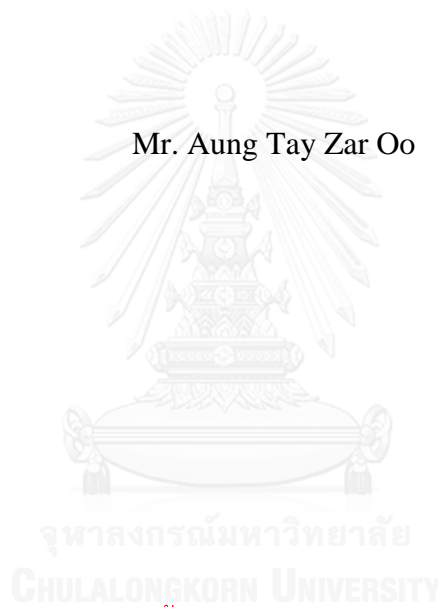


THE DYNAMICS OF LOCAL AGRICULTURAL KNOWLEDGE  
AND SUSTAINABILITY: A CASE STUDY OF A PA-O COMMUNITY  
IN SHAN STATE, BURMA

Mr. Aung Tay Zar Oo



บทคัดย่อและแฟ้มข้อมูลฉบับเต็มของวิทยานิพนธ์ตั้งแต่ปีการศึกษา 2554 ที่ให้บริการในคลังปัญญาจุฬาฯ (CUIR)  
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พลวัตและความยั่งยืนของความรู้ท้องถิ่นด้านเกษตรกรรม:  
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สาขาวิชาการพัฒนาระหว่างประเทศ  
คณะรัฐศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย  
ปีการศึกษา 2557  
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Thesis Advisor	Narumon Arunotai, Ph.D.

---

Accepted by the Faculty of Political Science, Chulalongkorn University in  
Partial Fulfillment of the Requirements for the Master's Degree

..... Dean of the Faculty of Political Science  
(Associate Professor Ake Tangsupvattana, Ph.D.)

THESIS COMMITTEE

..... Chairman  
(Associate Professor Niti Pawakapan, Ph.D.)

..... Thesis Advisor  
(Narumon Arunotai, Ph.D.)

..... External Examiner  
(Assistant Professor Nalinee Tuntivanich, Ph.D.)

จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY

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ชนเผ่าปะโอเป็นกลุ่มชาติพันธุ์ที่ใหญ่เป็นอันดับที่ 7 ในประเทศพม่า มีพื้นฐานใน  
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สิบปีที่ผ่านมา ชาวปะโอได้เปิดรับความรู้จากการเกษตรอุตสาหกรรมแนวใหม่ มาเป็นยุทธศาสตร์  
ในการรักษาและพัฒนาความเป็นอยู่ที่ยั่งยืนต่อการขาดแคลนที่ทำกินในภาวะที่จำนวนประชากรเพิ่ม  
มากขึ้น ทว่าแผนที่วางไว้ไม่ได้ช่วยในการรักษาและพัฒนาความเป็นอยู่ เนื่องจากเกษตรกรชาวปะ  
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โอ เจ้าหน้าที่องค์กรพัฒนาเอกชนและผู้เชี่ยวชาญทางการเกษตร ที่มาจากรัฐฉานทางตอนใต้  
การศึกษานี้พบพลวัตการเปลี่ยนแปลงความรู้ทางการเกษตรของท้องถิ่นในชนเผ่าปะโอ และ  
ผลกระทบต่อความยั่งยืนในการดำรงชีวิตของชนเผ่าปะโอ ทั้งนี้ จากการศึกษาที่ยั่งยืนได้ว่า การ  
ผสมผสานความรู้จากการเกษตรอุตสาหกรรมไม่นำไปสู่ความยั่งยืน เนื่องจากความรู้แนวใหม่ที่  
รับมานั้นไม่สามารถแก้ไขปัญหามหาชนที่เพิ่มขึ้นและที่ทำกินที่ขาดแคลนได้ การ  
วิเคราะห์และข้อสรุปของการศึกษานี้ทำให้เราเข้าใจถึงกระบวนการเปลี่ยนแปลงความรู้ทางการ  
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AUNG TAY ZAR OO: THE DYNAMICS OF LOCAL AGRICULTURAL KNOWLEDGE AND SUSTAINABILITY: A CASE STUDY OF A PA-O COMMUNITY IN SHAN STATE, BURMA. ADVISOR: NARUMON ARUNOTAI, Ph.D. {, pp.

The Pa-O, the seventh largest ethnic group in Burma, engage primarily in agriculture, having practiced traditional farming methods for generations. However, in the past few decades, they have started adopting new knowledge from industrial agriculture. This is their strategy to sustain their livelihood endangered by the decreasing amount of land in ratio to the increasing population. This strategy, however, has not proved to be feasible as Pa-O farmers have to rely on input-intensive farming methods leading to more expenses and less income. This has resulted in heavy debt among farmers, out-migration of the young Pa-O, and intensifying environmental issues. Drawing upon the in-depth interviews with Pa-O farmers, NGO workers and agricultural experts in Southern Shan Region, this thesis examines the dynamics of change in local agricultural knowledge of the Pa-O and its impact on their livelihood sustainability. This thesis argues that the integration of new knowledge from industrial agriculture cannot bring about sustainability because this new knowledge cannot solve the issues of population and land scarcity. This analysis enables us to understand the process of change in local agricultural knowledge of the Pa-O and challenges imposed on the sustainability of their livelihood.

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## List of Acronyms

EMO	:	Effective Microorganism
FFS	:	Farmers' Field School
IMO	:	Indigenous Microorganism
KESAN	:	Karen Environmental and Social Action Network
NGO	:	Non-Government Organization
PNO	:	Pa-O National Organization



# **CHAPTER I**

## **INTRODUCTION**

### **1.1 Statement of the Research Problem**

This thesis aims to explore the dynamics of local agricultural knowledge of the Pa-O and the implications of integrating new knowledge from industrial agriculture into local knowledge. It aims to understand how different actors such as local agriculture-based NGOs, agricultural experts and knowledge from agricultural companies, together with social, economic and environmental changes influence Pa-O farmers to adopt new knowledge as a strategy for their livelihood sustainability. It looks closely at different layers of the process of change within local knowledge.

The Pa-O who live in middle Burma and Southern Shan State are an indigenous group who are facing increasing pressures from modern development, growing population and scarcity of land. These factors have created new challenges for the Pa-O to maintain their livelihood sustainability and to continue practicing their traditional farming methods. In their attempt to achieve livelihood sustainability, they have integrated new knowledge from industrial agriculture that attempts to engage local farmers in large-scale monocropping. They have also interacted with agriculture-based NGOs that aspire to promote sustainable agriculture. The integration of new knowledge into the local agricultural sector has reshaped their own knowledge on agricultural practices. Therefore, it is important to study the dynamics of change within their local agricultural knowledge in order to understand the factors behind this new knowledge integration from industrial agriculture, and its impact on the livelihood sustainability of local farmers.

Mainstream development relies on economic growth. Through the whole cycle of resource exploration and extraction, production, energy consumption, waste generation, and consumers' use and disposal of products, industry and its products have

an impact on the resource base and the environment of the planet. Today degradation of land and freshwater systems, greenhouse gas emission and the release of a huge amount of agricultural chemicals into the environment are taking place at a rate unseen in the past 10,000 years. Carbon dioxide levels, at 395.5 parts per million, are considered to be at historic highs (Millen, 2015). Most of these forms of environmental degradation are directly related to and contributed by the economic growth paradigm the majority of the world has embraced. Modern development is being implemented beyond the capacity of the planet, and material progress is being achieved at the cost of leaving behind an unlivable planet for future generations. The patterns of consumption, value systems, and economic systems today are antithetical to sustainability. On the other hand, indigenous peoples often possess a broad knowledge base regarding the behavior of complex ecosystems and they have a long history of resource-use practices (Gadgil, Berkes, & Folke, 1993, pp. 151-156).

Modern scientific knowledge views humans as being above and apart from the natural world. This knowledge may have had successes in advancing human understanding and exploiting simpler systems. However, it has not been very successful when challenged by complex ecosystems (Gadgil et al., 1993). Over time, people have started to take it for granted that modern science is the only way of knowing, which undermines the existence of many other forms of knowing and knowledge. Local knowledge of indigenous peoples is a way of knowing that has existed in traditional communities for centuries. It can be best explained as a knowledge that is centered not on exploitation, but in harmony with the natural world. Indigenous peoples do not consider the natural environment as 'wilderness' or 'a source of threat and danger'. They do not consider themselves as separate from it, and most importantly, they do not think they are superior to it. The forest is an integral part of their communities. It is 'their source of life', 'their university', 'their hospital' and 'their home'. In many parts of the world, indigenous communities have classifications for soils, climate, plants and animal species and recognize their unique characteristics. They have managed their forests sustainably for centuries. They use their intimate knowledge of the natural environment, not to exploit, but to co-exist with it. This involves careful management, control of population, the use of small quantities but a wide diversity of plants and animals, small

surpluses and minimum wastage. Their worldview is embedded in the notion that all flora and fauna have a place in a complex universe made up of human, nature and spirits. Their belief systems guide them to protect nature and other beings.

Local knowledge of most indigenous peoples centers around agriculture and is rooted in the concept of environmental and livelihood sustainability. For instance, shifting cultivation is a common agricultural practice among indigenous peoples living in Burma including the Karen, Shan, Pa-O, and the Kachin. In this system, plots of land are cultivated for one or two years until the nutrients in the soil are used up. Then, new plots are occupied and the old plots are left fallow in order to regenerate. Years later, the old plots are re-cultivated. A large diversity of indigenous peoples has been practicing shifting cultivation, or swidden (sometimes called “slash and burn”) for hundreds of years. Madegowda argues that shifting cultivation is more sustainable than permanent farming systems in tropical areas. In his argument, he singles out Soliga people of Karnataka State in Southwest India as an indigenous group who have been practicing shifting cultivation for years on a sustainable scale (Madegowda, 2009, pp. 65-69). The indigenous peoples of Burma use in their farming a complex mix of forest management techniques and natural pesticides and herbicides, therefore chemical fertilizers are not needed. Moreover, this system allows them to preserve a variety of local seeds. However, in areas where the population of civil war refugees is high, there is a scarcity of land and a higher demand for food. This has caused changes in their traditional practices (Karen Environment and Social Action Network, 2009). In those areas, farmers return to the old plots after two or four years, which leads to an imbalance due to decrease in soil quality and an increase in pests and weeds.

In countries like Burma and Cambodia, a huge challenge for indigenous peoples to maintain practicing their traditional farming methods is the lack of strong land and environmental laws; the existing ones are either weak or not enforced effectively (Colchester et al, 2013). According to the 2008 constitution of Burma, the state holds the ultimate ownership of all of the land and natural resources above and below it. Over the past 50 years, they have confiscated land from farmers and transferred it to cronies and military conglomerates who invest in mining and input-intensive agriculture. This

is a massive threat to both the livelihood of indigenous people and their knowledge. For indigenous people, the loss of land and natural resources means the loss of their way of life, their knowledge and their traditions.

This thesis looks at the dynamics of local agricultural knowledge of the Pa-O. Local knowledge may take on different forms according to different locales and cultures, and it is not static but evolves through time. In West Bengal in India, the local government amended the forestry legislation in 1990 to integrate knowledge of the local communities into scientific principles of modern forestry management. Because indigenous community members were appointed to forest protection committees, they could help the experts from outside to understand how community forests have been conserved traditionally. Mishra argues that the integration of local knowledge into modern forestry management has led to better management of forests, a richer anthropogenic activity and higher biomass yields (Mishra, 1998). It should also be noted that local knowledge would have also been reshaped by such government-led forest management projects, which is not necessarily a bad thing. Another important issue is that not all pre-scientific societies have always lived in harmony with nature, and neither have all indigenous communities outside industrial societies. Even today, there are nomadic hunter-gatherers who do not have ties to any resource base and territory. These indigenous groups might not gain much from frugal resource use. This is also true for some tribes who move around colonizing new territories as resources are depleted.

Additionally, indigenous communities will be facing more and more external influences and challenges, for instance, there will be an increasing demand for land because of population growth and for development projects, especially in least developed countries such as Burma, Lao PDR and Cambodia in the case of Southeast Asia. This will negatively affect the land use and livelihood of indigenous peoples as well as their knowledge. In response to this, indigenous peoples may need to engage with governments and civil society organizations to increase awareness on issues around environment, politics, food security and so on. Based on such issues and changes, indigenous communities may need to adopt new sustainable strategies and



integrate new forms of knowledge into their local knowledge.

The research findings will contribute to a better understanding of the process of change within the local agricultural knowledge of the Pa-O and why they have adopted new knowledge from different sources in their attempt to achieve livelihood sustainability. The results will shed light on the challenges the Pa-O farmers are facing today to sustain their livelihood while these results will also reveal the linkages between their agricultural practices and the globalizing impacts of other issues such as modern development, environmental degradation, population and migration. Therefore, this thesis has a significant importance.

## Pa-O



*Figure 1: Ordination Ceremony of Buddhist Pa-O (Photograph: Maung Day)*

The Pa-O are the seventh largest ethnic group in Burma, with an approximate population of 600,000. They are the second largest group in Shan State, and also live in Kayin State, Kayah State, Mon State and Bago Division. They are believed to be of

Tibeto-Burman origin and have 24 sub-groups (Pa-O National Organization, 2010, p. 23). They believe that they are descendants of a father who was a *weiza*, a supernatural being, and a mother, who was a dragon. They also believe that the Karen, the Karenni and the Padaung indigenous groups are their siblings. The Pa-O engage primarily in agriculture, cultivating their staple cash crop, the *thanapet* tree, the leaves of which are used for wrapping tobacco and herbs to make most of the country's cheroots (a kind of hand-rolled cigarette common in Burma). While tobacco is cultivated in the arid central plains, the *thanapet* leaf grows well in the hills of Shan State. The capital Taunggyi, in particular, is renowned for producing the best cheroots.

