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TITLE : PRODUCTION IN AQUATIC PERI-URBAN SYSTEMS IN SOUTHEAST ASIA

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LIST OF ACRONYMS

AIT	Asian Institute of Technology, Bangkok
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
EC	European Commission
ETC	ETC Foundation, Developmental NGO Netherlands
HH	Household
KU	Kasetsart University, Bangkok
KVL	The Royal Veterinary and Agricultural University, Copenhagen
NGO	Non Government Organisation
NIHE	National Institute of Health and Epidemiology, Hanoi
RUA	Royal University of Agriculture, Phnom Penh
RIA1	Research Institute of Aquaculture Nos 1, Hanoi
SOS	State of the System
UAF	University of Agriculture and Forestry, HCMC
UoD	University of Durham
UoS	University of Stirling
VAC	"Vuon, ao, chuong "meaning garden, pond, livestock pen

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Annexes provided in separate document.

SECOND ANNUAL REPORT

Prepared by the project co-ordinators:

PARTNER 1: UNIVERSITY OF STIRLING, STIRLING, SCOTLAND, UK

Personnel Involved in the Project

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Dr Francis Murray	Research Assistant

1.0 SUMMARY

The second year of the Papussa project saw the partners build on the individual findings of the first years Work Packages (WP) from each of the four study cities with a co-ordinated methodology and approach.

Our initial objective for WP1 in the first year of the project was to undertake a multidisciplinary situation appraisal of Peri-urban Aquatic Food Production Systems (PUAFPS) in four cities in three SE Asian countries. This was successfully achieved by carrying out and completing a three tiered methodology of: Market (1) and Institutional (2) Analyses in each of the four cities, and also participatory community appraisals (3) in a total of 16 indicative peri-urban communities (four in each city) which were involved in different types of either fish or aquatic plants cultivation.
The findings and results from these activities were developed into a series of output reports for each city:

Markets Analysis Report
Institutional Analysis Report
Participatory Community Appraisal Reports (x 4)

These reports are currently available on the Papussa Project website www.ruaf.org/papussa

Towards the end of the year in November the findings from these reports were presented back to a wide range of representative stakeholders at State of the Systems (SOS) Workshops. These were held in each of the four cities in order to validate our findings, collect any further information or recommendations, produce four bi-lingual SOS reports (available on the web-site), and finally begin a process of engagement, dissemination and dialogue (Work Package 8)

with and between a range of the different categories of stakeholders. These SOS workshops were followed by our first annual Progress and Planning (P and P) meeting in Ha Noi in December where we developed and set our overall project workplan for WP2, 3, and 4 in year two based on our findings and outputs from year 1.

The workplan for the three WP's in year 2:-

WP2	Public Health and Hygiene Monitoring
WP3	Production Systems and Livelihoods Monitoring
WP4	Social Policy and Institutional Monitoring

was formulated by integrating the 4 cities, and the three work packages into a joint methodological approach. This was achieved initially in the beginning of the year with a workshop in Bangkok with contributions and inputs from all of the partners in designing and developing standardised household baseline and monitoring questionnaire surveys each containing comprehensive sections relating to the three afore-mentioned WP's above. Once completed and agreed upon, these questionnaires were translated into local languages and then used in each city to survey 200 households in previously chosen communities which were involved in the cultivation of fish or aquatic plants.

Following piloting the questionnaires in the field in March - April 2004 the baseline and first monitoring questionnaires were carried out (April-June) with a total of 200 households from up to 4 communities in each of the 4 cities which had been selected as being indicative of those with peri-urban aquatic food production systems.

A standardised, joint Access database was designed and developed with the collaboration of the Stirling and Durham partners which could then be used by all 4 city partners for data entry from their own baseline and monitoring questionnaire surveys. The monitoring questionnaire survey was set up to cover seasonal changes in the activities and livelihoods of households and the second monitoring survey was carried out between August – October. The health related section in the baseline and monitoring survey questionnaires was further developed with a more detailed health/skin disease survey which was undertaken in Phnom Penh with collaboration from KVL Copenhagen, the National Institute of Health and Epidemiology (NIHE) Hanoi and the Royal University of Agriculture Phnom Penh.

Findings from the first years work in the Papussa project were presented at a special peri-urban aquatic systems session at the 7th Asian Fisheries Forum held in Penang in December. This was followed by the project holding its second annual Progress and Planning meeting, also in Penang, in order for each of the 4 city partners to present the initial findings from their household baseline survey analysis, and then to go on and develop a workplan for Year 3's activities.

Summary of findings from first two years of the project

Our initial overview from the first two years brought up the following findings and recommendations:

- There are a wide diversity of aquatic production systems producing fish and aquatic plants, often using the cities waste water in the peri-urban areas of our four study cities.
- These systems provide major incomes and employment and are an integral part of the livelihoods of certain peri-urban communities.
- They also supply the increasing number of urban consumers with almost 100% of their daily needs of edible aquatic plants, of which morning glory is by far the most cultivated and is a daily constituent of most urban dwellers diets.
- Consumption of peri-urban cultured fish within the cities is much less significant often due to consumers perceptions of the fish being grown in waste water, however it is an important source of food for lower income households.
- Institutional involvement and responsibility in the monitoring, management and at the future policy and planning level for peri-urban aquatic production systems is unclear particularly for the cultivation of aquatic plants.
- As urban populations continue to grow the increasing volumes of waste water produced are a valuable resource and source of nutrients for the production of fish and aquatic plants. However increasing pollution from urban industrial waste effluents is a major constraint towards the continued sustainability of these aquatic production systems.
- Skin disease is the commonest occupational health problem for those growing fish and aquatic plants in waste water.
- Our initial health/food safety studies on the most commonly produced (in waste water) and consumed aquatic plant, morning glory, in Phnom Penh, Cambodia indicate levels of toxic metals in plant tissue are well below WHO guidelines for safety for human consumption.
- The definition and geographical location of peri-urban areas is in a constant state of dynamic change. Comparing the overall trajectories and drivers of change for our four study cities, from Bangkok as the most developed to Phnom Penh as the least, aquatic production of fish and aquatic plants has translocated to districts or in the case of Bangkok areas further out from the centres of the cities.
- Lack of capital and investment in maintaining or developing peri-urban aquatic production systems appears to be directly related to short duration leases of land.
- From our 2nd Progress and Planning meeting in Penang in December 2004, a strong recommendation was made that the future and potential of sustainable cultivation of fish and aquatic plants in SE Asian cities would be particularly relevant to up and coming provincial urban conurbations where existing infrastructure and the development planning process would be far more flexible and amenable in overcoming a number of the major constraints associated with growing fish and aquatic plants in our 4 (capital or former capital) study cities.

Scientific Annual Report

2.1 Introduction

The report outlines the outputs and activities of the second year of the three year project 'Production in Aquatic Peri-urban Systems in South East Asia' (Papussa). This report covers the period from 1st January 2004 – 31st December 2004.

2.2 Activities during Year 2 of the project

Year 2 of the project was based on carrying out the following 3 Work Packages (WPs):

WP2 Public Health and Hygiene monitoring

WP3 Systems Production and Livelihoods monitoring

WP4 Social Policy and Issue Monitoring

2.21 Guidelines for Household Baseline and Monitoring Questionnaires

The second year of the project began with the initial phase of implementing the overall workplan agreed in Hanoi, the previous December. The four city partners and the National Institute of Health and Epidemiology (NIHE) Hanoi were given guidelines at the beginning of January 2004 by the University of Stirling (UoS) in assisting each of them to produce draft versions of household baseline and monitoring questionnaires.

2.22 Project Workshop 9-14th February

A Project Workshop was then held at the Asian Institute of Technology (AIT) Bangkok between the 9 – 14th February and facilitated by William Leschen (UoS) and Albert Salamanca (UoD) with the objective of representatives of each of the project partners discussing and then jointly producing a standardised household baseline and monitoring questionnaire survey which would be implemented in each of the 4 cities as the cornerstone for data collection for the years three WP's. The baseline and monitoring questionnaires were divided into constituent sections which related back to the years 3 WPs:

1. Household socio-economic information

2. Production systems

3. Migration Issues

4. Institutions

5. Health

6. Future

Copies of the two questionnaires are attached as files with the annual report submitted electronically through the email rtd inco projects mailbox.

2.23 Household Survey Sample Size

It was jointly decided to carry out these surveys with a sample size of 200 households in each city which were selected from indicative peri-urban communities where aquatic production systems (fish and aquatic plants cultivation) were actively being practised. Some of these communities were used in the projects first years participatory community appraisal studies. This household sample size was substantially increased and larger than that proposed in the initial project proposal ….. " a minimum of 30 households at each site", since the initial situation appraisal identified a greater level of system variation was felt that this was required to produce a more comprehensive analysis which covered a broader range of aquatic production systems. Also in order to cover seasonal aspects an annual three part household monitoring survey was considered a far more effective use of staff and resources, compared to the bi-weekly visits over a full calendar year described in the original proposal. The city partners also had strong reservations about the availability of busy urban household members for interviews on a more frequent bi-weekly basis.

2.24 Selection of Households

Each city partner went through the process of identifying and then selecting the 200 individual households to be interviewed. Initially Papussa staff carried out key informant interviews with community heads and local administrators, chairmen and women of local community groups eg Farmers and Womens' Unions, the outcome being to obtain a list of all of the households in that particular community. From these lists, and further discussions, a total of 200 households in each city were selected to be surveyed from between 3-5 indicative communities who were involved in peri-urban aquatic food (fish and aquatic plants) production. Several of the city partners, Research Institute of Aquaculture (RIA1) Hanoi and the University of Agriculture and Forestry (UAF) HCMC, on the recommendations of Stirling, were able to select an extra 20 households (10%) in order to allow for any future problems with the interviews.

The initial household baseline and 1st monitoring surveys were planned to begin by the end of April 2004 with two further household monitoring surveys to be carried out later in the year in order to cover longitudinal and seasonal aspects.

2.25 Formulation of Standardised Access Database

Coinciding with, and complementing the questionnaires a standardised Access database was developed by Dr Francis Murray (UoS) which would then be used by each of the 4 city partners to initially enter their survey data, and then carry out the subsequent analysis. This methodology of using a standardised format for household data collection and subsequent analysis between the 4 cities was based on discussions and observations made during the previous P and P meeting in Hanoi that it would be beneficial and subsequently lead to more comprehensive and comparable data analysis and thus findings between the 4 cities.

2.26 Introduction and Training in Access databases

Another activity which was carried out during the final two days of the Bangkok workshop by Dr Francis Murray (UoS) was an introduction and training session for the partners present on data entry and the management of Access databases.

Following the workshop UoS (Leschen and Murray) and UoD (Salamanca and Rigg) drew together all the discussions and findings from the weeks activities in order to produce (2) draft versions of the baseline and monitoring questionnaires. This process took some time to complete due to the regional and national variations and differences between the 4 cities.

2.27 Translation and Piloting of the Questionnaires

Two questionnaires (one baseline, one monitoring) were produced and then sent out to each of the partners for translation into local languages. This was then followed by each city partner piloting the two questionnaires in the field in order to identify any problems with misunderstandings, double meanings, cultural sensitivities, duration of interview, change of meaning in translation etc with the individual questions and survey as a whole. This process of piloting was also important in training and acclimatising each city's Papussa field staff in interview techniques and successful engagement and dialogue with household members. Feedback from this piloting was relayed back to Stirling and Durham who then further modified the questionnaires to produce a final form which was then re- translated into local languages and was ready for the partners to initiate their baseline and first monitoring surveys.

2.28 Baseline and first monitoring Questionnaire Surveys

The 4 city partners teams then went ahead and began the household interviews for the baseline and monitoring surveys in April. Details are shown in individual partners reports but the teams in each city were composed of between 3 - 4 staff, with interviews normally carried out on a one to one basis with the household head where it was possible. The RIA1 team were also joined by Papussa staff from the National Institute of Health and Epidemiology (NIHE) Hanoi to help

facilitate the questionnaires and more specifically to assist and add inputs in asking the questions from the health related section of the questionnaires.

2.29 Community and Individual Household Production Systems Mapping

Whilst visiting each of the households during the baseline and monitoring surveys the teams also carried out mapping exercises where they initially produced maps of each individual households production system i.e. fish ponds, aquatic plant plots grown in a lake or in channel, showing land and water areas, water inlets and outlets (where applicable), and other important features relative to their production e.g. pumping stations, location of waste water channels etc. Once they had completed all of the individual household maps they then produced one overall map for each community studied giving an overview of the relative locations of all of the production systems, water supplies, residential and industrial areas etc. These maps were subsequently very helpful and used during the household monitoring surveys to facilitate dialogue and responses from those who were being interviewed.

2.30 Second Household Monitoring Survey and Health Questionnaire

The timing of the second monitoring survey varied slightly in each of the cities due to logistical factors, however mostly was carried out between August and September. The monitoring questionnaire was shorter in length than the already completed baseline survey and as a result was easier for those out in the field to implement. Also the interviewers had by this time become more adept and accustomed in facilitating such household interviews. The Royal University of Agriculture (RUA) Phnom Penh team also conducted an additional, more specific health related questionnaire with each of the 200 households. This questionnaire primarily based on skin related conditions in the peri-urban communities was the result of collaboration between Partners 2 and 3, KVL Copenhagen and NIHE Hanoi respectively. It more specifically developed themes and questions which had been asked in the health sections of the baseline and monitoring questionnaires in order to lead on to assessing occupational health risk factors for those people who worked regularly in peri –urban waste water fed aquatic production systems.

2.31 Access Database Training – 10th -25th October

Further training in the areas of Access database data entry and synchronisation were carried out with each of the 4 cities Papussa staff teams by Dr Francis Murray (UoS) and Albert Salamanca (UoD). Two of the other important objectives of the visits were:

1. To ensure that each of the four cities databases could be synchronised with each other in order to facilitate future data analysis. This again was quite a lengthy process as most of the city partners staff had little or no previous experience with such database management techniques

2. To allow each of the partners to be able to modify and enter their own additional codes for database entry since a number of the responses to the questions asked were not included in the categories of codes which were listed in the original questionnaires

2.32 Data Entry including Checking and Cleaning

The 4 city partners teams then began the process of data entry with the 200 baseline household questionnaire surveys. This manual process of entering all of this data again was time consuming due to the comprehensive nature of the baseline questionnaire. Those entering data had to be especially vigilant and accurate with the coding system since incorrect data entry here would lead to conflicts at a later stage when they tried to synchronise their database with others.

During this and the previous training the importance was stressed of setting up the necessary systems and work practices to:

1. Regularly check and monitor the validity of data entry in the returned hard (paper) questionnaire copies

2. Check preliminary data entry in the database

3 Clean ie modify incorrect/invalid data entries, identify and fill in any blank or unanswered fields within the dataset.

The responsibility of this task was given to the team leader after the training course.

2.33 Follow up visit W. Leschen (UoS)

Approximately one week after the teams had received the database training Will Leschen (UoS) followed up with a visit to each partner in order to:

- Clarify any further problems with the database
- Monitor that data entry was being carried out correctly
- Give guidelines for preliminary data analysis
- Discuss and prepare the partners for identifying and selecting interventions for Year 3's work packages
- Make preparations for the partners for their presentations to be made at the 7th Asian Fisheries Forum and Project and Planning (P and P) meeting in Penang in December.

On recommendations made during the database training, two of the partners, RUA Phnom Penh and UAF HCMC, had both set up joint server hubs connecting each of the PC's they used for data entry to a central hub which stored and updated the complete dataset as it was entered. This meant that there was no need to regularly synchronise the different staffs data entry files and

resulted in a considerable saving in time and trouble-shooting as conflicts often arose during synchronisation of the different database files.

2.34 Preliminary Data Analysis – 15th -30th November

Preliminary analysis of the entered Baseline survey data was carried out by the 4 city partners in the weeks prior to the afore-mentioned meetings in Penang, using guidelines prepared by the William Leschen (UoS) and Albert Salamanca (UoD). Findings from these analyses are described in each partners individual reports.

2.35 7th Asian Fisheries Forum Penang, Malaysia, 3rd December

A special Peri-urban Aquatic Production Systems session was held at the 7th Asian Fisheries Forum in Penang in which the findings from the first year of the Papussa project were presented by each of the city partners. There were also presentations from:- Anders Dalsgaard (KVL) on the preliminary findings of Papussa's health survey work carried out in Phnom Penh and Hanoi, Dr Jonathan Rigg (UOD) on Urban development, land policy and the future of peri-urban aquatic food production systems in Southeast Asia, and Dr David Little and Will Leschen (UOS) giving a comparative overview of the status of aquatic plant and fish cultivation in the 4 Papussa SE Asian cities. Dr Nitai Kundu from the East Kolkatta Wetlands project also gave an overview on the constraints and institutional issues relating to the unique waste water fed aquaculture systems in and around Kolkatta.

2.36 Progress and Planning (P and P) Meeting Penang 4-5th December (including initial findings from Baseline Surveys)

The Papussa project's 2nd annual Progress and Planning Meeting was held in Penang where on the first day each of the 4 city partners presented their findings from the years work concentrating on the preliminary data analysis of the household baseline surveys.

Please see individual partners reports for more details of initial analysis of baseline surveys.

Hanoi - RIA1

Nguyen Thi Dieu Phuong of RIA1 presented a status report of production and livelihoods in the 4 research sites in Hanoi. She informed the meeting that the baseline, first and second monitoring surveys have been completed (third still to be undertaken); the water sampling programme has also begun..

