

Towards a sustainable livelihood with wild medicinal resources:

Economic aspects of harvesting and trading the Chinese Caterpillar Fungus *Cordyceps sinensis* and Southern Schisandra *Schisandra sphenanthera* in China's Upper Yangtze Ecoregion

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Credit: TRAFFIC/Xueyan Liu

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Background and introduction

The East Asian region is of extreme importance for both production and consumption of medicinal and aromatic plants (MAPs), China being one of the largest producers of medicinal plants globally (as well as an exporter, importer and consumer), and Japan being one of the world's major importers and consumers of MAPs (Lange 2006). The volume of China's medicinal plant exports is continuously growing, which links to concerns with increasing pressure on wild plant populations and ecosystems as a result of harvesting levels, and has implications for local livelihoods.

Two medicinal species—*Cordyceps sinensis* and *Schisandra sphenanthera*—are harvested in the Upper Yangtze River region in China, which is exceptionally rich in plant diversity, and is a traditional harvesting area for indigenous and local people in China. *Cordyceps sinensis*, not a plant but a fungus, though inextricably linked to the MAP trade in East Asia, is an ancient Tibetan and Chinese medicinal species that has become ubiquitous in traditional Chinese medicine (TCM) and a popular status symbol for the wealthy Chinese consumer. *Cordyceps sinensis* is used to treat many ailments ranging from lung disease to sexual impotence. It is applied in TCM to keep the lungs fit, strengthen the kidneys, build up the bone marrow, reduce phlegm, and stop haemorrhages (Ying *et al.*, 1987; Liu and Bau, 1980). The organism is a flask fungus which infects and kills ghost moth *Thitarodes* spp. larvae and produces a small fruiting body in early spring, hence *Cordyceps* is known as “Winter Worm, Summer Grass” (Dong Chong Xia Cao in Chinese) (Kendrick, 1992; Aryal, *et. al* 2004; Winkler, 2005a).

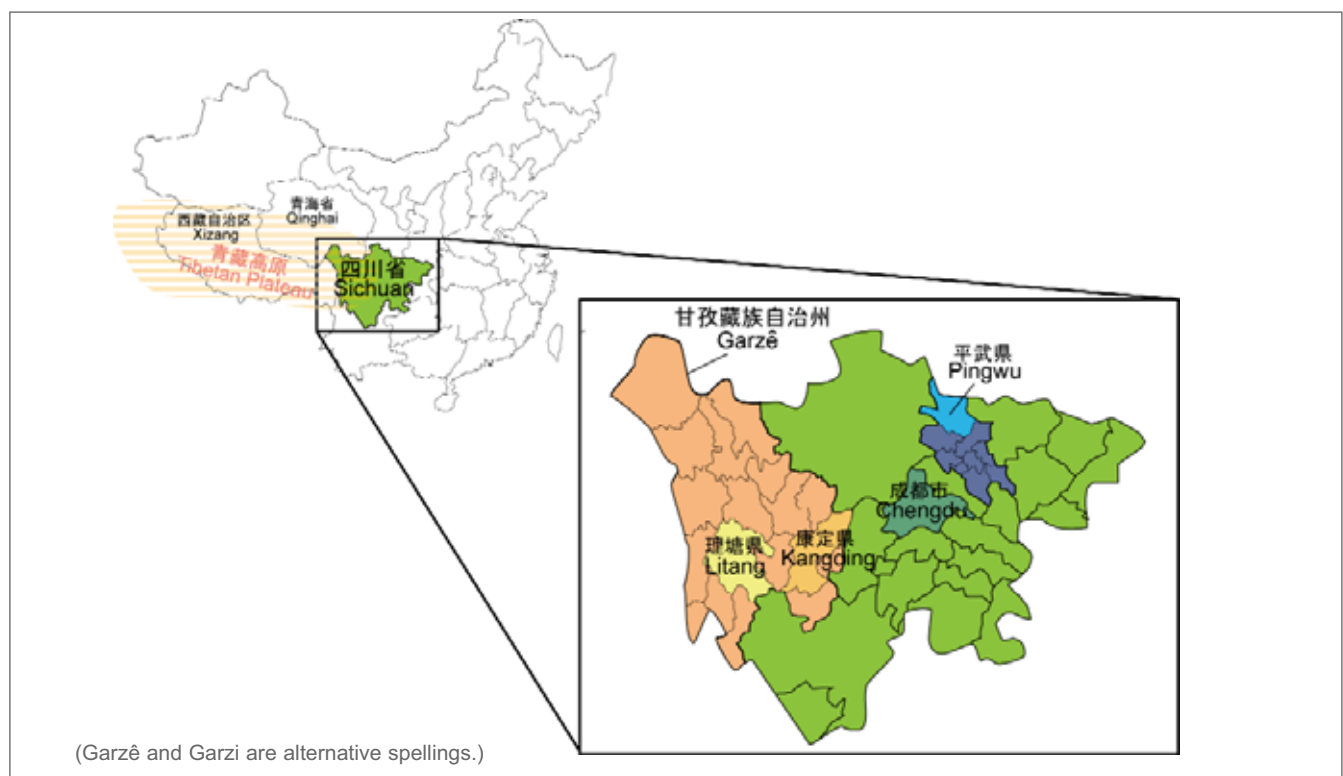
Schisandra sphenanthera is a shrub-like plant, widely distributed in the southern region of the Yellow River basin, especially in the Upper Yangtze Ecoregion (a habitat identified by WWF scientists as an area in special need of protection). The fruits of *Schisandra chinensis* (a species distributed in northern China) and *S. sphenanthera* are recorded in the traditional Chinese medicine pharmacopoeia as two related species. They are traditionally used for a nutritional tonic, with a range of attributed effects including nourishing *qi*¹ to generate fluid, neurasthenia and invigoration (Chinese Pharmacopoeia, 2005). While *S. chinensis* is the preferred species in TCM trade, *S. sphenanthera* has the same medicinal properties, as described in the TCM pharmacopoeia. Many compound preparations in TCM contain Fructus Schisandra (fruit of *Schisandra* spp.) as a main component.