Chann argues that the traditions and cultures of the Pa-O are little-known and gradually disappearing (Chann, 2004). This is true for many small ethnic groups in Burma as Burmanization and centralization processes have been consistently implemented by successive governments over the past fifty years. These governments have made systematic efforts to instill a Burman superiority in the consciousness of the people through education, economic and cultural policies. In the education sector, governments have used the official slogan "Burmese is what we read, Burmese is what we speak" and have made all schools in the country, regardless of the students' ethnic origins and mother tongue, use Burmese language as the only official language. Ethnic groups have demanded for autonomy in education for decades, but have been consistently refused. This also reflects the reluctance of the government to decentralize power towards federalism that the ethnic groups have requested. We can easily see that Burmese language has been a very crucial tool for propaganda for the government. They have created a grand narrative that implies the Burmese, (or the Burman) are superior to all the other ethnic nationalities and that the Burmese are the leaders of the country's unification process.

With the country opening its arms to foreign investment today, big-scale infrastructure and development projects have reached and will reach places where ethnic minorities live, and this will also affect the traditional life and agriculture of indigenous ethnic minorities. In the case of the Pa-O, foreign agricultural companies have already entered their agricultural communities to do business. That is why, it is

very important to understand the way the Pa-O engage their local knowledge in agriculture and the way they adapt to new knowledge to achieve livelihood sustainability.

## **1.2 Research Questions**

1. Why do Pa-O farmers integrate new agricultural knowledge into their local knowledge?
2. How do Pa-O farmers integrate new agricultural knowledge into their local knowledge and how do different actors contribute to this process of knowledge integration?
3. What are the immediate and long-term impacts of this knowledge integration on the livelihood sustainability of Pa-O farmers?

## **1.3 Research Objectives**

1. To research the factors behind the integration of new agricultural knowledge by Pa-O farmers.
2. To understand the process of new knowledge integration by Pa-O farmers and to explore the roles of different actors in this process.
3. To research the immediate and long-term impacts of new knowledge integration on the livelihood sustainability of Pa-O farmers.

## **1.4 Conceptual Framework**

FAO defines local knowledge as the knowledge that people in a given community have developed over time and this knowledge development is based on experience and embedded in community practices, institutions, relationships and ritual. Local knowledge is tested over centuries of use and has a dynamic nature (FAO, 2004). The

users adapt their local knowledge according to the local culture and environment. This adaptation may take place continuously as the local culture and environment are also changing all the time, triggered by changing social, economic and political patterns in the society. As the framework below shows, the engagement of the Pa-O in their agriculture with their local knowledge is not a linear process, and never simple. Their knowledge is never stationary but always subjected to change and evolution. Because their knowledge has originated in their cultural roots and within the local context, we cannot say it has no weaknesses. All knowledge systems have both strengths and weaknesses, and local knowledge is no exception. All the same, either local or scientific knowledge will never have a one-size-fits-all functionality (Grenier, 1998). In many cases, local knowledge is improved by the local community by incorporating from other sources what is appropriate in their local context. We can see these examples from KESAN's (Karen Environment and Social Action Network) involvement in community forest management of Karen villages. KESAN is a local NGO that has been working with Karen communities since 1997. The process of their facilitation may be very much participatory, but there will always be knowledge input through this process.

In the case of the Pa-O, development and agricultural organizations such as Metta Development Foundation play a similar role as KESAN even though their involvement is more in the agricultural sector. Farmer Field School (FFS) trainings conducted by Metta utilize and bring in local agricultural and ecological knowledge in a participatory manner, however, agricultural experts from the Foundation also bring in systematic and scientific mapping systems and new knowledge. It is interesting to see how this new input shapes and changes the existing local knowledge. Such input cannot always be condemned as a bad influence because, as mentioned above, local knowledge is not always perfect. In some cases, indigenous farmers' experiments can be poorly designed and some may not be appropriate anymore under new geographical, demographical, social, political and economic conditions. In case of the Pa-O, they are also subjected to these new conditions, plus the impact from modern development and industrial agriculture.

Burma is entering a new phase in its history under Thein Sein's government and

changes that have come along with it. The new developments include an influx of foreign direct investment, which has brought to the country big agribusiness companies as well. At the same time, because of the centralized nature of the governing system and the perpetuation of exploitation and corruption, we are also seeing a widening of the gap between the rich and the poor. These are immense threats to the wellbeing of indigenous peoples and their local knowledge which is grounded in the sustainability of their agricultural livelihoods and the environment. This thesis aims to look at this complex dynamic, as shown in the framework below, to understand the linkages and to explore the strategies the Pa-O have applied to sustain their local knowledge and their livelihoods.

## 1.5 Research Methods

A qualitative method has been used for this study to answer the research questions and ensure that the objectives are met. This has been facilitated through a cross-sectional study using different methods including exploratory research, observation, in-depth interviews and expert interviews.

### 1.5.1 Data Collection and Methods: Literature Review and Field Study Research

To study the dynamics of local agricultural knowledge of the Pa-O in Southern Shan State, the following section will discuss specifics about the data collected in the field. The data for this thesis was gathered during a one-month field study trip. Pa-O farmers who have integrated new knowledge from different sources, especially from industrial agriculture into their local agricultural knowledge, agricultural experts and NGO staff who work in the area for different agricultural programs were interviewed. This thesis has also benefitted from reviewing the literature on engagement of local knowledge in environmental conservation and sustainable agriculture. Good practices of local agriculture and resources management by Soliga people from South West India and

Karen people from Burma have provided with a better understanding of local practices and they way these practices are adapted to emerging social, economic and environmental contexts, while the case of the Karen communities also shows the involvement of outside experts and organizations in reshaping the local knowledge. The literature review has also provided the ever-changing nature of local knowledge and how indigenous peoples have made their choices to maintain their livelihood sustainability. All of the literature reviewed in this thesis has come into a synthesis of knowledge that has contributed a good background to the fieldwork.

## Experts and Key Informants

For this research, garlic was chosen as the crop based on which the dynamics of local agricultural knowledge of the Pa-O was explored. This research was conducted in Lwe Moon, a Pa-O village in Southern Shan State. Respondents came from three groups: experts, NGO staffs and local farmers. All these groups came from the same area and in-depth interviews were conducted. I conducted 10 interviews with ten farmers, 3 interviews with three NGO staff members from Naungkham Training Centre, and one interview with an agricultural expert also working at Naungkham Centre.

### 1.5.2 Research Scope

This research focuses on the dynamics of local agricultural knowledge of the Pa-O. Therefore, this research does not cover many other aspects of their local knowledge. However, when it comes to local knowledge, it is impossible to dissect one aspect from another as this type of knowledge is interconnected with many other aspects. Because of this, the surrounding components in the context of agricultural practices, for instance, social, political and cultural aspects were also touched upon.



Figure 2: The Map of Hsi Hseng Township, Southern Shan State  
 (Source: www.myanmars.net)

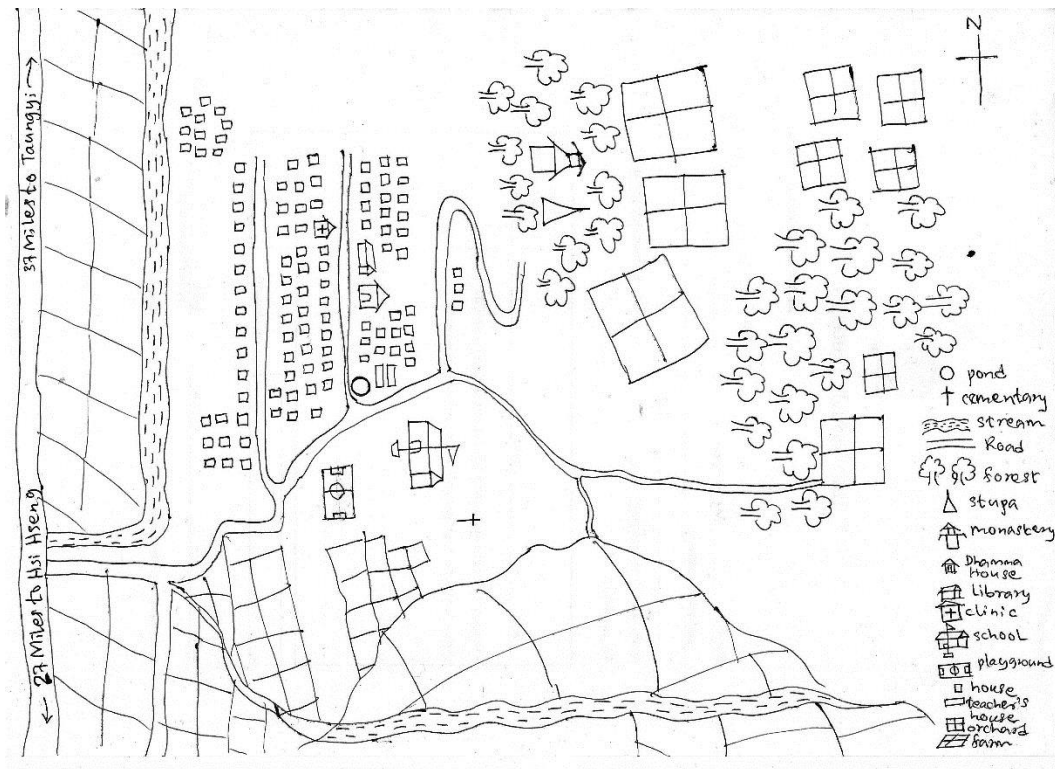


Figure 3: The Map of Lwe Moon village, Hsi Hseng Township  
(Source: Naungkham Training Center)

### 1.5.3 Research Site and Sampling

Lwe Moon village in Southern Shan State is a Pa-O community with 257 households and 1315 population (M: 613, F: 702), and was chosen as the research site for this paper. I have spent a sizable amount of time working with community development workers in the area in the past, and this has provided me with an opportunity to know the people from the community and build a relationship with them. Knowing the development workers there—who are mostly Pa-O—was also an advantage for me as I could get access to the body of knowledge they have accumulated over the past years through their agricultural programs. This has helped me to understand how agriculture-based NGOs have contributed to shaping local agricultural knowledge of the Pa-O by sharing “sustainable” farming methods.

Ten Pa-O farmers, who farm garlic, were the main focus of this research. They included young, middle-aged and elderly farmers. They had differing financial status



and agricultural practices; some did subsistence farming and others larger-scale farming. I looked at their use of local knowledge in agriculture and surrounding aspects of it, such as social, spiritual and cultural aspects. I also paid attention to how they have integrated new knowledge from industrial agriculture to solve the issues of a growing population in ratio to the arable land they had. I carried out in-depth interviews with these farmers to explore the outcomes from this integration of industrial farming methods. These interviews touched upon the outcomes, both good and bad, in relation to social, economic and environmental aspects. I had easy access to the village because staff members of Naungkham Training Centre introduced me to the village head and farmers. Naungkham Centre was set up as an agricultural training facility in 2003 and it is situated in Hsi Hseng Township. It was co-established by Metta Development Foundation and the Pa-O National Organization to bring sustainable agriculture to the region. The Centre implements Metta's projects—Metta is a local NGO active in many parts of Burma having set up regional offices in most of the states and divisions. Through the Farmers' Field School approach, agricultural experts from the Center give technical support to local farmers. I did in-depth interviews with the Centre's staff members and experts to learn their views on the issues around sustainable agriculture and their analysis on the integration of industrial farming methods by Pa-O farmers in the region.

#### 1.5.4 Methods of Data Analysis Procedure

After conducting the interviews with farmers, agricultural experts and NGO workers, the voice recordings were transcribed and translated from Burmese into English. Then, the data derived from these interviews were grouped under different categories that correlate the research questions and different parts of the thesis structure. By doing so, the data became accessible and ready for analysis. During the process of analysis, important data that is highlighted in this thesis was identified and analysis was made on different levels to reflect the perspectives of farmers, agricultural experts and NGO workers regarding the adoption of new knowledge by farmers from different sources, especially from industrial agriculture. The factors behind this phenomenon were explored and analysis was also made to show the linkages between the erosion of

local knowledge and the impact of external factors such as modern development, industrial agriculture and scarcity of land. Different perspectives of interviewees were juxtaposed to find incongruences and consensus on issues. The roles of NGOs, industrial farming methods and agricultural experts in reshaping the local agricultural knowledge of the Pa-O were discussed based on the data derived from the in-depth interviews, and conclusions were made to discuss the outcomes of integrating new agricultural knowledge in relation to livelihood and environmental sustainability of Pa-O farmers.

#### 1.6 Language Use and Use of a Translator

This research was conducted in a Pa-O village in Southern Shan State, and therefore, being non-Pa-O, the researcher used a translator during the in-depth interviews where the interviewee was unable to speak Burmese. One translator was used and the purpose of the research was explained in detail before conducting interviews for better understanding.

#### 1.7 Ethical Issues

The topic of this research is not an issue of controversy and therefore I did not see any potential risks for myself or for those being interviewed. However before conducting any interview, I explained to the interviewee the purpose of the interview and what the information would be used for. I also asked all participants of my research to sign a consent form agreeing that I could use the information they provided for my thesis paper and also asked for their permission to use their name or title, where necessary.