Phuong summarised the initial findings from the baseline survey:

- 209 Households surveyed;
- 97% born in their current village;
- Regarding well being/income status just 18 out of the 209 households were classified as 'worse off', 80 better off, and the remainder, medium;

- the respondents were 100% Vietnamese (Kinh);
- 87% of houses built of cement and/or tiles;
- 99% own a TV, 95% a bicycle, 76% a motorbike, 40% a landline, 35% a refrigerator;
- 95% own land.
- 72 households (34%) converted land to aquatic production in the last 5 years; just 1% abandoned land.
- There were not any households interviewed who were not involved in fish and aquatic plant production systems.

Phuong outlined the perceived problems in each commune and, on the basis of these, proposed a set of interventions based around nutrition improvement, water supply stabilisation, stocking modifications, fish seed improvement, and the production of a new training booklet.

Phuong answered various questions about water quality analysis (Anders), suggested interventions (Dave Little, Jonathan Rigg and Kwei Lin), selection of households (Dave Little), and the question of controls (non aquatic production HHs). This final point was put to one side for further consideration.

HCMC UAF Presentation

Huy (PH) presented a report on the status of HCMC's research. Like Hanoi, the baseline and first two monitoring surveys are complete. The third is scheduled for January/February 2005.

The baseline was undertaken in 6 sites. Most respondents were born in their village of residence except for Thanh Xuan which has a significant proportion (60%) of HHs from the north, producing water mimosa. This commune also has the lowest level of institutional membership, perhaps because they are new arrivals. District 9 also has a low rate of institutional membership. Some villages specialise in their aquatic production systems: Dong Thanh is all fish farming; Thanh Xuan all aquatic vegetables. The other 4 sites have various combinations of fish and aquatic vegetable systems.

Uptake of credit is at the lowest level for District 9 and Thanh Xuan. Long-term ownership of land is widespread, except in Thanh Xuan community where most of those involved in aquatic production systems are migrants from outside provinces who have rented plots of land to grow aquatic plants. Huy showed a graph of total household income against morning glory production which shows (i) considerable variation and (ii) possibly a link between low incomes and specialisation in morning glory.
There was considerable discussion of the nature of latrines and whether further clarification was required.

The presentation ended with a discussion of possible interventions: improving effectiveness of farmers' groups and links with local government in Dong Thanh; providing additional educational materials for water mimosa producers in Thanh Xuan; promoting appropriate fish species and stocking densities in Phong Phu; promoting the wild capture of crabs and then fattening them over a three month period in ponds in Da Phuoc.

Bangkok – Kasetsart University (KU)

Principal Investigators Dr Ruangvit and Dr Varunthat summarised the status of knowledge regarding Bangkok. 212 households had been surveyed – including non-aquatic households – across three communities. The baseline and first two monitoring surveys have been completed, as well as the first samples of water monitoring taken. Dr Ruangvit provided annotated maps illustrating the types of system under investigation. From the pictures it would seem these households are relatively wealthy in relation to their counterparts in the other three cities – the hard work of harvesting being undertaken by hired labour.

Dr Varundhat provided a preliminary analysis of the baseline survey including production characteristics, income and health. This led to an explanation of triangulation and how cross-checking of data can be achieved.

On the basis that farmers have been trained *ad nauseum* and don't wish to be trained any more, Varundhat and Ruangvit proposed the following interventions for next years work: integrating morning glory and fish culture; promotion of organic fertiliser as an alternative to chemical fertilisers; and the introduction of freshwater fish as a biological control for pests

They also presented the initial findings from their water sampling programme.

Phnom Penh – Royal University of Agriculture (RUA)

Research Assistant Sam An Srey presented the results of the Phnom Penh surveys. 200 households were interviewed for the baseline survey and the first and second monitoring surveys had also been completed. Initial analysis showed that most households have two main sources of income, but usually not more. Also there is evidence to strongly suggest that returns from wastewater-fed Pangasius in net enclosures in a community close to the centre of the city are less than for non-waste water fed fish grown more intensively with additional inputs (e.g. formulated feed) in ponds in Duong village which is located some 15km from the centre of Phnom Penh. This would also seem to indicate consumer preference and demand for the latter. Sam An also presented a set of proposed interventions: a manual for cultivation of morning glory and fish culture; toilet construction; introduction of a new aquatic plants production system e.g. rotation of water morning glory with water dropwort and water cress as is practiced in Hanoi; and promotion of alternative livelihoods.

Each of their presentations can be found attached to the electronic copy of the annual report sent to the Inco single entry point.

Health and Water Quality Survey presentation

Anders Dalsgaard (KVL) then presented the findings of skin problems survey questionnaire and research in Hanoi and Phnom Penh. 154 households with exposure to waste water and 46 control household were interviewed in Hanoi. Those with skin problems were referred to a dermatologist. Twenty two percent of people exposed to WW have skin problems whilst it is a problem for only 1% of those working in non-WW. A similar pattern was identified in Phnom Penh. Anders provided some further information on the cause of such skin problems which might be linked to waste water as such, but (for example) could be linked to pesticide use.

He then went on to present findings from WP 2's water quality and food safety research which had been carried out in conjunction with Papussa staff at RUA in Phnom Penh. Water quality samples had been taken from Beung Cheung Ek lake, the large water body which receives up to 80 % of the city's untreated waste water and in which a number of the surrounding communities are cultivating morning glory (water spinach) throughout the year. Water is tested at both inlet and outlet, 2 sites each, in Phnom Penh. There is also a control site. This work is on-going. It has already been noted that there is enormous daily and weekly variations in the samples in terms of the presence of *E coli* – from counts of 40-50,000/100 ml though to 50million/100 ml. This emphasizes the need for repeat sampling. Aquatic plants have also been sampled. Water quality at the outlet site and the control is good – not far from swimming water quality in Europe. Tests of morning glory (water spinach) showed the presence of parasites. Further testing is required to identify species.

Discussions followed relating all of the work presented as a guideline for setting an overall workplan for the final year, year 3.

PhD presentations

The first day finished with update presentations from the five PhD students whose research studies were associated with the Papussa project:

Will Leschen (UOS)	Prevalence and Impact of Foodborne Trematodes (FBT) in waste water fed aquatic production systems in Hanoi. Will presented an update on his work in Hanoi in which he had taken preliminary samples from a variety of cultured fish (as potential secondary hosts for FBT's) from one waste water fed production system, one local retail market and one wholesale market. Using the pepsin-acid digestion technique he had analysed his samples for the presence of FBT's. Initial findings indicated zero levels in freshwater cultured fish (source from outside Hanoi city) sold in the wholesale market. From the local retail market, fish grown in waste water from the city showed a low prevalence of the FBT's, whilst the samples taken from the waste water fish pond system indicated elevated levels of FBTs in two small wild indigenous species *Anabas* sp and *Raspora* sp which were present

	in the ponds but not initially stocked. This could suggest these species acting as potential "reservoirs" for re-infection for FBT's. This work will be further developed next year particularly in two areas: developing identification of FBT's down to species level and setting up a survey framework for determining the production to consumption chain including eating/cooking methods, and relative cause and effect of consumption of periurban waste water produced fish.
Helle Marcussen (KVL)	Toxic metal accumulation in plants and fish in Phnom Penh and Hanoi**.** Anders Dalsgard presented the interim results of Helle's work in this area. Plants have been sampled throughout 2004 and will continue into 2005; fish samples have been taken through the latter part of 2004 and will continue into 2005. Heavy metal analysis is carried out using ICP-MS. Arsenic, cadmium, lead and nickel were all present in the vegetable samples from Cambodia but not in high enough concentrations to be of concern. More tests are required.
Albert Salamanca (UOD)	Dynamics of peri-urban aquatic food production in Southeast Asia. Albert described his research in the context of the existing framework of year 1's participatory, institutional and market surveys and in year 2 the more formalized household baseline and monitoring surveys. He presented 4 scenarios of urban development in relation to communities involved in peri-urban aquatic production systems indicating particular "drivers" which could and do bring about this change. Now with a large and comprehensive household dataset available he intends to develop his analyses in relation to overall trajectories of change but also to more specifically look at issues of urban migration, spatial characteristics and pressures on and changes in land use.
Nguyen Thi Phuong (RIA1)	Aquatic farming systems and livelihood in peri-urban Hanoi. Phuong described the progress of this years work based on the data and overall findings from the years baseline and monitoring surveys. She elaborated that next year she will be including nutrient flow analysis of individual pond systems in Hanoi in order to assess the effective use of waste water in conjunction with other inputs eg feed, animal manures in order to increase fish production levels
Charlie Price (UOS)	Pesticide/Heavy metal analysis of aquatic plants cultivated in Phnom Penh (presented by Will Leschen)

	Charlie has been collecting morning glory in Phnom Penh from markets and production sites. Hypothesis that heavy metals are not found in the human waste (based on the work to date in Cambodia), but within the lake sediment. This work in Phnom Penh is part of a wider research study which is also analysing samples from aquatic plant cultivation in Thailand.

Electronic copies of each of these powerpoint presentations are attached in the annex of the electronic version of the annual report sent via the single entry point.

Day 2

The second day saw the partners discuss the workplan for next year particularly in respect of the interventions required which were to be integral parts of work packages:

Work package 5	Public Health and Hygiene Pilot
Work package 6	Production Systems and Livelihoods Project
Work Package 7	Social, policy and institutional pilot

The overall strategy and protocols for the water sampling programme was reviewed and following recommendations from Anders Dalsgaard, David Little and Prof Lin (AIT) it was decided that nutrient flow analysis (from WP3) would be carried out in two cities, Bangkok and HCMC, whilst the standard physio-chemical water quality sampling to assess waste water treatment capacity of one particular aquatic production system in each city would be carried out in Hanoi and Phnom Penh.

Papussa Website

A short discussion was held about publication of project outputs on the website. Anders Dalsgaard (AL) and Albert Salamanca (AS) both made the point that care should be taken with research data and findings which was intended to be used for either PhD‘s or papers to be published in peer reviewed journals – this should not be previously made available on the website since it could lead to potential conflicts in the originality of the publications.
It was agreed that only abstracts will be put on website. If partners don’t want full powerpoints/papers to be posted they should inform the project coordinators.

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List of Deliverables

The next session then concentrated on going through the Project Document to assess how far the original list of project deliverables had been met also highlighting those which hadn’t yet and

those which would be unlikely or unrealistic to be expected to be met within the time scale of the project.

This exercise was to allow all of the partners to jointly assess what had already been achieved and what was required to be completed so that we could effectively use the rest of the days programme to discuss the outstanding work and deliverables to be completed.

This exercise was also of use for all of the partners in their EC Annual Reports writing so that each could identify the work that had been completed and the work remaining. This is summarised in the Table of Deliverables below:

Table 1 Update and Status of Papussa project deliverables

Deliverable	Deliverable title	Delivery month	Update and status
D1	**Situation appraisal report**	**M 7**	**PCAs, SOS, Markets Analysis(MA) ,and Institutional Analysis (IA) reports completed**
D2	**Study protocols and designs**	**M 10**	**Protocols for PCAs, SOS, health reports completed**
D3	**Report of chemical and microbiological water quality**	**M 18**	**Interim results presented at 7AFF and P&P December 2004**
D4	**Report of chemical and microbiological food safety of products**	**M 18**	**Interim results presented at 7AFF and P&P December 2004**
D5	**Manuscripts for peer-reviewed journals**	**M 21**	**Draft papers presented at 7AFF, December 2004 (abstracts in conference proceedings). Proposal that set of papers submitted for publication in *Urban Agriculture* (Feb 2005?)**
D6	**Report on nutrient dynamics, production system management, livelihoods and actor networks**	**M 21**	**PCAs, SOS, MAs and IAs, SOS published in local languages and English. Distribution of stakeholders in progress. Nutrient dynamics to be completed**
D7	**Workshop proceedings**	**M 21**	**Completed (PCAs, P&P summary reports in HCMC and Hanoi on website)**
D8	**Report on trajectories of change and role of aquatic food production in household livelihood systems**	**M 15**	**PCAs, SOS, draft MSSs, PhD proposals and literature reviews**
D9	**Report on tensions/conflicts between different production systems in peri-urban areas**	**M 16**	**PCAs, SOS, draft MSSs, PhD proposals and literature reviews**
D10	**Report on marketing and consumption of production from aquatic systems in peri-urban areas**	**M 17**	**Marketing reports completed for each site (available on project website)**
D11	**Papers prepared for publication in scientific journals**	**M 18**	**Draft MSS completed; papers in edited volumes in press**
D12	**Meetings/workshops with study site stakeholders**	**M 19**	**Completed for each site; summary results in PCAs and SOS. Dissemination back to stakeholders underway**
D13	**Protocol and design of epidemiological study and intervention study (all partners)**	**M 21**	**Epidemiological protocols ready for Phnom Penh; others forthcoming. Draft protocols for intervention presented at P&P in Penang (December 2004)**
D14	**Report of results from epidemiological and intervention study**	**M 28**	**Intervention will be carried out in year 3**
D15	**Health risk assessment report**	**M 34**	**Subcontract – makes risk assessment report – data from skin problems**

D16	**Report on impact of enhanced management on production, nutrient and water-use efficiency and livelihoods**	**M 38**	**Will deliver report but not likely to cover water –use efficiency**
D17	**High potential management strategies selected based on stakeholder assessment**	**M 39**	
D18	**Reports on selected areas/communities selected for pilot work and integrative report (D20)**	**M 30**	**Pilot communities for health work identified PP and Ha Noi**
D19	**Report on policy context at both local and national levels**	**M 35**	
D20	**Report on production, marketing and consumption**	**M 37**	
D21	**Preparation of papers for publication in scientific journals**	**M 38**	
D22	**Report on media and opinion makers**	**M 4**	**Media invited to SOS meetings (later than originally anticipated). Interview with Thailand's Channel 7 and on radio; pieces in newspapers in HCMC and Hanoi. Proposal to further target local newspapers with pieces for publication.**
D23	**Project summaries in local languages and programme of local bulletins for four sites started**	**M 4**	**SOS published in local languages and English**
D24	**Project website established and reports (D1, D6, D8, D16) posted within one month of delivery date**	**M 4**	**Project website established and being populated**
D25	**Proceedings from the final regional workshop**	**M 36**	
D26	**Project CD-ROM disseminated**	**M 36**	

Blue – deliverables which have been mainly achieved
Green - deliverables which have been partially met but need more work in Year 3
Orange - deliverables which have yet to be started and will be completed in Year 3

The remaining afternoon session related mainly to dissemination and stakeholder engagement (WP8). These outcomes are summarised below, in the Co-ordinators Management Report and also in the individual partners reports.

2.3 Work Package 8 – Project Dissemination

Maintenance and further development of the project website for PAPUSSA

This objective has been achieved in various ways:

- A section on PhD studies was added to the site, holding presentations of PhD studies, linked to the PAPUSSA project.
- The online photo gallery was completely revised and expanded with general pictures and pictures of aquatic plants, food production and fish markets. The photo gallery now holds about 70 pictures of various cities in the project.
- Various project related publications have been published on the website.
- The layout (e.g. typography, font size and colour) of the various pages on the website were modified to create uniformity throughout the entire site.

The website now includes the following sections:

1. About PAPUSSA:
   General information on the project, available in various local languages
2. Partners:
   Background information and contact details of the partners
3. Publications:
   Documentation produced by the project as well as links to urban aquaculture literature on the RUAF site.
4. PhD Studies:
   Presentations of PhD studies, linked to the PAPUSSA project.
5. Forum:
   A public forum for discussion of issues related to the PAPUSSA project theme. Visitors to the forum can either initiate or respond to topics of their own choice, or they can contribute to occasional key themes identified by PAPUSSA partners.
6. Links:
   The links page contains information on other relevant websites related to the subject of peri-urban aquaculture and the social/health/institutional aspects of this topic. The intention is that visitors to the site, but particularly the project partners will contribute to this section.
7. Notice Board:
   The notice board is a section of the site dedicated to various items such as project (or other) events, news items of interest, developments in the project, reports by PhD students on the progress of their research.
8. Photo Gallery:
   A collection of project and theme related photos, categorized per city. Thirty nine pictures of Ha Noi, 16 of Ho Chi Minh City , 14 of Phnom Penh and 27 pictures from Bankok are published in the photo gallery.

Additions to the site have been supplied mainly by the University of Stirling. The project website, hosted by RUAF, can be visited at: www.ruaf.org/papussa.

Maintenance of project communication channel

To facilitate communication channels in the project, RUAF maintains a closed listserv for the PAPUSSA partners. Maintenance of this mailing list involves membership management (adding and removing members to or from the list), error handling and removing SPAM.

Difficulties and Countermeasures

- Over the year, a lot of junk mail was posted on the Forum. Now all messages have to be approved of by the forum's administrator, preventing the forum being flooded with irrelevant messages.
- Although this year the Forum was visited very often and all messaged were viewed more than once, the forum can still be considered under-utilised. Statistics do show that visitors (PAPUSSA members and non-members) are interested in reading the input of others. For some reason however, they have scarcely yet contributed to the discussion.

Instead of aiming to facilitate an open discussion with visitors to the PAPUSSA site, perhaps the PAPUSSA coordinators could stimulate periodic thematic discussions with project members.

- To visualize the theme of urban aquaculture and make the website more attractive to visitors, pictures of urban aquaculture related objects and situations will be placed on the various pages of the PAPUSSA website. This activity is planned for early 2005.

Impacts/Results

Website

One of the ways to measure impact of a website is the maintenance of statistics on:

- the number of visitors to the site;
- the way in which visitors find the site and
- the sections to which the attention of the visitors is mainly drawn.

Below are some (interpretations of the) statistical data collected over 2004:

- **Site visits**
  Unlike 2003, this year showed no gradual increase in the number of visits to the site. In the year 2004, the PAPUSSA site was visited about 20 times a day (on average).In November and December the website was visited relatively frequently. In December the website was visited most, 804 times in total. During the summer months, the site was visited less frequently. Least was in August: 428 visits that month.
  Compared to 2003, these figures show an increase in the number of visits. In 2003 the maximum number of visitors was in December: 370.
  Most visitors accessed the PAPUSSA website during the week (Tuesday-Fridays). Over the weekend (Saturday-Monday), statistics show a lot less visits.

