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# KAREN INDIGENOUS KNOWLEDGE OF SUSTAINABLE RESOURCE MANAGEMENT

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## ABSTRACT

Contemporary environmental thought is beginning to realize that the relationship between humans and their environments involves a deep intertwining and not a mere co-existence. Yet older cultures have understood this for some time. This article analyzes indigenous ecological knowledge of forest conservation for the Karen indigenous community at Hin Lad Nai in northern Thailand. It explores the values of human-nature relationships, rooted in spiritual beliefs, resulting in holistic approach to biodiversity conservation, and discusses how this indigenous knowledge is preserved across generations in the community. Interviews with local scholars, youth, and ‘house ladies’ in the community, show complex practices for the goal of sustainable livelihood. For example, the community does not reclaim forest land for single use, such as tea or coffee plantations, but instead develops a multi-use strategy integrating the production of wild tea, bee hives, bamboo clump plantations into the natural forest. Through this strategy, food security is assured in the community,

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and promotes sustainable living and fostering integrity between people and natural surroundings at the local community. Consequently, the Karen ecological knowledge potentially provides implications and contributions to promoting sustainable society which develops from local consciousness and well-integrated livelihoods.

## **Introduction**

Thai society is a diverse society with different cultures and ethnic groups. The indigenous knowledge of Karen ethnic minorities has been undervalued<sup>1</sup> or valued merely as a commodity for mass tourism. Karen indigenous knowledge is poorly understood and widely unappreciated by policy-makers and general public in most countries in Asia. False assumptions about Karen's ways of life still remain. The community is criticized for deforestation and their illegal settlement in national parks<sup>2</sup>. Meanwhile, in recent years, the human impact on biodiversity have called for a paradigm shift towards sustainable ecology and forest management. This has led to a reevaluation of indigenous wisdom concerning the environment. The environmental wisdom of the Karen community of Hin Lad Nai in Chiang Rai province, Thailand, can provide insight into such indigenous knowledge on sustainable resource use and forest conservation. This small rural village makes their knowledge on forest stewardship intrinsically interesting to further explore and promote their indigenous knowledge, beliefs, and practices to wider society.

Indigenous ecological knowledge (IEK), also commonly known as traditional ecological knowledge, demonstrates a long-term sustainable relationship of human beings with their environments<sup>3</sup>. Such knowledge can connect the gap between humans and their natural environment and potentially becomes an exemplar of the co-existing harmony between indigenous people (the Karen) and their forest resources. This type of knowledge is locally based, dynamic and unique to a given culture or society and juxtaposed with the international knowledge system derived from academic research. In essence, the practices of indigenous knowledge

potentially offer appropriate solutions to some of the crucial challenges of the present time, especially climate change and food security<sup>4</sup>.

The community of Hin Lad Nai has gained their wisdom and knowledge from observation and interaction with forest resources. The locals still continue to practice their traditional livelihoods by adopting an integrated system of wet terrace fields, rotation farming, mix farm of beekeeping, native tea and bamboo cultivations along with forest conservation. Their sustainable practices in ecosystem management and self-sufficiency<sup>5</sup> affirm that they have food security, sustainable income, and social resilience along with ecosystem conservation. Such practices have been an important means for managing local ecosystems and landscapes which the larger society can learn a great deal from their successful practices in sustainable management of complex ecological systems.

This paper focuses on sustainable resource management systems for Hin Lad Nai community who has adopted self-sufficient traditional livelihoods along with holistic land use and forest conservation. Their practices significantly benefit the community members and the surroundings, in terms of sustainable incomes and social resilience. It is in this context that this study aims to explore the indigenous values which are closely intertwined with ways of living and characterized in people and forest relationships. Particular attention was given to holistic land use and livelihood systems of the community along with their traditional beliefs and worldview in forest conservation.

