

**Intra-household dynamics of food security in Lao
PDR:
An aquaculture case study.**

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August 1998

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1. Introduction

1.1 Case study country

Lao PDR is the most sparsely populated country in South East Asia with a recorded population of 4.58 million in 1995. The population is predominantly young (45 % under 15 years of age), the annual population growth rate is 2.6percent and the population is projected to double within three decades. The life expectancy at birth is 53 years for females and 50 years for male (UNICEF, 1996).

Nearly one out of every two Lao people is poor according to a study by the World Bank in 1995. Although, between 1986 and 1995, the average annual household income doubled to \$350 per capita (UNICEF, 1996), Lao PDR is classified as one of the least developed countries in the world. It is widely acknowledged by the government and the UN that a number off actors including low income, limited education opportunity, low levels of health and inadequate food supply all contribute to poverty in Lao. Over one third of adults are illiterate.

Lao PDR is ethnically diverse and can be broadly classified by ethnic groups into Lao Loum - 59%, (low land Laos including Lao Thai), Lao Theung - 34% (lower mountain-dwellers) and Lao Soung - 9%(Hmong or Mien tribes that live higher up).

The Lao population is predominantly rural with over 83% of the population involved in agriculture. Only 15% of the population live in "urban" areas, including cities, towns and district centers. Increasing population pressure is creating increased demand for food and competition for natural resources.

Female-headed households may be more common in urban areas. One study in Vientiane Prefecture found that 13% of urban households were female-headed while another study in neighboring Bolikhamxay Province found that 7.5% of households were headed by women (Ireson, 1996).

Rural - urban migration to larger cities and towns is not currently a major issue in Lao PDR. Sex ratios by province indicate that young men are more likely than women to migrate to the capital Vientiane area, (Lao PDR 1985). However, recently established factories in Vientiane draw on the labor of young women and may be changing these patterns of migration (Ireson, C. 1996). Overall, migration issues are different in Lao PDR than in neighboring countries. At the moment, if people move to the cities it tends to be temporary and they often return to the villages at critical points in the year when their labor is required on-farm. There is a strong bond between children and their parents. However, some members of the Lao Soung community with a tradition of shifting cultivation are more mobile.

1.2 Agriculture in Lao PDR

The dominant economic activity in Lao PDR is rice production, with most areas producing only a single annual rice crop. Most Lao farmers subsist on wet season rice cultivation and have limited capacity to irrigate land for a second crop in the dry season.

While crop plants such as rice contribute fundamentally to the diet of the Lao population, the major sources of animal protein are cattle, buffalo, pigs, chickens, and fish. A wide diversity of wild animals is also important animal protein sources and hunted or foraged from forest areas. In addition to eating fish, rural Lao people eat many other aquatic resources such as eels, frogs, tadpole, crabs, insects, shrimps, etc. and many of these are foraged from water bodies and make up a considerable part of the daily diet.

1.3 Aquaculture in Lao PDR

Increases in demand for animal protein derived from fish are likely to occur throughout Lao over the coming decade because of the increasing population. Fish are an important source of thiamin and riboflavin of the vitamin B complex. It is known that the health and nutritional status of young children and lactating women could be enhanced through more regular consumption of fish. Fish culture (aquaculture) is hence considered a viable activity by the government of Lao PDR for the enhancement of food security and income generation among rural communities in Lao PDR.

1.4 Macro / government policy on aquaculture

It has been recognized by the government that opportunities to cultivate fish for increased food security and for income generation exist within an integrated wet rice-fish production cycle; and that increased fish production through aquaculture may also help to limit the depletion of wild animal and capture fish protein sources. The Ministry of Agriculture and Forestry implements aquaculture development projects through its Department of Livestock and Fisheries. The Department of Livestock and Fisheries emphasizes the important role of fisheries and is the main national agency for the formulation and implementation of fisheries policies to support demand driven fisheries production. Emphasis is also placed on strengthening technical support services in the more rural and remote areas of the country with the aim of increasing employment opportunities, food security and income levels of small farmers.

