

ENRICHED WITH MUSHROOM WISDOM

Local Karen Indigenous women conducted fungi diversity inventory research to strengthen conservation efforts in Keshorter-Thawthee-Pworgaw community forests within Salween Peace Park, Mutraw District, Kawthoolei.

*Make friends with termite hills if you like mushrooms, as Karen Proverb said:
"Good guests approach a good hospitable family, where rich mushrooms approach a good termite hill".*

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Photo credit

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1. Forward

The Karen indigenous people have inhabited the land both in the lowlands and hilly areas of the Salween Peace Park since time immemorial because the resident population predominately depends on their traditional rotational farming or paddy farming occupation. They have been harmoniously living with nature within the Salween Peace Park (Karen Hill) for centuries with limited external interference. However, the mushroom guidebooks or research about wild fungi inventories, or general mushroom reports have not been made. This is the first report that includes the richness of the mushroom and how it sustains the Karen traditional way of life in these areas. The wide variety of fungi species has enriched the Karen, not only as a dependent food source, but have also informed their local language usage health, and traditional knowledge, all of which are crucial for Karen existence. Knowledge sharing through collecting mushrooms in the forest with their elders encourages young people to appreciatively meet their older relatives to transfer expert knowledge and to share joyful moments together. The transfer of generational knowledge better ensures sustainable use of protected resources. The loss of forest in the Salween Peace Park has resulted in the loss of mushroom diversity and traditional knowledge along with it, while the displacement through civil war has resulted in the

loss of key knowledge leaders and the disappearance of the language and traditional knowledge specific to indigenous mushrooms. Similarly, globalization attracts young people who abandon their traditional way of life in favour of building their lives in major cities or abroad, which is another problem eroding Karen traditional knowledge of mushroom conservation.

Therefore, it is important to teach and equip the younger generation, both those who remain in their ancestral territories and those living abroad, to appreciate and manage their environment and its natural resources to battle environmental problems. Currently, research publications or reports present the best option for sharing the Karen traditional knowledge of mushrooms. This is because Karen youth who are resettled now all over the world have no access to their ancestral lands and the knowledge of resources residing there. Therefore, this indigenous Karen research team was established to promote traditional Karen environmental knowledge among the younger generation who are unable to participate in ground activities. In response to grave concerns for mushroom diversity degradation through knowledge lost within the Salween Peace Park, it is hoped that this report has been published before it is too late.





2. Research Summary

The Karen Indigenous Traditional Knowledge Research report on mushroom wisdom in Kheshorter-Thawthee-pworgaw, Community Forest, Salween Peace Park, Kawthoolei.

The Salween Peace Park, located within Kawthoolei State of Kayah-Karen montane rain forests¹ is one of the areas known to be rich in plants and fungus diversity. It is home to the diverse mushroom taxa, which are considered an important species for the local tradition of natural resources. Local people depend on mushrooms in a variety of ways, but use as food resources, herbal medicines, traditional tools, and home income are the most common.

However, no research has been carried out in this place for conservation activity. The indigenous Karen have been using mushroom resources in this territory over centuries without any knowledge input from the Western world. Therefore, the objective of this report is to document the Karen indigenous use of mushrooms to serve as a “secret education” in cultural practices not part of existing curricula which can not be accessed directly from schools since it requires personal field participation. The older generation never used notebooks or paper to teach in the field, but relied on oral storytelling and practical explanations which are key knowledge sharing methods during the fungus harvesting period. They will explain to the participants about the use of mushrooms such as food, medicine, tools and household income in the field.

It also aims to study the way indigenous Karen people conserve and identify mushrooms in order to use them safely. The lack of knowledge in identifying mushrooms from their ancestors’ land nowadays has cost some lives, necessitating documentation of precise identification methods used traditionally crucial to protect life. Finally, effective management of mushrooms using traditional Karen knowledge will sustain mushroom utilization in the wild.

¹ <https://www.worldwildlife.org/ecoregions/im0119>

Survey methods: The survey was conducted through semi-structured interview of the local villagers, women, and other local experts about the process of mushroom collection and their various uses.

Moreover, the research team members conducted field survey observations, were directly involved in mushroom collection process, and participated with villagers in mushroom harvesting trips in primary forests, secondary forests, and rotational farming areas of Pinus and montane forest types. They also observed the mushroom markets at the Thai-Burma border.

Result: This finding indicates that this rich diversity of fungi is important for the Karen indigenous people living in the Salween Peace Park as nutrition and food security. The Kheshorter-Thawtheepwor-gaw community forests survey helped us understand that local Karen people commonly use fungi for food, medicines, tools and others.

The result showed that there are 160 known species and 28 other unknown species. There are 160 known recorded species from 44 families of 11 orders. Besides the recorded species that are known by the community experts, some 28 species remain unknown to the local experts because of lost knowledge and long-term displacement. The other communities besides the study areas may know these species, but it will take a long time to find those with expertise. So, we designate these species during the current unstable situation as unknown species.

Of these 160 known species, some are used by the local people, with 98 species as food, 6 species as food and medicine, 20 species as traditional medicines, 1 species for making fire, 21 species are not eaten locally and 14 species are of unknown uses. For example, King Alfred's cake mushroom is commonly used by the local people to start a fire. From the above list of edible mushrooms, the local people only sell Hygroscopic earthstar (*Astraeus hygrometricus* (Pers.) species to Thailand and the rest of the species are

used locally. Also, from all these recorded species, there are 10 growth types categories classified by local people. This natural resource is important for the Karen indigenous people both for traditional education and language, which is why it is crucial to pass it on from generation to generation in order for the environmental resources and traditional language to live on.

Rich non-timber forest products create harmony within the Karen community because it requires knowledge to identify species when utilizing the food and fungi in the wild at a suitable time. Joyful field participation in collecting this product with experts will help children or young people to gain more knowledge about choosing the right species, such as food, medicine and tools. Also, later sharing the collected species with fellow community members creates love and care for one another as well as maintaining cultural survival.

Conclusion: This research shows us that wild fungi are one of the most important species for the Karen indigenous people of Salween Peace Park. It is because they are used as food, medicine and a tool that helps the community live a healthy life. Similarly, it creates small household incomes that also help maintain traditional knowledge values, and provides nutrition for the community. Today, the method of oral traditional knowledge of mushroom identification is disappearing, so researching and converting the existing ones through books or reports is the best way to help a generation come to learn and value this traditional wisdom. Therefore, this finding helps us understand that it is time to conserve our mushrooms by using our traditional knowledge, revitalizing our traditional way of life, and passing on this knowledge to our younger generation, as it is the only current option to ensure we enjoy living with our mother nature forever.

Keywords: Mushroom richness, traditional ways of life, Salween Peace Park, Kawthoolei State.





3. Background about the mushroom research

Why forming the Karen Traditional Research team in Salween Peace Park is required.

Background

Rich natural resources and biodiversity are still maintained in Salween Peace Park. Kawthoolei is understandable by its local governance system, using Karen Indigenous People's culture and traditional way of customary land management for centuries. However, after seven decades of civil war, knowledge of traditional natural resources management, such as wild fungi diversity and wild plant richness in the area, remains fractured and undocumented. During this difficult time of civil war, a ceasefire was reached, resulting in invasive opportunities such as mega-development projects, investments in dams, and other heavy illegal natural resource extraction in the area. So, maintaining the traditional knowledge to sustain the environment is a crucial step to take against deforestation and environmental degradation.

In 2012, after the Karen National Union (KNU), a rebel group, and the Burma government reached a ceasefire agreement, General Baw Kyaw Heh, an indigenous leader of the local area of Mutraw District, Kawthoolei, organized many summits with local leaders, foreign conservationists, foreign scholars, local CBOs and Karen Environmental Social Action Network group leaders to discuss and negotiate the establishment of the Salween Peace Park. These meetings and discussions occurred several times up until the idea of the Peace Park was agreed to by the stakeholders to proceed.

In June 2015, the concept of the Salween Peace Park was drafted and in September 2015, at the Mutraw District Congress 9th, the agreement was reached to set up the Salween Peace Park establishment procedure as one of the District's future activities.

Again, in 2016, during the Central Karen National Union congress (16), the idea of Salween Peace Park establishment had been proposed, and after the congress, the first KNU standing committee meeting agreed and supported the process of Salween Peace Park establishment.

What is Salween Peace Park

The meaning of the Peace Park has been defined in various of ways. Some defined the Peace Park as protecting the transboundary environment between two countries or more through building friendship to work together. Some people suggested that the Peace Park should not be seen as a transboundary issue. However, in the history of the conflict in the past, the establishment of the Peace Park could take place in any place within the country. Because of the different interpretations of what a Peace Park should represent and mean, there were 146 to 600 parks of this kind established around the world. One of the examples is that between Canada and United States called the Peace Arch Park, which was established on November 7, 1939, on an area of 9 hectares² which aims to commemorate the lasting peace between the two countries.

However, the aim of Salween Peace Park, through the combination of different ideas, was reached through the agreement and defined the meaning of Salween Peace Park³ over time. Finally, we confirmed that the main component of our peace park should be the protection of biodiversity, culture, and building peace within our territory. It is an initiation that is located within the local community territories without any discrimination between groups, as the result of a bottom-up approach.

² <https://bcparks.ca/peace-arch-park/>

³ <https://dohgabar.org/en/project/salween-peace-park>

The difference between the Salween Peace Park and other Peace Parks is based on the local people in the park wanted to be recognized as they were people who conserve biodiversity and they should not be relocated outside the park. It is because there were cases in which national parks establishment within the Indigenous territories displaced them. For example, the ethnic groups displaced and relocated from the establishment of national parks and wildlife protected areas in India dated back to the nineteenth century (Soni V. K. and Ranjan R. K. (2020); Rangarajan M. and Shahabuddin G. (2023))^{4,5}. For the Karen people to be residing within the Peace Park full of dignity and pleasantly living with nature and able to practice their way of life they need to be involved as the decision maker for the Peace Park establishment. Therefore, the Karen Indigenous people being fully involved in all processes toward establishment of Salween Peace Park was the priority.

The main objective of these activities

As mentioned above, the local peoples' active involvement in all levels for the Peace Park be established, they share the aims of the Salween Peace Park establishment which is to help the Karen Indigenous People to live peacefully, to enhance self-determination, to enjoy environmental integrity and to maintain their traditional way of life.

There are three main activities considered posts set to achieve the goals.

The first benchmark that is set up for peace and self-determination is an activity that aims to promote the right to a better life for Karen Indigenous People who have been suffering from civil war for decades. They must be able to live in genuine peace and to practice their traditional way of life in

⁴ Soni V. K and Ranjan R. K (2020). Kuno National Park: Displacement and Resettlement. ETIR September 2020, Volume 7, Issue 9 www.jetir.org (ISSN-2349-5162). Department of Geography, Government P.G. College, Sheopur, M.P. India.

⁵ Rangarajan M. and Shahabuddin G. (2023). Displacement and Relocation from Protected Areas: Towards a Biological and Historical Synthesis, Debate

other people territories, they need to recognize other people's ancestral land and help them to maintain their lands to be more prosperous and secure. In other words, invading neighboring customary traditional land is traditionally banned.

This park initiative will help to revitalize traditional ways of life, to rebuild customary land, and to encourage livelihood security with the freedom to re-develop their own traditional community within their ancestral land. The second benchmark is to protect the local environment's wildlife and wild plant diversities by implementing other activities that will promote harmonious living with nature for local indigenous people. The third benchmark relates to culture and traditional knowledge, with the intention to stimulate ongoing activity to revitalize Karen Indigenous People's traditional knowledge, language, culture and customs.

Traditional knowledge is fundamentally important for cultural survival because if it collapses, the other defining characteristics of their ethnic nationality will follow. These three posts act to fulfill the dream of Salween Peace Park as they are mutually integral to achieving the goals.

Location

Salween Peace Park is located in Kawthoolei (Karen State), northern Karen State (Pa-pun), covering 80% of Mutraw District land area. The territory stretches from the Thawthee-Pworgaw mountain in the north to the south at Kaydoh Mae Nyaw Wildlife Sanctuary at Hatgyi Dam, Salween River. The total area covers the western Salween River at the Thai-Burma Border and the whole Yoezalin River tributaries, and the Belin River watershed, which is estimated at about 1,355,578 acres (5,486 km²) of land areas.

Thawthee-Pworgaw mountain is the highest mountain in Karen State, Kawthoolei, Thai-Burma border. It is a sacred mountain surrounded by the Karen Indigenous People, who regard it as a spiritual mountain of the divine. It

such a way as to make the world know and recognize their existence as a Karen Nation. The Karen Indigenous People do not have any intention of conquering and oppressing others, but rather intend to promote equality between groups. This is because these Indigenous People cannot express or practice their traditional beliefs and knowledge outside their ancestor's territories as everything is rooted on ancestral land.

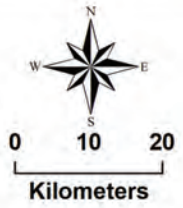
In Karen tradition, the Karen belong to their ancestral lands, so other land outside their ancestral territory must not be occupied by the Karen, because it has its own spiritual leaders that are not recognized by them. So, if the Karen try to take others' ancestral lands, their natural spirit will haunt them as occupiers and end up badly cursed by nature. So, invading some other people's land is a crime. Instead of taking other people's lands or invading

was a well-known strategic mountain as the British Army established instation on it during World War II to battle the Japanese Army. Kay Doh in the Salween River is one of the places with a strong rapid water site which has its own unique mythical history and is a sacred site for the Karen Indigenous People. However, the Burmese and Thai government plan to construct a mega-dam on this site called Hat Gyi Dam.

Moreover, the military coup in Burma on February 1, 2021, increased strong public opposition, which led to a public uprising that resulted in brutal oppression by the Burma Army, killing thousands of citizens all over Burma. Following the coup, the military imposed curfew in the cities and used fighter jets to bomb Karen Indigenous People's villages, which killed hundreds of Karen people, displaced thousands and disrupted daily life, making survival more important than conserving and managing their rich natural resources.

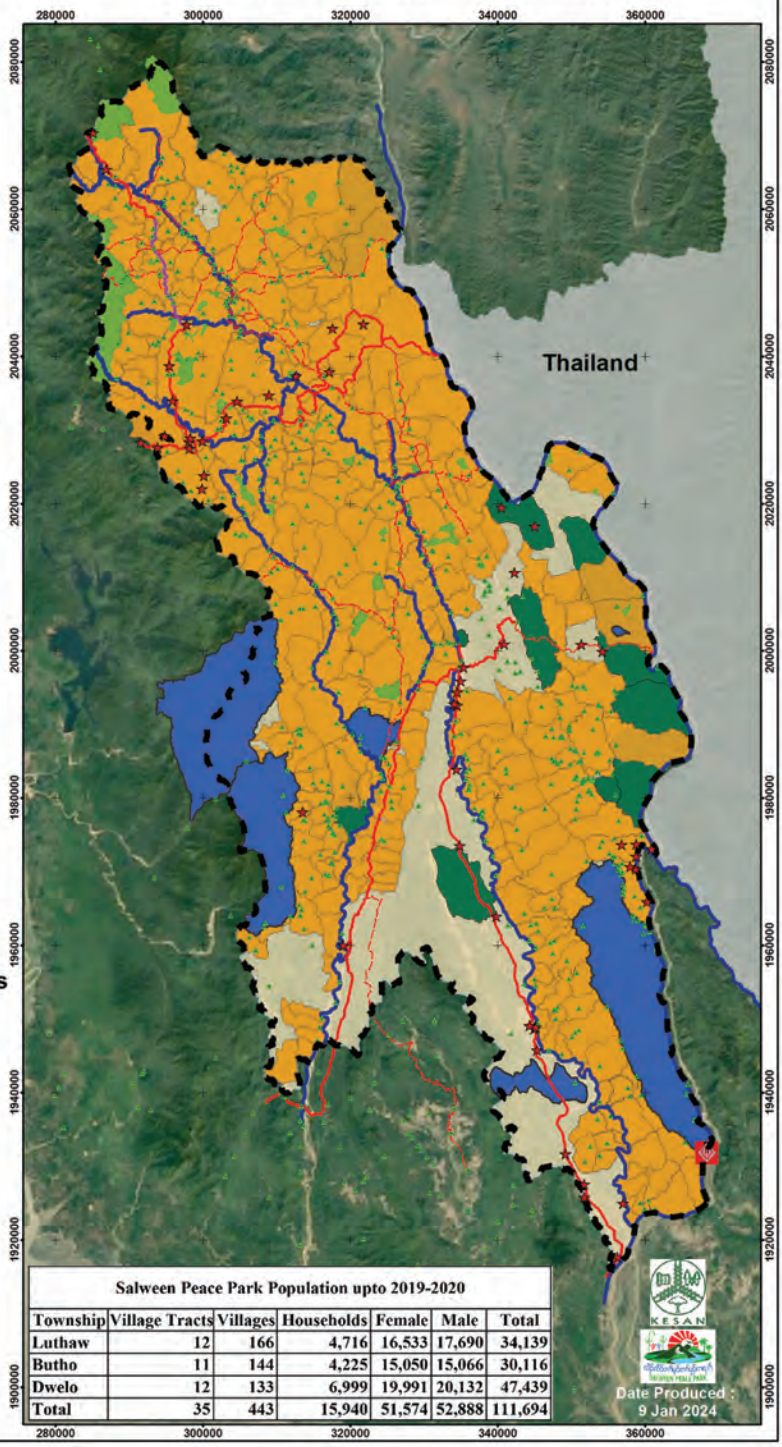


Salween Peace Park Map



Legend

- Salween Peace Park Boundary
- Salween Peace Park Area: 1,667,355 acres
- 43 Community Forests Area: 42,099 acres
- 287 Kaw Customary Territories Area: 1,192,100 acres
- 6 Wildlife Sanctuaries Area: 181,114 acres
- 9 Reserved Forests Area: 137,011 acres
- Villages
- Rivers
- Potential Burma Army Road
- Roads
- (53) Burma Army Camps located inside Peace Park
- Proposed Hatgyi Dam Site



Township	Village Tracts	Villages	Households	Female	Male	Total
Luthaw	12	166	4,716	16,533	17,690	34,139
Butho	11	144	4,225	15,050	15,066	30,116
Dwelo	12	133	6,999	19,991	20,132	47,439
Total	35	443	15,940	51,574	52,888	111,694



Date Produced : 9 Jan 2024



4. Introduction

Our Karen Ancestral proverb says, “We don’t only set traps to catch wild animals for food, neither do we cultivate crops alone and feed only on the products from our farm.” This means that survival from hunting only is impossible, because additional food will be needed from farming. In other words, both farming and hunting are needed. This means to live a healthy life, we must diversify our activities to survive well on this planet. We require different kinds of food for our body to grow healthily, especially carbohydrates, protein, vitamins, and nutrients.

