

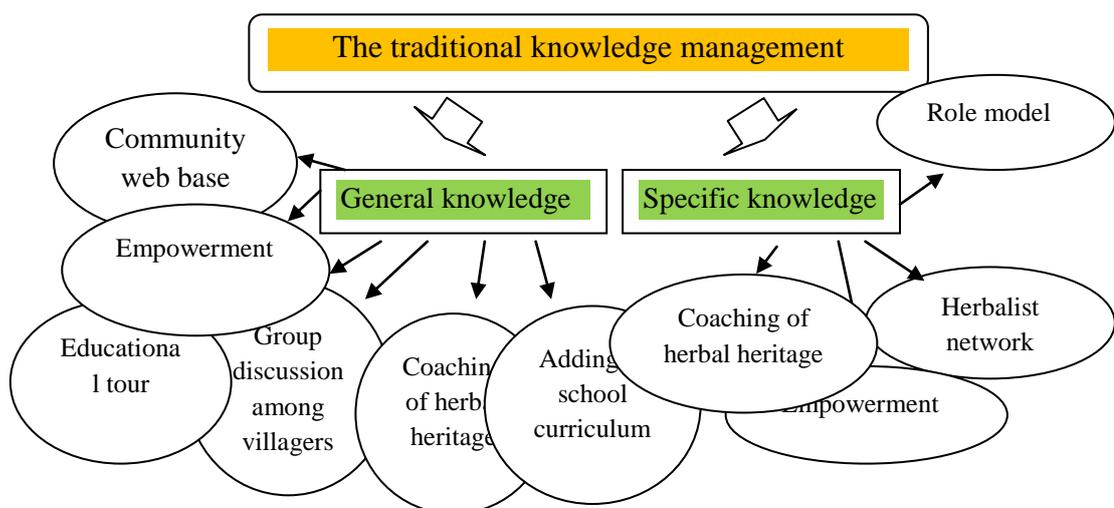
### **3.2.2.1 Analysis of medicinal plant use knowledge management for conservation**

Knowledge in Sancharurn Village should be managed for conservation as following:

**a. knowledge of general use** that is knowledge of the use of medicinal plants where these plants have been well known and commonly used by villagers to promote their health like medicinal plants that have been used in herbal bathing and tonic recipes among children, postpartum women use or plants that are drunk as tea in their everyday life or plants that have been used as food. This knowledge can be managed and promoted by the community and supported by outer organizations. The management must be performed by community policy that comes from the consensus of villagers who need to conserve this knowledge. The meetings for education and training should be done together with young Mien. Documentation that was recorded in the details and this recorded knowledge must be added into the curriculum in public primary school. Relevant local organizations such as the health sector and sub-district administration organizations would be the community supporter in both the knowledge of technology and materials. In order to achieve this objective, knowledge of medicinal plants used by the Mien in Sancharurn village that was documented in this study together with medicinal plant that was invented and produced as a book was subsequent provided to the community and the community school to add to school curriculum and to create website in further phase.

**b. Specific knowledge of medicinal plant use** is the knowledge that is held by herbalists. Since this knowledge has been carried on in the family, then it has to be

managed by these well-trained herbalists together with their community. The knowledge transmission must be encouraged. The young Mien in the herbalist's family should have experience about part use, quantity of each plant, the right method of collection, method of drug preparation, and the dose and duration of treatments. The ethno-pharmacological use and disease knowledge should also be trained and recorded in every step. The useful recipes used by the Mien herbalist should be promoted and use. The herbalist's role and their knowledge should be respected and properly praised from the community and the government. Information about intellectual property rights should also be provided to these herbalists. In order to conserve the specific knowledge in this study, the importance of local knowledge and the loss of knowledge regarding medicinal plants uses due to it is not being documented were discussed and emphasized. The ways to conserve this local knowledge by encouraging the transmission within their family or community, and others were then programmed. The conservation activities can then be concluded as the researcher's propose as following "Activities Tree":



