Chapter 10
An Ethnobotanical Survey in Shan State, Myanmar: Where Thanlwin Biodiversity, Health, and Deforestation Meet

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10.1 Introduction

The American botanist John Harshberger coined the term 'Ethnobotany' in 1896. Since that time, ethnobotany studies have covered a range of topics (Abbasi et al. 2011). The study of ethnobotany is of great importance in understanding the interrelations of material and intellectual culture. It can involve the study of plant species as well as the cultural practices of herbalists treating diseases. Ethnobotanical studies are also significant in communicating the medicinal values of locally important plant species to outside audiences and documenting them for future use, and can include traditional knowledge of plant diversity and use by indigenous communities. The documentation of traditional knowledge of plants has provided the basis for many modern drugs (Cox 2000; Flaster 1996). Ethnobotanists also explore how plants are used, not only for health, but also for necessities such as food, shelter, medicine, clothing, hunting, and religious ceremonies.

In Myanmar, wild plants have long been used as a source of medicine. This chapter presents research from an ethnobotany study to understand the traditional knowledge of herbalists and the uses of plants for healthcare in four communities in Myanmar's Shan State. We approach this work from a perspective that seeks to highlight the local knowledge of communities and the challenges they face. The research shows the ways in which local people in four villages in Lashio District along the Thanlwin (Salween) River, Shan State, rely on medicinal herbs for the treatment of disease. The research presented in this chapter is based on botanical surveys and interviews conducted from July 2015 to February 2016, when we collected and identified 21 medicinal plants from 14 plant families.

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This research also shows how the practice of herbal medicine is threatened by a range of factors, including deforestation and agricultural expansion. While residents in all four villages rely on herbal medicines, residents of poorer, more isolated villages tend to rely solely on these practices while residents of better off villages also access hospitals and clinics. As a research site, Shan State is very much understudied, and through the research presented in this paper, we aim to contribute to the general knowledge of botanicals for health and the ways that local communities practice herbal medicine in Shan State and more broadly, across the Thanlwin River Basin.

This chapter also highlights the importance of medicinal herbs to the health of local communities, and evaluates the future availability of medicinal herbs in the four selected sites. The study finds that deforestation, the expansion of shifting cultivation, and an increasing trend towards permanent cultivation of cash crops have the greatest impacts on the medicinal herbs used by villagers in the study areas. It is the significance of medicinal plants and deforestation that we turn to first, as it is important to understanding the broader context and future of medicinal plants in Myanmar.

10.2 Significance and Context of Herbal Medicines in Myanmar

According to the World Health Organization (WHO 2013), approximately 80% of people worldwide use herbal remedies as part of their overall health care. Herbalists across many different cultures throughout the world use plants and other substances to improve health, promote healing, and prevent and treat illness (Kamboj 2000). In Myanmar, while precise data on the number of people who use herbal medicines is not available, herbal medicine, which relies on plants and plant products, topically or orally, to treat illnesses, has widespread usage. However, what is perhaps unique to Myanmar is that in the face of rapid deforestation, local communities are maintaining their medicinal plant strategies.

A Global Forest Resources Assessment by the Food and Agriculture Organization of the United Nations (FAO 2010: 21) shows that Myanmar has one of the highest annual rates of deforestation in the world.[1] The 2015 report shows that Myanmar has continued to lose forest cover (FAO 2015: 1). Although Shan State has experienced less deforestation in the last twenty years than the rest of country, it is now considered a critical deforestation front (EIA 2015). The conversion of forested land into agricultural land for paddy rice, corn, rubber, and other exportable cash crops (WWF 2015) threatens areas where local people cultivate and collect medicinal plants. While it is hard to find precise data on the amount of land

[1]The report lists Myanmar as one of the "Ten countries with the largest annual net loss of forest area, 1990–2010."

already cleared to make way for cultivation, it is clear that agricultural expansion is a factor in the decline of medicinal plants (Woods 2013) and that agricultural expansion will continue as the demand to produce more crops for export increases (Phochan 2015).

This broader context of deforestation is of particular concern in this study as it is linked not only to herbal medicines, but also local people's livelihoods and local economies more generally.

10.3 Methods

To understand the importance of ethnobotany in Shan State, this study employed a mix of qualitative and quantitative data collection techniques. The authors and the research team conducted a botanical survey, interviews with villagers, and site visits in the selected study areas in Kunlong township. Field visits were conducted from July 2015 to February 2016 and the authors were assisted by local translators and research assistants at the four villages described below.