Therefore, the Karen Indigenous People use diverse non-timber forest products, including wild mushrooms, for additional needs in different ways. Mushrooms are rich food sources that contribute vitamins, protein, minerals and antioxidants⁶ for our body’s health.

There are 300 edible mushroom species, where 30 species are cultivated, and 10 species are economically significant⁷.

The mushroom is considered one of the most important resources because the Karen People are known to utilize wild mushrooms in the forest for selling, using them as food, medicine, tools, and cultural material since time immemorial. However, utilization of mushrooms might be slightly different from community to community because the mushroom diversity is based on forest types and their status. Today, this unique sharing of traditional knowledge has disappeared because of continued displacement that has eroded not only local mushroom wisdom, but so much more.

Another proverb says, “A more delicious mushroom has more chance of killing you”, meaning identification of edible mushrooms is essential before consuming it. If collectors do not know them well, people will die from eating

⁶ <https://www.medicalnewstoday.com/articles/278858#benefits>

⁷ <https://www.fao.org/3/y5489e/y5489e05.htm>



them. It is because there are many misleadingly similar mushrooms that look exactly the same as the edible variety. Making them additionally dangerous is that they initially taste as delicious as the edible variety. Sometimes, it is impossible to differentiate one from another. So, it is important to research mushroom richness in this Salween Peace Park to retrieve the Karen traditional knowledge about mushroom wisdom to be able to enhance food security and safety inside the community.

For these reasons, the women's research team in Salween Peace Park is carrying out research, approaching traditional knowledge on mushroom and mushroom richness in the region to rebuild the lost "database". It was necessary to initiate when the team discovered a family of five members had died from consuming the poisonous mushroom species, which they misidentified as being edible *termitomyces fuliginosus* mushroom.

The women and the research team visited the family which lost almost all of its members from consuming poisonous mushroom, and initiated the plan to research on this local mushroom. One of the main factors in this tragedy was the loss of traditional knowledge, which made it difficult for the younger generation to effectively identify the edible mushroom.

Therefore, the research question objective is based on four main problems laid down as follows.

1. To study how many edible and usable mushroom species are in the Park.
2. To study how the Indigenous people use each species of mushroom for food, traditional medicine, and tools
3. To study the interconnection between tradition, belief, and cultural value of mushrooms to local Karen people.
4. To study the traditional management of local mushroom diversity and the way they are passing over the knowledge of mushroom conservation from generation to generation.

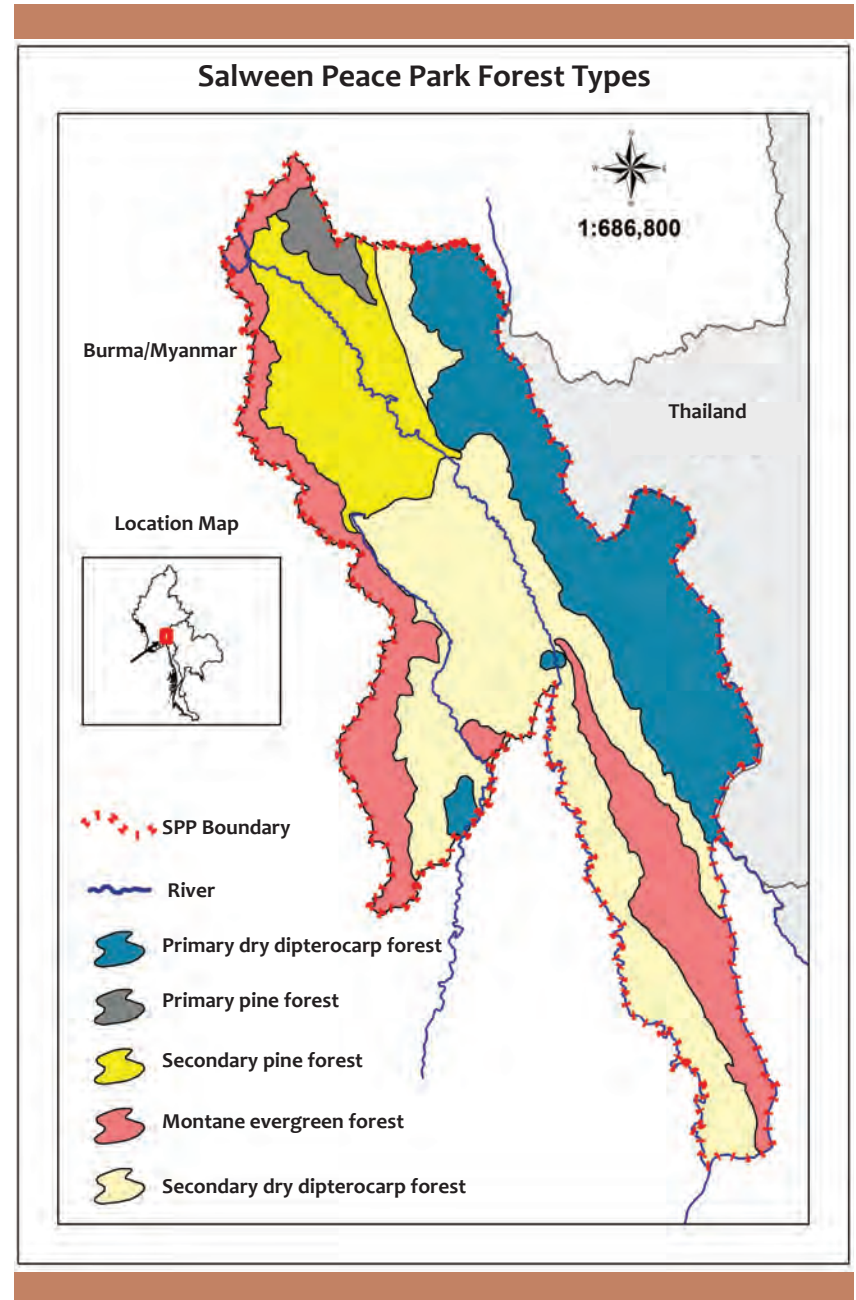
5. Background Information

The Salween Peace Park is not a vast area, but since it is comprised of different types of forests and forest status, it has maintained rich biodiversity until the present day, but requires urgent action for protection given current circumstances which threaten it.

From the diverse forest resources sitting on 60 MSL to 2,700 MSL, there are at least five categorized forest types, which include Dry Dipterocarp Forest, Mix-deciduous Forest, Hill evergreen forest, Pinus Forest, and montane evergreen forests. However, not all these forest types remain virgin since there are secondary forests of each forest type which have replaced forests which were cut down for rice plantation or by forest fire during displacement from the civil war. The burning of the forests mostly results from the indiscriminate shelling by the Burma army, which caused forest fires and after Karen villages were burnt by Burma the army, which entered the forest. It can be determined that only the montane forest types remain intact up to this present day.

Similarly, the rich biodiversity, including humans living in the same forest with wildlife, is protected by the traditional law and taboo to coexist together in different forests. The traditional law that prohibited biocultural species from being hunted e.g., Gibbon, tiger, and greater hornbill, and traditional Karen taboos that do not allow people to cut down sacred forest areas or forest corridors. The Karen Indigenous People protect their biocultural species through a species-based conservation, in which they do not harm or kill them whenever foraging in places for a specific species.

Mutraw District is a mountainous area where the Karen People's occupation depends about 90% on traditional agricultural practices. To maintain their traditional ways of life, religion, and culture, they practice living with rich biodiversity, clear water, clear airs and good natural soil.



Since the Karen Indigenous People sustainably use and depend on wild plants, wildlife, insects, and aquatic species for their religious and traditional way of life, they want the species to remain rich forever.

It is estimated that there are about 80,000 people residing in the Salween Peace Park, mainly The Sgaw Karen group, whose main religions include Animism, Christianity, Thomson (Klebopah, Poe Weh Koe), founded by Dr. Durmay Poe Min⁸, and Buddhism. According to the survey, there were about 73,000 people, but not all the people in the areas listed their names in this survey.

The main local language that is used in the area is Sgaw Karen and the education system comes from Karen Education and Culture Department (KECD). The highest education standard in the peace park is up to senior college.

5.1 Occupations

Agriculture

For the annual plants, the Karen Indigenous People in the area's main occupation is rice farming. Rice cultivation is mainly on two types of crops, which are wet paddy farming and dry rotation paddy farming. Wet paddy farming is the use of paddy cultivation on a specific area of land for the long term. In wet paddy farming, mostly rice is only planted on the farm, and the other mixed cropping is limited. However, the other crops, including bush bean, soy bean, groundnut, yellow bean, long bean, sweet potato, white pumpkin, pumpkin, cucumbers, squashes, gourds, melons, chili, mints, and other spices, are mostly planted on the edge of farmlands and surrounding areas mixed with paddy.

Annual agriculture

However, the dried rice rotation paddy farming usually depends on rain as its main water source in hilly areas which the cultivation needs to shift from

⁸ https://www.elephant.se/database2.php?elephant_id=2847

place to place every year. this rotational agriculture shifts every year. In this kind of dried paddy farming, all kinds of traditional food plants are planted in a mixed-cropping technique. They plant rice, corn, millet, white sorghum, job's tear, cucumbers, squashes, pumpkins, gourds, melons, taro, yam, Jicama, climbing bean, mustards, sesame, ginger, and other spices on the same farm.

For perennial agriculture

For the long-term plantation, the crop is mostly prepared and cultivated as an orchard closer to the villages, which is composed of pomelo, oranges, jack-fruit, mangoes, guava, papaya, banana, limes, coffee, cardamom, tea, pineapple, and many other fruit trees.

Livestock

The household livestock basically depends on domestic animals traditionally raised by a family's knowledge and expertise of inherited breeding stock, possession, or heritage. However, though the livestock can be different from village to village, the most common livestock include elephants, cattle, water buffaloes, pigs, goats, chicken, ducks, fish, and hunting dogs. They also domesticated wild birds, wild animals, dogs, cats, and other species for pets.

Local trade

The main trade in the area includes exporting cattle, goats, pigs, buffaloes, and elephants to Thailand. Agricultural products exported to Thailand include, cardamom, coffee, elephant foot yam, chili, banana and many different fruits from the orchids.

Occupation

There is very limited time to find jobs as salary workers, but jobs as domestic animal dealers, shopkeepers, teachers, motorcycle transportation, medical workers, pastors, and local NGO workers are the only jobs available in the area.

Non-timber forest products

Non-timber forest product utilization is for local needs but rarely for profit. The main utilizations are primarily for food, medicine, religious practices, household incomes, and other traditional uses. The main incomes from the non-timber forest products trade include honey, mushrooms, nuts, and leaves for roofing.

The materials included in the making of tools, carving, weaving, construction, transportation and other uses; for example, rattans, bamboos, palm leaves, tree sap are used for construction, making chairs, building rafts, houses, and lanterns. For weaving cloth, women collect Musa fiber, roots, bark, leaves, which are used for dyeing colors, as well as leaves like sandpaper, leaves that are used for their properties as sandpaper, wax from bees, and other types of weaving materials.

For the non-timber forest, products used for food include nuts, fruits, flowers, shoots, starch roots, leaves, mushrooms, and vegetables. There are also other uses which include honey, sap, mushrooms gathered for household income, plant parts for traditional medicine, specific plants for religious events and other plant species parts for traditional ceremonies.





6. Research Method and Materials

Survey area: the survey took place within Salween Peace Park, in the northern part of Mutraw District, Karen State, Kawthoolei. It occurred mainly in Kheshorter-Thawthee-Pworgaw community forests, but we also went to different forest types in the park to collect all species that were encountered during our field survey time. The field exploration survey was completed by forming a team and searching for the mushrooms on the forest floor. During this survey time, we used a ruler to measure the areas of each mushroom collected, and took notes, photos, and wrote habitat descriptions. Guidebooks were used in the field to compare the species with the book descriptions, photos, and internet searches.

6.1 Research geographical area

The wild mushroom survey area is located at longitude N: 18° 29. 970° and latitude E: 096° 58.635°. Forest type local seasons have the character of tropical zones at the eastern higher elevation of Myanmar and the western higher elevation of Thailand. There are three seasons in a year, which are called the hot season, the monsoon season, and the winter. The average annual rainfall is between 2,000 mm and 2,500 mm.

The hot season starts from March- May, while the rainy season is from June-October and the cold season is from November-February. It is very hot during summer with a clear sky, sometimes up to 40 degrees Celsius. During the rainy season, it is mostly cloudy and rainy, and winter is cold with thick frost in the morning and clear sky during the daytime, and temperatures going down to -7 degrees Celsius.

During the survey period, temperature differences can vary during summer, rainy, and winter seasons on daily and monthly cases. In higher elevations above 1,000 MSL, during summer, the temperature can be 10 degrees Celsius at night and 28 degrees Celsius during the daytime.

During the rainy season, elevations at higher elevations can vary from 10 degrees centigrade to 25 degrees centigrade, but the cold season's temperature at higher elevations is between -7 degrees Celsius to 18 degrees Celsius.

However, only personal observation during the research period was completed because there is no research that has been done in this area on temperature differences in each season. In lower elevations, in mixed-deciduous forest types closer to the Salween River, the temperature can be up to 40 degrees Celsius, and during the winter period can be up to 20 degrees Celsius.

Forest types

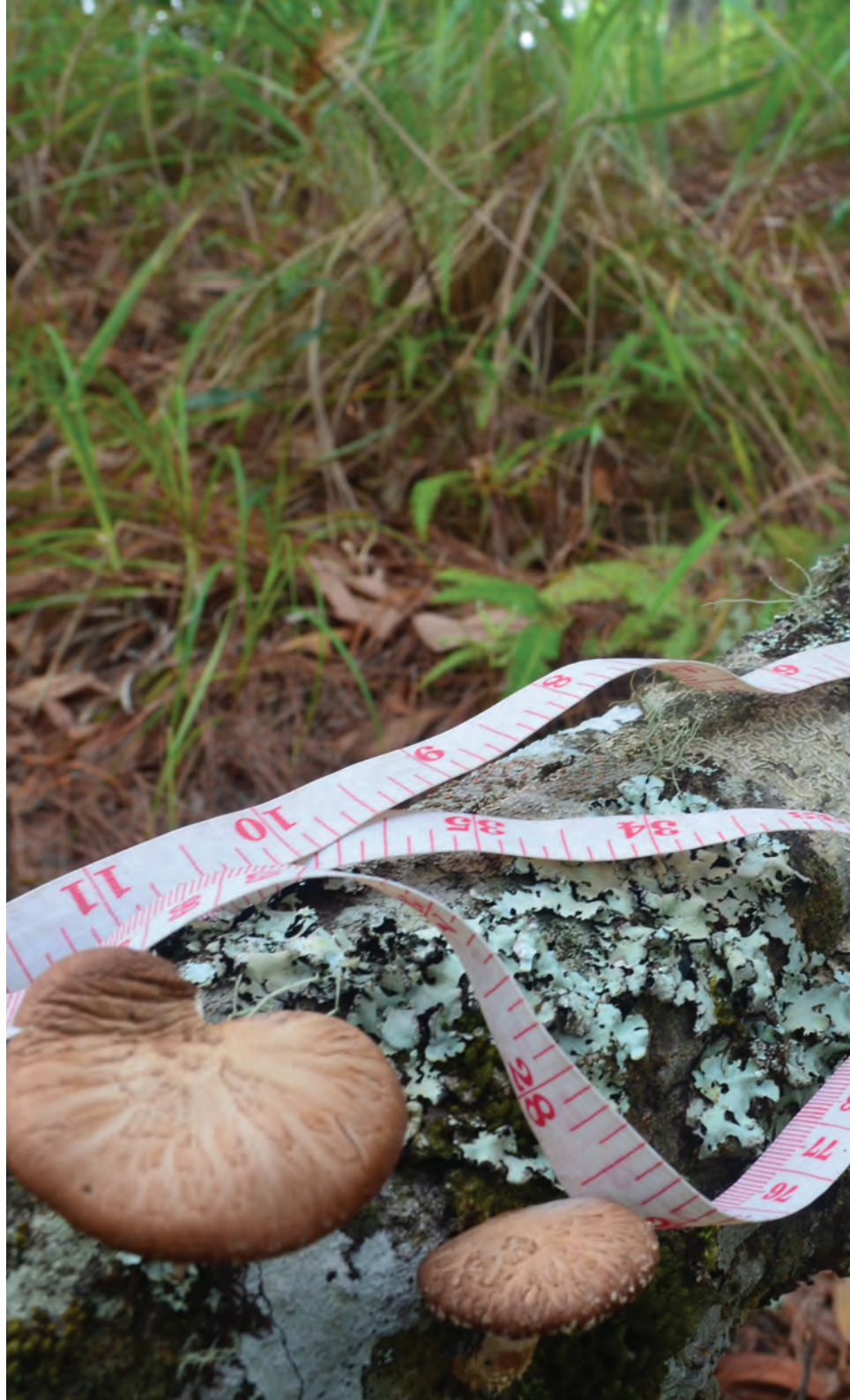
These forest types vary from 80 meters to 2-700 meters above sea level. In these different types of forests, there are various tree species, including pines and oak, as well as bamboo, and rattan.

The trees in the forest include Dipterocarpus sp. Hopea odorata, Magnolia garrettii, willows, oaks, rhododendrons, Pinus, and other species. The higher the elevation above sea level, the colder it gets during the winter. Sometimes, the temperature goes down to -7 degrees Celsius, especially in places above 2500 meters. This kind of forest type is very thick, but there is a lack of emergent tree species as most species are short and dense.

This kind of forest type is made up of at least four layers, which are the canopy, the sub-canopy, the shrubs layer, and ground layers. Some parts of the higher elevation forest types maintain their primary status, so only between 15-20% of sunlight can penetrate to the forest floor. The canopy is covered by large tropical tree species. The sub-canopy is occupied by rattan and small bamboo species. However, because the mixed-deciduous forest is mostly occupied by hard wood species which shed their leaves during winter or summer, a greater percentage of sunlight could penetrate the forest floor, even when the forest could maintain its primary status.

There are also secondary forest areas, fallow lands and rotational farming areas comprised of different types of secession plant species. The research areas also included the watershed of Salween, Yunzalin, and Sittang rivers tributaries, especially the Kheshorter-thawthee-pworgaw area (Nattaung Mountain) which is 2,700 m above sea level.

The watershed of Thet Lo Klo, Klaw Kaw Lo Klo, Plo Lo Klo and Tue Lo Klo originates from eastern Kheshorter Mountain, where the Len Lo Klo River flows into Yunzalin and ends in Salween River, while Traw Lo Klo (Mon River), Saw Lo Klo, Bu lo Klo, and Yaw Lo Klo are from the western Kheshorter Mountain, which flows into Sittang River.





