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THIRD ANNUAL REPORT: ANNEX 2
Partners 5,6,7 & 8 RIA1, UAF, RUA & KU
covering the period from January 2005 to December 2005

Title: Annex 2: RIA1, UAF, RUA, KU: Production in Aquatic Peri-urban Systems in South East Asia

Project homepage : http://www.papussa.org

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Cover photo: Red tilapia cage culture in river HCMC July 2005

Annex 2A Partner 5 Research Institute of Aquaculture (RIA1) Hanoi

Photos of 2005's activities

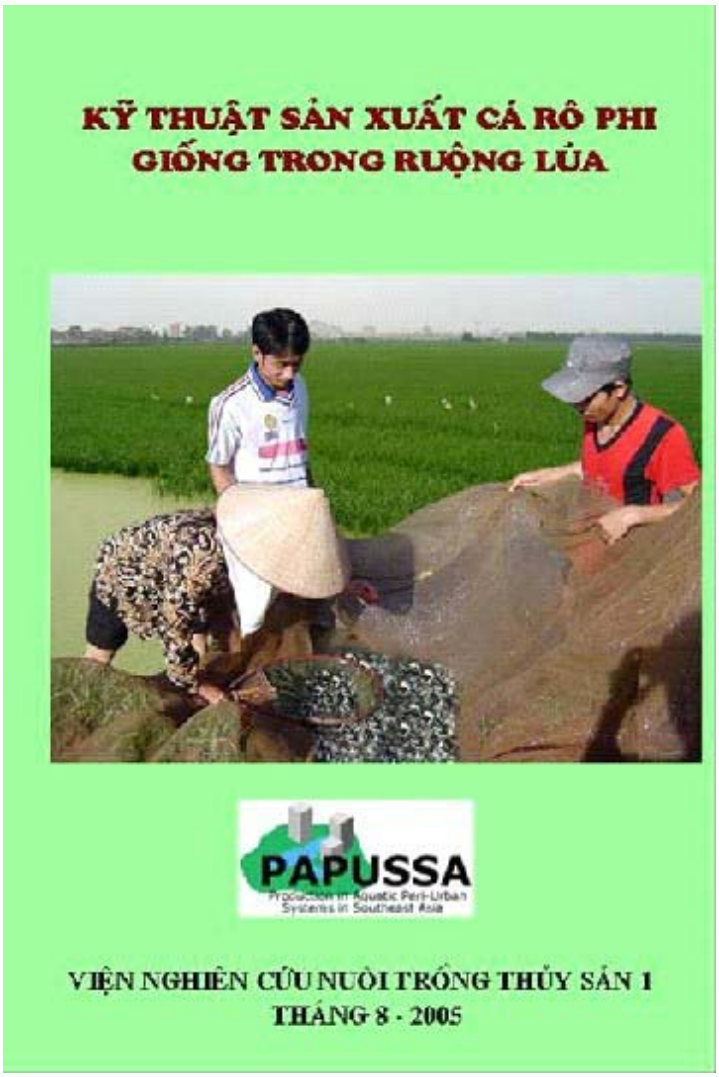

Figure 1 Booklet of Tilapia seed production in rice fields in northern Vietnam

Figure 2 Poster presentation in public place in communes for intervention September 2005

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Figure 4 Dr. Tuan organizing meeting with farmers for co-operative water sampling research August 2005

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Annex 2C Partner 7 Royal University of Agriculture (RUA) Phnom Penh

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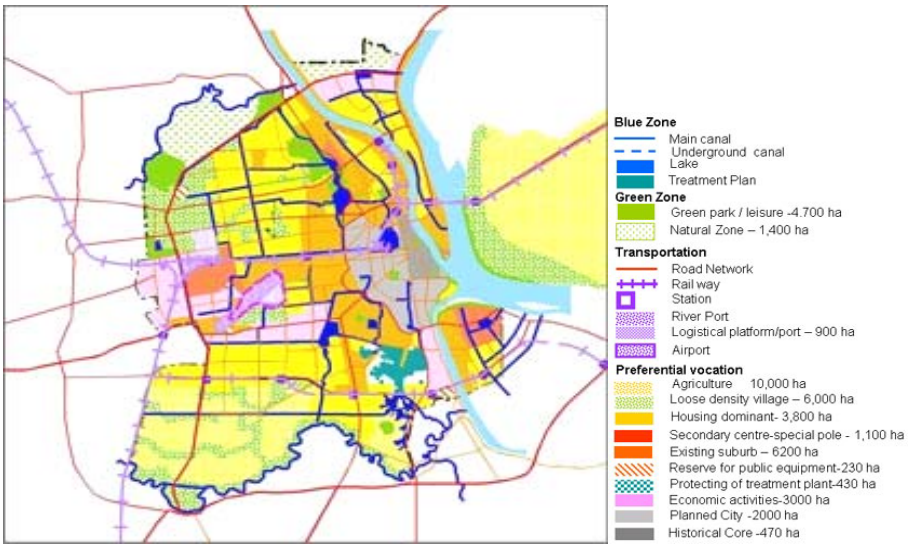
Seyha at HH interview of 3rd Monitoring Survey

Mrs Kim Bunthach- interviewee for a case study for article of the Peri-Urban Aquatic Food Production Systems in Phnom Penh, Cambodia in Urban Agriculture Magazine

Database training in Siem Reap July 2005

Illustration from morning glory booklet

Phnom Penh Municipality Master Plan 2020



Water quality sampling

APPENDIX 2C2: Protocols for Interventions

Protocol of Aquatic Plant growing Manual (Booklet)

1. Methodology

The manual will be made in a way that less educated people could be able to read and understand. It would be composed of techniques in growing the plants, improving product quality as well as sanitation. A specific guide for health related problems and safety measures during production and marketing would also be included. Theory as well as practical experiences combined from older and experienced farmers would be collected for the manual, as well as carrying out a secondary data search in the other 3 Papussa cities and wider field in the literature and on the internet.

1.1 Farmer meeting

Meeting with the farmers are necessary in order for them to share experience amongst each other and the experience will be captured by the project team for making the booklet. 5 farmers will be selected from morning glory producers and 5 farmers from Water mimosa producers. Selection criteria will be based on the years of experience and production yields. Village leader will assist in the selection process of those farmers. The meeting will be arranged at the field so that farmers will be able to illustrate their growing techniques more easily.

1.2 Writing up booklet

The team will process the information from the farmers meeting and combine with secondary data for writing up the booklet. The booklet will be written in a way that less educated people could be able to read and understand as their target audiences are farmers. Drawing pictures will be used to illustrate each activity in production.

1.3 Farmers' review

After the draft version of booklet laid out, farmer meeting will be arranged again for their review on the booklet. Amendment will be necessarily made during review.

2. Structure and tentative information of the booklet

Cover page: **Inside Booklet:**	**Contents**
I- Introduction	1- Objective of the booklet Why we have to create this booklet and distribute it to the farmers? 2- Important of Morning glory 3- Difference type of Aquatic System Should be focused on only morning glory or other aquatic system for them to have more alternative

II- Method and Material in cultivation	1- Field preparation: 2- Seed selection 3- preparation/growing process 4- Time 5- Fertilizer use: labour, equipment needed 6- Volume of fertilizer use/ha/amount of morning glory 7- Self protecting during pesticide preparation and spraying 8- Taking care morning glory, how often-just cropping and after cropping status, difference attention? 9- Material, tools/body protected tool - How to protect yourself from chemical that you use to spray pest?
III- Harvesting	1- Harvesting method/ after cropped, when will you harvest 2- Processing / re-use for other agricultural purpose 3- Method of package or transport 4- Benefit: Production (kg)/ha or income/ha (internet, farmer, DB)
IV- Consequence and problem solve	1- Problems occuring: disease, land,.. 2- Expenditure on the production system? 3- Problem Solving

3. Work schedule

No	**Items**	**Time Frame**					
		June				July	
		W1	W2	W3	W4	W1	W2
1	Field work Preparation						
2	Farmer Meeting at the field						
3	Information Processing and Writing up						
4	Drawing picture for booklet						
5	Farmers Review						
6	Amendment and Printing						

Protocol of Experiment
Integrated System of Morning glory and Snakeskin gourami fish with Effective Micro-organisms

Please note that this intervention was not carried out as mentioned above

I. Introduction

The trial experiment of cultivating snakeskin gourami fish with floating morning glory in cages (large hapas) was an early idea of intervention in third year Papussa project. Later, another variable (Effective Microorganism) was decided to be included in the experiment with hypothesis below:

- EM will be used to substitute inorganic fertilizer and pesticide heavily applied in local way of farming in which it will deteriorate the environment and cause health risk. This EM will reduce the cost of input of MG production.
- EM will improve the water quality of which Giant gourami fish are cultured in
- Giant gourami will feed on the fauna and flora in MG branch and root systems thus reducing pests. It will also l reduce cost on feeding and generate more income beside MG sold.

II. Methodology

This study experiment will be held in part of Beung Cheung Ek area which water will be in certain level retained for fish culture. Estimate time cultivation is 4 months (June-September, 2005)

2.1 Experimental design

There are 4 treatments, with 3 replicates using CRD (Complete Randomly Design). The 4 treatments are:

- Treatment 1 (T1): Control; MG farming using chemical and pesticide followed the method of local people
- Treatment 2 (T2): Morning glory farming with 1/3 of surface covered on the snakeskin gourami and using Effective Micro-organism
- Treatment 3 (T3): Morning glory farming with 1/2 of surface covered on the snakeskin gourami and using Effective Micro-organism
- Treatment 4 (T4): Morning glory farming with 3/4 of surface covered on the snakeskin gourami and using Effective Micro-organism

2.1.1 Experimental morning glory seed

New fresh morning glory stem just being cut off will be brought from the farmer and planted in raft in row according to surface area estimation. The space between each row will be 0.5 m and 20 Cm between each seed.

2.1.2 Experimental fish

Snakeskin gourami (*Trigogaster pectoralis*) with size 40-50 g per head, will be raised in the hapa once the morning glory seed were laid. Snakeskin gourami will be stocked at 10 fish per m^2 in experimental cages of T2, T3 and T4.

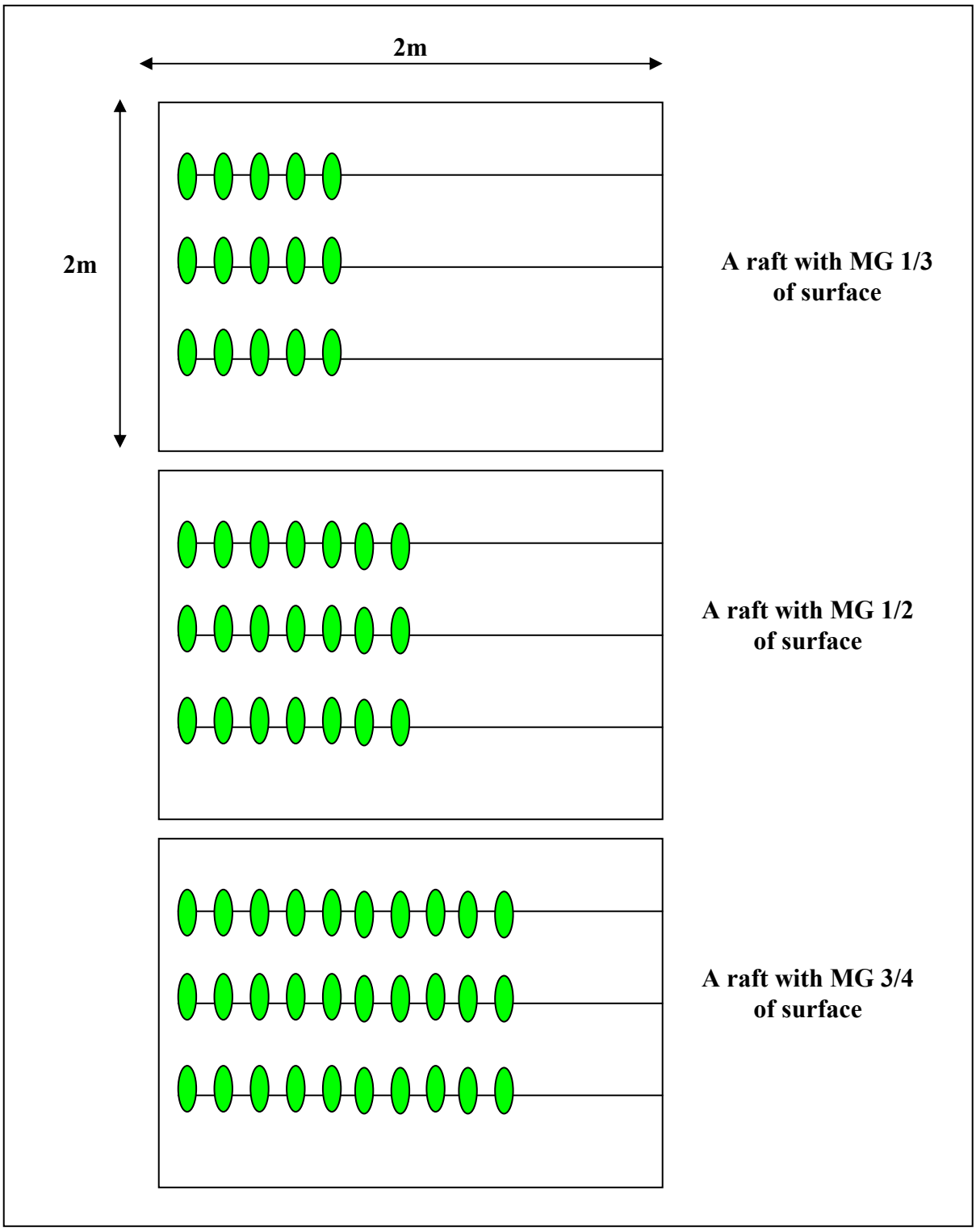


Figure 2.1 Raft/hapa design

2.2 Experimental unit preparation

2.2.1 Hapa set up

There are 4 treatments with 3 replicates each. 9 hapas of size 2m x 2m x 2m made of Nylon net with wooden frames in Cheung Ek Lake will be set up for T2, T3 and T4. Treatment 1 (T1) will follow the farmers traditional method which morning glory will be farmed without fish and hapa. The hapas will be attached by hard plastic tanks to keep the hapa floating beneath the surface level. Each hapas will be connected to a pole for maintaining balance and position when the water level goes up.