Schisandra and *Cordyceps* are of value for indigenous and local people both as medicines and for their traditional use. Besides local use, national and international trade takes place, both species being widely valued for their medicinal effects. Abundance in the wild of the two species varies—*Cordyceps sinensis* is at risk from over-harvesting because of high market demand, while *Schisandra sphenanthera* is at low risk and rather abundant in the wild.

The survey on which this briefing is based investigated the trade and socio-economic context for harvesting of these species in the Upper Yangtze Ecoregion via questionnaires and interviews during 2010.

Figure 1

Map of the focal area and project sites in Sichuan Province. The Upper Yangtze Ecoregion, a major collection area for *Cordyceps* and a region where *Schisandra sphenanthera* is widely distributed, includes Sichuan Province.



¹ Qi is frequently translated as "energy flow", meaning vital life or energy, and pranayama, meaning control of breath or energy.

Survey findings

The economic context of each species is very different. *Cordyceps sinensis* is a highly priced, increasingly rare species with limited range and distribution. According to prices revealed during interviews for the study on which the present briefing paper is based, *Cordyceps* in end consuming markets in China can fetch CNY100 000 to around CNY300 000 (USD14 881 to USD44 643)/kg. By contrast, *Schisandra sphenanthera* fetches a much lower price: CNY8 to CNY12 (USD0.88 to USD1.76)/kg in Pingwu TCM market and Chengdu Hehuachi TCM market.

Trade mechanisms show similarities between the two species. Profit margins increase with every step in the trade and with this system in place, and the continuous market demand for medicinal species growing, it is necessary to ensure that species are harvested sustainably and well managed. For *Cordyceps*, sustainable harvesting mechanisms are a priority, as a high proportion of active *Cordyceps* collectors depend on collection of this species for their livelihoods, indeed for 50% to 100% of their total income, according to the present study. In the case of *Schisandra*, there is an opportunity to change the low-profit harvesting model (potentially unsustainable harvesting method and low prices) to a high-profit model (sustainable harvesting method and higher prices). If successful, this effort could create a model example for other medicinal species, to replace the current system of wild resource harvesting.

