

## **CHAPTER 2**

### **THE IMPORTANCE OF AQUATIC FOOD BIODIVERSITY IN HOUY YAE VILLAGE**

In order to understand the important role played by the aquatic food biodiversity found within the rice field ecosystem and its links to the livelihood of those living in Houay Yae community, it is necessary to understand what types of aquatic animals exist in the study area. In this chapter, I will provide an overview of the Houay Yae community, discuss the important role that aquatic foods play in the community, and discuss the gender roles and experiences as well as access to such foods. I will also examine the factors affecting such issues and the trends with regard to aquatic animals within the local rice field ecosystem.

#### **2.1 Overview of Houay Yae Community**

##### **2.1.1 Physical Characteristics**

Houay Yae village is located within the Nam Song watershed in Vang Vieng district in Vientiane province, Lao PDR, and its paddy land adjoins the Nam Song River, to the west of Vang Vieng (between 18° 55' 00" and 18° 56' 00" north, and 102° 26' 00" to 102° 27' 00" east). It also lies at an elevation of 400 to 600 meters above sea level. The total area of the village is 230.5 ha, of which housing covers 76 ha, gardens take up 55 ha and rice fields cover 99.5 ha. The north of the village is bordered by Houay Yae stream and the Pha Puak mountain, while to the south are rice fields and Tham Chang cave. To the east lies the Nam Song River and Vang Vieng town, while to the west the village shares a border with Phonengern village.

Houay Yae community has an abundance of natural resources, including forests and rivers, and rice fields these resources play an important role in the lives of the community and helps its people to practice agriculture and utilize non-timber forest products (NTFPs) for food, shelter and herbal medicines. The Nam Song is the

main river in Houay Yae village, as well as in Vang Vieng town, but there are other small streams, including Houay Yae, Nam Ka and Nam Kuang streams, each of which contains an abundance of habitats for aquatic animals, those which have provided a natural food source for local people over an extended period. In terms of climate, the temperature during the year ranges from between 37°C and 13°C in January, to 38.7°C and 21°C in April. The dry season runs from November to March, while the wet season lasts from April until October, with the average rainfall being 440.23 mm based on records from the Vang Vieng Meteorological Unit of District Water Resource and Environment Administration Office in 2010.

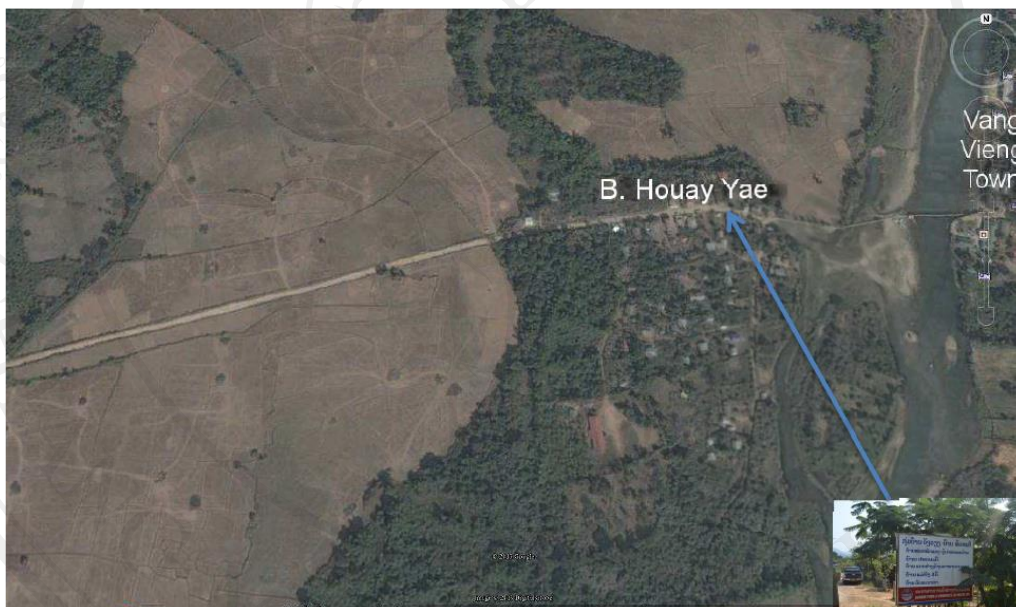


Figure 2.1: Location Map of Houay Yae Village

Source: Google Earth (Accessed 2013, October 24)

### 2.1.2 Socio–Economic Characteristics

**Social structure:** Houay Yae community is a rural society in which kinship ties are strong and people tend to help each other. This could be observed through the farming practices that took place there, and are based on labor exchange and mutual assistance. The population of the village is 591, of which 284 is women and most of who are from the Lao Lum majority group. The village committee collectively acts as the leadership of the community and administers both inside and outside the community. The committee consists of three people, a president called a *nai barn* and

two vice-presidents, all of who were selected by the villagers and through kinship ties. In addition, Houay Yae village has a primary school which provides basic, general education and has a temple which supports Buddhism related activities. The village has roads which connect to areas outside the community.

According to the official local government classification of household financial status, Houay Yae is an eradicated poor village with no poor households. However, the wealthy households were classified by the villagers themselves. During my research study, the wealth ranking of those in the village was assessed by the villagers themselves, who classified households into two financial groups, the rich and poor. However, it should be noted that this definition is not based on an absolute evaluation but based, rather, on a relative view, that is, the villagers' perceptions of who are considered wealthy and who are considered poor. As a result, the terms 'rich' and 'poor' will not apply to other communities. The criteria used by the villagers in order to categorize households as rich and poor are shown below:

**'Rich' households**

- The rice supplies are sufficient with some surplus.
- They have a large area of land for housing and cultivation.
- They own animals such as cows, buffalos and pigs.
- They work as officials, staff and on their own farms.
- They own vehicles such as a tractor for cultivation.

**'Poor' households**

- They have to borrow from other households.
- They own a small area of land for housing and cultivation.
- Have few or no animals.
- They work as farm laborers (who do not work on their own farm) or wage laborers who prepare land for cultivation.
- They do not own vehicles.

In terms of the social structure in the village, the rich group consists of 49 households, or 44.95% of the total population of the village, while the poor group has 60 members or 55.05% of the total population (see Table 2.1).