7. Method of Mushroom Identification

Mushrooms which grow in similar areas appeared to be similar in size and color, but indistinguishable in their different toxicity and poison level. The Karen traditional knowledge of testing poisonous mushrooms using lime and limestone application on the under cap to see color changes was the primitive technique used to discover specific species of mushroom. However, though many other methods of testing mushroom toxicity were practiced in the past, they have been lost through the passage of time.

For example, in traditional knowledge, it was known that Slender Parasol (*Macrolepiota gracilentata* (Krombh.)) (Buffaloe dung mushroom - in Karen) is similar to another species called False Parasol (*Chlorophyllum molybdites*), which is toxic to humans. The application of limestone cream under the cap of False Parasol will change the color to green or black, but while the same thing to Slender Parasol, the color will remain the same. This is how they used traditional knowledge to identify mushroom species. Therefore, using the right methods to identify them before consuming them is crucial.

Checking the mushroom forms, types, and color plates.

We observed the mushrooms in the field to identify each species based on the traditional Karen knowledge method of four of the five senses, which are; sight, scent, taste, and touch. When we do a survey together with local villagers and local experts, we look at the color plates, forms of mushrooms, growth types, and the touch and smell of them. We also interviewed the local expert about the mushrooms, names and important information.

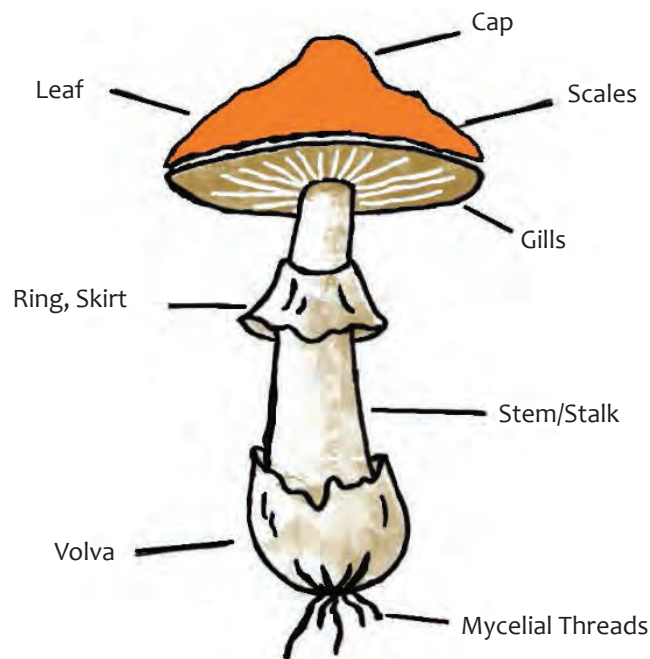


Figure 1. Names of mushroom particular plates leveled in this figure.

To double check the names of mushrooms, we compared the local knowledge with guidebooks written by scientists from different sources by checking journals, books, reports, internet search, Google Scholar, and ScienceDirect. The local people named the mushroom species based on its physical appearance, color plates, form and growth types.

Field survey

The team conducted field surveys from 2014 – 2018, for four years. The typical field survey day can be subdivided into three parts. The first part was that the research team conducted the survey by themselves in forest outreached by communities. Also, the survey was mainly based on personal observation and identification using guidebooks. The second part included the research



team members participating with the local villagers during the times they had harvested mushrooms and when cooking mushrooms in the kitchen. The third part included accompanying the people to the places where they buy and sell mushrooms in the market on the Thai-Burma Border along the Salween River.

In our field survey in Kheshorter CF, we invited local Karen women to participate in our survey two times, and the Thawthee-pworgaw CF two times as well. For additional information, we conducted participatory research on fallow lands in rotational farming areas or secondary forest with Heghoelo Der villagers at least two times.

Since the team members did not have proper documents to travel to Thailand, only one team member, Blaw Htoo, travelled to both sides of the Salween River and observed the mushroom marketplaces along the river and the market place in Mae Sarieng fresh market.

Blaw Htoo accompanied the mushroom traders to the Salween River to find out how the mushrooms are traded for household income on Kawthoolei's side from the Western Salween River into the Eastern River band of Thailand.

We also conducted informal interviews with mushroom dealers from both sides. One of our team members, Naw Hsa Yu, harvested this kind of mushroom by herself many times for household income. However, the most common locally consumed mushroom species were collected close to residential areas, rotational farming areas, rice fields, and fallow land which are not for market purposes but for local use purposes, so the trading of these mushroom records was not made.

In addition, we also encountered mushrooms while we did the habitat survey several times in the designated forest area. For the purpose of the mushroom survey, we prepared a questionnaire mainly about the identification method of mushrooms, the names of mushrooms, differentiating edible and poisonous mushrooms, the use of mushrooms, habitat types, growth types, sustainable

utilization, good management, the traditional value of mushrooms to Karen Indigenous ways of life and the methods of current knowledge transfer to the younger generations. We interviewed 20 people in total. There were 15 women and 5 men. The people were selected based on their rich experiences of harvesting mushrooms, selling mushrooms, and other uses of mushrooms.

However, another method of interviewing during the survey times was when we walked into the forest with local mushroom knowledge experts. We conducted face-to-face interviews and held discussions while traveling during mushroom collection. This happened every time we encountered mushrooms in the forest during the forest trips. We discussed each species with the local expert right beside the mushroom we sighted, whether they were identified or unknown to the experts. We recorded it and made notes about the unknown species and its status.

Sometimes, we were fortunate enough to visit villagers when they cooked mushrooms. We discussed the types of mushrooms, their taste, their abundance and their current status. So, we took these opportunities to make sure we could obtain all the knowledge from different kinds of local people. Sometimes, the local people were comfortable enough to look at the photo guidebooks and discuss the similarities and differences of mushroom details in the guidebooks with local knowledge. In the guidebooks, they use rulers and ropes to measure the mushroom areas, while the local people use their fingers and arms to measure the mushroom areas.

Again, we met villagers several times from many villages and talked about the differences between edible and poisonous mushrooms during the most abundant seasons. We also talked about what were the best habitats for each mushroom species and how they used mushrooms for food, medicine, and tools.

We also asked people to talk about how they collected mushrooms when we encountered them coming back from harvesting mushrooms in the forest or from the fields. These were ordinary questions such as “where did you get it?” and “what was the best place and times for that specific mushroom growing?”.

We recorded and summarized all the information obtained from discussions with local people and villagers during our trip to villages. During our field trip or interview days, we took pictures of every single mushroom we encountered and recorded the interview with tape recorders and videos. Taking photos and videos for recording the mushroom information is one of the notetaking methods for recording data. We also recorded all other information with a tape recorder when interviewing the local experts.

We can conclude that since all the research team members are local Karen Indigenous People who also use mushrooms in their daily life in Salween Peace Park, where they obtained knowledge from their ancestors the same way

the older generations share knowledge with their children today. Therefore, we can finally, check and list the mushrooms that are edible and usable by the Karen Indigenous People within the park.

Result

The edible, usable, and other mushroom species that were in the park during our survey were successfully recorded; a total of 44 families and 160 species of mushrooms. The use of mushrooms is varied from species to species as well as from communities to communities. We put together the mushroom as its growth types, families and species associated with its specific group.

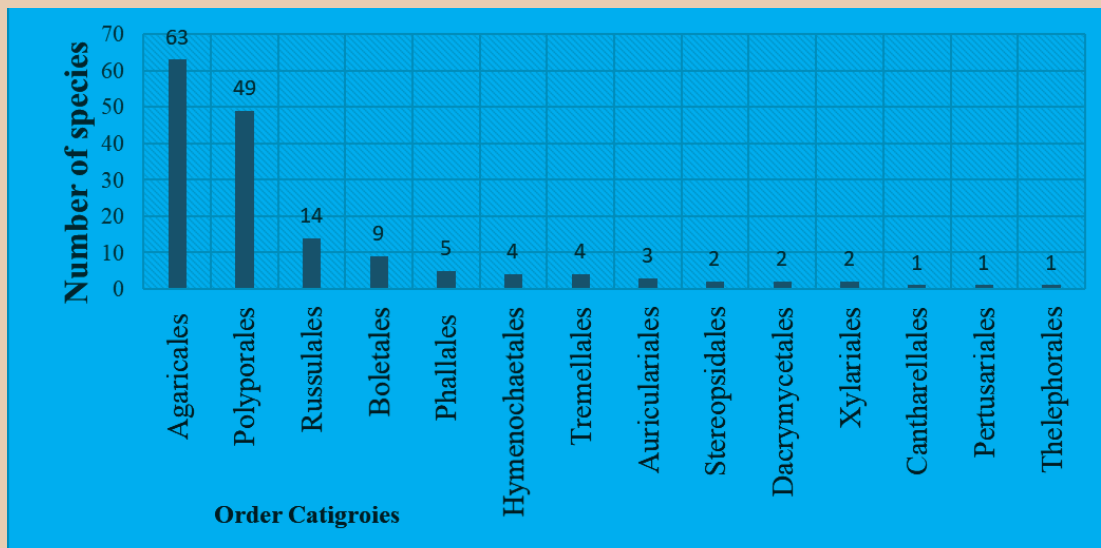


Figure 2. mushroom orders arranged

There are 11 orders including; Agaricales, Polyporales, Russulales, Boletales, Phallales, Hymenochaetales, Tremellales, Auriculariales, Stereopsidales, Dacrymycetales, Xylariales, Cantharellales, Pertusariales and Thelephorales.

Since there are 44 families of 160 species where some families contain more species within it taxa, for example, there are 27 species of Polyporaceae, 11 species of Lyophyllaceae, 10 species of Russulaceae, 9 species of Tricholomataceae, 8 species of Pleurotaceae, 7 species of Ganodermataceae, 6 species each of Boletaceae, Meruliaceae, Pluteaceae, 5 species of Hymenochaetaceae, Sparassidaceae, 4 species each of Amanitaceae, Omphalotaceae, Phallaceae, Physalacriaceae, 3 species each of Auriculariaceae, Clavariaceae, Hygrophoraceae,

Ramaria, Stereaceae, 2 species each of Agaricaceae, Dacrymycetaceae, Fomitopsidaceae, Inocybaceae, Stereopsidaceae and one species each of Boletinellaceae, Cantharellaceae, Diplocystaceae, Gomphaceae, Hydangiaceae, Hypoxylaceae, Icmadophilaceae, Lachnocladiaceae, Marasmiaceae, Meripilaceae, Phanerochaetaceae, Sarcoscyphaceae, Schizophyllaceae, Sclerodermataceae, Squamanitaceae, Strophariaceae, Tremellaceae Thelephoraceae, Xylariacea.

The habitat type differences of mushrooms are subdivided into categories in figure (3) below. In this figure we group the mushroom based on its habitat site into 10 groups.

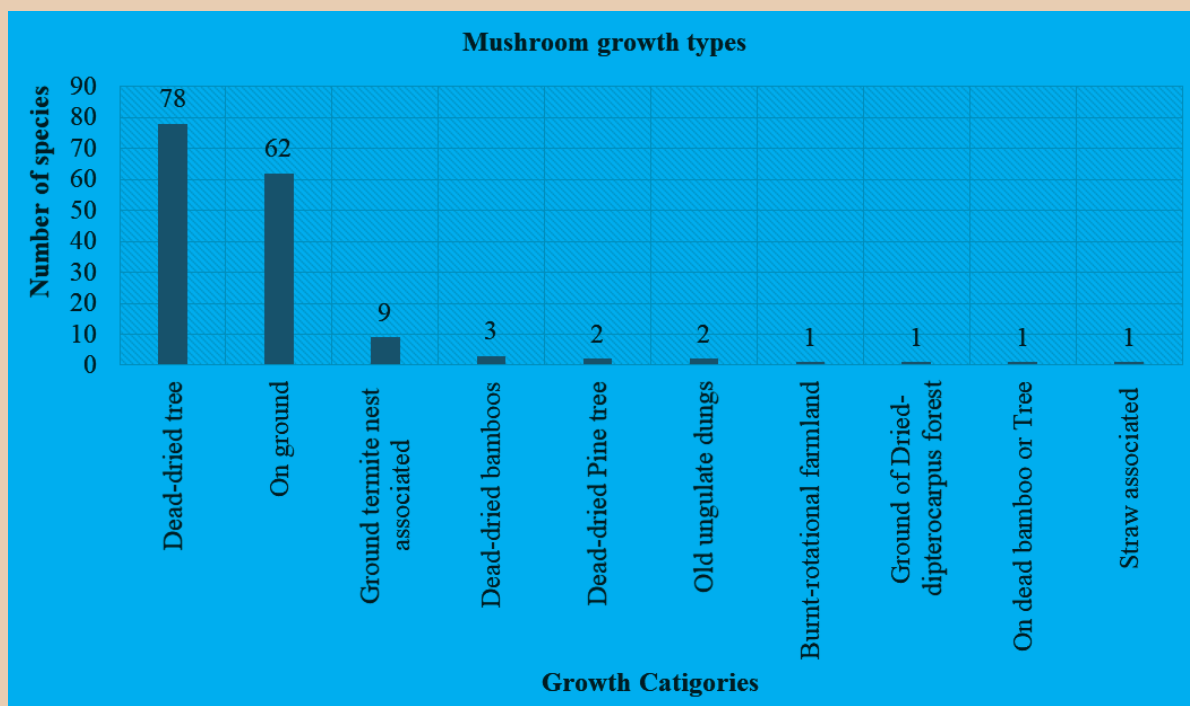


Figure 3. The growth types of recorded mushroom species in the Salween Peace Park.

The grouping of the mushroom types is based on local knowledge and identification methods only. The growth types included grew on dead plants (78) species, on the ground (62), on the ground associated with termite hill (9) species, dead bamboo (3), decayed feces (1) species, ungulate dung (1), burnt pine tree (2) species, after burning farm associated with dead woody vines (1) species, associated with straw (1) specie, associated with dried Dipterocarpus forest types (1) specie, respectively.

The fully detailed description of each mushroom species can be seen in table (1) summarizing each species with its uses and growth types. In the table (1) the local names, common names, scientific names, family names, notes, and some additional descriptions for the locals to understand them better are also included. The research prioritized the traditional Karen Indigenous People's knowledge of wild mushrooms for traditional food, medicine, marketing,

and tools. Some information interpretations could be more complicated and difficult for the western science to understand, but both sources of knowledge are important for all parties. Furthermore, the growth types of mushrooms are described in more detail below. The types of mushrooms grown on the ground are based on field observation and local classification.

However, the findings of 160 species of mushroom were commonly used in five ways. There are 98 species of mushroom used for food, some other 20 species used for traditional medicine, 6 species used for both food and traditional medicine, 21 species not eaten locally, 1 species used for making fire, and the other 14 species use is not known. This can be found in detail in figure (4) below on used types.

How the Indigenous people use each species of mushroom for food, traditional medicine, and tools.

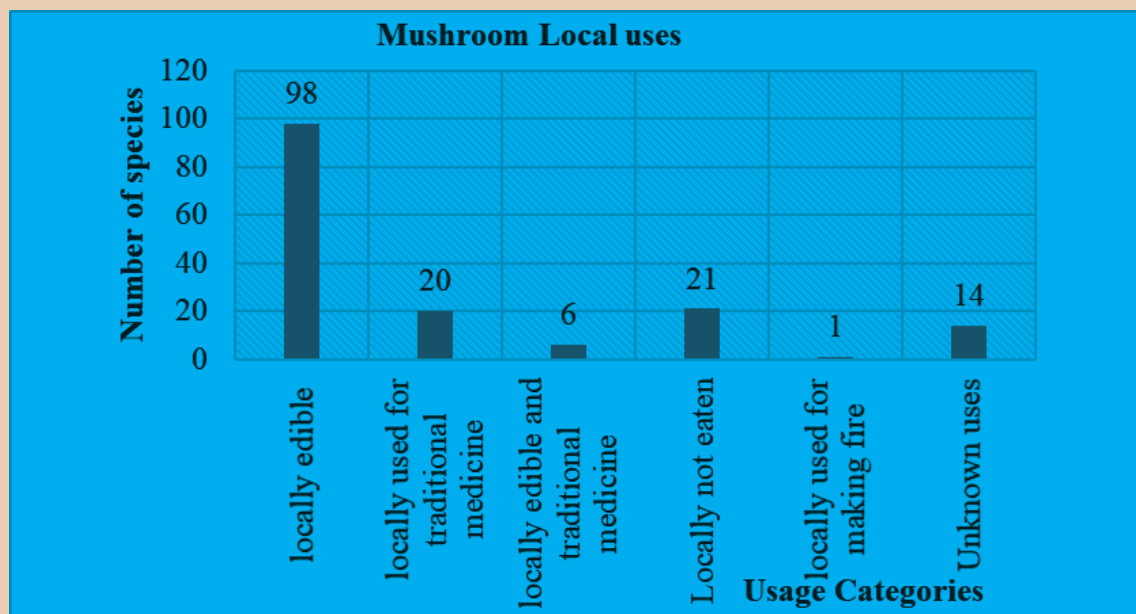


Figure 4. Shows how each species is used by the locals categorized by them as it used types. Based on this figure 3. the most common use of mushroom is for food, with 98 species, followed by 20 species for medicines, 6 species used both as medicine and food and one other species used for making fire, while 21 other species were not used locally and the uses of 14 species were not known by the locals.



Again, it is clearer when we check further information in Table (1) which describes each species in more detail. The mushroom that grows on the ground is locally considered to have many hard to distinguish varieties (toxic mushrooms that are similar to an edible one). This ground growth type is the most dangerous of all types, according to local experts, since it may have a similar appearance to the poisonous types e.g., *Amanita* sp. Some recorded ground mushrooms are a composite of both locally and not locally consumed. However, all kinds of these mushrooms are edible if not local, but in another part of the world, all of these edible mushrooms that may not be consumed in local Karen traditions, but may be consumed in other parts of the world. This can be attributed to varying culinary practices throughout the world.

Some of the species used locally are described below as:

Gū t̄a loo - Chepang slender Caesar (*Amanita chepangiana* Tulloss & Bhandary)

This kind of white-greyish mushroom is locally consumed by those who know them well. It is suggested that they should not be eaten if they are not known well. That is because other poisonous species look similar to the species (Chandrasrikul et al., 2011). Here we also show that one of the similar species that is poisonous, called (*Amanita exitialis*), is very common in the area.

Gū t̄a loo



Gū baw htòh p̄wa - Half-dyed slender Caesar (*Amanita hemibapha* Berk. & Broome)

The kind of yellow mushroom is edible and consumed by local people in the survey areas. However, it is dangerous if collectors lack knowledge of how to identify them well because there are poisonous ones that look similar. It is common in the rainy season from May to September (Mortimer et al., 2014). However, in Kheshorter forest, we could see them until January of some years.