## **Social and Cultural Perspectives of the Pgaz K’Nyau (Karen) Ethnic Group**

The term “Karen” or “Kariang” or “Yang” is widely used by the people outside the community, the Karen call themselves as Pgaz K’Nyau which literally means “human person”. In this study, Karen is referred to as Pgaz K’Nyau, and sometimes interchangeably used to mean the same group of people. Being the largest ethnic minority in Thailand, the Karen people prefer settling in valleys surrounded with evergreen forest, conifer

forest, and mixed deciduous forest at 400 meters to 1,200 meters above sea level and riparian areas or water meadows. In other words, they build their settlement in the midst of hill forests, valleys and plains, along the streams, and lowlands in mainly the provinces of Tak, Mae Hong Son, and Chiang Mai.

The Pgaz K'Nyau have long history and unique cultural identity, arts, traditions and rituals. There is also evidence that they have been in Thailand over 600-700 years. In the 19<sup>th</sup> century, the historical evidence was recorded by the British government officers and later American Missionaries on the life of Pgaz K'Nyau and Mon. Since the 20<sup>th</sup> century, Pgaz K'Nyau communities widely dispersed across Myanmar and northern and western part of Thailand, especially Myanmar-Thailand border<sup>6</sup>. There are many subgroups within Karen ethnicity. Notably, the subgroups are distinguished by the color of their clothing and in Thailand the main subgroup are the Sgaw and the Pwo or White Karen who shares the same ancestry as the Karen in the Karen State in Myanmar. Nowadays, the Sgaw Karen are more populated than the Pwo in northern Thailand. In this study, the main focus is the Sgaw Karen in northern Thailand.

Karen people are deeply rooted in their own traditions, customs, culture and nature. Pgaz K'Nyau language is related to Sino-Tibetan family. They show deep respect for elders and Karen tribal rules and customs and the laws of the larger society they live in, and help one another acculturate. Furthermore, the Pgaz K'Nyau believe that all human beings are free and equal and have deep sense of brother-sisterhood. The Pgaz K'Nyau subscribe to a monogamous marriage, and divorce is considered unacceptable. They spend most of their live engaged with their natural surroundings, thus they traditionally have a deep respect for nature.

The source of life energy, which cycles through plants, water, sky and rock, is the life-giving. So a lifestyle of modesty, simplicity, and a deep sense of collective community encourages the Karen stubbornly value forest conservation despite the ardent external pressure from the economic development, politics, and modern public policy.

## **Pgaz K’Nyau and Their Religious Cosmology**

Traditionally, the Pgzaz K’Nyau believe in animistic cults and the Supreme Being (*Ywaz*) in nature which nowadays can still be seen in some communities. One of the Pgzaz K’nyau writings called *Hta* narrates the Pgzaz K’nyau myths, legends, fables, and folktales. This folklore reflects their customs, morals, worldview, and teachings on life. The beginning of all things comes from Ywaz, the Creator and Keeper (*K’caj*), and human beings are merely temporary dwellers and caretakers<sup>7</sup>. It is in this context, people should remember that this world has a greater being who keeps things in order.

The notion of the Supreme Being is *Taj hti taj tau* or *Hti K’caj kauj K’caj*, the powerful Creator and Keeper of the nature, who gives people water and enables all villagers, regardless of who they are, to live together and brings a new life to the soil, all plants, trees, and animals<sup>8</sup>. Likewise, this Supreme Being, a Lord of the Earth and Water, will punish those who destroy or take advantage of nature and protect those who do right. Whenever someone violates the rules, there is a reconciliation ritual to pacify the Supreme Being. There is a clear social and cultural legitimacy among the Pgzaz K’Nyau to maintain the cycle and flow of life with their natural surroundings.

Pgzaz K’nyau basic tenet of cosmology is highly related to ecological conservation where human beings are required to maintain the ecological equilibrium. Humans cannot claim ownership of nature but only are permitted to use and preserve them. Thus every year, when the time comes to prune and plow a land for agriculture, people have to ask permission from the Keeper and perform a particular ritual to honor the Keeper. There is a consciousness of the fact that while tilling the soil, they may hurt living organism such as frogs, toads, ants, cicadas, and so on, or kill them without knowing it. Tilling the soil is akin to piercing the Mother Earth<sup>9</sup>. This signifies a nurturing mentality of the Pgzaz K’Nyau that involves caution and respect for living creatures that co-exist in the world with them. Human activities sometimes disrupt nature, and so humans need to show a great deal of discretion and due respect.