#### 1.8 Significance of the Research

I hope that my research on the dynamics of local agricultural knowledge of the Pa-O will contribute to filling a knowledge gap in development studies and social sciences. One reason for this is that the local knowledge of the Pa-O has never been offered a

substantial academic research even though this small ethnic group has a strong tie to their land, culture, value system and knowledge systems, consistent with the ideas of holism and sustainability. Another reason is that local knowledge can be considered as an alternative collective wisdom relevant to a variety of issues and subjects, especially at a time when dominant knowledge paradigm, values, norms and laws are called into question. Moreover, because all knowledge systems including that of indigenous peoples are always changing depending on many factors, such as impact from modern development, increasing population and decreasing land availability, and growing demand for food. This has led to indigenous peoples adopting new knowledge to adapt to the changing context. The Pa-O are one of those indigenous groups and they have integrated new knowledge from different sources especially from industrial agriculture to achieve livelihood sustainability. Therefore, I believe that it is important to study this process of change in order to understand how indigenous peoples strategize to respond to pressures for sustainability and what the outcomes are. I also hope that this research can be of help in getting the importance of local knowledge acknowledged by the society, and thus contributing to indigenous peoples from Burma being included in development decision making.

## **CHAPTER II**

### **LITERATURE REVIEW**

The following section is part of the literature review that discusses three key topics: local knowledge and sustainable development, local knowledge and sustainable agriculture, and erosion of local knowledge.

#### **2.1 Local Knowledge and Sustainable Development**

Sustainable development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987). Sustainable agricultural and resource development means “the utilization, management and conservation of the natural resource base and the orientation of technological change to ensure the attainment and continued satisfaction of human needs—such as food, water, shelter, clothing and fuel—for present and future generations” (Titilola, 1995).

Grenier has made some valid observations regarding the development paradigm. She observes that development that has been implemented over the past several decades has placed enormous pressure on the planet's soils, watersheds, forests and other natural resources. Then she argues that some development solutions are not economically feasible and culturally appropriate, and thus have been abandoned; and that development projects benefit only a small number of people who are also considered privileged in the society (Grenier, 1998). One reason is modern development is rooted in western science—which is considered by the majority of people today as the only way to know and understand our world—and tends to treat problems by dividing them into small compartments, removing all the interlinkages with many other possible factors, whereas local knowledge takes into account the interaction of multiple factors,

social, cultural, political, spiritual and so on, in its approach to problems. Development practitioners have increasingly supported the idea that local knowledge of indigenous peoples can “create mutual respect, encourage local participation, and build partnerships for joint problem solution; facilitate the design and implementation of culturally appropriate development programs, avoiding costly mistakes; identify techniques that can be transferred to other areas; help identify practices suitable for investigation, adaptation and improvement; and help build a more sustainable future” (Grenier, 1998).

The involvement of indigenous peoples and their knowledge in local development programs should be underlined by the participation of these people in important decision making processes that will affect their lives and environment. Moving towards sustainability also means that local people needs additional resources and a better control of their local resources, for instance land and resource tenure play a very crucial role in livelihoods and food security of local people. Therefore, states should foster a strong governance and decentralization process of resource management that pays attention to needs at both local and national levels. As scarcity of natural resources and environmental degradation worsen, there will be more and more demands for sustainable strategies. In such a scenario, local knowledge of indigenous peoples, which is underlined by its holistic approach to the natural environment and sustainable livelihood strategies, will be able to play an important role in providing viable and practical solutions. It is true that it can be a daunting task to interpret local knowledge within the framework of science as practice and belief are interlinked in local knowledge. However, it is still possible to abstract the knowledge that is related to utilization, for instance, physical methods of farming such as integrated farming, or traditional medical practices. On the other hand, how local knowledge likewise inform scientific frameworks to be more holistic. Again, it is very important that modern conservationists, researchers and governments involve indigenous communities in forest and resource management, so that they can benefit from traditional methods and knowledge of indigenous peoples on conservation and forest management.

## 2.2 Local Knowledge and Sustainable Agriculture

Indigenous peoples use a variety of agricultural practices, which include determination of favorable times for preparing the land, planting and harvesting; land preparation practices; propagation of plants; seed storage and processing; seed practices; methods of sowing; seedling preparation and care; farming and cropping systems; crop harvesting and storage; food processing and marketing; pest-management systems and plant protection methods. Different indigenous groups have created different agricultural methods based on a number of factors including geographical features, available resources, climates and ecosystems that each group depends upon.

Indigenous communities in tropical areas practice similar agricultural methods, especially shifting cultivation. It should also be noted that these practices reflect many aspects of a group of indigenous people, such as social, political and spiritual aspects. For instance, In the Soliga communities in South West India, the plot for cultivation is chosen by the tribe's elders. After the elders have identified the plot, the weeds and bushes are cleared off the land for growing crops (Madegowda, 2009). According to this practice, it can be observed that the Soliga elders are respected as custodians of local knowledge, and that they also hold power in decision making that concerns the life of a Soliga. In many communities like this, local knowledge that encompasses a huge range of areas, from agriculture to making toys, from courtship to waging territorial wars, is passed along from one generation to another, and mostly the elders are both archivists, sages and teachers in the process of knowledge distribution and transmission. In the Soliga communities, when they clear off the land, trees are always left standing on the land because they never cut the trees. After that the cleared plot is treated with fire as they believe that ash adds more nourishment to the soil. When comes the monsoon, the Soligas sow various kinds of crops including maize, *togari*, field beans, cucumber and different species of climber beans which would climb up the trees standing on the land. After maize, they grow bananas, mustard, chilies, papaya, guava, lemon and different kinds of millets. They would use the same plot for three or more

years and when the soil is depleted of nutrients, they move to a new plot. These are commonly recognized as sustainable practices.

Shifting cultivation is also a common practice among different ethnic groups of Burma. For instance, the Karen, whose economy is largely based on subsistence dry rice production, choose a plot for growing rice every year and after seven years, they return to the first plot and cultivate again. Because they employ a mix of forest management techniques and natural fertilizers, their agricultural practices contribute the sustainability of soil and the environment. There are also other methods of farming practiced by indigenous peoples throughout the world.

Forest islands of Brazil are a cutting-edge agricultural practice. Kayapo Indians who inhabit the southern limit of the Amazon created this method based on their local knowledge in agriculture and forest management. These forest islands locally known as *apete* start as small mounds of vegetation with 2 m diameter. The mounds expand as the crops and plants on them grow bigger. The taller trees at the center are cut down to let sunlight in. Depending on the variety of plant species each mound contains and depending on the specific location of the mounds, their shapes vary. This is also one of many good examples of agricultural practices in the Amazon where different indigenous groups have created different agricultural methods with one common aim: to adapt to long-term changes in the forest structure. These forest islands produce up to 3 years and for some species such as yam, taro, banana and papaya, production period goes up to 6 years and more. The old mounds are not abandoned; they become forest patches and “game farms” for wildlife. Besides, they are still managed for fruit and nut trees (Gadgil et al., 1993). There are other good examples in China, Indonesia and Hawaii where more integrated methods of agriculture are practiced by making use of a mix of species and their ecological characteristics for more sustainable purposes. For instance, some traditional communities in China practice various forms of agriculture-aquaculture methods in which waste from farming becomes food for fish and fish waste becomes fertilizer for crops.

In his book *Mutual Aid*, Peter Kropotkin rejected social Darwinism by

emphasizing how cooperation and self-governance led to technological innovations and productivity in history (Kropotkin, 1955). Commons supported Kropotkin's argument by saying collective action is natural and common, and leads to sustainability (Commons, 1934). The success of community forests in Karen State can be considered a testament to these arguments.

The Karen who have a substantial wealth of local knowledge in forest management have always efficiently conserved their forests. Some of the forests have been managed and conserved for more than three generations. However, these forests are subjected to illegal logging which poses a big challenge to the local communities. Since 2005, Karen Environment and Social Action Network (KESAN)—a local environmental and rights group which started as a refugee camp-based youth group in 1997—has been working with Karen communities in community forest projects and other conservation projects. As of 2009, there were 9 community forests in Karen State. KESAN has been conducting workshops to increase awareness among villagers and village leaders of the dire consequences of mining, over-logging, over-fishing, and over-hunting. The group takes on the facilitator's role for the villages that embark on conserving their forests. The process is entirely participatory; the communities identify their goals and objectives, decide their policies, rules and guidelines by themselves. The common goal of all these villages is to regenerate the ecosystem and to restore self-sufficiency to their communities, so that they can meet their long-term needs. The core value of this community approach is self-reliance.

These community forests have different sizes, the largest being 64 acres. In many cases, the facilitation of KESAN is just to provide the formal structure and give recognition to the already existing institutions which are in line with the Karen's traditions. The detail planning of a community forest group involves outlining land use, outlining the management plan as to how resources will be shared, how often bamboo and other plant species should be cut down for the community use, which species should be added to the existing forests and so on. They would also discuss how to share responsibility for monitoring the community use. Local knowledge is very central to this process and it should be noted that based on the information villagers receive from



the facilitating organizations, new knowledge and strategies are also added to the existing knowledge. Through this bottom-up approach, villagers are able to empower themselves. This again highlights the point that sustainability in agriculture and forest management can be achieved when local people with their local knowledge are placed at the center of programs in which experts, NGOs and local governments only act as facilitators.

### **2.3 Erosion of Local Knowledge**

Local knowledge systems, biodiversity, and cultural diversity—the three interacting, interdependent systems—are increasingly threatened with extinction these days. Some local knowledge has been lost naturally and very often it is lost because its techniques and tools are modified, or fall out of use. Other factors that accelerate the loss are rapid population growth, growth of international markets, educational systems, and development processes (Grenier, 1998).

Rapid population growth often triggered by in-migration or government relocation schemes resulting from mega development projects such as dams have changed the standards of living. Today most development projects with short-term economic gain are being favored over the ones that take into account the environment, livelihood sustainability and self-reliance of local communities. Many governments have claimed that these projects are implemented in their attempt to alleviate poverty. However, we are seeing increasing disparities as only a selected group of people are benefiting from these projects, and at the same time, a lot of indigenous communities are uprooted from their way of life, their cultures and most importantly their traditional knowledge systems, which are in danger of disappearing. It should be noted that local knowledge systems are embedded in specific cultural and social contexts, and have a strong tie to land. With increasing levels of poverty, farmers do not have enough time and resources to sustain the dynamic nature of their local knowledge systems through local experimentation and innovations (Grenier, 1998, pp. 65-69).

The loss of local knowledge is also strongly linked to the emergence of industrial agricultural practices that focus on monocropping. The policies promoting generic rice and wheat varieties devalue locally adapted species. The biodiversity and cultural diversity are even more at risk because of the advancement of food industry that promotes using genetically modified food and seeds. Deforestation is also a big threat to local knowledge in two ways. Firstly, it increases the loss of biodiversity that will result in the loss of medicinal plant species that in turn will result in the loss of traditional healing and medical practices. Secondly, deforestation will force indigenous peoples out of their home and land. That will lead them to migrating to other places—more often to cities—where it will be very difficult for them to practice their traditional knowledge. Another big threat is the oral nature of local knowledge itself. Local knowledge is orally transferred from one generation to another, and therefore it is subjected to rapid change. Moreover, because of internal migration, younger generations will end up adjusting their way of life to that of cities and it will be very difficult for the older generation to transfer knowledge to their children. The lack of protection of local knowledge on a national level intensifies these threats (Australian Human Right Commission, 2008, pp. 211-226). In many countries, mechanisms that protect and maintain local knowledge remain inadequate at all levels of governments, and in most cases, indigenous peoples are excluded from making laws and policies that will affect their life, knowledge and social and cultural values. At the same time, most countries are marching towards economic liberalization and people are embracing a more materialist worldview that makes them see indigenous people and their knowledge as obsolete and inferior.

## **2.4 Knowledge Gap**

The local knowledge of the Pa-O is underrepresented in the area of academic research even though they are one of the larger ethnic groups of Burma that engage their local knowledge in agriculture. This thesis contributes to filling this research gap, while it also offers a close investigation and insight into the dynamics of the Pa-O's local agricultural knowledge. It looks closely at multiple factors behind the integration

of new knowledge into their local knowledge and finds interconnections between livelihood sustainability and social, political, economic and environmental aspects.



## **CHAPTER III**

### **FINDINGS: THE INTEGRATION OF NEW AGRICULTURAL KNOWLEDGE BY PA-O FARMERS**

This chapter reveals and discusses the research findings from the field research. Firstly, the in-depth description of the engagement of local knowledge in garlic farming by Pa-O farmers in the past is presented. The description highlights their practice of crop rotation, their use of animals and animal manure for labor and fertilizers, and how they used and saved local seeds. It also explains about their traditional methods of garlic farming. Next, the chapter touches upon the relationship between agriculture and spiritual practices of Pa-O communities. Significant local spiritual practices are described followed by a discussion on the cultural perspectives of Pa-O communities. Finally, the integration of new knowledge from industrial agriculture is discussed based on the field interviews. The factors behind this phenomenon are unpacked and an analysis is made on the linkages between these factors. The chapter reaches the conclusion that because of emerging problems that include growing population, scarcity of land and increasing costs of living, the adoption and integration of new knowledge from industrial agriculture is an inevitable step for Pa-O farmers as they seek to achieve livelihood sustainability.

#### **3.1 Community Settings and the Background of Traditional Agricultural Practices**

Lwe Moon is a Pa-O village with 257 households and 1315 residents in Hsi Hseng Township, Southern Shan State. The approximate number of family members in each household is 5.1. Hsi Hseng is one of the three townships in the autonomous area controlled by the Pa-O National Organization (PNO), who signed a ceasefire agreement with the Burma Army in 1991. Lwe Moon started with 15 households 54 years ago and has been gradually expanding until today. It is a close-knit community renowned for the villagers' diligence and discipline. Every villager engages in growing agricultural cash crops such as garlic, turmeric and tobacco, and different kinds of vegetables (see

Table.1 for the seasonal calendar). Rice is grown for household use. Some villagers have opted for growing poppy for their livelihood. They choose poppy because they can make good money from it, and there is always a high demand. On the downside, poppy farming has contributed to a great deal of deforestation, and the number of poppy farmers is on the rise according to Khun Maung Khae, an agricultural technician from Naung Kham Training Centre located near Lwe Moon village.

