

CHAPTER 1

INTRODUCTION

1.1 Principles, Theory and Rationale

The use of medicinal plants is common in addressing the healthcare needs of mankind to the extent that all ethnic groups (world-wide) retain this distinct knowledge as a primary part of their cultures. In the twentieth century, eighty percent of the world's population depended on traditional medicine for their primary healthcare needs [1]. Currently, medicinal plants have an important role in the care of the world's population in terms of new drugs, herbal supplements, and food supplement products.

Traditional medicinal plant knowledge consists of two components: the plants and the information regarding their use. Knowledge of the use, or indigenous knowledge, can be divided into three levels: an individual or family level, a community level, and a national level. Most scientific knowledge comes from the indigenous knowledge. A primary threat to this knowledge of medicinal plant use is that it has never been properly documented [2]. Plants, and most specifically medicinal plants, also have many threats to their survival. These plants are threatened with habitat destruction, over exploitation, an increase in demand, changes in agricultural practices - from native to high yield crops, the needless destruction of poorer specimens, bad storage conditions, lack of equipment for transportation [3].

To promote the conservation of medicinal plants use, the use of both components of traditional medicinal plant knowledge must be considered [3].

The concept of conservation was first legislated in Yellowstone National Park in the United States of America in 1870 to restrict any use of forest lands for conservation and restoration. This led to conflict between the governmental policy makers and the indigenous people who lived in rural areas. After that, the World Conservation Strategy (WCS) of Living Resource Conservation for Sustainable Development produced a report published in 1980 and was prepared by the International Union for Conservation of Nature and Natural Resources (now called IUCN - The World Conservation Union). Assistance and collaboration was received from UNEP, WWF, FAO, and UNESCO. The three main conservation objectives of the WCS are as follows: to maintain essential ecological processes and life-support systems on which human survival and development depend, to preserve genetic diversity, and to ensure the sustainable utilization of species and ecosystems which support millions of rural communities as well as major industries [4-5]. Term to be conservation of medicinal plants and forest in this protocol refers to ecological term which was divided into two types: *in situ* and *ex situ* conservation that are the conservation in and out of community, respectively [6].

After that, the Brundtland Report also defined 'sustainable development' as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [7] while during the UN conference on the environment and development in 1992, the right to develop the environment was

discussed. It was decided that such development must equitably meet developmental and environmental needs of both present and future generations [8].

In 2003, the guidelines established by the WHO (1993) on the conservation of medicinal plants were revised. The guidelines provided governments and others working on a political level with instructions on how to improve medicinal plant resource management and conservation. The crucial issues were comprised of eight sections and emphasized issues of responsible business practices, equity, awareness training and capacity building [9].

China has abundant knowledge regarding medicinal plants and their uses among various ethnic groups. Since the 15th century, many such groups have migrated to Vietnam, Laos, and northern Thailand. When they moved, this knowledge of medicinal plants was taken with them [3].

The Mien or Yao or Dzaio people, who use a Sino-Tibetan language, are an ethnic group who originated in middle to south-west China. The Mien first migrated into Thailand in 1854 and now reside in nine provinces with a population of 45, 571 people [10]. The Mien are known to be familiar with the use of medicinal plants to treat or prevent diseases among their people. The most common treatments involve the combining and decoction of popular medicinal plants, which when allowed to cool will be imbibed or used as a herbal bath, two to three times a day [11]. This knowledge of the use of medicinal plants by the Mien has accumulated for more than a thousand years and has been conveyed from generation to generation by oral tradition. When they migrated from south-west China to Vietnam, Laos, and northern Thailand during the 15th to 19th centuries, their knowledge of medicinal

plants was held by their herbalists and shamans. Along with their knowledge, they also brought some important medicinal plants with them [3]. The herbal bath, especially a postpartum herbal bath, and child herbal bath are effective methods for their self care [11]. Common cold and flu (bacterial and/or virus infections), and some diseases relating to puerperal conditions have been treated for a long time by herbal bathing.

