# CHAPTER 3
# SOCIO - ECONOMIC TRANSFORMATION IN HOUAY YAE

Socio – economic transformation is a factor that will lead to changes of the local livelihoods, the environmental and ecological systems. These changes have forced local people in Houay Yae village to adapt their livelihoods and resource use in order to manage and maintain their living. In this way, resources management of local resources and practices is critical. The management of aquatic resources could be practiced in many forms, based on the collecting tools and methods used, as well as the cultural and ritual practices related to such resources. Sutton and Anderson (2010) argued that rituals and religious activities were a key part of resource management activities. They referred specifically to particular beliefs held with respect to supernatural powers and the control they had over aspects of the environment, for example, gods who controlled rain or could move the sun. This chapter focuses on the socio-economic transformation factors that impacted on how local people in Houay Yae adapted their livelihoods and managed their resource. An overview of socio-economic transformation in Laos and Houay Yae community focusing on the new forms of livelihoods is provided. The adaptation methods used in the management of aquatic resources in the Houay Yae village, (focusing on farming practices, gathering methods, food culture and livelihood adaptations) are discussed

## 3.1 Overview of Socio - Economic Transformation in Laos

Since 1986, the Lao government had launched the New Economic Mechanism (NEM) known as "*Chintanakarn Mai*" (new thinking), which marked the beginning of transition from central planning to market orientation. It led to profound socio-economic transition in Laos. The tourism and mine sectors had become main contributors to the national revenue during the 1990s and 2000s as well as the agricultural sector.

The Lao government reformed the agricultural sector, (as observed in the later agricultural master plan for 2011 to 2015 and also the strategy for agricultural development 2011 to 2020 (MAF, 2010b; MAF, 2010c) through policies that focused on market economics and the modernized production of agricultural commodities in order to achieve poverty reduction and food security. From this point of view, the transformation of self – sufficient agricultural cultivation to market based agricultural cultivation impacted on the local livelihood. Wright (2009) argued that commercial farming policy (introduced in the 1980s) was a way of addressing widespread poverty and developing the national economy. The 1986 'New Economic Mechanism' offered further support for this policy, urging farmers to transition from traditional forest-based swidden agriculture towards sedentary, intensive agricultural and commercialization. The commercialization of agricultural included rubber, sugar cane, and maize by providing of concessions, commercial farming, and small-investor farming.

After the declaration of the new regime in 1975, the Lao government started to apply an open – door policy which, coupled with the New Economic Mechanism (1986) impacted directly on the tourist sector. With the recent implementation of more open borders and markets there was an increase in international tourists to Laos: since 1993 there was an increase in both the number of tourists as well as the length of their visit. The NTAL provided a conceptual framework for national and provincial tourism in the master plan for tourism development (1998). Provincial governments were encouraged to develop their own model of tourism in order to spread the benefits from tourism through the country. In Vang Vieng, the local government has prioritized tourism, with a focus on using tourism as a tool to eliminate poverty from the district (NTAL, 1990 cited in Damdouane, 2010).

## 3.2 Livelihood Transformation in Houay Yae

Vang Vieng is one of the eight districts in Vientiane province and located half way from the capital city Vientiane to Luangprabang province, which is classified as a world heritage site. In 2005, Vang Vieng had 78 villages, with 8,785 households, of which 15% were classified as poor households. Houay Yae community belongs to Vang Vieng and is located in Vang Vieng district town. Rigg (2006) argued that there are eight "tendencies" occurring during the transformation process in rural areas in the

Global South: (i) occupations and livelihoods in the countryside are diversifying; (ii) occupational multiplicity became more common and more pronounced; (iii) the balance of household income shifted from farm to non-farm; (iv) livelihoods and poverty were becoming de-linked from land and from farming; (v) lives were becoming more mobile and livelihoods correspondingly delocalized; (vi) remittances were playing a growing role in rural household incomes; (vii) the average age of farmers was rising; (viii) cultural and social changes were being implicated in livelihood modifications, and in new ways.

In line with this point of view, profound change had begun to take place on different levels in Laos. New actors had emerged through the process of marketization and this factor framed new opportunities for jobs, which shaped a new model of livelihoods. In the case of the communities around the Vang Vieng district, profound change had occurred through the adoption of new livelihoods, but it is important to understand that these livelihoods varied from context to context due to differences in the availability of capital provided and created by different actors. In the Houay Yae community (similar to other communities in the Vang Vieng district), people had adapted to the new forms of livelihoods and moved from self-sufficient agricultural cultivation to market based agricultural cultivation, from *na* cultivation to paid work livelihoods and small scale businesses.

### 3.2.1 From Self – Sufficient Agricultural Cultivation to Market Based Agricultural Cultivation

As I mention above, after reforming the New Economic Mechanism in 1986, the Lao government developed the agricultural sector to modernized, localized agriculture. Tractors, chemical agriculture was promoted alongside the development of hybrid varieties of rice and has been the main tools in agricultural practices in Vang Vieng since the 1990s. Modernization of tools and methods reached Houay Yae in 2003; the goal was ensure food security and poverty reduction. The villagers in the community cultivated rice in their paddy rice fields, raised animals, and collected forest productions for household consumption. Over and above the goods for the household the villagers exchanged surplus goods both inside and outside the community, mimicking practices from primitive societies. Maithong is the head of Houay

Yae village, Vang Vieng district. He was born in Houay Yae, and is 57 years old. His father was the first head of the village and his family was farmers. Maithong's family decided to change their practices of agricultural production towards market based production and used modern agricultural techniques including tractors, chemical fertilizers and planting of cash crops. He said:

> *I was born and grow up in Houay Yae village and I saw my father who planted rice and other second crops for household consumption and collected forest production and gathered fish and other aquatic animals. This is a traditional agriculture which used the buffaloes as engine for soil preparation. Then in 2003, tractors become popular in the community and I decided to sell three buffaloes and two cows to buy a tractor and my family is the first one who has the tractor in the village. Now, I have some cows but don't have any buffaloes. In addition, in dry season I also grow cash crops such as water melons, pumpkins, cucumbers, cabbages and corns for sale in the market (Interview January 2013).*

The story told by Maithong showed that before the late 2000, villagers' livelihoods were based on traditional agriculture, collected forest products and gathered fish, frogs and other aquatic animals for household consumption. However, after 2003 the agricultural system utilized in the Houay Yae community was changed from traditional agriculture to modern agriculture. The tractors and chemical fertilizers were a symbol of modern agriculture. The socio-economic development in Houay Yae community, including market–based production, began to filter down to the local and daily life of local people in this rural area. The greatest market demand was for cash crops.