As part of this research, a botanical survey was conducted in each of the villages. Specimens were collected with the help of local informants and then processed using herbarium stand methods. Fresh specimens of both vegetative and reproductive parts of plants were identified using available literature (Dassanayake/Fosber 1988; Hong Kong Herbarium and South China Botanical Garden 2007, 2008, 2011, 2012; Hundley/Chit Ko Ko 1961; Hutchinson 1959; Kress et al. 2003; Lawrence 1966; De Padua et al. 1999). Both the vegetative and reproductive parts of the specimens were pressed, dried, preserved, and mounted on herbarium sheets in the Botany Department of Lashio University. Both the vegetative and reproductive parts of the fresh specimens were used for morphological studies. In the study, 21 medicinal plants were collected and identified as part of 14 plant families. This was done with the help of taxonomists in the Department of Botany of Lashio University.

A total of 80 interviews were conducted across four villages (20 per village), in addition to interviews with each village's herbalist or traditional healer (see Table 10.1: Interviews in the Study Area Across Four Villages). Table 10.1 summarizes the number of interviews in each village. Interview guides were used (see below for the list of open ended questions). Topics covered during the interviews included: the use of herbal medicine versus modern medicine; uses of plants and importance to the community; which species are cultivated locally, which are collected wild, areas where plants are collected; changes in the availability of wild plants, and reasons for these changes.

All interviews were conducted in Myanmar, Shan, or Kokang languages with the help of local translators. In general, most of the herbalists are men; however, their wives assist them in their work, including in the treatment of diseases. Most of the local people who use herbal medicine, however, are women, because the men are

Table 10.1 Interviews in the study area across four villages

Village	No. of interviewees		Herbalist
	Male	Female	
Yae Lei Kyun	8	12	1 (male)
Tone Kyat	4	16	1 (female)
Wa Soke	5	15	1 (female)
Ohn Tone	8	12	1 (male)

Source The authors

frequently away doing agricultural work in the forest. The majority of interviewees were between 48 and 75 years old.

The interviews were guided by five key questions:

1. How do you treat your illnesses, by herbal or modern medicines?
2. What species are used for various alimentary diseases?
3. How do you collect herbal plants, cultivated or wild?
4. Where do you collect medicinal herbs?
5. What are the local names of the plants collected?

The study sites for this research were located in Lashio District of Northern Shan State. Lashio District is positioned along the Thanlwin (Salween) River, which originates on the Tibetan Plateau and flows southeast through Yunnan Province of China to arrive in Myanmar, where it cuts through the Shan Plateau (Deetes 2012). This area is ethnically very diverse, and includes Shan, Kokang, Wa, Lahu and Kachin residents. A history of conflict has limited studies in this area. The study site of this research was Kunlong township, and the four villages selected were Yae Lei Kyun, Tone Kyat, Ohn Tone and Wa Soke (see Fig. 10.1: Map of Study Area: Four Selected Villages).

10.3.1 Site Rationale: Geography and Livelihoods of the Four Villages

The four villages of Yae Lei Kyun, Tone Kyat, Wa Soke, and Ohn Tone were selected for this research because they represent communities at different elevations and with a range of different livelihoods, adding to the potential diversity of herbal plants. The four villages are also ethnically and culturally diverse. Yae Lei Kyun village is a majority Shan community, while both Kokang and Shan people reside in Tone Kyat village. Wa Soke is majority Kachin, and the fourth village, Ohn Tone, includes Kachin, Shan, and Lahu residents.

Two of the four villages, Tone Kyat and Yae Lei Kyun, are situated on the banks of the Thanlwin River. Wa Soke and Ohn Tone villages are located in a mountainous area. Each village in the study area is located at a different elevation, and the authors relied on a GPS device to measure elevation.

Fig. 10.1 Map of study area: Four selected villages. *Source* Cartography by Chandra Jayasuriya, University of Melbourne, with permission

The research showed that herbal medicine played an important role in all four villages, even though livelihoods, economic status, and access to services (hospitals, markets, roads) varied, particularly between the mountainous and lowland villages. For instance, the lowland villages of Tone Kyat and Yae Lei Kyun are generally economically better off, and enjoy better access to hospitals in nearby

towns. While they still rely on herbal medicine, they can more easily combine it with western medicine. Interviewees in all four villages noted concerns around threats to traditional medicine.