Knowledge regarding the use of medicinal plants by the Mien is being eroded. Its erosion is caused by a similar situation to many ethnic groups all over the world, mostly caused by cultural change [12]. It is predicted that in the 21st century more than 90% of the indigenous knowledge will be lost [13]. Indicative of this trend, the Mien changed their way of life to modernize, their herbalist's role has been diminished, and their traditional knowledge is neglected by the young generation [14]. The Mien's culture should be urgently conserved, including tradition of medicinal plant use before their culture is lost forever.

Since the Mien and other ethnic groups migrated into northern Thailand, many forested areas have been opened up to slash and burn plantations to grow opium. When opium was prohibited, these cultivated lands were changed again to cultivate cash crops by mono-agriculture farming [15]. The increase of mono-agriculture farming has caused an increase in deforestation that has greatly affected the loss of biodiversity, which could increase up to more than 90% within the 21st century [13]. It will also lead to more violent natural disasters such as global warming, floods, drought, soil erosion and violent storms in many parts of the world.

Thailand also faces a similar situation in which its forests have been destroyed at a rapid rate. The total area of forestland was reduced from 53% in 1964, to 26% in 1993 [16] and it is still decreasing in order to cultivate high-yield crops or cash crops, cellulose, wood for furniture making, etc. This reduction in area averages 367,244.30 rai/year, or an estimate of 1000 rai/day (1 rai = 1,600 square meters = 6.25 hectares) [17].

Strategy of conservation and sustainable use of WHO and CBD [18-21] guide about conservation and sustainable use of medicinal plants by “promotes the use of biological resources in accordance with traditional cultural practice” and Hamilton, conservationist, also recommended that “most work by conservationists on medicinal plants should be with those people who own, manage or make use of these species, or else own or manage the land where they grow” [22].

WHO and CBD also explained the strategy for conservation as follows: Good agricultural and collection practices (GACP) are the first step for quality control and quality assurance of medicinal plant products [19]. Methodology for monitoring and the ensuring of safety, efficiency and quality of raw materials and products, provision of the training and information on good agricultural practices should be provided. Cultivated medicinal plants should be verified for their local and common names. In order to promote healthy plant growth, the propagation or planting materials should be of the appropriate quality and be free from contamination and diseases. Cultivation practices should not include the use of chemicals. Organic farming is the best method for every requirement. The conditions and duration of cultivation required depend on the quality of medicinal plant materials required. If no scientific

data is available, traditional methods of cultivation should be followed. It should be kept in mind that medicinal plants can show significant differences in quality depending on the influence of soil and other environments [18-21].

WHO also recommend some practical considerations on harvesting as follows: the crop should not be harvested when wet or in conditions of high humidity. All parts in contact with the crops of a cutter used should be kept clean and free from accumulated material. Containers for harvested material should be kept clean, the collected raw materials should not come into contact with the soil. Fragments of plants that are not required and foreign matter, in particular toxic weeds, and decomposed medicinal plant materials should be discarded. Appropriate age of each plant, the optimal season and time period to ensure the production of medicinal plant materials and finished products of the best possible quality should be considered and recorded. Medicinal plants should not be collected in or near areas where high levels of pesticides or other possible contaminants are used or found, such as roadsides, drainage ditches, mine tailing, garbage dumps, and industrial facilities which may produce toxic emissions. After collection, the raw medicinal plant materials should be washed, sorted, and cut then prepared for drying in open air (shaded from direct sunlight), or drying oven machines, and temperatures should be kept below 60 °C. The production process should follow the good pharmaceutical practices [23-25].

Home gardens and nurseries can be important places for revitalizing local health care traditions. They can play an important role in the conservation of rare, endangered native medicinal plant species. Species that are heavily depleted by over-exploitation and changes of their habitat should be re-introduced in home gardens and/ or somewhere near their habitat. This way not only can conserve endangered

plants, but also maintain a wide range of genetic variation of medicinal plants and also be useful for resources for sustainable use in their primary health care [23-25].