Phor Saeng provided another example. Phor Saeng, a villager, is an expert in gathering of aquatic animals in the village, for food and household income. He described that Vang Vieng although a small district had an abundance of natural resources, particularly aquatic resources, which were popular food in Vang Vieng. Aquatic animals, found in the rice field ecosystem, were gathered by villagers for

both household consumption and for sale at the market. Phor Saeng alluded to the problem of reduced aquatic food resources making them more difficult to catch. He believed that this was a result of villagers using tractors instead of buffalos for farming practices and chemical fertilizer application in cash crop cultivations. He recounted:

> *I gather aquatic animals such as fish, frogs and other aquatic animals from rice field. In the past there was a lot, I put the cooking pot on the fired place then I went to catch fish, shortly I got enough fish for cooking but nowadays, after using the farming tractor and chemical in the cultivation which led to biodiversity degradation, it takes more time to collect fish or aquatic animals and has to look for in more areas in order to get enough food for surviving my livelihood" (Interview January 2013).*

It was clear from the interviews that aquatic food still played an important role for local livelihoods. The tractors and chemical fertilizers were not only a symbol of modern agriculture, but also a sign of change in both ecological and environmental systems negatively impacting on the declining of aquatic food resources that were presented in rice field ecosystem, as well as the contributing to the change of local livelihoods. Wright (2009) pointed out that there were two main impacts of agricultural commercialization. Firstly, the declining managed access to forest resource left some farmers and gatherers with a weaker capacity to cope with shocks. The declining food consumption was the most likely result. Households also had to travel further away to gather wild food or they migrated to new locations. Secondly, agricultural comm- ercialization increased waged labor opportunities. The agricultural commercialization relied in many cases on seasonal labor. The increased labor opportunities provided a new coping strategy for households facing shock. However, give the seasonal nature such job opportunities were hard to predict in advance. This coping strategy was mainly utilized by households who did not already depend on wage labor as a primary livelihood.

Rigg (2006) further argued that the transition from subsistence to comercializ-

ation to become market led were drawn ever more tightly into the embrace of the market economy and of the central state. Many upland areas of Laos' livelihoods were being squeezed from below by the environmental degradation and from above by the operation of government policies and, more generally, by evolving market relations. On the other hand, market pessimists saw market integration as a largely destructive process. In addition, Rigg also argued that these opportunities were unequally available and were likely to promote social differentiation. For example, some households found themselves in a position to embrace new opportunities while others were forced to continue to rely on a declining and degrading forest resource.

Villagers in Houay Yae community have changed their farming practices from subsistence agricultural cultivation to market based agricultural cultivation and have become modern farmers. It could be observed that almost all households used tractors as engine for farming practices and have moved away from buffalo use. In addition, they have converted to chemical fertilizers use and farm hybrid varieties applications (such as DR6 and DR8) as well as cash crops. The villagers' livelihoods were not only focused on their farms but also on paid work in Vang Vieng town. This will be described in the next sub- chapter.

### 3.2.2 From *na* Cultivation to Paid Work Livelihoods

After Vang Vieng became a tourism destination in 2000, economic development, including infrastructure development projects, increased in the area and focused on the market. In addition, population growth led to an increase in the exploitation of natural food resources. Almost farmers in Houay Yae village switched from subsistence farming to a market economy model, growing crash crops such as, cabbages, water melons and cucumbers, in order to respond to market demands. Moreover, they replaced their buffalos with tractors and farmers also switched to commercial agriculture methods, for example, using chemicals. These methods of running agricultural business and trading, has led to the decline in aquatic biodiversity.

Nang is a villager in Houay Yae village and is 34 years old. She is a farmer. Previously her family used buffalo in their farming practices but nowadays they used a tractor. She and her family worked on a farm, collecting food from the forest and

gathering aquatic food in the rice fields and rivers for their household consumption. Nang is also a housewife and take care of her children and her family. After Vang Vieng became a tourism site, Nang and her husband did not only work on the farm, but they also worked in Vang Vieng town as a housekeeper and tour guide respectively. She reported that:

> *I still work on rice paddy. My family is a farmer. We bought a farming tractor and use it in farming practices, which save time. After planting and harvesting rice we are free so I work as a housekeeper in Vang Vieng town. My husband also works as a tour guide. There is the job opportunity as Vang Vieng becomes a tourist destination. Each month I and my husband can earn money between 1,700,000 – 2,000,000 kip or 226.66 – 266.66 US$. In fact these money are not enough to survive our livelihood and whenever my husband have a time, mostly at night he will go to catch fish and other aquatic animals in rice field and rivers for household consumption and for sale, which makes income (Interview January 2013).*

This demonstrated how the villager's livelihood in Houay Yae community had changed after Vang Vieng became a tourism site in 2000. Tourism relates to socio – economic development has changed the local livelihoods, environmental and ecological systems. These changes have led to a decline in aquatic resources; difficulties in catching aquatic resources has led to local people adapting the gathering tools in order to maintain food security and ensure their basic needs are met. The changes also reflected the local people diverse cultural ecology, which is adaptable, and has been able to be modified to deal with the changing condition faced. Sutton and Anderson (2010) claimed that cultural practices could be seen as adaptive because they presented the potential methods of adaptation available to human, such as technolo- gies, organizational form, political and social system in order to adapt to their environment. Villagers in the Houay Yae community engaged in paid work for their livelihoods, such as wage labors, tour guides, house-keepers and launching small businesses. According to the data reported by the head of Houay Yae village, since

Vang Vieng became a tourism destination, villagers in Houay Yae tended to work in Vang Vieng town as housekeepers (43/12%) and casual laborers (40.37%) (see Table 3.1).