The following paragraphs discuss traditional agricultural practices of Pa-O farmers that include crop rotation, using natural fertilizers and using local seeds. These practices were central to the agricultural life of Pa-O farmers in the past, and ecological sustainability was an important component in these practices. Using natural fertilizers and local seeds enabled the farmers to utilize and manage their resource base according to their needs in a sustainable manner and strengthened their self-reliance. However, Pa-O farmers face an ever-growing pressure on their livelihood sustainability, and this has led to them abandoning some traditional practices and integrating new knowledge from different sources. The process of their knowledge integration will be discussed in the next chapter.



Table 1: Seasonal Calendar of Pa-O (Lwe Moon Village, Hsi Hseng Township, Southern Shan State)

Crops	January	February	March	April	May	June	July	August	September	October	November	December
Irrigated Rice					Making ditches, sowing seeds	Sowing seeds and tilling	Sowing seeds, tilling, planting seedlings	Planting seedlings	Adding fertilizer and irrigation		Harvesting	Storage
Rain Fed Rice				Plowing	Planting	Planting	Weeding			Harvesting	Storage	
Garlic	Watering and weeding	Watering and weeding	Harvesting	Harvesting	Planting					Preparing soil	Preparing soil and planting	Preparing soil and planting
Turmeric	Harvesting, boiling, sun-drying	Harvesting, boiling and sun-drying	Harvesting, clearing land, preparing soil	Planting	Planting		Weeding					
Corn	Harvesting maize grain and selling	Selling	Selling	Preparing soil	Planting	Planting	Weeding			Picking corn	Picking corn and harvesting maize grain	Harvesting maize grain
Peanut	Preparing soil and planting	Preparing soil and planting	Weeding and loosening soil	Loosening soil			Digging up peanut					
Festivals			Pa-O National Day	Alms donation ceremony	Annual pagoda festival		Alms donation during the Buddhist Lent	Alms donation during the Buddhist Lent	Alms donation during the Buddhist Lent	Alms donation during the Buddhist Lent		

Table 1: Seasonal Calendar of Pa-O (Lwe Moon Village, Hsi Hseng Township)

### 3.1.1 Crop Rotation

Today garlic farmers from Lwe Moon village have integrated new knowledge from industrial agriculture by using chemical fertilizers and tractors in garlic farming. However, over many generations in the past, they used local farming methods and local seeds in garlic farming. It should be noted here that even though they have integrated industrial farming methods today, they are still using local seeds.

In the past, garlic farmers in Lwe Moon did subsistence garlic farming, which was enough for the household and left a little extra to sell. This should be considered in the context of a time when there was not a big market for garlic and farmers did not know anything about chemical fertilizers. Besides, the village population was much smaller compared to today's population. In those days, garlic farmers practiced crop rotation on the land they had. They never grew garlic on one plot for two consecutive seasons. After using one plot for garlic for a season, they grew beans on it to replenish the soil. These beans may include soya bean and a few other kinds, but one common kind is locally called *pe yin*. This bean does not allow weeds to grow and replenishes the soil fertility. After growing beans, or 'green manure', the farmers went back to the old plot and grew garlic again.

Crop rotation has been recognized as one of the oldest and most effective cultural control strategies. It is an ancient practice that includes planting of species in a particular order over sequential farming seasons. It has been a common practice in the East since 1000 B.C. (Bullock, 1992). Pests and disease-causing organisms are host-specific, for instance, rice stem borer feeds on rice. Therefore, if rice is not rotated with other crops of different plant species, the problem continues to exist because there is always food for the pest. Rotating rice with other crops that may include corn, beans and then bulbs will cause the pest to die as the food is no more. Crop rotation prevents soil depletion, maintains fertility, reduces soil erosion, controls pests, prevents diseases, suppresses weeds and lastly, reduces reliance on chemical fertilizers and pesticides (OISAT, 2010).

However, Lwe Moon village is facing an increasing shortage of land and this has led to farmers abandoning the practice of crop rotation. The village was established 54 years ago and started with 15 households. According to Khun Aung Than, a former teacher at the local school and garlic farmer, the village has been expanding quickly and this is a common issue not just in his village but in the neighboring villages also. Traditionally, Pa-O people divide their land and share it with their children when they marry and start their own family. Land has been shared this way for many generations, and today, with the increased number of village population, there is no more land to share with new generation. Lwe Moon village is made up of 257 households and 1315 residents today. Land scarcity means farmers are no longer able to practice crop rotation, and this is one of the reasons why they have adopted new knowledge from industrial agriculture by using chemical fertilizers. Industrial farming methods allow them to plant on the same piece of land every season even though over a period of time other issues have emerged from the application of this new knowledge such as decreasing soil quality and the need to put more chemical fertilizers every season.

Abandoning the practice of crop rotation has resulted in monocropping and that, in turn, leads to infestation of pests and diseases. According to Khun Myint Swe, an agricultural expert and garlic farmer, crop rotation contributes to weed suppression and because farmers can no longer continue this practice, they are forced to use chemical herbicides to control the weeds. Today garlic farmers from Lwe Moon make a heavy use of pesticides and herbicides in order to deal with the problems that their parents and grand parents did not have to deal with. The emergence of new pests have been observed by the community, and Khun Myint Swe explained that pesticides that farmers were using did not solve the problem of pests, but rather the immunity of these insects has increased. In order to address this issue, farmers increase the use of pesticides which further increases farming expenses. Khun Tun Phyu, a 50 year old garlic farmer, confirmed that there were more pests today than in the past. He spoke of one particular kind of stem borer, a species of pests that feeds on the inside of rice stems. In Lwe Moon, rice is grown for local consumption. According to him, the pest plagues the paddy fields in the three months after fertilizers are added to the soil. After three months, the effect of fertilizers wears off and the pest eats away the paddy from the



inside. No pesticide has been able to eradicate this pest and farmers have not found any solution for this yet.

### 3.1.2 Natural Fertilizers

Previously, farmers from Lwe Moon village and neighboring communities used cows and buffalos for preparing the land and manure from these animals for fertilizers, in contrast to today's farming methods. In the past, farmers let loose their cows in bamboo groves near their village in the summer. Cows ate the bamboo leaves and their dung nourished the bamboo groves. Farmers did not need to be worried about the safety of their cows, as they never heard of any theft in the community. According to Khun Myint Swe, several decades ago, Pa-O farmers started to feel pressure from modernization processes. Cars and television sets entered their communities and they started to imagine their villages to look like urban towns. They thought that bamboo groves scattering about the village made the place look unattractive and untidy. This was one reason for why they cleared the bamboo groves. In reality, bamboo groves not only gave food for their cows, they also provided the community with good material for building houses and barns. However, they got rid of bamboo groves and opted for new building materials such as brick and metal roofing. The new material means they need income to pay for it.

Phya Kya is a 65 year old garlic farmer from Lwe Moon village. He has two acres of land and grows garlic on one acre, which produces one thousand viss of garlic every year. (Viss is a Burmese unit of measurement and one viss equals 3.6 pounds). He said that this was enough for his household income and that he did not want to expand his garlic farming, his old age being one reason and his contentment another. According to him, the farmers from Lwe Moon have always used animal manure for fertilizer and cows and buffalos for tilling the land. However, over the past few decades, the village population and living costs have increased. People started to expand farming until there was no more grazing land for cows and buffalos. This shortage of pasture has led to farmers abandoning cows and buffalos. No more cows and buffalos means no more manure for natural fertilizers. Industrial farming methods offer solutions for

this problem. The farmers adopted these methods to adapt to the changing scenario. Today, using chemical fertilizers and machines is normal in the community. According to Phya Kya, using natural fertilizers such as cow dung has a lot of advantages, and one of the key advantages is soil that is enriched with animal manure is rich in fertility. Farmers can use that soil for at least two more seasons without adding more dung. On the contrary, for farmers who use chemical fertilizers, the amount of fertilizers put onto land increases every season. Phya Kya complained that industrial agriculture is input-intensive and costly. He said that his income from garlic decreases every season.

According to the interviews conducted with the farmers from Lwe Moon, they believe that they cannot bring back cows because there is no more pasture, and this is a problem most farmers throughout the country face today. However, Aung Myo Mon from Naungkham Training Center that runs a Farmers' Field School (FFS) in the region said farmers from middle Burma—which is a dry zone—kept cows in their houses and used rice straw as feed. This is their solution for the shortage of pasture. According to Aung Myo Mon, farmers in Lwe Moon burn the rice straw before they use the land for farming again instead of using it as feed. Aung Myo Mon reiterated that if the farmers were willing to abandon chemical fertilizers and tractors, and if they were willing to practice sustainable agriculture, they must bring back cows and cow dung into local agriculture practices. He admitted that it was still a big challenge to turn this around and suggested that raising cows and animals be started at the training center first as an exemplary practice.

### 3.1.3 Local Seeds

In the past, garlic farmers from Southern Shan State used local seeds. They used buds from the first harvest and sow them in the next farming season. From this season, they harvested single clove garlic. Again, they sowed the single clove, which then grew to become a fully segmented bulb of garlic. In this way, they saved garlic seeds for the seasons to come. They had to wait for two successive seasons to get single clove garlic, some of which they sold for household income and some they kept for planting the next season. However, after one season, they could grow fully segmented bulbs of garlic.

This was the traditional method of saving garlic seeds in Pa-O communities. Today most of the garlic farmers in the region buy seeds from companies and grow different kinds of fully segmented bulbs of garlic. This costs them money whereas in the past, people never had to buy seeds.

According to Khun Tun Phyu, former village head, many young farmers in the region today do not even know that they could get seeds from buds, and those who know about this do not want to wait for one season until they produce their own seeds. Meanwhile buyer companies require garlic farmers in the region to grow certain kinds of garlic species. The same companies sell seeds that they want farmers to grow. This has affected the local agricultural knowledge of Pa-O farmers. Here, it should be noted that many farmers from Lwe Moon village have continued to grow their local garlic by saving their own local seeds for more than 50 years, while other communities rely on seeds from agribusiness companies. The traditional way of growing garlic is as follows:

#### The Process of Traditional Garlic Farming

##### *First Stage*

After harvesting rice, farmers grow garlic. Before seeds/cloves are sown, garlic is dried in the sun and the segments are pulled apart. Then the land is tilled and ditches are made for irrigation. Seeds are sown and covered with hay.

##### *Second Stage*

Water is irrigated into the ditches. Seeds are watered every 5 days. Green seedlings spring up and fertilizers are added to the soil. Weeding needs to be done at this stage.

##### *Third Stage*

Once the buds come out, they should be picked because their growth suppresses the roots. Buds are removed and the garlic bulb in the soil gets bigger. (Poor families

eat the buds. However, farmers from Lwe Moon throw them away). Seedlings are watered until the harvest. Watering is done every 15 days.

#### *Final Stage*

After three months, comes the time for harvest. (Garlic season starts in December and depending on the time for growing rice, garlic may be sown later). The plants are plucked out of the soil, the roots are cut from the stalks and the garlic is carried home. The harvest is sorted and divided into different categories according to the quality. The biggest ones are put under the category of “premium” and farmers usually sell the smaller ones first and wait for a good price for the premium category. They can keep them for one year, but after one year, they rot. They also leave some for planting the next season.



*Figure 4: Garlic buds that are traditionally used as seeds (Photograph: Maung Day)*

Farmers from Lwe Moon village have saved local seeds for generations and this is an important aspect of local agriculture because by saving seeds farmers can maintain local agricultural knowledge and seed freedom, while also contributing to self-reliance of the community. However, even though the farmers do not buy seeds from outside, they still rely on agrochemical companies for fertilizers and pesticide. This affects their

practice of traditional farming methods. It should be noted that integrating new knowledge and methods from industrial agriculture is their strategy to achieve livelihood sustainability, questionable though it may be.

Today, agrochemical companies like Monsanto are trying to patent local seeds and producing GMO seeds through genetic engineering. These agrochemical companies claim that genetic engineering and hybridization can help maximize productivity and therefore, solve the problem of the world hunger. However, this notion has led to controversy and criticism. Shiva argues, “Control over seed is the first link in the food chain because seed is the source of life. When a corporation controls seed, it controls life, especially the life of farmers” (Shiva, 2013). According to her, 95 per cent of cotton seed in India is controlled by Monsanto. She links this with the epidemic of farmers’ suicide in India in late 1990s and early 2000s. India adopted the seed policy of the World Bank in 1988. Through the implementation of this policy, local farmers' common source became the property of Monsanto that introduced non-renewable hybrid cotton seeds to local farmers. These hybrid seeds increase vulnerability to pests, diseases, drought and crop failure. Higher agricultural expenses and crop failure drove farmers into debt and consequently into suicide (Shiva, 2013). The agricultural transformation should not focus on the intensification of technologies of extraction and control. It should be an agriculture that regenerates soil, aquifers and biodiversity. The role of traditional agricultural societies where seeds are saved and shared will be of significant importance in this transformation because they are consistent with the ideal of ecological agriculture (Eisenstein, 2012).

### **3.2 Local Agriculture and Spiritual Practices**

Spiritual practices and cultural traditions are integral to indigenous communities. These practices are often intertwined with their agricultural practices. In indigenous communities throughout the world, it is widely believed that forests, mountains and rivers are blessed and guarded by spirits, even though these spirits may have different names and honored in different ways. The Soliga people, an indigenous

group from South West India, believe that spirits permeate matter and that both trees and animals embody spirits (Madegowda, 2009). Therefore, they worship bears and elephants besides trees. The calendar of Soliga people is full of cultural and spiritual festivals. Each clan has their own god and during the festivals, they make traditional food and perform traditional dances. The priest would be possessed by the god, to which the clans would pray and ask for good health, good rains, a good harvest and the protection of their forests.