According to Sabhasri [26], there are some activities which are vital and necessary in order to conserve and sustain the use of medicinal plants. Education, establishment, extension and maintenance of protected areas or conservation zones can be initiated by baseline surveys of the medicinal plants and the establishment of their inventories. Ethno-ecological studies of indigenous and traditional knowledge, along with innovations, practices relevant to the conservation and sustainable use of medicinal plants should also be investigated. Identification and establishment of *in-situ* and *ex-situ* conservation of species which may have potential for sustainable utilization should be of concern. Furthermore, research and development on the uses of medicinal plants should be correlated for future benefits.

So, to answer the questions about the erosion of medicinal plant use knowledge in the Mien community especially the issue of are there the traditional use of medicinal plant in current use of the Mien community of Thailand?. What are the existing useful plants and recipes which can be researched and development?. How to conserve both the Mien's knowledge and protect plant biodiversity for sustainable use of medicinal plants in their community?

1.2 Literature review

Literature review for this study consists of 8 parts as follows:

1.2.1 Conservation and sustainable use of medicinal plants

1.2.2 The Mien in Sancharurn village and their health care system

- 1.2.3 Knowledge of the medicinal plants used by the Mien
- 1.2.4 Knowledge of the medicinal plants used by the Mien in Sancharum village in previous literature
- 1.2.5 Medicinal plants and their role in the primary health care of postpartum women in previous literature
- 1.2.6 Chemical constituents and biological activities of the Mien's medicinal plants
- 1.2.7 Literature on the clinical study of puerperal bacterial infection.
- 1.2.8 Free radical, oxidative stress and antioxidant activities

1.2.1 Conservation and sustainable use of medicinal plants

International literature on the principles of conservation and sustainable use of medicinal plants has increased in recent years. Odugbemi *et al.* [27] reported on “Conservation and Sustainable Use of Medicinal Plants in Ghana: An Ethnobotanical Survey”. The project aims were to help the communities to develop a system to conserve medicinal plants by propagation and to provide opportunities for sustainable harvesting from the wild. In this survey phase they found that 86 people were registered as herbalists, a total of 339 medicinal plant species were recorded, that the leaves of the plants were the most commonly used part of the plant, and that about 80% of the plant parts used were common to all of the communities.

Mahindapala [28] reported on “Conservation and Sustainable Use of Medicinal Plants in Sri Lanka”. This report emphasizes a strategic approach by establishing five medicinal plant conservation areas (MPCAs) in different ecological zones of Sri Lanka (dry, intermediate, and wet zones). The report also identifies villages located within the MPCAs that are available for social mobilization. This study found that the outcome was satisfactory, the sustainability was likely. This project also provided positive reinforcement of several best practices to encourage the community to achieve the goal of conservation.

Shengji [29] explained “Ethnobotany and its application with reference in China” as ethnobotanical research should contribute the development in many ways including: the compiling information on local knowledge about plants so that it remains available potentially for development. This work should be urgently done because much traditional knowledge of plant held by communities and it is

disappearing when face with forces of globalization. Land management is the best way to conserve ecosystem including plant habitat. Community participation is the valuable tool for helping to identify and solve community problem of conservation and development relating to plant. He also mentions that conservation and sustainable use of plant are central challenges of world economic development. At the same time, ethnobotany plays an important role in rural community development and biodiversity conservation.

Literature on the principles of conservation and sustainable use of medicinal plants in the Mien communities is also currently available. Khanh *et al.* [30] explained about conservation efforts in Vietnam. This study included an inventory of useful plants, developing a one-hectare garden of useful plants, educating and training the community, and trial cultivation of native useful plants in local communities.

Trung and On [31] discussed domesticating useful native plants in Vietnam by training 70 farmers in the towns of Dai Dinh, Minh Quang, and Tam Dao. The farmers were trained in propagation techniques and in developing nurseries for propagating plants by seeds and stem cuttings on a community level. One of the most useful plants was *Erythralum scandens* Bl.