Table 2.1: Study Village - Household Financial Status

Household Financial Status	No. of Households	Percentage (%)
Rich	49	44.95
Poor	60	55.05
Total	109	100

**Agricultural system:** Agriculture has played an important role in the economic life of the Houay Yae community a total agricultural area of 99.5 ha. The agricultural system included the growing of rice and cash crops, plus the rearing of livestock. Rice was the main crop grown and was cultivated for both household consumption, and, if there was a surplus, for trade purpose. Medium and short growing-time rice varieties were cultivated in the wet season, these being the hybrid varieties RD6 and RD8. In addition, cash crops were also cultivated in the dry season in order to enhance the villagers' incomes, including watermelons, cucumbers, vegetables, cabbages and pumpkins, plus pineapples, cassavas and other fruit. These cash crops have played an important role in the lives of the local people, as they were a key source of household income, provide food security and were used in cultural and ritual activities. Livestock animals were reared for household food security purposes and to generate an income, including cows, buffalos, pigs, ducks and chickens. Ducks and chickens were the most common animals found with around 1,943 animals raised, 88.64% of the total livestock, including 233 cows, that were 10.63% of total livestock in the village (see Table 2.2).

Agricultural practices in Houay Yae village included both traditional and modern practices, a system which was friendly to the environment and ecology of the area because it is mostly based on traditional methods. Most of the inputs used were from natural sources such as compost, with only one or two chemical fertilizers and



no pesticides used. In addition, the villagers practiced a rotation system, moving between rice and cash crops, with rice grown in the wet season and cash crops in the dry season.

Table 2.2: Livestock in Houay Yae Village

Livestock Type	Total	Percentage (%)
Ducks and chickens	1,943	88.64
Turkeys	10	0.46
Goats	0	0
Pigs	0	0
Cows	233	10.63
Buffaloes	6	0.27
<b>Total</b>	<b>2,192</b>	<b>100</b>

**Occupations:** Farming was the most common occupation among the people of Houay Yae village, and 79 households (72.24%) were involved in this activity. This activity is seasonal the rapid socio-economic development that has taken place in Vang Vieng in recent years has been mainly due to tourism where many jobs have become available for local people. These jobs included working as traders, taxi drivers and wage laborers (housekeepers and working on construction sites). In Houay Yae village, these new occupations were either people's main jobs or they did them in their spare time after their farming activities were finished. After farming, eighteen households (16.67%) were engaged in wage labour (see Table 2.3).

These new occupations have provided an increased choice in terms of income, improving both food and livelihood security plus reducing the exploitation of natural food resources and, in so doing, has helped the level of aquatic biodiversity within the local rice field ecosystem. However, access to cash became a significant factor in terms of food security, as the villagers had less fish and have had less time to collect NTFPs, though this has helped to conserve the local environment and ecological system.

Table 2.3: Occupations in Houay Yae Village

Occupation Types	No. of Households	Percentage (%)
Government Officials	4	3.41
Farmers	79	72.24
Traders	6	5.13
Drivers	3	2.56
Wage Laborers	18	16.67
Total	109	100

### 2.1.3 Local Resource Management System

The hilly landscape that surrounded the community and the abundance of natural resources, particularly water and forests resources, provided Houay Yae with a diverse natural ecosystems such as forests, rice fields, the Nam Song River and small streams which has played an important role in local livelihoods and agricultural practices. A multiplicity of rights existed over these natural resources: forests, the Nam Song River and small streams were common property while the rice field could be private and common property. Aquatic resources such as plants and animals were accessible to all while rice productions and rice fields land were private property. The local resources that were managed by local communities was considered plain land and was located near the streams and other water resources and was ideal for the growing of rice in the rainy season – also called '*het na*' (growing rice). The *Muang fai* system was a local irrigation system which was built to supply water to the rice fields and cash crops cultivated in the dry season. Other crops that were grown in the upland areas included cassava, fruit trees, bananas and pineapple.

My findings has shown that the Nam Song River and Houay Yae, Nam Ka and Nam Kuang streams were important sources of water supply for agricultural practices and that it played a key role in the ecosystem services, providing permanent habitats for aquatic resources and foods for the local households. The rice field ecosystem has also proven to be important for the habitat for aquatic animals and was vital for the laying of eggs and its survival. Local livelihoods were closely linked to these ecosystems and the cultural practices of the community was in sync with the utiliza -

tion of aquatic animals and plants.

#### 2.1.4 Historical Utilization of Aquatic Resources

Houay Yae is a small village located in Vang Vieng district town, Vientiane province in Lao PDR, and was founded in 1969 when it had just two households. In 1970, sixteen households were moved from Xiengkhouang Province, and in 1979 another 30 households were moved from Houaphan Province. Most were from the Tai Neua and Tai Phuan ethnic minorities and belonged to the Veing Keo village. In 1986, the study village was separated from Vieng Keo and set up as a distinct village called Phon and had 30 households at that time. Subsequently, in 1997, the village's name was changed to Houay Yae. Over 30 years ago, Houay Yae village was located in an area which had an abundance of natural resources, such as NTFPs and aquatic plants and animals. Yae is a plant in the rattan family and was used as food by the local people when the village was first formed, which is the reason for calling the village Houay Yae.

Over the years, the Houay Yae villagers have grown rice, cash crops such as vegetables, cucumbers and corns, and have gathered food from the forests and have utilized the aquatic plants and animals found in their rice fields for household food and income. These resources have provided an enabling environment for interactions and relationships in the context of local cultural and ritual activities. Local people in Houay Yae village have long utilized the aquatic animals around them, either for immediate consumption or storage for later use and these practices have later developed alongside the emerging farming activities. The evidence has shown that their ancestors' livelihoods have interacted with and were related to the use of natural foods. The local food culture has strongly become related to aquatic resources and was concerned with their farming activities, including the use of *pa daek* (fermented fish). Fermented fish provided evidence of the fact that the people in the Houay Yae village have long used aquatic resources. The villagers have made *pa daek* by collecting fish from the rice fields during the wet season, and then used it as a food source in times of food crisis and during harvesting time. This was a crucial part of daily life in Lao and was strongly linked to the people's food culture and Lao identity, particularly in Houay Yae village. Phor Thong, an elder in the village, had said:

*The question you asked me is ‘how long you have been using aquatic resources for food?’, and the answer is I don’t know when it started, but from before I was born as I saw my father collecting fish and other aquatic animals for consumption and making pa daek for use during harvesting. Now I am 80 years-old, but when I was fifteen I collected fish in the rice fields using fish hooks and this was enough for our consumption needs, but nowadays I don’t do anything at all. I only have my son and grandson to collect fish, and sometimes they can catch only a few (January 2013).*

Most who gathered aquatic animals before 1975 had used traditional tools and collected for household consumption only. Since 2000, Vang Vieng has become a tourism destination and the population has increased which meant the end of the collection of aquatic resources household consumption as well as for sale. The use of aquatic resources has continued in Houay Yae village, though the methods used to collect them have been adapted due to their decline, and with the need to enhance and conserve such resources.