Likewise, religious beliefs and spiritual practices are an important part of a Pa-O community. Majority of the Pa-O are Buddhists and their spiritual life centers around the teachings of Buddhism. However, the belief in spirits, local deities, and other aspects of their traditional belief system have been integrated into their Buddhist ceremonies. In the more remote areas, the Pa-O villages still retain their animist beliefs (Minahan, 2012). These animist beliefs and spiritual practices are interrelated with their livelihoods, especially agriculture. Their agricultural practices have subtle physical relationships and spiritual ties with their belief in spirits and the natural environment. They believe in the guardianship of spirits and that these spirits can give them a good harvest, while they are also able to destroy their crops if a human action of profanity is committed. Agricultural practices of Pa-O communities are rooted in a holistic worldview that sees humans, animals, natural environment and spirits as interconnected to one another. It should also be noted that these practices are being gradually eroded as new generations adopt a more materialistic worldview. Some spiritual practices of Pa-O communities are as follows:

#### *Rocket Festival*

Buddhist temples can easily be found in Pa-O communities. If there is a Pa-O village, there is a temple. Buddhist temples and monasteries are mostly situated on hills and mountains. Before a farming season starts, the Pa-O organize rocket festivals on the hills. They believe that by firing hand-made rockets into the sky, there will be good rains. Rocket festivals also take place in the form of a competition where people compete by firing the rockets they have made by themselves. The winner is decided

based on the distance of the trajectory. There has been an issue of gambling with this tradition as people start to bet on this competition. According to the interviewees, Buddhist monks from local monasteries have started to see the gambling as a threat to the tradition and good social values of Pa-O communities. They have started taking action by banning the gambling on rockets during these festivals. It should be noted that monks are held in high esteem and play an important role in Pa-O communities.

#### *Picking the Blessed Day for Planting Crops*

Farmers from Lwe Moon village always consult with elders and monks to pick a blessed day for planting crops. They believe that by starting the season on a blessed day, they will obtain high yields and failures will be avoided. Occasionally, some farmers may not be ready to start their crop season. However, because they have already known the blessed day for starting the season, they would go to their land and dig a few feet in the ground or sow a few seeds symbolizing that they have started on the chosen day. This tradition has been practiced in Lwe Moon and many other Pa-O villages for generations.

#### *Offering Crops to Spirits on the Mountaintops*

Like many other ethnic groups, the Pa-O believe in spirits (*Nat* in Burmese). They believe that spirits are guardians of crops, forests and mountains. Before they start their crops, they would go up a designated mountain with small offerings of the crops they plan to grow and offer them to spirits. Elders who may be considered mediums lead this ritual. These old people know all the names of the spirits and those names will be called out loud during the ritual. The Pa-O believe that if a name is forgotten even by accident, they will experience droughts or crop failures.

Khun Tun Phyu said some Pa-O communities have abandoned these practices and many young Pa-O are not even aware of their existence of these practices. He recollected that when he was young, boys and girls participated in the ceremony of offering food to the Buddha statue and monks at the hilltop temple. This ceremony was usually organized on an auspicious day like a full moon day. They would dress

themselves in their traditional clothes and they would go up the hill in a procession, dancing and playing traditional music with locally made musical instruments. According to him, this tradition has waned today. Even though people still offer food at the temple on an auspicious day, there would only be women and men no longer participate in it. He blamed the spread of modernization for the disappearance of cultural and spiritual practices.

Khun Sein Aye, a former teacher at the local school and garlic farmer, said the village youth enjoyed watching Korean soaps and they wanted to dress like the young people they saw on TV. However, Lwe Moon village has some regulations with a punitive nature regarding culture, religion and spirituality. The regulations state that young people must wear traditional dress in the community. Khun Sein Aye says they could do nothing if the village youth wore modern clothes when they went to school in the town. However, when they are in the village, they must comply with its rules. People who do not follow these rules will be punished, with the maximum punishment for the offender to leave the village. The village also has strong rules regarding drugs, alcoholism and gambling. If one abuses drugs, the village will ask him to go for rehabilitation. If he keeps abusing and his parents do not try hard enough to solve the issue, they will be banned socially, or they may even be asked to leave the village.

Now that one mobile phone company is building telecommunication towers in the region, Khun Sein Aye is worried that modern development will influence the village. Khun Tun Phyu discussed the increasing spiritual bankruptcy in modern society. He was aware that science was just one way of knowing and while it may have given new electronic devices and easier ways of life to the society, it did not offer spirituality and good social values. He said his community had not known theft or any other crimes. He claimed that nobody from his community had ever been to a police station. Being a devout Buddhist, he said that the five precepts were the best laws and the best way of life. The researcher observed that people from Lwe Moon left their houses unlocked when they went out, and came back to find their belongings as they left them.



### **3.3 Integration of New Agricultural Knowledge as a Strategy for Sustainability**

Neither local nor scientific knowledge will ever have one-size-fits-all functionality. In many cases, local knowledge is improved by the local community incorporating from other sources what is appropriate in their local context (Grenier, 1998, pp. 1-25). It is evident that local knowledge is always in motion, changing and evolving. This is also the case with local agricultural knowledge of Pa-O farmers from Lwe Moon village. They, in their attempt to adapt to the changing social, political, environmental and economic situations, have incorporated new knowledge from industrial agriculture by using chemical fertilizers in place of animal manure and tractors for cows and buffalos.

Garlic is one of the primary cash crops for Lwe Moon village and other Pa-O villages in the Southern Shan State. In Lwe Moon, every farmer grows garlic. The garlic season starts in December and ends in April. In the past, Pa-O farmers used cows and buffalos to prepare land, and their manure as fertilizer. However, over the past few decades, they have started to use chemical fertilizers and machinery to prepare land. Phya Khae, an elderly man from the village, said the introduction of chemical fertilizers to Pa-O farmers could be traced back to the days of General Ne Win's socialist government. In those days, the government imposed a countrywide quota system for rice farmers. This system aimed at increasing the exports of rice and required farmers to sell the government a fixed amount of unmilled rice at a price that was much lower than the market cost. According to Phya Khae, when the subsistence farmers could not fulfill their quota, the government introduced chemical fertilizers, pesticides and machinery. The first season with chemical fertilizers was productive. However, farmers were forced to put more fertilizers in the following seasons because the soil started to degrade and pests became immune to pesticides. Even though the new Farmland Law, issued by Thein Sein's government in 2012, abolished the quota system, Pa-O farmers keep practicing industrial farming methods because of new pressures on the community's livelihood sustainability. Today, the community face the issues of growing population, scarcity of arable land and increasing costs of living. These issues

are inter-related and can be considered as key factors behind the integration of new knowledge from industrial agriculture by Pa-O farmers.

### 3.3.1 Population, Land Scarcity and Increasing Costs of Living

There are two important reasons for agricultural intensification. One reason is the increased demand for output, and another is a fall in availability of natural and human resources such as land, water, and labor (Carswell, 1997, pp. 3-11). Increased demand for output and decline in land can be directly linked to population growth. Malthus argued that as growing populations of the world expand into more marginal land, returns of labor subsequently decline. He continued that improvements in production technologies would just encourage population growth together with increasing labor supply and increasing demand for food and that because conversion efficiency of land and labor into food diminished, new production technologies would be futile (Malthus, 1830). Based on this argument, some scholars have concluded that the rates of population growth are such that it will be out of the question to produce adequate food and environmental degradation will be an unavoidable result (Carswell, 1997).

In Pa-O communities, the shortage of land has been a prevalent issue and a driver for Pa-O farmers to adopt industrial farming methods, which is directly linked to the growing population. In the early days when Pa-O people married, their parents would share a portion of their land with the newly weds. This tradition reflects a positive social value that indigenous peoples have kept for a long time: sharing. However, land is not infinite. The number of village households has grown and almost all of the land has been divided into small patches and shared, therefore, there is no more land to share. Today, when two people get married, their relatives put together some money so that they can buy a piece of land from somebody from the village, or from neighboring villages. This means that there are people without land today. Khun Sein Aye said there are two things Pa-O young people do today: going to town to study and migrating to Thailand to work. Here, the direct link between growing population and land scarcity can be observed. In this scenario, farmers have no alternative but integrate new

knowledge from industrial agriculture as input-intensive agriculture gives high-yields in a short period, although there are longer-term problems caused by this agriculture. Farmers have considered the integration of industrial farming methods into their traditional practices the solution for their livelihood sustainability.

Population growth also has a direct link to increasing costs of living. As the size of village families enlarge, they are required to spend more money on living costs. This in turn leads farmers to practice industrial farming methods, as they need high yields to generate income quickly so that it can contribute to the household expenses. Khun Sein Aye, who is a father of a teenager, said when he was young, crops his parents grew was more than enough for the household consumption and they sold the extra to earn some money. According to him, they did not have much to spend on those days. However, today, he has to grow high yield garlic and that barely covers the expenses which also include his son's education, pocket money and fuel for his motorbike. Almost all of the farmer families in Lwe Moon have motorbikes today. Certain aspects of consumerism are prevalent in Pa-O communities and this has also contributed to increasing household expenses.

According to the interviewees, there are 150 television sets and more than 100 mobile phones in the village. As the number of households in the village is 257, it can be concluded that more than half of the total households have televisions. The interviewees claimed that older community members were not familiar with modern technology, but most young people liked to use mobile phones, even though the reception in the community was very limited. They said the village youth wished to adopt modern lifestyles they witnessed on television. They also said, in reality, the village youth did not know much about technology, they were just willing to look and behave like city people. Consequently, they bought what was expensive because they believed that the more expensive, the better quality. Khun Aung Than said modern lifestyles and its consumer products today gave a lot of options for the youth, but numerous options also confused young people as they no longer knew what was good and what was bad. Khun Aung Than pointed to the fact that because young Pa-O have started to dress, behave and talk like city youth, the local customs have started to

disappear, and that local culture and diversity are dying. In Pa-O communities today, older women still wear Pa-O traditional clothes, but most young people—male and female—now prefer generic modern clothes.

Growing population, scarcity of land and increasing costs of living are major drivers behind the integration of new knowledge from industrial agriculture by Pa-O farmers. They consider this as a viable solution and strategy to maintain their livelihood sustainability.

In conclusion, Pa-O farmers have practiced local farming methods and used local seeds for generations. In the past, garlic farmers practiced crop rotation and this local method had many practical advantages that include prevention of soil depletion, enrichment of soils fertility, reduction of soil erosion, control of pests and diseases. In the past, Pa-O garlic farmers did not have to rely on chemical fertilizers, pesticides and hybrid seeds, nor did they have to depend on machinery, as cows and buffalo provided both labor and natural fertilizers. Their local agricultural knowledge was closer to the ideal of ecological agriculture, and they led a simple life. Being able to use the resources available within the community, they achieved livelihood sustainability and maintained their resilience. However, over time, Pa-O communities have expanded and the population has grown. This has led to not having enough land to grow crops and support their families. Consumer products have reached Pa-O communities and this has resulted in the young Pa-O wanting to buy these products, therefore, increasing household expenses. Coupled with increasing costs of living and scarcity of land, farmers have no other option but to take new knowledge from industrial agriculture and farm for high yields. Cows and buffalo have disappeared and tractors have substituted them, chemical fertilizers have replaced animal manure. The adoption and integration of new knowledge from industrial agriculture is an inevitable step for Pa-O farmers as they seek to achieve their livelihood sustainability.

## **CHAPTER IV**

### **FINDINGS: THE PROCESS OF KNOWLEDGE INTEGRATION BY PA-O FARMERS**

Indigenous knowledge systems have a cumulative nature, represent generations of experience, and are the results of continuous experiments (Grenier, 1998). These systems are always moving, changing and innovating from within. This dynamic involves internalizing, using and adapting new knowledge to respond to changing social, political, economic and environmental situations. Local agricultural knowledge is a significant component of indigenous knowledge systems and is also subject to change. Integration of external knowledge into local agricultural knowledge may be facilitated and influenced by various actors such as agricultural companies, agriculture-based NGO's and experts. In case of the Pa-O, this integration process has been facilitated—in some cases, imposed—by the government's policies, industrial companies and agriculture-based NGO's over a long period of time.

This chapter reveals the research findings from the field research. Firstly, the process of knowledge integration from industrial farming methods into local agricultural knowledge of Pa-O farmers is discussed. The discussion highlights the government's agricultural policies as a driver for Pa-O farmers to adopt industrial farming methods, followed by a description of the features of industrial agriculture and the behavior of agrochemical companies in the local context. Next, the role of a local agriculture-based organization and how its agricultural programs contribute to the dynamic of local knowledge is explored. A description of the features of organic agriculture and a discussion on how local Pa-O farmers respond to it are presented in this part. The chapter reaches the conclusion that local agricultural knowledge of Pa-O farmers has been adapted to changing needs triggered social, spatial, economic and environmental changes, and that different stakeholders have been involved in shaping the knowledge.