- **Most visited pages**
  Most visited page on the website was the forum. Naturally also the PAPUSSA home page was visited a lot (though less than the forum), followed by the pages Publications, Partners and the Photo Galleries.
- **Access to the website**
  Most people accessed the website by directly entering the url (www.ruaf.org/papussa). Others where lead to the site via search engines. Mainly the general search engine of Google (google.com) but also via Google Thailand (google.co.th) and Google Vietnam (google.com.vn).
- **Keywords**
  (Combinations of) the following keywords where mainly used for internet searches that lead to the PAPUSSA website:
  - Names: papussa
  - Regions: ha noi / vietnam / ho chi minh / (south east) asia
  - Subjects: aquaculture / culture / urban / aquatic / production
  - Type of info: gallery / picture / photo

- **Forum messages**
  This year 6 messages were posted on the PAPUSSA forum. Three replies were posted, making the total number of messages nine.

Mailing list
The listserv has been used regularly by the project partners and seems to be fulfilling the desired function.

Some statistics of the mailing list follow below:
Total number of e-mails sent this year : 69 (163 in 2003)
Most messages sent in : November, just before the P&P meeting (same in 2003)
Number of messages sent in November : 19 (50 in 2003)
Changes in the members list : 11 subscriptions and 5 unsubscriptions

Other activities

Training materials on senior stakeholder engagement and dissemination (November 2004)
ETC (Marielle Dubbeling) elaborated for PAPUSSA partners a training manual, including guidelines and case studies on methods and tools for Senior Stakeholder Engagement and Dissemination leading to policy change. The training manual describes amongst others the role of researchers in policy advocacy and lobbying as well as reflects on different ways of engaging with policy makers, through the elaboration and dissemination of policy briefs, through direct contact with policy makers or through the multi-stakeholder processes of action planning and policy design. Additionally examples of Fact Sheets and Policy Briefs were provided. The materials were made available in English to the PAPUSSA Progress and Planning meeting that took place on the 4th and 5th December in Penang, Malaysia. An initially planned training workshop in Penang on the topic had to be cancelled because of late agreement on funding. PAPUSSA partners will use the materials as a basis for orientation of their future dissemination activities and ETC will support in 2005 a series of other related activities (see section: forward looking).

State of the System (SOS) Reports

Four State of the System (SOS) Reports, one for each city were edited and then published during the latter part of the year. They were a major outcome of the first years work following on from the SOS meetings held in December 2003 in each city. Their objective is to provide an initial multidisciplinary overview of the status of Peri-urban aquatic production in the 4 cities in the format of an informative and attractive bilingual (local language and English) report which can be read by a wide range of stakeholders, many of whom have little or no background in aquaculture or fisheries sciences. Several hundred of these reports have already been sent out to a variety of stakeholders with sub contracting partner ETC Netherlands and Stirling using these SOS reports to initially set up a process of dialogue and dissemination with more senior stakeholders (See section below on Dialogue with Senior Stakeholders). Copies of these SOS reports are available on the project website.

Dialogue with senior stakeholders (December 2004-ongoing)
The PAPUSSA partners, with help of ETC-RUAF (Resource centre on Urban Agriculture and Food Security), plan to approach a wider group of experts and senior stakeholders in urban aquaculture (including policy-makers, land use planners, food processing and marketing experts, health officials, urban waste and recycling managers) with the aim to establish a dialogue on the SoS reports and their consequences for policy development.

Two questionnaire were developed by ETC and Stirling, incorporating inputs from local PAPUSSA partners, to facilitate senior stakeholder providing their view on (a) The content of the SoS reports; (b) The presentation and layout of the reports, (c) The respondents view on the situation as depicted in the SoS reports, and (d) Interventions they would recommend in the given situation (which measures or actions could be taken to develop production of fish and aquatic plants in/around cities in South-East Asia?).

One questionnaire is aiming at respondents living or working in the cities described in the SoS reports (Hanoi and Ho Chi Minh City in Vietnam, Phnom Penh in Cambodia and Bangkok, Thailand) and one at international respondents. The first questionnaire aims to trigger local respondents to reflect on their own city (with a more intimate knowledge of the local situation), while the international respondents probably will reflect on the reports from a broader perspective.

Questionnaires will be translated by local PAPUSSA partners in local languages in 2005. ETC will be responsible for contacting international organisations and actors. Responses will be collected in February 2005 and analysed.

Special issue Aquaculture Magazine (Nov 2004- ongoing)
Preparation of a special issue of the Urban Agriculture Magazine, focussing on (peri)urban aquatic production was started in November 2004. ETC and Stirling will co-edit the Magazine. PAPUSSA partners will provide contributions (abstracts from their presentation given at the Asian Fisheries Forum in Malaysia in December 2004) as well as additional contributions will be collected. A call for contributions was developed in December, placed on the website and disseminated widely. Incoming contributions will be edited in 2005 and the Magazine will be produced in March next year.

Dissemination : Forward looking 2005

In 2005 the following activities will be implemented, next to the continuation of the ones mentioned above. The additional activities all have to do with processes of senior stakeholder dissemination and engagement:

Production and dissemination of a set of Aquaculture Policy Briefs for senior policy makers
A set of Policy Briefs will be produced for the senior technical staff and the municipal decision-makers. The set will consist of:

a. general policy issues, concepts, facts and recommendations on urban/ peri-urban aquaculture (4 pages) and
b. 4 to 5 subject Briefs of 2 pages (1 double sided sheet) each. The latter will deal about thematic issues like marketing, health, aquatic plants, fish production and waste water use in aquaculture.

The Briefs will illustrate PAPUSSA project findings and recommendations with cases. They will be printed in full colour; the language of one set will be in English + translation in 3 local languages. The Brief will be elaborated based on PAPUSSA and other aquaculture documentation.

Workshop on Aquatic Food Production in Urban Livelihoods (Dhaka, Bangladesh)
In collaboration with ITDG-Dhaka a workshop will be organised by ETC and Stirling in Dhaka, Bangladesh in 2005. The workshop will bring together representatives of different (peri)urban aquaculture related (research)projects from Bangladesh and West-Bengal, India, as well as senior policy makers from Municipalities and Ministries in Bangladesh. Workshop objectives, programme and methodology are to be developed jointly between ETC and Stirling. ETC will take the lead in the development of the programme and organisation of the workshop.

Production and distribution of a CD-ROM
Scheduled for the second half of 2005 is the production of a practical, informative CD-ROM. During the PAPUSSA project, various types of information were used or created in the four partner cities, as well as in the context of the general programme. The purpose of this CD-ROM is to provide a larger number of stakeholders with these documents. Examples of proposed contents are the SoS reports and publications produced during 2004 and the stakeholder engagement manual. Other information materials, to be developed in 2005, that will be added, are:

- policy briefs;
- the proceedings or declaration of the Dhaka workshop;
- a digital version of the thematic issue of the Urban Agriculture magazine on Urban Aquaculture and
- a report on the activities related to the dialogue with stakeholders.

Production of the CD-ROM will be facilitated by RUAF.

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As previously mentioned a project web site and list server was set up by RUAF in order to improve the exchange and dissemination of information both between the partners and also to a wider audience. The list server functioned particularly well in disseminating information and improving co-ordination “throughout the project” ie not just at senior PI level but also down to the more junior staff involved.

2.4 Technical Problems

The major technical problems encountered during year two of the project included:

- Delays encountered by all of the city partners in beginning their household surveys due to the prolonged time period it took to put together two comprehensive standardised household questionnaires (baseline and monitoring) which would be practically effective to administer in each city. This process, although ambitious, was time consuming (including the piloting) in ensuring that each of the individual questions would be applicable to each city. Areas such as land ownership and institutional and political systems varied considerably between the three countries necessitating a thorough approach and discussion in covering all possibilities within the questions asked. The outcome of this being that the city partners were only able to begin their household baseline and first monitoring survey in April/ May. Although this wasn't necessarily a problem for the Baseline and first Monitoring surveys it meant that in order to cover all aspects of seasonality within the remaining two Monitoring surveys this resulted in the final monitoring survey taking place in January of 2005.This was particularly relevant to cities such as Hanoi where temperatures in January and February can go down to 12 - 15° C and thus have considerable effects on not just aquatic production systems but also the communities overall livelihood strategies and related health and well being.

- Associated with the prolonged period of producing the questionnaires the Access database which was the vehicle used for joint data entry between all 4 cities also had its problems not so much with its design and formulation but more in its use and application by the 4 city partners, due to their previous lack of experience in using such databases. As a result three separate training sessions were organised over the year in Access database use and management for the partners however there were still a number of problems relating to incorrect or missing data entry which should have been picked up by the city partners when they were Data Checking and Cleaning. In practice this process of data cleaning took much longer than originally anticipated with Albert Salamanca (UOD) taking a major and painstaking role of properly cleaning the data for all 4 of the cities. The subsequent step of beginning data analysis could not be carried out until this process of data cleaning had been properly completed.

- Carrying out a household survey on such a scale within 4 large cities also had its associated difficulties for the field staff particularly in relation to the availability of the interviewees. This was mainly due to such people and peri-urban households having very busy and full working days often being involved in a number of income earning activities. Thus it was often not possible to always interview the household head which as a result meant that the data collected could be lacking in some areas. Related to this it was necessary in some of the communities interviewed to provide a "gift" or cash remuneration to each household in order for them to agree to participate which could at times lead to some tensions and problems. In order to circumvent this difficulty the city partners also produced a designed T shirt with the Papussa logo and some related pictures and a slogan about growing fish and aquatic plants in cities. These shirts were given out to households participating in the survey and were received very favourably. They also had the added objective of increasing the profile of the project to a wider audience not just in the local community but around the city as a whole.

- Other technical difficulties which arose included problems and anomalies in the process of translation of the questionnaires into local languages. During the piloting phase a number of mis-translations were picked up and subsequently rectified.

2.5 Workplan for 2005

By the end of the Progress and Planning Meeting a workplan of activities for 2005 was agreed as is summarised below:

January - February

- Third household monitoring survey to be started and completed by February
- Annual technical and financial reports to be completed and submitted to the co-ordinators
- Articles for special peri-urban edition of Urban Agriculture Magazine to be submitted in draft form to editor
- Senior stakeholder list to be expanded and completed in each city. Dissemination of SOS reports to be initiated – engagement with senior stakeholders developed- inputs from RUAF Netherlands partner.
- Continuation of water sampling for nutrient flow analysis in HCMC and Bangkok, and for physico-chemical treatment capacity analysis in Hanoi and Phnom Penh to be carried out and continued until June.
- Setting up internet linkage and interaction between the 4 city partners staff and MSc students (Aquaculture and Sustainable Livelihood courses).

March – April

- Database to be fully established and analysed as well as production of report
- Publication of special edition of Urban Agriculture Magazine
- Planning for Dhaka Workshop in November in collaboration with RUAF (ETC) partner in the Netherlands and ITDG (Intermediate Technology Group) Dhaka.
- Feedback from senior stakeholders on the SOS report to be completed and collected.

May

- Interventions to be implemented and monitored on the basis of common themes in each of the four cities.

- Findings from senior stakeholder feedback on SOS reports analysed and subsequent report produced

June

- Completion of water sampling - nutrient flux and water treatment capacity analysis of production systems, report written.

- Inputs from ETC Netherlands towards producing a selection of specific Policy Briefs which will summarise and disseminate the main outcomes, findings and recommendations of the project to specific categories of senior stakeholders eg Urban Policy Planners, Health, Food safety and marketing, waste disposal etc. Draft Policy Briefs to be presented and piloted by June

September - December

- Finalising data analysis and synthesis; results aggregation, and production of reports

- Production of CD Rom by ETC Netherlands highlighting associated materials from the Papussa project eg reports, training manuals, articles, publications, video clips, photos etc as well as related material,information and links to other sources eg Kolkatta Wetlands project and DFID Peri-urban aquaculture project in Lagos Nigeria.

- Further refinement of ETC's Policy Briefs and then following the Dhaka workshop in November their dissemination to senior stakeholders. This will then be followed up in November by assessing feedback which will be incorporated into other project documents such as the final report and other project publications eg papers or articles.

November

Dhaka workshop on peri-urban aquaculture – drawing in senior stakeholders with research findings and recommendations in the sub-region.

- Progress and Planning meeting in Phnom Penh planned towards the end of November.

Figure 2 Papussa Workplan for 2005

	January	February	March	April	May	June	July	August	September	October	November	December
Annual technical and financial reports submitted												
3rd Household Monitoring Survey												
Articles for Urban Agriculture submitted												
Internet linkage with Stirling MSc courses												
Dissemination of SOS reports												
Engagement an dialogue with senior stakeholders												
Database data entry completed, analysis and production of report												
Water sampling – nutrient flow and physico chemical analysis												
Interventions carried out in each city on common themes												
Collation and analysis of three years findings, Reports writing												
Progress and Planning (Pand P) Meeting Phnom Penh												

Please note that following discussions between the partners at the Progress and Planning meeting in December 2004 a letter requesting a six month extension until June 2006 was sent to the European Commission.

2.6 Publications

Non refereed Scientific Reports

State of the System (SOS) Reports (X4) Hanoi, HCMC, Bangkok and Phnom Penh.

Publications and Papers

Book Chapters

Little, D. C., Bunting, S.W. 2004. Opportunities and constraints to urban aquaculture, with a focus on south and southeast Asia. In Press: Costa-Pierce, B.A., Edwards, P., Baker, D., Desbonnet, A. (Eds.), Urban Aquaculture, CABI.

Non-refereed scientific reports

Papers presented as oral presentations at the 7th Asian Fisheries Forum in Penang – special peri-urban aquaculture session 4th December 2004:-

Little, D. C., Bunting S.W., and Leschen, W., 2004. Peri-urban aquatic food production systems in S.E. Asia: An overview of four cities:Bangkok, Phnom Penh, HCMC, and Ha Noi. 1: Methodology. 2: Contrast and comparisons.

Rigg, J.D., and Salamanca, A.M. , 2004. Urban development, land policy and the future of peri-urban aquatic food production systems in Southeast Asia.

Hung, L.T., and Huy, H.P.V.H., 2004. Status of peri-urban aquaculture systems, marketing channels of aquatic products, and institutional structure for aquaculture in Ho Chi Minh City, Vietnam.

Borin, C., 2004. An Overview of The Current Status of Peri-Urban Aquatic Food Production Systems In Phnom Penh: A summary of the first years research findings of the PAPUSSA project.

Yoonpundh, R., Dulyapurk, V., and Srithong, C., 2004. Peri-Urban Aquatic Food Production Systems around Bangkok, Thailand

Tuan, P.D., and Phuong, N. T. D. 2004. Status of Peri-urban aquatic production systems in Hanoi.

Marcussen, H., Jørgensen K., Dalsgaard, A., and Holm P.E., 2004. Accumulation of toxic metals in aquatic production systems receiving urban wastewater in Cambodia and Vietnam.

Anh, V.T., Cam P.D., Phuong, P.T., Van der Hoek, W., Vicheth, C., and Dalsgaard, A., 2004. A study on skin problems among people engaged in wastewater-fed culture of water spinach in Phnom Penh, Cambodia.

Dalsgaard, A., Anh, V.T., Tram, N.T., Hoa N.V., Borin C., Rosenberg C., and Cam, P.D. 2004. Microbiological water quality and food safety of water spinach (*Ipomoea aquatica*) produced in peri-urban wastewater in Boeng Cheung Ek lake, Phnom Penh, Cambodia

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Phuong, N.T.D., 2004. Bang B village: Case study of a peri-urban community producing aquatic vegetables from waste water in Hanoi. Article published on Papussa project website www.ruaf/papussa November 2004.

3.0 Management Annual Report

3.1 Organisation of the collaboration within the second year

As in year 1 Stirling University were responsible in the second year as the "lead contractor" in the overall co-ordination of project activities. However the responsibility for co-ordination of each of the second years three individual work packages was carried out by the individual partners as follows:-

WP2	Public Health and Hygiene monitoring	KVL Copenhagen, NIHE Hanoi
WP3	Systems Production and Livelihoods monitoring	RUA Phnom Penh, RIA1 Hanoi, UAF HCMC, KU Bangkok.
WP4	Social Policy and Issue Monitoring	University of Durham.

Overall project co-ordination involved Stirling being in daily contact with partners through email correspondence and also during the latter part of the year by Skype allowing good quality verbal communication through personal computers.

A system of emailing back to Stirling a brief report of the weekly activities and progress by each of the four city partners was continued and proved invaluable in monitoring the progress of the work, whilst also allowing the partners to forward on any problems or special requirements needed.
In order to supplement this regular visits throughout the year were made by Stirling (William Leschen, Dr Francis Murray) and the University of Durham (Albert Salamanca) to each of the four city partners mainly concentrating on training in the implementation and analysis of the years baseline and monitoring surveys (see below)

The Asian Institution of Technology (AIT) Bangkok continued to carry out its role of project co-ordination and technical support on a regional basis, however in year two fulfilling this role with RUA Phnom Penh and KU Bangkok, as it was considered following the first year that the two Papussa staff teams at RIA1 Hanoi and UAF HCMC were now competent enough to do with less support.

In May 2004 the project welcomed the addition and experience of Professor Kwei Lin from AIT to co-ordinate AIT's involvement and oversee Ms W. Saelee in her work with KU and RUA. Prof Lin set up fortnightly meetings with staff at KU Bangkok to assess and support their progress with help also being given in editing and reports writing. He and Ms Saelee also kept in regular email and telephone contact with RUA in Phnom Penh and during the year visited the Phnom Penh partner on 4 separate occasions. By the end of the year a definite improvement had been noted in the performance of the KU partner.