The case of *Cordyceps sinensis*

Over the past 10 years, an extensive trade network has been developed to bring valuable *Cordyceps* from high grassland habitats to luxury stores in large cities such as Beijing, Hong Kong and Guangzhou, as well as centres in South-east Asia where TCM outlets proliferate. This boom in demand has driven the price of *Cordyceps* as high as CNY360 000 (USD53 700)/kg for good quality product, much higher than the price of gold per kilogramme.



Credit: TRAFFIC/Xueyan Liu

Sack of *Cordyceps*, ready for purchase

Results from questionnaires and interviews in primary source areas (Litang and Kangding Counties, both situated in Garzi Tibet Autonomous Prefecture [TAP]) and the local market area (Chengdu) (see **Figure 1**) show that *Cordyceps* is moved from collection sites to middle-class businessmen or wealthy local dealers, who sell in bulk to travelling agents from large TCM companies. While several hundred kilogrammes move through Kangding, the vast majority of *Cordyceps* moves directly from Litang to major cities. Interviews with local stakeholders (traders and harvesters) reveal that communities in

both Kangding and Litang engage in their own particular systems of territorial and kinship-oriented taxation linked to *Cordyceps* collection and trade.

The *Cordyceps* industry is reported to account for 90% of the value of total economic production of Kangding County and 50% of the same for Garzi TAP (part of Sichuan province) (Winkler, 2005b). It is estimated from the present study that 225 t of *Cordyceps* originated from Garzi TAP in 2010 and that total revenue from the resource would reach CNY3.9 billion (USD550 million). When compared to data from 1994 (a maximum of 20 t from Garzi), as recounted during interviews, this shows an 11-fold increase in supply of *Cordyceps*. Revenue from collection comprises an estimated 50% of the Prefecture's GDP of CNY7.9 billion (USD1.17 billion). Sustainable management and use of *Cordyceps* is directly related to the livelihoods of the local and indigenous harvesters, positioned as they are at the start of the trade chain and for whom it provides 50%–100% of total income in Kangding and Litang (TRAFFIC, unpublished information under review).

The impact of this large-scale trade runs far deeper than economics alone—new customs are being created and previous traditions are adapted to take account of the presence of this valuable commodity. The overall social context for the *Cordyceps* trade revealed by the present survey was significantly influenced by the trade itself: schools and monasteries were found to close during collection season, nomads charge a collection fee on their lands, and women who marry people from outside their village are required to pay a yearly tribute fee to their mothers' communities for the right to collect *Cordyceps* in those communities.



Credit: TRAFFIC/Xueyan Liu

Medicinal market, Kangding



Credit: TRAFFIC/Xueyan Liu

Litang City, a key transit point for the *Cordyceps* trade



Credit: TRAFFIC/James Compton

Cordyceps advertisement, Causeway Bay, Hong Kong

The case of *Schisandra sphenanthera*

The fruits of *Schisandra chinensis* and *Schisandra sphenanthera* are traditional export commodities in China and large volumes are exported to Japan, Korea and Singapore, for example, where there is increasing demand. Re-exports from Hong Kong are also increasing and new *Schisandra* (*Schisandra* spp.) products from both species are continuously being



Credit: TRAFFIC/Xueyan Liu

Schisandra sphenanthera on sale at Chengdu Hehuachi TCM market

developed. The total export volume for *Schisandra* (*Schisandra chinensis* and *Schisandra sphenanthera* combined) in 2007 exceeded 1000 t, which was a record high.

According to surveys conducted for a study co-ordinated by WWF for ECBP (EU-China Biodiversity Programme), the whole of Sichuan province is expected to produce 20 000 t of *Schisandra sphenanthera*, producing dried fruits weighing 3000–4000 t and worth CNY45–70 million (USD7.5–10.4 million) at the current market price, comprising about 20% of income for a local village (Guo, unpublished a). Surveys for ECBP, found that farmers in the county of Pingwu earned CNY500–800 (USD75–120)/year/per person by collecting medicinal herbs: this amount accounts for over 10% of annual income and is therefore of great significance to local farmers in terms of a means of improving quality of life. According to previous studies, *Schisandra sphenanthera* contributed a smaller amount of income to farmers in the past, less than 5% in 2008 and 2009 (Guo, unpublished b, c). Because of limited income opportunities for local households, the harvesting of *Schisandra sphenanthera* can potentially contribute a significant increase to their overall standard of living.

