Conserving Tibetan Medicinal Plants in the Khawakarpo Region

Ma Jianzhong, Han Mingyao, Renqin Wangxuo, Chiren Sangzhu

Abstract
To local Tibetans, Mt. Khawakarpo is not only an important sacred mountain but also a major storehouse of medicinal plants, which they use. Recent field surveys show that Mt. Khawakarpo and adjacent areas ('the Khawakarpo region') are home to 144 species of household medicinal plants from 126 genera of 63 families, which are used in both Chinese and Tibetan medicine. These plants include eight Class I and Class II nationally protected species (four being CITES—Convention on International Trade in Endangered Species of Wild Flora and Fauna—listed); of these, 37 species have been recognized by local practitioners of Tibetan medicine as plants in need of conservation. Results from fieldwork indicates that initiatives to conserve plants used in Tibetan medicine should consider not only their biological properties but also their cultural values to local communities; in order for these efforts to be sustainable, the communities must be brought in as key players. The fieldwork described here comprised a participatory resources inventory, the creation of community-based medicinal plants reserves, cultivation trials, and training opportunities for medicinal practitioners to share indigenous knowledge and acquire skills in plant conservation and harvesting on a sustainable basis.

Keywords
Medicinal plants, Khawakarpo, participatory inventory, in situ and ex situ conservation, Tibetan medicine

Introduction
While it has assimilated and integrated principles from both traditional Chinese and Indian medicinal systems, Tibetan medicine represents a unique ethnic medicinal system that has evolved for centuries.\(^1\) Tibetan medicines primarily originate from plants, animal products, and minerals; plants from the Tibetan Plateau are a crucial source of materia medica. Given the growing global interest in natural medicines, a number of research and development projects focusing on Tibetan medicine have been implemented in Tibetan areas of the People's Republic of China. In recent years, more than a hundred

\(^1\) Qiu 2007.
businesses specializing in the production of Tibetan medicines for clinical and commercial purposes have emerged in China.\textsuperscript{2} As such, Tibetan medicine has become one of the most important economic industries in Tibetan areas. That said, there is an array of constraints on the sustainable use of the plants at the heart of Tibetan medicine. These include limited stocks of some important species and slow renewal rates of most species as well as their low level of resilience in the light of their origins in cold, high altitude regions. Meanwhile, current industrial trends that encourage unregulated harvesting while neglecting resource conservation have led to a depletion of the resources and caused irreversible harm to the natural environment.\textsuperscript{3} By elaborating on the field surveys and conservation efforts we carried out across the Khawakarpo region in Diqing Prefecture, Yunnan Province, this article intends to shed some light on the creation of a future paradigm suitable for conserving some important plants used by local Tibetan communities.

**Background to study area: Mt. Khawakarpo**

Situated in the core area of the Hengduan Mountain Range, the Mt. Khawakarpo region stretches far into Deqin County, Yunnan Province from the southeastern outskirts of the Tibetan Plateau (known as ‘Qinghai-Tibet Plateau’ in China). This range is home to the highest peak in Yunnan (6,740 m), and exhibits an incredible altitude range of 4,720-meters from the upper Mekong River’s surface at its base (altitude: 2,020 m). The Khawakarpo region comprises an alpine terrain affected by monsoons year-round and dominated by rigid temperate climate. Statistics from the local meteorological observatory based in Deqin County indicates that the annual average temperature of Deqin town and adjacent areas in the vicinity of Mt. Khawakarpo is about 4.7° Celsius. While the conditions in Deqin town are somewhat different than that in surrounding mountain communities, they are comparable. In July, the hottest month, the average temperature can reach 11.7° Celsius, whereas in the coldest month of January, the average temperature is around −3.1° Celsius. The average precipitation in the region is about 650 mm. With its deep-cut gorges running from north to south, as well as its low latitudinal location and significant altitudinal differences, climatic types vary widely from the mountain’s base to its peak.