Table 3.1: New Forms of Livelihood in Houay Yae Village

| Forms of Livelihoods | Amount (hh) | Percentage of Total (%) |
|---|---|---|
| Wage Laborers | 44 | 40.37 |
| Housekeepers | 47 | 43.12 |
| Owner Small Businesses | 6 | 5.50 |
| Tour Guides | 8 | 7.34 |
| Weaving | 4 | 3.67 |
| Total | 109 | 100 |

## 3.3 Houay Yae Community and Adaptation Methods Used in Aquatic Resource Management

The management of aquatic resources could be practiced in many forms, based on the collecting tools and methods used, as well as the cultural and ritual practices related to such resources. Sutton and Anderson (2010) argued that rituals and religious activities could be a key part of resource management activities, and in particular the beliefs held with respect to supernatural powers and the control they have over aspects of the environment, such as gods who control rain or can move the sun. This chapter will focus on the adaptation methods used as part of the management of aquatic resources in Houay Yae village, focusing on farming practices, gathering methods, the food culture present and the livelihood adaptations that have occurred.

### 3.3.1 Farming Practices as Aquatic Resource Management Functions

Farming practices were a key part of the aquatic resource management framework, and in particular those present in the rice field ecosystem. This section will describe the farming practices used with regard to the management of aquatic resources in Houay Yae village, including both traditional and modern farming practices.

- **Traditional Farming Practices**

The traditional farming systems used in the Houay Yae community helped conserve the aquatic resources found within the rice field ecosystem, given that they relied on the natural environment and were friendly towards the environment and ecology. Houay Yae community has been practicing traditional farming methods for a long time, and these methods were closely linked to, and interact with, the utilization of aquatic resources as well as local livelihoods in the community. These traditional farming practices included soil preparation activities and management of the rice field and harvest systems.

Soil preparation was the most important activity within the traditional farming system, as it helped sustain the abundance of aquatic resources within the rice fields. Animals were the 'engine' for soil preparation activities, with buffalos being used to plow the soil, with *khee thaiy* (plowed soil) then left for one or two months before transplanting took place. Because animals were a key for soil preparation activities, farmers had to maintain water in the rice fields before and after plowing in order to make the soil soft, and during this time the soil had to be picked-up and put-down in a process known as *peen khee thaiy* and *hak khee thaiy*. This activity was a local method used to eradicate and/or control weeds, plus it provided a habitat for aquatic animals, within which they could lay eggs and grow. The rice fields were harrowed before transplanting, in order to make the soil smooth and uniform, and to get rid of weeds. During this time aquatic animals were also collected; particularly fish, as during this time the farmers maintained a high water level so as to allow the animals to flourish. With the traditional farming methods, after transplanting, the farmers visited their rice fields every morning and evening to maintain the water level and get rid of weeds, until harvesting time at the end of the year. No fertilizers were applied when this method was used.

Traditional farming practices reflected the traditional livelihoods that took place, such as the collecting of natural foods for household consumption, (this was observed during the rice cultivation process), during which time concern was shown for the use and management of people's food sources. One example of this was the maintenance of a high water level in the rice fields for two months prior to and after plowing takes place - a practice which provided a habitat for aquatic animals to lay

eggs and grow, plus the harrowing of the fields before transplanting, which allowed some animals to be collected but left the smaller animals in the fields to grow – to be collected after transplanting two months later.

In addition, traditional farming practices were also closely linked to cultural and ritual practices. For example, two months after transplanting, farmers took the water out of their rice fields in order to build strong rice stems, at which time most of the aquatic animals were collected for household consumption and for use in Buddhist activities such as the *boun haw kao pa dub din* and *boun haw khao sa lark* ceremonies. Traditional farming practices were, therefore, important in contributing to the conservation of aquatic animal biodiversity. As Phor Chanthaphone, a villager in Houay Yae, reported:

> *Traditional agricultural practices are friendly; helping to enhance the ecological system and in particular helping to conserve aquatic animals. I have cultivated paddy rice for a long time. I use buffalos to prepare the soils, and in order to use buffalos the rice fields need water – to make the soil soft, otherwise it cannot be plowed. After plowing I leave the paddy rice fields alone for two months and maintain a high water level, in order to keep the soil soft. During this time I rotate the plowed soil (khee thaiy) in order to get rid of weeds. After transplanting the rice seedling, every day in the morning and evening I go to the paddy fields to take care of the rice, maintaining the water level and controlling the weeds. In my paddy fields there are many of fish and other aquatic animals, because I maintain a high water level, which provides a habitat for these animals. I can then collect them again at harvest time - for household consumption and for storage in the form of fermented and pickled fish, which we can eat later, particularly during the harvesting periods (March 2012).*

- **Modern Farming Practices**

Modern farming practices used chemical fertilizers, pesticides, herbicides and hybrid rice varieties, and most of the rice was grown for the market.

Since 1986, the Lao government had reformed the economy, including the agricultural sector, making it more modern in an effort to meet the country's basic needs, and in particular, its food security and income needs. Modern farming had been practiced in Houay Yae village since 2009, when tractors were brought-in to replace buffalos, in particular for the soil preparation activities. A few farmers also applied chemical fertilizers and herbicides. Preparing the soil using a tractor takes a short time and does not require high water level to be maintained, nor for weeds to be removed. This had led to the use of tractors rapidly decreasing aquatic biodiversity, as it destroyed habitats and minimized the time available for fish and frog to spawn and their eggs to develop. Ten years ago, when traditional farming was practiced extensively, there were lots of aquatic animals in the paddy fields, but over the years the number of such animals has declined, making their collection more difficult. During one interview held with Phor Vieng, a local villager in Houay Yae village, he said:

> *The introduction of modern agricultural practices is one factor which has led to a decline in the availability of aquatic food resources in the rice fields, and in particular the use of tractors, chemical fertilizers, herbicides and molluscides. The using of tractors has had a big impact on aquatic animals, including fish, and in particular small fish, which are killed when the rice fields are harrowed. Ten years ago there were many fish, frogs, molluscs and other aquatic animals to be found in the rice fields, but nowadays the numbers have declined and they are difficult to collect. Native snails have disappeared and been replaced by golden apple snails. However, in order to maintain biodiversity in the rice field, I maintain a high water level during harrowing time, to minimize the death of small fish and other small aquatic animals, plus I also maintain a high water level after transplanting, in order to maintain the animals' habitats. Also, I have never used chemical fertilizers, pesticides or herbicides, which is why my rice fields still have an abundance of aquatic resources when compared to others (January 2013).*

Due to the influence of modern farming practices, as well as socio–economic developments, most farmers' livelihoods have changed, in fact they no longer spent all their time farming but also did other work such as in hotels, guesthouses and restaurants - as housekeepers, or work on construction sites as wage laborers and engage in tourism activities – working as boat pilots and tourist guides. However, agriculture and the collection of natural foods still played the most important role in their livelihoods, and in particular, the use of aquatic resources in their rice fields. However, because modern farming practices had been adopted more recently, local people had tended to maintain and conserve aquatic biodiversity in their rice fields by mixing their traditional and modern farming practices. Most local people in Houay Yae village, however, have used tractors for their soil preparation work but avoided the use of chemical fertilizers and herbicides. In this way they maintained the water level in the fields so as to provide a habitat for aquatic resources.