They understand their role in this world as an ephemeral one. They are born to live, labor, and raise up the new generation while upholding their relationship with nature. Nowadays, a fair number of Pgaz K'nyau communities have adopted Christianity or Theravada Buddhism while maintaining their traditional "animist" beliefs.

### **The Hin Lad Nai Community**

Hin Lad Nai, a Karen ethnic community settled between the National Forest Reservation Area and the Khun Chae National Park, is situated in Ban Pong sub-district, Wiang Pa Pao district of Chiang Rai province. Topographically, Hin Lad Nai is classified as hill evergreen forest with an elevation of 800-1,000 meters above sea level and within a mixed-deciduous forest, and the leaf-shedding forest and therefore there are various tree and plant species. Biodiversity of the forest is still intact. A large portion of the village's land is hilly terrain. Hin Lad is called according to the topological structure of the terrain and stream and near the watershed. There are 14 streams running in the region thus the water supply runs unceasingly in the community.

The climate at the location is pleasantly cool all year round and rather cold in winter. Still the community is within the tropical climate zone. Thus, summer lasts from February to May, the temperature is rather high yet with the ecosystem of this green area and upland watershed, the place experiences a relatively pleasant climate. Rainy season usually lasts from May to October. In winter, the temperature can drop lower than 10 degrees Celsius. The climate is suitable for cool season plants and flowers all year round as well.

The forest area is comprised of 10,954 Rai (1,753 ha.) and divided into two main functions. The first is the upland field and residential areas around 1,228 Rai (196 ha. or 10% of the total area) meant for basic consumptions such as house-building wood, food growing, and agroforestry gardens. This area is preserved and forbidden to cut any trees or hunt any animals within the 1-km diameter and so a forest for cultural rituals and beliefs. The second area around 9,726 Rai (1,556 ha.

or approximately 90%) is called a community forest and preservation area since it is the watershed. The area is used for shifting cultivation (162 Rai or 26 ha.), tea cultivation as well as upland rice farming (168 Rai or 27 ha.), and being protected and not allowed to invade<sup>10</sup>.

Demographically, Hin Lad Nai is part of Moo 7 in Ban Pong sub-district with 120 people and 20 families. The number of the residents is considered relatively small. At Hin Lad Nai according to the Karen tradition, when a man gets married, he has to move in to live with the family of his spouse. For the last consecutive decades, the number of the population at Hin Lad Nai, has been almost the same. Thus the community is relatively small and has less human impact on forest resources.

The criteria of site selection was that in 2010 the community of Hin Lad Nai has been chosen as a “Pilot Project and Special Cultural Zone”<sup>11</sup> of the four chosen Karen villages. Besides, there has been data collection and research on the ethnic traditional knowledge and so the study will build upon what is known and collected as information. The village is now a community learning center for those who wish to learn and deeply appreciate how human-forest relationship harmoniously and peacefully co-exist.

### **Indigenous Knowledge for Sustainable Land Use and Forest Conservation Practices**

The traditional livelihood of Karen people depends upon forests by the mere fact that most of them live in and benefit from the forest. This is especially the case of the Hin Lad Nai. The forest becomes an integral part of their lives. The basic attitude that can be gleaned from the research is the idea: *We live in and benefit from the forest, we need to take care of the forest. The forest is the source of all lives here and affects all aspects of our lives.* Several scholars<sup>12</sup> claim that the foundation of the traditional ecological knowledge is centered on the forest — the core of indigenous community life — where life begins and ends; and it becomes a strategy for the indigenous community to care for forests. The mutual relations and dependencies of humans on the forest is a distinctive attribute of the

communities' consciousness.