\textsuperscript{2} Zhan 2004.
\textsuperscript{3} Li and Ciren 2001.
Typical of this region’s climate is that its rainfall/snowfall is centered on the sub-alpine or alpine areas, at altitudes above 3,000 meters. These areas are dominated by a rigid-temperate climate. However, altitudes below 2,500 meters are short of rainfall and basically arid, especially the valley areas on both sides of the upper Mekong, which is covered predominately with shrubs.4

Methodologies for resource conservation

From mid-April to mid-September 2008, a ten-member study team conducted a series of field trips to investigate traditional medicinal plants and their use in the Mt. Khawakarpo region. The study team consisted of some renowned local medicinal practitioners and staff members from Deqin Tibetan Medicine Study Association, a local organization. Over the course of five months, the researchers covered zones representing three climatic types: 1) lower mountainsides of the upper Mekong valley (arid areas at altitudes below 2,500 meters); 2) montane areas (at altitudes ranging from 2,500 m to 3,300 m); and 3) alpine/sub-alpine areas (at altitudes above 3,300 m).

Participatory resources inventory

The primary methodology used during these field trips was a participatory resource inventory technique. Previous surveys had been undertaken primarily by botanists. In contrast, these field studies were intended, through a participatory approach, to offer opportunities to local practitioners of Tibetan medicine—the major resource users and local ‘conservationists’—to understand the dynamic changes of medicinal plants resources found across the Khawakarpo region, thus facilitating their efforts toward sustainable harvesting. In addition, the mission of these trips was to take stock of the resources in order to inform the greater scientific and conservation-development communities of the current status of local medicinal plants. During this survey, emphasis was equally given to contributions from the practitioners themselves in designing survey methods, routes, and targeted species selection, along with principles of modern conservation biology and conventional research techniques. For instance, apart from the list of the nationally protected class species and CITES list, the values of species (in numerical ratings from one to

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4 Jin and Ou 2000; Ou 2006.
five, with five meaning the most important) in terms of their importance in Tibetan medicine was assigned by the traditional practitioners as a key factor in considering species to be conserved.

**In-situ and ex-situ conservation**

Our field surveys indicate that unsustainable harvesting of local plants and overgrazing are major threats to local medicinal plants; yet our field survey team’s work also revealed that it would be difficult, in the short term, to eliminate or mitigate these threats to species in a substantial manner. Notwithstanding these trends, this project was being implemented on a trial basis for conserving the plants in an in-situ and ex-situ manner, with the emphasis on the needs of local Tibetan residents who use these plants in their daily lives, the status of the species, and the availability of techniques suitable for ex-situ cultivation.

In-situ conservation is appropriate for most of the major plants as it is not permitted to transplant these species. Based on the results from the field surveys and levels of species endangerment, four forestlands (each measuring around 500ha) were identified for medicinal plant reserve designations on the upper reaches of two local rivers known as Hongpo River and Yongzhi River, respectively. With the two forestlands near the village of Hongpo, common religious beliefs were integrated into the project plan, for conservation purposes: prestigious monks were invited to designate a watershed forestland and another forestland on the upper reaches of Hongpo River as *ri bkag*, or sacred sites off limits to community members. At Yongzhi village, village-specific rules and regulations governing plant harvesting and conservation were developed and agreed upon by community members. These local people have gradually understood that the loss of species, which are so important to their and future generations’ medicinal and economical well-being, is imminent if not brought under protection and harvested in a rationed manner, even though this mean self-imposed limited access to forest and NTFP products. After trial operations over the course of a year, these measures proved to be helpful in advancing long-term conservation of medicinal plants in these reserves.

Species for ex-situ conservation were selected by local plant experts or medical practitioners based on the results from the field surveys, current understanding of the species, and availability of needed techniques for cultivating them. This effort involved sixteen plant species. According to the requirements of specific species in terms of climate, sunlight, and soil conditions, several sites at three different altitudes were identified for trial cultivation in the vicinity of Hongpo village. Specifically, three species were planted at altitudes of about 2,800 m, including: *shug pa* (*Cupressus ducouxiana*), *gu gul*
(Ailanthus vilmoriniana), and star bu (Hippophae rhamnoides); nine species at altitudes of about 3,000 m: zhum khan (Symplocos sumuntia), sle tre (Tinospora cordifolia), gur gum (Carthamus tinctorius), gul nag (Styrax tonkinensis), ma nu (Inula helenium), ru rta (Aucklandia lappa), me tog bdun can lo ma (Paris polyphylla), pri pang ku (Dracocephalum tanguticum) and kyi lce dkar po (Gentiana macrophylla); and four at altitudes of about 2100 m: ba ru ra (Terminalia bellerica), go byi la (Strychnos nux-vomica), da trig (Schisandra chinensis) and shing tsha (Cinnamomum cassia Presl).