Gū baw htòh p̄wa



Gū t̄a loo a yāw - (*Amanita exitialis*)

This kind of mushroom is similar to the edible variety if collectors do not have enough knowledge to differentiate between them. Therefore, to avoid eating the wrong one, collectors need to be guided by the local mushroom experts. We can observe table (1), for more information.

Gū kòh duh - Grisette (*Amanita vaginata* (Bull.))

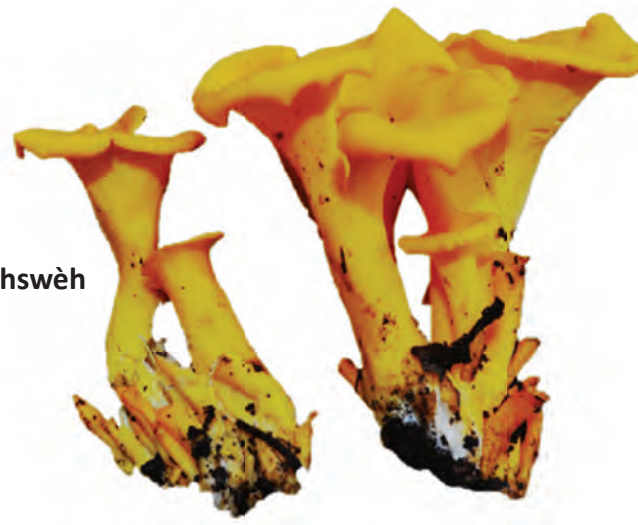
This mushroom with a scale cap is edible locally. It looks similar to other *Amanita* species but is a little more distinct from others because of its scale caps when young (Mortimer et al., 2014).



Gū kòh duh

Gū baw hswèh - Craterellus (*Craterellus odoratus* (Schwein.) Fr.)

This golden mushroom looks similar to golden chanterelle, but it is different in its physical parts because it is thinner and harder in texture. It is consumed locally as it is very common in many forest types, but it is not very popular locally (Mortimer et al., 2014).



Gū baw hswèh



Gū baw bày

Gū baw bày - Golden chanterelle (*Cantharellus cibarius* Fr.)

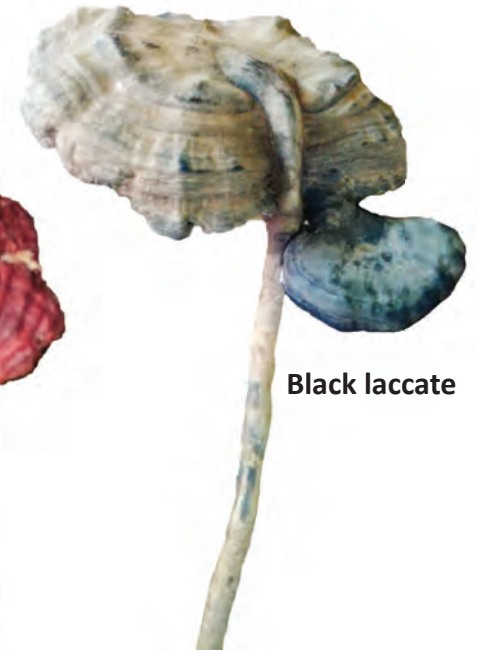
This kind of golden mushroom is found in most of the forest in Salween Peace Park in all types of forest. We had obtained images of this mushroom, but accidentally deleted the photos. It is locally consumed in most villages in Salween Peace Park. We could see this mushroom species in the Thai-Burma border fresh market.

- Gū goh thwä a hkä - Brown laccate (*Amauroderma rude* (Berk.) Torrend)
- Black laccate (*Amauroderma rugosum* (Blume & T. Nees) Torrend)
- Black laccate (*Amauroderma* sp.)
- Reishi (*Ganoderma lucidum* (Curtis) P. Karst)

This kind of mushroom has many varieties, especially with forms and distinct colors. The colors are black stripe brown and red. This kind of mushroom is used for medication purposes, not for food. They are used locally to apply to the wound or drink a small amount to get a better immune system and for diabetes because they are bitter. Lvovskaya S. and Smith P. D. (2013) indicated that bitter mixtures act through an extracellular odorant binding protein to inhibit sweet-responsive neurons and block the response to sweet taste⁹.



Reishi



Black laccate



Brown laccate



Black laccate

- Gū pa hòh baw - Persistent Waxcap (*Hygrocybe acutoconica* (Clem.) Singer)
- Witch's hat (*Hygrocybe conica* (Schaeff.) P. Kumm.)

This kind of mushroom has different colors, from golden, brown to white. They are common during the rainy season in burnt areas. The mushroom is delicious and commonly consumed by the local people in the Salween Peace Park area. This kind of mushroom mostly grows as a clump or colony.



Gū pa hòh baw

⁹ Lvovskaya S. and Smith P. D. (2013). A spoonful of bitter helps the sugar-response go down Svetlana Lvovskaya and Dean P. Smith Departments of Pharmacology and Neuroscience, University of Texas Southwestern Medical Center, 5323 Harry Hines Blvd., Dallas, TX 75390-9111.

Gū thway - Bamboo mushroom (*Phallus indusiatus* Vent.)

This kind of bamboo mushroom species looks like a fishing net, so the Karen people called it a net mushroom. They are not often eaten by the locals since they produce a bad smell. However, some know how to prepare them well for cooking. Also, the mushrooms grow individually, so they are not plentiful enough to cook them for a meal.



Gū thway



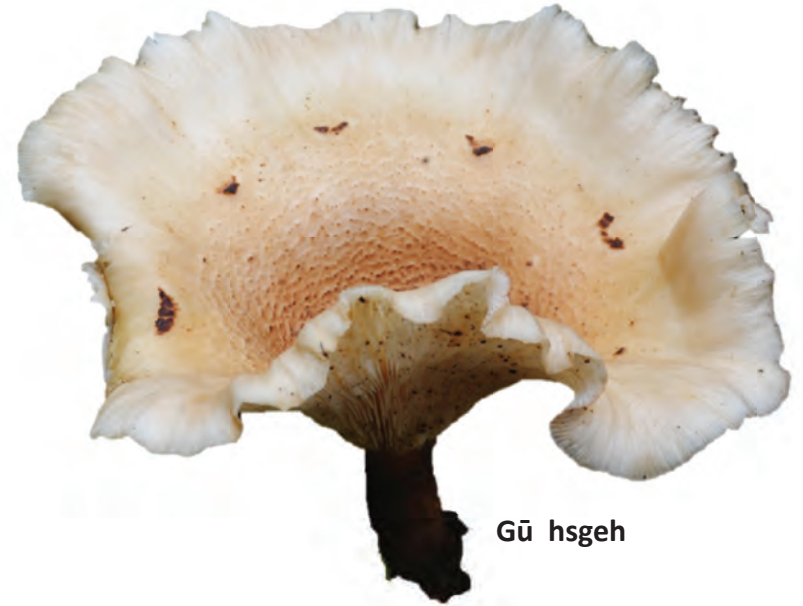
Gū htöh thoh

Gū htöh thoh - Deep root mushroom (*Xerula radicata* (Relhan) Dörfelt)

This kind of mushroom looks like pig fat, so the local people call it pig fat mushroom, as the mushroom looks oily. This is commonly consumed by the local people, but the mushroom grows individually by itself, not as a clump, so it is not enough for a meal. It has good taste and local people like it very much. The mushroom is common during the rainy season, but in rare cases, it is found during winter and summer in virgin forest.

Gū hsgeh - Polyporus (*Lentinus sajor-caju* (Fr.))

This kind of mushroom is very hard to chew but, when included in a soup produces a flavorful broth . Local people make soup, by mixing it with other fruits and vegetables. It is edible only when young.



Gū hsgeh



Gū luh hpaw

Gū luh hpaw - Coral mushroom (*Ramaria sanguinea* (Pers.) Qué.)

This kind of mushroom is delicious and often consumed by the local people. We do not know whether it grows on tree roots of decayed logs, but we often see them growing on soil. This kind of mushroom is common during the rainy season.

Gū nu htee - Indigo milk cap (*Lactarius indigo* (Schwein.) Fr.)

This kind of mushroom with a blue and white color is often found in the deep forest of Salween Peace Park. However, they are not recorded as being eaten by local Karen people in our survey area. In reference books, it indicates that they are eaten by Chinese in some places in China.



Gū nu htee



Weeping milk cap

**Gū hswèh ghāw - Milk-cap (*Lactifluus hygrophoroides* (Berk. & M.A.Curtis) Kuntze),
- Weeping milk cap (*Lactifluus volemus* (Fr.) Kuntze).**

This kind of mushroom is locally called the crab mushroom since its color looks similar to the river crab. This mushroom has different colors, from red, yellow and white, depending on the forest type. The species produces a lot of sap if we tear it or touch it. They are consumed raw most of the time, in making salads.

Gū tha bà hpaw wah - Cauliflower mushroom (*Sparassis brevipes* Krombh.)
- Cauliflower mushroom (*Sparassis spathulata* (Schwein.) Fr.)

This kind of Cauliflower mushroom is different in color, form, and size, but it is locally consumed by the Karen People of Salween Peace Park. It can be seen in many different types of forests, but they are more common in Pinus Forest. They are more abundant in the rainy season.

Gū htöh pwẹ sạ - Cauliflower mushroom (*Sparassis crispa* (Wulfen) Fr.)

This kind of cauliflower mushroom is locally called pig intestine mushroom, which is edible and often consumed by local people. This kind of mushroom is found mostly in virgin forest of hills and evergreen forest. It is very delicious but hard to wash, requiring more time to prepare and cook.

Gū tha bà hpaw wah



Cauliflower mushroom
(*Sparassis spathulata* (Schwein.) Fr.)



Gū htöh pwẹ sạ



Gū hsaaw thwèe - Dead Man's Fingers (*Xylaria polymorpha* (Pers.) Grev.)

This kind of mushroom is not commonly consumed, but known for use as medicine within the local community. When broken, the sap of this mushroom flows and resembles chicken's blood, so it locally is called chicken blood mushroom. It grows in deeper forest and is commonly seen during the rainy season.



Gū hsaaw thwèe



Mushrooms that grow on the ungulate manure

Gū pa nà ày - Slender Parasol (*Macrolepiota gracilentia* (Krombh.))

The local Karen mushroom name is directly translated into English, called buffalo dung mushroom, which is the common name and scientific name for the Slender Parasol (*Macrolepiota gracilentia* (Krombh.)) is a large mushroom species, which grows singly or as a group. Local knowledge considers this mushroom species dangerous to eat if the collector cannot differentiate it from the poisonous variety of the mushroom. This mushroom is often grown on buffalo or cattle dung, and the undercover cap should turn white when applying limestone powder or liquid as a test for toxicity.

Gū pa nà ày a yāw - False Parasol (*Chlorophyllum molybdites*)

The False Parasol (*Chlorophyllum molybdites*) is a mushroom species that looks similar to the Slender Parasol, but they are poisonous to humans. It is vitally important to know this species because it looks very similar to the edible species and grows in similar habitat. If accidentally consumed, induced vomiting as much as possible is advised, because intense vomiting occur after two or three hours of consuming the mushroom. They are differentiated by using the limestone cream to find color changes, because it will turn green if you apply lime stonecream on its under-cap gills.



Gū pa nà ày

Gū thweh lah - Fairy rings (*Lepista sordida* (Schumach.))

This is a purple mushroom that is found in areas of decomposed manure. The mushroom is delicious and it is consumed by local people in the area. They are more common during the early rainy seasons from May to July of the year. This kind of mushroom is safe to consume because there are no similar mushrooms to this one which grows in ungulate dung.

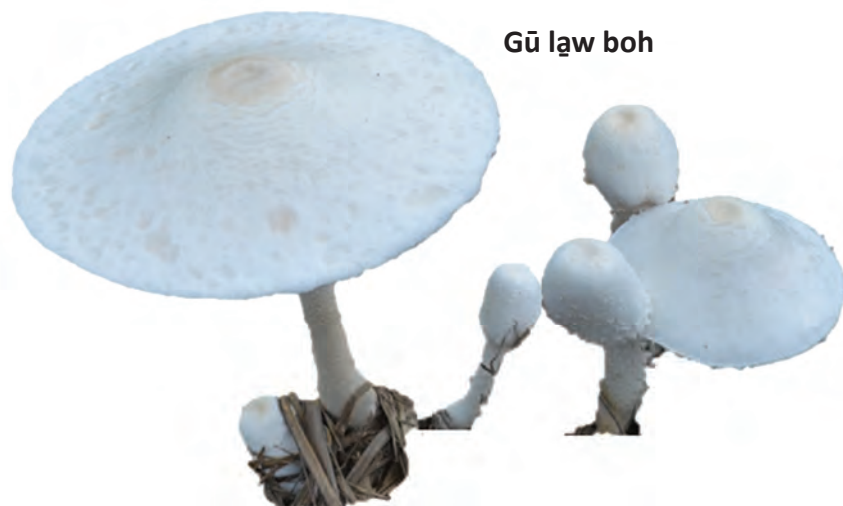
The mushroom that grows on the decayed hay and decomposed grasses

Gū law boh - Straw mushroom (*Volvariella volvacea* (Bull.) Singer)

This straw mushroom is commonly found on decayed straw sites. This kind of mushroom is round like a little ball when young. However, as it grows older, it produces both its cap and its stem. This is an edible mushroom species which is collected most of the time from the paddy field when straw is left to decay. It is commonly found during the rainy season from May to September. There are some other mushroom species which grow in that area, but they may not be safe to consume if they are not well recognized by the local people.



Gū thweh lah



Gū law boh

Mushrooms that grow in proximity to termites

This kind of mushroom, which is considered the most delicious mushroom species, is widely consumed by local villagers in Salween Peace Park. They grow in a variety of forms, shapes, sizes and habitat types. Some of the species grow on the current termite hills or on abandoned termite hills that appear to be normal ground. Also, some grow as a colony of smaller individuals, while single mushrooms may grow bigger in size. This mushroom which grows as a clump colony, is smaller in sizes per individual, while the one that grows as a single individual is bigger in size. These mushroom species include: *Termitomyces clypeatus* Heim, *Termitomyces eurrhizus* (Berk.) R. Heim, *Termitomyces fuliginosus* (R. Heim), *Termitomyces heimii* (Natarajan (1979)), *Termitomyces le-testui* (Pat.) R. Heim (1942), *Termitomyces microcarpus* (Berk. & Broome) R. Heim (1942), *Termitomyces tylerianus* (Otieno), *Termitomyces umkowaan* (Cooke & Masee) D.A. Reid, and others *Termitomyces* spp.

Gū lēh wah - Agaric fungus (*Termitomyces clypeatus* R. Heim)

This kind of mushroom is often found in the termite hills later in the rainy season. This is a species growing on dead termite hills with a smooth cap and is a little thinner than the other species that grow on live termite hills. The cap of the mushroom is pointed, very silky and without rings. The mushroom grows in a clump and is found one or two times per year. It is very delicious and known as a popular food species among local villagers.

Gū blùh - Agaric fungus (*Termitomyces heimii* Natarajan)

This kind of mushroom is locally called termite hill mushroom which is known to grow on termite hills during the rainy season. Sometimes, it grows twice per year, in the early or the late rainy season. However, others grow only at most twice per year. It is recorded that a village which uses rice husk to cover a termite hill for cultural purposes saw this kind of mushroom growing on that termite hill for all 12 months of the year. The local people believed that if a termite hill is covered with rice husks, the termite will grow, and in return, your business will grow. This kind of termite hill mushroom is not smooth, with a small rutted scale cap, while the other mushrooms that are associated with termites' nests have smooth caps. They are widely consumed by the local villagers and easy to collect since they sprout in the same place at almost the same time every year for decades. Local people believe that it sprouts most of the time when a thunderstorm occurs which is then followed by sunlight after rain. It takes weeks to be mature enough to be good for collection.



Gū lēh wah



Gū blùh

Gū htòh hpwëe wah - Agaric fungus (*Termitomyces tylerianus* Otieno)

This kind of mushroom is very popular and therefore is expensive in Thailand's fresh market. The mushroom is associated with old termite hives, but not exactly on termite hills, as it grows on normal ground that has a termite nest underneath. The species has smooth skin with a pointed cap and has no rings. It takes a few days to be mature enough to be collected. The taste is very good either for making soup or deep frying. It grows once or twice annually at its respective sites. The mushroom is white and will grow in the same place for decades. So, if the local people mark the area and the season, they can check them every year to collect the mushrooms.



Gū htòh hpwëe wah

Gū htòh hpwëe thoo - Agaric fungus (*Termitomyces fuliginosus* R. Heim)

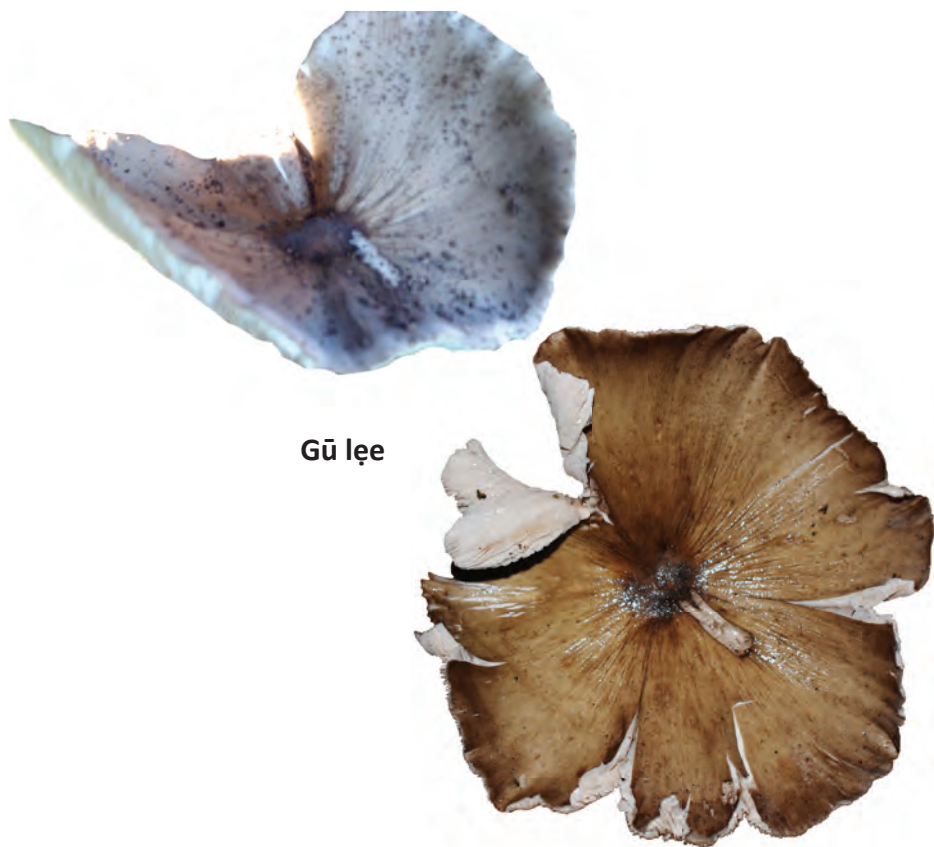
This termitomyces mushroom species is similar to the other agaric fungus mentioned in the previous entry, but is slightly different in color. The color is darker, and it grows later in the rainy season around September. It only takes at most a week to be mature enough to be collected. The cap is smooth and silky with a grey or dark color and has no rings. The mushroom grows as a clump, but sometimes it can be seen growing individually. It is very delicious, and local people share it with one another all the time. In Thailand they are expensive, but are always shared freely in Salween Peace Park.



