

***T*echnology Transfer  
in Freshwater Aquaculture in  
Ubon Rachathani Province,  
Northeastern Thailand:  
Can Both Women and Men Benefit  
in Sustainable Way?**

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### บทคัดย่อ

เทคโนโลยีในด้านการเพาะเลี้ยงปลาน้ำจืด ในหมู่บ้านที่ศึกษาถ่ายทอดโดยบริษัทข้ามชาติ ผู้มีธุรกิจเกี่ยวกับการค้าด้านการเกษตร และโดยเจ้าหน้าที่กรมประมงของกระทรวงเกษตรและสหกรณ์ของรัฐบาลไทย แหล่งถ่ายทอดเทคโนโลยีทั้งสามแหล่งมียุทธวิธีในการถ่ายทอดที่แตกต่างกัน รวมทั้งแตกต่างกันในแง่แรงจูงใจและวัตถุประสงค์ ผู้ได้รับผลประโยชน์โดยตรง คือ ผู้เพาะเลี้ยงทั้งหญิงและชายได้รับผลกระทบจากผู้ถ่ายทอดเทคโนโลยีในด้านต่าง ๆ และในระดับความเข้มข้นที่ต่างกัน การถ่ายทอดเทคโนโลยีในแต่ละขั้นตอนมักประสบปัญหาต่าง ๆ แต่ก็สามารถที่จะแก้ปัญหาเหล่านั้น ๆ ได้ด้วยความช่วยเหลือจากกรมประมง (DOF) และกรมส่งเสริมสหกรณ์ (DOAE) สำหรับในภาครัฐ แต่ปัจจัยที่สำคัญที่สุด คือ ความตั้งใจจริงของเกษตรกรผู้ทำการเพาะเลี้ยงที่จะทำให้อาชีพของตน ก่อให้เกิดรายได้เพิ่มขึ้นและมีความยั่งยืน บทความนี้กล่าวถึงกระบวนการในกิจกรรมต่าง ๆ ที่เกี่ยวกับการทำการเพาะเลี้ยงปลาน้ำจืด ช่องทางต่าง ๆ และประเภทต่าง ๆ ของการถ่ายทอดเทคโนโลยี รวมทั้งได้ให้ข้อเสนอแนะในเชิงนโยบายที่จะทำให้อาชีพนี้มีความยั่งยืนในบริบทปัจจุบันซึ่งอยู่ในระบบโลกาภิวัตน์และระบบทุนนิยมในระดับสูง

## 1. Preamble

Artisanal fisheries has been a way of life of the Thai people since at least the time of "*Pho Khun Ramkhamphang*" during the *Sukhothai* period. The abundance of fishery resources had been such that there has been the still frequently quoted "*Nai Nam Mee Pla, Nai Na Mee Khao*". The quotation that "There is fish in the water, there is paddy in the field" is now just that: a quote. The grim reality is that in the agricultural sector, fishing households are even poorer than the paddy farmers (Korsieporn,2000). As a result of the overall high rate of population growth, particularly in the early 1970s, rural households have become interested in aquaculture in the past decade.

FAO (1988) give the definition of aquaculture as "The current government headed by the PM Dr.Thaksin Shinawatra realizes the urgent need of the country to mitigate the pervasive negative impacts of the July 1997 economic crisis on the majority of people. The Ninth Economic and Social Development Plan (2002-2006) sets poverty alleviation as the first priority (Policy Statement in the the Prime Minister on March 26<sup>th</sup>, 2002). The Policy document in the part that concerns fisheries development emphasizes commercial-scale fisheries for export"

Artisanal fisheries can be considered to be of much lower importance. With the depletion of coastal and freshwater

fisheries resources, the small-scale fisherman and fisherwomen have to turn to aquaculture. While there are quite a number of socio-economic studies on small-scale coastal aquaculture, less have been carried out on freshwater aquaculture.

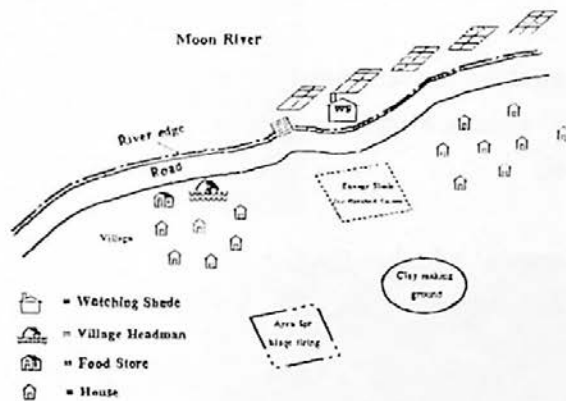
This study aims to add to the currently available pool of knowledge on freshwater aquaculture. It is a case study of a village in Northeastern Thailand. The village "*Ban Chang Mho*" in the Sub-district "*Kham Nam Sab*", "*Varin Chamrap*" District, in Ubon Rachathani Province.

The village is under the jurisdiction of *Kham Nam Sab* Tambon Administrative Organization (TAO). The Village Headman has two assistants and four senior advisors of the Village Committee (14 members, four of whom are women). There are 93 households, as of 24<sup>th</sup> April, 2002, with the population of 236 females and 228 males. They are all Buddhists and the older generations attained compulsory education of six years. Due to their entrepreneurship in pottery selling, they are numerically literate. The major occupation is pottery, making traditional and economic cooking stoves, or "*Tao Ang Loh*" and "*Tao Satetakit*", respectively.

Ninty eight percent of the households engage in pottery making. There are 15 households that engage in both pottery making and fish farming along the *Moon River*, which flows

southwards. Almost all (14 out of 15) who engage in fish farming are contracted fish farmers for a transnational corporation (TNC), as well as farming for themselves. The fish farmers, overtime, have become an informal group with the village headman being the leaders. The fish that are raised are black, pink and red Nile Tilapia (*Oreochromis niloticus*).<sup>1</sup> The TNC contracts fish farmers to raise red Nile Tilapia, called in Thai "Pla Tubtim" in cage culture

**Figure 1 Ban Chang Moh Village, Kham Nam Sab Sub-district, Varinchamrap District, Ubon Rachathani Province**



<sup>1</sup> The black Tilapia was introduced in Thailand from Japan in 1965. It was developed into a better quality breed called in Thai "Pla Nin Chitlada", which is of pinkish color with some gray scales. It was further developed by a Transnational Corporation into a pure breed of reddish scales and of better quality and value called in Thai "Pla Tubtim".

## 2. Objectives

### 2.1 To describe

- The process of Pla Tubtim cage culture;
- The women's roles in the cage culture;
- The technologies transferred by a transnational corporation (TNC);
- The technologies transferred by national entrepreneurs (NE);
- The technologies transferred by the Department of Fisheries (DOF);
- The problems faced by and the needs of the fish farmers;
- The recommendations of the fish farmers

### 2.2 To analyze the economic situation and the fish farmers' obtained technologies that are transferred from each channel;

### 2.3 To answer whether the fish farmers, women and men, can benefit from the various in a sustainable manner;

### 2.4 To provide policy recommendations to the Royal Thai Government (RTG) to reach the goals of rural poverty alleviation and sustainable development in the context of fresh water aquaculture.

### 3. Methodology

The method used are (1) rural rapid appraisal (RRA), (2) in-depth interviews with key informants (Village Head and his wife), (3) focus group discussion with seven fish farmers and (4) interviews with two women who sell Tilapia, both at retail and wholesale prices, at the *Talad Yai* Market in Muang District.



**Figure 2**  
**Mrs.Auey Selling Tilapia**  
**at the Market**



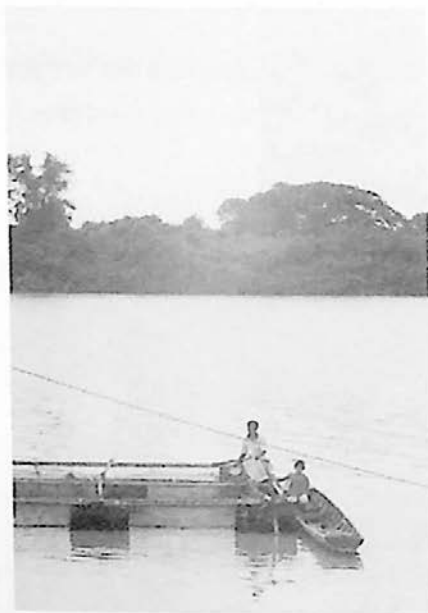
**Figure 3 Miss. Noi Selling Tilapia the Market**

#### 4. Study Findings

##### 4.1 The activities involved in Pla Tubtim cage culture

The cages of "*Krachang*" are not far from the shore and situated more or less in a straight line. The *Krachang* are adjacent to each other and are framed with wood structure and bouys. Within each *Krachang*, there are about 6-8 small square "locks" with netting both around the edge and at the bottom, with a wood plank in the middle for the farmers to walk during feeding (Figure 4).

**Figure 4 A Fishery Employee at the Evening Feeding Time**





**Figure 5 Krachang structure**



**Figure 6 Feed pellets mixed with Safta**



**Figure 7** Pla Tubtim feeding



**Figure 8**  
**Feed pellets provided**  
**by the TNC**

**Table 4.1 The Activities involved in "Pla Tubtim" cage culture by Sex of Farmers**

Activities	W	M	W>M	M>W	W+M
Krachang building		/			
Building a shack for a night watcher/guard		/			
Obtaining fingerlings		/			
Feeding two or three times daily				/	
Cleaning the surrounding nets and the bottom nets				/	
Tending the fish				/	
Curing the fish		/			
Mending the nets				/	
Farming the fish of appropriate size		/			
Cooking some dead or fresh fish for household consumption	/				
Selling at the farm (wholesale)		/			
Selling at the market (retails)	/				
Processing the fish left over from selling at the market into fried salted meat	/				

Note: W= Women , M= Man

#### 4.2 The technologies transferred by a transnational corporation (TNC)

An individual interested in Tilapia farming would approach the TNC with 20,000 baht (approximately 41-42 baht = US\$1) in cash. The two stakeholders would sign a contract, after which the *contracted* farmer would get the following inputs: 2,000 *Pla Tubtim* fingerlings and 70 sacks of feed in pellets (20 Kg. each)

**The TNC's costs are:**

2,000 fingerlings* 2 baht	4,000
70 sacks of feed* 395 baht	27,650
Total costs	<u>31,650</u>

**The farmer's own inputs** (per *Krachang* of 3\*6 m; 18 sq.m) are: [The up-front cash of 20,000 baht per one cycle (four months); in one year, a farmer usually farms at least twice, but in the last two years, only twice a year]

The material inputs:

• The outer netting 8 kg.*120 baht	960
• Bamboo rods for framing 8 rods* 25 baht	200
• Empty petrol round tanks for buoying 8*130 baht	1,040
• Nylon strings for tying 4 kg.*60 baht	240
• Fine inner nets with metal buoys, the length depends on the water depth; must be about 50 cm. From the bottom of the river 1 set*120 baht	120
Total costs	<u>2,560</u>

As the material inputs last 18 months, they can be used for four cycles of farming. Thus, on average, the material inputs for one cycle cost at least  $2,560/2=1,280+20,000$  cash=**21,280** baht.

In addition, the farmers have to buy the medicine called "Safta" from the TNC, costing 320 baht per bottle. The disease called in Thai "*Rok Raidang*" is the major disease of Pla Tubtim. *Rok Raidang* is normal throughout the cycle, but it becomes serious during late April-September, when it rains. The farmers have to buy a few bottles of Safta, make the powder watery and mix into the feed. This extra cost is approximately **800** baht. Added to the **21,280** baht, the total cost born by each farmer per cycle is at least **22,080** baht. If the farmers are short of cash, they have to do without sufficient close of the medicine as they have to buy it in cash from the TNC representative. The likely result is that disease becomes pandemic and the farmers loss all the lot of fish.

The farmers complain that the TNC gains high profit, whereas they gain only small profit. At the end of each cycle, the TNC employees will come to buy the lot of fish at the farm at the TNC-fixed prices. The benefits of each stakeholder are shown in the following table.

**Table 4.2 The Comparative Benefits of the TNC and the Farmer.**

	The Farmer Costs	The Farmer Net Benefit	The TNC Costs	The TNC Net benefit
Initial Cost	22,080		31,650	
Benefit from selling to the TNC			Benefit from re-selling	
Black Nile Tilapia (38 baht/kg.)*1,000 kg.*	38,000	3,500**	45,000	7,000
Pink Nile Tilapia (38 baht/kg.)*1,000 kg.*	38,000	3,500**	45,000	7,000
Pla Tubtim (42 baht/kg.)*1,000 kg.*	42,000	3,500**	48,000	6,000

\* Usually, the farmers loss about 100 kg. Per cycle

\*\* The data were collected by telephone interview on 11/12/2002 with the village headman who also is the leader in Nile Tilapia culture, to crosscheck the information obtained from the focus group discussion.

The TNC's costs are 31,650 baht, and the benefits are  
6,000 baht per cycle

The farmers' costs are 22,080 baht, and the benefits are  
3,500 baht per cycle

Cost ratio = 1.48 :1; the benefit ratio = 1.71 :1

Ratio of Investment = (benefit/cost)\*100

TNC = (6,000/31,650)\*100 = 19%

Farmers = (3,500/22,080)\*100 = 16%

#### 4.3 The technologies transferred by national entrepreneurs (NE)

- How to make and use EM instead of the TNC 's  
Safta
- Information about each feed brand and its  
ingredients
- Information about how other customers solve  
their problems of fish diseases

#### 4.4 The technologies transferred by the DOF

- Suggestion to alleviate the Rok Raidang  
(reducing number of fish to reduce stress,  
reducing feeding to twice daily, using EM)

#### 4.5 The problems faced by fish farmers

- Low profit and high risk of loss and debts
- Dependence on the TNC
- Inability to find their own market outlets

- Insufficient technological transfer from the DOF personnel
- Lack of long-term loans

#### 4.6 The needs and the recommendations of the fish farmers

- DOF to transfer appropriate aquaculture technologies via training (in farming techniques, in seeking market outlets, fish farmer' s group formation and management of the group in a sustainable way)
- DOF's assistance in obtaining loans that are of larger amount and requires longer period of repayment than that of the "One Village/One Million Baht" Project.
- DOF's advice how to get SIF loans or any sources of medium-term loans.
- Alternatives to farming Pla Tubtim as contracted farmers
- Alternative types of aquaculture best suit to the water of the village

#### 4.7 The women's roles in fisheries

As can be seen from the activities in Tilapia culture by gender, women engage in a few activities that are interchangeable with men. The only activity that they take sole responsibility is cooking the fish for household consumption.



This is of no surprise as cooking is the traditional domain of women worldwide.

With regard to Tilapia selling, the two sellers are women and in the "*Talad Yai*" morning market, there is no fish sellers who are men. The two Tilapia sellers employ two male laborer to carry out the heavy tasks for them, such as carrying ice to put around the fish container to keep the water cool, to carry the oxygen tank, to put up the large umbrella and keep them in place after use.

The two women buy about 10-15 kg. of Pla Tubtim and about the same amount black and pink Tilapia from the TNC. Their wholesale was 45 baht per kg. ; while the retail price was about 50 baht per kg. They mentioned that they could sell all the Tilapia for only two days in a week. For the remaining five days the consumer demand is low and they have to process the remaining Tilapia into dried fish, which they sell at 180 baht per kg. Ten kilograms of fresh fish could be process into one kilogram of dried fish that could not keep for long due to the low technology of processing.

The problems faced by the two women Tilapia sellers are: (1) low income; (2) being in debts to the TNC and (3) lack of alternative, supplementary occupation(s).

## 5. Discussions

The economic situation of the contracted fish farmers is deplorable. It is apparent that the TNC attempts to promote only Pla Tubtim culture. It benefits from the cash, material inputs, unpaid local labor and, last but not least, from the Thai natural resources and the Thai natural environment. It does not come as a surprise, given that TNCs recognize no national boundaries and the RTG policy on fisheries that promotes fish export. It is contradictory that while the overall policy is rural poverty alleviation, the contracted farming provides the fish farmers with small income and in some cases make them poorer. The women who sell and process the TNC-provided fish are only marginally better off and are sometimes in debts. The urban consumers who have to buy from the TNC supermarket outlets have to increase their price to be profitable.

The economic situation of the fish farmers who are not contracted with the TNC is no less acceptable. They totally lack appropriate fish farming technologies and the knowledge gained is based on traditional wisdom and the information from fish agro business stores, friends and neighbors, and from the DOF personnel.

## **6. Can Pla Tubtim Farmers of Both Sex Benefit in a Sustainable Way?**

As can be gleamed from the above description, the technologies transferred from each channel are of vastly different level. To answer whether the fish farmers, women and men, can benefit from the various types of technology in a sustainable manner is not an easy task. The major reason is that to see the impact and sustainability, one needs to conduct an *ex post facto* evaluation that should take place around five years after the project, which in this study is the Pla Tubtim culture. Even better, if it is known beforehand, it would be theoretically most valuable to design project monitoring, mid term evaluation, end-of- project evaluation and impact evaluation.

Sustainability could be considered from the economic environmental and social viewpoints. Economically, the Pla Tubtim farmers could benefit but the benefit is sustainable because of their total dependence on the TNC, which has the monopoly on the provision of Pla Tubtim fingerlings.

Pla Tubtim cage culture is also not environmentally sustainable. It is well known that most TNCs are not concerned with the natural environment of the country they base their operation in. This TNC is no exception. Despite the high technology they provide, they do not transfer any knowledge on environmental conservation to Pla Tubtim farmers. There is a complaint in the village under study that

the quality of water of the *Moon* river is deteriorating and the rate of loss of the fish has been increasing. The lack of environmental concern on the part of the TNC hurts not only the fish farmers, but also the water resource quality of the nation in the long run.

Socially, the informal group of Tilapia farmers might be sustainable, if they can maintain their profits at a satisfactory level. Otherwise, their informal grouping would tend to dissolve. One complaint was that the size of cash to make the contract with the TNC is large and difficult for the farmers to obtain. To make the group sustainable it is imperative to promote the group to a formal group, such as a co-operative, the members of which can be trained in co-operative administration and management. As the farmers are not very literate and tend to neglect keeping any record in their expenditures and profits, it is very difficult for them to know exactly what their net profits are. The tendency is that the information is inaccurate, both for themselves and for outsiders such as the government personnel and academic researchers.

## 7. Policy Recommendations

1. The role of the TNC should be controlled. It should be made more responsible for the natural water resource quality.
2. The DOF should be concentrating more on technological development of PlaTubtim breeding. They should distribute the fingerling to the farmers free of charge or at low price to reduce the monopoly of the TNC.

3. The Department of Agricultural Extension (DOAE) should train their personnel in the Pla Tubtim cage culture and in transferring the technology to the farmers in an effective manner.

4. The Tambon Administrative Organization (TAO) and the DOAE should use various kinds of mass media to widely transfer the technology, especially, using the information technology to be provided at the Tambon Agricultural Information and Service Center.

5. The DOAE should not discriminate women in any topics and any means of technology transfer. In this study, women Tilapia farmers always get second hand information from their male counterpart.

6. The Department of Co-operative Promotion (DOCP) should promote the Tilapia farmers to set up their own co-operative and train the members in management and administration, as well as accounting and record keeping. The formal grouping would also enable the members to acquire long term and larger loans from financial institution that are larger than those obtained from the one village/ one million baht program.

7. The DOCP should also promote women fish processors to set up their own co-operative and help improve the quality of their products, as well as diversifying them. The benefit from promoting the women processor co-operative would be similar to that of the fish farmers co-operative in terms of loans and training.

8. All the government agencies concerned should work in collaboration to give optimal benefits to these involved in Tilapia and other kinds of fish farming. Their work implementation should be well planned, systematically implemented, monitored and evaluated, so as to improve the quality of their future performance and hence also the quality of life of the rural people.

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