The government would like to encourage small farmers to participate in the development of aquaculture as an income generation activity, but have not implemented policies to do so on a wide scale. It is expected that fish production through aquaculture activities in Lao can be increased through a number of different models and activities. Such models and activities for aquaculture in Lao PDR include:

- Pond culture offish
- Rice-cum-fish culture
- Hatchery production of fish fingerlings
- Private mini-hatchery development
- Private fish nursing and on-growing for sale

The government encourages aquaculture in order to: (a) Increase food security for farmers;(b) Help to reduce shifting cultivation; and (c) Increase income generation for farmers.

2. Case study project and context

2.1 UNDP/FAO Aquaculture project

A nationally executed UNDP/FAO funded aquaculture project (Lao/97/007) is currently being implemented in Lao PDR. The project is executed through the Fisheries Development Division within that Department of Livestock and Fisheries. The project activities are based in six provinces of Lao, with the objective of building upon the results of previous UNDP/FAO and government projects. Low-income fish farmers' groups in rural areas are targeted to contribute to food security through increased fish production from aquaculture. The project aims to:

- extend fish culture to such farmers through farmers' groups
- develop a trainers pool at central, provincial and district levels well skilled in aquaculture technology;
- improve the technical and managerial capabilities of extension personnel at provincial and district levels;
- increase the supply of fish fry and fingerlings by improving production at provincial fish seed center and expand the involvement of the local private sector;
- and finally work towards creating an enabling environment to make institutional credit more accessible to low income fish farmers.

While it is expected that these activities should include the involvement of women fish farmers, the evaluation of previous UN and government aquaculture projects in Lao PDR emphasized that the activities of aquaculture projects should not be limited only to technological aspects of fish culture, but should also include consideration of gender issues.

Women perform key roles in aquaculture (for instance, they often feed and care for fish and women almost exclusively perform fish marketing). However, the extent to which the introduction of aquaculture projects in Lao PDR added to women's workloads and its effects on household labor and income dynamics were unknown. Whether aquaculture projects provided tangible benefits to women was also unknown. In situations where fish is marketed for income there was the question of the net effects of the additional income to the household and the distribution of the income within the household. Further knowledge was required on the gender division of work in all aspects of fish farming, from production to processing.

2.2 Socio-economic and gender analysis study of aquaculture project

Recognizing the role of women in aquaculture development, it was noted that special efforts need to be made to actively include women in fish farming activities and opportunities for increased fish production. Thus, it was decided that in 1998 a gender study would be conducted within the broader socio-economic framework of the UNDP/FAO LAO/97/007 aquaculture project.

The objectives of the study were to:

- Analyze the gender roles in aquaculture, from preparation of fishponds to production including marketing, processing, access to credit, control over income, family health and nutrition, etc.
- Make appropriate implementable recommendations/suggestions that could be applied to the project LAO/97/007, respecting the technological, socio-economic and cultural conditions of Lao PDR.

A socio-economic and gender study was undertaken between June and August 1998 by a gender analysis team. A framework for conducting a gender study of aquaculture in Lao PDR was developed from existing literature on gender analysis on aquaculture, and loosely based on the SEAGA framework (FAO, 1998). Using the SEAGA framework, information on gender issues was divided into different factors or issues to identify the resources and constraints facing different stakeholder groups. These issues were classified as:

- Demographic factors
- Socio-cultural factors
- Political and legal factors
- Environmental factors
- Institutional factors
- Economic and commercial factors
- Labor factors
- Technological factors

The geographic scope of this study focused on Xieng Khouang, Oudomxay, Sayaboury, Savannakhet and Luang Prabang provinces. In each province the team visited two districts, and at least one village close to a main market and another village in a more remote location. The villages were chosen as broadly representative of farmer's groups/individuals, which were involved in the UNDP/FAO LAO/97/007 project, as well as other farmers, engaged in aquaculture. Most of the time in the villages was spent doing informal focus group interviews and gender analysis activities with farmers involved in aquaculture activities. The groups chosen in each village were mainly involved in pond based aquaculture activities, although some of the groups in villages were also involved in rice-fish production systems, in lowland irrigated wet rice production systems. Some farmers were involved in fingerling production (mini-hatcheries) and supply. In most provinces the team also the provincial state hatchery and the provincial Agricultural Promotion Bank.