### 3.3.2 Fishing Gears and Their Evolution as an Adaptation Method

The gathering methods used to collect aquatic animals acted as a form of a management system, and this section will focus on the ways in which the collecting of aquatic resources had been adapted within the rice field ecosystem, and in particular the use of time and space rotations. All human cultures use complex technology based on their needs, the available materials, innovation and the influences of other cultures. If one of these conditions changed, the technology would also change, and the environment and culture would be affected as a consequence (Sutton and Anderson, 2010).

Local people in Houay Yae village had long used traditional gathering tools to collect aquatic resources, and these had been adapted to suit the environmental and ecological systems in place, in order to sustain livelihoods and meet basic needs. Many kinds of gathering tools had been used in the village over the years, some of which had disappeared and others of which had emerged. There were more than 34 types of fishing tools used to collect aquatic food biodiversity in Houay Yae village; the most commonly used were the *bet* (fishhook), *toum* (rounded bamboo fish trap), *xai* (bamboo trap), *peun laem* and *laem sak pa* (fishing gun), *ving* (dip-net), *soum sak pa* (fishing coop), *morng* (fish net), *khong* (fish basket) and other indirect forms of

fishing tool.

Fishing methods were as important as the aquatic animals themselves in terms of sustaining local livelihoods, as they ensure families can meet their food requirements. In order to respond to changing conditions and retain their livelihoods, plus sustain their culture and rites, local people in the study area had, over time, developed and adapted their fishing tools based on the socio-economic and environmental situation. Many traditional fishing tools used a long time ago had all but disappeared, such as the *xai* (bamboo fish trap), *morng tien* (fish net), *lun* and *ving son tae*, while many were still used but had been adapted, such as the *ka tong kob, ka tong pa, dang kuad pa phun* and *bet pong si no.* These reflected the adaptations made when catching aquatic animals with the rice field ecosystem. These adaptation methods had played an important part in the conservation and existence of these resources. The evolution and adaptation of fishing tools in Houay Yae could be divided into four periods, as follows:

- **Before 1975 - Traditional Practices**

Due to the abundance of natural resources and small population, livelihoods in Houay Yae village were based on natural resources, such as seasonal farming practices, which relied on water obtained from rainfall, foods from the forests and rivers, for example, non-timber forest products, fish and other aquatic animals, all of which were collected and caught using traditional methods. Most of the fishing tools used were traditional tools and made from materials found in the local area, such as bamboo, which was used to make a range of fishing tools, including the *xai, sorn, lun, khong* (fish basket) and *ving*. Aquatic animals were used for household consumption, with any surplus exchanged in the village or used to make processed foods such as *pa daek* (fermented fish), *pa som* (pickled fish) and *pa khaem* (salty fish), to be used at the end of the year, such as during the harvest or during food crisis periods.

This period could be described as a 'sufficiency livelihood' time in Houay Yae village, as most local people worked on the farm and collected natural foods for household consumption; not for the market. Also, dried bamboo called *lua lin* was used as a torch to catch frogs and fish at night, and up to eight kinds of fishing tool

were used such as *xai, sorn, lun, khong, ving,* fishnet, *ving sorn tae* and *soum sak pa*. This sufficiency lifestyle was important in helping to enhance and conserve natural resources. As, Phor Keo, a villager in Houay Yae told me:

> *In the past, we used traditional tools to collect aquatic animals in the rice fields, and these served our consumption needs, such as using dried bamboo as a torch to collect frogs at night, or using xai to collect fish in streams during the wet season, and using ving to collect fish in the rice fields when harrowing. The amount of fish caught then was enough for household consumption, the fish were not caught for the market. As a result, it was not necessary to change to the use of modern fishing tools – only the xai, ving, sorn and lun were used (January 2013).*

- **After 1975 - Change Begins**

After the declaration of the new regime in 1975, Lao PDR started to apply an open–door policy and the New Economic Mechanism (NEM) was launched. The socio-economic developments, and in particular infrastructure development projects, were introduced in Lao PDR, and the population grew. However, these changes caused an increased demand for natural resources, and especially food, leading in turn to the increased exploitation of aquatic resources and increased levels of competition and exploitation, as market demands increased. Resource use in Houay Yae village was now not just for household consumption, but also for exchange in the village. Population growth also led to over-exploitation and strained the capacity of the ecosystem services provided; leading to a decline in aquatic food resources. It was then not easy to catch aquatic animals and so some of the traditional gathering tools were no longer suitable and could not catch enough for household consumption.

Local people in Houay Yae village; therefore, had to adapt their gathering methods and tools, using new fishing gears in some cases such as the *bet* (fish hook), fish nets, *toum* (rounded bamboo fish trap) and *peun laem* and *laem sak pa* in order to maintain their livelihoods and household food security. After 1975, local people in Houay Yae started to use fishing nets made from nylon replaced fishnets that made

from ramies, which are effective for catching fish. In another change people used torches instead of dried bamboos to catch frogs and fish at night after 1993. During this time, the local people not only adapted their fishing tools, but also had to change their fishing times; now they fished and collected aquatic animals both during the day and at night. However, most of the traditional gathering tools were used together with the new ones, due to the ecological changes and scarcity of aquatic resources.