10.3.1.1 Village 1: Yae Lei Kyun

Located on the bank of the Thanlwin River, Yae Lei Kyun Village is home to a total population of about 200 people of Shan ethnicity and is made up of 36 households. In the summer and winter, the villagers cultivate seasonal vegetables and medicinal herbs on the riverbank and sell the products to local consumers. In the rainy season, Yae Lei Kyun is only accessible by boat travel across the Thanlwin River from Kunlong town. While the local people also use modern medicine, the majority of the villagers still rely on medicinal plants given by herbalists for their health problems. For serious health problems, residents visit the public hospital for treatment with modern medicine by health providers in Kunlong. This village was selected as a community with access to a hospital to analyze the people's reliance on herbal medicine, their economic situation, and their ways of addressing health issues.

10.3.1.2 Village 2: Tone Kyat

Tone Kyat village is also located on the bank of the Thanlwin River. With about 170 households and a total population of 1288 individuals, it is home to Kokang and Shan ethnic groups. Most of the villagers depend on agriculture. The local people cultivate on rubber plantations and grow corn for export, mostly to China. According to interviews and observation, most of the youth no longer live in the village; they have migrated for either study or work. Because of their export crops, the socioeconomic status of households in Tone Kyat is higher than the other riverbank village of Yae Lei Kyun, and higher than the two mountainous villages in this study (Wa Soke and Ohn Tone). There is a government-supported primary school for basic education in the village, with instruction in Myanmar language. There is also a hospital nearby in Kunlong; Tone Kyat is about 1 mile away.

10.3.1.3 Village 3: Wa Soke

Located at the top of a mountain, Wa Soke village is east of Kunlong city and about nine miles away from the mainstem of the Thanlwin River. The village is the largest of the four, with a population of about 214 people and 41 households. It is home to residents who identify as members of the Kachin ethnic group. Villagers usually travel by car or motorbike to access the town or other villages. Due to difficult road access during the rainy season, villagers must rely heavily on medicinal herbs for their health. Some villagers earn a living by cultivating sugarcane and corn as cash

crops; however, they still earn less money than the residents of Yae Lei Kyun village. The majority of the population are poor and rely on locally collected and cultivated food resources. Men usually work in agriculture, while women stay at home to care for the children. Only one certified midwife serves pregnant women and those needing newborn care in the village. The midwife plays an important role in the village, as the nearest hospital in Kunlong city is quite far away and transportation is difficult.

10.3.1.4 Village 4: Ohn Tone

Ohn Tone is located at the top of the same mountain, approximately two miles away from Wa Soke. There are about 200 people, with a total of 35 households in this village. It is home to Kachin and Lahu ethnic groups. Some villagers cultivate rice and corn on the slope of the mountain to earn income. However, the majority of villagers are very poor. There is a primary school supported by the government with Burman teaching staff from the lowland areas of Myanmar. Because this village is located in an upland area far from public health facilities, they also rely heavily on medicinal herbs to treat their ailments. Similar to Wa Soke, there is no hospital nearby.

10.4 Research Challenges: Translators and Transportation

The challenges of conducting this research are related to access, language barriers and transportation. In terms of transportation challenges, the study sites of mountain areas such as Ohn Tone and Wa Soke are difficult to reach. In the summer, they can only be reached by car or motorbike. Throughout the rainy season, the roads are slippery and dangerous.

In regard to language barriers, the majority of villagers speak a range of local languages and dialects, such as Wa, Shan, Kokang, Lahu and Kachin. To address this challenge, the authors worked with translators to translate from local languages to Myanmar (Burmese) language. Most of the translators assisting in this research were herbalists and leaders of the villages. The position of the translators within the villages was important, because the villagers interviewed trusted and respected them, which aided in their willingness to be interviewed. We also worked with motorbike taxi drivers, car taxi drivers, and local botany students who attended Lashio University. All these individuals lived in the selected areas, had the skills to help negotiate access to the research area, were able to help introduce the authors to herbalists and village leaders, and were available to translate.

10.5 Collected Botanical Species and Local People's Lives and Livelihoods

10.5.1 Summary of Collected Plants

Twenty-one medicinal plants were collected from the four villages and identified as belonging to 14 plant families. Specifically, the plant families *Acanthaceae, Lamiaceae, Asparagaceae, Euphobiaceae, Anarcadiaceae, Polygonaceae, Dioscoriaceae, Solanaceae, Nytaginaceae, Caprifloliaceae, Taccacaceae, Chloranthaceae, Menispermaceae,* and *Laganiaceae* were cited. Identification was done with the help of taxonomists in the Department of Botany of Lashio University. Out of the medicinal plants collected, 40% are wild plants and 60% are both wild and cultivated. The most widely useful plant parts in the preparation of remedies (see Fig. 10.2: Percentage of plant parts used for herbal medicine) are the whole plants (28.6%), leaves (47.6%), stems (9.5%) and tuberous roots or bulbs (14.2%).