**Uses of cultivated plants in Tibetan medicine**

The table below lists the different medicinal plants that have been cultivated, or have undergone cultivation trials, for the purpose of use in Tibetan medical compounds.

<table>
<thead>
<tr>
<th>Latin Name</th>
<th>Tibetan Name</th>
<th>Medicinal Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cupressus duclouxiana</td>
<td>ཤུག་པ།</td>
<td>Branches and leaves used for kidney infection, gonorrhea; fruits used for bladder diseases, gout, liver and gall diseases</td>
</tr>
<tr>
<td>Ailanthus vilmoriniana</td>
<td>གུ་གུལ།</td>
<td>Its resin is capable of curing infections, leprosy, and headaches</td>
</tr>
<tr>
<td>Hippophae rhamnoides</td>
<td>སྟར་བུ།</td>
<td>Fruit is used for cough, indigestion, and stomachache</td>
</tr>
<tr>
<td>Symplocos sumuntia</td>
<td>ཞུམ་ཁན།</td>
<td>Leaves are used for digestive diseases</td>
</tr>
<tr>
<td>Tinospora cordifolia</td>
<td>གྲུབ་གུམ།</td>
<td>Vines are used for improving lung functions and rheumatism</td>
</tr>
<tr>
<td>Carthamus tinctorius</td>
<td>ཕྲི་པང་ཀུ</td>
<td>Flowers are used for liver diseases and gynecological disorders; seeds are used for skin problems (pimples and sores/skin ulcers)</td>
</tr>
<tr>
<td>Styrax tonkinensis</td>
<td>རྟོག་རྒྱན།</td>
<td>Its resin is capable of curing phylogenetic infections</td>
</tr>
<tr>
<td>Inula helenium</td>
<td>རྟོག་རྒྱན།</td>
<td>Roots are used for indigestion, alleviating pain and curing fevers</td>
</tr>
<tr>
<td>Aucklandia lappa</td>
<td>རུ་རྟ།</td>
<td>Plant is used for abdominal pains, lung diseases, as an anti-pyretic and for diarrhea</td>
</tr>
<tr>
<td>Paris polyphylla</td>
<td>རྟོག་རྒྱན།</td>
<td>This plant is not used in Khawakarpo Tibetan medicine, but is planted as a cash crop</td>
</tr>
<tr>
<td>Dracocephalum tanguticum</td>
<td>བྲི་པང་ཀུ</td>
<td>Plant is used to treat hepatitis, edema, headaches</td>
</tr>
</tbody>
</table>

5 Sources include information obtained from local doctors as well as consultation with Yang and Cuceng 1987.
### Table (cont.)

<table>
<thead>
<tr>
<th>Latin Name</th>
<th>Tibetan Name</th>
<th>Medicinal Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Gentiana crassicaulis</em></td>
<td>རིག་ཀྱི་ལྕེ་དཀར་པོ།</td>
<td>This plant addresses haemostatic problems and relieves swelling</td>
</tr>
<tr>
<td><em>Terminalia bellerica</em></td>
<td>ཤུ་རུ་ར།</td>
<td>Plant is used to address dysentery and balding/hair loss</td>
</tr>
<tr>
<td><em>Strychnos nux-vomica</em></td>
<td>རུ་ལྡོད།</td>
<td>Plant reduces swelling, kills pain and relieves sore throats</td>
</tr>
<tr>
<td><em>Schisandra chinensis</em></td>
<td>ལ་ཏྲིག་</td>
<td>Plant improves arterial circulation and digestion, is an anti-pyretic and helps treat diarrhea</td>
</tr>
<tr>
<td><em>Cinnamomum cassia</em></td>
<td>ཤིང་ཚ།</td>
<td>Plant addresses liver and gall bladder diseases, colds and stomachaches</td>
</tr>
</tbody>
</table>