Interviews were also conducted with key personnel and institutions (e.g. the Lao Women's Union, central office of the Agriculture Promotion Bank) in Vientiane. Some of the conclusions and recommendations from this study are summarized in this paper.

3. Results and Discussion

3.1 Livelihood security sources and options for rural Lao households

In Lao, subsistent integrated farming is practiced for household consumption, with any surplus contributing towards family income. Most farmers produce mostly for household consumption. In most villages visited by the team no-body produces fish as a sole income generator. Farmers are dependent on a range of activities as sources of livelihood, from selling livestock to weaving. Most families keep some chickens or pigs and tend vegetable or fruit gardens of various sizes.

Hunting for game, birds and small wild animals is also very important for food security and is done by men. Gathering of wild plants and food is a task that often falls to women and is also an important economic activity, amongst others. Children and women scour the rice fields for small shrimps, crabs, frog etc. Many rural women obtain as much as 30 percent of the family's diet and household needs from foraging (UNICEF, 1996).

Weaving is an indispensable income producing activity in many villages and it is exclusively a female occupation. Intensive weaving does not normally occur during the planting season (when the team visited), but is an important activity after harvesting.

3.2 Lao Women's sources of livelihood

Rural women in Lao PDR have diverse sources of livelihood and income. Typically Lao women's work activity each day is spread over several different, but vital tasks:

- Raising pigs and small livestock such as chickens, ducks, turkeys etc
- Weaving
- Sale of vegetables and herbs.
- In some villages, in some years income is earned through the sale of surplus rice.
- Many women distil the traditional Lao rice whisky and sell it as a source of income locally - often being their second major income.

Rural men in Lao PDR also have diverse sources of livelihood and income. Important income sources include sale of buffaloes and cattle. For many men their labor is an income generating resource that can be hired out or exchanged.

3.3. Income distribution and expenditure control

Overall in Lao PDR household members share the responsibility to secure welfare for their families and they generally pool the family income. However women often control expenditure. For instance, in lowland

Lao Loum culture, financial management of cash is exclusively the domain of the women up to certain levels of expenditure. The team found this to be the case in Lao Loum villages in all provinces visited. However, purchasing expensive items such as production equipment or buffalo is usually decided by men. Although men control the money from the sale of large items such as buffaloes, in reality both husband and wife typically negotiate exactly what they will do with the money in advance.

In Lao Sung households' men are in charge of decisions about money. For instance, the oldest male in Lao Sung "Hmong" households looks after the money. Hmong men do the selling of products (in 80-90% of households), although women do sell certain non-wood forest products. However, again although men make the decisions about money, in certain circumstances they would discuss such decisions first with their wives. This was also the case for Lao Theung villages.

3.4 Gender division of labor and time allocation

3.4.1 Comparison of the total workload of women and men in Lao PDR

The National Union of Lao Women estimates that in rural areas women work two hours per day more than men (1989). Their work includes production tasks as well as household and child care chores (Ireson, 1996). Time-budget micro studies in Lao PDR show that women and girls perform 50 to 70 percent of all household consumption and production tasks (UNICEF, 1996).

During the wet season there is a heavier workload for both women and men (See Box 1 and 2). Many tasks are shared and overlap, but ploughing is usually done by a man and planting a woman's job. Women perform a range of tasks in addition to their household and reproductive tasks.

The gender division of labor in Lao PDR tends to be more rigid among midland and upland ethnic groups, perhaps reflecting the relatively lower status of women among these groups. This reflects the relative high status of Lao Loum women in comparison to women of other ethnic groups.