The plants collected can be found growing in the wild in forests, on the slopes of the mountains and within or nearby the villages. These plants can be found in a wide range of habitats including woodlands, rocky surfaces, forests, grazing areas and farmlands, home gardens, road and riversides, farm borders and live fences (boundaries made of living herbs or shrubs).

Some local medicinal plant users get the plants from herbalists who sell them in the 'five day' markets as fresh or dried plants, discussed further below. In addition, some villagers, especially herbalists, cultivate medicinal plants in their home gardens for treatment of ailments. Among the 21 collected plants, 12 plants are both cultivated and wild plants. The remaining nine plants are wild plants (see Table 10.2).

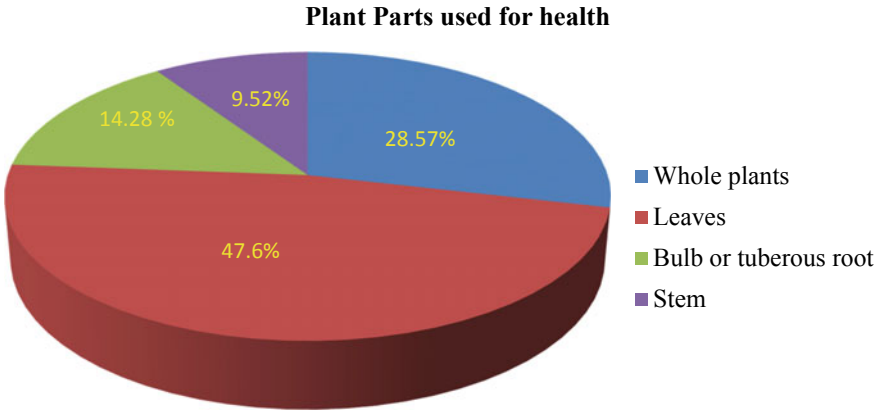


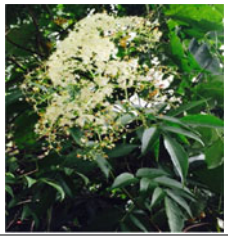
Fig. 10.2 Percentage of plant parts used for herbal medicine. *Source* The authors

Table 10.2 Collected plants for health

Photo	Nomenclature	Medicinal uses
	Scientific name *Datura metel* L.	Asthma and pneumonitis (as inhaler); toothache
	Common name Angel's trumpet	
	Local name Ba-daing (Burmese)	
	Family *Solanaceae*	
	Scientific name *Dioscorea bulbifera* L.	Hypertension
	Common name Air potato	
	Local name Lay-arr-lu, Putsa-o (Burmese)	
	Family *Dioscoreaceae*	
	Scientific name *Asparagus spp.*	Tonic for general health
	Common name Asparagus Fern	
	Local name Shint-ma-tet, Kanyut-gala (Burmese)	
	Family *Asparagaceae*	
	Scientific name *Bryophyllum pinnatum* (Lam.) Oken.	Bone fractures; muscle swelling reduction
	Common name Bryophyllum, Air Plant, Life Plant	
	Local name Ywet-kya-pin-paunt (Burmese)	
	Family *Crassulaceae*	

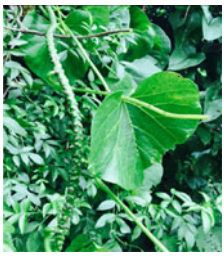
(continued)

Table 10.2 (continued)

Photo	Nomenclature	Medicinal uses
	Scientific name *Buddleia acutiflolia* Common name Butterfly bush Local name Pone-ma-gyi (Burmese) Yar-punn-pan (Shan) Family *Loganiaceae*	Women's general health; reduce swollen gastrointestinal tract
	Scientific name *Chloranthus spicatus* (Thunb.) Makino Common name Charan Local name Tha-nat-khar-pan (Burmese) Family *Chloranthaceae*	Reduce swelling in different parts of the body (as bandage)
	Scientific name *Sambucus javanica* Bl. Common name Elderberry Local name Pale-pan (Burmese) Family *Caprifoliaceae*	Laxative; dysentery
	Scientific name *Cleodendrum japonicum* (Thunb.) Sweet. Common name Glory bower Local name Phet-kha ni (Burmese) Family *Lamiaceae*	Reduce swelling in general (as a dressing); reduce gastrointestinal tract illness (taken orally); women's general health (as bath)