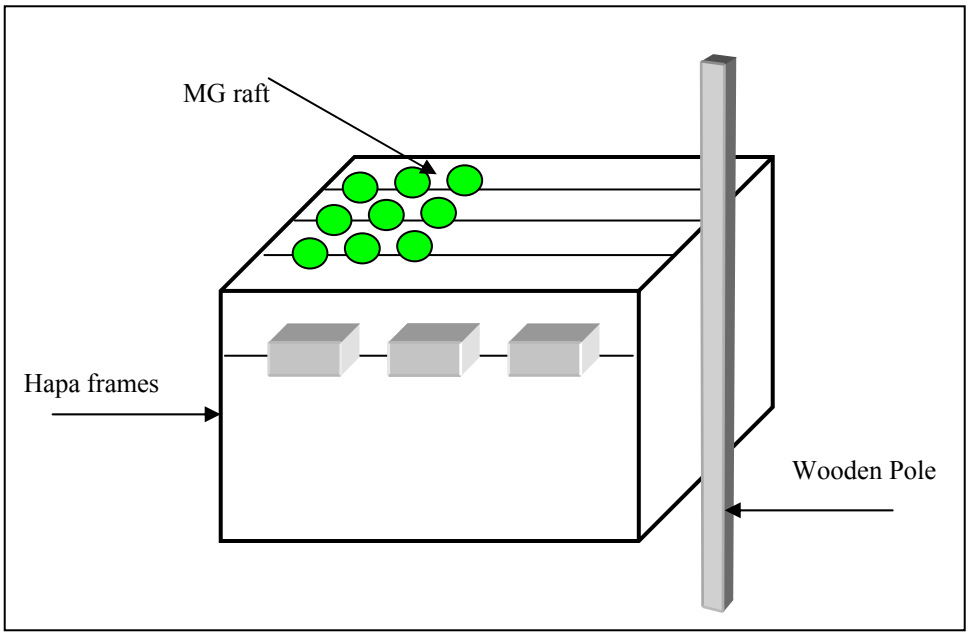


Figure2.2. Hapa preparation

2.3 Cultivation system

Morning glory

After finished setting up the hapas, morning glory seedlings will be brought from the farmer with fresh stems at the earlier stage of their harvesting. (Approximate 10 cm of each morning glory stem). Seed will be well knotted h along ropes of approximately 2.5 meters length. The space between each row will be 50 cm and 20 cm between each floating seedling. The number of rafts will be depending on the proposed surface area of each treatment.

Fish

Snakeskin gourami (*Trigogaster pectoralis*) with size of 40-50 g per head will be stocked in T2, T3 and T4 at the stocking density 10 fish /m² (40 fish /hapa).

2.3.1 Fertilizing

Each hapa will be fertilized weekly one day after setting up the morning glory seedling rafts by using the Effective Micro-organism (EM) spraying on the morning glory stems and then leave. EM concentrated solution will be bought from local supplier in Phnom Penh. EM concentrated solution will be mixed with water at the ratio 1:500 at the time of spraying. Fertilizer (Plant conditioner) will be applied upon farmer's traditional method which unknown 3 to 4 kind of chemicals will be mixed with pesticide for spraying on morning glory weekly after a part (rows) of morning glory was harvested.

2.3.2 Harvesting method

The morning glory will be harvested weekly. Harvesting method will be following the local knowledge by using manual harvesting cutting the stem of morning glory about 30-60 cm long. Cleaning and packing will be done at situ. The raft of morning glory will be replaced if the whole part of morning glory were destroyed.

2.4. Analytical Methods

2.4.1 Morning glory product

- Amount (Kg) harvested every week
- Amount of broken morning glory every week

2.4.2 Growth performance of Snakeskin Gourami

- Weekly Weight Gain (DWG)
- Net Yield
- Gross Yield
- Survival rate (%)

2.4.3 Water Quality analyses

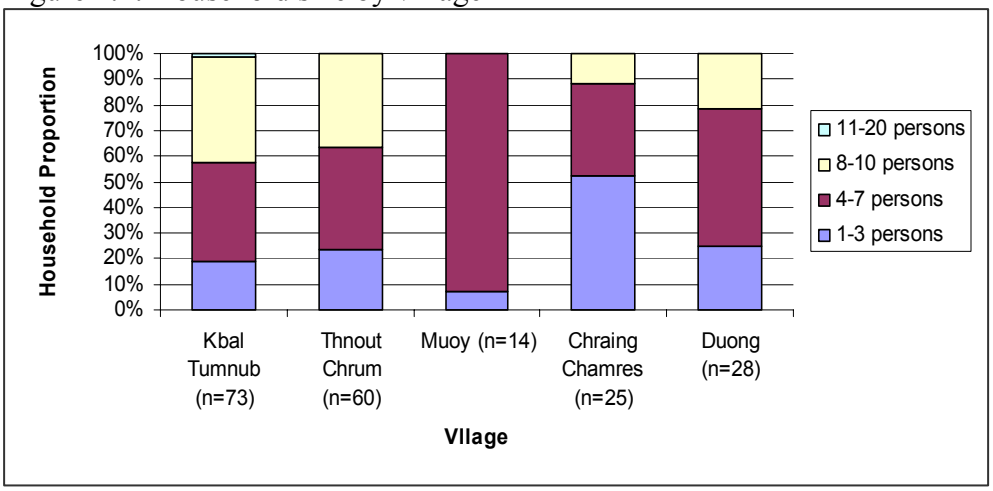
Water quality parameters (Dissolved Oxygen, pH and Temperature) will be weekly monitored at 0600 and 1400 h.

Appendix 2C3: Initial findings from Baseline and Monitoring Survey Analysis

I. Household information

1.1. Household Size

Figure 1.1: Household size by village



Morning glory producer households (Kbal Tumnub and Thnout Chrum village) generally have larger number of members compared to fish culture (8-10 in each household).The relationship of household size was found with number of children in each households as morning glory producers have more children than other production systems.

1.2. Dependency Ratio

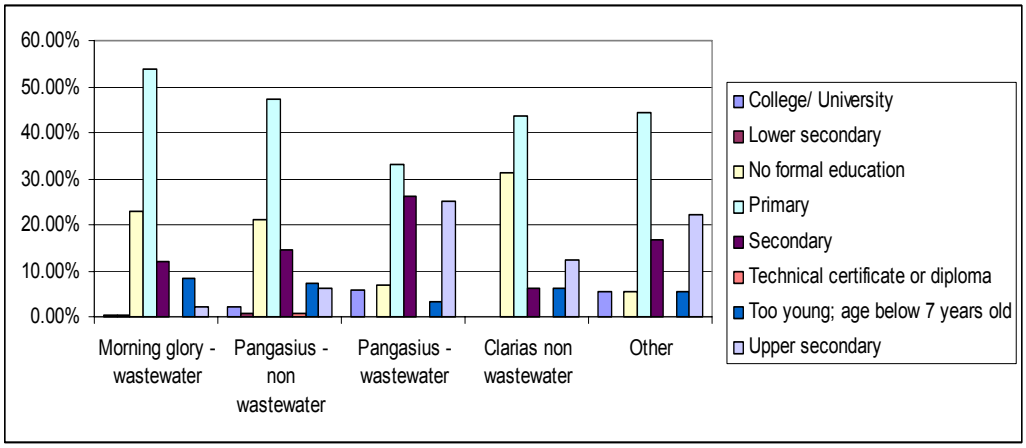
Table 1.1: Dependency ratios by production

Production System	Dependency Ratio Both Sex
Morning glory	57.47
Pangasius - wastewater	70.45
Pangasius - non wastewater	57.22
Clarias-non wastewater	82.05

Dependency Ratio was calculated by ratio of Income earner to the Non-income earner. The higher ratio reflects the less dependency. The Table 1.1 shows aquatic plant growers had higher rate of dependency in households as more household members perhaps those children in their young age were non income earners.

1.3. Education

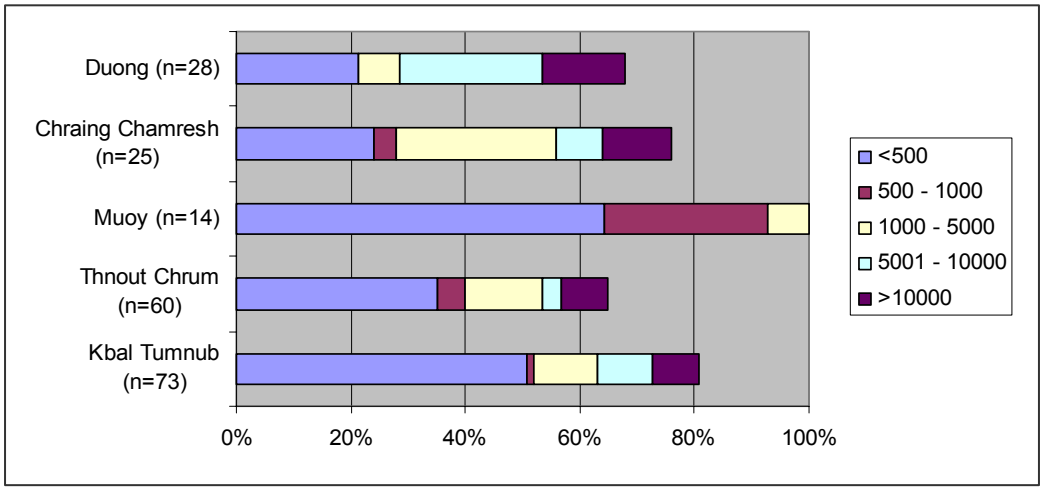
Table 1.2: Education level by production system



Aquatic plant producers have relatively lower education levels compared to fish farming households. Those who produce Clarias catfish were among Vietnamese so majority of them had no formal education level in Khmer, but perhaps they had in Vietnamese language.

1.4. Land Ownership

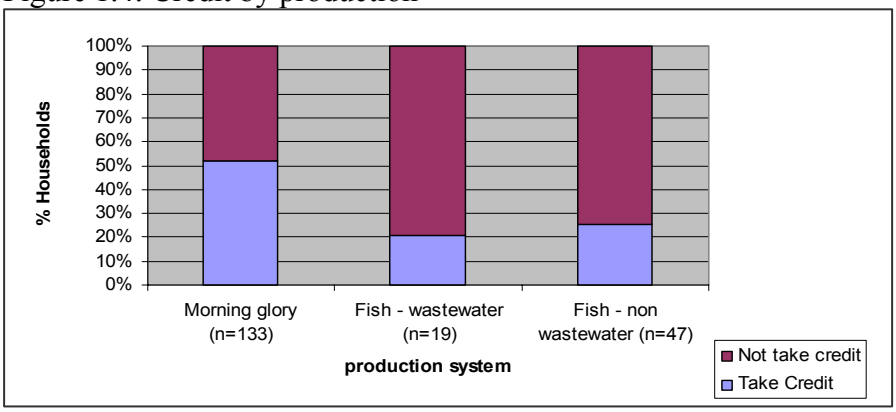
Figure 1.3: Land ownership by village



Fish producers own larger land areas than aquatic plant producers as those aquatic plant producers were likely to own only the land for their housing, only a few own agricultural production land. This perhaps due to previous land tenure were not accessible to be owned due to government policy and of course they were poor, but now those land areas in the lake have become increasingly accessible to the ownership of the urban rich and powerful.

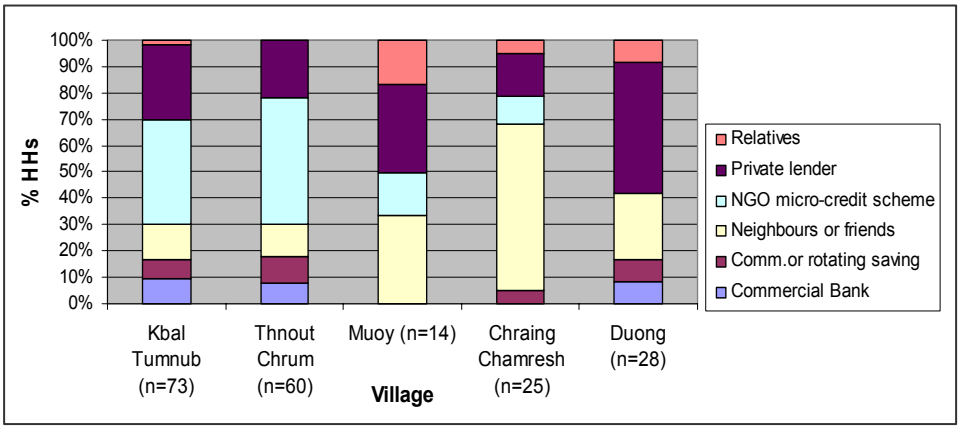
1.5. Credit

Figure 1.4: Credit by production



Credit was of importance for communities producing morning glory in waste water. They tend to take credit in the beginning of their production cycle as money was needed to be invested for renting the land and buying inputs for production.

Figure 1.5: Credit sources by village

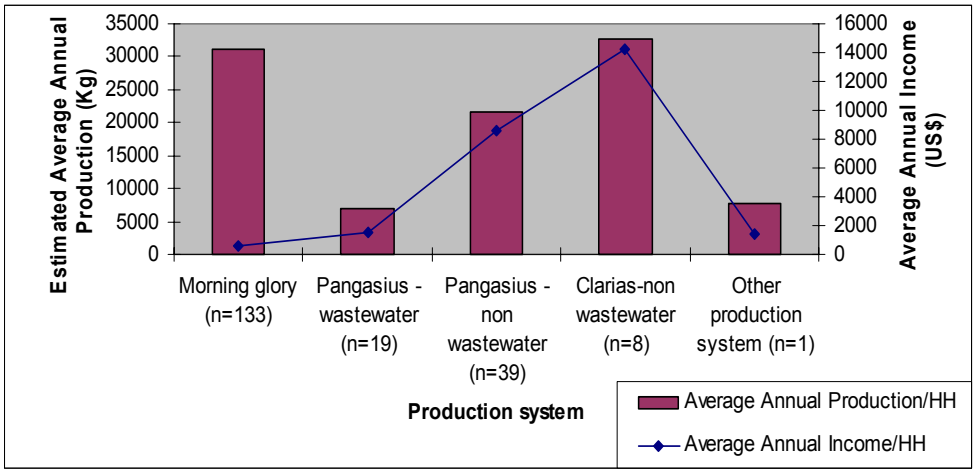


A number of credit sources used were described - commercial bank, community or rotating saving, neighbours or friends, NGO micro-credit scheme, private lenders, and relatives. Amongst these, NGO micro credit and private lenders were the most popular for people to turn to it for provision of credit but neighbours or friends were indicated as a source of credit in communities of fish production.

II. Production Systems

2.1. Estimated Average Yield and Income

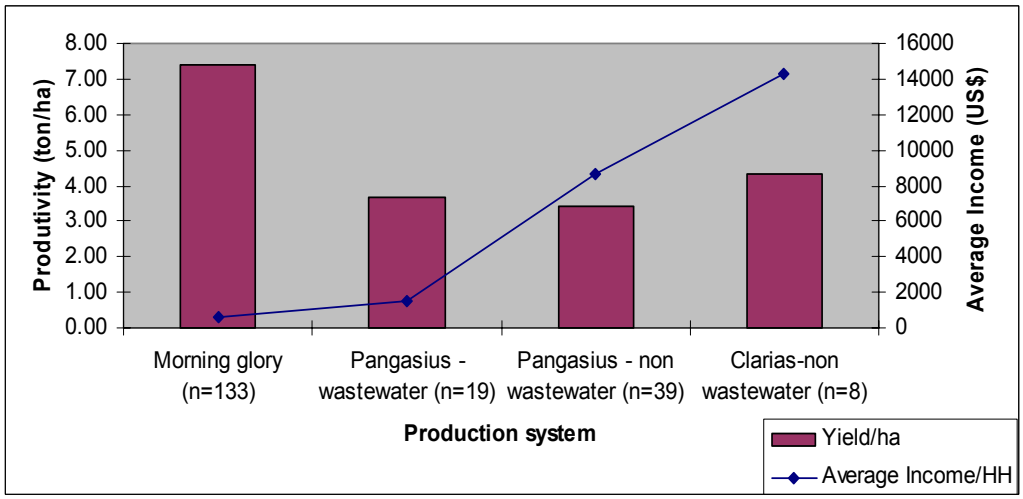
Figure 2.1: Average Annual Production and Income by Production System



Among those peri-urban aquatic production, clarias catfish in non wastewater produce the highest annual production due to its short cycle of production which required only a 3 month period to reach the market size while pangasius culture takes the whole year. Morning glory was second amongst the other production systems. The annual income of morning glory ranks in the lowest level due to its cheap product price. However, the input to this system was also much lower and the turnover time was considerably shorter as farmers can harvest part of it regularly once a week for household income.

2.2 Productivity

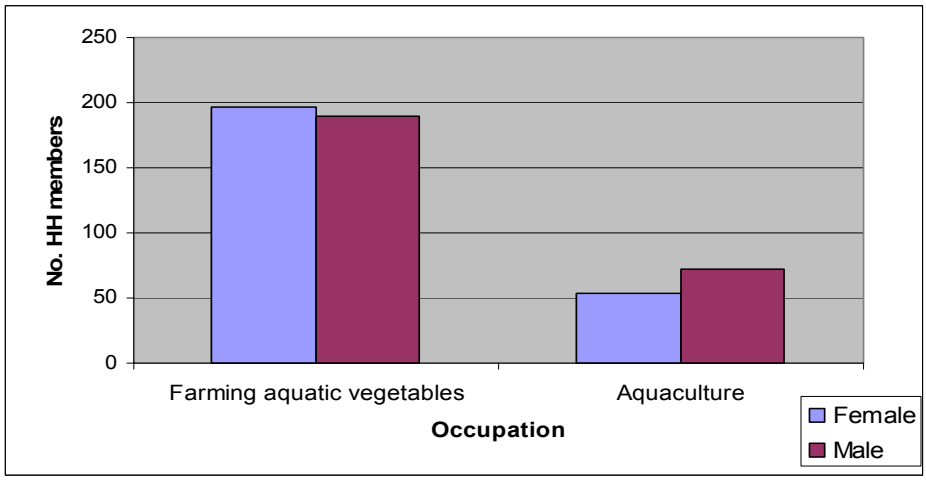
Figure 2.2: Productivity and income by production



Clarias productivity was relatively higher at 4 to 5 ton/ha compared to other fish species. However in terms of productivity morning glory is the most productive amongst other peri-urban aquatic production systems (about 7 ton/ha), although the lowest income earned due to the cheaper price of the product. However there is inadequate information to compare the net profit of each production system.

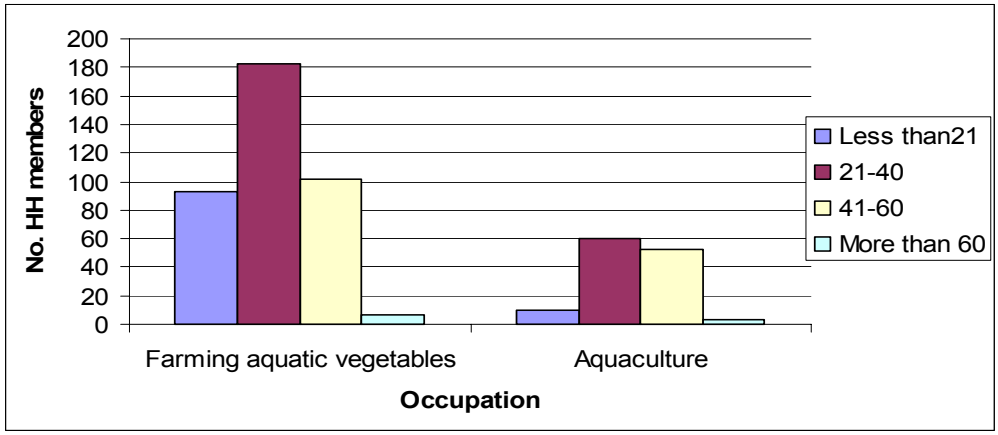
2.3. Labour used in production systems

Figure 2.3: Production Labour by gender



There is more chance for women to get involved in aquatic plant production rather than fish production as most of their work is associated with plant harvesting and selling. Fish production commanded more male labour for maintaining farm operations. However, male labourers were also subsequently needed to support activities in growing morning glory such as setting up pole and raft networks and spraying of pesticides.

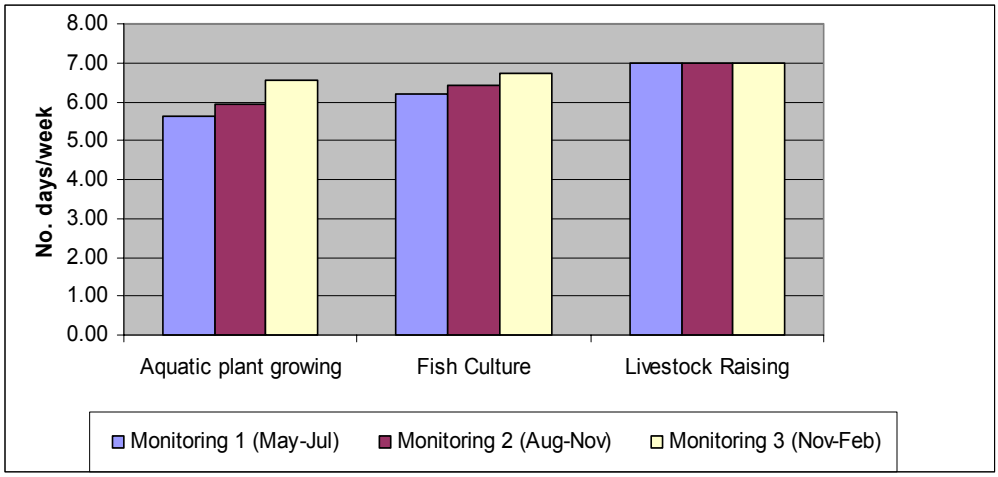
Figure 2.4: Production labour by age groups



Young adults were found to be mainly involved in morning glory production perhaps this job is more tolerant to young unskilled workers and as well as labourers less than 21 years old. Unlike fish production which demands more skilled workers with older ages.

Also considerably more HH members under the age of 21 were involved in aquatic plants cultivation compared to fish culture reflecting that quite often younger children are involved in helping with growing aquatic plants.

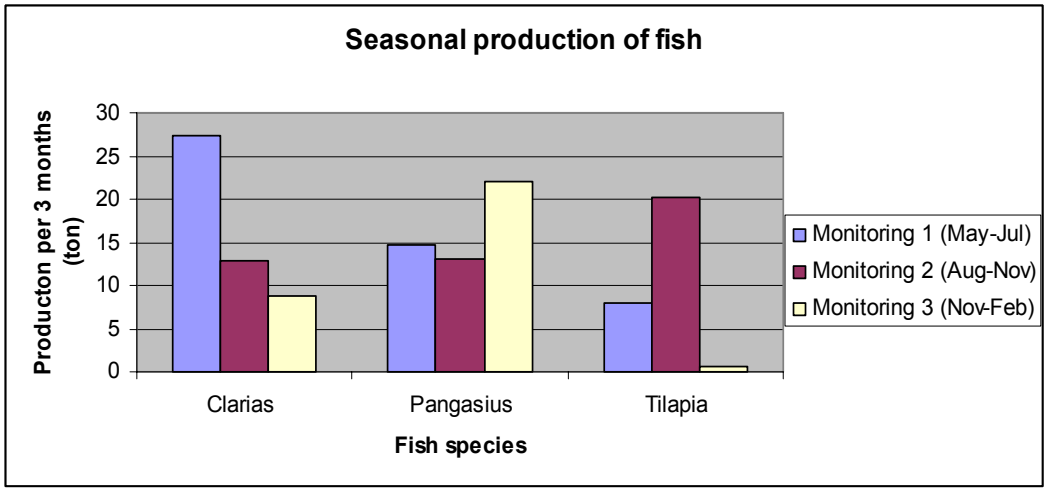
Figure 2.5: Seasonality of Production labour (working days/week) by production



For both aquatic plant and fish production, more labour was demanded in terms of working days per week in the 3rd monitoring survey from the end to the beginning of the year (Nov- Feb). During this period fish producers were likely to harvest their fish and start the new production cycle for which extra labour is needed for harvesting fish and preparing ponds for the next cycle.

2.4 Seasonal Production of Fish

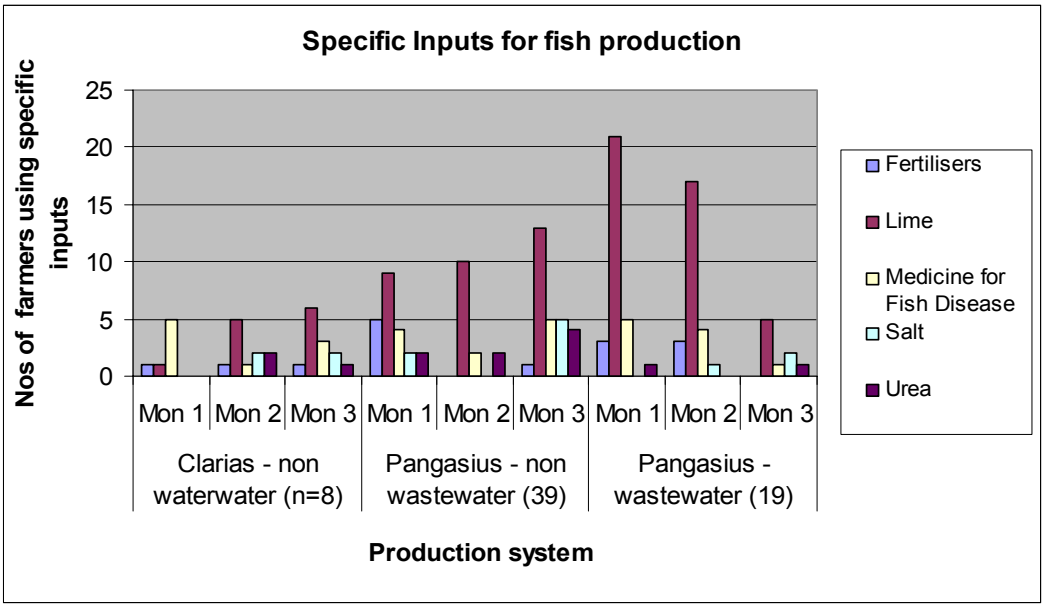
Figure 2.5: Seasonality of Fish Production



Clarias production seasonality was mainly based on the input intensification managed by producers as it needed only 3 months per crop. They tend to intensify their production in the season where other species were less produced perhaps in order to meet the market

demand in the appropriate period, unlike Pangasius where the production cycle is more fixed and they tend to harvest specifically at the beginning of year (Monitoring 3).

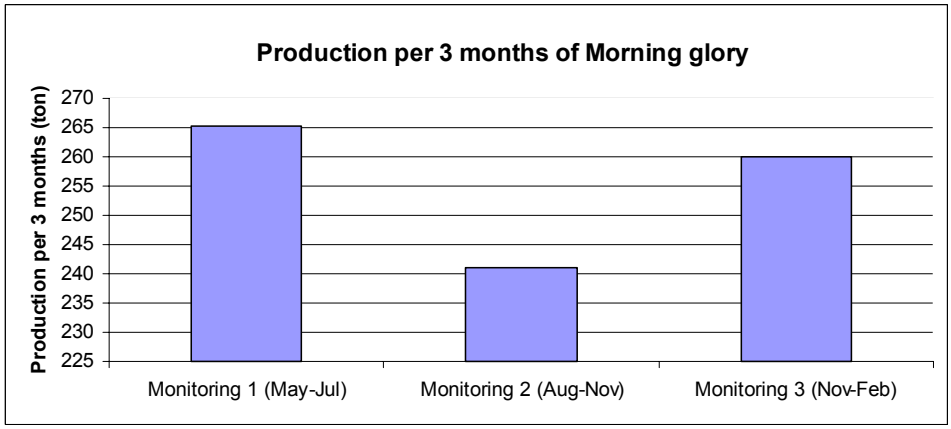
Figure 2.6: Seasonality of Fish Inputs



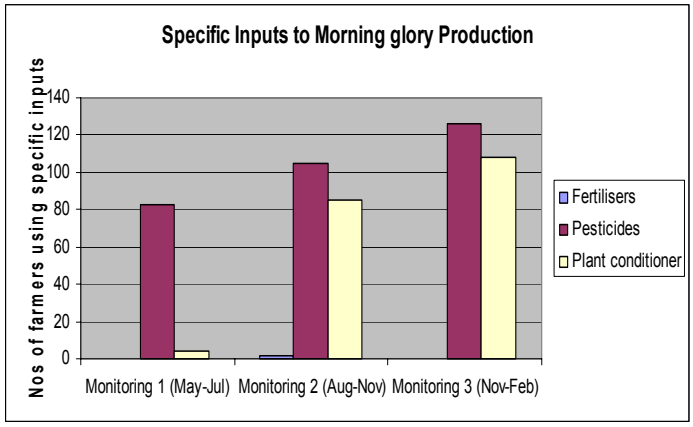
The seasonal production was found to have a very close relationship with seasonal inputs. The inputs were more intensified with fish pellets, protein adding to regular feeding of rice bran and trash fish for clarias production in Monitoring 1. Although pangasius culture used fish pellets but only in the fingerling stage. Pangasius producers tend to intensify inputs as mainly the trash fish for feeding during Mon 3 as they become close to the period of harvesting. However it is difficult to describe the production of pangasius in wastewater as their inputs were mainly based on canteen waste.

2.5 Seasonal production of Morning glory

Figure 2.7: Seasonality of morning glory production



The production of morning glory was very seasonal as it is associated with main factors including flooding level, rainfall, and pest intrusion and many other subsequent factors. Through the Monitoring surveys, it was found that the production is at its peak during Monitoring 1 (May–July) as it was the beginning of rainy season while more spaces in the lake as fed by initial flood were available for the increase of production. The contamination of wastewater subsided due to rain water discharged from the city which in turn increases the productivity of the aquatic plants. This also led to reduction of all chemical and pesticides used by farmers particularly the plant conditioners applied to the production systems.

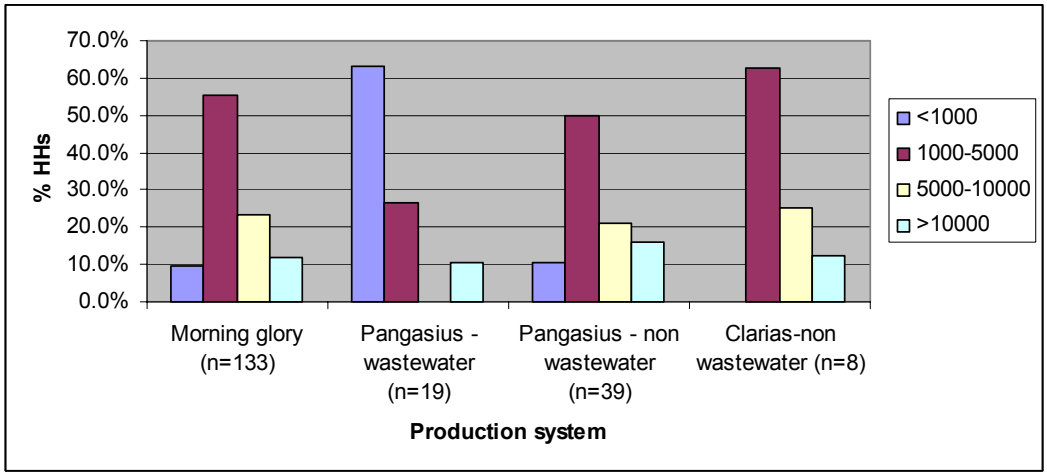


The extreme decline of morning glory production during Monitoring 2 (August – November) was the result of big floods brought in with wind, strong flow current and dominance of water hyacinth growth on the water surface. Almost half of the farmers stopped their morning glory production during this flooding period and some who were the immigrated labourers turned to work in their paddy farms in the provinces for the paddy field preparation.

Morning glory production climbed up again during Monitoring 3 (Nov-Feb) when more space became available. However during the period of Monitoring 2 and 3 the plants were more vulnerable to pests and hot weather, which can lead to a declined quality of the production as more pesticide and conditioner were becoming favourable with farmers. The production of plants declines more and more till the end of dry season which is in reality in May.

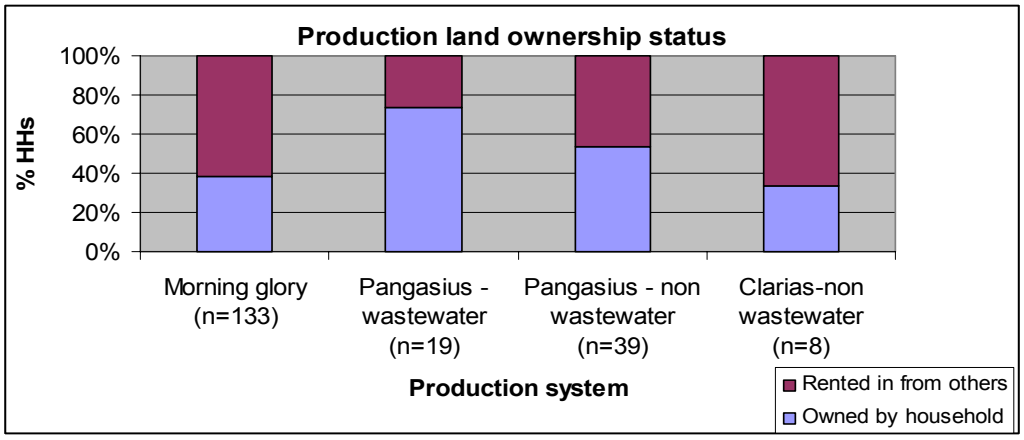
2.6 Production land (Access rights)

Figure 2.8: Land Areas for production



It seemed that the production land for morning glory and fish production in peri-urban areas of Phnom Penh were almost similar even a bit different. The production systems tend to occupy land of around 1000-5000 m^2 per household except pangasius production in waste water occupied a smaller area for production for pen culture under their houses on the fringe of the lake toward the centre of the city.

Figure 2.8: Production land ownership

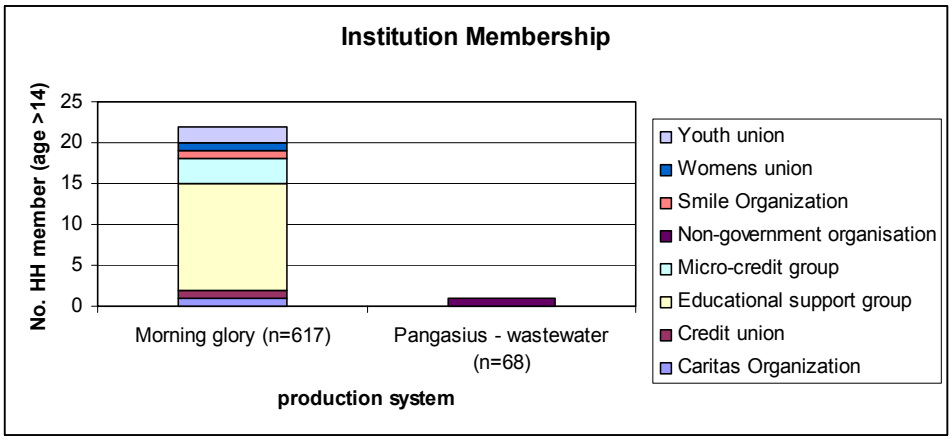


More than half of morning glory producers tend to rent in land for their production. This seemed to be reflected from their migration status which more than half of them migrated into the village for the production, however as mentioned in the previous section, the lands were not available to be owned during initiation of their production and now those lands increase in price so that they could hardly be afforded by those morning glory producers-urban poor. It was notably observed that fish producers around the city tend to increase their production area year by year and some of them tend to own the land for securing the existence of their production.

III. Institution and Policy

3.1 Institutional membership

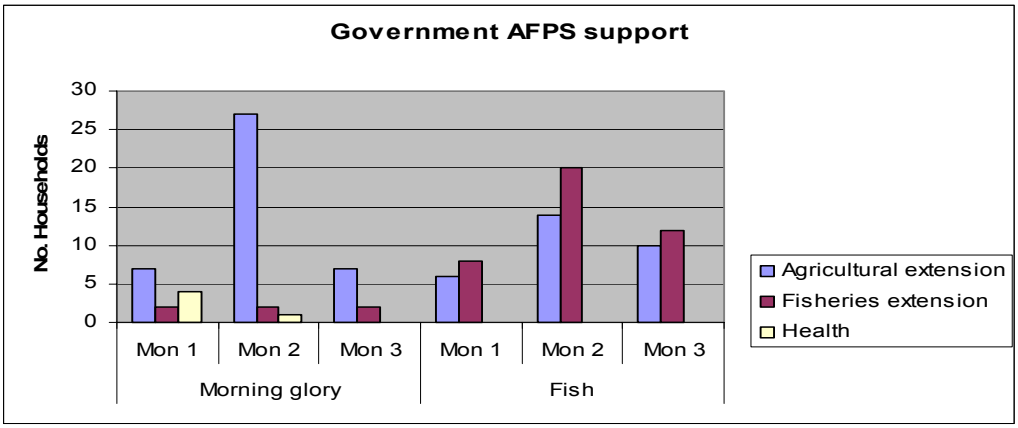
Figure 3.1: Institutional membership by production



The results indicated a quite limited involvement in institutions. Only 20 of 133 households producing morning glory were involved in institutions mainly the education support group, micro-credit, and youth union which these provided them the benefit in education support for their children and allowing them to get loans essentially for their production. Fish producers also were very limited in their institution membership as only a very few NGO's asked them to get involved in their technical research. This low involvement was likely to be associated with fear of sharing their information resulted from loss of trust between farmers and institutions working with them and frequently projects did not involve them in making decisions for their benefit.

3.2 Government AFPS support and AFPS training

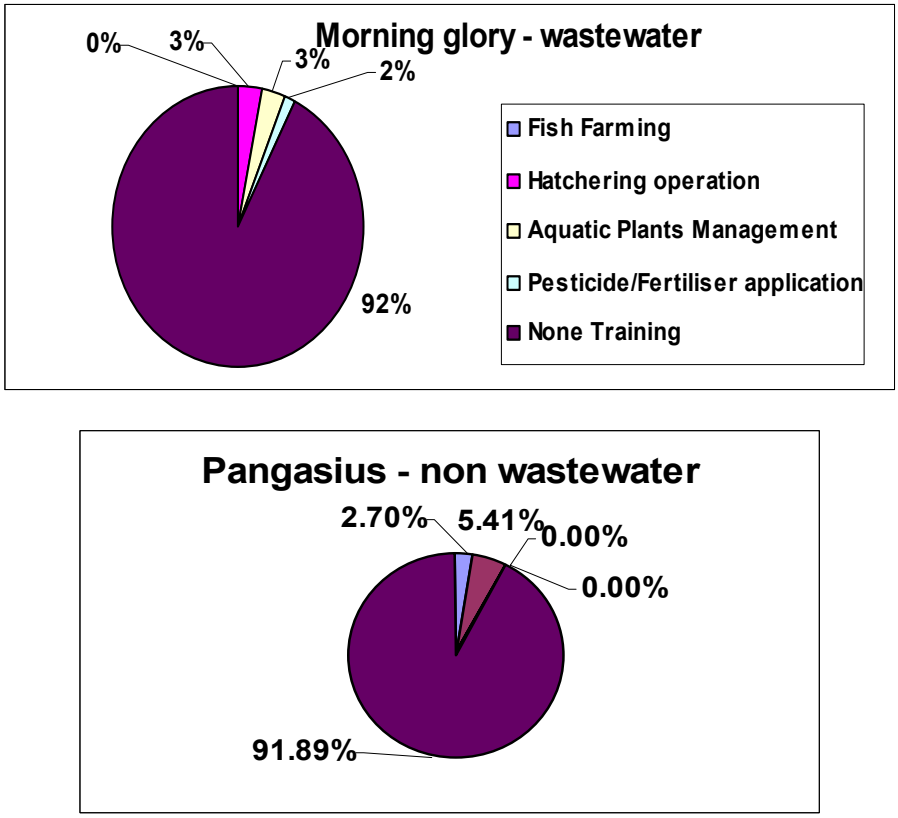
Figure 3.2: Government AFPS support



The result reflects the perception on peri-urban aquatic producers on the needed support from the government to improve their production system. Consequently with a certain trust, the majority of them did not wish for any action of support from the government,

however some of the Morning glory producers perceived that government should help their production with agriculture extension and health maintenance , while some fish producers need fisheries extension.

Figure 3.3: AFPS training



Amongst both morning glory and fish producers, few of them received Aquatic food production system training while most of them have learned their producing and management methods from relatives or neighbours.

Annex 2D: Partner 8: Kasetsart University
Initial Findings from Baseline and Monitoring Survey Analysis

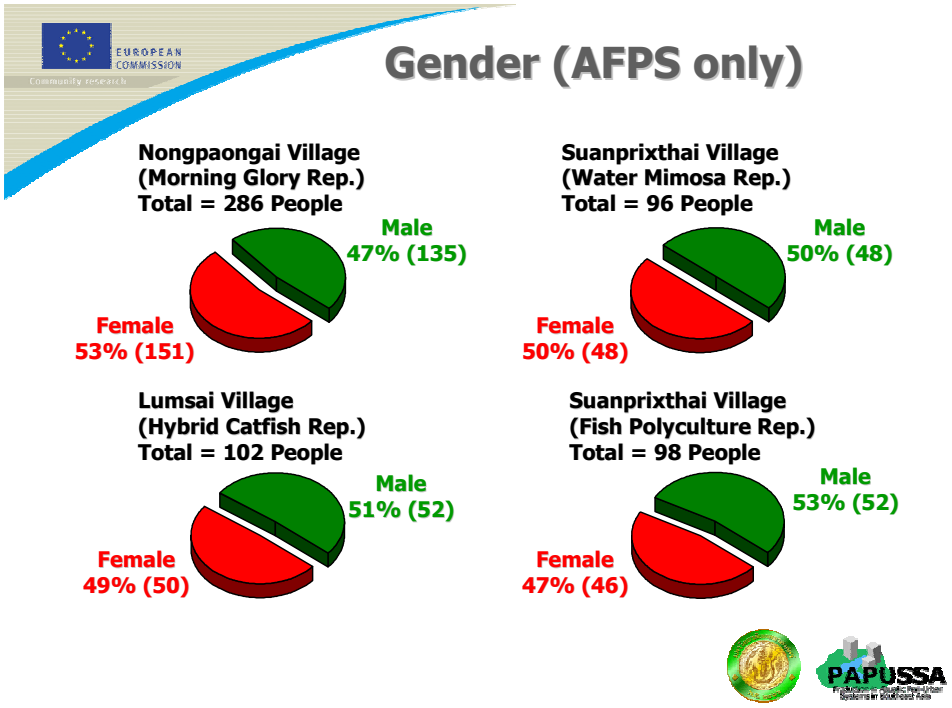


Figure 1 Gender status of all family members related aquatic food production systems in the three communities.

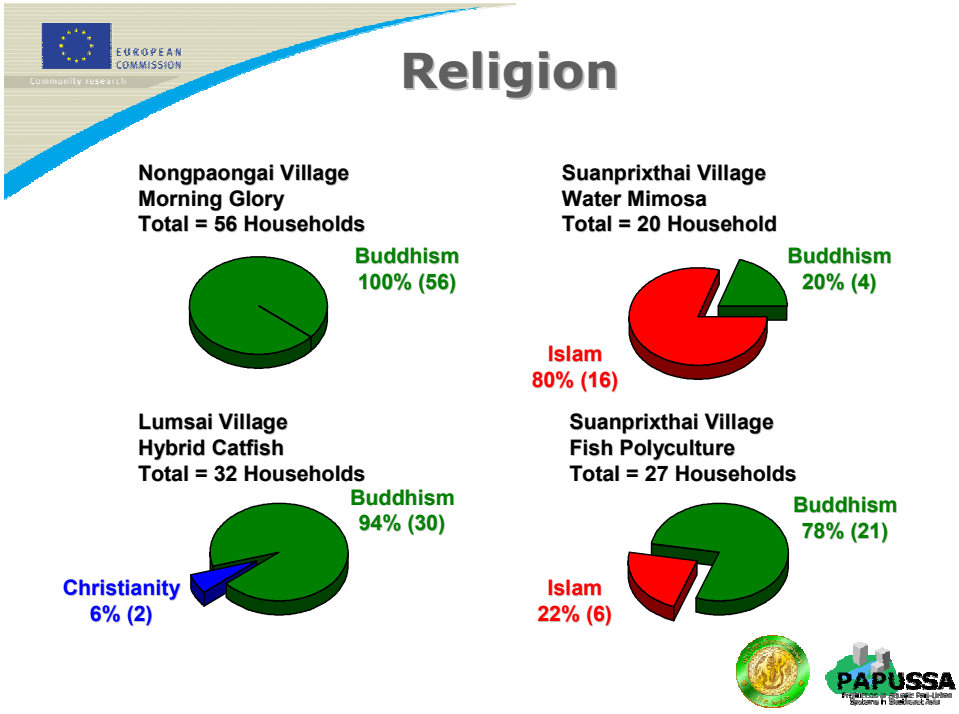


Figure 2 Religion of household head's based on all aquatic food production systems in the three communities.

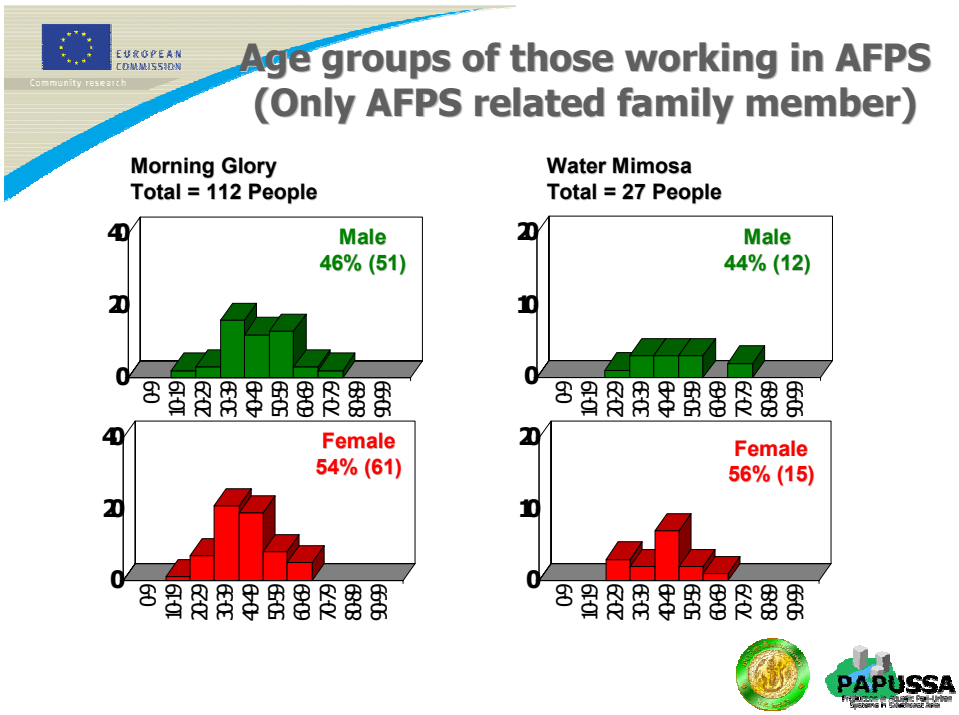


Figure 3 Age size class distribution of gender working in aquatic plants.

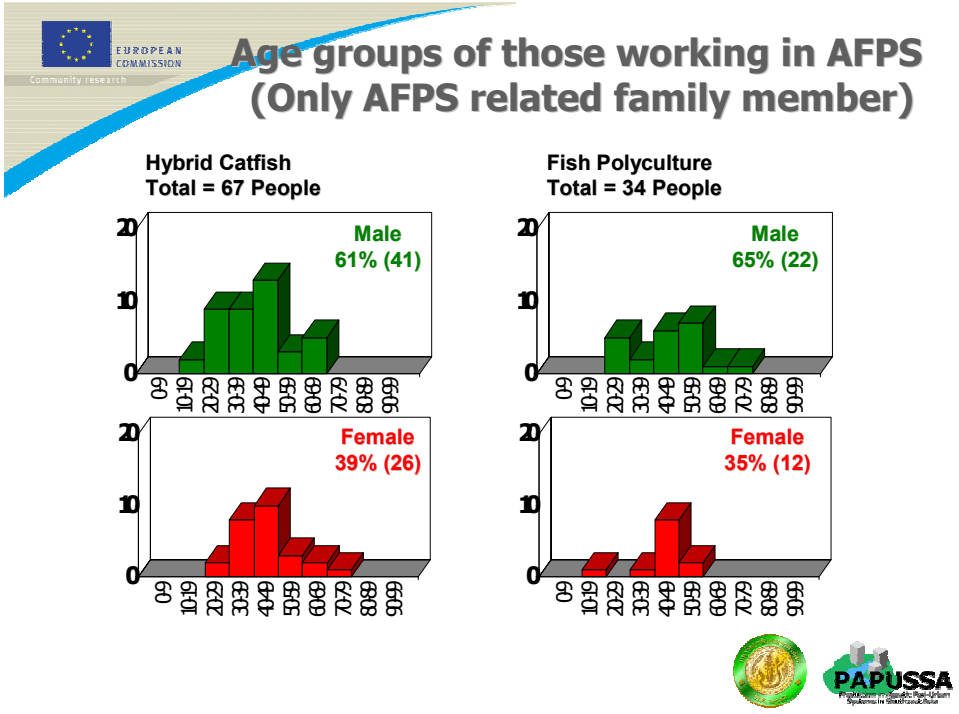


Figure 4 Age size class distribution of gender working in fish culture.

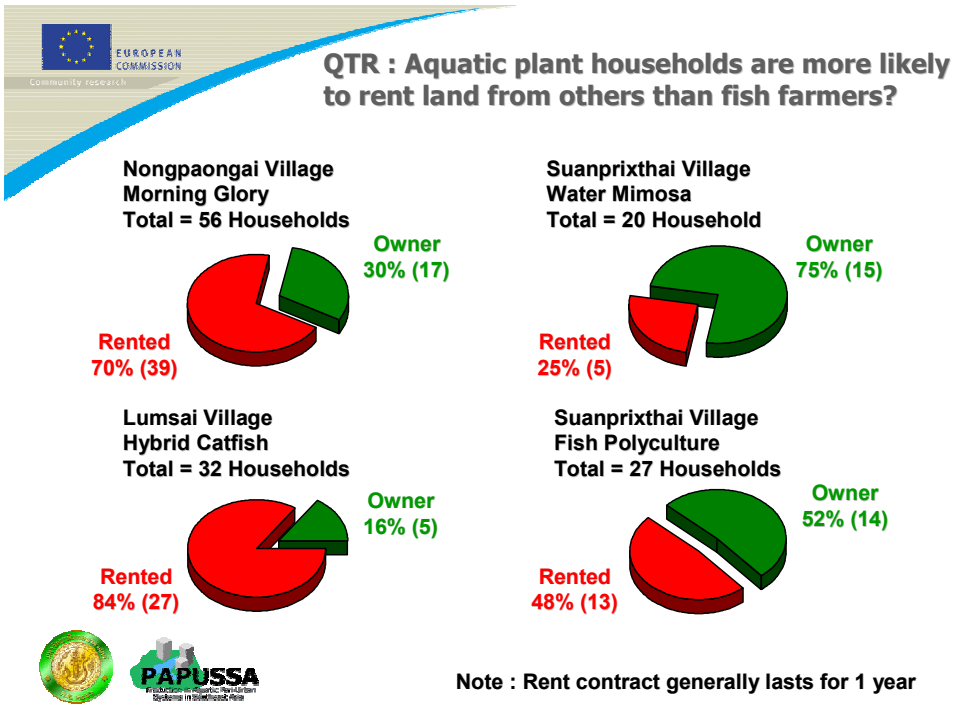


Figure 5 Land status of households related to aquatic food production systems in the three communities.

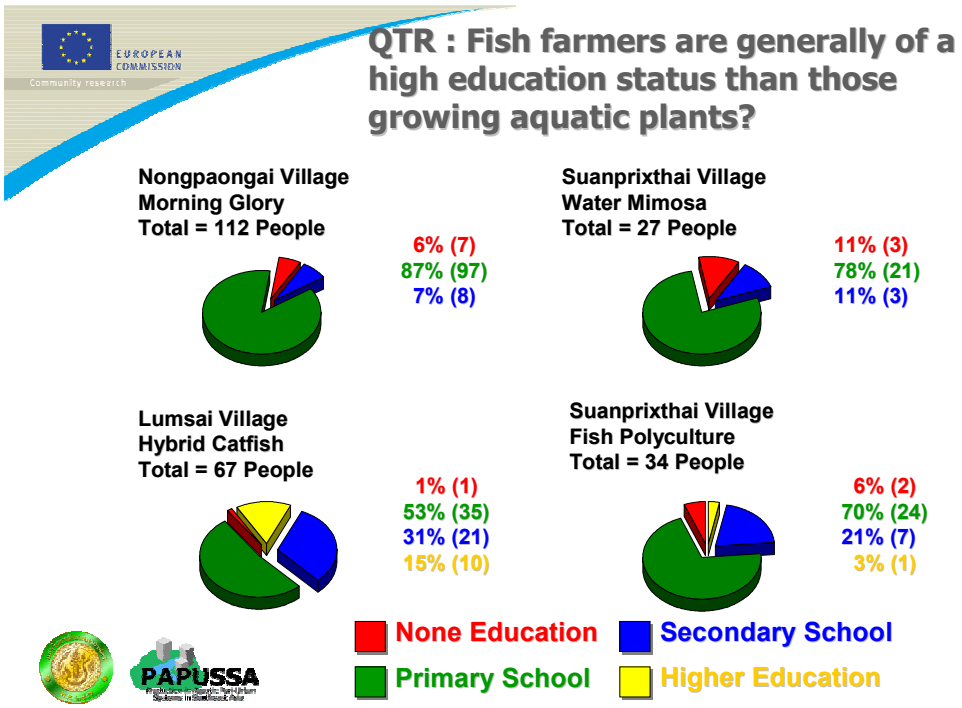


Figure 6 Education status of family members related to aquatic food production systems in the three communities.

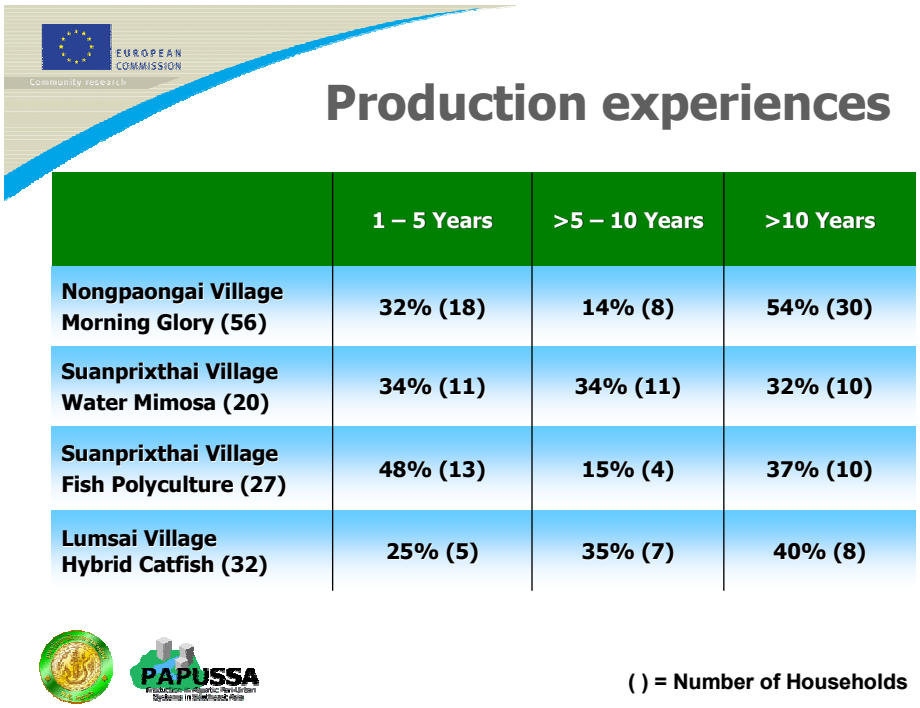


Figure 7 Production experiences of household head's related to aquatic food production systems in the three communities.

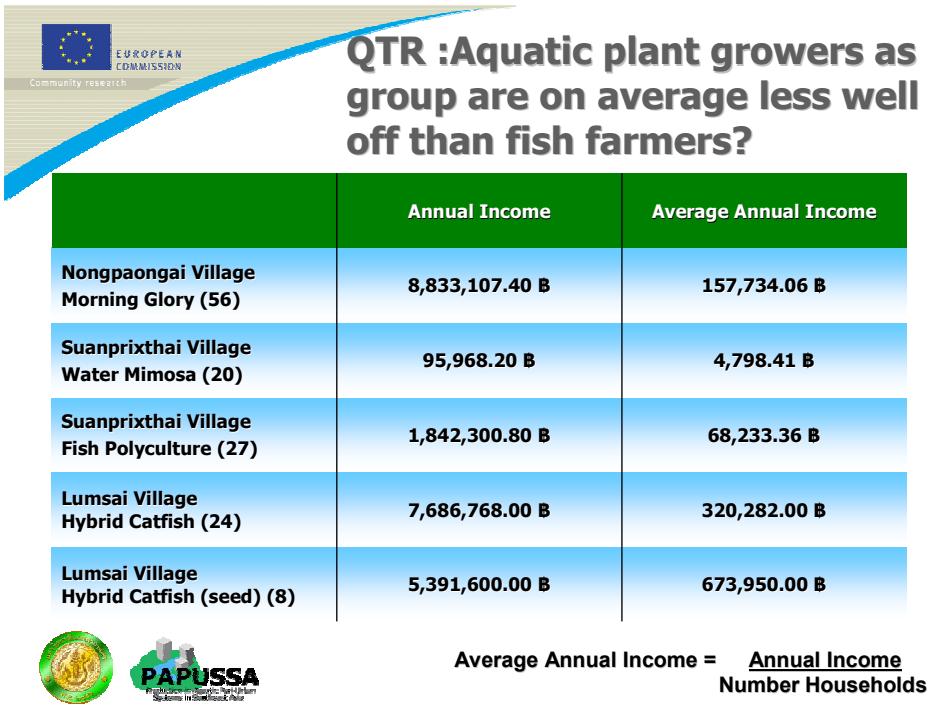


Figure 8 Annual income generated by households related to aquatic food production systems in the three communities.

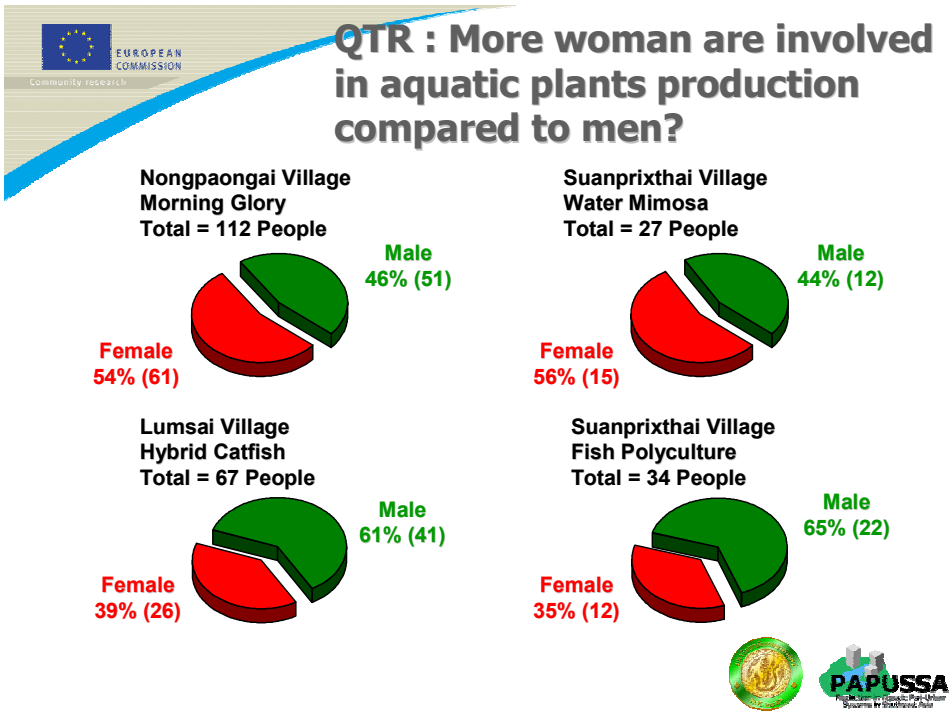


Figure 9 Gender status of family members related to aquatic food production systems in the three communities.

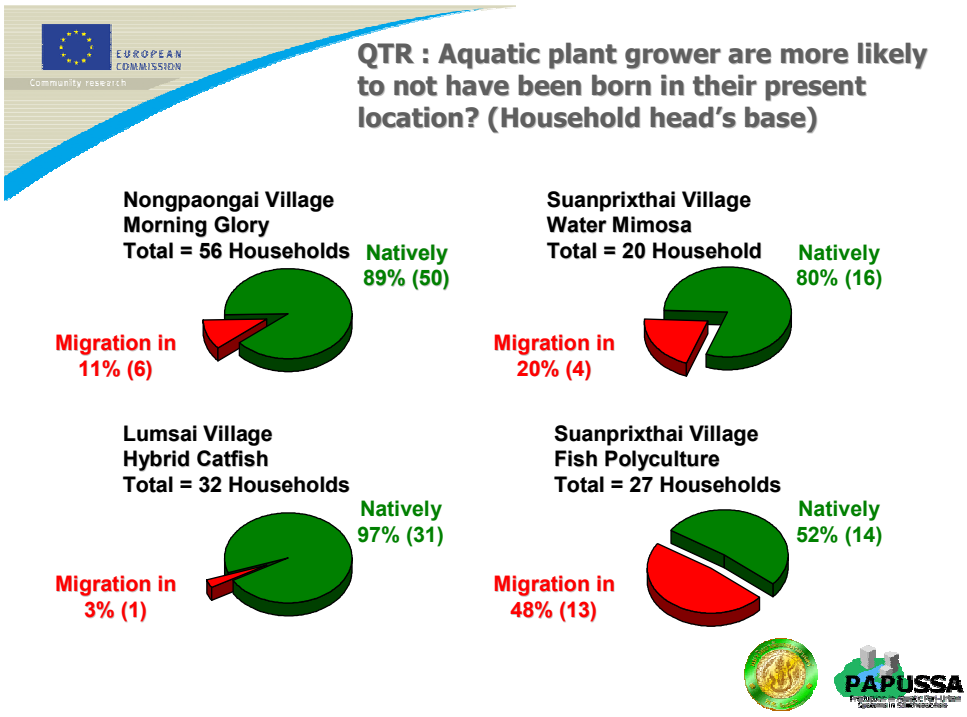


Figure 10 Migration status of household head's base related to aquatic food production systems in the three communities.

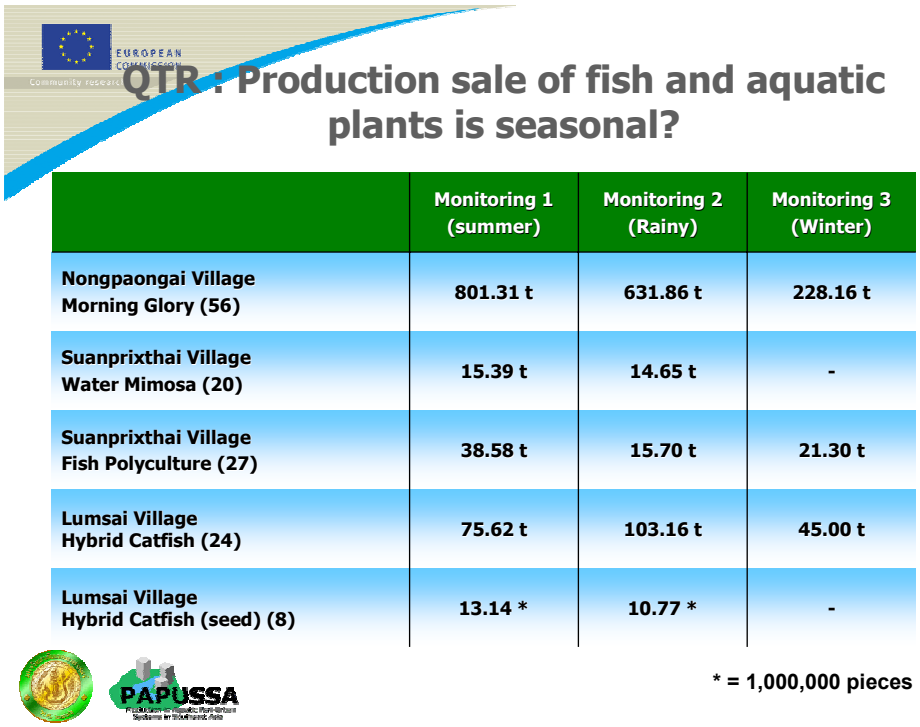


Figure 11 Seasonal variations of aquatic food production sold by the three communities.

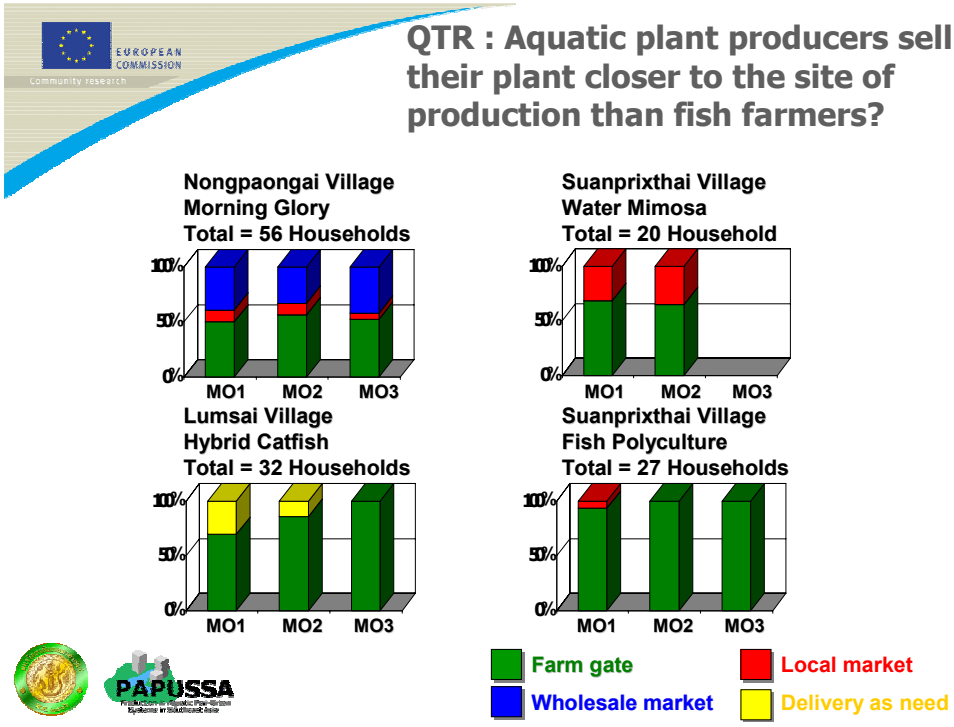


Figure 12 Seasonal variations of different market channels selling aquatic food products in the three communities.

A field visit to the relevant sites by Dr. David Little with his colleagues March 2005.

A field visit to one kind of mixed fruits and vegetable organic farming system located in Rangsit district, Patumthani province with AIT consultant colleagues (Professor Lin, Ms. Wanwisa and Mr. Albert Salamanca) in mid April, 2005.

Collection of water samples from hybrid catfish ponds by KU staff for nutrients analysis

On farm trial of organic morning glory cultivation for project intervention located at Nongpraongai sub-district, Nonthaburi province during August to November, 2005.

Participation of the principle investigator (Dr. Ruangvit Yoonpundh) in the policy Workshop Meeting on "Peri-Urban Aquatic Production and Improvement of the Livelihood of the Urban Poor in South-east Asia" in Dhaka Bangladesh, November, 22-23rd 2005.

Aquatic Food Production Systems in Bangkok

Around 10 million people now reside in densely populated communities in Bangkok. As a result, the demand for food has increased dramatically. Of the many varieties of fresh produce available, city consumers favour aquatic products such as water spinach, water mimosa and freshwater fish. These products are grown primarily in periurban areas around Bangkok.

Aquatic production systems, including farming of edible aquatic vegetables and fish, play an important role in the livelihoods of many urban dwellers employed as farmers and vendors. Production from inland aquaculture increased to around 280,000 metric tons in 2002, accounting for nearly 10% of total annual fish production in Thailand (Department of Fisheries, 2004). This generated an estimated income of nearly 10,000 million Baht (US$ 250 million) a year. Around 30% of this aquatic production is concentrated and produced intensively around Bangkok periurban areas. For example, in the northern part of Bangkok in particular, hybrid catfish (Figure 1) farms produce more than 70% of the country's total production of catfish (around 80,000 tons) and extensive water mimosa farming in public canals can be found in Pathumthani province. In Nontaburi province about 40 kilometres west of Bangkok, there are vast areas of intensive water spinach – commonly known as morning glory - farms (Figure 2). About 20 kilometres south of Bangkok, mixed tilapia and carp polyculture in large ponds and intensive water mimosa farming can be found. However, recent changes in water and land uses in periurban areas, made to accommodate rapid expansion of housing projects, industrial factories and construction of a new airport, have seriously impacted on some aquatic production communities. This development is leading to changes in their traditional way of life from agricultural communities into urban and industrialised districts and suburbs of the city.

Deterioration of the aquatic environment resulting from this development is an important factor directly affecting aquatic production systems. Although the 9th (2002-2006) National Economic and Social Development Plan (NESD) has put a priority on decentralisation, aiming to increase authority at community level in order to utilise local resources more effectively and sustainably. There are limitations in the readiness and capacity of these communities to implement these plans. Capacity building should include all stakeholders, e.g., farmers, extension officers, vendors and policy makers.

A recent State of the System (SOS) workshop held with a variety of stakeholders involved in urban aquatic production systems in and around Bangkok revealed the main problems faced by farmers. These included lack of land, high cost of investment and pollution from waste water effluents from communities, factories and village estates. These environmental problems were especialy severe during the dry season due to lack of dilution and drainage within the culture areas, as well as low personal responsibility towards the public environment. These problems may be an important motivation for farmers to increase the intensity of their farming activities and systems in order to increase yields. Intensive farming, particularly in aquatic vegetable cultivation, uses large amounts of chemical fertilisers and pesticides. However many of those who cultivate water spinach and water mimosa still lack sufficient knowledge and understanding of chemical uses due to their low educational backgrounds. Also the government extension service lacks the capacity to work directly with farmers and is continually being constrained by the relatively low level research base involved in aquatic vegetable production . In addition these problems are compounded by the lack of effective mechanisms for the dissemination of information on chemical toxicity and ineffective statutory regulations and monitoring of chemical uses in the field environment.

In terms of fish culture, periurban fish farms produce mostly common commercial species such as hybrid catfish, tilapia and carps, which are sold mostly fresh except for hybrid catfish, which are sold live to markets in Bangkok. Keen competition amongst producers keeps fish prices low resulting in fish farmers attempting to source low

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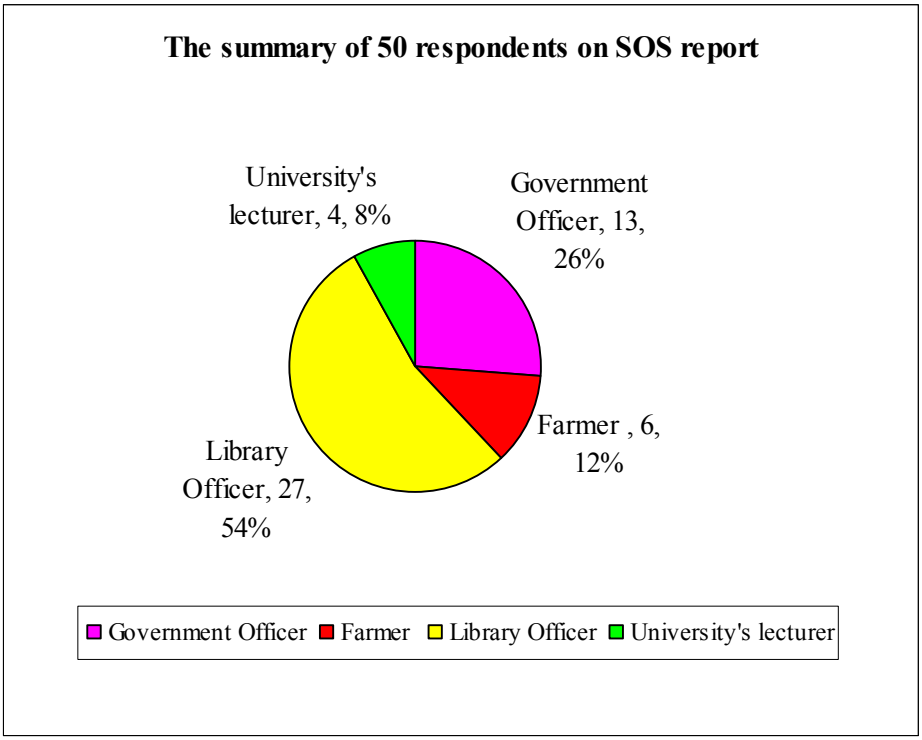
Morning Glory farming on the outskirts of Bangkok

A review of Aquatic Food Production Systems in Bangkok published in Urban Agriculture MAGAZINE No. 14, July 2005.

SOS Dissemination Reports

The SOS report was sent to the 53 participants of the State of the System workshop which including farmers, local Officers, marketing and the policy maker group. And more than 200 SOS reports and the dialogue on SOS report were sent to Library Office of all the Universities in Thailand, Government Offices especially related with agriculture and environment. Only 50 Feedbacks had been received since we had been distributed the SOS book by Jan, 2005 as shown the following pie chart.



Results

This report aims to analyze a feedback following the stakeholders' review on the SOS report and answer on the dialogue questionnaire base on their opinion of our project

Part A Contact data

1. *Do you agree that your contact data will be incorporated in the PAPUSSA and RUAF database?*

Most of the respondents (48 persons) were agreed to add their contact to the PAPUSSA and RUAF Database as calculated into 96 %. But only 2 persons (4%) who are the librarian were not agreed to give their contacts and personal data to be added in the PAPUSSA and RUAF database.

Table A1. The number of respondents agree to add their personal data to be added in the PAPUSSA or RUAF database

Answer	Number	%
Agree	48	96
No	2	4

2. *How do you prefer to receive future information?*

Table A2. How do the respondents want to get the future information?

Answer	Number	%
Internet	16	32
Hard-paper copy	4	8
Cd rom	12	24
All	2	4
Internet, hard-paper copy	1	2
Hard-paper copy, Cd rom	4	8
Internet and Cd rom	5	10
None	6	12
Total	50	100

32% of the respondents wanted to get more information on internet by E-mail and 24% wanted to receive a CD-Rom. Some respondents prefered internet and CD-Rom, internet and hard paper copy, and hard paper copy and CD-Rom with the total of 20%. Only 2 persons didn't want to get any further information. As a result, internet and CD-Rom seem to be the highest preferred choice among others.

3. *Would you like to give a copy of this?*

Table A3. Do the respondents want to give this SOS report to other people or organization?

Answer	Number	%
Yes	26	52
No	24	48

About 52% of the respondents would like to distribute this SOS report to their friends, colleagues and especially to send it to a library or send it to the department of agricultural in their universities.

Part B Contents

1. *Please indicate your impression of the contents?*

Table B1. Relevance of the report

Answer	Number	%
Relevance	45	90
No comment	5	10

Most of the respondents (90%), after reviewing the content of the report, agreed that the contents are relevant meanwhile only 10 % of them have no comment about the contents. Some suggestions from the respondents about the content were more in-depth details required in each part.

2. Credibility-is it believable?

Table B2. Credibility of this report

Answer	Number	%
Credibility	49	98
No	1	2

The credibility of the report has been indicted by 98% of all the respondents and only 2% still not sure about. This maybe because of this respondent has less knowledge background about the topic due to his/her different working experience.

3. Importance given to each section in the report?

Table B3 Importance given to each section in the report

Answer	Number	%
Yes	31	62
No	19	38

The results show that 62% of respondents, after reviewing through the report, confirm an importance of each section meanwhile 38% of respondents do not agreed. However, all respondents don't provide any suggestion on the content.

Part C Presentation

1. Design and Lay-Out

Table C1. Design and lay-out

Answer	Number	%
Yes	33	66
No	14	28
No comment	3	6

We found that 66 % of all the respondents liked the design and lay-out. On the other hand, 28 % report that they don't like it. The rest of respondents (6%) have no comments. **One suggestion from the respondent is that SOS report required better arrangement for its front cover and design**

2. Choice of Pictures

Table C2 Choice of Picture

Answer	Number	%
Yes	26	52
No	18	36
No comment	6	12

52 % of respondents agreed with the choice of pictures compared to 36% who disagreed. The comments included that **the SOS report is nice but however, it needs to add more pictures for demonstrating with a text and more details about community's activities.**

3. Use of 2 Languages

Table C3. The used of 2 languages

Answer	Number	%
Yes	22	44
No	2	4
No comment	26	52

Only 44% reported that they liked it compared to 4% who didn't. However, most of the respondents (52%) did not answer this question. Among the respondents, we got a comment about the spelling in English translation. The correction on English name of some communities is an example. Most of them have no problem to have 2 languages used in the report. **One comment was that 2 languages (Thai and English) should be an exact translation and located within the same page**.

Suggestions for Part C Presentation;

Respondents think that this report needs more in-depth details to be more understanding and useful. Some comments were about some confusion caused by the different name of SOS report and name of the questionnaire**, a reference and index required and a recommendation of project website for outsiders**.

Meanwhile, some positive comments such as very useful information, good source as a reference, completion on every part and concise and easy to understand, are reported.

Part D Your view on the situation as described in the SOS report

1. *Does the report adequately fill your information needs on the subject? Please clarify in detail what information is missing in your view.*

Table D1. Shows the view on the situation of the information on SOS report

This report fill your information need on the subject	Number	%
Yes	48	96
Not quite	2	4
Compliment the SOS report as a good source of agriculture information	9	18
Please clarify in detail what information is missing in your view.	20	40

Most of respondents (48%) were agreed that this report provided good information needed on the subject. Only 4% reported that they are not quite sure. We found that 9% reported that this report was a good source of agricultural information and could be used as their reference in the future.

Suggestion on what information is missing in your view.

They suggested that more in-depth data required in each section as follows:

- No detail about the production system of aquatic plants. Should add both activities of the fish and aquatic plant production systems as topics
- Lack of details about the chemical residues
- Should present action plan for the project in the next report for updating
- Should relate a size of the study area to be compared with a size of the whole city and calculate how many % of an aquatic plant systems of that city
- Should present an aquatic plant and fish production system in the rural area also
- No Table of Contents and Reference
- Lack of details about income of each community
- No suggestions/solutions for the problems faced
- Lack of the details of illness from the chemicals.
- Should add more details about how to increase value-added on for production
- The effects of the environment degradation on the livelihoods of a farmer
- Quality of aquatic plants and contamination of each chemical used

2. *Are the selected study sites representative for Bangkok?*

Table D2. Are there study sites representative of Bangkok?

Answer	Number	%
Well selected	30	60
Not quite	5	10
I have no specific knowledge of the city described	10	20
No comment	5	10

Most of the respondents (60%) were agreed with the selection of the study sites as a good representation of aquatic production systems in Bangkok. 10% thought that the study site was not quite a good representative. 20% had no specific knowledge of the city described meanwhile 10% of the respondents had no comment due to their lack of experience in this activity or their personal interests on the topic.

Suggestions for other study sites regarding aquaculture in and around Bangkok

We had no data about the suggestion for the other study sites regarding AFPS in and around Bangkok It may be possible that most of the respondents have not seriously dealt with the AFPS communities in and around Bangkok.

3. *Is the information in the "Problem faced by stakeholders" section useful/ relevant for your field?*
...Yes, Because
...No, Because

Table D3. The "Problem faced by stakeholders" section useful/ relevant for your field

Answer	Number	%
Yes	38	76
No	8	16
No comment	4	8

76% of respondents think this problem faced by stakeholders were useful and relevant for their work especially agricultural government officers, lecturers in the university and librarians. All of them found that they were happy to know more about AFPS information as they could also keep as reference in the library or it would be a preliminary data for other researchers. Farmers were also grateful with the report because their communities had been shown to the outsider to know about their activities and they were happy that their communities became popular to others.

4. *What other problems not mentioned in the report are you aware of?*

There were some problems that we did not mention in the SOS report but it's aware of by the respondents as follows;

- Detail of the production system
- Price and marketing system
- Unclear objective
- Try to explain clearly about the topic and the content of what the project going to do
- The content doesn't match with the introduction
- Why do you want to study aquatic fish and plant in Bangkok?
- Should tell the size of wetland in the city and what is the potential of agriculture land

5. *Is the purpose of research and action agenda useful/ relevant for your work?*
Yes, because
No, because

(See further Section E; Recommended interventions)

Table D5 Is the purpose of research and action agenda useful/ relevant for your work?

Answer	Number	%
Yes	36	72
No	7	14
No comment	7	14

There were 72% of respondents that agreed on the purpose of research and action agenda being useful and relevant to their work. Only 14% reported that it was not, meanwhile 14% had no comment on this issue.

Most of the respondents who thought that this research and action agenda was useful and relevant with their work because they could use this issue as their reference to teach their students or to resolve some problems of farmers in a community as a local agricultural officer. Most of the respondents said at least they had gained more knowledge about AFPS which was valuable in their daily life.

6 Interesting/ good section or section to be improved is?
Table D6 Interesting/ good section or section to be improved is?

Answer	Number	%
Problems faced by stakeholders	3	6
Research and Action Agenda	3	6
Marketing	4	8
Marketing and the Institutions	5	10
Introduction	1	2
Every part is good	3	6
Picture	1	2
Picture and marketing	1	2
Study sites	1	2
Overview about the production and communities	4	8
Historical timeline/ Marketing/ Problems faced by stakeholder	1	2
No comment	23	46

10% of respondents were interested in Marketing and the Institutions, 8% were interested in marketing and the overview about the production and communities, 6% thought that Problems faced by stakeholders, research and action agenda and all parts were good. Some sections that the respondents liked were introduction, pictures, study site and historical timeline. However, there was still high percentage of respondents that had no comment on the issue.

Why? Did you like that section?

Many suggestions and reasons why they liked the section in the SOS report,
especially those who interested in marketing, had been reported because they felt interested on the marketing process, marketing channel and could be used for the marketing management in the future.

Some people liked the 'Problems faced by stakeholders' section because they would know what were the grass root problems which they may be able to find some solutions in the future. It can also be used as part of their own future research.

Part E Recommended interventions (Research and Action agenda)

***** Based on your experience, what future research or action interventions you would suggest (<u>in addition</u> to those mentioned in the SOS report) for each of the following categories (please indicate specific examples):*

☐ *Wastewater-related interventions*

Table E1 Wastewater-related interventions

Suggestion	Number	%
Have a wastewater treatment system in the village, factory and community	5	10
Make a campaign promoting the dangers of waste water to the people such as don't throw the garbage into canal, don't use chemicals in the water	6	12
Government responsibility; control by law, having enough officers to make an intervention at the communities level	10	20
Communities responsibly ex. sub-district administration office	7	14
No answer	22	44

Most of the respondents (66%) gave answers and suggestions on how to solve the waste water problem but still 44% of the respondents had no answer.

20% of the respondents thought that this issue should be the responsibility of the government. These included controlling the water used and water treatment by using law and sending govt officers to implement and giving more knowledge about the dangerous nature of waste water.

Public health and food safety aspects

Table E2 Recommended interventions on public health and food safety aspects

Suggestion	Number	%
Very careful with food such as making sure your eat clean vegetables, buy organic production	6	12
Government support such as to implement about public health, food safety and concern about the chemical residues issue and introduce an organic way to produce the agricultural product in the country (Also find the market)	20	40
Others	2	4
No answer	22	44

The respondents suggested that the government should be the main party supporting and implementing any law & regulations about a public health issue. These included a promotion on food safety issue, being realistic with law and regulation uses to control the chemical uses in agricultural sectors and also promoting organic farming to farmers and consumers. But some respondents, especially farmers (12%), said that the better way to intervene on the public health was to take care of ourselves by being aware of what you eat (e.g., selecting a good and clean product, eating cooked food and buying an organic production). However 44% of all the respondents didn't answer the question.

Infrastructure interventions

Table E3 Infrastructure interventions

Suggestion	Number	%
New product in the future should stop or reduced the chemical or pesticide use	3	6
Government responding to promote food safety, provide a basic infrastructure, working closely with the local officer to implement and give new knowledge to the people	19	38
Others; Get the knowledge from Online information/ training/ motivation	2	4
No answer	26	52

Market interventions

Table E4 Market interventions

Suggestion	Number	%
This issue might be useful for the farmer, government officers and every reader for ex. Marketing channel, gender status in the market	8	16
Have no specific field with this issues others	9	18
Others	2	4
No answer	31	62

The summary of the respondents to this question was that 62% of all respondents had no response to the question. 18% of all respondents had no idea about marketing part and 16% thought that this issue might be useful for the farmer and they had gained new knowledge from this topic (e.g., market channels, gender status in the market). A few people thought differently about this market intervention. For example, a market sector always gained an advantage and the in-depth study in some section was required.

Introduction of new production systems and technologies

Table E5 Introduction of new production systems and technologies

Suggestion	Number	%
Reduced the chemical use or introduce organic culture to the farmer	2	4
Technology transfer by the government officer or experts from private sector help together to give new techniques or arrange the workshop/ demonstrate farm for the people who are interested	12	24
Introduce new knowledge about Cleaning and GMO	1	2
Let's the farmer think it themselves and work on their own	1	2
Build strong communities	1	2
Let's the farmer think it themselves and work on they own	1	2
No answer	32	64

Others (please add)

Only a few people gave some suggestions on this issue as shown below;

- Studying more on water quality and soil quality, the effect of fish and aquatic plants, and technology transfer in the freshwater fish culture
- Arranging a workshop (providing the knowledge of food safety) tour in different areas to reach a target of producers and consumers.
- The communities need to work together to gain more power
- Collecting more data of water quality and chemical contamination
- Evaluating and monitoring a development in the communities
- Taking care of environment and reducing the chemicals used
- Having a wastewater system in a aquaculture section

- Promoting to the communities about awareness of chemical contamination and waste water to the public
- Promoting soft shell turtle and fish culture and food safety and promoting a food for life in the peri-urban area
- Arranging a meeting or work shop for exchanging knowledge between the organizations

** What special activities, projects or programmes are you already developing that are in line with the proposed research and action agenda and could be of relevance for Bangkok?*

- Getting the primary data from the farmer is more useful for the project
- Biology system in Mangrove area
- Agricultural sector
- Research plan can be very useful for the future research
- Department Pollution Control department
- Department of Fisheries is doing a similar thing
- Arranging the workshop in the site study
- Working through the Sub-district administration Office/Communities leader/ and farmer groups
- Working with the local agriculture officer

** Are you aware of any other research projects or practical experiences in other cities which would be of interest and relevant for us?*

We had not received an answer for this topic. It may be possible that the respondent had no specific knowledge about AFPS before. This can be shown that our PAPUSSA project was quite new for the Thai stakeholder.

** Final suggestions, comments or ideas:*

- It's a good report but should be more concerned about who was the target reader and adjusted the content base on the reader
- Thank you to concern about our occupation
- The content is short and easy to understand
- Should clarify the problem and have the solution plan
- The purpose of this questionnaire on SOS report is unclear that you want to present as a magazine news or research result.
- Should have more details about Environment concerns (e.g., water quality, soil bottom quality and waste water)
- Lack of details in term of sciences
- Good report and should have regularly
- Easy to understand for the grass roots people (e.g., farmers)
- The topic of this research talking about a production system but doesn't have a production system detail in the report
- Should study more to know problem and find out the solutions.
- Very good

Appendix: Lists of the respondent on the SOS report questionnaire.

Num		Name of respondent	Occupations
1	Mrs.	Amara Kaerod	Librarian
2	Mrs.	Arpapan Kunkoi	Local government officer
3	Mr.	Arun Kumvan	Local government officer
4	Mrs.	Artima Sripakdee	Librarian
5	Mr.	Chalom Pethnumnuen	Librarian
6	Mrs.	Chaveewan Panchee	Director of library Office
7	Mr.	Doarat Tanrat	Librarian
8	Mr.	Ismain Mahamad	Mimosa's farming
9	Ms.	Jutarat Sothronjit	Librarian
10	Dr.	Jiraprapa Ra-oongkrum	Vice director of Au library office
11	Mrs.	Jirapa Jomtaisong	Agriculture officer
12	Ms.	Jaadee Pongmaneerat	Director of Inland Fisheries Research and Development Bureau
13	Mrs.	Kanlaya Mohamad	Mimosa's farming
14	Associate Professor.	Kittipong Mano	Director of the center library
15	Mr.	Manit Tatreemontreechai	Director of the library Office
16	Associate Dr.	Narong Chimparee	Director of the center library
17	Mrs.	Onsurang Somphee	Librarian
18	Mrs.	Paijit Keadyu	Librarian
19	Ms.	Panni Suppanimith	Director of development and Information Office
20	Mrs.	Papaporn Huchum	Librarian
21	Mrs.	Patchara Chiawnawin	Farmer
22	Mrs.	Pavinee Na Saiburi	Government officer
23	Mr.	Pimol Meksawat	Librarian
24	Dr.	Piya Chaleamkien	Director of Research and information transfer center of Thailand
25	Mrs.	Pongjan Chunhawan	head of the library Office
26	Mr.	Pongsak Sangklapinyo	Director of library Office
27	Mrs.	Ratchanee Srisakda	Director of library office
28	Associate Dr.	Rungsan Pitipanya	Director of the center library of Kasetsart University
29	Dr.	Samorn Pornchaichoowong	Suranaree University of Technology
30	Ms.	Sasithon Yaileard	Librarian

31	Mrs.	Sirirat Namjan	Librarian
32	Mrs.	Sittichai Hatachot	Lecturer
33	Mr.	Somkid Didsathaporn	The specialist of plant disease
34	Mr.	Somnueak Pethin	Administer officer of Tambon Lumsai
35	Mr.	Sompong Maisuporn	Local government officer
36	Mr.	Somporn Iamsaard	Local government officer
37	Mr.	Suchat Tangjundang	Farmer
38	Mrs.	Sukanya Yusabai	Fish farmer
39	Associate Professor.	Somkid Duanjak	Lecturer
40	Mrs.	Sunee Tangpinta	Head of agricultural Wastewater Management
41	Mr.	Suppachai Tangjaitong	Vice President
42	Mrs.	Supranee Chandratat na Ayudhaya	Director, Specific Areas Agricultural Development
43	Mr.	Supap Kienruang	Librarian
44	Mrs.	Supatta Lakchan	Librarian
45	Mr.	Suporn Suntronnon	Director of library office
46	Mr.	Suton Supawong	Librarian
47	Mr.	Tawan Chookajohn	former DOF officer
48	Mrs.	Vadsana Pongpan	Government office
49	Mr.	Veerasak	Lecturer
50	Mr.	Vorranon Somraparlom	Fish farmer