**Figure 21** "Activities Tree" of knowledge management in Sancharun Village

The systematic development of medicinal plant use in Sancharum Village need to cite the learning pyramid [290] that human especially leaders, herbalist, young Mien must be the center of local development because the sustainable use need to motivate by the local people [291]. The learning pyramid suggest the effective methods to provide education by shows that the average amount of knowledge that recipients can retain from certain learning experiences such as the recipients can retain knowledge about 5% from listening to a lecture, 10% from reading from a textbook or similar while they can retain 75% by actually doing the skill and 90% by teaching others. The activities that are indicated in the Knowledge Management (KM) models [292-295] also were discussed. These KM models suggest that there should be consistent knowledge acquisition, development, sharing, preservation, and application. The recommendations also include other details such as a reward should be provided for farmers who have innovations and researcher should also integrate local knowledge with the external knowledge system. Information and communication technologies (ICT) should be a device that is used for integration of indigenous knowledge with other knowledge systems. Knowledge intermediaries should be considered for differences of gender, age, and education. Knowledge sharing should be promoted between individuals, groups, and through communities of practice in a way to encourage active participation in the existing structures to build network relationships. Tacit knowledge can be preserved through oral demonstrations such as folklore, initiation rites, apprenticeships, and various social networks.

### **3.2.2.2 Analysis of medicinal plant habitat management for medicinal plant conservation**

Between brain storming, information from transect walk, forest plot, and from interviews were discussed, that were since the Mien are the ethnic group who are located in areas that have changed the land use from shifting cultivation to cultivate coffee and orchards. However, the Mien have not cultivated their cash crops together with other perennials like the practices of the other ethnic groups. Thus, in order to promote conservation and sustainable use of medicinal plants in this village, the land should be managed as following:

The natural forests should be regulated to maintain these lands by the co-operation of government and community. The forest near the village should be managed by zoning. The vulnerable zone should be temporarily restricted for any use while some zones can be used to collect medicinal plants, food, and non-timber products. Native plants such as *Arenga pinnata* (Wurmb) Merr., called sugar palm or “tao” that are commonly found in this community should be promoted for use of variable food production. This use of native plants may decrease the deforestation to open up land for cash crop plantations. Reforestation with the valuable plants should also be encouraged.

The sacred forest of the Mien that is the original of stream near community should be re-emphasized because this forest needs to conserve by cultural ways. All of these regeneration process are useful for plants to their adaptive variable evolution in basic structures against stress from the environment such as drought, salt, freezing, extreme temperature, fire, nutrient deficiency, and biotic (herbivorous animals, and

microbial pathogens). This evolution can lead to the various types of the plants that can be used as both traditional material at a local and industrial societies such as the adaptive variation of leaves and stem for their natural defensive roles also leads to more quantities of cellulose, hemicelluloses, lignins, tannins and silica. This evolution can also lead to the generation of new phytochemicals that can tolerate insects and organisms, such as more alkaloids, cyanotic glycosides, glucosinolates (mustard oils), and terpenoids. These have led to more antimicrobial and toxic substances [21]. The term of forest regeneration is called as *in situ* conservation. The community garden, home gardens, and plantations can also act in this role as follows:

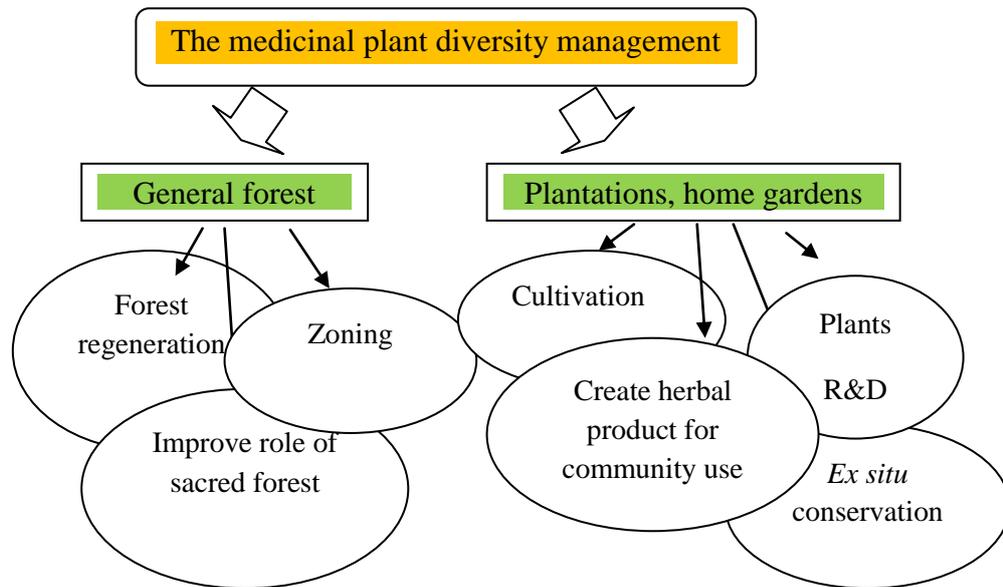
In plantations, useful medicinal plants can be grown by agro forestry. The cultivation of valuable medicinal plants and food in spaces between the cash crop trees combined with animal husbandry can increase the value of land use, easier management and harvesting, and sometimes an increased yield by using organic fertilizer collected from the dung of poultry. This practice can be useful to balance soil nutrition, humidity, and also make a good ecosystem for the plantations. This forest management relates to recommendation of Reekasem *et al.* [296-298].

Community and home gardens can be places for revitalizing local health care traditions. They can conserve rare, threatened, and endangered native medicinal plant species. Species that are depleted by changes in their habitat and abuse can be re-introduced in these areas. This way not only conserves useful plants but also maintains a wide range of genetic variation of medicinal plants and can be a useful resource for sustainable use in primary health care. At a same time, in order to encourage both a cultural and ecological conservation, Sancharum village also should

be promoted as a “eco-cultural travels village”.

*Ex situ* conservation should be adopted to cultivate vulnerable and useful medicinal plants in further research. This practice can be performed at botanic gardens and/or university gardens, and natural parks. These plants can be researched to improve the phytochemical characteristics of their plants and find more conditions for cultivation in different soils and climates. Ways to protect the plants from pests and diseases, and ways to control weeds also should be found so that these plant cultivars can be grown under a wide range of conditions. By choosing the best time of harvest, the possibility of mechanization, and the development of the best system for post-harvest processing can also be considered [19-21].

From analysis, it can be concluded that methods that are used to increase the medicinal plant value can be performed by promotion of the value of medicinal plant for primary healthcare and also trade value. This may convince villagers to conserve these plants by increasing of cultivation and use them. The other methods to conserve medicinal plants diversity in Sancharun activities that should be preformed also were concluded as researcher’s perspective as following “Activities Tree”:



**Figure 22** “Activities Tree” of medicinal plants management in Sancharurn Village

### 3.2.2.3 Processing of implementation for *in situ* conservation and sustainable use of medicinal plants in this study

After brain storming phase, the meetings were held to provide scientific knowledge which useful for conservation and were importance for sustainable development to community such as the organic agriculture knowledge and relevant involving medicinal garden, education on primary health care, knowledge of oriental medicine, and scientific knowledge of medicinal plants involving their uses. Books or inventories of medicinal plants used by the Mien in Sancharurn village also are provided to herbalists, leaders of village, community public school, and the health sector of the community. Collaboration was received by Inter Mountain Peoples Education and Cultural in Thailand Association (IMPECT Association) to support fund for establishment of these medicinal plant gardens in the community. The collaboration for conservation was also received from community health sector, the

organization which will supports villagers to buy some medicinal plants to use in the alternative medicine part such as to make the herbal compress ball, to use in stream bath. The assistance also was received by the sub district administration organization to be the community on behalf to communicate with the outer village and the central government for the expander supporting.

Two months after the first meeting, the community nursery with medicinal plants garden were subsequent establish near their temple. The working started by survey and list number of plants that naturally grow in this area, after that the other important plants were selected to add into this garden. One month after establishment of nursery, the cultivars from this nursery were cultivated in their community garden by students from Sancharurn public school and some villagers. Some plants were then carried from their old village “Tom in de” to their community garden and home gardens. These gardens will not only be the medicinal plants garden for conservation and sustainable use of the villagers in the community but also will be the learning place about the Mien’s medicinal plants of the school students and general people.