(continued)

Table 10.2 (continued)

Photo	Nomenclature	Medicinal uses
	Scientific name *Tinospora crispa* (L.) Hook. F & Thornson	Jaundice; heart ailments; relieving flatulence
	Common name Heart-leaved moonseed	
	Local name Sin-don-ma-new (Burmese) Wu-kinn-htin (Kokant)	
	Family *Menispermaceae*	
	Scientific name *Clerodendrum infortunatum*	As Glory bower (above)
	Common name Hill glory	
	Local name Phet-kha-phu (Burmese) Mai-lu-hpawng (Shan)	
	Family *Lamiaceae*	
	Scientific name *Mirabilis jalapa* L.	Laxative
	Common name Four o'clock flower	
	Local name Lay-nar-ye-pan, Mye-su-pan (Burmese)	
	Family *Nyctaginaceae*	
	Scientific name *Pedilanthus tithymaloides* Peit.	Skin infection (as protective barrier); bandage for damaged skin tissue
	Common name Zigzag plant	
	Local name Gongaman (Burmese)	
	Family *Euphorbiaceae*	

(continued)

Table 10.2 (continued)

Photo	Nomenclature	Medicinal uses
	Scientific name *Dendrobium aphyllum* Common name Leafless dendrobium Local name Thit-khwa (Burmese) Family *Orchidaceae*	Tonic for general health
	Scientific name *Pseuderanthemum latifolium* Common name Malabar false eranthemum Local name Not known Family *Acanthaceae*	Women's general health (as bath); reduce gastrointestinal tract illness (orally)
	Scientific name *Leonurus sibiricus* L. Common name Motherwort Local name Pingu-hteik-peik (Burmese) Family *Lamiaceae*	Protective barrier for treatment of injury; diarrhea and treatment of dysentery
	Scientific name *Rhus semialata* Murs. Common name Nutgall tree Local name Ma-phwet (Shan), Chin pyut (Burmese) Family *Anacadiaceae*	Dysentery

(continued)

Table 10.2 (continued)

Photo	Nomenclature	Medicinal uses
	Scientific name *Solanum indicum* L.	Malaria (Tone Kyat Village)
	Common name Poison berry, Indian nightshade	
	Local name Khayan-kazawt (Burmese)	
	Family *Solanaceae*	
	Scientific name *Cryptolepis buchanani*	Treatment of bone fractures (protective barrier); skin disease (as bath)
	Common name Wax leaved climber	
	Local name Nasha-gyi (Burmese)	
	Family *Asclepiadaceae*	
	Scientific name *Plantago major* L.	Heal wounds; diuretic; malaria; edema; and burning sensation of the body
	Common name Way bread	
	Local name Pharr-gyaw (Burmese)	
	Family *Plantaginaceae*	
	Scientific name *Fagopyrum cymosum* Meissn.	Reduce high blood pressure; bone fracture (used with Life plant and Lemongrass)
	Common name Wild Buckwheat	
	Local name Buckwheat, Shari-mum, Phet-mu (Shan)	
	Family *Polygonaceae*	

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Table 10.2 (continued)

Photo	Nomenclature	Medicinal uses
	Scientific name *Tacca integrifolia* Ker.Gawl	Reduce swollen tissues (paste of rhizomes); malaria (decoction of rhizomes)
	Common name White batflower	
	Local name Zawgyi-moke-seike (Burmese)	
	Family *Dioscoreaceae*	

Source The authors

The collected medicinal plants are described by interviewees as beneficial to local people for addressing health problems. In this research, most plants are commonly used by local people in the study areas for stomach disorders and as protective barriers for edema (tissue swelling) or injury. According to research findings, there were some commonly used species across the four villages. For example, "Air Plant" or Bryophyllum (*Bryophyllum pinnatum*) is used as a remedy for bone fractures across all villages and all ethnic groups in the selected villages. It is collected wild by herbalists and is cultivated (see also, Table 10.2: Collected Plants for Health). The fresh crushed leaves of this species are used to apply on bone fractures and to reduce muscle swelling. This species can be easily reproduced in its natural habitat, and is therefore easily accessible for collection and home garden cultivation.