- **Arrival of Tourism and Socio-economic Change**

After Vang Vieng was made a tourist destination in 2000, economic development projects, including infrastructure developments, increased in the area and were focused on the market. In addition, population growth led to an increase in the exploitation of natural food resources, and most farmers switched from subsistence farming to a market economy model, growing crash crops such as vegetables, cabbages, watermelons, cucumbers, corn and pumpkins in order to response to market demands. They also started to use chemical fertilizers, pesticides and herbicides on their crops. In addition, most farmers began to replace their buffalos with tractors, while some farmers switched to running businesses and trading, became wage laborers such as work onhousekeepers and construction sites, and this led to a decline in aquatic biodiversity.

These practices all took place without much awareness as to the impact they were having on the environment and ecological system, and in particular aquatic animals presented in the rice fields, which started to decline, making catching them more difficult. Since that time, some of the traditional collecting tools have disappeared from Houay Yae village, such as the *xai*, *sorn* and *ving sorn tae*, because they were not suitable for catching aquatic animals under the new conditions. However, some local people had created their own gathering tools in order to catch aquatic animals, such as the *ka tong pa*, *ka tong gob*, *dang kuad pa*, *peun laem* and *laem sak pa*, as mentioned previously, as well as adopted the eight volt battery, called a *mor soard*, to collect fish in large amounts. However, use of the battery was illegal, so not so many people use it anymore.

The results of socio-economic developments had been a new focus on the market, the replacement of subsistence agriculture activities with chemical-driven

agriculture, and a growth in the population, all of which had led to the over-exploitation of natural resources, and in particular aquatic animals. As a result, aquatic resources had faced big challenges and were increasingly in decline, plus livelihood changes based on the adoption of a market economy had taken place with little awareness of issues related to conservation. These changes had led to a decline in aquatic resources and so a difficulty in catching them, causing local people to have to adapt their gathering tools in order to maintain food security and their basic needs. The changes also reflected the local people's diverse cultural ecology, one which was adaptable and had been able to change to deal with the changing conditions faced. Sutton and Anderson (2010) claimed that cultural practices could be seen as adaptive, because they presented the potential methods of adaptation available to humans, such as technologies, organizational forms, political and social systems, in order to adapt to their environments. Mae Mon, a villager in Houay Yae village, reported the following in relation to this point:

> *I was the first person who knew how to make ka tong sorn pa and use it in Houay Yae village. In the past I used a dip-net made from nylon to catch fish in the rice fields and sometimes in channel or small streams, and this was enough for household consumption purposes. It is now difficult to catch fish in the channels, because there are few fish and when they see the dip-net they swim away. Now I use a shape sized tool with a small line that is the same color as the water, a dip-net which I call a ka tong sorn pa, which is a semi-circle made of bamboo and with which I can catch a lot of fish. This tool is now used in Houay Yae village and nearby (January 2013).*

- **Conservation and Renewal Period**

Once environmental and ecological system changes started to take place in the area, natural resources, and in particular aquatic resources declined due to a loss of habitats. Local people in Houay Yae village and nearby were aware of this change and so started to conserve such resources, and at the same time Vang Vieng started to promote traditional food for tourism purposes, such as c*houp phuk* (mixed

vegetables), *kaeng nor mai* (bamboo shoot soup), *kaeng pa khor* (snakehead fish soup), *chaew pa daek* (fermented fish sauce), *chaew pa khaem* (salt fish sauce) and *chaew nam puu* (fermented crab sauce), with aquatic foods playing an important part in such dishes. In order to conserve aquatic animals, in 2009 the Nam Song River was split into four conservation sites called *vang sa nguan*, with the local communities encouraged to use traditional gathering tools in order to collect aquatic species. In addition, other more harmful tools and practices were prohibited, such as the electric shock tool (*mor soard*), and the use of fish poison and dynamite. The four fish sanctuaries sites created were as follows: (1) *Tha Ta Lard*, (2) *Tham Norn* (3) *Tham Lom* and (4) *Pha Tang* fish sanctuaries. Houay Yae village was a part of this conservation project, which included rules of practice and the use of traditional gathering tools. Phor Chanthavong, a villager in Houay Yae village, told me:

> *Since 2009, Vang Vieng has been included in fish sanctuaries, and local people in Houay Yae village have played an important role in participating in and helping to conserve aquatic resources, such as by using traditional gathering tools to collect the animals, including fish hooks, dip-nets, fish nets, toum and fish baskets. I usually use fish hooks, toum and fish net and have never used modern fishing tools to collect fish, as these cause the fish to disappear – including the mor sord, the use of dynamite and fish poisons (January 2013).*

### 3.3.3 Time and Space Rotations

Local people had a close relationship with the natural resources around them, and in particular the aquatic animals present within the rice field ecosystem, as these provide food security and household incomes, and are involved in the cultural and ritual activities that take place. The relationship between local resources and the local community was important in helping to manage local resources, including through the use of time and space rotations for collecting the aquatic resources, which represented a form of natural resource management regime based on local livelihoods and local resource use.

Local people in Houay Yae community rotated their use of local resources

based on the diversity of resources and species that were present. As the local population had increased, so had the boundaries set for utilizing such resources. Thirty years ago, aquatic resources were gathered from around the village, in paddy fields, small streams and the Nam Song River, and it took just three to five hours to collect enough for household consumption. However, as the population and demand for food increased, so did the level of competition for aquatic resources, leading to their decline. Nowadays, it takes local people more time to collect these resources - up to one or two days if they travel to areas far from the village (see Figure 3.1).