Cu and Tien [32] explained about the infrastructure of a garden (working unit and water supply), nursery facilities and planting areas in the same region of Trung and On's project.

Long and Li [11] reported the conservation techniques of the Mien (Yao) population in China. They found that the Red-Headed Yao herbalists have vast and rich experience in the protection and utilization of medicinal plants. According to

different seasons and climate conditions, the local people pick different parts of the medicinal plant to treat diseases. When the local people pick medicinal plants, they do not pick the roots to treat diseases. If, however, the roots alone are needed for the cure, they invariably pick old roots and leave the new roots so the plant can continue to propagate. Moreover, the Red-Headed Yao herbalists think it is important to protect big trees.

The Ministry of Health, Thailand [33] performed a preliminary study on the conservation and sustainable use of medicinal plants. Their work refers to medicinal plant protection laws that were legislated in 1999. They are concerned with the loss of medicinal plant resources and knowledge. The projects emphasize surveys of medicinal plant resources and legislation to protect their habitats. However, the work did not cover the use of medicinal plants by ethnic groups who migrated from China, such as the Mien, Hmong, Lisu, etc.

1.2.2 The Mien in Sancharurn village and their health care system

Sancharurn Village located in Nan Province, 19° 17' N latitude, and 100° 3' E longitude [34]. The climate is tropical with three seasons: cool-dry, hot-dry, and rainy. The lowest temperature during the cool-dry season (November - January) is 9 °C. The highest temperature in the hot-dry season (February-April) is 41 °C, the average temperature there is about 30 °C and nights average around 14 °C. The mean annual rainfall is 1400 -1500 mm. [14].

Mien people in Sancharurn Village migrated from Laos to Thailand in 1854. Originally, they lived in high areas more than 1,300 meters above sea level (referred to as "tom in de"). They cultivated opium in slash and burn farming and then traded

agricultural products with Chinese merchants. The deterioration of the soil combined with the political disturbance of communism in Laos forced them to migrate to Sancharum Village, which is located at 450 meters above sea level. Presently, the population has 141 households and nearly 600 people. Most people (80%) are Buddhist and Animism, while some are Christian. Villagers below 30 years of age have completed primary levels of education in public village schools. Some of them continued studying in more advanced schools. Almost all the elderly are illiterate. Their economic status is poor. Most people grow coffee, fruit, rice, and corn. Their income is obtained from selling coffee and cash crops [14].

Chamlong [35] and Srisombatti *et al.* [36] studied the beliefs, attitudes, and the health care system of the Mien in northern Thailand, including Sancharum village. They found that the Mien have a good attitude towards physical ailments and injuries. Their perspective is that ailments are a common part of their lives. Because of their belief in animism, and feudal superstition, whenever the Mien become ill they inquire of their gods as to the cause of the illness. The gods of the Mien are their ancestors, and are called “Jafinjian”. The Mien believe that the “Jafinjian” reply to their inquiries. Any subsequent curing or healing ritual will be prepared in accordance with the answer received from the “Jafinjian”. Some medicinal plants will be used in some situations together with a magic formula by the shaman, who is called “zipmienmien”. The shaman also plays the role of herbalist, who is called a “dearsai”. In cases of pain, or the need to increase blood circulation, or to rid the body of toxic substances, physical treatments called “nibsa” and “tooyjaow” will be used. Diet, including the consumption of medicinal plants cooked with chicken, is

encouraged for promoting and maintaining good health, especially in pregnant and postpartum women, children, elderly people, and in patients.