In addition, species such as asparagus fern (*Asparagus densiflorus*) are widely used both by local people in Tone Kyat and across Myanmar. According to the herbalist in Tone Kyat, a tonic is prepared by cleaning the fresh or dried rhizome and boiling it in water. Both herbalists and villagers, male and female, prepare this tonic, but it is mainly consumed by men. They believe that the tonic will keep them healthy and strong. The asparagus fern is also collected by herbalists for sale, either dried or as a tonic, and may be mixed with other plants. There is no shortage of this species in the forest near the village.

Additionally, wild buckwheat or Sharimum (*Fagopyrum cymosum Meissn.*), known locally in Shan as 'Phetmu,' is very popular in Northern Shan State for reducing high blood pressure. It can be eaten fresh, or cooked. The cleaned and crushed leaves are combined with lemon grass and Bryophyllum to make a paste and are used as a bandage for bone fractures. There is no shortage of this plant reported.

Generally, most of the collected plants were applied in the same way to treat the same ailment across different villages, locations, and ethnic groups. However, the research did show that some herbalists had distinctive herbal remedies and applications. According to the botanical survey, Tone Kyat residents used multiple plant species that were only recorded in that village. This included several plants, such as:

Charan (*Chloranthus spicatus*), Elderberry (*Sambucus javanica Bl.*), Four o'clock flower (*Mirabilis jalapa L.*), Zigzag plant (*Pedilanthus tithymaloides Peit.*), and Poison berry (*Solanum indicum L.*), which were used only by herbalists in Tone Kyat, located along the Thanlwin River. In both Tone Kyat and Ohn Tone, Glory bower (*Clerodendrum japonicum*), Hill glory (*Cleodendrum infotunatum*), and Malabar false eranthemum (*Pseuderanthemum latifolium*) were turned into a paste and applied directly to reduce swollen tissue and were used orally to address gastrointestinal tract illnesses.

Only the herbalist at Ohn Tone used Nutgall tree (*Rhus semialata*), Wax leaved climber (*Cryptolepis buchanani*), and White batflower (*Tacca integrifolia Ker. Gawl*). Nutgall tree was used not only for the treatment of dysentery but also in cooking to add a sour flavor to the food. Wax leaved climber was used as a protective barrier for the treatment of bone fractures and as a bath for the treatment of skin diseases. White batflower was also used to reduce swollen tissue, and a decoction of rhizomes was applied for the treatment of malaria. The leafless dendrobium (*Dendrobium aphyllum*) was used by Kokang villagers in Tone Kyat as a tonic for general good health and longevity. To make the tonic, they use leaflets boiled in water. It is also cultivated for export to China.

In sum, a wide range of plants are used to treat a number of ailments; some are only grown in a particular context, like the species mentioned in Tone Kyat along the Thanlwin River. For more details and a full listing, please see Table 10.2.

10.5.2 The Role of Herbalists

Across these four villages, herbalists are highly respected for the important role they play in the collection and application of medical herbs. The physical and economic limitations of the villagers make it difficult to buy modern medicines and access public healthcare services, which are only located in Kunlong city. This gap in healthcare is covered by village herbalists, who are also generally poor and rely on agriculture for their livelihoods.

Most villagers in Yae Lei Kyun highly respect U Sai Aung Myat, a Shan herbalist with a long experience in the treatment of various ailments in this village. He cultivates medicinal plants in a home garden, which he tends with his spouse near the bank of the Thanlwin River. The plants grown here are used either for medical care for patients or are sold.

In Wa Soke village, local people likewise show respect to herbalists who live in their village, and rely on them for the treatment of ailments, not least because of transportation difficulties and their lower economic status (Herbalist interview, 20 December 2015). In Wa Soke village, the herbalist used a combination of more than one species. Herbal plants can be collected around the village easily, and are soaked in a traditional rice brew or decoction of water to reduce the swelling of internal organs. Although villagers said that they sometimes used Myanmar medicine

(specifically mentioned Ywet-hlay brand) for health problems, the majority reported relying on herbal medicines.

Most herbalists interviewed have no formal education, but work from generational experience and knowledge that has been passed down. Among the interviewed herbalists, only Mr. U Sai Than Sein of Ohn Tone village became an herbalist through more formalised herbal medicine training after his work as a primary school teacher. He received his training in medicinal herbs from the Nationalities Youth Resource Development Training School. This is in contrast to the other herbalists in Ohn Tone and Wa Soke who said they received medicinal knowledge from their ancestors in order to understand how to use medicinal herbs to treat aliments.