## **2.2 The Important Role of Aquatic Foods in Local Livelihoods**

Aquatic foods played an important role in supporting local livelihoods in Houay Yae village, as they provided households with food security, an income and also contributed to the village’s cultural and ritual activities, food culture. This sub–chapter will illustrate the important role aquatic resources played at the local level in Houay Yae community.

### **2.2.1 Household Food Security and Aquatic Foods**

Household food security refers to the availability and accessibility of adequate food of a quality and quantity that is safe, nutritious and acceptable to all household members throughout the year. Similarly, the Food and Agriculture Organization (FAO) (2008) has argued that food security is the availability and accessibility of sufficient safe and nutritious food to all people and at all times. It should be enough to meet their dietary needs and food preferences and help them lead



an active and healthy life.

The foods consumed by households in Houay Yae village included rice, meat, pork, duck, chicken, vegetables and aquatic animals. Rice was the staple food, as were the aquatic animals, and they all played an important role in supporting household food security. This meant that the main source of food for these households were the rice fields and their ecosystems. More than 88 species of aquatic animals were consumed in Houay Yae village, including 48 species of fish, thirteen species of frog, six species of mollusc, four species of crab, three species of shrimp and fourteen species of insect. These figures are close to those that have been mentioned by Gregory et al. (2007) who had studied upland aquatic resources in Xiengkhouang and Luangprabang provinces in Lao PDR. They found at least 78 species of aquatic animals, including twenty species of fish, five species of frog and three species of mollusc. Likewise, Halwart (2002) studied the traditional use of aquatic resources within rice-based ecosystems in China and Viet Nam, and found that 95 species had been utilized in China and 74 in Viet Nam, including 60 species of fish in China and 42 species of fish in Viet Nam. It was also found that these aquatic resources were used extensively by the local people. Phor Saeng, a Houay Yae villager had said:

*Aquatic animals such as fish, frogs and eels are of great importance to us as they provide food security to the local households and in particular the poor households, for who they are the basis of most meals. I work on a farm every day and collect wild vegetables and fish from the rice fields or streams for lunch; it is a great and wonderful life in rural area. In addition, when I go back home, in my hand I also carry fish and wild vegetables to be used for dinner (January 2013).*

Halwart (2002) argued that rice field ecosystems have tremendous aquatic biodiversity and that it was used extensively by local people in his case study in Xishuangbanna, where fish and other aquatic animals were obtained from the rice field ecosystems and formed a key part of the rice Dai minority rice farmers' daily diets. These diets provided one-fifth to one-third of the total household consumption and fish was the most important species consumed by the local people.

In order to understand the important role that aquatic foods have played in terms of food security, I have ranked the food consumed in the study households into four in order to describe the importance of different types of food for Houay Yae villagers. My research has shown that the four ranking of food consumed are meat, pork and chicken, vegetables and aquatic animals (see Table 2.4). Aquatic foods found within the rice fields were the most important, with 85.19% of households having ranked these first, followed by vegetables (11.11%) and then meat and pork/chicken that came in third and fourth.

Table 2.4: Food Consumption Rankings for the Study Households

Rank	Meat (%)	Pork – Chickens (%)	Vegetables (%)	Aquatic Foods (%)
1	1.85	1.85	11.11	85.19
2	7.41	5.56	77.78	11.11
3	57.41	33.33	5.56	0.00
4	33.33	59.26	5.56	3.70
Total	100	100	100	100

In addition, I examined the amount of food consumed in the Houay Yae village; between general foods and aquatic foods, general foods referring to beef, buffalo, pork, ducks/chickens and farmed fish (fish cages and catfish). The amount of these general foods consumed was low when compared to the aquatic animals food sources; 127.79 kg per household per year (see Table 2.5) as compared to 435.6 kg per household per year for aquatic foods (see Table 2.6).

Table 2.5: General Food Consumption Levels by Household

General Foods Consumed	Amounts (kg/hh/week)	Amounts (kg/hh/year)
Beef and buffalo	0.90	46.94
Pork	0.53	27.59
Ducks and chickens	0.64	33.03
Farmed fish	0.39	20.22
Total	2.46	127.79

Note: hh= household

Among the general foods that were eaten, beef and buffalo were consumed the most, at 46.95 kg per household per year as compared to 33.03 kg, 27.59 kg and 20.22 kg per household per year for ducks/chickens, pork and farmed fish respectively (see Table 2.5). As can be seen, aquatic foods had played an important role in sustaining household food security, with fish being the most popular type of aquatic food consumed - more than 241.43 kg per year per household. After fish came mollusks, frogs, eels and *khoung son* at 112.45 kg, 59.62 kg, 12.01 kg and 10.09 kg per household per year respectively (see Table 2.6). These findings were similar to those of Garaway (2008, cited in Nurhasan 2008) in the Champasak and Savannakhet provinces in Laos, who found that the average fish consumption was 41.61 kg per person per year in Champasak and 26.65 kg per person per year in Savannakhet province. In addition to fish, amphibians were consumed at 34.31 kg per person per year in Champasak and 12.78 kg per person per year in Savannakhet province. A similar picture emerged for mollusks, but with those in Champasak had consumed significantly more (13.14 kg/person/year) when compared to Savannakhet province (6.57 kg/person/year) (Garaway, 2008 - cited in Nurhasan, 2008). In a similar vein, Gregory et al. (2007) had found in a case study carried out in Xiengkhouang and Laungprabang provinces, that 36,5 kg per person per year of aquatic animals were consumed in Xiengkhouang province and 29 kg per person per year in Luangprabang province.