Albert Salamanca (UoD), who was based at AIT Bangkok throughout 2004, continuing on from the first year of the project maintained his strong and comprehensive support to each of the 4 city partners particularly in the areas of the baseline and monitoring questionnaires and the subsequent database training.

For WP2 Public Health and Hygiene monitoring Dr Anders Dalsgaard (KVL) visited RIA1 Hanoi and RUA Phnom Penh during the year in order to co-ordinate activities between the partners and the National Institute of Health and Epidemiology (NIHE), Hanoi. The project welcomed Vuong Tuan Anh as Papussa's main staff contact from NIHE following the departure of Dr Thi Phuong. Helle Marcussen also of KVL was also involved in supporting Papussa staff in both Hanoi and Phnom Penh during her time carrying out field work for her PhD studies.

3.2 Project Meetings

Project Workshop 9-14th February 2004 at AIT Bangkok, was attended by representatives from each of the 4 city partners, also NIHE, AIT, Universities of Stirling and Durham. The objectives were:

- To jointly produce standardised household and baseline questionnaire surveys which could be used in 2004 for each of the 4 cities
- to undergo initial training in Access database formulation and data entry.

By the end of the week two draft baseline and monitoring survey questionnaires had been produced and two days of Access database training had taken place.

3.3 Project coordination visit Stirling – ETC

A meeting between Stirling University (Will Leschen) and ETC (Mariëlle Dubbeling and Dorine Rüter) took place on June 14, 2004 in Leusden, the Netherlands, to discuss progress of implemented activities thus far (website management, email list) and discuss the need for additional support and activities, specifically relation to senior stakeholder dissemination and engagement. Stirling gave a short overview of the state-of-the-art of the PAPUSSA project and shared the draft SoS papers. Proposals for improving the PAPUSSA website were discussed and ETC shared its experience with a variety of strategies for stakeholder dissemination and engagement (special issues of the Magazine, Policy Briefs, use of videos and e-conferencing, etcetera.) Based on the meeting and following email and phone discussions a proposal was developed by ETC to Stirling, that was after several revisions – agreed to be funded by AFGRP –DFID.

3.4 Progress and Planning (P and P) meeting

The second annual P and P meeting was held following the 7th Asian Fisheries Forum in Penang, Malaysia between the 4-7th December 2004. Representatives of all of the project partners attended with objectives of the meeting being:

- To present and review the years work in the project.
- To formalise a draft workplan for year 3.

- To allow interaction and exchange between the different partners staff.
- To discuss whether an extension of the project would be applied for.

Presentations of the years work and findings were given, following discussions a draft workplan was agreed upon for 2005, and it was also agreed due to delays within the first two years of the project to apply to the EC for a project extension up to June 2006.

3.5 Project Exchanges

In March – April 2004 Ms Nguyen Thi Dieu Phuong from RIA 1, Hanoi, visited The Institute of Aquaculture, Stirling University for a 6 week visit to see her supervisors Dr Stuart Bunting and Dr David Little as part of her PhD studies. During her visit she also took part in a number of short courses related to her studies as well as benefiting from her interactions with other students and staff.

3.6 Problems: Managerial, Administrative and Financial

A major constraint to carrying out all of the planned activities during the second year of the project was the delay associated with the allocation of funds to each of the partners. The process of annual reports writing (scientific/technical and financial/cost statements), especially the latter, caused considerable problems for some of the partners and much time and email correspondence was spent by the co-ordinators trying to sort this out. This resulted in the annual reports being submitted to the EC past the deadlines stated. However following submission there were also shortfalls and misunderstandings in the communication between the EC and Stirling over the documents that had been received and also any further requirements that were needed to fulfil all of the criteria for payment of the project budget. In this respect the experience has been a learning one for all of the partners concerned with hopefully the process of next years reports writing and submission being able to run more smoothly.

Loss of important project staff had significant effects on the activities of NIHE Hanoi, KU Bangkok, and more particularly RUA Phnom Penh where two good staff members left. The RUA Phnom Penh partner particularly suffered from the delays associated with the (non) allocation of budgets, since out of all of the Papussa partners it has the least capacity, infrastructure and in fact experience in managing such overseas funded development projects. This resulting turnover of staff had implications for the management of some of the more junior staff as well as the good contacts which had already been built up with officials and influential persons in the peri-urban aquatic production communities which were being studied.

Although Stirling were responsible as the overall co-ordinators of the project as mentioned above the responsibility for co-ordinating individual work packages in year 2 was divided between the different partners. For both WP2 (Public Health and Hygiene Monitoring) and WP4 (Social Policy and Issue Monitoring) University of Durham and KVL Copenhagen respectively carried out their roles effectively maintaining good communication and guidance with all of the partners. However for WP3 (Systems Production and Livelihoods Monitoring) with 4 separate institutions – RUA Phnom Penh, KU Bangkok, UAF HCMC and RIA1 Hanoi – all being responsible for co-ordination, in reality what happened during the year was that there was limited communication

between each of them, resulting in the Universities of Stirling and Durham taking the lead in facilitating communication and co-ordination between the other partners. Using this as a learning experience it indicates the inherent problems of allocating 4 partner institutions in the co-ordination of one work package.

Individual Partner Annual Reports

INDIVIDUAL PARTNER ANNUAL REPORT
2004

INCO-DEV PROJECT: PAPUSSA

Proposal No: ICA4-2001-10072

Partner 2: Royal Veterinary and Agricultural University, Denmark (KVL)
Partner 3: National Institute of Hygiene and Epidemiology, Hanoi, Vietnam (NIHE)

Personnel involved in the project:

KVL

Anders Dalsgaard, Principal investigator

Helle Marcussen, Research Assistant

NIHE

Professor Phung Dac Cam (Principal investigator)

Vuong Tuan Anh, M.D.

Phan Thu Phuong, M.D.

Nguyen Dang Tuan, B.Sc.

Tran Minh Thu, B.Sc.

Nguyen Thuy Tram, BSc

Summary

During year 2004, we initiated research activities in WP2 and WP5 in Phnom Penh and prepared for the WP2 and WP5 activities in Hanoi which will be initiated in March 2005. Health-related questionnaire parts were prepared for the baseline and monitoring surveys conducted by other partners at the four field sites. Research protocols were finalized and studies initiated in Phnom Penh in July 2004 on microbiological water quality, chemical and microbiological food safety of aquatic plants and occupational health hazards among workers engaged in wastewater culture of aquatic plants. NIHE and KVL have established a good and close collaboration with local partners in the preparation and implementation of WP2 and WP5 activities, including RUA in Phnom Penh and RIA1 in Hanoi. Preliminary results from research activities in Phnom Penh were reported as abstracts and Power Point presentations at the P & P meeting in Penang, Malaysia in December 2004. A draft manuscript was prepared for an article to be published in a coming issue of the Urban Agriculture magazine published by RUAF on skin problems associated with wastewater culture of aquatic plants in Phnom Penh. Field sites have been agreed upon in Thanh Tri district, Hanoi and research protocols drafted for the future water quality, food safety and human health studies. Further, possible interventions to improve food safety and reduce health risks have been discussed and identified (WP5). In conclusion, the WP2 and WP5 activities are well under way and the requested no-cost extension of the project activities will allow studies to capture any seasonal variations in findings as well as testing the impact of different means of interventions.

ACTIVITIES

Meetings and workshop attended

1. PAPUSSA Workshop 9-14th February 2004 Location: AIT Centre, Bangkok

Dr. Phan Thu Phuong, NIHE attended this work shop at the AIT Centre, Bangkok, Thailand to provide inputs to the preparation of in particular the health parts of the baseline and monitoring questionnaires to be used for household interview studies at the fours field sites. Inputs from KVL were provided during phone meetings.

2. 7th Asian Fisheries Forum, 29 Nov – 3 Dec, 2004, Penang, Malaysia.

Anders Dalsgaard attended this meeting and gave three presentations at a special PAPUSSA session on behalf of KVL and NIHE. Further details about the presentations are described under the heading “Publication and reports”.

3. Annual Project Partner (P & P) meeting in Penang, Malaysia 3-6th December 2004

Phung Dac Cam together with Vuong Tuan Anh, Nguyen Dang Tuan from NIHE and Anders Dalsgaard, KVL attended the P & P meeting in Penang, Malaysia from 3-6th December 2004. Vuong Tuan Anh presented on behalf of NIHE/KVL the preliminary results from the 1st round of the skin problem survey in Phnom Penh, which was initiated in July 2004. Anders Dalsgaard gave presentations for results obtained from the microbiological water quality and food safety analyses in Phnom Penh. More info can be found about these presentations in “Publication and reports”.

After the P & P meeting, Vuong Tuan Anh and Nguyen Dang Tuan attended a PAPUSSA training course in Access database software on 6th December 2004.

Helle Marcussen did not participate in the Penang meetings as priority was given for her to use available financial resources for visiting Phnom Penh as part of the WP2 and WP5 activities.

4. Access Database Training course 17-19th October 2004 Location: RIA1, Hanoi, Vietnam

Nguyen Dang Tuan from NIHE participated in an Access Database Training course held at RIA1. This course was useful for NIHE in formatting the data entry for data related to skin problems among people engaged in wastewater-fed aquaculture.

Field visits and technical assistance to partners

Visits to Phnom Penh, Cambodia

Several visits were paid to Phnom Penh by NIHE/KVL researchers to plan and train local partners and other researchers to be involved in WP2 and WP5 activities. Researchers visiting Phnom Penh included Prof. Phung Dac Cam and Phan Thu Phuong (replaced by Vuong Tuan Anh from the end of October 2004) both NIHE researchers and Dr. Wim van der Hoek, International Water Management Institute, Colombo, Sri Lanka together with Helle Marcussen, KVL. Dr. Wim van der Hoek was invited by KVL.

- Aims of these visits were to collect information in order to carry studies:
- on toxic metal accumulation and mass balances in the Boeung Cheung Ek (BCE) lake/wetland
- on assessment of health risks for household members engaged in culture of aquatic vegetables in BCE lake
- on the efficacy of the BCE lake to reduce numbers of helminth eggs and thermotolerant coliforms in wastewater collected at the lake outlet compared with inlet water
- to assess the microbiological safety of morning glory plants produced in the lake wastewater.

Helle Marcussen, KVL visited Phnom Penh three times in 2004 to collect information on wastewater flow and use for aquatic production, collect plant samples and organise future research activities related to presence and accumulation of toxic metals in aquatic plant at the lake field site. In addition she followed up on status on the other activities listed above.

Wim van der Hoek, Phan Thu Phuong and Helle Marcussen visited Phnom Penh from May 19th to 25th to establish contact with partner- and other research institutions such as RUA, the Pasteur Institute and to visit the field sites of BCE lake and the non-wastewater control sites. A health study team consisting of staff members from the partner at RUA was identified and trained to be involved in household questionnaire interviews and sample collection. A second visit was paid by Phan Thu Phuong from July 7 to 16 to do the final preparations on the study on skin problems

among workers engaged in wastewater culture of aquatic plants. This study was implemented in the middle of July 2005 and is expected to go on for a total of 9-12 months. The study includes approx. 200 households from the wastewater exposed site and non wastewater-exposed sites in which all household members are interviewed for skin problems. Training was also provided in the collection and processing of water and aquatic plant samples. It has been arranged that the Pasteur Institute in Phnom Penh analyses water and plant samples for numbers of thermotolerant coliforms.

KVL visits to NIHE and other institutions in Vietnam

Helle Marcussen visited Hanoi, 24th April to 9th May. The purpose was to collect information regarding wastewater flow and use for aquatic production, collect plant samples and organise future research activities. Another purpose was to visit the National Institute of Occupational and Environmental Health (NIOEH), Hanoi to investigate the possibility for carrying out some of the research on toxic metals at this institution. From the visit it was clear that NIOEH was a suitable institution for such work. The needed analytical equipment was available as NIOEH planned to purchase a microwave needed for sample preparation. It was agreed between KVL and NIOEH that Helle Marcussen would carry out 6 ½ months research at NIOEH as part of the PAPUSSA activities on toxic metal accumulation in wastewater systems. NIOEH is a partner in the Danida-funded research capacity building project entitled "Sanitary Aspects of Drinking Water and Wastewater Reuse in Vietnam".

Anders Dalsgaard paid a total of four visits to Hanoi during 2004 of which one visit was part of PAPUSSA. However, meetings were held with NIHE and other relevant PAPUSSA institutions during each of these visits.

Field visits in Thanh Tri District, Hanoi

In Hanoi, several visits were done in collaboration between KVL, NIHE and RIA1 to Tran Phu, Hoang Liet, Dong My, and Duc Tu communes with the purpose of identifying suitable study sites for WP2 and WP5 activities. Communes and field sites with use of untreated wastewater (exposed site) and a control site culturing plants and fish with use of non-wastewater (non-exposed site) were identified. Information was collected about water flow and use of wastewater in morning glory and fish production from farmers in field site. Information about the production methods of morning glory and fish was collected (harvest time, fish species, transportation of fish to market etc.) was also collected.

Research activities

Baseline and monitoring surveys

NIHE/KVL provided inputs on health issues in the preparation of the baseline and monitoring household questionnaires. NIHE staff participated in the fieldwork in Thanh Tri district.

1st round of skin problem survey in Phnom Penh conducted in July 2004

The preliminary results of the 1st round of skin problem survey in PP is reported as an abstract that is included into the Annex.

Studies on water quality and food safety in Phnom Penh. Preliminary results.

Results are shown in the abstract in Annex 2.

Toxic metals in aquatic production systems in Phnom Penh and Hanoi. Preliminary results.

Sampling in PAFPS in Phnom Penh, Ho Chi Minh City and Hanoi of aquatic vegetable was carried out in April and May 2004. Samples were analyzed at KVL on ICP-MS for total content of 40 different elements including the toxic metals arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), nickel (Ni), zinc (Zn) and lead (Pb). Most of the analyses are completed. The objective of the study was to identify metals which could constitute a risk to human health and which should be the focus of further studies. Another objective was to determine if toxic metal accumulate in certain parts of the aquatic vegetables.

Preliminary results are shown in the abstract in the enclosed Annex .

Publication and reports

Oral presentations (PowerPoint) at the 7th Asian Fisheries Forum meeting

Dalsgaard, A., Vuong. T.A., Tram, N.T., Hoa, N.V., Borin, C., Rosenberg, C., and Cam, P.D. 2004. Microbiological water quality and food safety of water spinach (*Ipomoea aquatica*) produced in peri-urban wastewater in Boeng Cheung Ek lake, Phnom Penh, Cambodia. Oral presentation at the 7th Asian Fisheries Forum, 29 Nov – 3 Dec, 2004, Penang, Malaysia.

Vuong, T.A., Cam, P.D., Phuong, P.T., van der Hoek, W., Vicheth, C., and A. Dalsgaard. 2004. A study on skin problems among people engaged in wastewater-fed culture of water spinach in Phnom Penh, Cambodia. Oral presentation at the 7th Asian Fisheries Forum, 29 Nov – 3 Dec, 2004, Penang, Malaysia.

Marcussen, H., Joergensen, K, Dalsgaard, A., and P.E. Holm. 2004. Accumulation of toxic metals in aquatic production systems receiving urban wastewater in Cambodia and Vietnam. Oral presentation at the 7th Asian Fisheries Forum, 29 Nov – 3 Dec, 2004, Penang, Malaysia.

Abstracts of the three 7th Asian Fisheries Forum presentations were prepared for publication at the RUAF website.

Abstract to be presented at the 8th International Conference on the Biogeochemistry:

Marcussen, H., Joergensen, K., Holm, P.E. and Dalsgaard, A. Accumulation of toxic metals in aquatic foods cultivated with use of urban wastewater in Southeast Asia. 8th International Conference on the Biogeochemistry of Trace Elements, Adelaide, Australia, 3.-7.4.2005

Newsletter

A newsletter on the seminar "Status of aquatic production system in peri-urban Hanoi" which took place in Hanoi on December 12th 2003 has been published in the Vietnamese Journal of Aquaculture No 12 Year 2004. Further information about the newsletter is included in the Annex.

Research protocols

Standard research protocols have been prepared for all activities in Phnom Penh and draft protocols have been prepared for the planned activities in Thanh Tri district, Hanoi. Protocols are not shown in annexes but can be made available upon request.

Research priorities and experiences problems

The research priorities for the WP2 and WP5 activities to be conducted in 2005 will be studies of 1) skin problems among workers engaged in culture of plants and fish irrigated with wastewater; 2) food safety of wastewater-fed plants and fish; and efficacy of wastewater-fed ponds/lakes as low-cost wastewater treatment technologies. These studies will be conducted at field sites in Phnom Penh and Hanoi areas.

Due to the research priorities mentioned and limited resources, the following activities and laboratory analyses originally proposed in WP2 will not be carried out: 1) microbiological food safety and water quality studies at sites in HCMC and Bangkok; 2) studies on the overhung-fish pond production systems in HCMC, which have been banned by the Vietnamese Government; 3) the main international recognized microbiological indicators of fecal pollution, i.e. thermotolerant coliforms and helminth eggs, will together with protozoan parasites be studied in food and water samples. Thus, other proposed parameters like Salmonella will not be studied; 4) Fish and plant samples will be studied but not molluscs, crustacea and amphibian sample types; and 5) heavy metals, but no chlorinated hydrocarbons, will be studied.

In relation to WP5, fecal samples will not be collected as preliminary findings from PAPUSSA and other activities in Vietnam have indicated that priority should be given to studies of skin problems rather than problems with gastro-intestinal diseases. Assessment of risks in Thailand, Cambodia and southern Vietnam based on assessment of health status using indicators derived from secondary data will not be carried out as such data can not be made available/is not available. Intervention studies will primarily be carried out in Hanoi and Phnom Penh.