1.2.3 Knowledge of the medicinal plants use by the Mien

Since the Mien migrated from southwest China to Vietnam, Laos, Burma, and northern Thailand, there have been few articles concerning their use of medicinal plants. Almost all of them emphasize and focus on medicinal plants used for postpartum women, especially bathing preparations and tonic recipes. The prevalence of publications regarding postpartum women over other publications regarding other medical conditions is in great part due to the cultural practices of the Mien. In Mien society, women are the major work-force that supports their families and indeed, the whole village. It is the women who work in the fields, along with completing other daily tasks necessary for the prosperity of the village. Thus, it is imperative that postpartum women receive the care and rest needed to enable them to return to work fully recuperated and in as short time as possible. This specific need has influenced why the Mien have focused their accumulation of medicinal plant knowledge to this segment of society, and why studies regarding other members of Mien society and the treatment of their medical conditions are less publicized. Details of the plants used in the publications available are shown as the following:

Sutthi [37] was the first to do a study on the use of medicinal plants by the Mien on slash and burn farming in Thailand. He found that 149 species of plants were used for food and medicine. The medicinal plants that were commonly found in their fields were *Solanum nigrum* L., *Gynura bicolor* DC., used for postpartum women, and “Paajaitop” which was used for treating allergies.

Thaoprasert [38] made a survey of the medicinal plant knowledge of the Mien living in Chiang Rai and Payao Provinces and discovered that more than 196 species of plants were used. From this survey they made a list of medicinal plants citing their pharmacological details.

On [39] discussed a survey on the use of medicinal plants in the Tam Dao National Park and in a buffer zone in Vietnam, where 224 species of medicinal plants were used by the Dzaio ethnic group (Red-Headed Yao in Vietnam). From this knowledge On and the Dzaio community developed herbal products from the traditional recipes of the Dzaio lore, the postpartum herbal bath is their most well-known recipe. A survey of medicinal plants in the Ba Vi National Park, Vietnam by On *et al.* [40] found that over 200 medicinal plant species were used by the Dzaio people and that more than 40 species were economically important medicinal species, and half of these important medicinal plant species are vines.

Long and Li [11] used an integrated approach of ethno-botany, anthropology and participatory rural appraisal in south-western China. They found that the Red-Headed Yao's medicine is learned by experience. In the course of its development it was influenced deeply by religious culture and feudal superstition. They also found that 66 medicinal plant species were traditionally used by the Red-Headed Yao people in the Jinping, Yunnan Province in southwestern China. The local Yao people take medicinal baths on special days to treat and prevent diseases. Several plant species have special uses and are mixed up together and are boiled for two to three hours. The patients are then bathed in this medicinal water once it has been cooled. In this manner, some gynecological and obstetric conditions have been effectively treated.

The authors of the study also gave comments and suggestions about further analyses necessary to carry out phytochemical and pharmacological studies of these plants in order to verify the validity of these uses. The knowledge of medicinal plant usage is often held on to by the older herbalist; meanwhile, the younger generations have learned little from them. If it were possible, the authors would like to provide some preferential policy from the nation to encourage the Red-Headed Yao doctors to disseminate their medicinal knowledge to successive generations.

Li *et al.* [41] studied the knowledge of traditional medicinal plants of the Red-Headed Yao in China. They found more than 110 species of medicinal plants which were used for bathing. The Mien like to relax after strenuous work with herbal baths. These herbal baths can boost the blood circulation, enhance the metabolism, and improve immunity.

Srithi *et al.* [42] reported a study of medicinal plant knowledge and its erosion among the Mien in northern Thailand. They found that of fifty medicinal plant species recorded, 74% of them were said to be “easy to find” whereas 16% and 10% were defined as “difficult” and “very difficult to find”, respectively. None of the informants used all of the recorded plant species. The most commonly used species was *Gynura bicolor*, with 46 usage reports by the 34 informants, giving a use value of 1.35. These plants have been used as food supplements for postpartum women.

Data from literature and from preliminary research found that knowledge of medicinal plants used by the Mien (Yao) especially the use of medicinal plants for the postpartum health care using a the stream bath, it is not only the most common

method that is found in actual use of the Mien in Laos, Yunnan of China, Vietnam but also used in the Mien in many parts of Thailand.

1.2.4 Knowledge of the medicinal plants used by the Mien in Sancharurn Village in previous literature

There was only one research article that mentioned medicinal plants used by the Mien in Sancharurn Village. Towaranon [43] studied the ethnobotany of the Mien in Sancharurn Village, where 128 species of plants were used for food, medicine, as hand-tools, poisons, etc. Medicinal plants used in the treatment of postpartum women were also recorded.