### Preservation of indigenous knowledge in Tibetan medicine

In 2006, a local organization of Tibetan medicinal doctors, known as Deqin Tibetan Medicine Study Association (DTMS), was established in Deqin County, Yunnan. The mission of DTMS is to advance appropriate use and conservation of medicinal plants by local medicine practitioners, and to facilitate research, documentation, and preservation of indigenous knowledge contained in the Tibetan medicinal system. In 2007 and 2008, DTMS hosted five fifteen-day training workshops on medicinal plants and Tibetan medicine, funded by The Nature Conservancy (TNC) and held in Hongpo village. These workshops targeted the younger generation of local medicine practitioners who possess some knowledge of the Tibetan medicine system from Honpo and adjacent communities, as well as other young Tibetans who were interested in Tibetan medicine and had fundamental language abilities in Tibetan language; 6 fifteen doctors and ten participants who were not doctors attended. To meet participants’ learning needs as well as the needs for plant conservation around the Khawakarpo region, the principles and practices of the Tibetan medicine system were taught by a senior Tibetan doctor, supplemented by instruction by a conservation scientist (from TNC) in the methodologies of modern conservation biology; methods used include in-classroom discussion, field surveys, and training in practical skills for medical treatment. After this series of workshops, most participants were able to identify 90 to 120 species of local medicinal plants and displayed a mastery of basic skills in harvesting the plants in a sustainable manner.

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6 Editors’ note: authors are here referring to the fact that these participants were literate in Tibetan language. This is noteworthy since the literacy rate in Tibetan among Tibetans is quite low in this area.
Results and analysis

The serial surveys conducted in 2008 have borne out our hypothesis that the Khawakarpo region could be one of the regions in northwest Yunnan that harbours the richest density and diversity of plants commonly used in Tibetan medicine. During the surveys, specimens of 144 plant species regarded as important in Tibetan medicine were collected and documented, including four Class I and Class II nationally protected species and another four CITES listed species. While most of the studied species are rated as endangered with an endangerment value of two-three on the CITES scale, data collected from the field indicates that 37 plant species, or 26% of the recorded medicinal plants total, are rated as endangered with a value of four-five by the traditional practitioners themselves, including: spang rtsi do bo (Pterocephalus spp.), a’om bu (Myricaria germanica), skyer pa (Berberis dictyophyll), hong len (Picrorhiza scrophulariiflora) and bya rgod sug pa (Saussurea medusa). Meanwhile, about eleven species are found to be targets of large-scale commercial harvesting, including nine species that have almost been depleted from the region or on the brink of extinction.7

Creation of community-based protected reserves and species cultivation

With a unique and ancient culture, many Tibetans espouse a view of nature which underlies their belief in the idea that all sentient life is equal—a cultural sensibility which assigns dignity to all life forms on the planet.8 With the extraordinary strength drawn from traditional Tibetan culture and Tibetan Buddhism, local Tibetans from Diqinq have survived the harshness of living on the Earth’s ‘Third Pole’ (the Qinghai-Tibet Plateau) from generation to generation. During the past centuries, in the Khawakarpo region, Tibetan people’s compliance with local rules and regulations regarding resource extraction were normally more influential and pervasive than any outside-imposed regulations. Meanwhile, the existence of natural sacred sites known as ri bkag lend themselves to effective conservation strategies in contemporary terms, with a focus on local ecosystems and medicinal plants. During a field survey conducted in the summer of 2009 by botanists from the Kunming Institute of Botany (KIB) and local traditional doctors, 86 useful medicinal plants were identified in the community protected reserves (in situ conservation site) in and around Yongzhi village.