A number of difficulties were experienced in preparing and implementing activities in Phnom Penh, including related to sample collection, processing and microbiological analyses. However, good collaborations between NIHE/KVL and local institutions, including the PAPUSSA partner RUA have enabled the studies mentioned to be well-planned and initiated despite very difficult working conditions and limited human resources.

Planned activities for 2005

Visits to field sites/institutions and research in Phnom Penh

Several visits by NIHE and KVL staff are anticipated to field sites and partner institutions in Phnom Penh to follow-up on field activities.

Studies on microbiological water quality of the lake wastewater (inlet/outlet), food safety of wastewater-irrigated plants and skin problems among workers engaged in wastewater-fed aquatic plant culture will be conducted.

Research activities in selected communes in Thanh Tri district, Hanoi

Studies on microbiological water quality of wastewater in selected fishponds (inlet/outlet), food safety of wastewater-irrigated aquatic plants and skin problems among workers engaged in wastewater-fed plant culture will be initiated in March 2005 for an initial duration of 9 months.

Risk assessment for different types of PAFPS

An overall qualitative risk assessment model will be developed for the different types of PAFPS in PAPUSSA. If available resources allows, semi-quantitative or quantitative model will be prepared for specific PAFPS. The sub-contractor mentioned in the PAPUSSA contract will be hired to do these risk assessments in close collaboration with mainly KVL, but also NIHE and other PAPUSSA partners.

INDIVIDUAL PARTNER ANNUAL REPORT
2004

INCO-DEV Project: PAPUSSA
Proposal No: ICA4-2001-10072

Partner 4: University of Durham, UK

Personnel involved in project:
Professor Jonathan Rigg (Principle Investigator)
Mr Albert Salamanca (Research Assistant and PhD student)

Summary

This year has seen a great deal of activity, most notably the completion of the baseline survey and two of the three monitoring surveys. The third monitoring is scheduled to be undertaken in February 2005. In addition Rigg and Salamanca attended the second P&P meeting in Penang in December 2004 and a survey design and training workshop in Thailand in February 2004. Salamanca has also, and separately, played a pivotal role in maintaining communication between the partners, including visiting them in-country to provide advice and guidance on conducting the surveys and on data entry. The majority of the data is now collected and entered and a clean database is close to completion. Production of preliminary and largely descriptive statistics has been achieved. Meetings between Rigg and Salamanca were arranged in September 2004, largely for PhD supervision purposes, to coincide with a separate visit of Professor Rigg to the city.

ACTIVITIES

Meetings and workshops attended

1. Survey design workshop at AIT, Bangkok (9^{th}-13^{th} February 2004) Rigg and Salamanca both attended and contributed to a survey design workshop coordinated by Stirling. This produced the framework for the baseline and monitoring surveys. An Access training course for the country partners from Cambodia, Thailand and Vietnam was also organised around this meeting. Rigg gave a seminar at the Asian Institute of Technology (AIT).

2. Meeting in Bangkok (4^{th}, 5^{th} and 9^{th} September 2004) Rigg and Salamanca had three meeting during a visit to Bangkok by Rigg financed by another project. These meeting largely focused on Salamanca's PhD progress.

3. P&P meeting in Penang (2^{nd}-6^{th} December 2004) Rigg and Salamanca attended the second P&P meeting which was arranged to coincide with the 7^{th} Asian Fisheries Forum. They presented a paper at the conference as well as attending the P&P meeting and an Access database analysis training session held on the 6^{th} December. Salamanca provided assistance to the University of Stirling in planning for this P&P meeting in Penang.

Report and manual preparation

1. Preparation of baseline and monitoring surveys Following the meeting in Bangkok in February, Salamanca played a pivotal role in producing and then fine-tuning the baseline and monitoring surveys, liaising with country partners and ensuring that concerns of the partners were addressed and, where appropriate, incorporated.

2. Baseline and monitoring survey handbook Salamanca also took a leading role in the preparation of an extensive survey handbook, essential to ensuring that the survey is carried out in a common manner across the four selected sites.

3. Paper for 7th Asian Fisheries Forum Rigg and Salamanca completed a paper for the 7AFF with the title "Urban development, land policy and the future of peri-urban aquatic food production systems in Southeast Asia".

4. Printing and distribution of the SOS reports The SOS reports for each of the four sites were printed and made available for distribution at the end of 2004. Salamanca made a considerable contribution to this process, helping with editing and coordination.

5. Preliminary PhD chapters Salamanca wrote two preliminary chapters on the research issues, questions and methodology of his PhD. The aim of the drafts is to help him focus and refine his field work activities and identify the links between his PhD research and the wider project.

Field visits and technical assistance to partners

1. Meeting in Phnom Penh (26th – 28th Apr 2004) Salamanca travelled to Phnom Penh to follow up on survey administration

2. Meeting in Hanoi and HCMC (21st – 26th June 2004) Salamanca travelled to Hanoi and HCMC to assist University of Stirling in following up the outcome of questionnaire administration.

3. Database management training (September 2004) Salamanca assisted a consultant hired by the University of Stirling to provide training on the use of MS Access to manage and analyse the baseline and monitoring databases.

4. Hanoi, HCMC, Phnom Penh and Bangkok (6th – 29th Oct 2004) Salamanca travelled to these cities together with a consultant from the University of Stirling to train partners in database management and analysis.

Challenges in 2004

As noted in the 2003 Annual Report, the late start to the project has had implications over the last year as we have tried to meet activity deadlines. The baseline and monitoring surveys were undertaken a few months later than we would have hoped, and the SOS reports have also been delayed. While the implications have possibly been greatest for the Asian country partners, there have also been ramifications for the University of Durham; this Annual Report will focus on these latter impacts.

From a Durham perspective, the main implication has been the additional demands placed on Salamanca. Salamanca has come to fill a pivotal role in the project. Based in Bangkok (at the Asian Institute of Technology [AIT]) for the last 18 months, he has been geographically closer to the Asian country partners and has been drawn into more of the day-to-day administration and coordination than was originally envisaged, including two extended visits to the partners during June and October 2004 for training and follow up purposes. He has been happy to take on these additional responsibilities and, moreover, has done so very effectively and efficiently. The administrative changes at AIT Aqua Outreach noted in last year's report have also contributed to this increase in responsibilities. This has had implications for the amount of time that Salamanca has been able to allocate to his PhD during 2004.

Inevitable with such a large team of researchers, there have been glitches and difficulties; these, though, have been managed satisfactorily from a UoD point of view and we are enthusiastic about the research prospects for 2005: with the survey largely complete the task of making sense of our data and drilling down to elucidate the complex social, institutional and economic contexts within which peri-urban aquatic systems are situated lies before us!

Publications, reports and surveys

1. Baseline survey A baseline survey was drawn up and implemented in 2004, covering more than 800 households across the four sites (200 in each site).

2. Monitoring survey The first two periods of monitoring were also completed in 2004 for the selected 800 households; the final monitoring will occur in early 2005.

3. Compilation of database In November Salamanca compiled the national databases into one regional database incorporating both the baseline and regional surveys.

4. Survey handbook An extensive handbook was produced to inform, guide and support the survey.

5. Four SOS reports (Bangkok, Hanoi, Ho Chi Minh City and Phnom Penh) The four SOS reports, in four languages (English and the regional language), were completed.

6. Paper for 7th Asian Fisheries Forum, Penang, Malaysia Rigg and Salamanca wrote a paper entitled "Urban development, land policy and the future of peri-urban aquatic food production systems in Southeast Asia" for the 7th Asian Fisheries Forum in December 2004.

Achievement of planned activities for 2004

In our 2004 annual report we listed five planned activities for the forthcoming year…

✓ Meeting in February 2004 Rigg and Salamanca met, as planned

✓ Pre-implementation meeting/s with partners This was achieved during the survey design meeting and workshop held in Bangkok in February 2004

✓ Coordination meetings with other PIs in other WPs The integrated and participatory design of the survey framework and protocols, the survey meeting in February, and Salamanca's trips to Hanoi and Ho Chi Minh City in June 2004 all helped to cement links and help in coordination.

✓ Social and policy analysis/monitoring This was explicitly built into the monitoring elements of the survey; as noted above, two of the three monitoring elements have been completed and the third is due for completion earlier this year.

✓ Negotiation for the extension of Mr Salamanca's stay in Bangkok This has been agreed.

Planned activities for 2005

1. Salamanca and Rigg will meet in January and March 2005 Rigg has arranged to see Salamanca in Bangkok and/or Hanoi during 2005 to keep abreast of progress and to maintain communication. This will be important in terms of focusing Salamanca's PhD research and building synergies between this and the broader project objectives.

2. Analysis of baseline and monitoring surveys One of the key tasks for the first half of 2005 will be to begin the process of analysing the data collected during the baseline and monitoring surveys. UoD will look particularly at the comparative, regional dimension of the project, leaving much of the country analysis to the country partners

3. 'Add-on' research The second major activity for 2005 will be to identify and undertake additional pieces of focused research, of a more qualitative nature, in line with the aims of WP7. What these will be an outcome of the initial analysis of the baseline (particularly) and monitoring surveys. Salamanca and Rigg will negotiate individually with the country partners to arrange a suitable time to carry out this work with their support.

4. Papers It is also anticipated that during the latter part of 2005 a series of papers will be written – probably as drafts – based on the work and analysis. Rigg together with other PIs plan to write an opinion piece in a major national daily in the region on peri-urban aquatic production.

INDIVIDUAL PARTNER ANNUAL REPORT
2004

INCO-DEV Project: PAPUSSA
Proposal No: ICA4-2001-10072

Partner 5: Research Institute of Aquaculture Nos 1, Hanoi

Personnel involved in project:

1	Dr. Pham Anh Tuan	Team Leader/Principal Investigator
2	Ms. Nguyen Thi Dieu Phuong	Researcher
3	Mr. Pham Bau	Researcher
4	Ms. Ho Kim Diep	Researcher
5	Ms. Nguyen Thi Hanh Tien	Researcher

SUMMARY

The main objectives to be met by the RIA-1 partner in the second year of the project (2004) were to carry out Work Package 3 (WP3) with livelihoods and production monitoring of Hanoi peri-urban aquatic food production systems. The activities of WP3 have enabled us to gain a deeper understanding of livelihoods and aquatic production systems in Hanoi peri-urban areas at the household level.

ACTIVITIES

RIA1 carried out WP3 to assess livelihoods and aquatic production systems which included four separate sets of household questionnaire surveys: Baseline and three monitoring surveys throughout the year. Water quality samples were also taken from representative sites in order to assess the treatment capacity/potential of typical waste water aquatic production systems and analyzed.

1. Design Questionnaires (Workshop Bangkok, 8-14th Feb.)

- Forms of each questionnaire were drafted: Baseline and monitoring questionnaires were designed and discussed by staff of Stirling, Durham and the 4 Asian partners (Hanoi, Ho Chi Minh, Bangkok and Phnom Penh). The questionnaires were made up of three basic components:

  - Household socio economic information,

- Production systems information
- And health related issues.

The duration of the surveys related to covering seasonality throughout the year. Choosing households and mapping households production systems were discussed and then a pilot of each of the questionnaires was carried out by all 4 partners. It was agreed to survey 200 households representative of aquatic production systems in each city in the year 2004 with an extra 10% surveyed to allow for any unresponsive or unwilling households.

- The uses, construction and associated analysis using an Access database were introduced by Dr. Francis Murray (University of Stirling) to staff of 4 cities as a powerful tool to collect and analyze data from the baseline and monitoring surveys.

2. Baseline & the first Monitoring survey (14th Apr. to 18th Jun.)

A total of 216 households in 4 communes were chosen and surveyed with both the baseline and monitoring 1 surveys carried out at the same time when staff visited households. Table 1 shows the numbers of household surveyed in each commune with 7 households pulling out not being willing to answer our questionnaires.

Table 1. Number of household surveyed in 4 peri-urban communes of Hanoi

Commune	No. of HHs	Aquatic production systems
Tran Phu	53	- Fish polyculture in wastewater (ww) - Water morning glory/dropwort
Hoang Liet	30	- Water mimosa/dropwort, - Water morning glory/ dropwort/cress - Water morning glory/dropwort,
Dong My	66	- Fish seed nursing in wastewater - Fish polyculture in wastewater
Duc Tu	60	- Fish polyculture in non-ww in VAC system (garden, pond, livestock), - Rice/fish
Total	209	

3. Mapping

In each of the 4 communes: Tran Phu, Dong My, Duc Tu and Hoang Liet from our considerable field work and observations we produced 4 general maps of each of the communes to show the household's aquatic production systems within the commune. Also we also produced an individual map for each household showing their fish and aquatic plant ponds, their areas and relating the system to features around them eg vegetable gardens, (waste) water pumping stations, outlet, inlet, etc.

4. The second Monitoring survey (15th Aug. - 30th Sep.)

The 2nd monitoring survey was carried out from 15th Aug. to 30th Sep.2004 in the same communes and households, with a total of 209 households surveyed.

5. Access database training (11th-15th Oct.)

The Access database training was conducted by Dr. Francis Murray & Mr. William Leschen (Stirling) and Albert Salamanca (Durham). Before the training RIA1 practiced and familiarized itself with the Access database sent out by William Leschen. By the end of training RIA1's staff could actively carry out data entry and manage database records.

6. Data cleaning and entry (11th Oct -20th Nov.)

All data entered were checked and cleaned for coding of the data.

Both baseline and monitoring 1 and 2 data entry were completed into the database by 20th Nov.

Entered data was rechecked for errors and missing data.

7. Primary data analysis & presentation (20th – 29th Nov.)

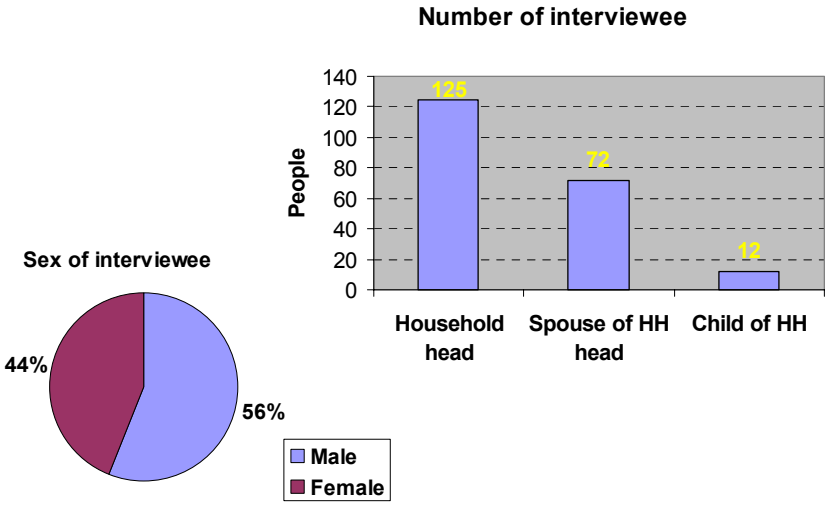
Primary baseline data were analyzed for the presentation at Papussa's 2nd annual Progress and Planning (P&P) meeting in Penang (4 - 5th Dec. 04) and identification of possible interventions for year 3's work plan were set. The summary of baseline survey analysis is shown in the following section:

- Household identification
- Institutional membership

- Housing and economic infrastructure
- Domestic water source
- Household income/credit for aquatic systems
- Aquatic food production systems
- Health and consumption issues
- The future

Preliminary Results of Baseline analysis in 209 households:

- Average age of interviewee: 45± 0.63, Max: 70 and Min: 18



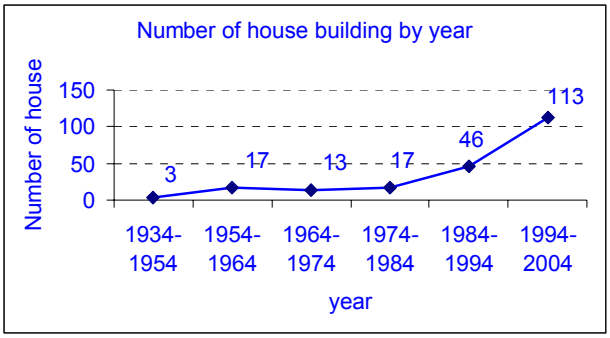
- Household heads interviewed were 100% Vietnamese of the Kinh ethnic grouping with each household (HH) having on average 4-5 members 99% of whom following the buddist religion.
- 97% of Household heads were born in their current residence and 3% from outside.

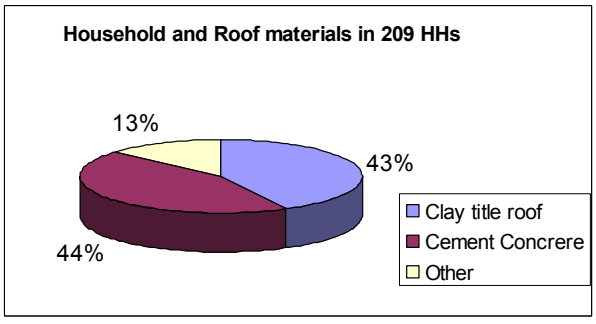
- In the 209 Households, there are 80 better-off HHs, 111 HHs- medium and 18 HHs-Worse-off
- Institutional membership: 1430 persons are members of institutions made up of 1389 ordinary member (97.1%) and 50 executive positions (2.9%).