Gū htòh hpwëe thoo

Gū lẹe - Agaric fungus (*Termitomyces eurhizus* (Berk.) R. Heim)

This kind of termitomyces mushroom is rare because it grows as an individual but is bigger than the those growing in clumps. It is locally called eagle fungus, where the cap looks like the eagle's head and the body looks like the eagle's wings. It grows later in the rainy season, around September, when rain is decreasing. It is also associated with termite nests, particularly abandoned termite nests. This is a very delicious mushroom which is widely consumed by local villagers. Since they are not found in clumps and are less in numbers at growth sites, they are rarely shared by the community.



Gū lẹe

Gū gā bee hsoo - Agaric fungus (*Macrolepiota albuminosa* (Berk.) Pegler)

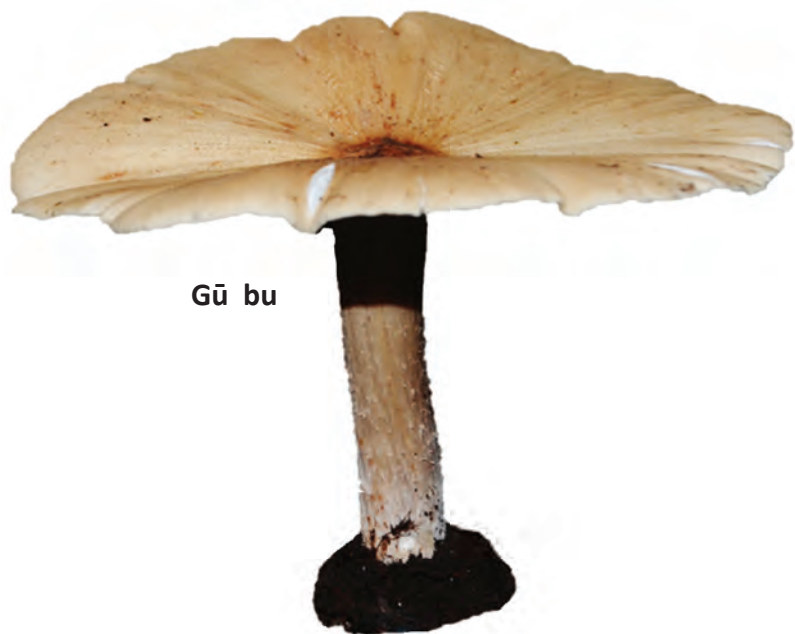
This kind of mushroom is very big and weighs up to one kg. However, they are very rare. It grows as a single individual associated with the termite nest underneath. The cap flips over backwards and covers the tip of the cap. It is a very delicious mushroom, but is not commonly shared with others since they are very rare. The mushroom grows in the late rainy season between September to November. The root and stem of this mushroom are large and it is associated with termite nests.



Gū gā bee hsoo

Gū bu - Agaric fungus (*Termitomyces le-testui* (Pat.) R. Heim)

This kind of mushroom is also big, but the stem is slim and the cap is thin and broad. It grows as a single individual during the mid-rainy season around August to early September of the year. This is a very delicious mushroom species but quite rare, so sharing with other villagers is considered uncommon. It is similar to other termite nest mushroom species, with a broad smooth cap, slimmer roots, which can take up to a week to be mature enough to be harvested.



Gū bu

Gū yōh - Agaric fungus (*Termitomyces umkowaan* (Cooke & Masee) D.A. Reid)

This kind of termitomyces fungus is found during the rainy season. It grows from July to September of the year. The cap tears into many parts as it grows older, and the root is big and round like an egg shape when it meets the soil. This is a very delicious mushroom which is very common during its season. It has a smooth cap and is found growing as a single individual. They are shared between communities, but there is no record that they are sold within the communities.



Gū yōh

Gū beh klee - Agaric fungus (*Termitomyces microcarpus* (Berk & Broome) R. Heim)

This is the smallest termitomyces mushroom species which is very common during the rainy season. It grows as a clump which is associated with termite nests, but they are too small to collect enough for a meal. On rare occasions, the local people collect them to cook with other vegetation. They are an edible mushroom species, but the communities do not pick them or share with one another.



Gū beh klee

Mushrooms that are found in the decay of dead bamboos

This kind of mushroom is commonly seen growing on dead bamboos or decayed bamboos. It might grow on other dead plants, but we call them bamboo mushrooms because they are often found growing on them.

Gū wà kòh - Oyster mushroom (*Pleurotus concavus* (Berk.) Singer)

This kind of mushroom is called bamboo trunk mushroom because it often grows on dead bamboo roots. It may also grow on dead wood, but in our survey area, it is often collected from dead bamboo clumps. This kind of mushroom is edible and most similar species are edible.



Gū wà kòh

Gū pa nā meh -

Ochre Bracket (*Trametes ochracea* (Pers.) Gilb. & Ryvarden)

This kind of mushroom is often seen on decayed bamboo stems. It looks like buffalo teeth, so it is called in Karen bamboo buffaloes tooth mushroom. The mushroom grows mostly in the early rainy season to the late rainy season, particularly on dead bamboo. It is a tough mushroom, but after cooking, it tastes like dried meat or jerky. It is widely consumed by the local people and shared among the local villagers at Salween Peace Park.

Gū pa nā meh



Gū klēe tẹ hpā dōh - Giant oyster mushroom (*Pleurotus giganteus* (Berk. Karun & Hyde))

This kind of mushroom is also found in bamboo forests. It grows mostly on the ground where the decayed bamboo or bamboo roots are located. This mushroom is widely consumed by the local people and shared between villagers within the Salween Peace Park. It is found mostly during the rainy season but is more in abundance in the later rainy season in August and September of the year. The shape looks like wine glasses with a grey to white color.

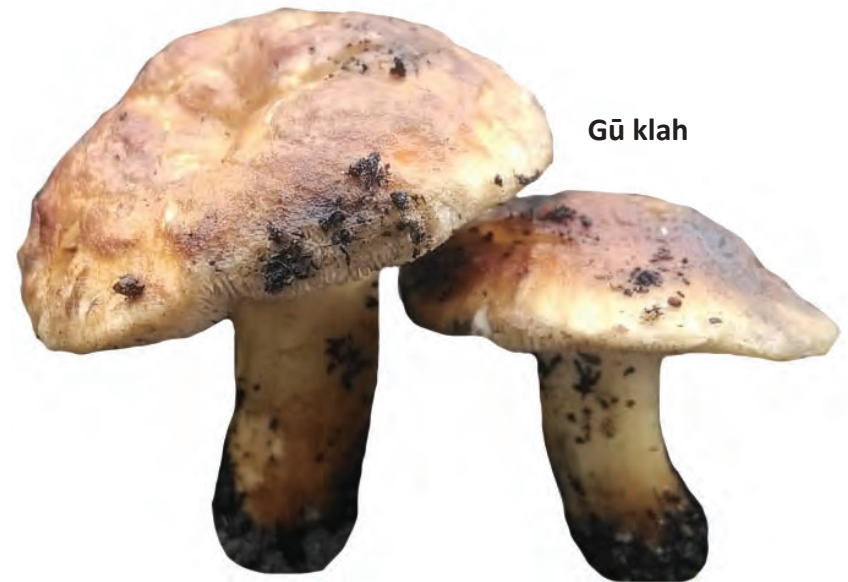


Gū klēe tẹ hpā dōh

Mushroom that grows on the burnt rotational farmland within a month

Gū klah - *Tricholoma (Tricholoma ustaloides Romagn.)*

This kind of mushroom is only grown in the burning site of a rotational farming area of Salween Peace Park. The mushroom often grows in a couple of days after the farming site burns or after the rain hits the burnt site. The Karen people, called Ku Klie, means (Mushroom of silt from plant debris). Many local people said this kind of mushroom is associated with woody vines that decay and are found only on the ground not on the tree. However, the mushroom is widely eaten by the local people and shared within communities. This is a unique mushroom species and only found in the early rainy season around May-June of the year. The size of the mushroom cap can be from 1-8 cm. It has many different colors, whereas the most common one is the brown color.



Gū klah

Mushrooms which grow on decayed plants

Common mushrooms are found on dead plants. This kind of mushroom growth is associated with dead plants. This variety is widely consumed by the local villagers of Salween Peace Park. They are found mostly near or on dead bamboos, dead woody vines, dead trees and dead palms.

Gū hsaw mēe - Hen-of-the-woods (*Grifola frondosa* (Dicks.) Gray (1821))

This kind of mushroom is found in the higher elevation of forested areas in Salween Peace Park. It is often seen in the oak forest and Pinus Forest in the late rainy season.

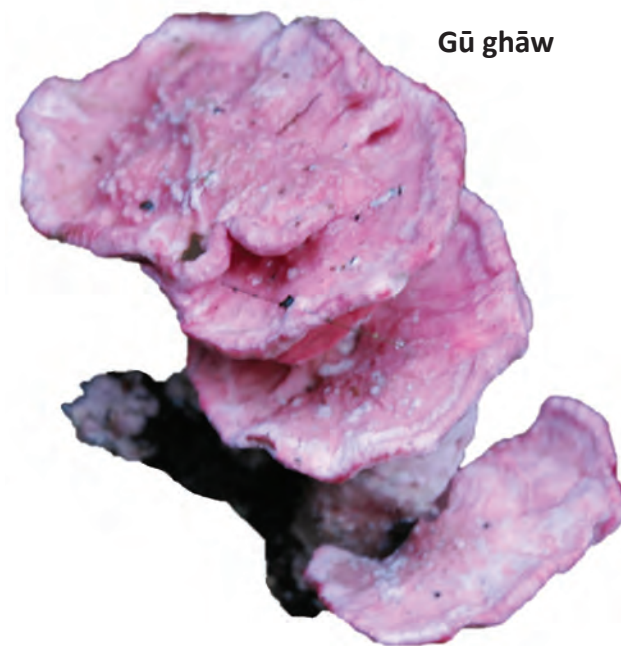
The mushroom grows mostly on dead plant or dead plant roots close to the ground or at the ground level. It is widely consumed by the local people and shared between communities. However, it is rare and prefers primary Pinus Forest and montane forests.



Gū hsaw mēe

Gū ghāw - Coral-pink merulius (*Phlebia incarnata* (Schwein.) Nakasone & Burds. (1984))

This pink mushroom is found mostly on dead trees and dead bamboo trees. They are not eaten as food but often consumed for medication purposes. They are mixed with honey and used for treating worm infestations. They are commonly used by the community members and shared within community members for traditional medicinal purposes.



Gū ghāw

Gū thày kòh wah - White beech mushroom (*Hypsizygus marmoreus* (Peck) H.E. Bigelow)

This kind of mushroom grows on dead trees or dead tree's roots. It grows during the rainy season, but September is the month that it is commonly found in the forest. It can be found in different forest types and states. It is widely consumed by the local people and shared between local communities. The species grows as clump colonies almost in the same spot. The color of the mushroom is white, but sometimes the color grows brown as they get older.



Gū thày kòh wah

Gū thày kòh - Winter mushroom (*Flammulina velutipes* P. Karst.)

This kind of mushroom is also found on dead trees and dead woody vines. They are commonly found growing in oak and Pinus Forest types. It grows during the rainy season but is more common during September. The color can be white or brown, but the growing site comes in the same areas as a clump colony. They are a soft and delicious mushroom species which is consumed and shared by the local communities.



Gū thày kòh

Gū klēe tẹ baw - Golden oyster (*Pleurotus citrinopileatus* Singer)

- Oyster (*Pleurotus cystidiosus* O.K. Mill)

- Grey Oyster (*Pleurotus pulmonarius* (Fr.) Quél.)

This kind of oyster mushroom can be different in sizes, color and forms. The species is commonly found during the rainy season on dead trees, dead bamboos and dead palms. They have been widely consumed by the local people and shared among the local communities for generations. They are a very common mushroom species which can be found any time during the rainy season. However, in some places with thicker and wet forest they can be seen year-round.



Gū klēe tẹ baw



Grey Oyster



Oyster

Gū dāy hpwaw hsò - Polyporales (*Lentinus arcularius* (Batsch) Zmitr.)

- Polyporales (*Lentinus concavus* (Berk.) Corner)

- Polyporus (*Lentinus polychrous* Lév)

- Polyporus (*Lentinus squarrosulus* Mont.)

This kind of Polyporales mushroom has many varieties of sizes, colors, shapes and forms. The growing season can vary from species to species, but the environmental factor is another issue for this mushroom to grow in each season. It is common in the rainy season but absent or rarely seen in winter and summer. In a deeper forest, we see them grow year-round. They are popular and widely consumed by local people and shared between community members. However, some of the species are soft, while some are very hard to eat. It depends on the species, because some of them grow as a clump colony, while some grow as a single individual.



Polyporus (*Lentinus squarrosulus* Mont.)



Gū dāy hpwaw hsò



Polyporus (*Lentinus polychrous* Lév)



Polyporales (*Lentinus concavus* (Berk.) Corner)

Gū gwēh hpoh - Cauliflower mushroom (*Sparassis radicata* Weir)

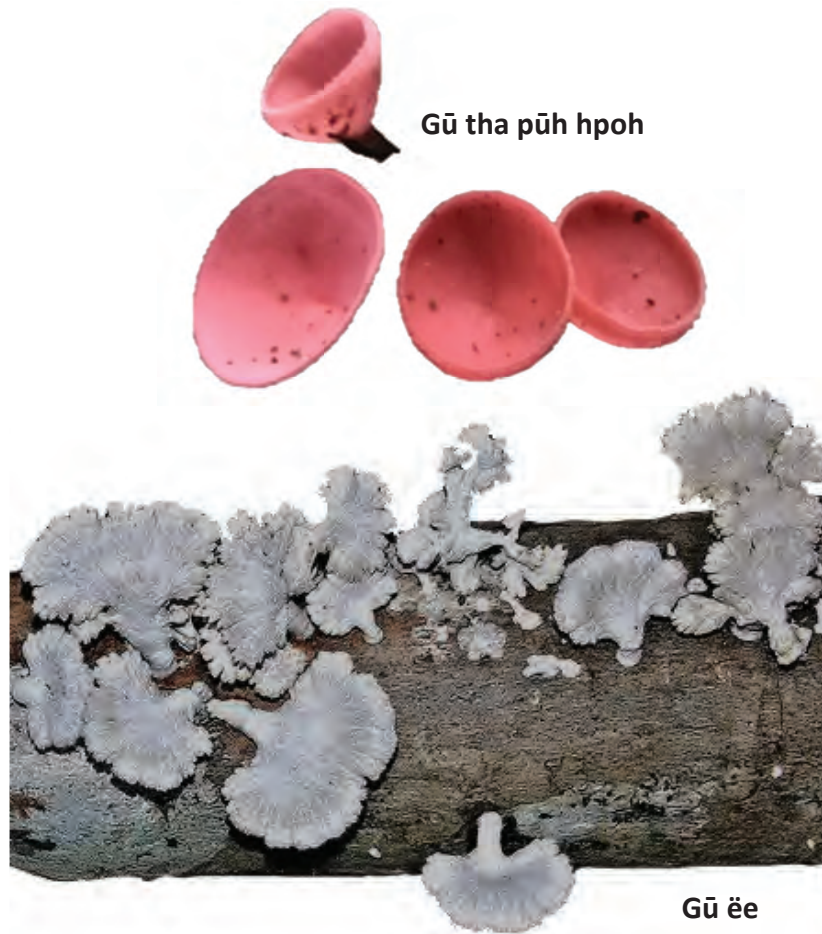
This kind of mushroom grows in different kinds of forests when the forest is in better condition. It is found as a colony on dead tree roots. They are widely consumed by the local people and shared between the community members. The problem with this mushroom species is that it is difficult to wash as it contains some soil particles within it, so they are not a favorite species to collect. It grows during the rainy season in a deeper forest of higher elevation.



Gū gwēh hpoh

Gū ēe - Loose Chinese fan (*Schizophyllum commune* Fries)

This is a small mushroom species but very popular within Karen communities in Salween Peace Park. The mushroom grows year-round, but they are bigger and softer during the rainy season. It takes a long time to collect enough for a meal, but where there is no other food available, collecting this mushroom is the final choice. The taste of the mushroom is similar to dried meat, which is very delicious. The sporocarp of this fan-shaped mushroom is up to 3 cm and grows on all kinds of dead plants.



Gū tha pūh hpoh

Gū ēe

Gū hsò wah - Oyster (*Pleurocollybia imbricata* T.J.Baroni, Lodge & D.L.Lindner)

- Trogia (*Trogia infundibuliformis* Berk. & Broome)

- Little white mushroom (*Trogia venenata* Zhu L. Yang)

This kind of little and hard-textured mushroom grows on all kinds of dead plants during the rainy season but is sometimes found in all seasons. The mushroom is delicious, but hard to chew. Most of the time the villages make soup of this mushroom if they are old, but prefer them when they are young. There are no poisonous species similar to this mushroom, so it is safe to consume them.

Gū hsò wah



Trogia



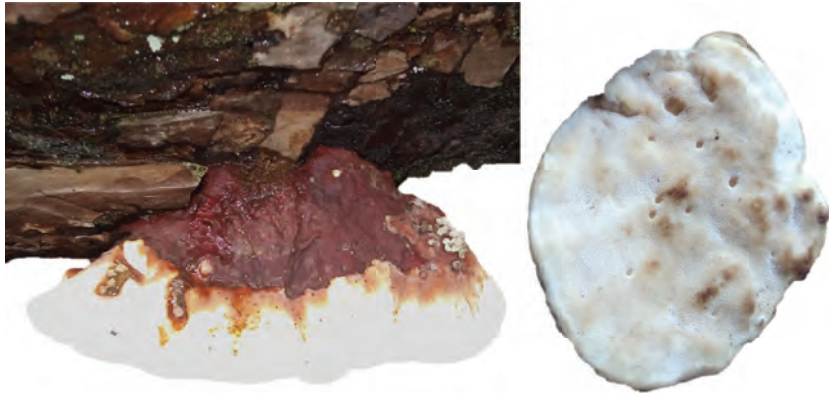
Little white mushroom



Mushrooms that grow on dead or burnt pine trees

Gū heh - Stem decay fungus (*Fomitopsis pinicola* (Sw.) P. Karst)

This kind of stem decay fungus species is widely consumed by the local people as it has a distinct taste and hard texture. The taste of the mushroom is similar to ginger and chili, so it is called spicy mushroom. When cut into small pieces, it is delicious and widely shared between communities. They are also used medicinally to control coughing and body pain. The mushroom grows only on the dead pine during the late rainy season to early winter of the year.