#### 4.1 New Knowledge from Industrial Agriculture

Chemical fertilizers and pesticides were first introduced to Pa-O farmers during General Ne Win's reign. In 1962, led by Ne Win, the military staged a coup and took over power. In 1970, the new military regime named the Revolutionary Council announced their policy "the Burmese Way to Socialism" (Hlaing, 2000). The regime led countrywide economic reform by taking control of the whole economy including production, domestic distribution of commodities and foreign trade. In order to boost the exports of rice, the government imposed a quota system for rice farmers called *tar-won-kyae-zabar*. According to this system, farmers were required to sell the government a fixed amount of unmilled rice at a price that was lower than market price. From 1974 to 1988, farmers were asked to sell 5 baskets per acre of rice to the government's trade department (one basket of rice is equal to 46 lbs). Through this coercive process, the government arrested and jailed farmers who failed to meet their quota. Frightened and desperate to avoid imprisonment, farmers resorted to buying rice from other farmers to fulfill their quota. This quota system also reached Pa-O farmers, and they too had difficulty meeting the quota. Phya Kya, an elderly garlic farmer, said most Pa-O farmers who did subsistence farming could not fulfill the quota and the government started to introduce them to chemical fertilizers and pesticides. The government subsidized the fertilizer prices until 1990, and after that, the prices increased to a level close to international prices (Lwin, 2013). The fertilizer consumption in Burma in 2012 was 177.22 per cent of fertilizer production, that is 15.75 kilograms per hectare of arable land (World Bank, 2013). In 2012, Thein Sein's government issued new Farmland Law that annulled the quota system. However, Pa-O farmers have kept using fertilizers, pesticides and tractors in order to suit changing situations: growing population, scarcity of land and increasing costs of living.

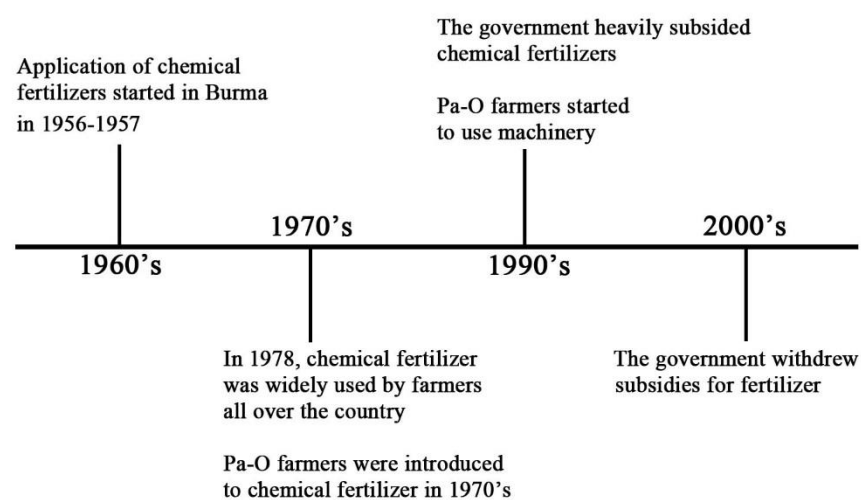
Industrial agriculture is characterized by "farms that are often very large, highly specialized, and run like factories with large inputs of fossil fuels, pesticides and other chemicals, and synthetic fertilizers derived from oil" (Union of Concerned Scientists, n.d.). One common feature of industrial agriculture is monoculture, cultivation of one single crop. Monoculture is practiced to produce high yield crops and expected to

reduce production costs. This agricultural form relies on a narrow genetic base of crops. According to the Union of Concerned Scientists, in the early 1990s in the United States of America, only six varieties of corn were grown for 46 per cent of the crop, nine varieties of wheat for half of the wheat crop and only two types of peas accounted for 96 per cent of the pea crop. Because of this largely narrow selection of varieties, thousands of local varieties are in danger of extinction. This farming method also relies on a heavy input of chemical fertilizers and pesticides. Chemical fertilizers are needed because in a monoculture, the same crop is planted on the same plot of land season after season and depletes the nutrients in the soil quickly. The pesticides are needed because single crop fields attract particular types of weeds and pests.

Phya Kya, said agricultural experts and agrochemical companies recommended certain types of chemical fertilizers and pesticides to farmers. According to Khun Aung Than, marketers from fertilizer companies would come to their village, approach the village head and with assistance of the village head, organize a meeting in which they would promote their products. They would bring catalogues that give a very simple explanation about the fertilizers. They would also give presents to the attendees. Khun Aung Than said the catalogues were very simply designed and different types of fertilizers were color-coded, so that farmers could easily ask for the type of fertilizers they wanted to purchase at the fertilizer shops in town. These catalogues did not mention side effects of using chemical fertilizers, but guaranteed high yields. Moreover, agrochemical companies are spending a lot of money on television commercials for their products. These commercials try to convince farmers that chemical fertilizers will give high yields and thus, a prosperous life for farmers. He said many farmers in his community were aware of the problems caused by these fertilizers. Farmers know that year after year, the soil quality decreases and they are required to put more and more fertilizers in order to maintain the yield. This has led to more farming expenses and less income. Khun Sein Aye, another garlic farmer, spoke of health issues that he thought had been intensified by the side effects of chemical fertilizers. However, these farmers do not see any other alternatives because growing population, the decline of cattle and space constraints have contributed to increasing use of chemical fertilizers and machinery and decreasing use of draught power and traditional fertilizers (Baver et al.,

2013, p. 64). Khun Sein Aye said farmers were with pressures that include rising costs of living and skyrocketing commodity prices. He said even though farmers knew more sustainable forms of agriculture such as organic farming, they would have to keep practicing industrial farming methods to maintain their livelihood sustainability.

#### Timeline of Chemical Fertilizer and Machinery Application by Pa-O Farmers



#### 4.2 New Knowledge from Agriculture-Based NGO's

The dynamic of change within the local agricultural knowledge of Pa-O people includes new knowledge input from different sources including agricultural institutions and organizations. There is a training center for farmers called Naungkham Training Center in Hsi Hseng Township. The center is very close to Lwe Moon village, the research site for this thesis. Metta Development Foundation and the Pa-O National Organization (PNO) jointly established it in 2003 as an agricultural training facility. One of the key objectives of the center is to bring sustainable agriculture to the region. It has been running Farmer Field School trainings and various agricultural programs since its inception. Through these trainings and programs, it shares sustainable agricultural methods and facilitates forest conservation projects with Pa-O communities.



#### 4.2.1 Pa-O National Organization (PNO)

The PNO signed a ceasefire agreement with the military government in 1991, and since then it has autonomously governed the Pa-O area in Southern Shan State; its autonomous area includes three townships: Pin Long, Hsi Hseng and Naung Mon. In the 1960s, the organization took some vacant land for crop trials in its bid to encourage local agriculture. Aside from this, it does not manage or take control of land in the area; communities co-manage their land and forests according to Khun Myo Nyunt, the manager of Naungkham Training Center and a member of Metta's senior management team. However, because it is the authority in the area, it takes on the facilitation role in land disputes among Pa-O farmers. It is also influential in crime-related cases. Since the early days of the organization, it has focused on education and economic development of the area. The organization has built new schools for the educational development, and to boost the local economy, it has been promoting tourism including running a few hotels in the area for its financial sustainability. It has also been involved in mining. According to Khun Myo Nyunt, (apart from the crop trials) it has not been involved much in agriculture. In 1950's, the PNO and the then Burmese government held peace talks to reach a ceasefire agreement. It was not successful and it took until 1991 to reach a ceasefire agreement. Khun Myo Nyunt said some years ago, local people asked the PNO to give back the land it took for promoting agriculture in 1960's. They gave back some, but not all. The PNO cooperates with Metta Development Foundation in agriculture by establishing the Naungkham Training Center. Metta run the agricultural project and the PNO contributed the land for building the center.

#### 4.2.2 Naungkham Training Center and Sustainable Agriculture

Naungkham Training Centre was set up as an agricultural training facility in 2003 and implements the projects of Metta Development Foundation. Metta is the biggest local non-government organization in Burma, operating with 800 staff members with regional offices in most of the regions and divisions of the country. Agricultural experts and staff members of Naungkham Training Center conduct Farmer Field School

trainings for local farmers. They also give technical support and raise awareness on the impact of using chemical fertilizers and industrial farming methods. While the center encourages farmers to shift to organic farming, it also focuses on local food security. All of these projects are implemented under an umbrella project called Upland Agriculture and Community Forest Project. In 1995, the government allowed local communities to start community forests. Experts from the center conduct trainings on community forestry to encourage local people to get involved in sustainable co-management and conservation of community forests. They facilitate the process for communities that decide to be involved. However, the center's main focus is on agriculture.

Farmer Field School trainings have a strong focus on local knowledge and sustainable agriculture. They also bring in appropriate technology as part of the learning. Besides agriculture, they touch upon soil nutrients, health and environmental issues. The trainings recruit and empower farmers who have potential to become community leaders. Because these trainings share sustainable agricultural methods, it can be assumed that participants will bring back knowledge to their communities, leading to some form of knowledge integration at the community level. According to Khun Maung Khae, one of the trainers of these trainings, the trainings are run in a participatory manner and emphasize the experience and knowledge of participants. Pa-O communities rely on agriculture and agriculture relies on soil, climate and the environment. Farmer Field School trainings are designed to bring awareness on the importance of soil, climate and the environment to farmers, and empower them so that they will be able to choose right paths and make right decisions. The impact of chemical fertilizers and pesticides are extensively discussed in these trainings. One success story of Naungkham Training Center was helping farmers to successfully grow "rain-fed rice". The biggest problem for Pa-O farmers in rain-fed rice farming was a particular kind of weed. They used different ways and different herbicides to solve this problem. However, they could not find the solution until the center gave technical support and tools specifically designed for this weed. Now that the weed problem has been solved, rain-fed rice has become very important for local food security. This can also be considered a good example of knowledge integration that has been put to an appropriate

use. This is an innovation within the local agricultural knowledge of the Pa-O people facilitated by external experts.

The trainings and programs of Naungkham Training Center largely focus on sustainable and organic agriculture. Organic agriculture is a system that depends on ecosystem management instead of external agricultural inputs (FAO/WHO Codex Alimentarius Commission, 1999). That includes eliminating synthetic fertilizers, pesticides, genetically modified seeds and breeds, preservatives and additive. All these synthetic inputs have long term and short term social and environmental impacts, and organic agriculture attempts to reduce and eradicate these negative impacts by replacing them with agricultural practice that will maintain soil fertility for the long run and prevent pests and diseases. While farmers from Lwe Moon village see adopting industrial farming methods as inevitable for their livelihood sustainability, some experts and staff members from the center believe there are solutions offered by organic agriculture. For instance, Aung Myo Mon, a staff member of the center and trainer in Farmer Field School argued that using effective microorganisms (EMO) and bringing back cows and buffalos were two viable solutions for the issue of chemical fertilizers.

Effective microorganisms (EMO) also called indigenous microorganisms (IMO) have been around for many years and have achieved success in countries like Japan, and are paid a lot of attention in today's agriculture. The concept and technology of EMO was promoted and made known by Teruo Higa, a professor of horticulture in Japan in 1980s. However, Aung Myo Mon claimed that this kind of agricultural knowledge has existed in many indigenous communities throughout the world for many years. Therefore, IMO (indigenous microorganisms) is the preferred word because it suggests a possibility of various methods for preparing this form of organic fertilizers. This method usually takes on different techniques in its production, and commonly in Southeast Asia and Burma, it is made by digging up a piece of earth under a shady tree, putting waste (whatever organic waste that can be found easily in a community can be used) onto the dug ground forming a layer, then applying sugar and covering the whole pile with hay. The size of dug ground can vary depending on how much fertilizer is needed, and there can be more than one layer of waste.

Aung Myo Mon argues farmers from Lwe Moon village have enough raw materials to make their own IMO. There are plenty of rice husks, bean skins and waste from garlic at their disposal. However, some farmers in the village are not familiar with such methods, and those who know are reluctant to practice it because they have to wait until the IMO is ready for use. Meanwhile they can get chemical fertilizers whenever they want. For IMO, they have to wait for two weeks and if they want it for a larger scale, they may even have to wait for a month or two. But this process will allow the local farmers to use what they have in their village and it will not cost them any money. Besides, it is ecologically sound; chemical fertilizers deliver results in a short period of time and boost the productivity, but at the same time it destroys the soil quality leading to farmers having to put more and more fertilizer each year. Whereas, after IMO is added to the soil for 5 months, the soil remains fertile for another 5 months, and builds the fertility of the soil in the long run. Chemical fertilizers may give high yields in the beginning, but the yield will drop as time goes by. In the case of IMO, the yield starts from small and increases over time.

Why are farmers reluctant to use IMO? The answer is simple. Farmers need high yields in a short time and chemical fertilizers can deliver that result. Almost every farmer uses chemical fertilizers in the region and it has become an agricultural norm. Besides, according to Khun Aung Than, farmers from Lwe Moon have not seen the success of using IMO; they only have information. At the same time, fertilizer companies use a lot of money to advertise their products and their agents reach out to the villagers and spread the information. Aung Myo Mon said, agriculture-based NGO's are still yet to reach out to farmers to share the information about EMO/IMO to a large extent. Some NGO's have been promoting sustainable agricultural methods, but in a larger picture, the effort they have made is insignificant and the area they have covered is still very small. Naungkham Training Center has trained two young farmers from Lwe Moon village to make and use EMO/IMO. However, these young farmers who are also staff members of the center still have a lot of work to do to convince the farmers. According to interviews with farmers from Lwe Moon village, farmers want the quick results and do not want to wait until they get good yields from sustainable farming. Many of them are not well aware of the negative impacts of using chemical

fertilizers, related ecological problems or health problems. Aung Myo Mon admitted that their center had a lot of work to do if they were to avert the unsustainable agricultural practices in the area.

Another solution for the issue of chemical fertilizers is to bring back cows and buffalos. Interviewers believed that it was impossible to bring back cows and buffalo because there were no more pastures. The shortage of animal pasture is a problem farmers throughout the country face today. According to Aung Myo Mon, there is a solution. He said in the dry zone in middle Burma, farmers kept cows in their houses and they used straw as feed. They collect the straw in piles and feed their cows while farmers in Lwe Moon burn their straw before they prepare their land. This means that farmers from middle Burma do not need pasture. Aung Myo Mon argued that this could also be done in Lwe Moon. He reiterated that if the farmers wanted to abandon chemical fertilizers and started sustainable agriculture, they would have to bring back cows, buffalos and animal manure to farming.