Table 2.6: Consumption of Aquatic Foods per Study Household

Type of Aquatic Food	Amount (kg/hh/week)	Amount (kg/hh/year)
Fish	4.64	241.43
Eels	0.23	12.01
Frogs	1.15	59.62
Molluscs	2.16	112.45
<i>khoung son</i>	0.19	10.09
Total	8.38	435.60

However, the different financial statuses of the households have impacted on the frequency and the amounts which aquatic foods were consumed. Those in the rich group had consumed more than those in the poor group - an average of 531 kg per household per year, with fish consumed much more than the other aquatic animals – at an average of 320.23 kg per household year. However, the average consumption of those in the poor group was 324 kg per household per year; but with fish consumed more than the other aquatic animals (see Table 2.7).

Figure 2.2: *Mok pa* (steamed fish) - A Traditional Food in Houay Yae Village



Table 2.7: Consumption of Aquatic Foods by Household Financial Status

Financial Status	Fish (kg/hh/yr)	Eels (kg/hh/yr)	Frogs (kg/hh/yr)	Molluscs (kg/hh/yr)	<i>khoung son</i> (kg/hh/yr)	Total (kg)
Rich	320.23	18.44	107.20	72.59	12.56	531
Poor	159.08	4.81	50.20	89.88	20.03	324

The earnings of each household were related to the use of aquatic foods, and I have classified the households based on their main earnings. As can be seen from the table, the consumption of aquatic foods was the highest among those household that sold aquatic animals, at an average of 580.84 kg per household per year, followed by agriculture-based households (an average of 504.92 kg per household per year (see Table 2.8). Fish was a popular food and was consumed by all households and more than other aquatic animals.

Table 2.8: Consumption of Aquatic Foods and Household Types

Household Types	Fish (kg)	Eels (kg)	Frogs (kg)	Molluscs (kg)	<i>khuang son</i> (kg)	Total
Government Official	144.56	11.96	83.20	50.44	6.76	296.92
Agriculture	288.08	2.08	65	131.56	18.20	504.92
Trade	286	11.96	71.24	113.36	13.52	496.08
Wage laborers	249.60	30.68	52	130	12.48	474.76
Sell NTFPs	117	4.16	20.80	78	5.20	225.16
Sell Aquatic Foods	344.76	9.88	32.76	175.76	17.68	580.84

### 2.2.2 Household Income and Aquatic Foods

Household income was one of the key requirements in terms of meeting food security and other basic needs, and I highlighted the sources of household income in Houay Yae village, and, in particular, those related to aquatic animals. I had found that the main sources of income in Houay Yae village included salaries, selling crops, livestock sales, trade, wage laboring, selling wild vegetables and selling aquatic foods, all of which have played an important role in helping to sustain local livelihoods (see Table 2.9).

Table 2.9: Household Income Sources in Houay Yae

Income Sources	Amounts (kip/hh/year)	Percentage of Total (%)
Salaries	8,984,127	31.30
Crop sales	2,274,868	7.93
Livestock sales	1,757,407	6.12
Trade	1,339,524	4.67
Wage labor	6,913,492	24.09
Selling wild vegetables	1,430,159	4.98
Selling aquatic resources	6,001,640	20.91
Total	28,701,217	100

The table above has shown that salaries were the highest proportion of household incomes and contributed an average of 8,984,000 kip (1,197.86 US\$) per household per year, or 31.3% of the total. It was followed by sales of aquatic animals at an average of 6,001,000 kip (800 US\$) per household per year, or 20.91% of total income. However, all the other activities (crop and livestock sales, trading, wage labor and selling wildvegetables) together have contributed a significant amount to household incomes per year and provided 2,274,000 kip (303.2 US\$), 1,757,000 kip (234.26 US\$), 1,339,000 kip (178.53 US\$), 6,913,000 kip (921.73 US\$) and 1,430,000 kip (190.66 US\$) respectively. During an interview with Phor Saeng, he had mentioned:

*I am a farmer, but after I finish farming or during my free time I am mostly unemployed because I have few skills in terms of doing other jobs, except working on the farm and gathering natural foods, including aquatic animals. However, last year, I earned around 20,000,000 kip(2,666.66 US\$) from collecting aquatic animals, not only for household consumption, but also for sale at the market, and this year I have earned more than 15,000,000 kip(2,000 US\$) from selling fish, enough to send my daughter to the National University of Laos (January 2013).*

The rich group earned more than the poor group - an average of 37,230,000 kip (4,964 US\$) per household per year, and aquatic foods were an important source of their income, ranking third behind salaries and wage labor (see Table 2.10). The total income of the poor group resulted at an average of 11,642,000 kip (1,552.26 US\$) per household per year, which included 3,464,000 kip (461.86 US\$) drawn from aquatic resources and this meant it that it was the most important source of income for this group.

Table 2.10: Household Income Sources by Financial Status

Income Sources	Rich (kip/hh/year)	Poor (kip/hh/year)
Salaries	11,476,191	4,000,000
Crop sales	2,951,191	922,222
Livestock sales	2,308,333	655,556
Trade activities	2,009,286	0
Wage labors	9,636,905	1,466,667
Selling wild vegetables	1,578,572	1,133,333
Selling aquatic animals	7,270,239	3,464,444
Total	37,230,715	11,642,222

As mentioned above, aquatic animals were an important source of household income for local people, with most of this produce having been sold by the women at Meung Song and Houay Sa Ngao markets in Vang Vieng. The women of the village have tended to be housewives and also traders and collectors, while the men tended to be collectors only. However, aquatic animals were collected from the rice fields by men, while the women sold them in the afternoon markets and prepared them for cooking. Mae Nom, the oldest woman in the village, had considerable experience, and told me:

*My husband never goes to the market to sell aquatic animals; he just collects them and leaves it to me to cook and sell. Normally, I go to*

*Meung Song market to sell fish, frogs and khouang son, where I can earn 50,000 to 100,000 kip or 7 to 14 US\$ per visit (January 2013).*



Figure 2.3: Aquatic Foods being sold at Meung Song Market in Vang Vieng District

### 2.2.3 Food Culture and Aquatic Foods

Members of the Houay Yae community have had their own cuisine which they have consumed over a long period, having been passed-down from generation to generation. This, in essence, had become part of the local food culture and as part of their owned intellectual property. It has also represented a key part of their local identity. Almost all the food consumed in Houay Yae community has been seen as traditional and could be found only in Houay Yae village. Examples of this food were *larb thao* (fresh water algae salad), *choup phark* (mixed vegetables), *mork khouang son* (steamed mixed insects and small aquatic animals), *larb pa* (fish salad), *tom som pa khor* (snakehead fish soup), *tom som ien* (eel soup), *chaew nam puu* (crab paste sauce) and *chaew pa khaem* (salty fish sauce), as well as *chaew pa daek* (fermented fish sauce).