This was only a survey and documentation of medicinal plant presented there. There was no plan for development or conservation ideas put forth. However, this study can provide information for the researcher about the region and medicinal plants used in this village.

1.2.5 Medicinal plants and their role in the primary health care of postpartum women in literature

There have been articles discussing the traditions and the roles of medicinal plants used in primary health care of women all over the world. Many of them discussed the health care of postpartum women in particular.

The native Americans from Pacific North America also mentioned about mother roasting. The mother will lay on the bed over the herbal steam [44]. Spanish-Americans in New Mexico use mother roasting by spreading lavender over burning coals to treat postpartum hemorrhage [45].

Boer and Lamxay [46] recorded that in Lao PDR, 55 plants species were used in women's health care, and over 90% of them were used for postpartum women's recovery. These medicinal plants contribute toward the recovery of postpartum women by being consumed as part of a postpartum diet and taken as medicine. Herbal steam baths and mother roasting with aromatic plants were also used. Mother roasting is commonly used to "dry out" and to stop the lochia and to alleviate postpartum abdominal pain. This confinement is characteristic in the cultures of many ethnic groups who live in Southeast Asia including in Laos, Malaysia, Philippines, Thai, Indonesia, and Vietnam [47-52].

Various ethnic groups who live in Thailand such as Thai, Thai Lanna, Hmong, Karen, Lahu [53-57], also concern and mention about herbal steam bath and confinement. The Thai Lanna believes that confinement and steam herbal bath help them to eliminate waste blood from the vagina. Postpartum women who did not follow this tradition may not be tolerant to cold weather. Moreover, they may get long term suffering from illness relating to post-labor such as numbness, bone pain, intolerance to some smells and / or may die by waste blood reflux into their lung [54].

1.2.6 Chemical constituents and biological activities of the Mien's medicinal plants

For more than two decades ethnobotanists have tried to determine the chemical constituents and biological activities of medicinal plants used by ethnic groups in many parts of the world in order to verify the validity of their uses. Some species of medicinal plants are well known and used by many ethnic groups, thus some species

have already been tested for chemical constituents and/or biological activities such as antioxidant and antimicrobial activities. These plants along with their chemical constituents and/or biological activities are shown in Table 1. However, there are few articles regarding the chemical constituents and/or the biological activities of the medicinal plants used by the Mien people. One such survey, complete with chemical constituent test data and /or biological activities data regarding the species *Schefflera octophylla* and *Schefflera heptaphylla* (L.) Frod. as follows.

Schmidt *et al.* [58] were the first group of scientists in Vietnam who reported the chemical constituents of *S. octophylla*, which has been used by ethnic groups in Vietnam to treat rheumatism, liver disorders, and as a general health tonic. They found that the bark of *S. octophylla* possessed long-chain, fatty acid esters and other triterpenoid constituents. After that, Sung *et al.* [59] studied the chemical constituents of the same plant. They found that the leaves of this plant are composed of triterpenoid saponin. These details are also shown in Table 1.

Yaolan *et al.* [60-61] explained the chemical constituents and biological activities of some of the important medicinal plants of the Red-Headed Yao in China. *S. heptaphylla* is a medicinal plant widely used as a main ingredient in health tea preparation against infections. They found three caffeoylquinic acid derivatives, namely 3,4-di-O-caffeoylquinic acid; 3,5-di-O-caffeoylquinic acid; and 3-O-caffeoylquinic acid. They also found twenty-seven volatile compounds, seventeen of which belonged to monoterpenes or sesquiterpenes. The main volatile components were a monoterpene and pinene up to 22% of the total volatile components. Moreover, *S. heptaphylla* was also tested for its biological activities, exhibiting potent

activity against a respiratory syncytial virus (RSV) and significant anti-proliferative activity against three cancer cell lines. Other plants were also studied by the scientists. These details are also shown in Table 1.