According to results from the study organized by WWF for ECBP, four to six transactions occur along the trade chain (Guo, unpublished a). From this same study, the purchase price in the collection area was recorded as CNY2–3 (USD0.29–0.45)/kg and the end market price for the Chinese consumer as CNY12–15 (USD1.79–2.24)/kg (Guo, unpublished a). Being at the bottom of the trade chain, farmers may try to enhance their income by increasing collection volumes, which may have implications for the sustainability of the resource and the long-term supply, and hence benefit flows. Collectors of *Schisandra sphenanthera* have traditionally sold their produce mainly to middlemen, with low returns.

Both the amount of *Schisandra sphenanthera* harvest and the price are low. As a result, local people do not get high returns from its collection. One of the most important aspects in supporting methods of sustainable collection is the raising of economic returns by reducing the number of steps in the trade chain, accompanied by an improvement in quality of the product, and an exploration of more market avenues. If this multi-track approach is pursued successfully, the likelihood of local people receiving more benefit from sustainable wild medicinal plant collection is increased. For the implementation of sustainability standards, local collectors have been encouraged to replace old collection methods (for example, collection of fruit in a way that breaks branches and damages the plant) with careful, selective collection which leaves some fruit for seeds. In addition, there is a focus on connectivity between sustainable harvest of *Schisandra sphenanthera* fruit and direct buying relationships from the international market.

Summary and recommended action points

With current demand for wild medicinal ingredients increasing, there is a need for enhanced understanding of the value of wild resources for local livelihoods and traditional knowledge. Survival of species, their habitats, and of livelihoods of indigenous and local people depending on wild resources for their income and health will only be possible if sustainable resource management practices are followed. With this in mind, the points below are recommended for consideration in actions to improve the situation for the two medicinal species that are the focus of this briefing:

Raising awareness and training: awareness-raising among all stakeholders along any important medicinal plant trade chain is a key component of successfully establishing a long-term, sustainable harvesting and trade mechanism.

Scientific survey for a resource management plan: sustainable collection systems first rely on correct and comprehensive identification of resources, to specific and sub-specific level. Collecting operations should keep voucher specimens for documentation and future reference. A reliable resource survey/assessment must cover all relevant populations of target species and is the baseline reference for any further monitoring. It may include information on the population status, distribution, age/size classes and abundance. In addition, surveys should be conducted to assess the surrounding socio-economic situation and to understand the economic significance of the target medicinal species in the local communities. As a final step to the scientific survey, a resource management plan should be developed.

Communication and transparency along the trade chain: The current investigation showed that the lack of continuous and transparent market information was a big hurdle to collectors becoming more independent of intermediate traders, or at least having a stronger position in price negotiations.

Local empowerment: To improve the status of the collectors, particularly those from indigenous and local communities, and increase their participation in the trade process, the development of organized groups or collector associations is recommended, unless contradicted by local traditions or negative experiences with such associations.

Species conservation: The studies have shown that, especially in cases where resources have become depleted (as in the case of *Cordyceps*), be it through over-harvesting or other human impact, strict conservation action (such as the establishment of a defined harvest period) beyond the introduction of sustainable sourcing practices may be necessary to protect the resource.

Development of policies and regulatory frameworks: National or local regulatory frameworks or policies (including access and benefit-sharing provisions), if sensibly developed and reliably implemented, can help to protect resources by defining clear ownership and resource access rights. Official guidance should also be provided for the development of management plans. These regulations can also demonstrate a higher value attributed by the national or local/provincial government agencies to natural resource management.

Streamlining the complexity of trade: Wherever possible and useful, measures should be taken to reduce intermediate trade links and promote certified TCM products in the market, for added value. This not only brings higher revenues directly to the collectors, but could also increase their incentives to protect the resource. It may make it easier to establish optimum sustainable yield levels and implement potential restrictions on collection limits.

Adopting the appropriate standard for harvesting and trade: To ensure sustainable harvest and equitable benefit-sharing from the species, local associations, national and international bodies can consider standards such as the FairWild Standard, which addresses ecological, social, fair-trade and economic requirements.

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Note: The exchange rate used is USD1 = CNY6.72.

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