Institutional membership

No.	Name of some Institutions	Count No. of member involved
1	Joint Co-operative Organization	385
2	Farmer Union	385
3	Women Union	222
4	Youth Union	213
5	Elderly Union	76
6	Trade Union	47
7	Party committee	28
8	Veterans Organization	19
9	Coeval Union	17
10	Fish Farmers Organization	15
11	Gardener Union	5
12	Civil defence	5
13	Bird culture Union	1

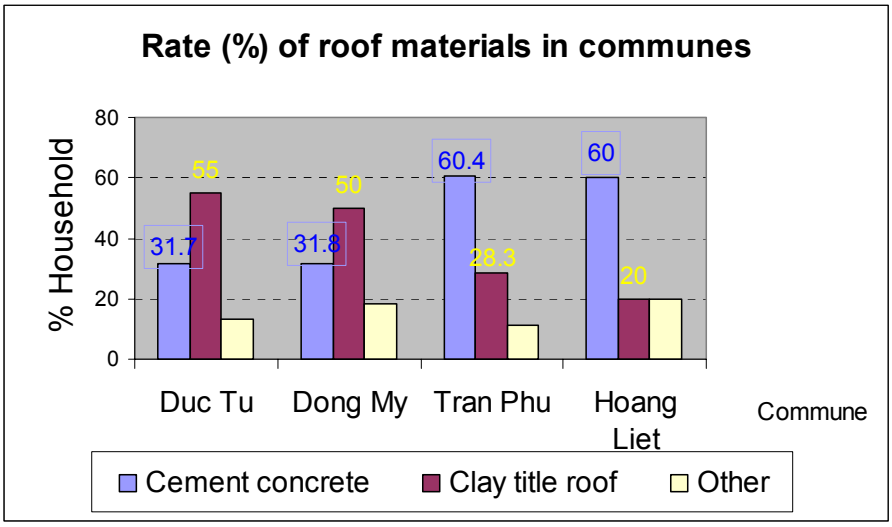
Housing





From our baseline survey the majority of households interviewed were living in newer houses built from 1984-1994 (46 houses) and from 1994- 2004 (113 houses). One of indicators for household's wealth of economic is the house's roof. Results from the households surveyed show 44% of house's roofs were made from cement concrete, 43% from clay tile roof and 13% other. From this we can conclude that Tran Phu and Hoang Liet communes are

weathier than Dong My and Duc Tu communes, with the rates of cement concrete roofs respectively 60.4%, 60%, 31.8% and 31.7% of households.



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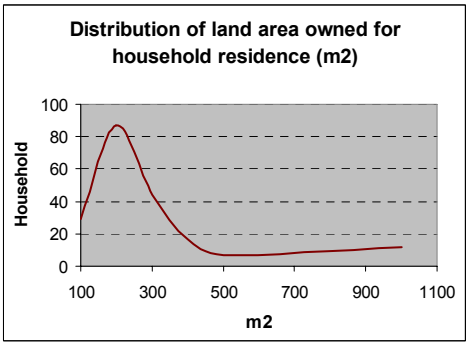
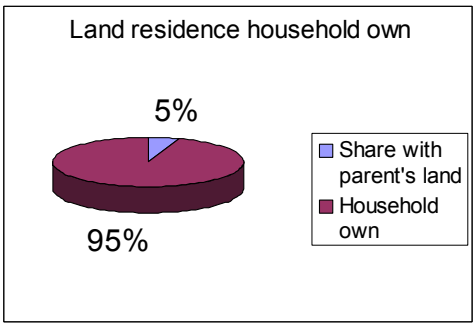
Land Areas for household residence

Ownership issues





Distribution of land area owned for HH residence from 100 to 300 m^2 is more popular than from 300-500 m^2. About 90% of HHs owned their own land residence and the rest 5% HHs live with their relations.

Main production systems: Fish/prawn

Systems	No. HH involved	Average size of system (m^2)	Average Productivity (Ton/ha/year)	No. crop
Fish nursing ww	58	2,028	For grow-out	2
Fish nursing Non ww	13	3,996	for grow-out	2
Non ww fish polyculture	45	4,568	4.54	1
WW Fish polyculture	67	7,910	5.4	2
WW fed Fish in swamp	20	53,389	5.49	4
Rice/fish	11	67,872	1.46	1
Prawn	6	12,656	0.35-1.08	1

The area of fish production systems varied from 2028 m^2 to 67872 m^2, fish production varied from 1.46 to 5.49 ton/ha/year and depend on systems. But wastewater fed fish seem the largest (average 53389 m^2) land area and highest production (5.49 ton/ha/year) compared to other systems.

Main systems: Aquatic vegetables

Systems	No. HH involved	Average size of system (m^2)	Average Productivity (Ton/ha/year)	No. crop
Morning glory WW	64	589.06	87	1
Morning glory for fish livestock, HH consume	49	767.15	-	1
Mimosa/dropwort	18	864.94	153	2
Morning glory/ Dropwort/Cress	12	387.83	197	3
Morning glory/Dropwort	8	232.50	275	2
Mimosa/dropwort/cress	6	888.50	179	3
Morning glory/cress	3	156.00	230	2
Mimosa/cress	3	401.00	204	2

Water morning glory is the most popular aquatic plant both for human consumption and for livestock with the highest number of people involved in growing it in our survey (>113 HHs). Some aquatic plant farmers rotate their crops during the year in order to get higher production and thus income. The highest aquatic production is rotation of morning glory and water dropwort at 275 ton/ha/year.

There are difficulties in communities during production, shown in this summary table below (number in table is ranking of difficulties 1 = most important):

Difficult	Duc Tu	Dong My(waste water)	Tran Phu (waste water)	Hoang Liet (waste water)
Fish Disease	1	4		
Lack of knowledge/technique	2			
Low quality of fish seed	3	3	4	
Lack of capital	4	2		
Lack water for production	5	1	1	1
Lack access to market		5		
Aquatic plants disease				2
Low quality of water				3
High input cost			2	4
Loss land use				5
Fall market price			3	
Short time auction			5	

For the 3 study communities which utilized waste water their most important difficulty in production was lack of water for production. Following problems were fish and aquatic plant diseases, as well as lack of capital and training and knowledge in new production techniques.

8. Water sampling (28th Oct. - 4thNov.)

Following the protocol/guideline of Mr. William Leschen, RIA1 carried out water sampling: in Tran Phu, Dong My for waste water and Duc Tu commune for non waste water systems.

In total 4 sites with 16 separate sampling points - used in the cultivation of fish or aquatic plants were sampled for water quality analysis of temperature, DO, pH, conductivity, NH_4, NO_2, NO_3, total Phosphate, Ortho-Phosphate, BOD, Hardness, Alkalinity. Water samples were taken from inlets and outlets of ponds and main channels.

9. Meetings

9.1 The 7th Asian Fisheries Forum in Penang, Malaysia (30th Nov.- 3rd Dec.)

A special session on: "Aquatic Production Systems in Peri-urban SE Asian cities" was organised by Dr. Dave Little (UOS) as part of the 7th Asian Fisheries Forum in Penang. Ms.

Phuong and Ms. Diep were the representatives attending from the Research Institute for Aquaculture No.1 (RIA1) and participated in this special section. All 4 cities had the opportunity to present a summary outcome of the first year's work of the project to the international audience present at the forum. RIA1 presented "Status of Aquatic Production Systems in Hanoi". This presentation is also now being modified into an article which will be submitted for a special peri-urban aquaculture edition of the Urban Agriculture Magazine (RUAF- Netherlands) to be published in March 2005.

The copies of the SOS (State of the Systems) reports which were disseminated out at the forum with names of the receivers being taken who will then be contacted later for their feedback through a standard short questionnaire.

9.2 Progress and Planning (P and P) meeting in Penang, Malaysia (4 - 5th Dec. 2004)

The results of the household baseline survey in Hanoi in 2004 were initially analysed and presented at the P&P meeting. Problems and difficulties of surveying the households were summarised and subsequent ideas for interventions for both fish and aquatic plants for next years work presented by each of the 4 cities. Discussion during the meeting centred on choosing interventions for next year, water sampling, SOS report dissemination, list of deliverables, annual report, dissemination WP8, and other related matters.

9.3 Initial dissemination of the SOS reports

The SOS report for Ha Noi was completed during 2004. This report was not written in the format of a scientific report, instead it is written into two languages (English and Vietnamese) and contains many photos and presents data in an easily understood way so that most people reading can understand it.

We are planning to start disseminating the SOS reports in January 2005. In December 2004 RIA1, Stirling and RUAF in the Netherlands have collaborated to produce a short questionnaire form which will be included with each SOS report in order to firstly begin a process of engagement and dialogue with various groups of stakeholders, and secondly illicit feedback from them on the content and format of the SOS reports. RIA1 has translated the questionnaire into local language. The SOS report will initially be sent out to different

categories of stakeholders i.e. at local and Ministry policy and planning level, NGOs, etc. including farmers, those working in marketing, journalists, researchers, lecturers, etc. It is important to stress that our dissemination and engagement is targeted not just at aquaculture and fisheries related stakeholders but equally importantly to other related stakeholders at local and higher planning levels e.g. – urban water and sanitation, public health, agriculture, environment, leisure etc

10. Editing of reports

Ms. Phuong (RIA1) was involved in editing reports of the PAPUSSA project with Ms. Arlene (AIT) for the State of the System Report: North Vietnam, series No. 4/2003 and together with Mr.William Leschen (Stirling University) for the edition of the reports of Marketing channels of fish and aquatic plants in Hanoi, Institutional analysis in Hanoi, overall Participatory Community Appraisal in Hanoi and Participatory Community Appraisal in Bang B village, Thanh Tri district, Hanoi. All those reports are available on the project website: http://www.ruaf.org/papussa/index.html

11. Other outputs

There were some other outputs from the members of RIA1's team for the year related to PAPUSSA:

Visit to Stirling University 20th Apr. to 15th May

Ms Phuong visited the University of Stirling from 20th Apr. to the 15th May for:

- finalizing her PhD proposal and continuing her literature review
- working with Mr. Will in editing the Marketing, Institutional and PCA reports.
- She was also involved in training seminars for PhD. students
- also training courses for computers and reports writing
- database training from Dr. Francis Murray
- visiting a local fish farm and hatchery (Howietoun fish farm).

Overall the visit was very beneficial for her knowledge and improved her English both in conversation and also in reports writing.

- Ms. Tien – a student of University of Fisheries, Ha Noi studied "The status of social – economic and aquatic production systems in Dong My commune, Thanh Tri district, Hanoi city" for her_BSc thesis. She then gave a presentation of her thesis based on Papussa's analyzed Baseline survey data in Dong My commune (this years activity). She is presently working for the PAPUSSA project as an able and valued researcher.

- Ms. Phuong published an article entitled "The development of Bang B village- one of the major areas of aquatic vegetable production in Peri-urban Hanoi" which is available on the Papussa Project website.

- A comprehensive **collection of photographs** relating to Ha Noi's aquatic production systems were taken throughout the year whilst working in the field, a selection of which are now available on the project web-site.

- All the reports **Institutional Assessment, Marketing Analysis, PCA's, and Annual report** from year 2003 are available on the project website.

- The (4) Community and individual (200) household's maps were completed by members of RIA1's team: Mr. Bau, Mrs. Diep and Ms. Tien.

- Ms. Phuong also gave a presentation "**Marketing channels of fish and aquatic plants in Hanoi"** from 21st - 23rd Dec. at the National Conference of Science and Technologies in Fisheries recently held at Vung Tau province, Vietnam.

– The RIA1 team initially handed out 70 of the SOS reports at the above conference and took all of the names/addresses of the receivers in order to contact them again in the near future for their views and feedback on the content of the reports.

- The team, especially Mrs. Diep, also helped Mr. William Leschen for the initial sampling programme and field work for his ongoing PhD which is examining the prevalence and impact of food borne trematodes in peri-urban aquatic production systems in Ha Noi.

- The RIA1 team also worked in collaboration with the National Institute of Health and Epidemiology (NIHE) Ha Noi during the year for water sampling and the health questions in the surveys.

PROBLEMS FACED

- Database late: training, entry, analysis
- No plan water sampling for RIA1 from last P&P and meetings before – to remain passive
- Not enough time and capacity analysis data from new Access database for P&P meeting, only Baseline/ not enough evidence from data analysis available to prepare for next years interventions.
- These factors have all affected our progress next year: survey monitoring 3 + water sampling + intervention progress.

PLAN OF ACTIVITIES FOR 2005

Activities	Planning Time
Final monitoring survey (3rd)	15 Dec. to 30 Jan.
Check data entry of the 1 & 2nd monitorings	15 Dec. to 30 Jan.
Data entry of the 3rd monitoring	Feb.
Water sampling	Jan-Sep
Interventions	Mar. to Sep.
Baseline/monitoring analysis	Feb. to April
Reports for 2004	April-Sep.
Intervention analysis and report 2005	Sep. -Dec.

INCO: International Scientific Cooperation Projects (1998-2002)
Contract number: ICA4-CT-2002-10020

INDIVIDUAL PARTNER ANNUAL REPORT – 2004

Partner 6: University of Agriculture and Forestry (UAF)
Ho Chi Minh City, Vietnam.

Personnel involved in project:

1	Dr. Le Thanh Hung	Principal Investigator
2	Mr. Huynh Pham Viet Huy	Research Assistant
3	Mr. Tran Van Minh	Fieldwork staff
4	Ms. Nguyen Thi Thanh Truc	Fieldwork staff
5	Ms. Bui Thi Phuong Thao	Fieldwork staff
6	Mr. Pham Ngoc Tam	Fieldwork staff

OBJECTIVES

The main objectives of the project in the year 2004 were:

- To analyse household-level livelihoods of representative primary stakeholders
- To monitor the impacts of seasonality and shocks on technical production and impacts on producers, intermediaries and consumers
- To study the role of Peri-urban Aquatic Food Production Systems (PUAFPS) in 4 selected sites in and around HCMC

ACTIVITIES

1. Workshop for planning in Bangkok 9th – 13th February 2004

In order to achieve year two's objectives, a planning workshop was held at the Asian Institute of Technology (AIT), Bangkok, Thailand to jointly set up standardized Household Baseline and Monitoring Survey Questionnaires for the 4 city partners as a basis for setting up and using a joint database in Access for all 4 city partners and thus the whole project. Also the workshop was summarising and clarifying the objectives of work to be done in year 2004 – and how it would lead into WP's 5, 6, and 7 in year 2005. Mr. Huynh Pham Viet Huy attended the workshop during 9th – 13th February 2004 as a representative from the UAF-HCMC partner.

2. Baseline and monitoring surveys

Piloting the questionnaires

As agreed in the planning workshop, questionnaires had to be piloted before conducting the actual surveys. This step was done in the two weeks during 15th – 30th March 2004. The piloted questionnaires were then sent to Stirling University along with a checklist in order to aggregate information for completion of the questionnaires.

Conducting baseline and monitoring surveys:

Before the actual survey was conducted, some steps were required as follows:

- Obtaining a list of every household of the community
- Identifying the households involved in the systems (through key informants)
- Randomly choosing samples for the survey

As agreed in the first annual Progress and Planning meeting (P&P) meeting in December 2003, a total of 200 households involved in peri-urban aquatic production systems were chosen for the surveys. The overall sample was divided into 6 sites in order to meet the requirement of 200 households and to cover the various different types of aquatic production systems present in and around HCMC. The selected sites were partially from PCA communities we had worked with in the first year but some extra communities were also included. Therefore samples were taken in following communes:

Phong Phu, Da Phuoc – Binh Chanh district,
Tam Phu – Thu Duc district,
Thanh Xuan – District 12,
Dong Thanh – Hoc Mon district, and
Long Thanh My – District 9

According to the real situation of all Asian partners in 2004, the methodology of WP3 was changed in comparison to what was proposed in the initial project proposal. It was found irrelevant to have biweekly monitoring because it wouldn't say much about the seasonal changes and shocks. In addition, 30 households would not be able to represent the whole context for each city partner. Therefore the above modified sampling method was made and applied to have a wider, more comprehensive picture of each city, whilst all seasonal changes and shocks would also be reflected. Therefore a modified methodology was applied for all cities partners, including UAF. However the final sample was 197 households as some households were rejected during data entry when they were found not to be relevant.

The baseline and first monitoring surveys were combined and conducted during the period of 4th April – 20th June 2004. The second monitoring survey was started on 15th August and finished on the 15th October 2004. All project staff (Mr. Huy, Mr. Minh, Ms Thao, Ms. Truc and Mr. Tam) were involved in all of the surveys. The third monitoring will be carried out early in year 2005 (January and February).

3. Completion of State of the System (SOS report) – January - May 2004

Along with surveying activities, the UAF partner was also taking part in the final steps of editing and fully completing the SOS report that was initially produced in year 2003 with AIT partner (Ms. Arlene). The final version of the SOS report was actually completed in May 2004. It has been published and disseminated at the time of year 2004 P&P meeting and will be continuously disseminated and evaluated in year 2005 as an intervention and output of the project.

4. Database training - 15th to 20th October 2004

As an important step to initiate the data entry, database training was held by Stirling University (Dr Francis Murray) in co-operation with Durham University (Mr Albert Salamanca) at UAF- Ho Chi Minh City on the 15th to 20th October 2004. Project staff were trained on database structure, how to carry out data entry and how to resolve problems faced during data entry. The training was very much helpful to the project staff who hadn't practiced Access database before. After this training a relatively complete database was formed and circulated for project partners to enter their baseline data for preliminary analysis.

5. Data entry - 25th October to 11th November 2004

After being trained, all 4 project staff were involved in baseline data entry process which was done during the period of 25th October to the 11th November 2004. Following the suggestion of the trainer, data were aggregated into one set of databases using a local network which helped to avoid errors of synchronizations at the end of each day/week for good database management and checking.