However, farmers from Lwe Moon argued that to entirely shift to organic agriculture was not possible for a number of reasons. Khun Tun Phyu said he was aware of the problems posed by chemical fertilizers. He knew very well that he had to add more and more fertilizers to the soil to keep up the required yield. He knew that this could not go on forever. Now he has started to use pig manure and compost in addition to chemical fertilizers. He noticed that because of this new method, he was able to reduce the use of chemical fertilizers. Today, he also has a few buffalo that provide him with some manure. When asked whether he would consider changing to organic farming, he said that he knew organic farming was good for the long term. He pointed out that it took time until the soil became organically fertile again, and during that time, the family would have to struggle financially. He said organic farming was labor-intensive, so if one did it on a small scale for instance, on a hectare of land, it would be fine. However, doing organic farming on a few hectares of land would prove to be really difficult as a lot of labor and time would be needed for each hectare to carry out the necessary tasks that include repeated weeding and preparing the land. He said while one hectare was being farmed, the other hectares would have been covered in weeds

and grass. According to the interviews, it was learnt that the economic pressure on farmers' families created difficulty for them to abandon the input-intensive farming. In Lwe Moon, every family has children who go to school and the costs of living increase every year. Therefore, they need high yields to cover all the household expenses.

To conclude, the integration of new knowledge from industrial agriculture by Pa-O farmers started in 1970s during the reign of Revolutionary Council led by General Ne Win. Rice farmers were imposed a quota system in which they were required to sell rice to the government at a fixed price. Not being able to meet the quota, farmers adopted industrial farming methods introduced by the government. Pa-O farmers have kept practicing these methods since then. Local NGO's have implemented sustainable agricultural programs and shared organic farming methods. However, issues such as growing population, land scarcity and increasing costs of living have proved to be substantial challenges for Pa-O farmers to practice organic farming methods and those are the key reasons for which they have kept practicing industrial farming methods. However, they have partially integrated new knowledge shared in agricultural trainings, for instance, Pa-O farmers have adopted weeding tools and techniques from Naungkham Training Center. In sum, the local agricultural knowledge of Pa-O farmers is always in motion as it has changed and innovated from within by adopting new knowledge from external sources. Their particular sources have been the government's agricultural policies, agricultural programs of local NGO's and experts.

## **CHAPTER V**

### **FINDINGS: KNOWLEDGE INTEGRATION AND SUSTAINABILITY**

As the previous chapters discussed, Pa-O farmers have integrated new knowledge from different sources, especially from industrial agriculture, in their attempt to sustain their livelihood that is endangered by a growing population, increasing land scarcity and rising costs of living. Therefore, adopting industrial farming methods is their strategy for livelihood sustainability. This chapter reveals findings from the field research, and these findings highlight the outcomes of this strategy and its short term and long term impacts on the livelihood of Pa-O farmers, their environment, and their local knowledge itself. Firstly, the outcomes in terms of their livelihood strategy are explored and an analysis is made to find relationships between livelihood sustainability, arising issues of debt among Pa-O farmers and out-migration of young Pa-O. An in-depth description on increasing environmental and health issues in Pa-O communities is presented and these issues are discussed in relation to use of synthetic inputs. Finally, the issue of the erosion of local knowledge is discussed and factors that contribute to erosion are explored, followed by a conclusion drawn upon the overall outcomes of knowledge integration from industrial agriculture.

#### **5.1 Impacts on Livelihood**

While it can be understood that Pa-O farmers have integrated new knowledge from industrial agriculture as a strategy for their livelihood sustainability, the question whether this strategy has delivered the results remains. The general assumption is that by increasing the value of output per acre, industrial agriculture will increase the quantity of output and the quality of livelihoods. Therefore, livelihood sustainability of farmers is increased. However, Carswell argued that there could be negative impacts of agricultural intensification on both the quantity and quality of livelihoods if there had

not been an increase in output (Carswell, 1997). These negative impacts will not only affect farmers' household economy, but also the environment.

According to the interviewees from Lwe Moon village, when Pa-O farmers used chemical fertilizers for the first time, they saw an increase in yield. However, as years went by they are now witnessing the degradation of soil fertility due to heavy use of fertilizers, and this has led them to putting more fertilizers to maintain the yield. Khun Myint Swe complained that farmers did not look after the quality of soil and the degradation of soil in the region has been worsening. He said this was a problem of a large significance on a global scale. According to him, many agricultural communities in the world are bringing back cows and buffalo today, but there are few cows and buffalo in Pa-O communities. As a result, farmers have resorted to using more and more chemical fertilizers. Khun Myint Swe warned that this issue was a ticking bomb for Pa-O farming communities and that the risk of their land becoming totally unusable for farming in the near future has heightened. At the same time, farmers' investment in chemical fertilizers, pesticides and seeds has increased and their income dropped (see Table.2). The increase in agricultural expenses and decrease in household income in lowland rice farming can be observed. This pattern also applies to other cash crops planted by Pa-O farmers by using synthetic fertilizers. Lwe Moon village has been expanding in number both in terms of household and family size. The number of community members has also increased because new people have moved to settle in the community over the past few decades. With the increasing family members within a household, its expenses have increased, leading to a decline in the sustainability of the household economy. Many farmers have started to rely on loans according to Khun Aung Than.



Table 2: Example Calculation: 1 Acre of Lowland Rice Cultivation

Description	Year-1		Year-2		Year-3		Year-4		Year-5		Year-6	
Paddy seed	1 basket	8,000	1 basket	8,000	1 basket	8,000	1 basket	8,000	1 basket	8,000	1 basket	8,000
Fertilizer	4 bags	80,000	5 bags	100,000	6 bags	12,0000	7 bags	140,000	8 bags	160,000	9 bags	180,000
Land preparation	2 times	40,000	2 times	40,000	2 times	40,000	2 times	40,000	2 times	40,000	2 times	40,000
Farm mgt cost	2 times	20,000	2 times	20,000	2 times	20,000	2 times	20,000	2 times	20,000	2 times	40,000
Harvesting and transporting	1 time	100,000	1 time	100,000	1 time	10,0000	1 time	100,000	1 time	100,000	1 time	100,000
		248,000		268,000		288,000		308,000		328,000		348,000
Total production	80 baskets	320,000	80 baskets	320,000	80 baskets	320,000	70 baskets	280,000	70 baskets	280,000	70 baskets	280,000
Balance		72,000		52,000		32,000		-28,000		-48,000		-68,000

*Table 2: Example Calculation: 1 Acre of Lowland Rice*

Today, indebtedness is one of the major issues in Pa-O communities. Those farmers who need financial resources to invest in farming loan money from loan sharks. Sometimes the interest rate is 10 per cent, and some farmers are not able to return the money. In stead, they may be forced to take more loans resulting in growing amount of interest and debt. According to Khun Myo Nyunt, now Naungkham Training Center is embarking on promoting food sovereignty and encouraging small farmers to subsist so that they can keep themselves out of indebtedness. Another solution to this issue may be that the government should establish subsidy programs for small farmers. According to farmers from Lwe Moon village, even though farmers can access government's loan today, it is not enough. The government allows 100 USD per acre loan for rice farmers and just 10 USD for other vegetables and crops. This is a big challenge because farmers in this region rely a lot on non-rice farming. Farmers also complained that it is difficult to get access to government's loan because of the long procedure due to the government's red tape system. Through Farmer Field School Trainings, Naungkham is trying to identify and train potential farmer leaders so that they may start mobilizing farming communities and forming farmers' unions and organizations. These organizations will play an important role by representing farmers and communicating with the government in terms of loans and subsidies on behalf of farmers.

According to Khun Aung Than and Khun Sein Aye, both of who are former school teachers at the local elementary school, the decline in livelihood sustainability has forced farmers to look for viable solutions, and some have found one solution in education. They said farmers realized that they did not have land to share with their children so they thought if their children had a good education, they would be able to get jobs in the city. They believe that in the long run, their educated children will be able to financially support them. However, sending their children to town for education is costly, and this is another reason for which farmers need to borrow money from loan sharks. They have to struggle to support their children's education and pay debt at the same time until their investment in their children's future pays off. Now Pa-O communities have created an informal education network through Buddhist

monasteries in major cities and towns. Pa-O villages are a long distance from towns and cities as these villages are located in rural areas. In rural areas, there are not many schools and if there are, they serve only primary and secondary level education. Young Pa-O people go to urban towns and cities to seek further education by staying at monasteries. This phenomenon started with Pa-O monks going to monasteries in urban cities for monk's education and they encouraged Pa-O children to come and stay with them at temples and monasteries so that these children could go to school. This phenomenon can be linked to internal migration of the Pa-O. Many of them have remained in towns and cities working in different business and service sectors, and sending money back home. While Pa-O farmer families may benefit from the remittances, this may threaten the food security of Pa-O communities as this can lead to a decrease in the number of farmers. It may be argued that because there is already a shortage of land, the decrease in the number of farmers can be considered a positive thing. However, the village population that relies on local food production may still be a significant number and a lot of young generation migrating internally and externally may imply that there is less number of people to do farming. However, statistics and data regarding the migration of Pa-O are not available, and therefore, it is difficult to make a conclusion about the impact of their migration on their local food security.

Another solution that Pa-O farmers have sought to solve the issue of livelihood sustainability is sending their children to Thailand to work. There is a large number of young Pa-O having migrated to Thailand. For instance, Kone Kyaung village that has 160 households has seen more than 100 village youth leaving for Thailand. The Pa-O villages in Southern Shan State are teeming with agents who try to persuade young people to work in Burma's neighboring country. Remittances go back to the villages and people use the money to build modern brick houses and buy cars and motorbikes. Khun Maung Khae from Naung Kham Center said the influx of modern consumer products into Pa-O communities threatens the traditional way of life and makes the younger generation feel inferior for being Pa-O as they start to aspire to look like modern people from cities. The phenomenon of out-migration also discourages younger generation to become farmers as they start to see migrating to Thailand as the best option for their future. There are also many cases of young Pa-O not being able to send

any money back home and many of them have experienced difficulties and problems in Thailand. According to Khun Sein Aye, who used to work in Thailand for a short period of time, the number of village youth migrating to Thailand is increasing. He critiqued that many young Pa-O are not aware of problems they may face in a foreign country such as human trafficking, forced labor and different forms of discrimination.

## **5.2 Impacts on Environment and Human Health**

Increased dependence on synthetic inputs has negative repercussions for economic and environmental sustainability (Carswell, 1997). The long term impacts of chemical farming are hazardous to human health and the health of the soil, and for the environment because as the same species of plants are grown with the assistance of excessive use of synthetic inputs year after year, the balance of the ecological processes in the soil is destroyed (Capra, n.d.). In this process of soil degradation, the amount of organic matter in the soil and the ability of the soil to maintain moisture diminishes, resulting in interrelated consequences such as loss of humus, dry and sterile soil, wind and water erosion. Monoculture farming and heavy use of synthetic inputs also leads to an increasing number of pests and diseases. Farmers respond to these problems by adding more pesticides and herbicides that sink in the soil, run into water sources and end up in daily food. This not only affects the environment, but human health is in danger. Industrial agriculture is fossil fuel based and contributes to greenhouse-gas emissions. It can do so by directly through the fuel burnt by agricultural machinery, food processing, and transportation of food on a global scale (Capra, n.d.).

According to the interviews with farmers from Lwe Moon village, they have witnessed the degradation of soil quality. However, they have all added more synthetic fertilizers to the soil to counter this problem. They were aware that the problem could not be solved this way. However, they pointed to the increasing demand for high yields as the main reason they could not turn their back on industrial farming methods. Khun Tun Phyu, one of the interviewees, has come up with a more sustainable practice. He realized local agriculture could not go on forever like this. Therefore he has started to adopt organic farming methods by starting to put pig manure and compost in the mix

with chemical fertilizers. He now has a few buffalo that gave him manure. According to him, he noticed that his soil has become more fertile than before and he has managed to reduce use of chemical fertilizers. Khun Myint Swe, an agricultural expert from Naungkham Training Center, endorsed this practice by saying farms that use a mixture of fertilizers between organic and inorganic ones tend to be more ecologically sustainable. Pretty et al., argue that “in certain agroecological systems, moderate use of chemical fertilizers is necessary to ensure the appropriate balance of plant nutrients and minerals in the soils” (Pretty, Thompson, & Hinchcliffe, 1996).

The increase in the number of pests has been observed by the community. Khun Myint Swe explained that insecticides that farmers were using did not solve the problem of pests, but rather the immunity of these insects has increased. However, to address this, farmers increase the use of pesticide that further increases the farming expenses. Khun Tun Phyu, a 50-year-old garlic farmer, confirmed that there were more pests today than in the past. He spoke of one particular kind called “stem borer”, a species of pest that feeds on the inside of the rice stem. Rice is grown in this community for local consumption. According to him, this pest plagues paddy fields in the three months after fertilizers are added to the soil. After three months, the effect of fertilizers wears off and the pest eats away paddies from the inside. No pesticides have been able to destroy it and farmers have not found any solution for this yet.

All of the interviewees agreed that the climate has become hotter even though they did not know anything about climate change in scientific terms. They said that the cold season was not as cold as before and the climate has become irregular. Khun Myint Swe observed that tamarind trees at Naungkham Training Centre have fruited a lot more than before. Normally, tamarind trees thrive in hotter climate and the ones at the center never fruited much in the past. He concluded that this might have been a sign of climate change. According to Khun Myo Nyunt, the manager of Naungkham Training Centre, more than a decade ago, the center organized Farmer Field School trainings in the northern part of Taung Gyi located in Southern Shan State. That area was covered with big forests, and had good soil for agriculture, which was the reason why the center

chose it as a potential place for promoting sustainable agriculture. However, people started to cut trees and used the vacant land left after logging for farming. Logging has continued and now the area is largely deforested. In 2014, farmers in that area experienced a serious drought for two months and the study farm of the Farmer Field School training was destroyed. Khun Myo Nyunt predicted that many parts of Southern Shan State would become barren dry land in the near future. The region is also experiencing water scarcity today. There is huge deforestation on mountains because of logging and poppy farming. It does not rain enough in the region, and when it rains, soil erodes. Water from the mountains floods the rice farms. A stream called Tha Bet Chaung has nearly disappeared because there is no water in it in the hot season. In the rainy season, it gets flooded. Consequently, farms that have used the stream for irrigation have been destroyed. More than 300 acres of land around that stream are barren today.