Local aquatic resources has formed a key part of both the main meals and ingredients to be found in the village, of which were more than eight types of traditional food consumed, that included *kaeng or tom* (soups), *aow*, *mok*, *mork* and *ping* (roasts), *ouas*, *poon* and *larb pa* (fish salad), *choup phark* (mixed vegetables) and



various kinds of *chaew* (sauces). In addition, there were at least five types of processed food made in the village, and included *pa daek* (fermented fish), *pa haeng* (dried fish), *nam puu* (crab paste), *pa khaem* (salty fish) and *pa som* (pickled fish). All of these were related to the local people's livelihoods, culture and identity, and in particular *choup phark*, *pa daek* and *larb pa*. These foods were prepared and served either for household consumption or for serving friends and guests who visited, and was also treated as a sign of welcome, of friendship and good luck. These foods reflected and enhanced the relationships that existed between hosts and visitors, referred to locally as *chin pai pa maa* – which meant a form of exchange between people. *Pa daek* has been part of the local food culture and has been consumed for a long time, since before the people's grandparents lived, and is popular among all Lao people. Whether used as a meal or as an ingredient, this food was found in most local meals. Most of the traditional foods were cooked with fermented fish, including *larb pa*, *aow and kaeng* (soup) and *som tum* (papaya salad), which was used to enhance the taste. In one interview, Mae Phone told me:

*Pa daek is part of a cultural identity and food consumption style that is called "food culture", and every meal we put-in fermented fish. pa daek is used as an ingredient for many kinds of food, including som tum, and in Laos it can't be papaya salad without fermented fish. Whenever, if I cook and I forget to put fermented fish in, the taste seems to be lost to me. In the past, my grandparents did not have many ingredients, so fermented fish helped to enhance the flavor of their food (January 2013).*

*Larb pa*, was an important part of their food culture and was also seen as an important part of their cultural identity. This can be observed from many activities related to Buddhism and local customs, such as the *Basi* - ceremonies, weddings and house warming ceremonies. During these activities, hosts provided food for the guests and visitors, including rice, meat and fish, and in particular *larb*, with *larb pa* in particular which was served as a sign of a warm welcome, for good luck and friendship. *Larb pa* was a key element of the food consumption style and cultural

identity of the people in the Houay Yae community. As Mae Kaen had explained:

*At traditional wedding parties one has to have larb pa - at least for the elders who protect and practice traditional customs. Larb is a traditional food that offers good luck to all visitors. Larb pa is prepared and served for people who are attending the Basi- ceremony; a traditional practice that has been going on for a long time (March 2012).*

#### **2.2.4 Aquatic Foods and Cultural and Ritual Values**

Most Lao people practice Buddhism and so have adopted a traditional culture and customs that reflect this. These activities reflect the realities of local life the interactions and relationships that exist with natural resources, and this is particularly the case in Houay Yae village. Local people there have traditional livelihoods, cultures and customs that reflected their interactions and relationships with aquatic food sources – which represented almost supernatural or Buddhist form of food, and could be observed at festivals and customs each year. These activities included the preparation of rice, fish, meat and fruit, plus other food that were found in local areas, such as those used to pay respects to supernatural entities and ancestors.

Yos (2003) argued that among ethnic groups, the use of local vegetables was linked to many common religious beliefs and ritual practices, such as the mixing of *sompoi* with water to bathe Buddha statues and pouring ceremonial water in order to receive blessings from senior elders, plus the decoration of banana trees, sugar cane plants, goot trees and coconut palm leaves in order to welcome the return of Bodhisattva and the tenth reincarnation of Buddha during the traditional Yee Peng festival. These local vegetables have were highly valued and played an important role within religious belief systems and rituals during the everyday lives of local people. It was also an important facet of the preservation of their way of life and existence.

Aquatic foods have played an important role within cultural and ritual practices in Houay Yae community. This could be seen in the Buddhist practices of *boun khao pa dub din* and *boun haw khao sa lark*, and traditional activities such as the *ta hak na* custom, and also at traditional wedding parties, house warming ceremonies

and other local, customary practices. At these activities, food was provided for guests and visitors and respect was paid to supernatural beings and ancestors. Many types of aquatic food were prepared at such gatherings, together with rice, fruit, meat and other food which reflected how important the role of aquatic foods have played in the culture and rites of people in the Houay Yae village. The *boun haw khao pa dub din* festival was a Buddhist festival held during September each year. It was a local belief that some ancestors who have passed away are in hell, and that these ancestors were not allowed to eat all year. As a result, in September of each year, they leave hell to partake of food provided by their children and grandchildren, food which included rice, fish, aquatic food, meat, vegetables and fruit, which were prepared from local resources and were used to pay respects to the ancestors.

The *boun haw khao sa lark* ritual was also a Buddhist festival held in September each year, fifteen days after the *boun haw khao pa dub din* festival. During this ritual food would be wrapped in banana leaves and would be prepared for the ancestors, each parcel containing the relevant ancestor's name written on it. After the *boun haw khao pa dub din* festival, the ancestor spirits would already have returned from whence they came; therefore, at this ritual the food would have their name added (called *sa lark* – a 'name sign') by the monks who would chant on their behalf. Dried food such as fish and meat called *chin haeng pa taiy*, as well as rice and fruit, were prepared and wrapped in banana leaves. During one interview, a local villager, Phor Thao Ong, said:

*Boun haw khao pa dub din and boun haw khao sa lark are Buddhist customs during which we pay our respects to ancestors who have passed away. It is a local belief that ancestors who have passed away, particular those residing in hell, will come back to get food from their children and grandchildren, food prepared for them during September of each year. The haw khao pa dub din is related to the land, and many different types of food are prepared and left around the temple. During the haw khao sa lark ritual, food is wrapped and named so that it can be sent to the ancestors, because they cannot come to receive it themselves. On the signs are written the names of the ancestors and*