Karen indigenous knowledge emerges from this relation. Generally speaking, indigenous knowledge is defined within the construction of the present and the interpretation of the past, and this can never happen if there is no relationship as a ground for socio-cultural and physical context. The community of Hin Lad Nai has successfully restored their forests that were destroyed by logging companies. Significantly, they have blended traditional agriculture with evergreen forest and pine forest along the hills<sup>13</sup>. Meanwhile, they have adopted an integrated system of wet terrace fields, shifting cultivation, beekeeping, wild tea and bamboo farming along with forest conservation. The intricate knowledge of the locals in land use and protection illustrates well how they fully understand ecosystems and annual cycles. For instance, upland rice growing in the highland mountain requires water from the watershed through stream. The irrigation is simply taken from the forest and once the process of rice growing was done, water running through the paddy field will be released back into the stream again.

Indigenous knowledge in land use and forest conservation reflects their holistic approach to sustainable resource management systems<sup>14</sup>. Lands are segregated into settlement, agroforestry/mix farm (of wild tea, bee hive, bamboo clumps), community forest, burial ground, shifting cultivation/rotational farming, and paddy field. Within the embrace of rich forest resources, the indigenous Karen have their own form of community-based forest management and the community reckons how to manage their living space and producing land with their own traditional knowledge in subsistent uses. This community has blended traditional agriculture — agroforestry as well as shifting cultivation — with evergreen forest and pine forest along the hills.

For agroforestry, they reject any single crop plantations since this may pose risk to the natural environment and forest resources as a whole. The imbalance can occur, natural harmony means not only what is suitable for forests, but also what consequences that might happen and disrupt the flow of food supplies. Single crops can also alter the

nature of the soil and disrupt the socio-cultural bonds between humans and forests. As such, no single crops are cultivated at this rural village. Monetary gain from the single crops cannot sustain and what has lost is not easy to regain. In a way this is to counter the dependency on the market demands which leads to mass production of single crops and as a result the loss of a sense of self-sufficiency. In the farming areas, there are many other foodstuffs simultaneously grow with rice such as melons, cucumbers, beans and etc. This is the proof that multiple crops are more compatible with Mother Earth. The emphasis on sustainability of food is a crucial concern for the community, and zoning for living, preserving, and producing areas strengthen the community in self-sufficiency in food and products. The community formulates rules to restore forest resources in the form of government project, and in so doing the Karen indigenous knowledge officially perpetuated.

For shifting cultivation or rotational farming, the tradition farming has been passed on from their ancestors. In this way the community prioritizes only the needed space through multiple fields for cultivation or “planting crops on the hill,” which rotate between short and long periods (1-10 years) for the land to recover. In effect, the practice of shifting cultivation<sup>15</sup> renders the regeneration of flora and fauna and the biodiversity as well as prevents lands from excessive use and degradation. Such practice is a natural and organic way which ensures food security and seeds for the next round of farming. Furthermore, the traditional rituals and spiritual beliefs characterize how they relate respectfully with nature and acknowledge their place in it without claiming ownership, but instead, stewardship.

Karen indigenous knowledge helps to preserve biodiversity of the forest and ecological systems in the long-term. In the past, the common belief of forest destruction was partly due to shifting cultivation which was labeled as “forest destroyers” or “illegal occupants” for several decades. However, in the recent years, once the better understanding of the shifting cultivation was acknowledged and so it is now politically called the rotational farming or *Rai Mun Wian*, and is also underpinned by

recent research that this process benefits the earth's biodiversity with an alteration of fallow periods where the land is left to its recovery stage of fertility. This type of farming is considerably reliable and highly preferred by the community for food variety, low carbon emission, and sustainable use and management of resources. The indigenous knowledge of choosing soil and preserving watershed is also paramount to their wellbeing. This can be referred to as the Karen philosophical concept of the humans-forest relationship or the livelihood-based forest management of the Karen. This has challenged some misunderstandings about the ethnic Karen where they have been perceived as agents of deforestation.