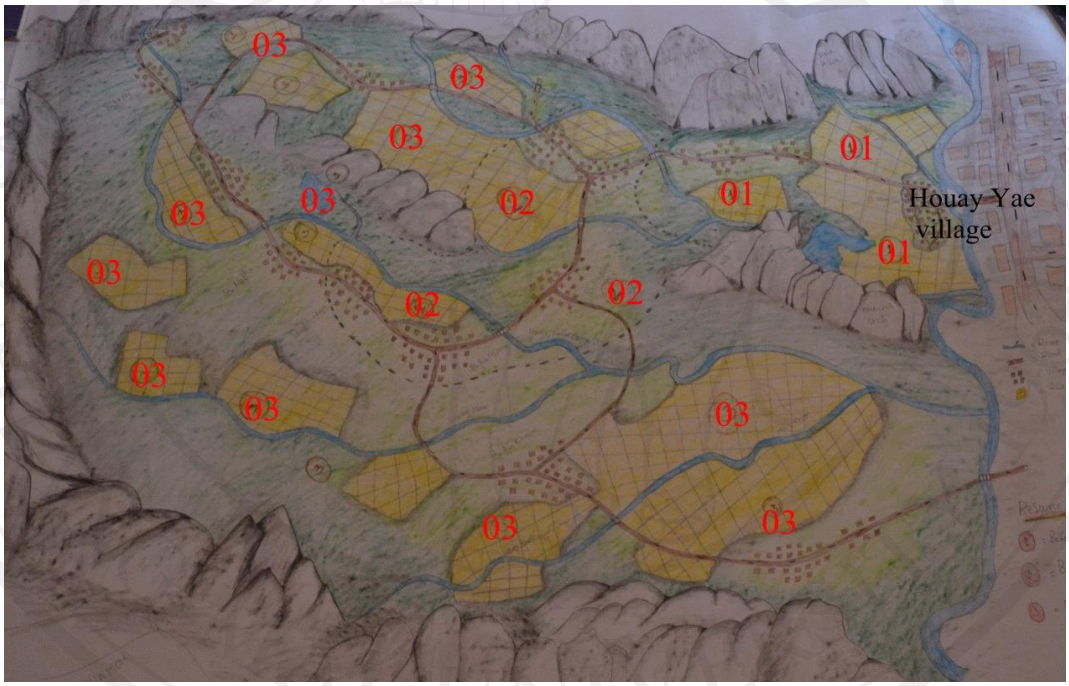


Figure 3.1: Local Map of Aquatic Resource Use around Houay Yae Village

Where:

01 = Aquatic resource use 30 years ago

02 = Aquatic resource use 20 years ago

03 = Aquatic resource use in last five years

Figure 3.1 shows that local people in Houay Yae village had to adapt their range for collecting aquatic resources, by rotating and expanding the access boundary. Thirty years ago, the area within which they collected aquatic resources was small

when compared to the present, but provided enough food for household consumption and other activities in the community. One local villager, Viengkham, described the situation in terms of collecting aquatic resources around the village, as follows:

> *Thirty years ago, I caught aquatic animals such as fish, frogs and other small animals around the village; this was enough for my household consumption and I gave any surplus to my neighbors. Nowadays, I have to go more five kilometres far from the village; sometimes it takes me between three and five hours walking. In order to achieve food security, I have had to adapt and rotate the areas I use to collect these resources and maintain biodiversity (January 2013).*

In addition, different species of aquatic animals were collected at different times of the year; for example, most fish, frogs, eels and molluscs were collected between June and October each year, while *khuang son*, insects and eels were collected in the dry season. Local people in Houay Yae village had a calendar in their head which they used to decide when to catch different species, as could be seen through their practices, with most fish and frogs collected in the wet season between June and October, and with eels collected in both the dry and wet season, plus *khuang son* collected only in the dry season between November and May (see Table 3.2). This practice represented a form of rotation of natural resources use, helping the ecosystem to recover in-between and helping to preserve aquatic resources.

Table 3.2: Aquatic Resources Collection Times

| Months / Types of Aquatic Resource | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fish | | | | | | | | | | | | |
| Frogs | | | | | | | | | | | | |
| Eels | | | | | | | | | | | | |
| Aquatic Insects | | | | | | | | | | | | |
| Molluscs | | | | | | | | | | | | |
| *Khuang Sorn* | | | | | | | | | | | | |

Notes: Fair times to collect, Good times to collect aquatic resources

The seasonally rotation method helped to maintain the efficiency of the natural resource management system, and showed that the traditional practices reflected upon local livelihoods, plus revealing the interactions and relationships the resources have with the villagers' cultural and ritual practices. The fish migrated in to the area during September and October of each year, then went back to the mainstream of the river (called *'fon tok lin deuan kao-deuan sip, pa long torn, long lee'*), at the beginning of the wet season. During this time, most fish swam back to the mainstream of the Nam Song River, and at this time local people caught fish and other aquatic animals for daily use, or stored them for later use (in the dry season or times of crisis). The villagers also used these aquatic resources in Buddhist and other local rituals, such as *boun haw khao pa dub din, boun haw khao sa lark* and *ta haek na*. Loung Kham, an elder from Houay Yae village, said:

> *A month after transplanting the rice seedlings I prepare 'torn' and 'lee' as gathering tools, to collect aquatic resources in a small stream or at the end of my rice field. When September arrives, called 'deuan kao, deuan sip, fon tok lin, pa long torn, long lee' ('fish go back to the mainstream'), I collect fish and other aquatic animals, not only for daily consumption, but also for future use by making fermented, pickled and dry fish. In addition, at this time it is nearly the end of the*

*wet season and beginning of the dry season, and so many Buddhist and local rituals are held, meaning I have to prepare dry fish and other dried aquatic resources to use in local and Buhddism custome activities (January 2013).*

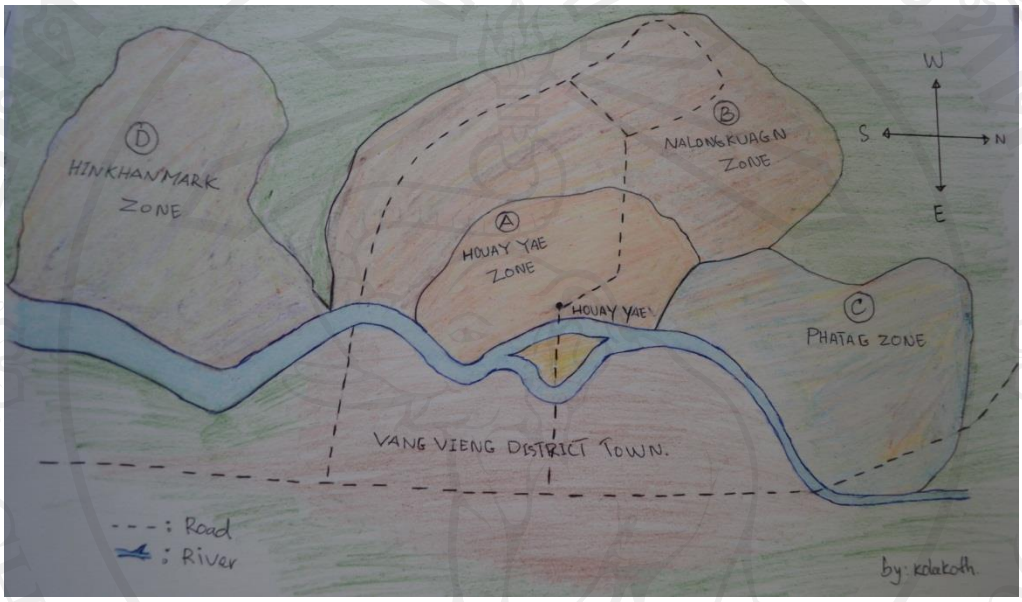


Figure 3.2: Map of the Aquatic Animal Gathering Rotation System used in Houay Yae Village