<i>Box 1: Wet season workloads- Phosii Village, Khoun District Xieng Khouang Province</i>	
<u>Women's activities in the wet season</u>	<u>Men's activities in the wet season</u>
• Preparing soil in the paddy	• Preparing the community irrigation scheme
• Preparing the water flow to the ricefield	• Preparing channels of water flow to paddy
• Ploughing (if there is no man in the household)	• Ploughing and Harrowing

• Fixing the ridges between the rice fields	• Choosing and preparing varieties of rice
• Growing the nursery rice and transplanting it,	• Helping women planting rice
• Putting manure on the land, wedding the land	• Manuring the rice paddy
• Maintaining the water level in the paddy	• Water management of rice paddy
• Weaving	• Making fences to protect paddy from buffalo
• Raising small livestock	• Cutting bamboo and preparing sting for bunds
• Vegetable gardening for the household	• Sharpening scythe for harvesting
• Raising children	• Repairing house and livestock shelters
• Cooking for the household	• Raising large animals - cows and buffalo

<i>Box 2: Dry season workloads - Phosii Village, Khoun District, Xieng Khouang Province</i>	
<u>Women's activities in the dry season</u>	<u>Men's activities in the dry season</u>
• Harvesting the rice	• November - December finishing the harvesting
• Threshing	• Preparing 'everything' to ensure the rice's storage
• Carrying rice to storage	• Looking after cows and buffalo
• Planting vegetables (chilies, onions, garlic)	• Maintaining the community irrigation canal and the canal to their paddy fields
• Cutting grass for livestock feed	• Cutting grass for livestock feed

Collecting firewood	If doing a dry season crop ploughing in January
Weaving	Moving fish from the pond to the ricefield
Raising small animals, chickens, pigs, ducks	Cleaning and preparing fishponds(March)
Raising children	Moving fish from rice paddy to fishpond
Cooking for the household	

3.4.2 Age distribution of labor

Different age groups may undertake different labor tasks. For instance, in Lao there is a high respect for older people and often the younger generation takes over the heavy work involved in transplanting and planting rice.

Children are an important source of labor for rural families. Usually the daughter helps around the house, preparing food, carrying rice from the granary to the household, fetching water. Boys are exclusively responsible for looking after the buffalo from washing and feeding them. Foraging for fish in natural waters and foraging for other wild food such as mushrooms, bamboo shoots, etc. is done by women, but both sons and daughters also help.

3.5 Gender analysis of aquaculture production cycles

In Lao PDR, Aquaculture is integrated with other agricultural and animal husbandry activities. Men and women usually share tasks and responsibilities in rural aquaculture production. As aquaculture is a relatively new activity in some provinces, farmers were unable to say who traditionally does what activities and which jobs would necessarily be considered men's or women's. However, the team was able to identify some patterns of activities that were predominantly female and others that were predominately male. For instance, some men said that apart from digging the pond, fish farming should be women's work. The following are some stages of aquaculture production processes where farmers outlined their perceptions on the gender division of labor.

3.5.1 Pond site selection and construction

Men usually select the site for pond construction and perform tasks such as digging, pond clearance and repair. Sometimes the entire family may help in the digging of ponds. In some situations farmers may buy or inherit land with a pond already in place. Where ponds are integrated with small livestock, men would generally construct the pens over the pond.

3.5.2 Buying fingerlings

Depending on where fingerlings will be cultured (e.g. in net cages, fishponds, or rice fields) different sizes of fingerling may be more suitable and have cost differentials. It is difficult to distinguish between different species of fish when they are at fingerling stage. Buying fingerlings can be a risky decision making process. Whether it is men or women farmers who buy fingerlings depends on the location of the village and the ethnic group. If villagers have to travel far to a district or provincial area to buy fingerlings, it is a man's responsibility. Whether the husband or wife controls the money is an important consideration. For example the Lao Sung Hmong people told the team that buying fingerling was exclusively a man's job, whereas many Lao Loum said that their wives have to consider the purchase of fingerlings a viable economic option in order for the wives to hand over the cash. For fingerling purchase, often the amount of cash required is small enough to be under the financial control of the woman. Hence, when traders with

fingerlings visit the village, it can be either men or women that buy them.

3.5.3 Pond fertilization, maintenance and feeding the fish

Fertilization of ponds is recommended for better fish growth. Women and children collect waste material from the farm and household leftovers to be composted in the fishpond. However, this may also be a man's task. Children help in tasks such as carrying the basket of manure to the ponds. If the family lives bordering the water body, it can be easier for both women and children to be responsible for pond fertilization and daily activities like the collection of household waste and animal manure for composting, water management and the feeding of the fish.