### **Local Consciousness and Preservation of Karen Indigenous Knowledge**

Considering themselves as the people of forests, the Karen perceive humans and nature as part of the same holistic diversity<sup>16</sup>. The local way of life has led to self-sufficiency and sustainable livelihood, and resolute socio-cultural identity. This becomes local self-consciousness of their presence of forest conservation. The community tries to instill this in the mindset of the youth. Jiao et al. pointed this out through an example of Hani indigenous people in Yunnan, China, in particular the important role of the youth in the conservation of local biodiversity and their unique cultural landscape of rice terraces:

Most of the younger generation [who have better education than their parents and grandparents] no longer believe that they are an integral part of the natural landscape or that they are spiritually connected to the flora and fauna that sustained their forebears. As such, the sustainable use of natural resources that was inherent in the traditional practices of the Hani people may be unable to survive the onslaught of the consumer culture or of the tourism industry that are rapidly penetrating this region.<sup>17</sup>

Only if the young indigenous people believe that they are an

integral part of the natural world and are spiritually connected to the local biodiversity that sustained their forebears, can the sustainable use of natural resources continue.

The Karen co-existence with forests manifests from their cradle to death. The Pgaz K'Nyau have a ritual practice of *deipauz htoof* where the newborn child's navel<sup>18</sup> is tied to a tree signifying a deep sense relation and a spiritual bond of dependency that facilitate deep respect for the forest. This is a socio-cultural strategy to instill in the babies at birth of their relation with the tree in a sacred forest. Their traditional beliefs and practices contribute to their moral values groundings and conscience in living with the forest.

The Karen *Hta* has transmitted the ideas, legends, folklores, sayings, wisdom and insights toward the young in the community. Such self-awareness of the indigenous people in this community indicates how they significantly appreciate their traditions, and find appropriate means to embody them. Interesting self-awareness usually dictates cultural assumption, inner determinants, experience and competence to act and continue to live out the living tradition of the ancestors. The tradition is neither static nor ready-made product of value but invented through time to help the locals adapt themselves to their environment. In this sense, the locals can live out the living tradition of the ancestors. Obligation as a result becomes self-imposed duties to face the changing reality within the environments in which they happen to act.

The Karen community has an oral tradition.<sup>19</sup> The oral tradition and other ethnic rituals are a means of socio-cultural transmission of indigenous knowledge from the older generation to the younger generation. As a result, the generation gaps are bridged and cultural values transmitted. The knowledge exchange from one generation to the next comes in two ways: theory and praxis. For the youth, theory is all about stories, legends, folktales, and etc. that teach and inculcate the values of life and living. As for the praxis, it is simply learning by doing. This approach has been characterized through their way of life. Besides, the youth can gain practical knowledge and skills through their

first-hand experiences. For instance, the youth are working with their parents in the fields whenever possible. Their local way of life has led to self-sufficiency and sustainable livelihoods, and resolute socio-cultural identity. It is clear that active participation of community members, especially women and youth, and their shared commitment towards common goals are among the strengths of Hin Lad Nai people. Such notions and practices are fully rooted in the patrimony associated with local wisdom and beliefs. Revival of traditional practices and cultures fully promotes community participation and social cohesion, and respect for local rules and regulations.

For decades, the community elders have been promoting good practices based on the interrelation of people and forests,<sup>20</sup> because the Forestry laws are insufficient to care for the forests<sup>21</sup> without true awareness and deep respect for the forest. In return, a good practice of caring for the forests has earned the community the Green Globe Award, the global certification for sustainable tourism in 1999 for a decade (1999-2008). In 2013 the title “Forest Hero” was given to one of the local scholars by the United Nation (UN), the awardee as a representative for the entire community to celebrate the fruit of their conscientious effort to care for forests and natural resources.

The community of Hin Lad Nai gives priority to the “community rights,” where a sense of belonging and non-alienation provides room for the community to thrive according to traditional beliefs and cultural practices. This creates the possibility of long-term sustainable development of ecological knowledge in the ethnic community. The realization that there is a balance between the taking from forest resources and caring for them, is the key to sustainable living in rural ethnic communities.