*their addresses – to make sure they receive the gifts. A diverse range of food is prepared at these rituals, including rice, fish, meat, fruit and other food. A diverse range of food is given to reflect the food eaten by your ancestors when they were alive, plus to show you are rich, have a good lifestyle and an abundance of resources(March 2012).*

*Ta hak na* was a local custom based on a spirit or god of the paddy fields, who took care of and protected them and helped the rice and crops to grow. Traditionally, local farmers would carry out this ritual before they planted the rice. In Houay Yae village, this activity was held in September of each year, and these aquatic resources played an important role in this activity since many kinds of food were prepared, such as dried fish, dried meat, fruit and rice, in order to pay respect to the ancestors and ghosts who protected the villager's crops. As one villager, Phor Thao Ong, told me:

*Around the time of the boun haw khao pa dub din and boun haw khao sa lark festivals, we also hold the ta hak na ritual. We believe there are 'chao na' (supernatural beings) who protect our crops and ensure there is enough rain to grow rice. Many kinds of food, including aquatic animals, are prepared by wrapping them in banana leaves (January 2013).*



Figure 2.4: Villagers in Houay Yae Paying their Respects to the Spirits who Protect their Rice Fields



The *heik khuan long* ritual (the ‘recalled people’s spirit’ ritual) was linked to the *chao nam* and *chao paa*. In the rural areas of Laos, when people got sick they believed they had offended one of the guardian spirits of the rivers and forests while collecting food or carrying out their livelihood activities. As a result, the local elder who would also be considered a ‘magician’ paid his respects to the guardian spirits of the rivers and forests and re-called a spirit called *heak khuan long*. The *heik khuan long* ritual comprised of a basket, a dip-net, a loincloth, a patient’s cloth, a boiled chicken and fire wood, and was practiced in the evening around 5 p.m. to 6 p.m. when the magician walked from a sick person’s house to where he or she was just before they fell sick. The magician would then say some words to the guardian spirit - paying his respects by serving it a boiled chicken, then placing the dip-net and a small stone (representing the sick person’s spirit) into the loincloth and saying the words: *oh uu nii da, kub barn kub heuan nam phor nam mae der* (“Oh ! You are here; let us go home with our parents”). After that, the magician would walk back to the patient’s home with fire wood in his hand and then inhaled smoke from the wood as a sign telling him the way to go home. The tools used played an important role and have had an important value in this ritual, particularly the dip-net as part of the local people’s cultural beliefs.

The *boun haw khao pa dub din*, *boun haw khao sa lark*, *ta hak na* and *heik khuan long* festivals and rituals all have had a social value and were a key part of the local beliefs system, one that interacted closely with the local ecological system. Aquatic foods, in particular, contributed to and played an important role in this system, which reflected the value of local resources to local livelihoods, culture and rites of the people in Houay Yae village, as well as the important role aquatic resources played in helping to preserve their way of life and their very existence.

### 2.2.5 Medicinal Values

Aquatic foods have had a significant nutritional and medicinal value. Fish, in particular, is a healthy food, rich in nutrients such as polyunsaturated fatty acids, amino acids, vitamins and minerals, and it is for this reason that is seen for its therapeutic value. According to Mohanty et al. (2011), fish possessed a therapeutic value and has long been used to treat a number of diseases. Fish was also a rich source

of polyunsaturated fatty acids and omega -3 fatty acids, which were effective at preventing and treating coronary diseases, osteoarthritis, dementia, age-related macular degeneration, asthma and depression. From speaking to local people in Houay Yae village, many kinds of food were made from aquatic resources in the area along with the fresh herbs, and some played an important role in terms of their medicinal value, such as *tom som ien kati* (eel soup with coconut milk), *ien pao pii* (fluted eels) and *tom som pa khor* (snakehead fish soup), and *tom som ien kati*, in particular - which is believed to enhance health and sexual performance, help with backaches and stomach aches, and led to a long life. Phor Saeng, a villager who is an expert on aquatic foods in Houay Yae village, said:

*Aquatic animals are good to eat and some species have important medicinal value, such as fish, eels and frogs. Tom som ien kati and ien pao pii are both very good tasty and healthy foods, as they have a medicinal value and lead to good health, alleviate backaches and stomach aches and enhance sexual performance. These kinds of food are special, so are normally not cooked on a regular basis (March 2012).*

Moreover, fermented fish also had medicinal value and played an important role in the making of local medicines. For example, it was used to treat burns and was used to treat people who had smoked or had taken too much marihuana. In addition, dried toads (*Bufo melanostictus*) were used with *pit pi daeng* and pickled with alcohol in order to treat gonorrhoea (*nong nai*), with one small glass that was drunk in the morning and evening.

### **2.3 Levels of Access and Gender Roles**

Aquatic foods have played an important role among all the households in Houay Yae village, and provided food security, household income and contributed to the cultural and ritual activities. In addition to this, it had an important medicinal values, an important factor which set the levels of access households enjoyed which was based on their different financial statuses, occupations and gender. Most local

people accessed aquatic foods by collecting the animals from their natural surroundings, in particular from rice fields, small streams and rivers. The rich and poor households were quite similar in this way, as they both reported as saying that they collected the majority of aquatic animals directly from the rice fields (89.29% and 88.89% of their total household consumption respectively). Both the rich and poor households also said that they bought such items from the local market (10.71% of the rich and 11.11% of the poor households' consumption - see Table 2.11).

Table 2.11: Forms of Access to Aquatic Foods

Household Type	Gather Locally (%)	Buy at Market (%)	Total (%)
Rich	89.29	10.71	100
Poor	88.89	11.11	100

In terms of gender roles, Karl (2009) stated that, not only had women played an important role in food security, they were also food producers, keepers of traditional knowledge, preservers of biodiversity, as well as food processors, preparers and providers for their families. In Houay Yae village, women played a less important role in gathering the aquatic foods they ate, but were key food processors, preparers and providers. For example, from my study, I found that 76.19% of the aquatic animals were collected by men, while 23.81% were collected by women (see Table 2.12). The women also played a more important role when it came to selling and buying the aquatic foods. The collected aquatic resources were prepared by the women, who divided them into two; for household consumption and for selling. I observed that most of the cooking and processing were practiced by the women, as was the selling of the resources, which took place both inside the village and outside the village at Meuang Song and Houay Sa Ngao markets in Vang Vieng town.