Generally, men are responsible for pond preparation, pond weeding, drying or draining and the regulation of water entry into pond prior to stocking, although women often help. Liming the pond (when done) is the responsibility of men. Men generally operate pump or pond gate operations and other water exchange practices.

Ideally farmed fish should be fed regularly. In general, women prepare feed for fish, such as collecting rice bran, grass and any other available vegetable wastes that are fed to fish. No farmers interviewed in the study purchased formulated feed. Although women may be responsible for feeding fish, there may not be an increased demand on women's labor for rice-cum-fish cultivation in comparison to rice-only cultivation, as people generally do not tend to feed the fish in the rice paddies.

The pond location was a critical deciding factor on who fed the fish. In villages where the ponds tend to be far away from the household women are less likely to feed the fish. If the pond is located near the household, feeding the fish fits easier into women's other daily routine work such as feeding poultry and other small animals. In cases where fishponds are located at a distance from the living quarters, responsibility to feed the fish lies with whomever happens to be going that direction from the household. Feeding the fish in this case would then depend on the season, whether the men are ploughing, or whether the women are planting, weeding or harvesting. In ponds integrated with small livestock, there maybe additional work in feeding penned animals rather than leaving the pigs, ducks or chickens scavenge for food.

3.5.4 Fish Harvesting

Fish can be harvested and eaten in Lao when they are hand size (about 200 grams each). Although most women make decisions about harvesting fish for daily/weekly family consumption, any overall major harvest of fish is under the control of men. When a large batch of fish is to be harvested from a pond using cast nets, this is definitely considered a man's responsibility. Some women said that wading in waist deep water is not suitable for women, particularly when they are menstruating. For rice paddies, although draining water from the rice paddy is a man's responsibility, both women and men collect and harvest fish from rice paddy fields.

3.5.5 Fish marketing, selling, and control over income generated

Women are the sellers, buyers, traders, middle-women and often the entrepreneurs regarding table-sized fish. In Lao Loum households, women control the income generated from sale of fish, which is used for purchasing household items. This is likely to also be the case in Lao Loum villages that are just beginning to raise fish to sell in the future, because women are already involved in marketing of agricultural and livestock products in these villages.

Overall, in low-income rural groups, the larger part of the fish production is usually sold at the pond site. Such farmers market their fish by word of mouth. Fish are hence only sold when friends and neighbors arrive. If someone is thinking of harvesting his/her fish, they let others in the village know in advance and buyers accumulate around their pond. The woman in the house often checks the price in the local market and then they decide a fair price for their fish.

In the Khum District of Xieng Khouang if there is surplus fish to sell from the villages it is sold to middle-women (traders) from the district town who travel by motorbike in the district calling on the villages where they know they can buy fish. They then sell the fish fresh in the market 30 kilometers away. In Savannakhet, an area where aquaculture is more established a fish farmer from a previous aquaculture project said that it was his wife who sells the fish. Although they live very near the town, they do not have a stall in the market, but they have permanent clients that his wife delivers to.

Women are responsible for the price of fish in Xieng Khouang and typically negotiate with the buyer/trader that comes to their village. Women decide the price by keeping abreast of how much fish may cost in the distant market. Some households said they might have up to 40-50 kilos of fish a year to sell. It is likely that farmers will only travel to the provincial capital to sell fish if they have other produce to sell as well. In Champhone District of Savannakhet, a successful fish farmer told us that his daughter sells the fish in the district market. His wife regularly checks the price and supply of fish in the market and reports back to her husband. Based on this information they decide how much to harvest.

Most fish is sold fresh in Lao PDR. Fish processing was not generally found to be conducted by the fish farmers to produce fish products for sale. However, in all Lao Loum households women were exclusively involved in the making of a fermented fish sauce "padek" for household consumption.

In summary, while some villages have easier access to local urban markets and to traders, on site selling of fish is also a viable option and very common. It would seem that channels for the sale of fish is not a major constraint for the majority of farmers. Local reputation of fish farmers is another important consideration in fish marketing. Most villages surveyed were not engaged in selling of fish for income because they did not have a surplus of fish production. Selling of surplus fish for most farmers was largely ad hoc and considered an added benefit.