Good practices emerging from indigenous ecological knowledge are grounded in the intimate connection between humans and environments which was expressed in social norms, cultural rituals, and spiritual beliefs for sustainability<sup>22</sup>. The villagers know that protecting and respecting the place where they live is a must without being told or being reprimanded to do so, since it is part of their way of life. In the consciousness of

the people, they respect the forest as their world and a home for their community and a *raison d'être* for their existence. The people and forest relationships are deeply intertwined. If the forest is being destroyed, the life of Karen people is at stake.

The difference that may occur is that the indigenous people are accustomed to use and exhaust it without replenishing it. The way of the Karen at Hin Lad Nai bridges the gap of this among people by teaching the way they live according to their spiritual beliefs and customs that they hold firmly within the community. The awareness is still being transmitted to the younger generation. This becomes the worldview and consciousness of the locals that is important to acknowledge since in our time the focus on development easily overlooks these rich local traditions and local sensitivities.

## **Conclusion**

The practices of ecological knowledge of the Karen at Hin Lad Nai not only aim at self-sufficiency as well as self-dependence but demonstrate universal strategies for resource use and sustainability that benefits ecosystems. Studying indigenous resource management, teaches us not only the importance of the humans-forest relationship for the sake of sustainable living, but also its role in spiritual wellbeing. The spiritual connection to the land and nature within the human-earth-spirit relationship has been communicated and transmitted across generations at Hin Lad Nai. The Karen cosmological belief in forest conservation is what most people have overlooked, and yet it is the most significant dimension that we can learn from the indigenous culture.

The focus of humans-nature-spirit relationships<sup>23</sup> is a crucial showcase study since it is not merely only a single form of resource management but also a whole intricate relationship between human and their natural surroundings or in today's terms, sustainable and environmentally friendly relationship. Understanding indigenous knowledge of human-forest relationships promotes not only Karen identity but the management of natural resources in the Mekong region.

Exchange of indigenous knowledge on forest conservation and securing the source of food and self-sufficient traditional livelihoods can lead to better understanding and respect for hill tribes in northern Thailand and elsewhere. Creating a right understanding with the people outside the community is also important through knowledge exchange and negotiations with the local authorities. The new mutual understanding should foster the strengthening of local wisdom, identity, and the nourishing of diversity in society.

Forest authorities interested in promoting sustainable resource development and community-based forest management should reconsider policies directed toward the ethnic groups. As far as forest stewardship and natural resources are concerned, indigenous ecological knowledge is more effective since it is directly connected to the community's way of life and traditional beliefs as they develop from within, and are not merely laws imposed from the outside. The true sustainable development has to come from personal consciousness and community life based in a culture. The common ground is again to place emphasis on community participation and cooperation to manage their surrounding with the relevant regulations by the government agencies.

## ENDNOTES

<sup>1</sup> For constraints on ethnic minority participation in forest management in Thailand, see International Fund for Agricultural Development (IFAD). *Managing Forest, Sustaining Lives, Improving Livelihoods of Indigenous Peoples and Ethnic Groups in the Mekong Region, Asia: Lessons learned from the Learning Route*, (Rome, Italy, 2013), p.10; Yoko Hayami, "Negotiating Ethnic Representative between Self and Other: The Case of Karen and Eco-tourism in Thailand." *Southeast Asian Studies*. 44, no.3 (2006), p.398.

<sup>2</sup> *Managing Forest*, p.47.

<sup>3</sup> Douglas Nakashima, Lyndel Prott, and Peter Bridgewater. "Tapping into the World's Wisdom." *UNESCO Sources*, (July-August, 2000), p.11.

<sup>4</sup> For the roles of indigenous ecological knowledge, see Fikret Berkes, Johan Colding, and Carl Folke. "Rediscovery of Traditional Ecological Knowledge as Adaptive Management." *Ecological Applications*, 10, no.5 (2000), p.1251.

<sup>5</sup> International Land Coalition (ILC). *Sustainable Forest Management Ties Indigenous Group Together against Eviction Threats*. Case Study of the ILC Database of Good Practices, by Lakpa Nuri Sherpa and Erin Sinogba, (Rome, 2016), p.4-5.