Moreover, time and space rotations in terms of collecting aquatic animals played an important role in terms of fishing methods, and acted as a form of resource management. Local people in Houay Yae divided their local resources into four zones around the community and nearby, these being Houay Yae, Nalongkuang, Phatang and Hinkhanmark zones, in order to rotate and re–rotate the collection of aquatic resources. Each of these zones was rotated every four or five days at a time in order to allow the renewal of the ecological system and the aquatic animals (see Figure 3.2). Viengkeo, a villager in Houay Yae village, described this method of collecting aquatic animals:

*Fishing is my job; I know everywhere where I can catch aquatic animals in the village and nearby. Normally, I go to collect fish and other aquatic animals in the rice fields near the village, but after going*

*back there one or two times I move to another area. I usually go to collect in four different zones: Nalongkuang, Phatang, Hinkhanmark and Houay Yae zone, each of which I rotate on a daily basis. For example, today I will go to collect fish and other aquatic animals in Nalongkuang zone, whereas tomorrow I will go to Phatang and next to Hinkhanmark and so on. I rotate like this when the collecting of aquatic animals does not provide enough for my household's consumption activities and when the animals become difficult to collect (January 2013).*

The adaptations carried out by local people in terms of resource use (dividing up the area into zones of collection and rotating these places, reflected the local community's way of managing their resources and dealing with the realities of their livelihoods) to maintain food security and generate an income, plus it also reflected the local culture and demonstrated a close interaction with local resource availability.

### 3.3.4 Food Culture and Livelihood Adaptations

Food is an essential part of human existence and fulfills the most basic of human needs; however, the food habits and behaviors of cultural groups are often shaped by cultural, ethnic and religious beliefs, those learned from childhood, and thus, can hold special value for an individual (Azam, 2012). Food consumption styles were a part of human culture that reflected the different livelihoods, customs and cultures of people, as well as the identity referred to as "food culture". Food culture mostly concerned traditional and local foods, as Azam (2012) pointed out when referring to Asian immigrants, for after moving to a new area they used food as a tool to practice their cultural traditions and maintain their distinct identity.

Likewise, Pottier (1999 cited in Krahn, 2003) argued that food is cultural and that the world food cultures changed in every country for better or for worse. The negative dietary changes were often the result of unbalanced development efforts. In many low and middle-income countries including Brazil, China, and Thailand, the rapid dietary change created a situation where under nutrition and over nutrition exists side by side and Laos is also a good example. While many people in the cities enjoy a

surplus of food and a lot of beer, many upland cultures are deadlocked in the decrease of their traditional food, especially wildlife and fish. Understanding of existing ways of food includes understanding acquisition, preservation and storage, as well as knowledge of local cuisine, including recipes, cooking methods and eating practices (Krahn, 2003).

Local people in Houay Yae had traditional food and consumption styles/eating habits related to their natural resources, and in particular aquatic resources obtained from the rice fields such as *pa daek, larb pa, kaeng, aow, mok-mork, choup phuk and ping, as well as som tum*. These kinds of food were local and made every day for consumption, plus they reflect the local livelihoods, culture and daily work activities of the local population. Most of these dishes were prepared in advance of the farming day, such as on transplanting or harvesting days. They were also prepared for local customary activities, including the *basi* - ceremony, the house warming ceremony, wedding parties and other festivals such as funerals (*ngarn sob*).

However, changes in the area's natural resources, plus socio-economic developments have led to local livelihood changes, including the food culture, which people have adapted. In fact, the people in Houay Yae village had adapted their food consumption styles, both in terms of their use of local resources and the use of styles from outside; mixing the two together. Most traditional foods were made and consumed within the community, but some traditional foods had been adapted, including the raw materials used, such as *larb pa*. In the past, *larb pa* was common and most referred to it as *larb pa tong* (*Notopterus spp*.), referring to the kind of fish used to make it which was very tasty. The eating of *larb pa* was supposed to bring good luck, health and wealth; therefore, it was usually prepared for rituals such as the *basi* - ceremony, wedding parties, house warming ceremonies and funeral parties, and in order to maintain its particular meaning, local people in Houay Yae village had adapted it by using different species of fish instead of *pa tong*. As the head of Houay Yae village said:

> *Larb pa is consumed regularly in the households of Houay Yae village, particularly in my household where we have consumed it for a long time. Whenever I catch pa tong (Notopterus spp.), in the evening I will*

*eat larb pa tong for dinner and it will have a very good taste when eaten with fresh vegetables such as neem leaves, native egg plants and khao thong (Chinese lizard tail), as well as with friends and neighbors. Nowadays, pa tong are difficult to find, which is why when I want to eat larb pa, I can't think of pa tong, as I have to use other species, and in particular white fish or 'pa khao' (March 2012).*

Moreover, many traditional foods such as *tom som ien ka ti, ien pao pii, ien oy* and *oua kob* were eaten in the past, but nowadays these foods were no longer made in Houay Yae village due to market and economic factors; most eels and frogs were sold at the market for a higher price. In addition, due to changes in occupations in the area from farmers to wage laborers, housekeepers and tour guides, most people chose not to eat aquatic foods. In the interview with Viengkeo, he said that after harvesting rice he worked as a tour guide and his wife worked in a hotel as a housekeeper in Vang Vieng town in order to earn more money and to meet their basic needs.