After cultivation phase, a project evaluation was performed by the researcher. Various village members were chosen to interview about their opinions and their desires to improve this project. The Village leaders said that since they moved to this Village there are few villagers still use medicinal plants. These plants are used in postpartum recovery and by some elderly people only. They hope that there will be interested in the medicinal plants when their teenagers can easily access them and they have a chance to use these medicinal plants by themselves. The village leaders have plans to provide health care knowledge and also agricultural knowledge to their

villagers. Herbal steam tents will be built at the temple to support the use of medicinal plants in this community, and to service monks and the other villagers who like to try them. Educational tours are a further project, which they would like to do to raise the interest of villagers about medicinal plant cultivation. Along with this motivation, they sent their project to the sub-district administration organization to request some funds to support the project.

Two elderly people provided the opinion that almost all of the elderly people like to bathe in medicinal baths, but the medicinal plant sources are too far from them to allow them to find medicinal plants for themselves. There is a good chance that if there were a community garden and also steam tents to service them, they would utilize them. The one villager said that because the Villagers have learnt to avoid deforestation, then he has tried to grow medicinal plants among coffee trees. He has learned to produce organic fertilizers in his field and he thinks when it is ready he will use this fertilizer for medicinal plants and coffee in his fields. He hopes that his field will be a place for demonstration of organic cultivation and also be the Mien's medicinal plants providing center. Three adolescent villagers said that they are interested in medicinal plant information, not only the Mien's medicinal plants but also information about the health promotion from the radio. At present, villagers are interested and talked very much about female nostrum recipes and enzyme ionic plasma, or "nammak", when they received information on it from the radio. Many Villagers believe that the mixture of various types of this enzyme ionic plasma can promote their health. Currently, more than twenty families provided fruits to preserve them as "nammak". These fruits are purchased from a market and also collected from

natural forests. These informants believe that the promotion of medicinal plant use can be performed by adolescents. This will allow them to have a chance to use these medicinal plants from the health service center in their community, for example “nammak” which was made by fruits and medicinal plants. They think that they do not have any experience about these uses then they may not trust the plant indications, whenever they used these plants the true value of medicinal plants will be recovered and there will be increased interest by adolescent Mien. They also said that this project can then be for sustainable development by their propagation and they guess that within the next three years medicinal plants will be used by more people in their community.

After the first implementation and evaluation, it can be concluded that this project is progressing the promotion of the use of medicinal plants in the Mien community at Sancharurn Village. Since finished the early phase of medicinal plants development in Sancharurn Village, there are benefits on conservation and sustainable use of medicinal plants to community which can be presented as following:

1. There are more than one of home gardens and one community garden were developed, these gardens can be useful to cultivate and propagate vulnerable species of medicinal plants, and can facilitate to promote the sustainable use of both local and global society.

2. The Mien community has also become educated on the usefulness of their medicinal plants and in the ways of protection, conservation, and sustainable use of medicinal plant resources in their area by training.

3. Books and inventories can facilitate the effective learning of school students

(the young Mien) and villagers to be familiar and more concerned with the usefulness of their local wisdom.

4. Medicinal plants used by the Mien that were botanically identified and examined for chemical constituents and their biological activities can confirm the usefulness of their traditional use. This knowledge can also be useful for everyone whom has interest in their values.

5. Reforestation can prevent disaster such as violent storm, drought, flood, soil erosion from global warming.

However, it is only the beginning, it needs to be followed up and support provided like educating the villagers through the process of their development. Important issues such as propagation promotion, organic fertilizer, organic farming, a demonstration and cultivation center, a community medicinal plants center, good practice of harvest and good management system for herbal product need to be recommended to community to create good system for sustainable management. For achieve goal of sustainable development, five year plan of collaboration between researcher and community are produced as following:

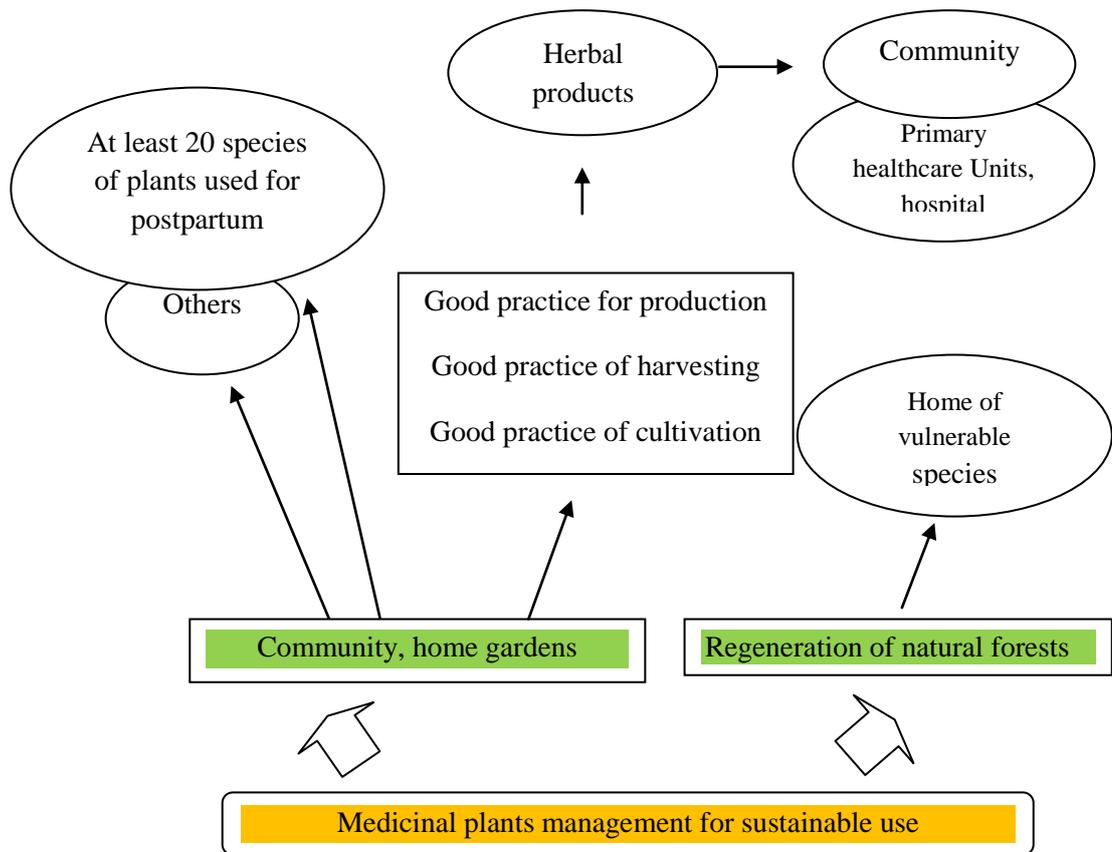
**Table 15** Five years planning for conservation and sustainable use of medicinal plants in Sancharurn Village

<b>Year</b>	<b>Activities</b>
1 <sup>st</sup> - 2 <sup>nd</sup> year	<ol style="list-style-type: none"> <li>1. Provide more resources to improve the community and home gardens for community use</li> <li>2. Encourage school to use knowledge from inventory of medicinal plants that provided to community, community school by add this knowledge to curriculum to formally teach student and product web site to disseminate the local knowledge to outside world</li> <li>3. Provide more scientific knowledge to herbalists and villagers</li> <li>4. Provide educational tour to “Best practice” such as Chao Praya Abhaibhubate Hospital</li> <li>5. Establish demonstrating organic farms of medicinal plant in community</li> <li>6. Train Villagers, students on organic farm, good harvest, and good production, and trading</li> <li>7. Provide workshops on development of herbal product to students and villagers</li> </ol>

**Table 15** Five years planning for conservation and sustainable use of medicinal plants in Sancharurn Village (continued)

