potentially including:
    - Medicinal *Dendrobium* spp. Consultation and field research with known exporting countries (Lao PDR, Myanmar) to gather information on scale of trade, evaluation of existing artificial propagation efforts, and the measures in place to enforce regulations on trade in wild plants.
    - *Chikanda* orchids. Consultation with key Parties (e.g., Zambia and Tanzania) and field research to evaluate scale of trade and primary trade routes.
    - *Salep* orchids. Consultation with key Parties (e.g., Turkey) and domestic experts to determine whether artificial propagation is viable, evaluate scale of trade and existing trade networks for wild plants.
    - Ayurvedic medicinal orchids. Consultation with key range states (e.g., Nepal, India, Bangladesh) to evaluate scale of trade, identify species being targeted for international trade, and review existing permitting processes for orchids.

23. **Identify Range States that have been successful with CITES implementation** to promote legal trade, reduce illegal trade, and collect and disseminate “lessons learned”

24. **Establish new efforts to monitor information on international orchid trade** that is not currently CITES-reported, to highlight issues of emerging concern (e.g., new species discovery, information from the horticultural community, shifting medicinal trends).

25. **Improve data on orchid species in trade**, recognising the size of the family and value to Management Authorities and Customs of being able to focus in on a subset of genera and species that merit closest monitoring, including:
    - Develop a list of all orchid species actively involved in international trade, both CITES and non-CITES reported.
    - Manage a dynamic list of orchid species of particular conservation concern in international trade (e.g., new species, emerging trends, shifting species-country combinations).

26. **Assess the need for specific orchid identification** resources and/or training.

27. **Identify funding to support improved CITES implementation for orchids**

28. **Assess the scale of global illegal trade in orchids**

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