Table 2.12: Gender Roles re: Access to Aquatic Foods

Financial Status	Women (%)	Men (%)
Rich	23.81	76.19
Poor	33.33	66.67

So, it could be concluded that women played an important role in both the collection and cooking of the food, its processing and marketing. In terms of the fishing tools that were used, these were also divided on gender lines. For example, the *ving* (dip-net), *ka tong son pa* and *ving son tae* (*schistura* collecting tool) were used specifically by women and have been used for a long time. These practices reflected the local livelihoods' culture in relation to women in Houay Yae village, for women were seen as housewives who took care of the children, cooked and served food for their family, and sold the agricultural produce and gathered items such as NTFPs and aquatic animals.

Figure 2.5: Women Collecting *Khuang Son* in Houay Yae Village

## 2.4 Factors and Trends in the Utilization of Aquatic Foods

Aquatic foods have played an important role in the livelihoods of local people in the study area and were an integral part of the interactions and relationships that took place there such as cultural and ritual activities. This sub-chapter highlights those factors which have altered the presence and the trends in the utilization of aquatic foods over time in Houay Yae village. These are as follows:



#### 2.4.1 Factors Leading to Changes in the Availability of Aquatic Foods

Given that aquatic foods have played such an important role in the livelihoods of people in the Houay Yae, there is concern about the changes in the diversity of resources due to socio-economic development; population growth; the increased levels of competition; the exploitation of resources; and the introduction of modern agricultural practices. Socio-economic developments were the key factor contributing to environmental and ecological change in the study village, both directly and indirectly. Infrastructure developments such as the construction of tourism facilities and the running of tourism activities have had an impact. These developments have led to a decline in the number of aquatic animals present in the area due to habitat destruction. During my observations and interviews, the local people in Houay Yae village had told me that tourism facilities such as hotels, guesthouses, resorts, bungalows and restaurants were being built and replaced agricultural land in the village and nearby particularly around the Nam Song River. Moreover, the waste from such tourism activities and facilities were discharged directly into the river and caused a decline in water quality. These were important contributory factors in the destruction of aquatic habitats and in the reduction of water quality in the area. In the past, the water was clean and blue, but currently the Nam Song River was dirty due to wastewater discharges and was black in color. Phor Sing, a villager in Houay Yae had told me:

*In the past the Nam Song River was clean and blue in color and we could drink the water directly, as well as go swimming. The water drinking did not need to be boiled before drinking; however, now the river is dirty and black and filled with waste, and in particular waste water from the tourism facilities that discharge directly into the river, particularly at night. In essence, the Nam Song River is a big waste water treatment plant, which is why nowadays there are fewer aquatic animals (January 2013).*

Increased exploitation has led to a reduction in the level of aquatic biodiversity in the area. Since Vang Vieng had become a tourism destination in 2000, the local

population had increased from 28,415 then, to 97,165 people in 2007, and around 170,000 tourists were expected to visit the town each year by 2020. This change had increased the demand for natural resources; had reduced food security for local people and had reduced the diversity of aquatic foods available. Added to this, the increased time spent on exploiting these resources as well as having used new collecting tools (including electric methods) have both contributed to the rapid decline of aquatic resources. In the past, the collected aquatic animals were used, not only for household consumption, but also for market demand, as Phor Keng, an elder in the village, told me:

*In the past, 30 years ago, Vang Vieng had an abundance of natural resources, particular aquatic animals, so we collected such resources for household consumption, plus used traditional tools. There was also a lower population at that time. Recently, the population has grown rapidly and infrastructure development projects, and in particular tourism facilities, have been built around the Nam Song River. These changes have caused environmental and ecological changes, with the water quality declining. Also, in the past local villagers focused only the number of aquatic animals they could catch, without thinking of the environmental and ecological impacts this would have. As a result of these changes, the level of diversity in terms of aquatic foods has decreased rapidly, as over-exploitation has taken place (March 2012).*

The agricultural practices that were carried out were key contributors to the decrease in aquatic animals in Houay Yae community. The chemical fertilizers, pesticides and hybrid varieties that were used all had adverse impacts on aquatic animals such as fish, frogs, molluscs, eels and other small aquatic animals. Edirisinghe and Bambaradeiya (2006) argued that practices such as plowing, the flooding and draining of fields, adding basal fertilizers before planting and the application of pesticides, have had a variety of impacts on rice field fauna and flora. Likewise, Ansari and Waleema (2009) both argued that when aquatic water bodies were polluted by agricultural pollutants such as fertilizers and chemical fertilizers, the

runoff and erosion of these chemicals would lead to toxicity with heavy metals, and affected the quality of the soil water and, hence, aquatic life. Since 1990, tractors have been used in Vang Vieng, and by 2000 had replaced animals in all districts, including Houay Yae village. The use of tractors had come along with modern farming practices, which have caused changes in the timing and water levels required for plowing the soils, as it was no longer necessary for them to be so soft. This has limited the time available for animals to lay their eggs and grow in the rice fields as soil preparation activities, prior to transplanting, in particular, the harrowing of the soils, could lead to the death of aquatic animals.

#### **2.4.2 State and Non – State Practices in Active Resource Conservation**

As mentioned above, aquatic foods have played a key part in local livelihoods and the cultural and ritual activities of local people which meant that the utilization of such foods have had a close interaction and relationship with local livelihoods. However, aquatic animals have faced threats from rapid environmental and ecological system changes and in order to maintain the diversity of aquatic resources within the local rice field ecosystems, many sectors have needed to be involved in conservation activities. These included the local community and local officials who have both been actively participated in biodiversity conservation programs, as detailed below.