Gū heh

Gū hsōhoh kà - Veiled polypore (*Cryptoporus volvatus* (Peck) Shear)

This veiled polypore mushroom is a species often found on dead pine trees. The taste of the mushroom is bitter when first tasted, but if you drink water after tasting it, the water will taste very sweet. So, this mushroom is used for salad with other vegetables. They are never used to cook or fry. The local people also use them as traditional medicine for different kinds of diseases such as the common cold and other diseases. It is found during the rainy season and winter of the year.



Gū hsōhoh kà

Mushroom that are used as tool

Gū thwèh lä - King Alfred's cake (*Daldinia concentrica* (Bolton))

The Karen ancestors used many different kinds of mushroom species as tools and materials but this knowledge today is disappearing. This kind of mushroom, King Alfred's cake mushroom, is used to light the fire during the rainy season. It is so hard to make a fire during the rainy season in the woods because the woods are soaked with water, so they need to use this mushroom to make the fire. It burns slowly and finally makes a fire. They were widely used by the communities in the old days, but since we are in modern times with access to petrol and diesel, we rarely use this mushroom for making fire. Again, there are also other mushroom species that our ancestors used during the nighttime to see objects. In the old days, for example, the Karen Indigenous People used bioluminescent fungi to see things when traveling during the night or doing things at night.



Mushroom richness table

To understand more about the richness of the mushroom, its scientific name, and its usefulness within this Salween Peace Park by the local people, the following table (1) will indicate most of the important information about the mushroom. It also helps us understand more about where and when the mushrooms can be collected, including the identification method of edible and non-edible species using traditional ways. Again, it will also show us more about how to avoid unknown species.



Habitat	Family Names	Common Name	Scientific Names	Local use
Dead-dried tree	Meruliaceae	Blushing Rosette	<i>Abortiporus biennis</i> (Bull. ex Fr.) Singer	locally edible after cooked
On ground	Amanitaceae	Chefang slender Caesar	<i>Amanita chefangiana</i> Tulloss & Bhandary	locally edible after cooked, but consumption is generally not recommended if they are not known well
On ground	Amanitaceae	Half-dyed slender Caesar	<i>Amanita hemibapha</i> (Berk. & Broome) Sacc.	locally edible after cooked, but consumption is generally not recommended if they are not known well
On ground	Amanitaceae	Head Man Slender Caes	<i>Amanita Muscaria</i> var. <i>alba</i>	locally edible after cooked
On ground	Pluteaceae	Panther Cap	<i>Amanita pantherina</i> (DC. ex Fr.) Krombh.	Locally not eaten, poisonous
On ground	Pluteaceae	Purple-brown amanita	<i>Amanita porphyria</i> (Alb. & Schweinitz ex Fr.)	Locally not eaten
On ground	Amanitaceae	Grisette	<i>Amanita vaginata</i> (Bull.)	locally edible after cooked
On ground	Ganodermataceae	Brown laccate	<i>Amauroderma rude</i> (Berk.) Torrend	Locally used for medicine mostly for diabetic, and to boost immune system

Habitat	Family Names	Common Name	Scientific Names	Local use
On ground	Ganodermataceae	Black laccate	<i>Amauroderma rugosum</i> (Blume & T. Nees) Torrend	locally used for medicine, mostly for diabetics, and to boost immune system
On ground	Ganodermataceae	Laccate	<i>Amauroderma</i> sp.	locally used for medicine, mostly for diabetics, and to boost immune system
On ground	Phallaceae	Anemone stinkhorn	<i>Aseroe arachnoidea</i> E. Fisch.	Locally not eaten
On ground	Phallaceae	Anemone stinkhorn	<i>Aseroe rubra</i> Labill., 1800	Locally not eaten
Ground of Dried-Dipterocarpus Forest	Diplocystaceae	Hygroscopic earthstar	<i>Astraeus hygrometricus</i> (Pers.) Morgan (1889)	Locally edible after cooked; the species is commercially important
Dead-dried tree	Auriculariaceae	Jew's Ear	<i>Auricularia auricula-judae</i> (Bull.) J. Schröt.	locally edible raw, or after cooked,
Dead-dried tree	Auriculariaceae	Jelly Fungi	<i>Auricularia mesenterica</i> (Dicks.) Pers	locally edible raw, or after cooked,
Dead-dried tree	Auriculariaceae	Cloud ear fungus	<i>Auricularia polytricha</i> (Mont.) Sacc.	locally edible raw, or after cooked,
On ground	Boletaceae	Shaggy cap	<i>Boletellus emodensis</i> (Berk.) Singer	Unknown
On ground	Boletaceae	King Bolete	<i>Boletus edulis</i> Bull. (1782)	Unknown
On ground	Sclerodermataceae	Gasteroid fungus	<i>Calostoma fuscum</i> (Berk.) Mass	Unknown
On ground	Clavariaceae	Yellow club fungus	<i>Clavaria miniata</i> Berk.	locally used for medicine
Dead-dried tree	Clavariaceae	Coral fungus	<i>Clavulina cristata</i> (Holmskjöld: Fr.)	locally edible after cooked
On ground	Phanerochaetaceae	Tooth fungi	<i>Climacodon roseomaculatus</i> (Henn. & E. Nyman) Jülich (1982)	locally used for medicine
On ground	Tricholomataceae	Collybia	<i>Collybia cookei</i> (Bres.) J.D. Arnold (1935)	Unknown
Dead-dried tree	Sarcoscyphaceae	Cup fungi	<i>Cookeina sulcipes</i> (Berk.) Kuntze	locally edible after cooked
On ground	Cantharellaceae	Craterellus	<i>Craterellus odoratus</i> (Schwein.) Fr.	locally edible after cooked
Dead-dried tree	Inocybaceae	Peeling oysterling	<i>Crepidotus mollis</i> (Schaeff.) Staude	locally edible after cooked

Habitat	Family Names	Common Name	Scientific Names	Local use
Dead-dried Pine tree	Polyporaceae	Veiled polypore	<i>Cryptoporus volvatus</i> (Peck) Shear.	locally edible as raw for salad, grills, or used for medicine including respiratory infections
Dead-dried tree	Meruliaceae	Poroid fungi	<i>Cymatoderma dendriticum</i>	locally edible after cooked
Dead-dried tree	Meruliaceae	Poroid fungi	<i>Cymatoderma elegans</i> Jungh. 1840	locally edible after cooked and also used for traditional medicine
Dead-dried tree	Dacrymycetaceae	Jelly fungus	<i>Dacrymyces stillatus</i> Nees ex Fr.	locally edible after cooked and eating them raw is fine too
Dead-dried tree	Dacrymycetaceae	Jelly fungus	<i>Dacryopinax spathularia</i> (Schwein.) G.W. Martin	locally edible after cooked
Dead-dried tree	Hypoxylaceae	King Alfred's cake	<i>Daldinia concentrica</i> (Bolton) Cesati & de Notaris	locally used for making fire
On ground	Lachnocladiaceae		<i>Dichantharellus brunnescens</i> .	Unknown
Dead-dried tree	Polyporaceae	Favolus	<i>Favolus tenuiculus</i> P. Beauv.	locally edible after cooked or grilled them
Dead-dried tree	Tricholomataceae		<i>Filoboletus manipularis</i> (Berk.) Sing.	Unknown
Dead-dried tree	Physalacriaceae	Winter mushroom	<i>Flammulina velutipes</i> P. Karst.	locally edible after cooked
Dead-dried tree	Polyporaceae	Tinder fungus	<i>Fomes fomentarius</i> (L.) Fr. 1849	locally used for medicine
Dead-dried tree	Fomitopsidaceae	Birch bracket	<i>Fomitopsis betulina</i> (Bull.) B.K. Cui	locally used for medicine
Dead-dried Pine tree	Fomitopsidaceae	Stem decay fungus	<i>Fomitopsis pinicola</i> (Sw.) P. Karst	locally edible after cooked and also used for traditional medicine
Dead-dried tree	Ganodermataceae		<i>Ganoderma applanatum</i> (Pers.) Pat.	locally used for medicine
On ground	Ganodermataceae	Reishi	<i>Ganoderma lucidum</i> (Curtis) P. Karst	locally used for medicine mostly for diabetic, and to boost immune system
Dead-dried tree	Ganodermataceae	Reishi	<i>Ganoderma sessile</i> polyps	locally used for medicine

Habitat	Family Names	Common Name	Scientific Names	Local use
On ground	Ganodermataceae	Black Reishi	<i>Ganoderma sinense</i> (J.D. Zhao, L.W. Hsu & X.Q. Zhang, Acta Microbiol. Sin. 19(3): 272 (1979))	locally used for medicine mostly for diabetic, and to boost immune system
On ground	Gomphaceae	woolly chanterelle	<i>Gomphus floccosus</i> (Schwein.) Singer	Locally not eaten
Dead-dried tree	Meripilaceae	Hen-of-the-woods	<i>Grifola frondosa</i> (Dicks.) Gray (1821)	Locally not eaten
On ground	Boletaceae	Red liver cow	<i>Heimioporus japonicus</i> (Hongo) E. Horak	Locally not eaten
Dead-dried tree	Pleurotaceae	Leaflike oyster	<i>Hohenbuehelia petaloides</i> (Bull. ex Fr.) Schulz.	locally edible after cooked
On ground	Hygrophoraceae	Persistent Waxcap	<i>Hygrocybe acutoconica</i> (Clem.) Singer	locally edible after cooked
On ground	Hygrophoraceae	Bog waxcap	<i>Hygrocybe coccineocrenata</i> (P.D. Orton) M.M. Moser	Locally not eaten
On ground	Hygrophoraceae	Witch's hat	<i>Hygrocybe conica</i> (Schaeff.) P.Kumm. (1871)	locally edible after cooked
On ground	Hymenochaetaceae	Ivory Woodwax	<i>Hygrophorus eburneus</i> (Bull.) Fr.	Locally not eaten
On ground	Physalacriaceae	deep root mushroom	<i>Hymenopellis radicata</i> (Relhan) Dörfelt	Locally not eaten
On ground	Strophariaceae	Sulphur tuft	<i>Hypholoma fasciculare</i> (Huds.: Fr.) P. Kumm. (1871)	Unknown
Dead-dried tree	Lyophyllaceae	White beech mushroom	<i>Hypsizygus marmoreus</i> (Peck) H.E. Bigelow	locally edible after cooked
On ground	Hydnangiaceae	Amethyst deceiver	<i>Laccaria laccata</i> var. <i>amethystina</i> (Cooke) Rea	locally edible after cooked
On ground	Russulaceae		<i>Lactarius affinis</i> var. <i>viridilactis</i>	locally edible after cooked
On ground	Russulaceae	Indigo milk cap	<i>Lactarius indigo</i> (Schwein.)	locally edible after cooked

Habitat	Family Names	Common Name	Scientific Names	Local use
On ground	Russulaceae	Peppery Milkcap	<i>Lactarius piperatus</i> (Fr.) S. F. Gray	locally edible after cooked
On ground	Russulaceae	Milk-cap	<i>Lactifluus hygrophoroides</i> (Berk. & M.A. Curtis) Kuntze (1891)	locally edible after cooked and eating them raw is fine too
On ground	Russulaceae	Weeping milk cap	<i>Lactifluus volemus</i> (Fr.) Kuntze	locally edible after cooked and eating them raw is fine too
Dead-dried tree	Polyporaceae		<i>Laetiporus cincinnatus</i> (Morgan) Burds., Banik & T.J.Volk (1998)	locally edible after cooked
Dead-dried tree	Polyporaceae	Crab-of-the-woods	<i>Laetiporus sulphureus</i> (Bull.) Murrill	locally edible after cooked and also used for traditional medicine
Dead-dried tree	Omphalotaceae	Shiitake/woodbridge	<i>Lentinula edodes</i> (Berk.) Pegler (1976)	locally edible after cooked and also used for traditional medicine
Dead-dried tree	Polyporaceae	Polyporales	<i>Lentinus arcularius</i> (Batsch) Zmitr., 2010	locally used for medicine
Dead-dried tree	Polyporaceae	Polyporales	<i>Lentinus cf. squarrosulus</i>	locally edible after cooked
Dead-dried tree	Polyporaceae	Polyporales	<i>Lentinus concavus</i> (Berk.) Corner	locally edible after cooked
Dead-dried tree	Polyporaceae	Polyporales	<i>Lentinus connatus</i> Berk.	locally edible after cooked
Dead-dried tree	Polyporaceae	Polyporales	<i>Lentinus fasciatus</i> Berk.	locally edible after cooked
Dead-dried tree	Polyporaceae	Polyporus	<i>Lentinus polychrous</i> Lév	locally edible after cooked and eating them raw is fine
Dead-dried tree	Polyporaceae	Polyporus	<i>Lentinus sajor-caju</i> (Fr.) Fr.	locally edible after cooked or grilled them
Dead-dried tree	Polyporaceae	Polyporus	<i>Lentinus</i> sp.	locally edible after cooked
Dead-dried tree	Polyporaceae	Polyporus	<i>Lentinus squarrosulus</i> Mont	locally edible raw, grill and cooked

Habitat	Family Names	Common Name	Scientific Names	Local use
Dead-dried tree	Polyporaceae	Polyporus	<i>Lentinus strigosus</i> (Schwein.)	locally edible after cooked
Dead-dried tree	Polyporaceae	Polyporus	<i>Lentinus swartzii</i> Berk. (1843)	locally edible after cooked
Dead-dried tree	Polyporaceae	Polyporus	<i>Lentinus tigrinus</i> (Bull.) Fr. (1825)	locally edible after cooked
Dead-dried tree	Polyporaceae	Wood-decay fungus	<i>Lenzites elegans</i> (Fr.) Pat.	locally edible after cooked
Dead-dried tree	Tricholomataceae	Fairy rings	<i>Lepista sordida</i> (Schumach.)	locally edible after cooked
On ground	Tricholomataceae	Giant leucopax	<i>Leucopaxillus giganteus</i> (Sowerby) Singer	Locally not eaten
On ground	Squamanitaceae		<i>Leucopholiota decorosa</i> (Peck)	Unknown
Dead-dried tree	Tricholomataceae	Decorated pholiota	<i>Leucopholiota</i> sp.	locally edible after cooked
Dead-dried tree	Lyophyllaceae	Hon-shimeji	<i>Lyophyllum shimeji</i> (Kawam.)	locally edible after cooked
Ground termite nest associated	Lyophyllaceae	Agaric fungus	<i>Macrolepiota albuminosa</i> (Berk.)	locally edible after cooked
Old ungulate dungs	Agaricaceae	Slender Parasol	<i>Macrolepiota gracilentata</i> (Krombh.) Wasser	locally edible after cooked
Dead-dried tree	Marasmiaceae		<i>Micromphale foetidum</i> (Sow.) Sing	Unknown
Dead-dried tree	Polyporaceae	May black	<i>Microporus affinis</i> (Blume & T.Nees)	locally used for medicine
Dead-dried tree	Hymenochaetaceae (Polyporaceae)		<i>Microporus xanthopus</i> (Fr.) Kuntze	locally used for medicine
On ground	Agaricaceae		<i>Micropsalliota megarubescens</i> R.L. Zhao, Desjardin, K.	Unknown
On ground	Phallaceae	Dog Penis	<i>Mutinus bambusinus</i> (Zoll.) Fisch.	locally used for medicine

Habitat	Family Names	Common Name	Scientific Names	Local use
On ground	Boletaceae		<i>Mycoamaranthus cambodgensis</i> (Pat.)	Locally not eaten
Dead-dried tree	Polyporaceae		<i>Oligoporus farinosus</i> Bref. (1888)	Locally not eaten
Dead-dried tree	Physalacriaceae		<i>Oudemansiella canarii</i> (Jungh.) Höhn	Unknown
Dead-dried tree	Polyporaceae	Polyporus	<i>Panus conchatus</i> (Bull.) Fr.	locally edible after cooked
On ground	Phallaceae	Bamboo mushroom	<i>Phallus indusiatus</i> Vent. (1798)	locally edible after cooked and also used for traditional medicine
Dead-dried tree	Hymenochaetaceae	Willow Bracket	<i>Phellinus igniarius</i> (L.) Quél. (1886)	locally used for medicine
Dead-dried tree	Hymenochaetaceae	Cushion Bracket	<i>Phellinus pomaceus</i> (Pers.) Maire	locally used for medicine
Dead-dried tree	Hymenochaetaceae	Cushion Bracket	<i>Phellinus</i> sp.	locally used for medicine
Dead-dried tree	Meruliaceae	Coral-pink merulius	<i>Phlebia incarnata</i> (Schwein.) Nakasone & Burds. (1984)	locally used for medicine to treat worm infection
On ground	Boletinellaceae	Gigantic Phlebopus	<i>Phlebopus colossus</i> (R. Heim) Singer)	locally edible after cooked
Dead-dried tree	Tricholomataceae	Oyster	<i>Pleurocollybia imbricata</i> (DED 8232)	locally edible after cooked
Dead-dried tree	Pleurotaceae	Golden oyster	<i>Pleurotus citrinopileatus</i> (Singer)	locally edible after cooked
Dead-dried bamboos	Inocybaceae	Bamboo Oyster mushroom	<i>Pleurotus concavus</i> (Berk.) Singer, 1955	locally edible after cooked
Dead-dried tree	Pleurotaceae	Branching Oyster	<i>Pleurotus cornucopiae</i> (Paulet & Pers.) Rolland	locally edible after cooked
Dead-dried tree	Pleurotaceae	Grey Oyster	<i>Pleurotus cystidiosus</i> O.K. Mill	locally edible after cooked