<sup>6</sup> For the origin of the Pagz K’Nyau ethnic group, see Hayami Yoko and Susan M. Darlington. “The Karen of Burma and Thailand”. In *Endangered Peoples of Southeast and East Asia: Struggles to Survive and Thrive*, ed. Leslie E. Sponsel (Westport, Conn.: Greenwood Press, 2000); Pinkaew Luangaramsri. “Redefining Nature: Karen Ecological Knowledge and the Challenge to the Modern Conservation Paradigm.” (Ph.D. Dissertation, University of Washington. U.S.A., 2000), p. 47-57.

<sup>7</sup> Prasert Trakansupakorn. “Spaces of Resistance and Place of Local Knowledge in Karen Ecological Movement of Northern Thailand: The Case of Pagz K’Nyau Villages in Mae Lan Kham River Basin.” *Southeast Asian Studies*, 45, no.4 (2008), p.587.

<sup>8</sup> Ibid., p.600.

<sup>9</sup> Ibid.

<sup>10</sup> PROCASUR Corporation. *Sustainable Solutions for Self-sufficient People”, Shifting Cultivation as an Integrated and Self-sufficient System: The Experience of Huay Hin Lad Nai*. Report for Systematization and Sharing of Good Practices in Rural Development Huay Hin Lad Nai, Chiang Rai Province, Kingdom of Thailand (2012), p.51. \_

<sup>11</sup> *Managing Forest*, p.51.

<sup>12</sup> International Labour Organization (ILO). *Traditional Occupations of Indigenous and Tribal Peoples: Emerging Trends*. Project to Promote ILO Policy on Indigenous and Tribal Peoples, (Geneva, 2000), p.33; Viveca Mellegard. “How Hin Lad Nai’s Farming Saved a Forest and Its Poetry Changed International Policy.” RE.THINK, Last modified (May 25, 2017): Virginia D. Nazarea. “A View from a Point: Ethnoecology as Situated Knowledge.” In *Ethnoecology: Situated Knowledge/Located Lives*, ed. Virginia D. Nazarea, 3-20. (Tucson: University of Arizona Press, 1999).

<sup>13</sup> Jintana Kawasaki. “Assessment of the Role of Karen’s Ecological Knowledge to Sustain Biodiversity, Ecosystems and Ecosystem Services in Northern Thailand.” In PBES-JBF Sub-regional Dialogue Workshop Report on Indigenous and Local Knowledge (ILK) for South-East and North-East Asia sub-region, Chiang Mai, Thailand, October 14-17, 2016. Institute for Global Environmental Strategies (Tokyo, 2017), p.10-11.

<sup>14</sup> Ibid., p.7.

<sup>15</sup> For the benefits of shifting cultivation, see Prasert Trakansupakorn. “Rotational Farming, Biodiversity, Food Sovereignty and Climate Change of Karen (Pagz K’Nyau) Community in Northern Thailand”. In *Indigenous Valuation of Biodiversity and Ecosystem Services Compared to Other Ways of Valuation in the Context of IPBES*, ed. Jürgen Nauber and Alex Paulsch (Bonn, German Federal Agency for Nature Conservation (BfN), 2014), p.28; *Assessment of the Role*, p.10-11.

<sup>16</sup> *Redefining Nature*, p. 120-121.

<sup>17</sup> Yuanmei Jiao, Xiuzhen Li, Luohui Liang, Kazuhiko Takeuchi, Toshiya Okuro, Dandan Zhang, and Lifang Sun. "Indigenous Ecological Knowledge and Natural Resource Management in the Cultural Landscape of China's Hani Terraces." *Ecological Research*, 27, no.2 (2012): p.260.

<sup>18</sup> *Assessment of the Role*, p.7.

<sup>19</sup> *Traditional Occupations*, p.33.

<sup>20</sup> *Managing Forest*, p.49.

<sup>21</sup> *Rotational Farming*, p.29.

<sup>22</sup> *Assessment of the Role*, p.7-8.

<sup>23</sup> Yos Santasombat. *Biodiversity: Local Knowledge and Sustainable Development*. Regional Center for Social Science and Sustainable Development, Faculty of Social Sciences, (Chiang Mai University, 2003).

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