Mr. U Sai Than Sein told us that in Ohn Tone, villagers usually opt to take herbal medicines to treat ailments, but sometimes also use modern medicine when they can afford it. During an interview, his mother showed us the earthen pot used to boil medicinal plants daily. As U Sai Than Sein described it:

> My mother boils a mixture of dried collected plant species and takes it as medicine daily, and she is healthy and over 80 years old. Applying a combination of species [rather than one single species] is more effective for curing disease (11 November 2015).

This was a key point made by herbalists, whether they were formally educated or not; in many cases it was more effective to use multiple species for treatments.

In addition to collecting medicinal herbs for treating ailments at home, herbalists and some villagers, particularly in Tone Kyat, collect plants to sell in the five-day market. The five-day market is very important for herbalists and local communities. It is held in rotation over a five-day period among five different sites around Kunlong township, namely Kunlong, Holi, Nartee, Karmine and Hopan. Local upland people, especially herbalists, sell both fresh and dried medicinal herbs in this market. As an herbalist who sells at the Kunlong five-day market described: "I collect herbal plants from the slopes of mountains which are located behind my village for selling and treatment" (Interview, 20 September 2015).

The five-day market provides an important economic link between rural and urban communities, supporting the local economy of rural upland villages like Ohn Tone and Wa Soke, and allow greater access to medicinal herbs. This arena for economic activities links rural and urban communities together through medicinal herbs. Herbal medicines thus play an important role in providing income for remote communities in addition to treating illness.

10.5.3 Local Medicinal Plants for Trade

Beyond the five-day market, some medicinal plants are also sold regionally and internationally. For example, the leafless dendrobium orchid is not only used locally, but is also sold commercially. This species can be found wild in the forest and can also be cultivated in home gardens. In the five-day market, there were only

a few of these orchids available for sale; most of the time, this plant is exported to neighbouring countries such as China. Thus, while it is clear that across the four villages local people rely on medicinal plants, there is also interest and pressure from outside actors and markets. Dr. Saw Lwin, an orchid expert who runs Myanmar Flora and Biotech, suggests that people, particularly in China, believe that the stem of some orchids can prevent and cure cancer and help people look younger (Phyu 2014).

Locally, the dried stem of leafless dendrobium is used by members of the Kokang and Wa ethnic groups as a tonic for general health. In the study sites, the dried stems are exported as medicinal plants to China for income for local people. According to an interview with local villagers, fresh orchids are sold for 200,000 Myanmar Kyat per viss (1 viss is equal to 3.6 lbs or 1632 g) in the local market (Interview, 20 December 2015). Dr. Saw Lwin, however, warns that the "over-collection [of *dendrobium* orchids] has resulted in the near-extinction of some species" (Phyu 2014).

There are questions surrounding the legality of such trade. Wild orchids are protected in Myanmar under a 1994 law, and the Convention on International Trade in Endangered Species of Wild Fauna and Flora also places restrictions on the international orchid trade. A range of orchid experts have discussed these challenges. In a recent *Myanmar Times* article, Mr. U Win Naing Thaw, director from the Ministry of Environmental Conservation and Forestry's Nature and Wildlife Conservation Division, explained that only one company, Myanmar Flora and Biotech, had applied for a permit to legally trade orchids. He also reported that most orchid growers and sellers did not know they are in breach of the protection of Wild Animals, Wild Plants and Conservation of Natural Areas Law, which also prohibits the sale of cut orchid flowers without a permit (Lwin 2011). In sum, the commercial or even local trade of this plant can impact local availability for medicinal uses and may be putting those who harvest it in breach of national laws.

10.6 Threats to Herbal Medicine: Deforestation, Cash Crops, Trade and Local Knowledge Transfer

In addition to the sale of orchids described above, other threats to medicinal plants and the practice of herbal medicine include the expansion of cash crops, overcutting, and logging for fuel wood (Sai Thein Sein Interview, 20 February 2016). Although current forest laws are being rewritten (Lwin 2017), according to a Forest Department officer, these laws are difficult to enforce in Kunlong township and the current fines are too small to discourage logging and overcutting (Interview, 24 February 2016).