Habitat	Family Names	Common Name	Scientific Names	Local use
Dead-dried bamboos	Pleurotaceae	Giant oyster mushroom	<i>Pleurotus giganteus</i> (Berk. Karun & Hyde)	locally edible after cooked
Dead-dried tree	Pleurotaceae	Hiratake	<i>Pleurotus ostreatus</i> (Jacq. ex Fr.) P. Kumm. (1871)	locally edible after cooked
Dead-dried tree	Pleurotaceae	Aspen oyster mushroom	<i>Pleurotus populinus</i> O. Hilber & O.K. Mill. (1993)	locally edible after cooked
Dead-dried tree	Pleurotaceae	Grey Oyster	<i>Pleurotus pulmonarius</i> (Fr.) Quél.	locally edible after cooked
Dead-dried tree	Pluteaceae		<i>Pluteus salicinus</i> (Pers.) P. Kumm	locally edible after cooked but required knowledge for better identification
Dead-dried tree	Pluteaceae	Psychedelic mushroom	<i>Pluteus</i> sp.	Unknown
Dead-dried tree	Meruliaceae		<i>Podoscypha nitidula</i> (Berk.) Pat.	locally edible after cooked
Dead-dried tree	Meruliaceae		<i>Podoscypha petalodes</i> (Berk.) Pat. (1903)	locally edible after cooked
Dead-dried tree	Polyporaceae	Polyporus	<i>Polyporus arcularius</i> (Batsch) Zmitr.	locally edible after cooked but mostly used for soup because it is very hard to chew
Dead-dried tree	Polyporaceae	Polyporus	<i>Polyporus retirugis</i> (Bres.) Ryvarden	locally edible after cooked
Dead-dried tree	Polyporaceae	Polyporus	<i>Polyporus squamosus</i> (Huds.) Fr. - Dryad's Saddle	locally edible after cooked
On ground	Ramaria	Coral mushroom	<i>Ramaria flaviceps</i> Corner, K.S. Thind & Anand	locally edible after cooked
On ground	Ramaria	Coral mushroom	<i>Ramaria sanguinea</i> (Pers.) Quél.	locally edible after cooked
On ground	Clavariaceae	White coral	<i>Ramariopsis kunzei</i> (Fries) R.H. Petersen	locally edible after cooked
On ground	Omphalotaceae	Buttery Collybia	<i>Rhodocollybia butyracea</i> (Bull.: Fr.) Lennox	Locally not eaten

Habitat	Family Names	Common Name	Scientific Names	Local use
Dead-dried tree	Polyporaceae	Black-footed polypore	<i>Royoporus badius</i> (Pers.) De (1997)	locally edible after cooked
On ground	Omphalotaceae	Birch Brittlegill	<i>Russula betularum</i> Hora	Locally not eaten
On ground	Omphalotaceae	Short-stemmed Russula	<i>Russula brevipes</i> Peck	locally edible after cooked
On ground	Russulaceae	Crowded russula	<i>Russula densifolia</i> Secr. ex-Gillet	Locally not eaten
On ground	Russulaceae	Emetica Russula	<i>Russula emetica</i> Pers. ex S.F. Gray	Locally not eaten
On ground	Russulaceae	Slender brittlegill	<i>Russula gracillima</i> Jul. Schäff. (1931)	Locally not eaten
On ground	Russulaceae	Russula	<i>Russula</i> sp.	Locally not eaten
On ground	Russulaceae	Green-cracking russula	<i>Russula virescens</i> (Schaeff.) Fr. (1836)	Locally not eaten
Dead-dried tree	Schizophyllaceae	Loose Chinese fan	<i>Schizophyllum commune</i> Fries (1815)	locally edible after cooked
On ground	Sparassidaceae	Cauliflower mushroom	<i>Sparassis brevipes</i> Krombh.	locally edible after cooked
On ground	Sparassidaceae	Cauliflower mushroom	<i>Sparassis crispa</i> (Wulfen) Fr.	locally edible after cooked
On ground	Sparassidaceae	Cauliflower mushroom	<i>Sparassis cystidiosa</i> Desjardin et Zheng Wang	locally edible after cooked
On ground	Sparassidaceae	Cauliflower mushroom	<i>Sparassis nemecii</i> (Pilát & Veselý) R.H. Petersen	locally edible after cooked
Dead-dried tree	Sparassidaceae	Cauliflower mushroom	<i>Sparassis radicata</i> Weir	locally edible after cooked but difficult to wash in preparation
On dead bamboo or Tree	Stereopsidaceae		<i>Stereopsis hiscens</i> (Berk. & Ravenel) D.A. Reid	locally edible after cooked
Dead-dried tree	Stereopsidaceae		<i>Stereopsis radicans</i> (Berk.) D.A. Reid	locally edible after cooked

Habitat	Family Names	Common Name	Scientific Names	Local use
Dead-dried tree	Stereaceae	False Turkey-tail	<i>Stereum ostrea</i> (Blume & Nees)	locally used for medicine
Dead-dried tree	Stereaceae	False Turkey-tail	<i>Stereum</i> spp.	locally edible after cooked
Ground termite nest associated	Lyophyllaceae	Agaric fungus	<i>Termitomyces clypeatus</i> Heim	locally edible after cooked
Ground termite nest associated	Lyophyllaceae	Agaric fungus	<i>Termitomyces eurrhizus</i> (Berk.) R. Heim	locally edible after cooked
Ground termite nest associated	Lyophyllaceae	Agaric fungus	<i>Termitomyces fuliginosus</i> (R. Heim)	locally edible after cooked
Ground termite nest associated	Lyophyllaceae	Agaric fungus	<i>Termitomyces heimii</i> Natarajan (1979)	locally edible after cooked
Ground termite nest associated	Lyophyllaceae	Agaric fungus	<i>Termitomyces le-testui</i> (Pat.) R. Heim (1942)	locally edible after cooked
Ground termite nest associated	Lyophyllaceae	Agaric fungus	<i>Termitomyces microcarpus</i> (Berk. & Broome) R. Heim (1942)	locally edible after cooked
Ground termite nest associated	Lyophyllaceae	Agaric fungus	<i>Termitomyces tylerianus</i> (Otieno)	locally edible after cooked
Ground termite nest associated	Lyophyllaceae	Agaric fungus	<i>Termitomyces umkowaan</i> (Cooke & Masee) D.A. Reid	locally edible after cooked
On dead tree	Icmadophilaceae	White-worm lichens	<i>Thamnolia vermicularis</i> (Sw.) Schaer. (1850)	Unknown
Dead-dried tree	Thelephoraceae	Ganba fungus	<i>Thelephora ganbajun</i> M. Zang (1987)	locally edible after cooked
Dead-dried bamboos	Polyporaceae	Ochre Bracket	<i>Trametes ochracea</i> (Pers.) Gilb. & Ryarden	locally edible after cooked,
Dead-dried tree	Polyporaceae	Bracket fungus	<i>Trametes pubescens</i> (Schumach.) Pilát (1939)	locally edible after cooked but very hard
Dead-dried tree	Ramaria	Snow fungus	<i>Tremella fuciformis</i> (Berk)	locally edible after cooked

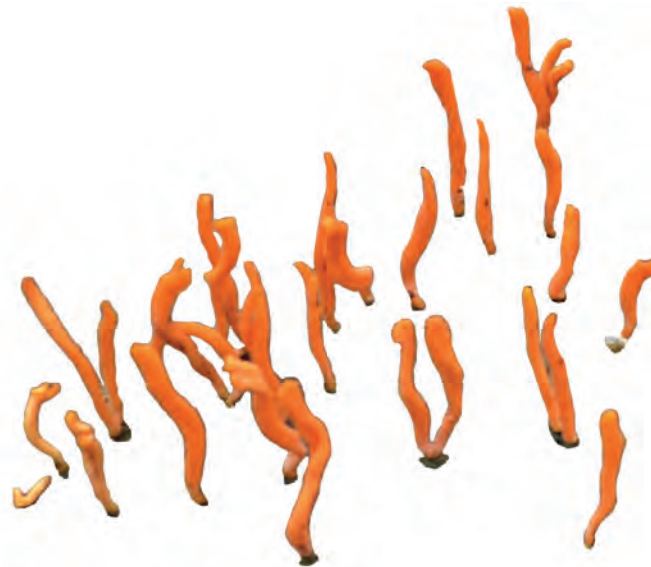
Habitat	Family Names	Common Name	Scientific Names	Local use
Dead-dried tree	Tremellaceae	Yellow brain	<i>Tremella mesenterica</i> (Retz. 1769)	locally edible after cooked
Burnt-rotational farmland	Tricholomataceae	Tricholoma	<i>Tricholoma ustaloides</i> Romagn. (1954)	locally edible after cooked
Dead-dried tree	Tricholomataceae	Trogia	<i>Trogia infundibuliformis</i> Berk. &	locally edible after cooked
Dead-dried tree	Tricholomataceae	Little white mushroom	<i>Trogia venenata</i> Zhu L. Yang, Y.C. Li & L.P. Tang (2012)	locally edible after cooked
On ground	Boletaceae	Black Cow liver	<i>Tylopilus nigerrimus</i> (R. Heim)	Locally not eaten
On ground	Pluteaceae	Silky shealth	<i>Volvariella bombycina</i> (Schaeff.) Singe	locally edible after cooked, eaten raw, or grilled
Straw	Pluteaceae	Straw mushroom	<i>Volvariella volvacea</i> (Bul.) Singer	locally edible after cooked
On ground	Boletaceae	Suede bolete	<i>Xerocomus subtomentosus</i> (L.) Quéf.	Unknown
On ground	Physalacriaceae	Deep root mushroom	<i>Xerula radicata</i> (Relhan) Dörfelt	locally edible after cooked
On ground	Xylariacea	Dead Man's Fingers	<i>Xylaria polymorpha</i> (Pers.) Grev	locally edible after cooked and also used for traditional medicine
Dead-dried tree	Stereaceae	Spectabilis	<i>Xylobolus spectabilis</i> (Klotzsch) Boidin	locally edible after cooked



Silky sheath (*Volvariella bombycina* (Schaeff.) Singe)



Yellow club fungus (*Clavaria miniata* Berk.)



Giant leucopax (*Leucopaxillus giganteus* (Sowerby) Singer)



Crowded russula (*Russula densifolia* Secr. ex Gillet)



Milky white mushroom (*Calocybe indica* Purkay. & A. Chandra)



Dog Penis (*Mutinus bambusinus* (Zoll.) E. Fisch.)



White coral (*Ramariopsis kunzei* (Fries) R.H. Petersen)



Shaggy cap (*Boletellus emodensis* (Berk.) Singer)



Red liver cow (*Heimioporus japonicus* (Hongo) E. Horak)



Suede bolete (*Xerocomus subtomentosus* (L.) QuéL.)



Black Cow liver (*Tylopilus nigerrimus* (R. Heim))



Gigantic Phlebopus (*Phlebopus colossus* (R. Heim) Singer)



Witch's hat (*Hygrocybe conica* (Schaeff.) P. Kumm.)



Black Reishi (*Ganoderma sinense* (J.D. Zhao, L.)



Agaric fungus (*Termitomyces* spp.)



Cloud ear fungus (*Auricularia polytricha* (Mont.) Sacc.)



Jelly Fungi (*Auricularia mesenterica* (Dicks.) Pers.)



Psychedelic mushroom (*Pluteus salicinus* (Pers.) P. Kumm)



Decorated pholiota (*Leucopholiota decorosa* (Peck) O.K. Mill.)



Shiitake (*Lentinula edodes* (Berk.) Pegler (1976))



Snow fungus (*Tremella fuciformis* (Berk.)



Favolus (*Favolus tenuiculus* P. Beauv.)



Jew's Ear (*Auricularia auricula-judae* (Bull.) J. Schröt.)



Wood-decay fungus (*Lenzites elegans* (Fr.) Pat.)



Peeling oysterling (*Crepidotus mollis* (Schaeff.) Staude)



Blushing Rosette (*Abortiporus* spp.)



Hiratake (*Pleurotus ostreatus* (Jacq. ex Fr.) P. Kumm. (1871))[1]



Russula (*Russula japonica* Hongo)



Crab-of-the-woods (*Laetiporus sulphureus* (Bull.) Murrill)



Winter mushroom (*Flammulina velutipes*)



Blushing Rosette (*Abortiporus biennis* (Bull. ex Fr.) Singer)



Jelly fungus (*Dacryopinax spathularia* (Schwein.) G.W. Martin)



Telephora ganbajun M. Zang (1987)



Hygroscopic earthstar (*Astraeus hygrometricus* (Pers.) Morgan)



Head Man Slender Caes
(*Amanita princeps* Corner & Bas)



Poroid fungi (*Cymatoderma* spp.)



Purple chanterelle (*Cantharellus cinnabarinus* var. *australiensis* Schw. Clel.)



False turkey tail (*Trametes Versicolor* (L.) Lloyd)



Polyporus (*Panus similis* (Berk. & Broome))



Cantharellus spp.

May black (*Microporus affinis* (Blume & T.Nees) Kuntze)



Coral fungus (*Clavulina cristata* (Holmskjold: Fr.))



Leaflike oyster (*Hohenbuehelia petaloides* (Bull. ex Fr.) Schulz.)



Shiitake (*Lentinula* spp.)

Yellow brain (*Tremella mesenterica* Retz. (1769))



Polyporus (*Polyporus arcularius*
(Batsch) Zmitr.)



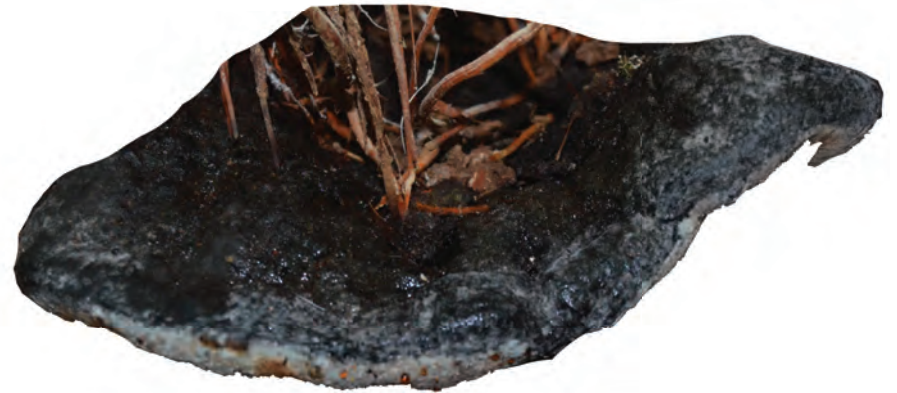
Polyporus (*Polyporus arcularius*
(Batsch) Fr.)

Dacryopinax elegans (Berk. & M.A. Curtis)
G.W. Martin (1948))



Spectabilis (*Xylobolus spectabilis*
(Klotzsch) Boidin)

Unknow Species









8. Some poisonous mushrooms in Salween Peace Park

Poisonous mushrooms (toxic mushrooms), which are described here in brief, included 20 species that we have obtained from the references (Parnmen et al., 2015). These poisonous mushrooms are also recorded in our area at Salween Peace Park, so this is additional information we accessed from the literature.

These poisonous mushroom species can be different from places to places within the Peace Park territory, but according to this cited reference of poisonous mushrooms from Thailand, they are also found in our areas. Sometimes the color of mushrooms differs from place to place, which we think is due to the color of the soil, which may also have some impact on the mushroom's appearance. It is important to carefully check the mushrooms when harvesting them in an unknown territory because there could be a toxic variety which has similarities to edible varieties in familiar mushroom collection localities.

The indigenous people believe that the most dangerous mushrooms are commonly grown on the ground, live trees and trees that have poisonous sap. Sometimes the ordinary mushrooms that are known and consumed all the time locally should not be eaten further afield because they may grow on allergic or poisonous tree species, and the tree species that they grow on are not known. The local Karen mushroom experts also mentioned some tree species, including Alder and Ficus that mushroom collectors should avoid.

Again, if the mushrooms that grow in manure are not locally collected, they should not be eaten because the appearance alone is not enough to confirm the species. The edibility of mushrooms grown in manure and collected in unfamiliar territory should be checked against local knowledge.

Similarly, the mushrooms that are associated with termite hill nests are often collected by local people. So, before consuming them, their edibility should be confirmed with local people as to whether the place is safe to collect that mushroom species from. Experienced mushroom collectors know mushrooms well in their own areas, but never collect mushrooms in the dark or in the evening time because the use of artificial light will not be as precise as sunlight in differentiating mushroom varieties.

The name list and photos shown below are the poisonous mushroom species recorded in Thailand. The most common mushroom species include *Amanita* sp., *Cantharocybe* sp., *Chlorophyllum globosum*, *Chlorophyllum molybdites*, *Chlorophyllum* sp., *Clitocybe* sp., *Coprinopsis lagopus*, *Entoloma* cf. *caespitosum*, *Entoloma*. cf. *subclitocyboides*, *Inocybe* sp., *Megacollybia* cf. *fallax*, *Panaeolus cyanescens* and *Russula emetica*.

This is to give awareness to the local people who love to eat mushrooms but worry about the safety of mushroom consumption. They can go through this book for a better understanding of the species and share more knowledge about the mushrooms.

Habitat	Family Names	Common Name	Scientific Names
On Ground	Amanitaceae	Guangzhou destroying angel	<i>Amanita exitialis</i>
On Ground	Amanitaceae	East Asian brown death cap	<i>Amanita fuliginea</i>
On Ground	Amanitaceae	False Brown Death Cap	<i>Amanita fuligineoides</i>
On Ground	Amanitaceae	The pileus of the cap	<i>Amanita</i> cf. <i>virgineoides</i>
On Ground	Amanitaceae	Death Cap	<i>Amanita</i> spp.
On Ground	Amanitaceae	Death Cap	<i>Amanita</i> spp.
On Ground	Hygrophoraceae	False parasol	<i>Cantharocybe</i> cf. <i>gruberi</i>
On Ground	Hygrophoraceae	False parasol	<i>Cantharocybe</i> spp.
Decayed Dungs	Agaricaceae	Parasol mushroom	<i>Chlorophyllum globosum</i>
Decayed Dungs	Agaricaceae	Green-spored parasol	<i>Chlorophyllum molybdites</i>
Decayed Dungs	Agaricaceae	Parasol mushroom	<i>Chlorophyllum</i> sp.1
On Ground	Tricholomataceae	Sloping head	<i>Clitocybe</i> sp.1
Decayed Dungs	Psathyrellaceae	Harefoot mushroom	<i>Coprinopsis lagopus</i>
On Ground	Entolomataceae	Western Platterful Mushroom	<i>Entoloma</i> cf. <i>caespitosum</i>
On Ground	Entolomataceae	Basionym	<i>Entoloma</i> . cf. <i>subclitocyboides</i>
On Ground	Inocybaceae	Fibrous hat	<i>Inocybe</i> sp.1
On Ground	Inocybaceae	Fibrous hat	<i>Inocybe</i> sp.2
On Ground	Marasmiaceae	Megacollybia	<i>Megacollybia</i> cf. <i>fallax</i>
Decayed Dungs	Bolbitiaceae	Blue staining panaeolus	<i>Panaeolus cyanescens</i>
On Ground	Russulaceae	The sickener	<i>Russula emetica</i>

Table 1. Literature cited from Thailand Poisonous Mushroom species that also recorded in Salween Peace Park (Parnmen et al., 2015).