7 Ma and Zhuang 2010.
Ex-situ conservation through plant cultivation

A survey on a trial plantation site at Hongpo village in 2009 showed that, after one year's trial cultivation, cases involving 11 species successfully germinated, accounting for 68% of the planted major species' total. The three species planted at an altitude of 2,800 m also survived (100% success). On the other hand, only six cultivated species (67% of the total) survived at an altitude of 3,000 m, namely: zhum khan (Symplocos sumuntia), ma nu (Inula helenium), ru rta (Aucklandia lappa), me tog bdun can lo ma (Paris polyphylla), pri pang ku (Dracocephalum tanguicum) and kyi lee dkar po (Gentiana crassucaulis); three species, gul gum (Carthamus tinctorius), gul nag (Styrax tonkinensis) and sle tre (Tinospora cordifolia) died. Further, two species planted for trials in local households' yards at an altitude of 2,100 m also proved to be cultivable through ex-situ methods: da trig (Schisandra chinensis) and shing tsha (Cinnamonum cassia). Two species, ba ru ra (Terminalia bellerica) and go byi la (Strychnos nux-vomica), did not survive in this environment.

These trials show that ex-situ conservation of many species used in Tibetan medicine is definitely possible if due diligence is exercised in selecting suitable geographical and climatic conditions, sound techniques are applied, and appropriate procedures are followed. At the same time, one should also be aware of the tremendous altitudinal and climatic differences when it comes to ex-situ cultivation of the plants in the Khawakarpo region, as well as difficulties associated with transplanting 'alien' plants, such as ba ru ra (Terminalia bellerica) and go byi la (Strychnos nux-vomica), in our case.

Preserving indigenous knowledge

As noted earlier, Tibetan medicines primarily originate from plants, animal products and minerals. The availability of authentic, natural materia medica makes possible the continued research and development of clinical medicines in various forms. Given the growth of commercially motivated industrial producers of Tibetan medicine (see Saxer this volume), a number of plant species are endangered, also as a result of inappropriate harvesting practices. Even as losses continue to accelerate, in particular in eastern regions of the Tibet-Qinghai Plateau where medicinal documentation is scanty and where a limited number of traditional doctors live and practice, the future of Tibetan medicine is at stake. Moreover, in circumstances where 'standard' healthcare services are inaccessible to locals, and the health of family members is often a major determinant of household well-being, as is the case for many people inhabiting the Khawakarpo region, changes in the use of local natural resources.
will have a profound impact on health care. Hence, more efforts and resources should be placed on the appropriate use of the medicinal plants, alongside training opportunities to enhance traditional doctors’ knowledge and skills.

Fortunately, training opportunities offered at the above-mentioned workshops in 2007 and 2008 have broadened the horizons of more than 25 traditional practitioners of Tibetan medicine from eight local villages and hamlets, allowing them to see the importance of their healing system in new ways, and to articulate its value in their own terms. These workshops have also made it possible for these practitioners to acquire the skills they need in resource inventory, sustainable harvesting, and artificial cultivation of the plants. Of course, there still remain many challenges to the future of Tibetan medicine, given the increasing industrial demand and the out-migration of skilled and educated young people from rural areas, as well as changing local and regional economic relations. Yet we can say that with the practical skills acquired and a new or renewed understanding of the value of local medicinal plants and Tibetan medical knowledge, these trainees will hopefully play a more important role in offering healthcare services to local populations while also helping conserve the medicinal plants across the region.

Conclusions

Medicinal plants not only possess the many biological properties of all other plants, such as occurring in communities, and being capable of decomposing and renewing in cycles; at the same time, they are susceptible to impact from a range of social, economic and cultural influences. As a type of important biological resource, medicinal plants represent ‘natural’ capital which has both socio-economic and cultural value. Consequently, conserving medicinal plants that occur across the Khawakarpo region is of paramount importance to local residents, who are both plant harvesters and users. Meanwhile, plant harvesting does not occur simply for the purposes of benefiting people in the form of medicinal supply; plant harvesting also represents a means through which people can meet their economic needs and reaffirm their cultural identity. Hence, the local communities should be included as key players in helping to conserve and sustainably use medicinal plants. For relevant government agencies, such as the Poverty Alleviation Bureau, the Agriculture Bureau and the Forestry Bureau, rather than pure economic-oriented policies and projects, more comprehensive policies and projects that combine economic, environmental and cultural elements should be supported in local communities through a bottom-up approach. Standardization of medicinal plants markets
at different levels (both from local level and regional level) and the development of relevant rules and regulations for profit-oriented enterprises are keys step for reducing threats placed on local medicinal plants resources.

References