Pesticides cause both long term and short term effects on human health. Pesticide residues leach into our systems through air, water, and food, and increases risks for different types of cancer, reproductive problems and endocrine disorders (Horrigan, Lawrence, & Walker, 2002, pp. 446-450). According to United Nations, pesticides cause 2 million poisonings and 10,000 deaths each year. Khun Aung Than from Lwe Moon village believes there have been cases of illnesses and diseases caused by the heavy use of chemical fertilizers in his community. He said that before the year 2000, very few people had to go to the hospital in Taung Gyi, the capital of Shan State which is one and a half hour drive from his village. He said people did not have critical health issues and enjoyed a long life in those days. According to Khun Sein Aye, his parents and grandparents never had any major health problems and he believed that was because they did not use chemical fertilizers and ate local vegetables, fruits and food. He said they did not know processed food and were healthy enough to work on the land even at a very old age. Both the interviewees agreed that there were all kinds of diseases in their village today: diabetes, high blood pressure, heart disease, hepatitis B and different forms of cancer. They also said the number of people needing to go to the hospital in Taung Gyi has increased, but conceded that people were not aware of the

relationship between chemical fertilizers and escalating health issues. Another reason could have been the lack of health knowledge among the villagers.

The Pa-O, like other ethnic minorities from Burma, have local medicinal knowledge that they have applied for many years. However, today, that knowledge is disappearing and traditional medicine is challenged by modern medicine that is promoted by large corporations. According to Khun Aung Than, people in Lwe Moon village use 50 per cent of traditional medicine and 50 per cent of modern medicine. People still offers food to spirits when their children have small health problems such as vomiting or chest pains. Mostly this ritual takes place on the bank of the village stream. People also go to the local shaman when they have fevers or some other health problems. The local shaman recites short verses that, local people believe, have healing power. There are also traditional medicine men who prepare medicine made from local herbs, shoots and animal internal organs. However, local medicine takes time for preparation as one needs to look for the ingredients, whereas, according to Khun Aung Than, modern medicine is easy to buy and responds quickly. Local people believe that traditional medicine cannot cure diseases that are new to the community such as cancer and heart diseases. Especially young people prefer western medicine because it tastes much more pleasant than traditional types, which are always a large amount for one dose and have an unpleasant taste. However, it should be noted that people may have come to this conclusion because of TV commercials they watch everyday, and their local medicinal knowledge is disappearing at the same time. Khun Aung Than said that people today were short-sighted and wanted quick solutions and he admitted that his fellow villagers and himself were always looking for an easy way out. He emphasized the role of greed that drove his fellow villagers to expand their agriculture and embrace chemical fertilizers.

### **5.3 Erosion of Local Knowledge**

Local knowledge has been lost naturally and very often it is lost because its techniques and tools are modified, or fall out of use. Other factors that accelerate the

loss are rapid population growth, growth of international markets, educational systems, and development processes (Grenier, 1998, pp. 151-156). Rapid population growth often triggered by in-migration or government relocation schemes resulting from mega development projects such as dams have changed the standards of living. Today most development projects with short-term gain are being favored over the ones that take the environment into account. Many governments have claimed that these projects are implemented in their attempt to alleviate poverty. However, we are seeing increasing disparities as only a selected group of people are benefiting from these projects. This is also the case for Burma where a lot of foreign investment and development projects are pouring in, leading to social unrest and environmental problems. Khun Sein Aye from Lwe Moon village expressed his concerns. He said, "I hope our village is not sitting on a mass of uranium or any other natural resources. I do not want to move anywhere because of effing development projects." The loss of local knowledge is also strongly linked to the emergence of industrial agricultural practices that focus on monocropping. The policies promoting generic rice and other crop varieties devalue locally adapted species. The biodiversity and cultural diversity are even more at risk because of the advancement of the food industry that promotes using hybridized and genetically modified food and seeds.

Internal and external migration of young people to big cities and foreign countries is also an important factor behind the erosion of local knowledge. Because of migration, younger generations will end up adjusting their way of life to that of cities and it will be very difficult for the older generation to transfer indigenous knowledge to their children. In Pa-O communities, there are already and ever-growing number of young people migrating to Thailand.

The lack of protection of local knowledge on a national level intensifies this knowledge erosion (Australian Human Right Commission, 2008, pp. 211-226). In many countries, mechanisms that protect and maintain local knowledge remain inadequate at all levels of governments, and in most cases, indigenous peoples are excluded from making laws and policies that will affect their life, knowledge and social



and cultural values. At the same time, most countries are marching towards economic liberalization and people are embracing a more materialist worldview that makes them see indigenous people and their knowledge as obsolete and inferior. The change in way of life and a growing preference for consumer products among the young Pa-O have contributed to the erosion of their cultural practices that are related to their traditional way of life and agriculture. Rituals and religious festivals that Pa-O communities have celebrated for many generations have taken a more materialistic form and the cultural details of these rituals and festivals have waned.

It can be concluded that Pa-O farmers have adopted industrial farming methods over the past few decades in their bid to achieve sustainability in the face of increasing population, land scarcity and increasing living costs. However, this strategy has not yielded desirable outcomes. On the contrary, this move to adopt industrial farming practices has led to environmental degradation, indebtedness, out-migration of young generations and erosion of local agricultural knowledge itself. Farmers are forced to invest more and more agricultural expenses for their farming year after year, so that they can earn enough for their household expenses that also includes costs of education and consumer products besides their living costs. However their income decreases because of space restraints, increasing agricultural expenses and infertility created by excessive use of chemicals. This has led to indebtedness and migration of young Pa-O to cities to seek education and work. A lot of young Pa-O have also migrated to Thailand for work. Knowledge integration from industrial agriculture has also negative impacts on the environment. Pa-O farmers today face increasing threat of soil degradation and pests. There are also signs of climate change in their region. Pa-O communities are being affected by more health issues than before as a result of using chemical fertilizers. Expenses on health have increased and that compounds their household financial problems. It is also important to look at farmers as actors or people who make their own choices, rather than victims. Investing in education and out-migration are choices available to them at present as they endeavor to find solutions. However, a conclusion can be drawn that knowledge integration from industrial agriculture by Pa-O farmers as a strategy for livelihood sustainability has not proved to

be successful, but rather resulted in more social and environmental problems.



## **CHAPTER VI**

### **CONCLUSION**

Pa-O farmers integrate new knowledge from different sources, especially from industrial agriculture and, to a less insignificant extent, from sustainable agriculture. This has been considered by local communities as an important move to maintain livelihood sustainability—a move that is triggered by growing population, shortage of land and increasing costs of living. However, the research findings in this thesis indicate that this strategy is not successful, and has led to negative impacts on sustainability of household economy, the environment, and human health. The consequences include chronic indebtedness among farmers, internal and external migration of the young Pa-O, degradation of soil quality, an increase in pests and erosion of local knowledge. Local knowledge of indigenous peoples will always be in motion, in a constant process of evolving as it is improved, changed within, reshaped and influenced by new knowledge from outside and various factors such as changing economic, environmental and political contexts.

#### **6.1 Theoretical Analysis**

This thesis tested whether the knowledge integration from industrial agriculture by Pa-O farmers can really bring about livelihood sustainability as they have hoped for. The findings in this thesis found that this knowledge integration has been used as a solution for farmers who face more and more pressures from a growing population, land shortage and increasing costs of living, and this solution has worked for short term as farmers reaped rewards from using chemical fertilizers in the beginning. However, in the long run, farmers have started to see that this agricultural practice has put more pressure on the soil, the environment and their livelihood as they are required to use more and more fertilizers, pesticides and herbicides to maintain a high yield. The findings showed that some farmers realized in the near future, the farms might not be arable anymore. Some farmers have started mixing organic fertilizers with chemical fertilizers, and seen positive results. Agriculture-based NGO's are also sharing

sustainable farming methods. However, this knowledge cannot solve the issues of population growth and land scarcity that endanger local food security and livelihood sustainability.

The findings in this thesis showed that knowledge integration from sustainable agriculture alone cannot be used to tackle the issue of livelihood sustainability. It is related to other factors such as population growth. Farmers need to explore more solutions such as regulating population among their communities and grassroots financial activities such as community banks and micro-credit unions in order to tackle indebtedness. Farmers need to work with NGO's to raise the issues to the government and the government should create debt relief programs and subsidy programs. Ethnic minorities in Burma live in rural areas that have a long history of civil wars and instability. The political instability and a lack of clear sustainable agricultural policies mean that livelihood sustainability of the ethnic groups are subject to being affected by political issues. According to the findings in this thesis, farmers have chosen investing in their children's education and sending them to Thailand to work as their long term solution. Even though these moves may partially solve their livelihood issues, in the long run, local food security and sustainability of local cultures and knowledge may be lost due to the lack of a new generation to continue farming and practicing their culture and local knowledge.

The findings showed that practicing input-intensive agricultural practices have caused environmental and health problems. Degradation of soil quality, soil erosion, and signs of climate change have been observed by farmers while people from the communities are suffering from more illnesses and diseases than in the past, and these are very likely to be the results of excessive use of chemicals in farming over a long period of time. Therefore, their knowledge integration from industrial agriculture has not improved but worsened the quality of their life and livelihood. A lack of government and non-government institutions that focus on sustainable livelihood and sustainable agriculture for farming communities in the country does not help but compounds the situation. The Burmese government also lacks mechanisms to protect local sustainable agricultural practices and local cultures. Furthermore, the government's development

projects do not consider enough the potential impacts on local livelihoods and the environment. As livelihood sustainability of farmers is interrelated with a number of other factors and issues, solutions have to be formulated in a more holistic manner.

## **6.2 Recommendations**

- 1.** Indigenous communities should engage with the government and civil society organizations to increase awareness on issues around agriculture, livelihood sustainability, food security and the environment. Local knowledge of indigenous peoples can create mutual respect, encourage local participation, and build partnerships for joint problem solving. Communities, the government, civil society, experts and scientists should work together to facilitate the design and implementation of culturally appropriate development projects at a national level. This should be done through a multi-stakeholder approach, and should be initiated immediately as Burma has opened its door to foreign investment in its development projects.
- 2.** Communities, the government, civil society, experts and scientists should work together to identify techniques that can be transferred to other regions and identify practices suitable for investigation, adaptation and improvement.
- 3.** According to the emerging issues and changing social, environmental, economic and political contexts, indigenous communities need to adopt new sustainable strategies and integrate new knowledge into their local knowledge in a more appropriate and sustainable manner. Communities will be key actors, and NGO's and experts can contribute by providing capacity building, necessary resources, expertise and facilitation.
- 4.** In Burma, there is only one agricultural university located in Pyinmana in Naypyidaw Union Territory. The government should start new agricultural institutions in different areas, that pay attention to local agricultural practices and promote sustainable agricultural practices appropriate for different cultural

contexts. These institutions should be established in the near future and work towards solving food security issues in the country.

5. The government should make policies to create incentives for farmers to adopt environmentally friendly management practices that include animal waste management, protection of pastures and reduction of farm waste. It should create subsidy programs for farmers who would adopt sustainable (both economically and environmentally) farming methods. It should establish an efficient R&D department to make proper assessment in its bid to tackle agricultural and livelihood problems farmers face today.
6. NGO's should create more effective mechanisms to bring awareness on negative effects of consumerism and chemical fertilizers, and promote sustainable livelihood strategies at the same time. Today there are NGO's working on the issue of local food security, however, their number is small and the areas they cover are inadequate. Therefore, more NGO's should engage in the issue of food security as soon as possible. They should also address the issues of the depleting resource base to farmers, and provide skills in alternative management practices and implementation support.

### **6.3 Suggestions for Further Research**

1. Further research on livelihood and environmental issues of indigenous farming communities may also take a closer look at the relationship between agrochemical companies and the government's agricultural sector to have a better understanding of their roles in promoting industrial agriculture and agricultural policies.
2. Further research may look to explore the scope of internal and external migration of ethnic minorities and find out what implications this phenomenon has on local food security and livelihoods.

3. Further research may look at the scope of poppy farming, the factors behind it and its related social, economic, environmental and political issues in relation to local livelihoods and agriculture.



## REFERENCES





**APPENDIX**



จุฬาลงกรณ์มหาวิทยาลัย  
**CHULALONGKORN UNIVERSITY**

## VITA

Aung Tay Zar Oo (b. 1979) is a Burma-born poet, artist and social activist based in Bangkok, where he works for Eco-village Transition Asia, a Thai NGO which focuses on Eco-village Design Education and the empowerment of civil society. He has published a number of books of poetry and translation under the pseudonym Maung Day. His artwork has also been showcased home and abroad. He started writing poetry at the age of 11 and got published at the age of 18. He became interested to work in civil society in 2008. His visit to the Irrawaddy Delta on the aftermath of Cyclone Nargis inspired him to be involved in the relief and community rehabilitation work of a Thai NGO called Spirit in Education Movement. He joined Ecovillage Design Education Training (EDE) and Training of Trainers (TOT) in Thailand in 2009, and started to work in Thailand until he joined Master of Arts in International Development Studies at Chulalongkorn University. He opposes any form of abuse and discrimination based on gender, color, nationality, and ethnic origin.