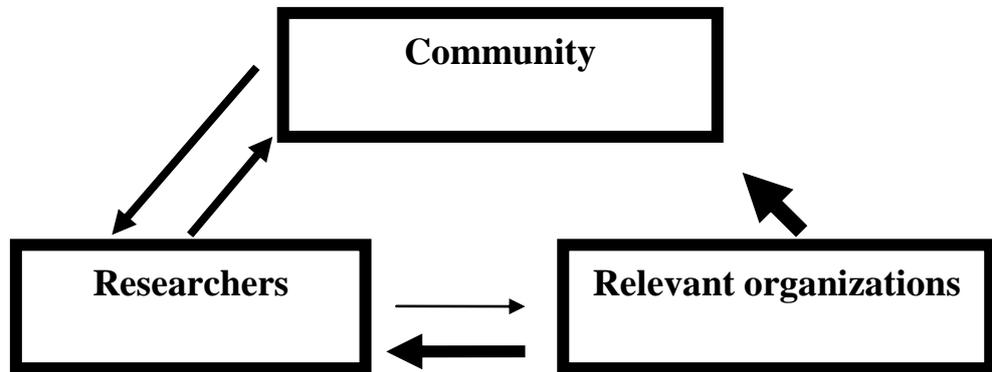
Year	Activities
3 <sup>rd</sup> year	<ol style="list-style-type: none"> <li>1. Establish unit for produce herbal product for community use and to provide good material to primary healthcare unit, hospitals, all workers in unit must be villagers and students who come from community</li> <li>2. Establish experimental and clinical research both in community and healthcare sector</li> </ol>
4 <sup>th</sup> -5 <sup>th</sup> year	<ol style="list-style-type: none"> <li>1. Further research and development</li> </ol>

To achieve goals of conservation for sustainable use of medicinal plant in Sancharurn Village, herbal product for community use should be developed in further project. The details of the further research should be composed of many processes as are presented as the following researcher's aspect "Development Tree":



**Figure 23** “Development Tree” of medicinal plants management in Sancharum Village

In this last section, researcher would like to recommend the model of local conservation and sustainable use of medicinal plants, this model was adapted from Shengj [29], it composes of 3 parts, the model and the activities of each part are shown as follows:



**Figure 24** Model of three social elements with their activities in each group

This model consists of three social elements. Characteristic and activities of each group are shown in following Table 16.

**Table 16** Good characteristic and activities of community, researcher, and relevant organizations

<b>Good characteristic and activities of</b>		
<b>Community</b>	<b>Researcher</b>	<b>Relevant organizations</b>
1. Be a community who is familiar with and can rely on the forest, and uses their local wisdom to conserve forest. 2. There are natural forests and also forests managed by the community for providing food and herbal medicine.	1. Research team should be a multidisplinary team, including an ecologist, botanist, anthropologist, pharmacist or pharmacologist. This team should be well coordinated with the community	1. Be on the behalf of the government to support the community by providing a national policy of medicinal plant conservation and guide the community in the right and proper way to create local legislation.

**Table 16** Good characteristic and activities of community, researcher, and relevant organizations (continued)

<b>Good characteristic and activities of</b>		
<b>Community</b>	<b>Researcher</b>	<b>Relevant organizations</b>
<p>3. Community leaders are interested and need to conserve medicinal plants and knowledge for their young generations.</p> <p>4. There are herbalists who hold knowledge and distribute their knowledge to the younger generation.</p> <p>5. Villagers have a positive attitude about herbal medicine and relevant knowledge.</p> <p>6. There is a group of people from the young generation who are interested in herbal medicine.</p> <p>7. The community is a homogenous community.</p>	<p>2. The team should be familiar and have trust with local culture without bias to community and local knowledge.</p> <p>3. There are proper projects, which are easily accessed by vulnerable groups such as elderly people and housewives.</p> <p>4. Researchers should take time for project implementation and support as long as the community requires for changing the attitude and raising awareness.</p>	<p>2. Be on the behalf of the government to provide funds or material for community development.</p> <p>3. Show support by providing other knowledge to serve community needs such as social, economy, marketing, etc.</p> <p>4. Integrate herbal medicine based on local medical traditions into the community sector of national healthcare systems.</p> <p>5. Encourage communities to raise awareness of local wisdom by adding local knowledge into the curriculum of local schools.</p>

And guideline for conservation and sustainable use of medicinal plant in Sancharurn Village also can be concluded by researcher as following Chart: