Policy Brief

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Is sustainable harvest of wild orchids possible?

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Key messages

- Unregulated and illegal wild harvest is a serious threat to the conservation of many orchid species, but in some places, it is also important to rural livelihoods, cultural traditions, and access to wild medicines.
- There is a clear need for improved enforcement to control the illegal harvest and trade of protected plant species. Based on one of the first trials to monitor wild orchid harvest in Nepal, we identify key species being targeted for commercial-scale harvest and propose possible responses.
- Under some circumstances, wild orchid harvest may be done sustainably in ways that balance conservation and livelihood needs. But we should be very cautious when we permit the legal harvest of wild orchids. We highlight the need to begin trialling more sustainable harvest methods – especially for the key species most targeted by commercial trade.

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The importance of making orchid harvest more sustainable

With over 30,000 species being reported globally, orchids represent one of the largest, widely distributed, and most diverse families of flowering plants. Orchids are harvested from the wild around the world – usually illegally – for many reasons, including as ornamental plants, food products, and medicines. However, the management and international trade of orchids is highly regulated and often protected under national legislation, and all species are listed in the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES).

There is very little information on the sustainability of orchid harvest globally, but the available information from our trial harvest monitoring and reviews of the literature suggests that wild harvest is a serious conservation threat to many species. Across the world, trade has driven orchid populations to collapse and some species have gone extinct. However, there are also some examples of long-term orchid harvest, suggesting that – under some circumstances – wild orchid harvest may be done more sustainably.

This Brief explores whether and how wild orchid harvest can be made more sustainable. This is an exceedingly challenging question to answer based on the available research[1,2]. However, it is also vitally important to biodiversity conservation and to the livelihoods and culture of people around the world involved in the wild orchid harvest. This Brief focuses on orchids in Nepal but has implications for orchid populations globally to:

- Develop Species Management Plans, and Species Conservation Action Plans;
- Inform decisions by site managers, including forest officers and community groups; and
- Support the CITES Authorities in conducting Non-Detriment Findings.

This Brief is for stakeholders interested in orchid conservation. It is equally applicable to the management and trade of CITES-listed species, and the management of non-timber forest products. In Nepal, this includes the CITES Authorities, the Department of Forest and Soil Conservation, and the Department of Plant Resources at central level, Division Forest Offices at the district level, Community Forest User Groups at the local level, and orchid scientists.

A dual approach: Enforcing conservation laws and promoting sustainable harvest

Species conservation often focuses on stopping people from collecting plants, animals and fungi from the wild, often through monitoring and enforcement. Although important, these actions are expensive, often place limitations on rural livelihoods, and reduce access to resources. Moreover, even when the harvest is regulated, illegal trade often continues because of economic need and cultural tradition. This is especially true for wildlife in isolated areas, and when government agencies have limited resources.

Sustainable harvest is (for some species) an important part of conservation. It relies on a regulated collection of wild resources in ways that the harvested population is able to regenerate and persist over the long term, and that other parts of the ecosystem are not negatively impacted. It is different for each species and context but is important because it creates economic incentives for people to protect remaining wild populations over the long-term instead of over-exploiting them in the short-term.

1. Ticktin, T., Charitonidou, M., Douglas, J., Halley, J.M., Hernández-Apolinar, M., Liu, H., Mondragón, D., Pérez-García, E.A., Tremblay, R.L., Phelps, J., 2023. Wild orchids: A framework for identifying and improving sustainable harvest. *Biological Conservation* 277:109816.
2. Bashyal, R., Paudel, K., Hinsley, A., Phelps, J. Making sense of domestic wildlife and CITES legislation: The example of Nepal's orchids. *Biological Conservation*. In Review.

Managing and protecting wild orchids

Many countries suffer from large-scale, commercial trade in wild orchids, but are often unregulated and under-reported. This is the case in Nepal, which hosts a little documented but large-scale trade in wild orchids across the country, mostly for use as medicines for domestic markets and export to China and India. There is very little information about how this affects wild populations, but harvesters and scientists around the country have reported that local populations have declined, and harvesters report that they have to travel further to find the orchids they used to collect. The high-value, terrestrial species *Dactylorhiza hatagirea* (photo 1) has especially been noted to be suffering from intensive commercial harvest and local declines. Also, *Satyrium nepalense* are found to be massively harvested (Photo 2).

Photo 1: Dried and ready to sell *Dactylorhiza hatagirea* rhizomes

Photo 2: Dried and ready to sell *Satyrium nepalense* tubers

However, orchid harvest is also important to rural livelihoods, access to medicines, and culture in many communities. As such, managing the trade-offs between conservation and livelihoods is a priority. This is particularly true in countries like Nepal, where there is a strong focus, backed by the Government, to promote the harvest of wild high-value medicinal and aromatic plants, including orchids, to generate "win-wins" for communities and nature.

Laws governing orchids in Nepal

- **National Species Management Plans.** Although wild orchid harvest, domestic trade, and international trade were previously legal in Nepal, they all became illegal under the country's CITES Act 2017. The Act states that all species covered by the CITES Convention – including all orchid species – must first have a Species Management Plan in place before harvest and trade can resume. These Plans are legally-binding documents, prepared by the CITES Management Authority (Department of Forest and Soil Conservation), with technical support from the CITES Scientific Authority (Department of Plant Resources), and occasionally with the help of civil society organizations. The Plans estimate population sizes, identify threats and priority areas and stipulate conditions for sustainable use such as harvestable stocks and techniques (e.g., quotas). Such plans have been prepared for some economically-important plant species (e.g., *Taxus, Nardostachys*), but not yet for orchids, until which no legal trade can occur.
- **CITES Non-Detriment Findings.** In order to issue CITES Permits for orchids to allow international export, CITES Authorities are required to prepare Non-Detriment Findings that demonstrate that trade of the species will not affect the survival of the species in the wild. These evaluations have not been conducted for orchids in Nepal.
- **Species Conservation Action Plans.** These guidance documents for plants are prepared by the Department of Forest and Soil Conservation, often with support from outside experts and NGOs. They set time-bound priorities, summarize past and current conservation activities, and identify potential and existing threats.
- **Provincial, divisional, and site-specific management plans.** Local forest managers, including Protected Areas, Division Forest Offices, and Community Forest User Groups, are responsible for implementing national legalization in their sites, including the CITES Act. If National Species Management Plans are created, these agencies will be responsible for operationalising them on the ground.

A focus on medicinal orchids in Nepal

Of Nepal's approximately 500 orchid species, more than 100 orchid species have been documented for use in the medicinal trade – including in Ayurvedic, Traditional Chinese, and Unani Medicine. This is dominated by at least 6 genera of orchids, both terrestrial and epiphytic (grow on trees) species.

Medicinal orchids in large-scale commercial trade in Nepal

Dactylorhiza hatagirea (local name: Panchaule)

Trade notes

- One of the highest-value orchid species in trade
- The most highly protected orchid species in Nepal
- Widely used in Ayurvedic medicines and, some use in Traditional Chinese Medicine
- Whole plant is collected and the rhizome roots are collected and dried
- Collected from high-level grasslands in sub-alpine regions (areas just below the tree line that are seasonally covered with snow)

Description and key identifying characteristics

- Terrestrial orchid
- Flowers are dark purple
- Rhizome root is very distinct, brown and looks like a hand with 3 to 6 fingers

Satyrium nepalense (local name: Gamdol, Chedung)

Trade notes

- One of the most heavily harvested species of orchids in Nepal
- Used mostly in Ayurvedic Medicine
- The whole plant is uprooted to obtain tubers, the part in trade
- Tubers are boiled and sundried until the color becomes dark brown

Description and key identifying characteristics

- Terrestrial herbaceous orchids with globular underground tubers
- Flowers are white to rose pink, densely clustered on a 3-15cm tall spike
- Underground tubers are oval-shaped, 2-5cm x 1.5cm
- Tubers are harvested when the flower and the plant itself dries out

Pholidota spp. (local name: Sunakhari, Kyasumar)

Trade notes

- Heavily harvested across a range of habitats and elevations
- Reportedly used in Ayurvedic medicines and traded for Traditional Chinese Medicine
- Pseudobulbs are harvested and dried

Description and key identifying characteristics

- Epiphytic orchids growing on trees (sometimes grow on rocks)
- Most species have oval-shaped pseudobulbs approx. 3cm x 60-100cm. Vegetatively often very similar to *Coelogyne* spp. and difficult to distinguish without flowers

Coelogyne spp. (local name: Sunakhari)

Trade notes

- Heavily harvested across a range of habitats and elevations
- They seem to be used in both Ayurvedic and Traditional Chinese Medicines - interaction with a trader from Makwanpur said that they were shipped to China probably for Traditional Chinese Medicine
- Only pseudobulbs are harvested and traded

Description and key identifying characteristics

- Epiphytic orchids growing on trees (sometimes grow on rocks)
- Flowers of most species star-shaped, white with yellow centres
- Pseudobulbs are oval-shaped with two leaves emerging from the tip. Leaves are often lightly placated. Vegetatively often very similar to *Pholidota* spp.

Pleione spp. (local name: Sunakhari, Kyasumar kya)

Trade notes

- Harvested from mid-elevation areas, during the blooming season (Oct.-Nov.)
- Used in Ayurvedic medicine, probably for both domestic trade and export to India
- Sometimes mislabelled as the fern rhizomes of the common Himalayan Ground Gooseberry *(Nephrolepis cordifolia,* photo 4b*)*

Description and key identifying characteristics

- Epiphytic and sometimes grows on rock
- 1-2 distinctive, pink or white flowers that usually appear after leaves have dropped
- Pseudobulbs are oval, cone or barrel-shaped and form tight clusters

Dendrobium spp. (local name: Sunakhari, Sungava)

Trade notes

- Many species, many of which seem to be harvested across habitats and elevations in Nepal
- Used as ornamental plants, and primarily for Traditional Chinese Medicine and some Ayurvedic medicine
- Pseudobulbs are harvested and dried. Psudobulbs can be selectively cut or the whole plant is harvested

Description and key identifying characteristics

- Usually epiphytic growing on trees
- There are many species of *Dendrobium*, many of which have colourful recognisable flowers
- Pseudobulbs come in many shapes, including oval-shaped, long thin chains, and chains with nodes

Wild harvest of these species has been formally documented in only a very small number of studies. However, it is known to be occurring in communities around the country. In some cases, this is opportunistic, but in others, it is a core part of local livelihoods, with households and villages traditionally specialising in the harvest and trade of medicinal plants.

Most harvesters use destructive methods that involve the collection of entire plants, digging up terrestrial orchids to remove their tubers, and removing entire plants from trees. This limits the sustainability of harvest because it removes entire individuals. There are some cases where harvesters report replanting old tubers of terrestrial plants, or selectively harvesting only some portions of epiphytic orchids, but this is not the norm and it is unknown how the plants respond. Harvesters report both high competition amongst the harvesters, and concern about sustainability because it is linked to their livelihood.

PHOTO-3: *Dactylorhiza hatagirea* in flowering stage

All of this harvest is currently illegal according to national law. However, harvesters report that they are collecting according to local rules–including the Division Forest Office 5-Year Management Plans, and the 10-Year Operational plan of their respective Community Forests. Reviews of these local plans show some state quotas and harvest regimes for orchids, sometimes using other local names or misidentifying them as other types of plants. For example, *Pleione praecox* are traded as the fern *Nephrolepis cordifolia*, “pani amala” (Photo 4). It is unclear if these practices are intentional, or by mistake.

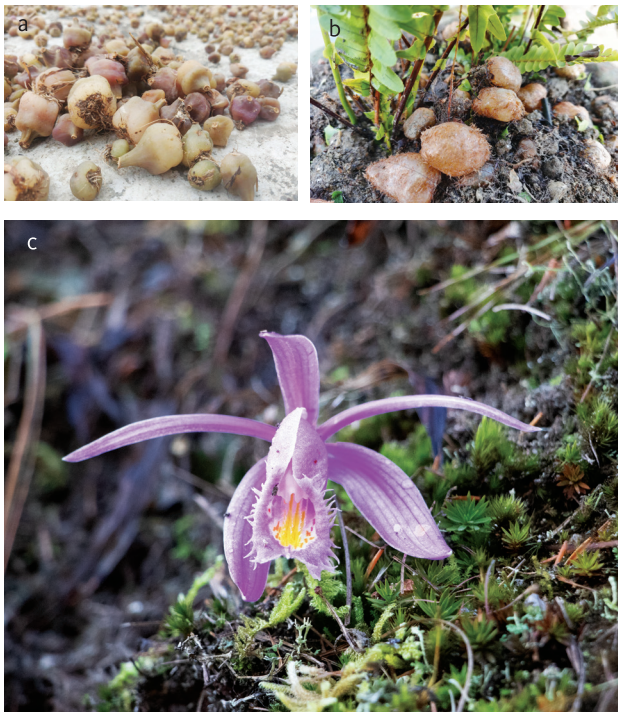

PHOTO-4: *Pleione praecox*, locally named "shaktigumba" (photo a & c) is often misidentified and traded as 'Himalayan Gooseberry "pani amala" (photo b). it is often not listed as an orchid in local plans

Could orchid harvest be made more sustainable?

Harvesting wild orchids, especially at a commercial scale, is illegal in many countries. In Nepal, it is currently illegal – until National Species Management Plans are established. This is a challenge for orchids given the huge data gaps, and because existing studies suggest that most species are very sensitive to over-harvest. Any future management plans should be very cautious when we permit the legal harvest of orchids and should take actions to limit illegal harvest.
There is a need to trial more sustainable harvest methods. Ticktin et al. (2023) developed a key that can help inform future Species Management Plans to guide more sustainable orchid harvest decisions for species currently in trade, at a given harvest site in a specific year. The key is expected to reduce the negative conservation impacts of wild orchid harvest. The research also highlights that there are a few key techniques that may help reduce the negative impacts of harvest that should be considered in future Species Management Plans and site-level plans to manage harvest, such as:

For terrestrial species with tubers (e.g., *Satyrium* spp.):

- Do not harvest if:
  - The species occurs in only one province
  - The location where you harvest has <1000 individuals

For epiphytic species (e.g., *Dendrobium and Pholidota* spp.) and all other terrestrial species that do not produce tubers (e.g., *Paphiopedilum* spp):

- Do not remove entire individuals. Instead harvest only part of the plant and leave it to recuperate.
- Do not harvest if:
  - You know of only 3 or fewer separate locations where the species occurs
  - There are few individuals in the location where you harvest or the number of individuals has decreased since the last time you harvested
  - There fewer young/small plants than adult plants in the location where you harvest (ie. the population is not replacing itself)
  - The host trees or habitat where the orchid grow is at risk or is declining

However, because all species and sites are different, and we have so little information about these species, this needs to be trialled with wild orchid populations. The research highlights that:

- Not all orchid species will respond in the same ways to harvest
- Even the same species may respond differently in different environmental conditions, based on factors such as levels of stress, which can be influenced by grazing and deforestation. This means that decisions about orchid harvest must be taken on a site-by-site and species-by-species basis, rather than as part of a single national strategy.
- Epiphytic and terrestrial species are likely to respond in very different ways to harvest

Trialling monitoring with orchid harvesters

Monitoring wildlife harvest volumes, sites and season is often an important part of ensuring sustainable harvest. Such monitoring is often undertaken by government agencies but can also be done by or alongside harvesters themselves. For example, harvesters can help monitor non-timber forest products[3] and fish harvest[4] around the world, providing unique insights, and regular, low-cost monitoring that can also help build local ownership over resource management.

In 2022, we conducted one of the first trials of orchid harvest monitoring, in cooperation with 30 established harvesters in a sub-alpine region of Nepal. This was challenging to establish, mostly due to harvester concerns about the illegality of their activities and changing national legislation. However, we managed to establish this based on local relationships over several visits, hired a local "eco-monitor" to help facilitate relationships, and trained participating households. We limited the data we collected to reduce burdens (species, amounts, origins, local names), and organised this via an "eco-monitor" who visited households every two weeks throughout the harvest season of 2022. This was necessary, in part, because many harvesters were not literate. We also conducted household interviews, and visited harvest sites alongside harvesters.

Cooperative monitoring has produced one of the first dataset on wild orchid harvest in Nepal, highlighting the commercial scale of harvesters that is not widely documented. It has also provided insights into harvesters' priorities and concerns and knowledge about orchids. Importantly, this trial demonstrated the potential for greater collaboration with harvesters, even in the context of illegal trade.

3. Lynch A.K., Jones T.E., McLain J.R., 2004. Nontimber Forest product inventorying and monitoring in the United States. Washington, D.C.: National Commission on Science for Sustainable Forestry.

4. Schemmel M.E. and Friedlander M.A., 2016. Participatory fishery monitoring is successful for understanding the reproductive biology needed for local fisheries management. *Environmental Biology of Fishes*, 100, 171-185.

The way forward with orchid trade

There is a clear need for improved enforcement, to stop large-scale and unregulated harvest and trade of wild orchids – especially for the key species most targeted by commercial trade. This needs to be done at both the local level where plants are harvested, and at points of international export. Much of this harvest and trade in Nepal, like in many countries, is occurring in the open, and monitoring is viable. Ensuring strong enforcement is necessary in order to develop a better regulated, legal, more sustainable trade.

Developing a future for a more sustainable harvest requires additional work. There are currently no species management plans for any of these targeted orchids, which requires detailed studies on key species and sites in order to determine whether and how the harvest is viable for each. Identifying the key species harvested at priority locations, particularly where rural livelihoods rely on orchid harvest, can help set priorities. In addition, we need to work directly with traditional harvesters, to trial different techniques and harvest regimes for different species and sites.

Both improved enforcement, and the potential for a more sustainable future legal harvest rely on broader recognition that the orchid trade is both economically and culturally important, and a growing conservation priority. They also require greater collaboration among harvesters, scientists, and government officials on key issues, including

- Trade chain studies to understand what orchid species are being most actively harvested, where they are harvested, how/where they are being used, and who is profiting from the trade
- Research on "partial plant harvest", to understand how different species and populations respond when harvesters collect part of the plant (rather than the whole plant), to see if this can improve sustainability
- Population inventory studies to understand numbers and population dynamics of priority species
- Understanding of orchid harvesters' practices, livelihoods, knowledge and receptiveness to monitoring and conservation efforts

More information

Contact: Greenhood Nepal, orchid@greenhood.org, #NepalOrchids

IUCN Species Survival Commission Orchid Specialist Group - Global Trade Programme
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