*Before working as a tour guide, I worked on a rice farm and went fishing. At that time aquatic foods played a key role in terms of my household food security and household incomes. I collected fish and other aquatic animals for household consumption and for sale at Meuang Song market every day. Since working as a tour guide; however, I have had no time to catch fish and other aquatic animals, so buy cooked food from the market (January 2013).*

The adaptations seen in terms of food culture and occupations can be seen as directly linked to aquatic resources management in the area. The change from local people working as farmers and gathering aquatic animals to working as wage laborers, housekeepers and tour guides has reduce the amount of time the people spend exploiting aquatic resources, as they have a choice now in terms of food security. This reduction in the amount of time spent exploiting the aquatic resources has also improved the ecological system and led to a renewal of such resource items.

Figure 3.3: Preparing *Larb Pa* for the Basi Ceremony in Houay Yae Village

## 3.4 The Impacts of Modern Agricultural Practices and Tourism Development on Local Aquatic Resources

Since modern agriculture was introduced in Vang Vieng, encouraging the use of tractors and promoting the growth of cash crops, farmers in Houay Yae and around Vang Vieng have changed their farming practices from self-subsistence to a market-oriented economy. In the quest for more efficient farming practices that would save time to do other works, changes were applied that included the replacement of buffalos with tractors for soil preparation and the application of herbicides for the control of weeds. These new practices, however, have impacted negatively on the environment causing limitations to the habitat of aquatic animals leaving them fewer opportunities to lay eggs, leaving them less time to grow and killing a large percentage of the small fish during harrowing times. Furthermore, chemical fertilizers and pesticides were applied to cash crop cultivation including water melon, cucumbers, cabbages, pumpkins and corns. This led to toxicity in the soil and water causing negative impacts on aquatic resources and decreasing rice field ecosystems.

In 2000 and, at the same time that these changes occurred, tourism development began in Vang Vieng with the building of tourism facilities such as hotels, guesthouses, bungalows, resorts and restaurants. These facilities were built

around Houay Yae village and alongside the Nam Song River to serve a large number of people who were either tourists or visitors because of the growing demand for natural resources. It was found that wastewater was discharged directly into the public drainage system and ended up in the Nam Song River without treatment. As a consequence of this, the ecosystem of the Nam Song River was destroyed and this has led to the reduction of the habitat of aquatic animal. Vang Vieng started to promote local foods for tourism purpose including *choup phuk* (mixed vegetable), bamboo shoot soup, *tom som pa khor* (snakehead fish soup), *tom som ien* (eel soup), *mork khuang son, chaew pa khaem, chaew pai pa daek and chaew nam puu*, all of which come from the rich aquatic resources of this region.

Despite the fact that tourism development has provided new opportunities to the people of Vang Vieng in the form of employment such as housekeepers, tour guides, wage laborers in construction sites, taxi drivers and small scale businesses, it has also destroyed the natural ecosystems which includes the aquatic animals' habitat. It has also increased competition between local people in Houay Yae and outsiders for and over exploitation of local aquatic resources, leading to the continuous decline of resources. As an example, most of collected aquatic animals were sold at Muang Song and Houay Sa Ngao markets in high price. The local community in Houay Yae have responded to these changes by adapting their living and local resource practices including fishing gear use, gathering methods use and livelihood adaptation in order to ensure household food security. Local communities were concerned about sustainable livelihoods and survival for future generations and managed to adapt on the use of resources. However, they were unable to negotiate on more higher level such as governance because of their lack of identity, the power relations that existed and their social status.

## 3.5 Summary

Socio-economic development such as agricultural transformation and tourism development in Vang Vieng led to changes of the local livelihood, environment and ecology including natural food resources as well as to the aquatic food biodiversity in the rice field ecosystem, which has declined. These changes forced local people in rural areas to adapt in terms of natural food resource used, particularly the aquatic

food that presented in the rice field ecosystem, plus the local livelihoods were also adapted from self–sufficient agricultural cultivation to market based agricultural cultivation and from *na* cultivation to paid work livelihood.

In terms of farming practices, in order to maintain and manage their food sources most local practices in the Houay Yae village, (such as farming, fishing and the food culture), represented a function of the management of aquatic resources, including preservation and conservation. Farming practices had been the main factor helping to improve aquatic resource levels in the rice fields, in particular traditional farming practices had played an important role in providing habitats for the aquatic species to lay eggs and grow. Even modern farming practices had been adapted in order to preserve and conserve aquatic resources, such as farmers trying to maintain a high water level in their rice fields and avoiding the use of chemical fertilizers, herbicides and pesticides. Farming practices in Houay Yae village reflected the aquatic resources management system used there, such as soil preparation, rice field management and harvesting practices, all of which were a part of the aquatic resource management system. For example, soil preparation activities provide habitats for aquatic animals for one or two months, allowing the animals to be collected when harrowing the rice fields. After transplanting, farmers maintained high water levels in order to provide suitable habitats for the aquatic animals, catching them again before the rice harvest.

At the same time, the use of fishing tools and fishing methods had also changed and was adapted based on the environmental and ecological situation. Many of the fishing tools used for a long time were no longer appropriate and not used, such as the *xai* (bamboo fish trap), *ving son tae, lun* and *morng tien*. However, in order to provide enough food for their households, farmers had developed fishing tools, such as the *ka tong gob*, the *ka tong pa* and the *dang kuad pa*, and adapted their fishing methods, rotating where they accessed the resources. Livelihoods change was also a driving force behind aquatic biodiversity changes. Local people in Houay Yae village had adapted their livelihoods in recent years and, in particular their food culture. Many foods consumed in the past were still consumed, such as *pa daek* (fermented fish), *larb pa, tom-kaeng*, *aow* and *mork–mok,* while some traditional dishes had been adapted, and, in particular, their ingredients, such as *larb pa*, which used to be made

from *pa tong* but was now made from other species of fish, and in particular white fish species, due to the decline in the number of fish species in the area. Finally, in the past, everyone worked on the farm, but now most local people went to work in the district town after completing their farming activities, working in hotels and restaurants as housekeepers, working on construction sites as wage laborers, and working as tour guides or as taxi drivers.

From these results, I conclude that these adaptation methods demonstrate local knowledge production, based on the changing condition and also reflect on the local people diverse cultural ecology. As such they demonstrate flexibility and an ability to deal change and to face dynamic conditions. Likewise, Sutton and Anderson (2010) argued that cultural practices can be seen as adaptive because they present the potential methods of adaptation available to human such as technologies, organizational forms, political and social system in order to adapt to their environment.