6. Preliminary analysis of baseline data and preparation of presentation – 11th – 29th November 2004

As it was fairly late in the progress of the year, only preliminary analysis (responsibility of and carried out by Mr. Huy) was able to be conducted to have general findings from year 2004's work. Please note that these are only our initial findings from the baseline survey data. Following on from this next year a full analysis of both the baseline and three monitoring surveys will be carried out in order to produce an overall report.

The initial findings can be summarized as follows:

Most of samples were taken from fish polyculture, fish monoculture, water mimosa and morning glory farmers as they are the most popular and typical aquatic systems in HCMC.
In many study places and for most of the systems, household heads were native residents

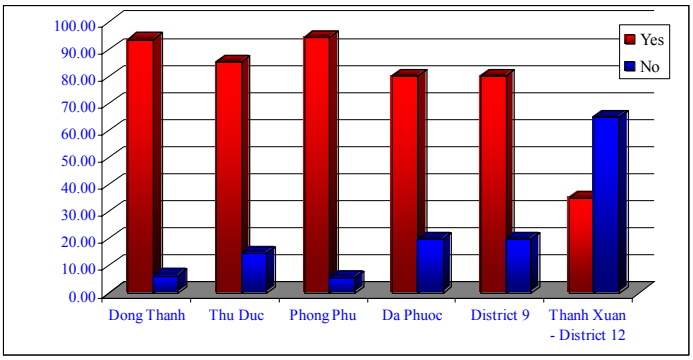


Figure 1 Percentage of farmers being native residents and non-native residents

meaning that they have been living in their place for long time. Only Thanh Xuan commune, District 12 is an exception where many migrants come to earn their living by doing water mimosa culture.

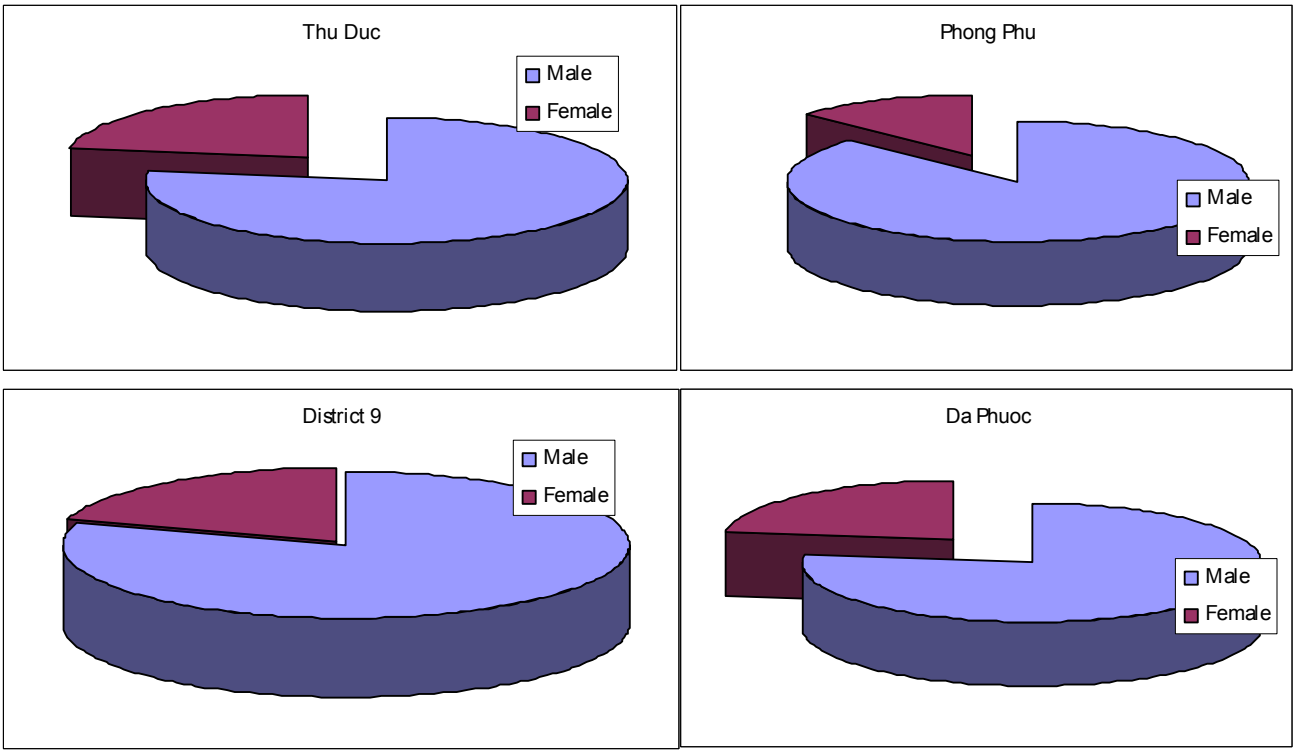
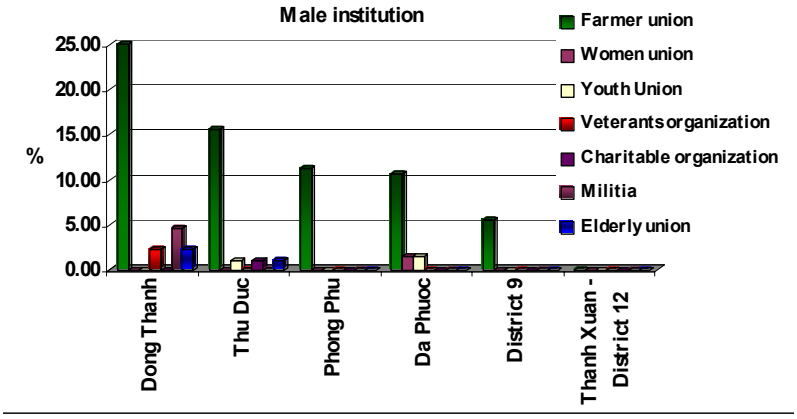


Figure 2 Male and female ratios of population surveyed in different study communities

Mens and womens populations are about the same in the study areas but men are more likely to be household heads in all the places and for many production systems.



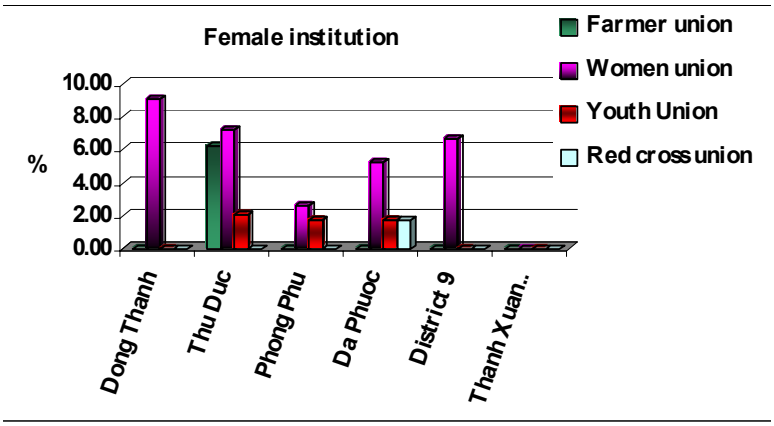


Figure 3 Institutional involvement for men and women

As far as institutional membership and interaction Farmers organizations were the most popular institution for men within the 200 households interviewed, with the Womens Union being the most popular for women. Participation of farmers in these institutions varied between sites. Very few farmers in Thanh Xuan are joining any institution. This could be because they are not allowed to join as they are not permanent residents. As a result this also might be a limitation for them to have equal access to resources such as technical information or training.

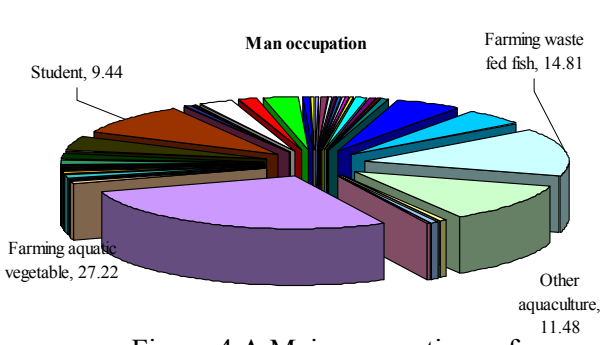
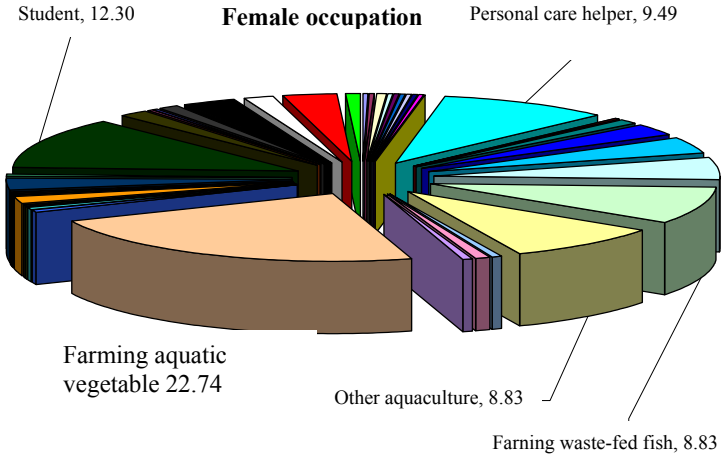
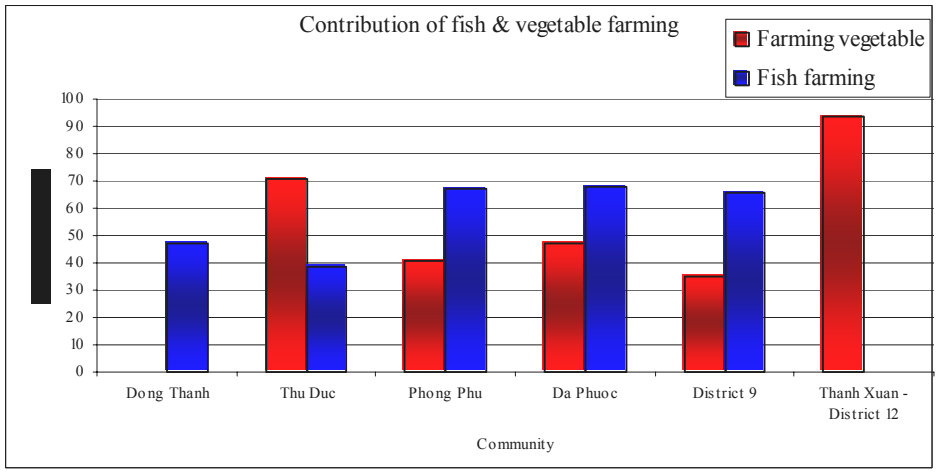


Figure 4 A Main occupations of males and females in households surveyed members



Regarding the 200 household members' occupations, although their income earning activities are diverse, most of them are involved in aquatic production systems. Farming aquatic plants, wastewater-fed fish culture, and personal care helpers are the most common jobs for women, whilst wastewater-fed fish culture, non-wastewater fish culture, aquatic plant cultivation and



being a student were the more frequently recorded for men.
Figure 5 Contribution of fish and aquatic vegetable farming to household incomes

Contribution of fish farming to income of households in some places is higher than in some others and conversely aquatic plants contribute more in some places than in some others. This is dependent on what aquaculture activity is the majority in a place. Thu Duc and Thanh Xuan are typical aquatic plant communities thus aquatic plants contribute more to household income than fish farming.

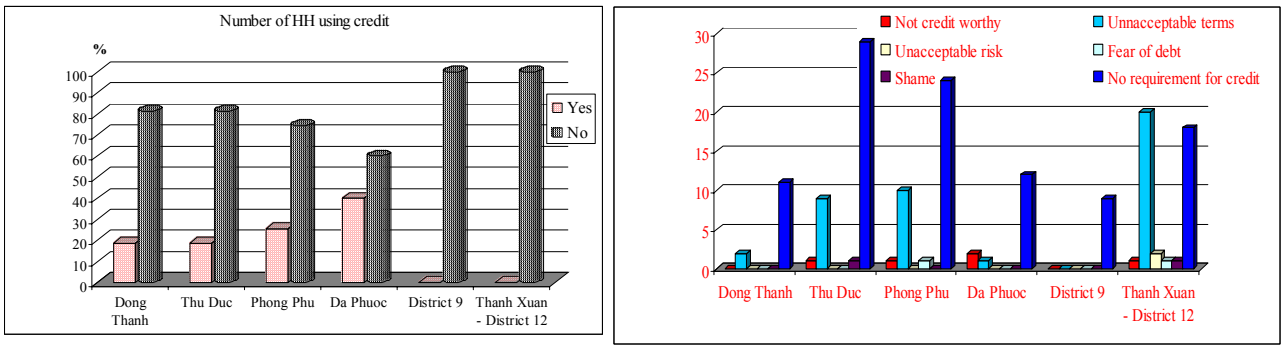
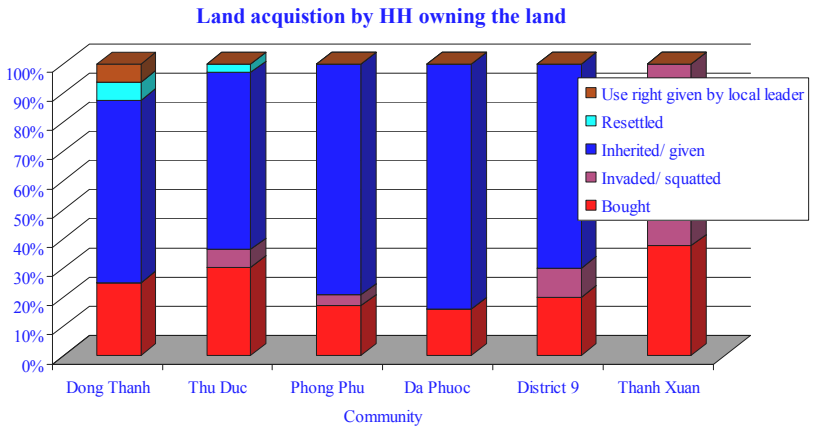


Figure 5 Credit used by households in different places

A high percentage of interviewed households were not borrowing money from any source of credit system for their aquatic farming because they found no credit worth borrowing ie the cost of borrowing was too high. Some were afraid of taking credit because they were in fear of debt. However, many farmers needed capital but were not able to borrow money as they do not meet the criteria necessary to be accepted to borrow. Farmers in Thanh Xuan commune are a good example of this, as many householders there really wished to borrow money to invest in their water mimosa farming activities but none of the credit sources were able to give them capital because they are deemed as non permanent residents, which is one of the primary criteria required to be allowed to borrow credit.



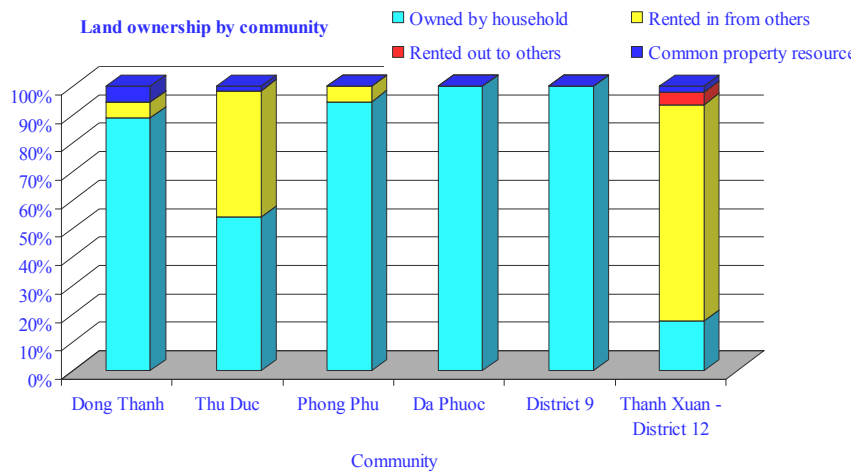


Figure 6 Land ownership and acquisition

Most of the households own the land which they farm which has been given to them through their family (e.g. fathers, grand fathers etc.). Thu Duc and Thanh Xuan have more households using rented land. Very few households have land to rent out to others indicating the limitation and value of land in peri-urban areas of HCMC.