The main threat to wild medicinal plants is deforestation and agricultural expansion, particularly cash crops and rubber plantations in the areas surrounding Kunlong. For instance, in Ohn Tone and Wa Soke, villagers traditionally grew rice

for subsistence through shifting cultivation. Now, swidden farming techniques are being used to clear portions of the forest to cultivate cash crops such as rice, corn, and sugarcane. According to interviewees, this is a more permanent form of cultivation and is occurring on the mountain slopes. Villagers cultivate cash crops both for local consumption and for export to neighboring countries such as China. Local people reported that they do not make enough money selling cash crops because the inputs like seeds and fertilizers cost more than they can make from selling their crops. Villagers also rely on synthetic chemical fertilizers to cultivate cash crops. These factors, combined with the natural vulnerability of such arid and semi-arid lands, may lead to further reduction in the natural habitats of medicinal plants.

In addition to being collected in the wild, traditional medicinal plants are also cultivated in home gardens, and harvested along the roadside and live fences. One reason that traditional healers are planting in their home gardens and sourcing the plants from distant places along the Thanlwin River is because medicinal plants are becoming harder to find in the Kunlong area. With medicinal plants becoming harder to find, an herbalist from Yae Lei Kyun village explained:

> *Medicinal plants are important to us, so I cultivate them in my garden for sale and treatment* (20 December 2015).

Not only is the direct overharvesting of medicinal herbs a challenge, but the overharvesting of other non-timber forest products also disturbs the habitat of these herbs. Near Wa Soke and Ohn Tone, some villagers live temporarily in the forests at certain times of the year, building huts and cooking fires while they collect bamboo shoots to sell in the local markets. Personal observations and conversations with the herbalist Mr. Sai Thein Sein showed that these activities also threaten medicinal plants.

Lastly, the continuing practice of herbal medicinal knowledge is also at risk due to the absence of intergenerational knowledge transfer, as young people tend to be more interested in other livelihoods such as growing cash crops and working in the city or abroad (Personal communication, 30 August 2015). Knowledge sharing is crucial not only to herbal medicine practitioners, but also to local policy makers in their efforts to conserve and sustain valuable medicinal knowledge in Kunlong and throughout Myanmar, where large numbers of people depend on herbal medicines for health.

10.7 Conclusion

Overall, this study documented plants from 14 families with medicinal value as indicated by local residents and herbalists. These plants can be found in a wide range of habitats, both wild and domestic, including forests, grazing areas, farmlands, home gardens, roadsides and riversides, farm borders and live fences. The majority of herbalists used one or more plants in their treatments, particularly in cases of bone fractures and stomach disorders, which is probably an indication of

the frequency of these ailments in the area. The most widely sought after plant parts in the preparation of remedies are the roots, leaves and stems in this order.

Also, while villagers from both lowland and highland villages relied on medicinal plants and herbalists to treat illness, this reliance was more acute in highland villages with limited access to health care in the form of medical doctors, hospitals, and clinics. In drawing a link between access to transportation, socioeconomic status and public health across the selected villages, a pattern emerges. For instance, among the selected villages, the highland areas (Wa Soke and Ohn Tone) are more difficult to access, and residents report less income and poor access to public healthcare, particularly when compared to lowland villages in the same area.

Threats to herbal medicines in Shan State are a cause for concern for communities who rely on these plants to treat illness. Agricultural expansion for cash crops like rice, corn and sugarcane, rubber plantations, and logging for fuel wood is threatening medicinal plants and contributing to declining availability. The continuing practice of traditional healing is also threatened in the absence of intergenerational knowledge transfer in villages, as young people desire to go abroad to work. Knowledge sharing is crucial not only to local practitioners but also to local policy makers so that efforts are initiated to conserve and sustain the valuable medicinal knowledge of ethnic groups in Shan State and throughout Myanmar and the Thanlwin River Basin.

As researchers, we encourage further research on the effects of the synthetic chemical fertilizers used on cash crops, as this may affect soil fertility and damage native medicinal herbs. As some interviewees reported a decline in returns from cash crops, this presents an opportunity for additional research to understand the drivers for local people to cultivate the cash crops, which requires the use of chemicals and results in forest loss, impacting local herbs directly. Research into possible livelihood alternatives could lead to recommendations for more sustainable income.

By highlighting local knowledge on plants and medicinal treatments and the challenges facing the survival of this knowledge, this chapter intends to also inspire a broader outlook regarding the cultural and social importance of traditional healing practices among ethnic communities in Myanmar, and particularly Shan State. The chapter also seeks to raise awareness of the uses of medicinal plants commonly available in villages, and encourage a practical and sustainable approach to the conservation of these plant species in Kunlong Township, Lashio district.

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