3.6 Gender, aquaculture and food security

A major question regarding raising fish in Lao PDR is whether farmers engage in raising fish for household food security or to increase their incomes, or both. According to Garaway (1995), in Xonbouli District, Savannakhet Province, only a minority of households have private ponds available for small-scale aquaculture, whether for food security or income generation. However, only a minority of these households is earning an income from aquaculture. Garaway found that in Xieng Khouang only one family was making a significant income from selling fish in 1995. Most selling was going on in an ad hoc and small-scale manner.

Garaway's findings concur with the findings from the study conducted under the LAO/97/007 project. It was found that cultured fish are being raised primarily for food security in most areas surveyed and are

only raised for income when production exceeds household consumption. There are isolated examples of fish rearing exclusively for income generation but these are mainly in food secure households.

4. Case Study: The Nang Daphone family in Ban Houey Khum 8 kilometers from the provincial capital of Oudomxay

We have selected our case study derived from the broader findings of the socio-economic and gender analysis to highlight intra-household dynamics and gender roles in the production and generation of case income from cultured fish.

In Oudomxay, the Provincial Fisheries and Livestock department told the team that interest in growing fish has expanded since 1995 because:

1. The catch from natural fish is decreasing
2. The price of fish in the market is increasing- the price of fish is now higher than meat

There is a lack of supply in the market for fish consumption - supply of fish is less than the demand. As a result, there is a high proportion of imported fish from Vientiane and Thailand for sale in the local market. In the Xay District of Oudomxay, one of the few families that are selling fish as their main source of income told the team that, they began doing this as their soil was poor for rice farming, they had the right physical conditions and they heard that it was a good business.

The following is a description of such a family engaged in aquaculture activities to increase household security and generate cash income. The details from this family are outlined to highlight the gender roles in food security, and more specifically in aquaculture, plus the importance of the intra household relationships in decision making.

The Nang Daphone household is composed of a husband and wife and two children (aged 7 and 9). The couple comes from two different ethnic groups, the husband Phone, aged 39 is of the Lao Loum ethnic group, and his wife Daphone aged 29 is Lao Theung. This family came to live in the Xay district in 1993 because of the husband's job in a state owned fuel station for which he earns approximately \$25 a month, not adequate to feed the whole family. Because they are new to the district, they lack the typical Lao extended family support, which would include helping with childcare, helping out in times of rice shortage and other emergencies. Thus, being new to the area, the household was more vulnerable in times of food shortages.

When they arrived to the village in 1993 they were allocated some land to cultivate rice, the land could be gradually bought off from the government at a subsidized rate, which they now have done. Although, the land is located near a main road, and has a supply of water all the year round, the land is not very suitable for growing rice, because the soil is acidic. In their first year in the village, their rice yield was poor, with not enough to feed the family, and they became worried about food security.

The husband met a friend who had a fishpond on his land, and was told about the possibilities of growing fish instead of rice. He discussed the proposal carefully with his wife, and they worked out the economics of investing in fish culture. They decided that as their land had water all the year around, they may be

able to farm fish successfully. They thought that perhaps they could harvest fish twice a year.

Although it was a major decision (financially) to dig up their rice paddy, the couple together decided that they that they would take the risk and attempt fish farming for a year. They used savings to hire a bulldozer to do this job. In 1993 it cost 45,000 Kip per hour to hire a bulldozer, but as they were near a road it was easier and cheaper to arrange. They built one pond in six hours costing them approximately 200,000 Kip. They bought a mixture of fingerlings species: common carp, Chinese carp, grass carp and tilapia. Then moved the fish into the pond in August 1993. The first harvest was nine months later in April 1994. That year they made 300,000 Kip on the fish and that did not include the fish the family consumed. They were pleased that they were guaranteed food security in terms of availability and access to fish all the year around.

4.1 Intra-household gender division of labor

Both the husband and wife's roles are clearly defined in the household. The wife gets up first in the morning, and is responsible for preparing breakfast. The husband goes directly to the pond after breakfast. It is his responsibility to check the ponds for predators. While checking the ponds, he also hunts for birds and small animals for food for the household. The husband then leaves the household and is absent between the hours of 8am-5pm at work in the local fuel station. From 8 am onwards the wife is solely responsible for the fishponds.