- **Agricultural Sector**

Agriculture is an important sector in terms of its impact upon aquatic animals and their conservation, particular with respect to rice field ecosystems. Edirisinghe and Bambaradeniya (2006) stated that rice field ecosystems were the ideal habitat for a variety of aquatic invertebrate communities - including neutron, zooplankton and nekton, as well as a variety of aquatic vertebrates - including fish and amphibians. The District Agriculture and Forest Extension Office in Vang Vieng was an important unit as it promoted and provided extension services for the conservation of aquatic animals within rice field ecosystems. This work could be seen through promotion activities and awareness projects aimed at the reduction of the use of chemicals during agricultural cultivation and replacement activities. The aim was

to adopt good agricultural production practices (GAP), pesticide free production activities (PFP) and organic agriculture (OA) through the use of organic fertilizers (compost), bio-extract (BE) and manure. I had interviewed the head of the District Agriculture and Forest Extension Office who said:

*Aquatic animals play an important role in terms of bio-pest control within the rice fields, and also play an important role with regard to household food consumption activities among local people, plus provide a key source of household incomes. The District Agriculture and Forest Extension Office in Vang Vieng sees aquatic foods as vital to the area and so has introduced activities and projects aimed at reducing the impact of agriculture on such resources, as well as supporting aquatic animals within the rice field ecosystem through the implementation of a Good Agricultural Production project in Phatang village and an Organic Farming project in Nathong Village (March 2012).*

In addition, in 2009, a number of ‘fish sanctuaries’ were established along the Nam Song River in Houay Yae village and nearby, called collectively *vang sa nguan*. These included Tha Ta Lard, Tham Norn, Tham Lom and Pha Tang fish sanctuaries. The aims of these conservation basins were: (1) to conserve aquatic resources and their habitats - for re-generation; and (2) to secure household food security at the local level and protect environmental and ecological systems by restricting the catching of fish in such areas. Many fish were released into the Nam Song River on National Fish Releasing and Conserving Aquatic Wildlife day, held on July 13<sup>th</sup> every year, an activity which played an important role in supporting conservation efforts and maintaining the diversity of aquatic animals.

- **Environmental Sector**

The District Water Resource and Environment Administration Office in Vang Vieng was also an important unit, as it was concerned with the environment and with water resources which supported the conservation of aquatic foods obtained



from the rice fields. Many activities concerned with environmental protection and the reduction of adverse environmental impacts have been organized in Vang Vieng District. Activities included the ‘Big Cleaning Day’ along the Nam Song River that was held twice a year and aimed to cleanse the Nam Song River; reduce the impact of waste on aquatic resources and promote protection of the environment among local people. In terms of the rules surrounding the construction and running of tourism facilities, most facilities have been assessed by the District Environment Assessment Unit who has issued certificates to construction project that do not adversely impact on the environment.



Figure 2.6: Environmental Protection Promotion Poster in Vang Vieng District.

- **Cultural and Tourism Sector**

Vang Vieng was a famous district in terms of its cultural heritage and natural resources as it had temples; a rich local culture; good food, as well as a number of interesting tourism destinations such as a caves. The District Information, Culture and Tourism Office in Vang Vieng played an important role in the promotion of tourism activities as it did in 2012 with the implementation of ‘Visit Lao Year 2012’ campaign. During this time, traditional foods were presented in order to promote the tourism sector, including aquatic foods such as *mork khuang son* (insects and small aquatic animals mixed with banana leaves); *ping pa khing* (roasted fish),

*tom som pa khor* (snakehead fish soup); *larb pa* (Lao fish salad), *chaew pa khaem* (salty fish sauce); *choup phark* (mixed vegetables); and *larb thao* (fresh water algae). They had displayed a sign in the town which said: “If you visit Vang Vieng without eating *choup phark* and *chaew pa khaem*, you have not visited Vang Vieng”. For this reason, many tourists, both Laotian and foreign, whenever visiting Vang Vieng, was bound to try these dishes. This supported the fact that natural foods, particularly those made from the local aquatic resources, played a key part in the tourism industry.

- **Locality Sector**

Aquatic foods also played an important role within local livelihoods in Houay Yae village, as they were a key part of the local culture and rites activities. In addition, they supported food security, household and income, and had medicinal value. For this reason, Houay Yae had become a center of aquatic animal conservation efforts, as could be observed in the use of traditional tools such as dip-nets, fishhooks, fish-traps and fishnets. In addition, local people in Houay Yae village also carried out a number of activities concerned with the conservation and enhancement of aquatic resources, such as the ‘village cleaning day’ held every Saturday morning; the promotion of the use of composts and a reduction in the use of chemical fertilizers in the village, as supported by the District Agriculture and Forest Extension Office in Vang Vieng.

All these activities reflected the villagers’ desire to preserve the local aquatic resources using sustainable practices which aimed to maintain aquatic food biodiversity, together with their livelihoods, covering agriculture, the environment, culture and tourism as well as other local sectors. It also aimed to minimize adverse impacts on the environmental and ecological systems of the Nam Song River, as well as the local rice field ecosystems.

## 2.5 Summary

Aquatic animals present in the rice fields at Houay Yae village have played an important role in local livelihoods; was a key part of the local food culture and local ritual activities; provided food security for households and contributed to household incomes. In terms of food security and income generation, at least 88 species of

aquatic animals were consumed in the village, including fish, frogs, molluscs, crabs, shrimps and insects. These aquatic animals provided the primary food source for household food consumption activities in the study village, in addition to meat, pork, chickens and vegetables. The average consumption of aquatic foods per household per year was 241.43 kg of fish, 12.01 kg of eels, 59.62 kg of frogs, 112.45 kg of snails and 10.09 kg of *khuang son* (aquatic insects) – all out of a total of 435.60 kg. Rich households consumed 531 kg of aquatic foods, while the poor households consumed 324 kg. Aquatic foods also contributed significantly to household incomes, contributing on average 6,001,640 kip per household per year.

In addition, aquatic foods also played an important role in cultural and ritual activities, from the serving of traditional foods at ceremonies to ‘supernatural foods’ during rituals. Aquatic foods were used to pay respect to supernatural beings and ancestors during Buddhist and local customs and ritual activities, including the *boun haw khao pa pub din*, *boun haw khao sa lark*, *ta haek na* ceremonies. In addition, aquatic foods were also used during other local ceremonies such as *larb pa* which is used at weddings, house warming ceremonies and the *basi* – ceremony. *Larb pa*, from a local perspective, is not just a food but represented good luck, health and success. Furthermore, aquatic foods have had an important medicinal value, one that is based on local beliefs. An example of this was the dried eels’ tails that was used to clean pregnant women during birth, reflecting the reality of local livelihoods in Houay Yae village, those practiced over many generations and right up to the present day.