Poisonous mushroom species recorded in Thailand



1 *Amanita exitialis*
Amanitaceae



2 *Amanita fuliginea*
Amanitaceae



3 *Amanita fuligineoides*
Amanitaceae



4 *Amanita cf. virgineoides*
Amanitaceae



5 *Amanita sp.1*
Amanitaceae



6 *Amanita sp.2*
Amanitaceae



7 *Cantharocybe cf. gruberi*
Hygrophoraceae



8 *Cantharocybe sp.1*
Hygrophoraceae



9 *Chlorophyllum globosum*
Agaricaceae



10 *Chlorophyllum molybdites*
Agaricaceae



11 *Chlorophyllum sp.1*
Agaricaceae



12 *Clitocybe sp.1*
Tricholomataceae



13 *Coprinopsis lagopus*
Psathyrellaceae



14 *Entoloma cf. caespitosum*
Entolomataceae



16 *Inocybe sp.1*
Inocybaceae



17 *Inocybe sp.2*
Inocybaceae



18 *Megacollybia cf. fallax*
Marasmiaceae



19 *Panaeolus cyanescens*
Boletaceae



20 *Russula emetica*
Russulaceae

9. The use of mushroom species and their significance towards the Karen Indigenous People of Salween Peace Park

9.1 Important information worth knowing on the current mushroom situation

There may be many more species of mushroom that are good for food, medicine, and other uses, but they currently remain unknown to researchers or are still waiting to be discovered and identified. Some mushrooms such as (Truffle mushroom)¹⁰ may also be discovered in Salween Peace Park if the research is done.

Some other mushroom species that we had photos of in hand were not known or were not used by the local people. However, we believed that if we conducted a conference and invited many villages within the Salween Peace Park and beyond the Peace Park, we could identify more species.

This is the first mushroom report made from a combination of local knowledge, western sciences and women researchers. Its intention is to share knowledge of mushrooms regarding their use and conservation.

9.2 Researching the religious and cultural significant role the mushroom can play locally

The interconnection between tradition, belief, and cultural value of mushrooms to local Karen people is discussed in the following section.

Traditional taboos of mushroom collection

The Karen Indigenous People of Salween Peace Park's traditional taboos on and traditional sharing of mushrooms can be different from one village to another. Unlike bee hives, the ownership and use of which are marked by the first person who sees them, the traditional taboo on mushrooms does not

allow villagers to mark the mushrooms even though they have been the first person to find the young mushrooms. Some mushroom species take weeks to reach their mature stage, especially termite hill associated mushroom species. So, anyone can collect the species if they see them at their mature stage. It is very important to educate the mushroom collectors to take this kind of mushroom only when they are fully mature.

Some villagers never collect mushrooms if they are carrying rice or chickens when going home. Also, some believe that you should not collect mushrooms and put them in your pants or shirt pockets or in any kind of clothes. You can only collect mushrooms and wrap them with leaves or use baskets only. They have the traditional taboo in the belief that if clothes are used to wrap the mushrooms, the mushrooms will never sprout again.

When traveling on a long journey, mushrooms should not be eaten if they are seen on the way because it is believed that eating mushrooms during the journey will bring bad luck, especially flood and erosion on the way which will delay the journey. Meat and wild mushrooms cannot be mixed together to cook in the same pot. This is because they believe that cooking them together would cause a curse, which can lead to natural disaster.

Certain kinds of mushroom species are not allowed to be eaten with strangers, while some family members do not cook mushrooms when they have guests at home. In the animist community, if a person used a mushroom name when calling their spirit back when they are sick, they would not be allowed to eat that specific mushroom species anymore; for example: calling someone named "TakwenHsu" results in that person never being allowed to eat KuHsu Mushroom (*Lentinus concavus* (Berk.) Corner) for the rest of their life.

¹⁰ <https://www.nationthailand.com/in-focus/30326061>

9.3 Mushroom harvesting site is an informal learning place.

The traditional management of local mushroom diversity and the way they are passing over the knowledge of mushroom conservation from generation to generation required revitalization. The fungus species are one of the most important natural resources for the Karen Indigenous People in Salween Peace Park forests, especially, for food, medicine, and traditional tools making it one of the traditional knowledge areas worth learning to maintain collective knowledge survival.

It is because their natural resources, especially mushrooms, should not be taken for granted as a free gift to them, but to have the best knowledge on how to use them safely and sustainability. Since there are many kinds of delicious mushroom species from different habitats, it is vital to know that there are also some poisonous and dangerous ones growing with them. In that case, to understand more about mushrooms, people living in the cities or places far from the forest could obtain knowledge of mushrooms from schools, which is very costly and time-consuming. Similarly, our village people are required to spend a lot of time to know each mushroom species even though they do not need to spend money to learn about them.

While learning from school required money and students to be a certain age, indigenous learning about mushrooms in the field observation required neither money nor limitation of age. However, it requires community students to present physically in the field while the experts could directly teach about the mushroom in its in-situ collections. During a trip, if the wrong mushroom species is picked, experts will stop and teach why the mushroom is bad and unsafe to eat. Similarly, they will also teach how to identify each type of edible mushroom species.

Since this kind of learning is required for survival, the local people always pay close attention and try their best to absorb as much knowledge as possible during the trip. This kind of learning is important for survival, so it seems

that people pick up the knowledge that is shared by experts very quickly. Moreover, when the mushroom is brought home by the elders, children in the village are able to observe and ask questions about these collected mushrooms, such as the names, numbers and how to identify the species.

Since they live very close to the forest and learned about mushrooms when they were very young, their knowledge of mushrooms has increased as they get older. This kind of education is important for the Indigenous Karen People in Salween Peace Park, both for survival and effective management. Therefore, outside experts are required to study more about local knowledge of mushrooms to be able to support and get involved in conservation activities.

9.4 We can reclaim and maintain our own Karen Language vocabulary through mushroom collection with local experts

The loss of language is not only in speaking, but the names of the species and materials and location are also counted. For example, a Karen man may speak fluent Karen Language but if he does not know the names of species, traditional tools and forest types in his own language, it will be difficult to talk about nature and culture. So, losing the names of plants, animals, fish, and mushrooms will also mean losing the language.

Moreover, language is unique to particular objects because something that has a name in local language has no equivalent word or concept in English, for example. For the above reasons, knowing the mushroom names in Karen Language is maintaining knowledge through vocabulary and preventing the loss of language.

9.5 Mushrooms can bring better relationships between families

Some mushroom growth sites are inherited by specific families for generations. So, it enables the family to know even the date and times the mushroom is growing. The mushroom species, especially, Agaric fungus, Hygroscopic

earthstars, Slender Parasol, and Oyster grew in amounts large enough for many families, so those who had collected the mushrooms could bring them back to the community and share them with other families.

This is done because if they do not collect the mushroom on time, the remaining crop will be spoiled in a few days. The tradition of sharing food like this for generations makes the community develop together, reduces poverty, and prevents homelessness in the community. Among those recorded mushrooms, there is only one mushroom species called Hygroscopic earthstars which is used for family income if it is traded to Thailand. Every year, tons of this mushroom species are exported to Thailand. The price of the mushroom can vary over time and years. The average price will be around 1 or 2 USD per liter.

This is a mushroom species that grows once a year in the early rainy season with large amounts associated with dried Dipterocarpus forest types. In some places it is left uncollected to decay by itself.

9.6 Utilizing mushrooms from the site creates happiness and relaxation

The culture of traditional mushroom collection is full of love and happiness because during a long trip, there is traditional poem singing, chatting, and joking with the team. This creates special opportunities for children, adults, and their grandparents to share knowledge, poems, and taboos with one another.

The children usually learn histories and myths, while learning the natural changes of mushroom richness and abundance of the area over long periods of time. The traditional methods of searching for mushrooms, sustainable collection of and eating of mushrooms are often taught during a mushroom hunting trip.

Again, discovering a mushroom brings happiness as collectors are competing for the sizes and amount of mushroom they can find and, so, they are praised by others. This beautiful culture is required to pass from generation to generation to build close ties with our mother-nature.

9.7 Wealth and greediness reduce family ties, quality of life, and love for one another

Civil war and displacement have great impacts on Karen traditional knowledge and way of life. Since daily survival is the biggest obstacle for the Karen people there, money is the most expedient resource to solve livelihood security.

Therefore, the culture of living together, sharing food, sharing knowledge, volunteering in the community, giving and receiving gifts, and valuing one another's lives is decreasing. This eroding culture creates more isolation, which has led to the disappearance of community ties, love, and knowledge sharing.

Sharing mushrooms with other families and community members creates more knowledge because some edible mushroom species are known only by those who are sharing. Different community members with different knowledge of backgrounds on mushroom species names will combine knowledge together for better management. Since sharing, helping and field collecting of mushrooms together by community members is not practiced anymore, this intrinsic method of passing traditional knowledge to children will stop.

Remarks - The mushrooms that we recorded here in this book are mostly included in the list of those that are edible and usable for local people. There are also a number of mushrooms collected during this survey that remain unknown to both research team members and local experts.

Therefore, these unknown mushroom species are kept reserved for further studies using both traditional knowledge and Western science methods. When all mushroom research in all the community forests of Kawthoolei is done, the analysis of the species and knowledge sharing of edible and usable mushroom species between communities will give more ideas to determine the conclusion. Moreover, these local edible and usable fungi will be compared with the Western science reports of mushrooms and methods for better understanding.

This is because the mushroom survey is usually done by university students and professors that are currently lacking in Salween Peace Park. The current research information allows informed mushroom conservation and sustainability to begin at a time when it is urgently necessary.

10. Discussions

The objective of this research is rooted in four reasons, which are 1. To document all the edible and useful mushroom species; 2. Record the traditional knowledge and beliefs regarding the wild mushroom in the local areas including food, medicine, income and tools; 3. To document the traditional techniques of sustainable utility and management of fungi and knowledge-sharing methods to their youngsters.

Therefore, to be able to revitalize the traditional wisdom of mushrooms, further research will need to be conducted. The strength of this research is from having been working very closely in the field with the local people for five years. Together, we conducted forest walks in the field, collected and ate mushrooms, and enjoyed this cultural learning and teaching experience as brothers and sisters.

Moreover, all the mushroom survey team members are Karen Indigenous People of the area who have experienced mushroom harvesting and knowledge sharing since they were children. We need to confirm with the local mushroom experts on our field research findings and interview results that our information was accurate before we plan other survey activities. The weaknesses are mainly the lack of resources to conduct our research using Western science methods. Traditional methods of collecting mushroom data were used to make this report.

Again, we are not very familiar with the mushroom scientific names and common names, so our use of local names sometimes makes it difficult to interpret local language and knowledge into English. Besides using the guide books, libraries, and Google Search, we did not have any other resources, such as expert help and mushroom lab assistance. Again, this is the first ever mushroom survey in the area. We also have a lack of references to depend on for writing this report.

The purpose of this book is only to provide the list of mushroom species collected which are edible and useful for the local people, but not to explain the detailed description of each mushroom species. However, the first report will help us to continue studying the mushroom species in more detail in the future.



11. In Conclusion and recommendations

Our biodiversity and natural environment contribute their resources to all people in the world, regardless of their status and nationalities. We need clear air and water, which comes from good forests, for our good health and nutrition, but people who destroy forests enjoy the right to clear air and water, the same as those who care about nature.

After we had conducted mushroom surveys for five years, we started to clearly understand that wild mushrooms, once considered as useless as garbage, are important to local people as food, medicine, tools and for food security overall. Since we took a closer look at this issue, we know that mushrooms act as one of the most important resources to keep our community alive.

The disappearing traditional wisdom of local mushrooms is the first documented report and hopes to be a good start to recover our eroding knowledge and help our Karen Indigenous with self-efficiency and poverty elimination. Since mushroom resources help us survive physically, it also creates harmony with community, classroom and leisure time for us. It puts children and elderly people together during the collection of mushrooms in the forests. The older person sharing knowledge, languages and relationships with the younger generation creates better friendship between the old and the young.

Knowing the names of mushrooms, their growing spots, and forest types are the vocabulary of a language of the people. Also, the sustainable mushroom utilization method was introduced during the survey times when local mushroom experts participated in the field. It taught us that mushroom diversity and richness is so precious for the Karen Indigenous people, who have limited access to man-made products but depend directly on forest resources.

It is also a way to share love and care between families and individuals, because sharing spare mushrooms with other family members creates ties between families. That helps them with time management, because when

one family collects the mushroom, they will think about other families and bring the surplus to those who do not have time to collect the mushroom.

In addition, different varieties of forest types enhance more opportunities to have more mushroom richness and abundance. For example, the Hygroscopic earthstar (*Astraeus hygrometricus* (Pers.)) grew only in the Dried-Dipterocarpaceae Forest type and Veiled polypore (*Cryptoporus volvatus* (Peck) Shear) is only found in Pinus Forest.

Since field observations indicate that mushroom richness ensures healthier forests, degrading the forest will reduce mushroom diversity and quantity. From this report, a brief description of poisonous mushrooms with some photos will also give people some idea of how the mushroom collectors avoid dangerous species.

Finally, our findings returned positive results for us and gave us a lot of knowledge about the mushroom diversity richness and the local people's interaction with them. As we discovered that mushroom resources create a platform for food security, quality of life, knowledge transfer, maintaining culture and livelihood security, we are thrilled with joy and hopes for conservation and awareness.

11.1 Recommendations

The first survey on mushroom inventory in Salween Peace Park gives us both joy and responsibility. It gives us more opportunity and knowledge to continue work on each species to discover the priority species that require urgent protection actions. Again, it enabled the survey team to further identify both common and scientific names of each one. We recommend that all community forests that are granted titles by the Kawthoolei Forestry Department should conduct a mushroom inventory in their respective forest to revitalize their traditional knowledge, language and environment. Also, restoring traditional knowledge of wild mushrooms will provide better food security for the local people.



Since wild mushrooms love good forest, we need to protect our forest to maintain our forest status to be able to have mushroom resources for long-term purposes. We also need to use all the knowledge related to mushroom conservation to preserve these important resources for our future generations.

12. We require self-determination to conserve our land and nature

The Karen Indigenous People have been living in Salween Peace Park for generations peacefully, without the intention of conquering or invading other territories of other ethnic states, because invading other lands which are not their ancestral territories is considered a sin. The other customary land territories belong to their own specific spiritual and ancestral domains. They have governed their land territories using their traditional governance system since time immemorial.

Under this ruling system, our ancestral main livelihood is to live with nature and create bonds with nature to manage them and use them for sustainability. When we are able to protect nature, it will protect us physically and spiritually. Conserving our nature is our pleasure. It is because planting trees, creating firebreaks and patrolling the forests are our leisure time that help us with family reunions and joy at the end. We, the Indigenous Women from these communities, enjoy learning the knowledge of nature that is passed on by our ancestors from generations to generations.

Since each individual requires a good knowledge of nature to live with them well, we are required to educate ourselves about the land and environment. As self-determination is one of our goals to be fully in control of our ancestral lands and mother nature, in order to fulfill our needs and create effective conservation, it is crucial to achieve it along with our goals in Salween Peace Park.

If we achieve self-determination, we will have the full right to manage and conserve mother nature as well as maintain our culture and traditional way of life. Self-determination not only helps us to save nature, but helps us to practice our language, culture, and religion freely. It is because we are currently victims of discrimination, are oppressed, and prevented from using our language, practicing our religion and culture.

Finally, when the biodiversity is conserved, and language and culture are maintained, the lives of Karen Indigenous People will be saved and they will once again live with nature harmoniously.

Women survey team

The women's survey team was made up of a combination of KESAN staff and the local women's research teams from two different communities' forests, which are Kheshorter-Thawthee-Pworgaw community forests. The KESAN staff are Naw Hsa Yu and Naw P' Len, where the local research team members included; Naw K'lu Moo, Naw Thawthee Wah, Naw Ka Poe, Naw Bee Meh and Naw Eh Htoo. The other leaders included, Saw Oo Moo, Saw He Say, Saw Pah Wah, and Saw Mu Lar.

NO	Names	Address	Duties and Responsible
1	Naw P' Len	T' May Kee Village	KESAN Research Staff
2	Naw Hsar Yu	Len Kee Village	KESAN Research Staff
3	Naw K' Lu Moo	Len Kee Village	Local Women Research Staff
4	Naw Thaw Thee Wah	Len Kee Village	Local Women Research Staff
5	Saw He Say	Kay Pu	Luthaw Township officer
6	Saw Mu Lar	Toe Thaw Lu	Kheshorter CF committee head
7	Naw Kar Po	Hor Thwen Kee	Local Women Research Staff
8	Saw Mai Meh	Len Kee	Voice head of Thawthee-pworgaw CF Committee
9	Saw Pah Wah	Hor Thwen Kee	Kheshorter CF Committee deputy head (passed away)
10	Naw Eh Htoo	Plo Kee	Local Women Research Staff
11	Saw Oh Moo	Ler Mu Plaw	Kheshorter CF Committee deputy head (passed away)
12	Naw Hser Ler Paw	K'Nae Mu Der	Local Women Research Staff
13	Naw Bee Meh	Ta Yu Kee	Local Women Research Staff



Naw P' Len



Saw Blaw Htoo



Naw Hsa Yu



Naw Hser Ler Paw



Naw Thawthee Wah



Saw Mu Lar



Saw Pah Wah



Saw Oo Moo



Saw He Say



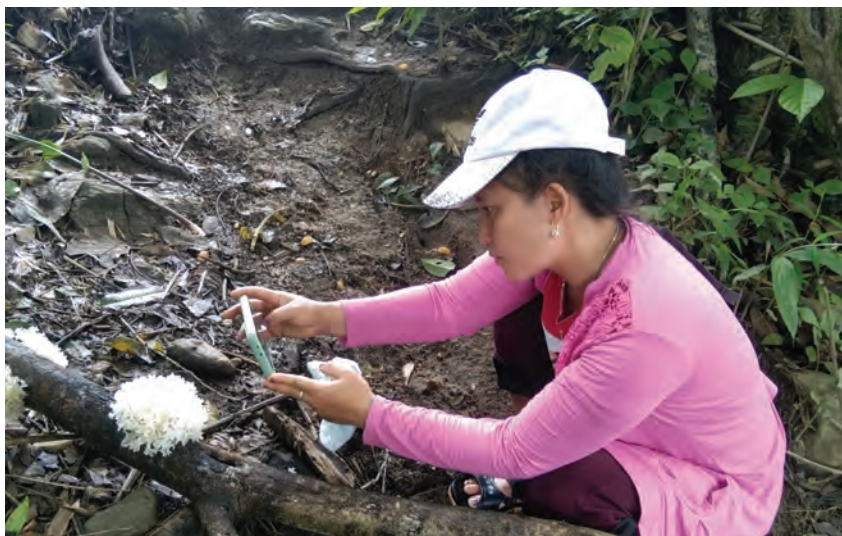
Saw Mai Meh

13. Acknowledgement

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*Make friends with termite
hills if you like mushrooms, as
Karen Proverb said:
"Good guests approach a good
hospitable family, where rich
mushrooms approach a good
termite hill".*



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