The wife divides her tasks between the house and the fishponds. In the morning, she completes all the household tasks. She then tends the vegetable garden where they grow cashew, eggplant, beans, tamarind, chilies, bamboo shoots, fruit trees, lemon trees, herbs other green vegetables. She collects food for the evening meal and prepares food for the children if they are going to school. Then she goes to work at the fishponds, which are located fairly near the house. She cleans the border of the pond, checks the water supply to the pond, collects grass and cabbage to cut and feed to the fish. She feeds the smaller fish with rice bran. She monitors what sort of food the different species and sizes of fish eat, their growth, and numbers.

With respect to decision making on overall harvesting of the fish, the team was told that the husband as head of the household should make these decisions. However, the husband admitted that in reality they discuss the progress of the fish together and their financial situation. He said that as his wife has responsibility for the regular daily activities for the fish, she knows the situation best. He recognizes that she is the real expert on the fish in the family and that if she does not agree with him to do something, he cannot do it on his own. He is very supportive of her activities in raising fish, and when the UNDP/FAO project came to their village, he insisted that she go to the training on aquaculture. She was one of the few women that attended the training (out of thirty-one people only four were women).

The majority of the fish are harvested and sold when friends and neighbors arrive at their house. If they use a cast net to harvest the fish, both husband and wife are involved. The wife also makes "padek" fish sauce but only for household use. She dries some of the fish ("pa heng") for eating in the household. "Pa heng" is easier for the children to eat when they go to school. The children prefer to eat meat rather than fish, so the sale of the fish is sometimes used to buy meat for the children. The husband said that he was not aware at all of the nutritional value of fish.

After harvesting, they keep some of the bigger fish for brood stock. The wife cleans the pond when all the fish have been harvested and the husband limes the empty pond in preparation for the following year.

4.2 Constraints/problems with the fish farming

During the rainy season, labor intensity demands on the household are higher. They have to constantly monitor that the pond does not over flow and the fish escape out over the walls of the pond. At nighttime, both of them often have to get up and monitor the water level if it is raining heavily. They have also built a screen to prevent the fish going with the water and an overflow pipe.

The husband said that fish farming is not very heavy work for his wife compared to working in the rice paddy and particularly working on upland rice. However the work is very focused. She has to take a lot of care of the ponds, and focus a lot of attention on the fish. It is not like a regular job, where you work so many hours and then finish for the day, but the work is all day long and sometimes night-time. They said that maybe it will be easier when the children are older and can help.

4.3 Households access to credit

The Lao government encourages lending to rural women as well as men. In this particular case, the wife was able to obtain a loan without any problems from the Agricultural Promotion Bank (APB). The husband is not allowed to borrow as he is a government employee, but he had to also sign the bank form as a guarantee for his wife. She used their land as collateral and obtained credit of 2,000,000 Kip. They have to pay it back in 10 months at 20%.

5. Study Conclusions and recommendations

Overall, the gender study team found that in Lao PDR men and women can work together in all aquaculture activities. There are few cultural constraints with regard to women's participation in aquaculture

In some aspects, (such as selling and processing) the gendered division of labor indicates that knowledge and experience differs between men and women. If projects are being formulated for aquaculture in Lao PDR, the project activities should be defined in terms of the different results aimed at, for both women and men and reflect the roles that both women and men play in aquaculture. This could help to indicate the target group for future extension activities and other interventions to enhance the production of fish in Lao PDR. Daily feeding of fish in ponds is considered a household activity so women's inputs (time and effort) should be taken into account. Advice on improved feeding techniques and materials should be targeted to women. Any future program to reduce post harvest losses could be aimed at women (such as training and support with respect to processing, distribution of fish and the management of aquaculture enterprises), while campaigns to encourage people to dig or prepare deeper ponds should be aimed at men. In any future group formation selection processes the LAO/97/007 project staff should make it explicit that women as well as men farmers are eligible for consideration to be part of fish farmer groups. It may be necessary to conduct a further survey in LAO/97/007 project villages to determine the viability of

organizing special training for women's groups. The provincial project counterpart in Xieng Khouang is already planning to conduct a special survey in the project villages to organize a woman's fish farming group

As management of income is of benefit to the household as a whole, projects should be concerned with increasing fish production in order to increase both household food security and income of both women and men. As women are major economic decision-makers, it is essential to explain to both women and men farmers the cost implications of engaging in different types of aquaculture activities. For example, as both women and men buy fingerling, both need to be able to identify fingerlings that are suitable for purchase in order to avoid buying low grade or unsuitable fingerlings. Because Lao Loum women control household cash and expenditure for smaller items they have to be convinced of the benefits to be derived from buying smaller aquaculture inputs (e.g. netting, fingerlings etc). Conversely, decisions about large expenditures tend to be in the domain of men but are often made jointly. Hence, expensive activities such as pond construction have to be made jointly by both men and women.

Rural women vary considerably with respect to their interests, priorities and time available. Women with older children may be the most suitable group for initial aquaculture related activities, because they are less busy with children, they tend to feel more confident about attending training. Indeed, the study found that older women tended to be more interested in raising fish than women with young babies. When considering involving women in aquaculture activities, they should not be categorized as a homogenous group, but 'disaggregated' into single, married, widows, pregnant, women that are breast-feeding children, older women or younger girls. It is essential to target activities to the appropriate group of either women or men.

When project staff visit the village they are in nearly all cases men, so they tend to meet with and talk only to men in the village, including the village headman first. Project staff hence have to very clearly state that future project activities are for both women and men and also explicitly specify that women can also become involved in fish farming. If this is not stated, there may be a tendency for women to think it is only for men and they will not attend meetings or training. If training in aquaculture is to be organized for women farmers, it would be important to state well in advance that they do not need to be able to read or write to attend, otherwise many women may feel ashamed or embarrassed to attend.

In the village on-farm technical training on aquaculture could take place so the women and men can learn and practice at the same time. This training should be as practical as possible. It will be necessary to organize training to take place in the most centrally located place for the majority of the target group. Alternatively, funding permitted, it may be possible to organize shorter but more frequent sessions so that women do not have to be away from their household for extended periods in one day.

Project staff and district 'extensionists' cannot assume that the men attending training will necessarily tell their wives about the training. In some ethnic groups they may tell their wives, whereas in others they may not. Also the training message can be distorted or lost in transmission. The project must specify clearly that women can also attend training or else they will not go. It has to be a deliberate suggestion to the villagers. It will be useful to develop a fact sheet for extension staff on how to work with women and other gender related considerations. In addition it will be necessary to ensure that any new aquaculture extension materials developed are gender sensitive and incorporate the roles of both women and men. The optimal time to organize fish farming training for women will be in January - March or August as women farmers labor intensity is least at this time.

As most people perceived the digging of the pond as the most difficult task in raising fish, it is essential to highlight the relatively low labor demands of fish production for women in comparison to cultivating rice, once the pond construction problem is overcome. Also, when extending advice on the location for digging the pond, it is necessary to ensure that the technical factors for selection such as the suitability of the soil (permeability) and the availability of water are balanced against the distance the pond will be from the living quarters, particularly if animals will be penned over the pond and have to be fed.

It may be useful to disseminate information to Lao based non-governmental organizations (NGOs) on the benefits of aquaculture and on gender roles in aquaculture and to encourage interested NGOs to collaborate with existing activities in the LAO/97/007 project. At the governmental level, the Lao Women's Union (LWU) has a strong organizational network which extends to the village level. The LWU is able to work with national and international organizations. Also it will be possible to make use of the newly established GRID centers (Gender Resource and Development Centers) for networking on issues related to women in aquaculture and for disseminating information on raising fish and nutritional benefits of fish. Aquaculture projects could seek the involvement of the LWU in order to take advantage of its organizational and large-scale mobilization capacity. As knowledge about the nutritional value of fish was generally found to be low in Lao PDR, promotion of the nutritional values of fish among children, young couples and lactating mothers would help to increase health and food security. Where possible, the nutritional value of fish should be promoted through channels such as the LWU, extension services, teachers and where possible through integration into existing educational curricula.

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