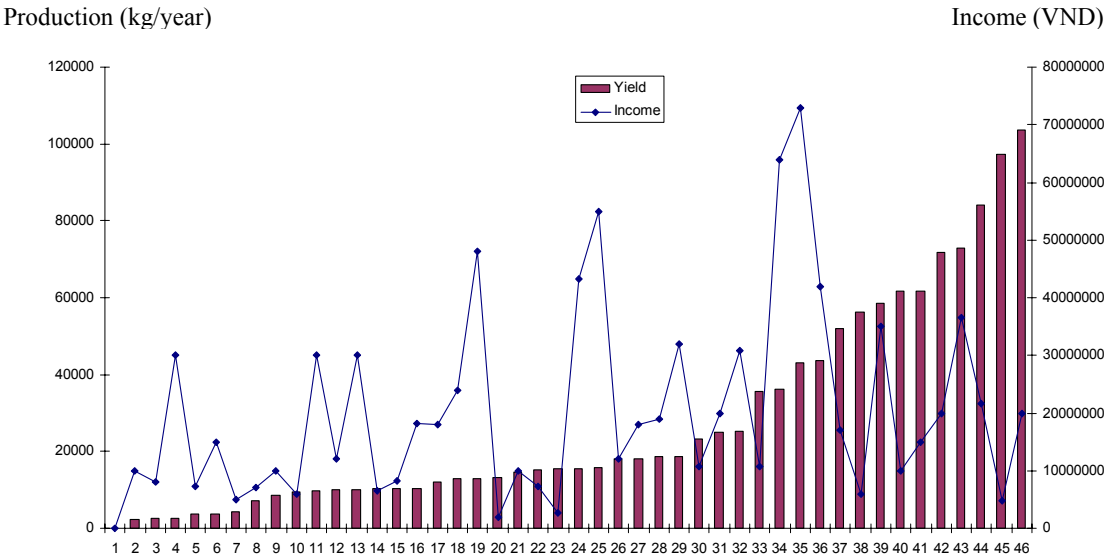
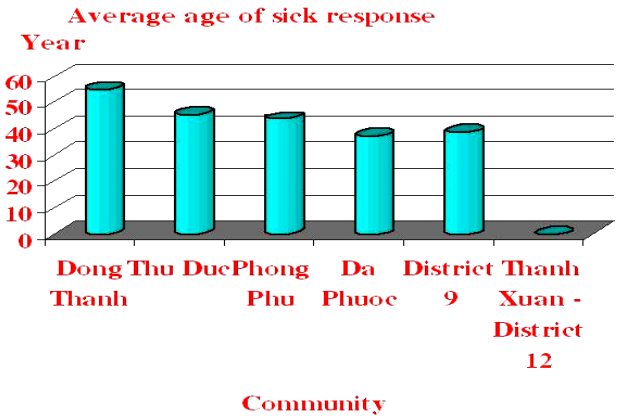


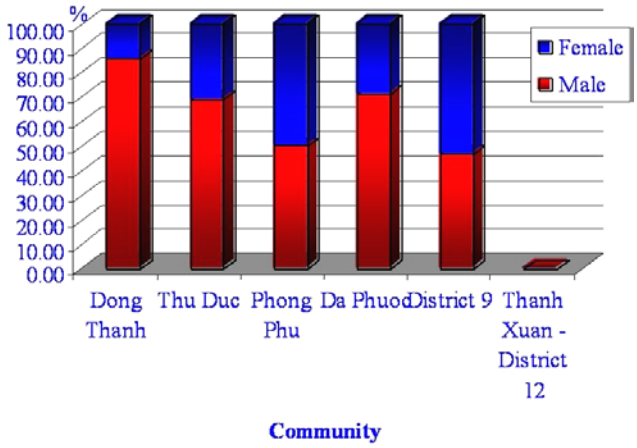
Figure 7 Yield and income of morning glory households

There seems to be no relationship between household income and aquatic yield. A household with low aquatic yield is not necessarily having low income. This might imply that aquaculture households are potentially involved in some other income activities which might



significantly contribute to household income.

Figure 8 Health problems in different sites



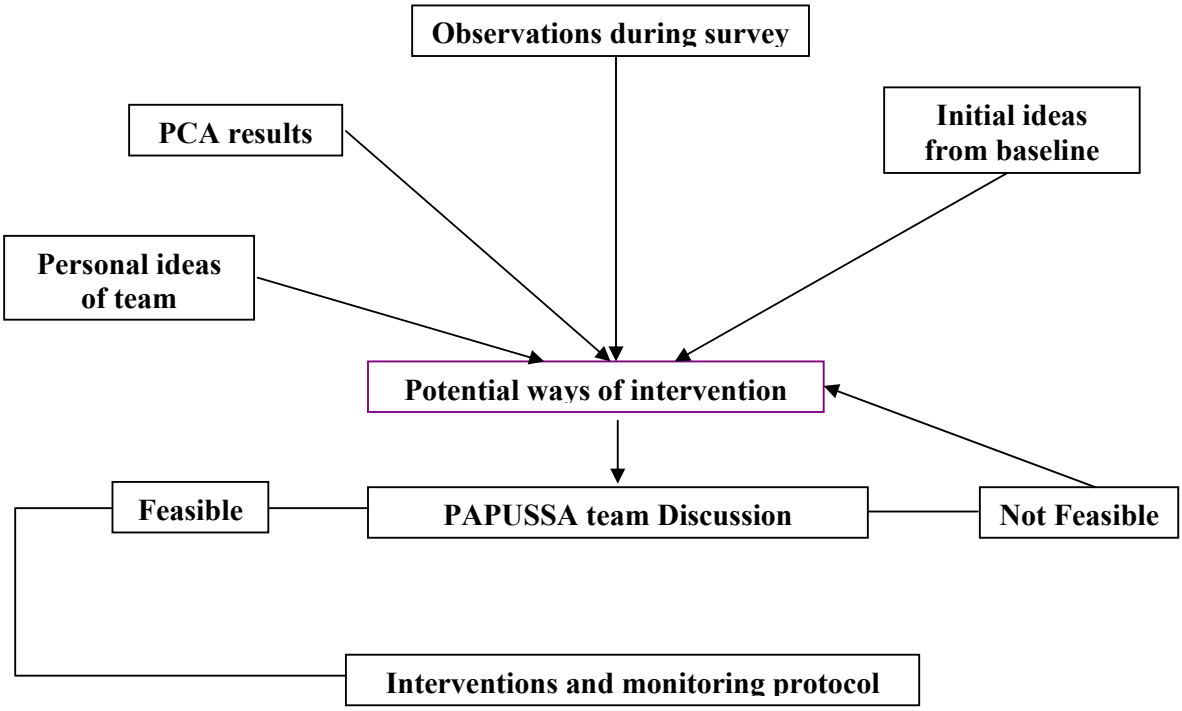
In many study sites a higher proportion of men suffered health problems last year possibly because men may be working with water more frequently and in greater depths than women. The average age of people experiencing health problems is between 39 – 54 years old which is the age of household member being actively and mainly involved in aquaculture activities.

Conclusions

- Thu Duc and Thanh Xuan are typical sites for aquatic plant culture systems including morning glory & water mimosa
- Fish culture systems are widely diversified – fish polyculture is more often seen in peri-urban areas of HCMC
- The Farmers and Womens Unions are the common institutions which farmers and those surveyed are involved in.
- Farmers generally own their land mostly inherited through generations of the family – fewer farmers have land to rent out, whilst some have to rent land for their cultivation, e.g. water mimosa in Thanh Xuan commune.
- Farming aquatic plants, students, and personal care helpers are the most common occupations for women.
- Farming aquatic plants, student, farming wastewater fish and other forms of aquaculture are the most common occupations for men.
- A low proportion of those interviewed borrow money because many are considered non credit worthy and also unacceptable terms for credit are offered. Farmers in Thanh Xuan are unable to borrow money due to no formal residential registration.
- Fish and aquatic plant farming contribute a high percentage to HH income in most of communities where we carried out our survey.
- There seems to be no relation between estimated net income and last years aquaculture production indicating multi-occupation involvement of farmers.
- Men are more likely to have health problems than women.

7. Interventions identification process

From the initial analysis of baseline data, integrated with ideas from the PCA exercises, observations and staff ideas from carrying out the surveys, interventions were proposed for year 2005 and Work Package 6 (WP6). These were also discussed during the project P&P meeting in Penang, Malaysia. This was very important to the project's activities next year when a large part of the final years work will be concentrated on interventions and their monitoring. All project staff were involved in the process of intervention determination which can be summarized in following flowchart:



Flow chart of interventions determination process

After long discussions, 4 potential interventions were chosen for the year 2005, which can be listed as follows:

- Encouraging farmers to apply "Mud Crab fattening model" at Da Phuoc commune: this idea was from Ms Thao, originating from her observations in the field during the survey.

- Recommendation of species and stocking density adjustment for fish polyculture system in Phong Phu Commune: this was from Mr. Minh, originated from his observations during the survey.

- Producing information booklets for farmers describing current water mimosa disease problems and treatments: from Mr. Huy and Mr. Tam originated from their observations during the survey.

- Technical training on fish culture for farmers in Dong Thanh commune: from Ms Truc, originated from her observations during the survey that farmers here are really lacking in technical knowledge in this area.

8. Working with Stirling and Durham Universities' Project Staff visits

- July 2004: Mr William Leschen and Mr Albert Salamanca visited UAF for baseline and monitoring survey follow up. Planning for second monitoring survey was also made during this visit. Mr Will and Mr Albert went to the field with UAF team during the team whilst they were doing their actual surveying. Many useful comments and suggestions were given to the team for their surveying technique improvement.

- 15th – 20th October 2004: Dr Francis Murray (UoS) and Mr. Albert Salamanca(UoD) visited UAF for database training. A lot of progress was achieved during this visit. Database was refined and completed and ready for data entry.

- 20th – 24th October 2004: Mr William Leschen visited UAF for further database and data entry inspection and AFF & PP meeting preparations checking. Discussions on interventions and planning for next year work was also carried out during Mr William's visit this time.

9. Special peri-urban session: Presentation at the 7th Asian Fisheries Forum, 3rd December Penang

Dr Le Thanh Hung (the PI of the UAF partner) gave a presentation on "State of peri-urban aquatic production systems in Ho Chi Minh City" during the PAPUSSA special session at the 7th Asian Fisheries Forum. This presentation was made from the outputs and findings of the first years work. Copies of the HCMC and 3 other partners State of the System (SOS) reports were disseminated out to 72 of the participants attending.

10. Project Progress and Planning (P&P) meeting – 4th – 5th December 2004 - Hotel Equatorial – Penang, Malaysia

All project staff attended the Project Progress and Planning Meeting held in Penang, Malaysia (4th – 5th December 2005). Mr. Huynh Pham Viet Huy (Project Research Assistant) presented a summary of 2004's years work done by the UAF partner and preliminary results from baseline data analysis and proposed interventions as well. Discussions and clarifications were made with all other city partners sharing ideas from last year findings. However monitoring data is still required to be completed so that the report for the corresponding work package can be produced and published.

During the P&P meeting partners also discussed about deliverables, what has been achieved and what hasn't – comparing these with those originally laid out in the Project Proposal. The following table is the list of deliverables that are within UAF's responsibilities and their current status of achievement.

List of Deliverables

List of outputs required of corresponding work packages for UAF (WP3 & WP6) and their status of achievement.

Deliverable	Deliverable title	Status
D1	Situation appraisal report	4 X PCAs, SOS, MarketsAnalysis (MA) Report, Institutional Analysis (IA) Report completed
D2	Study protocols and designs	Protocols for PCAs, SOS, reports completed
D5	Manuscripts for peer-reviewed journals	Draft papers presented at 7th AFF, December 2004 (abstracts in conference proceedings). To be submitted for publication in *Urban Agriculture Magazine* in March 2005
D6	Report on nutrient dynamics, production system management, livelihoods and actor networks	PCAs, SOS, MAs and IAs, SOS published in local languages and English. Distribution of stakeholders in progress. Nutrient dynamics will be completed in year 2005 in conjunction with the water sampling program.
D7	Workshop proceedings	Completed: PCA's, P&P summary reports
D8	Report on the role of aquatic food production in household livelihood systems	PCAs, SOS within corresponding WP3 completed
D9	Report on tensions/conflicts between different production systems in peri-urban areas	PCAs, SOS within corresponding WP3 completed
D10	Report on marketing and consumption of production from aquatic systems in peri-urban areas	Marketing reports completed (available on project website)
D12	Meetings/workshops with study site stakeholders	Completed: summary results in PCAs and SOS. Dissemination back to stakeholders underway
D13	Protocol and design of intervention study	Draft protocols for intervention presented at P&P in Penang (December 2004)
D14	Intervention study	Interventions will be carried out in year 3 within WP6
D17	High potential management strategies selected based on stakeholder assessment	
D22	Report on media and opinion makers	Media invited to SOS meetings and news published in newspaper (attached in Annex). Proposal to further target local newspapers with piece for publication on SOS report also publication of Policy Briefs in 2005.
D23	Project summaries in local languages and programme of local bulletins for four sites started	SOS published in local language and English
D24	Project website established and reports (D1, D6, D8, D16) posted within one month of delivery date	Project website established and being populated – afore-mentioned reports and annotated photos of production systems in HCMC now available on site

Amongst all deliverables, D6 hasn't yet been fully achieved which means that it was not likely to meet the time scale of the project. Some of this delay appears to be the nature of the integration of work activities between the 3 countries and 4 cities involved particularly in relation to the ambitious objective of setting up a joint household survey and database between the 4 cities. As year 2004's works were concentrated on 4 surveys with standardized questionnaires used for all partners, it required more time than what was originally proposed to integrate all issues and plans into a unique form and methodology that fixed each of the city partners' context so that the objectives could be completely achieved and comprehensive and comparable outputs could be produced. Therefore the delay was not just for the UAF partner but for all other partners as well. However this joint and interdisciplinary approach although with its difficulties will have its considerable benefits as the project progresses in that comparative analysis between the 4 cities will be much easier and more comprehensive due to taking the time and effort in the initial stages in setting it up. Another matter is the PhD scholarship that was supposed to be given to Mr Huy. It was unfortunately not taken up by him as he faced personal problems that he was not able to go abroad for the long term.

(List of documents, reports, press, or publications can be reviewed in Annexes)

Problems faced during the year

- The annual budget was delivered late due to delays of financial statements from individual partners.

- Difficulty in writing up cost statement and financial statement due to the strictly designed format that is really hard to follow. Furthermore there was a problem with project's fund caused by inappropriate time reference of exchange rate. The value of the Euro was very much higher at the time of calculation than that at the time of delivery. This created a big gap when the funded money was exchanged into local currency for the financial statement.
- Another problem is about the late progress of baseline and monitoring surveys which was briefly mentioned in the above section. To achieve the goal of having standardized questionnaires and complete database for all project's partners, it took much longer time in the preparation, correction, testing, and completion of those questionnaires. This long process has led to subsequently being late in overall progress of the surveys and therefore incompletion of database establishment and analysis within the year.

PLANS FOR ACTIVITIES IN YEAR 2005

- **January – March**:

  - Third monitoring survey to be completed

  - Data entry for all monitoring surveys (1st, 2nd and 3rd monitoring)

  - SOS report dissemination to be initiated – Policy Briefs written

- Dissemination and engagement process with senior stakeholders developed- inputs from RUAF Netherlands partner. This process of disseminating to and engaging non aquaculture related (senior) stakeholders in other related areas – e.g. urban water sanitation and drainage, health, environment and leisure, media, construction, is very important to the output of the project. If this process of stakeholder dissemination and engagement is done successfully during the next year, it offers the possibility that the status of aquaculture and aquatic plants cultivation in peri-urban HCMC will be improved or at least be much higher on the agenda of the afore- mentioned senior stakeholders who are playing very important roles in the city's planning and policy development.

- Feedback on the SOS report to be completed and report written

- Water sampling for nutrient flush analysis to be carried out and continued onwards to the end of the year

- **March – May:** database to be fully established and analysed as well as production of report

- **May – November** (tentatively): intervention on aquatic plants systems to be implemented following the plan from project coordination partner (Stirling University)

- November onwards: data analysis and synthesis; results aggregation, and reports production

INDIVIDUAL PARTNER ANNUAL REPORT

2004

INCO-DEV Project: PAPUSSA

Proposal No: ICA4-2001-10072

Partner 7: Royal University of Agriculture (RUA), Cambodia

Personnel involved in the project:

Mr. Chhouk Borin	Principal Investigator
Mr. Khov Kuong	" (replaced Mr. Sam Chinho on August 2004)
Mr. Srey Sam An	Research Assistant
Mr. Sok Seyha	" (Newly recruited)
Ms. Sok Daream	"

SUMMARY

The Royal University of Agriculture, Phnom Penh is one of the PAPUSSA partners having been under the support of the European Union. Year 2 of the Papussa project and its constituent work packages have involved the following main activities:

- Joint formulation of standardized Household and Monitoring Questionnaire Surveys for all 4 city partners
- Translation of both questionnaires (Baseline and Monitoring)
- Piloting both questionnaires
- Adjustment of both questionnaires after piloting
- Household interviews for Baseline survey
- Household interviews for First monitoring survey together with specialized health survey
- Questionnaire response Coding for Baseline and First Monitoring
- Household interview for Second monitoring survey
- Database training and entry using Microsoft Access
- Preparation for Third monitoring survey
- Water quality monitoring

ACTIVITIES

1. Partner Meeting for 2nd Year Work Package (9-14th February 2004)

Phnom Penh team representative Mr. Thak Kuntheang, (Papussa team leader) participated in a workshop in Bangkok city who's objective was to set and develop a work

plan for 2004, and more specifically to jointly formulate standardized household and monitoring questionnaires which were made up of sections and questions relating to the three individual work packages (WP) to be carried out during year 2 ie WP2 Public Health and Hygiene Monitoring, WP3 Production Systems and Livelihoods Monitoring, and WP4, Social, Policy and Institutional monitoring. The meeting was attended by a representative from each of the project partners from Cambodia (Phnom Penh), Thailand (Bangkok), and Vietnam (Ho Chi Minh and Hanoi) as well as staff from the National Institute of Health and Epidemiology (NIHE) Ha Noi, and the Universities of Stirling and Durham It was decided that the Baseline and Monitoring questionnaire surveys would be carried out in 200 households from some of the study communities used in the 1st years WP1. An initial database was built up and brought in to discussion in the meeting. Each partner brought back country-wise database for preliminary trial of data entry.

2. Translation into Native Language (15th – 30th April 2004)

After draft questionnaires of Baseline and Monitoring were received from the University of Stirling, the team translated them into native language to make it easier for the field interviews. The translation took about two weeks time during April.

3. Piloting the Questionnaires (May 2004)

After the translation was finished, the questionnaires were piloted in the field with the main objective being to detect the suitability and difficulties of all questions in each questionnaire. Questionnaire interviews were made by survey team in those study sites (Tnout Chrum village for morning glory with 10 baseline questionnaires and 10 monitoring questionnaires, Duong village for non- waste water *pangasius* culture with 5 baseline and 5 monitoring questionnaires, and Buon village for waste water pangasius culture with 5 baseline and 5 monitoring questionnaires. **Miss. Wanwisa Saelee** from the Asian Institute of Technology (AIT) visited to give advice and also participate in the piloting session as well. Each Baseline questionnaire interview initially consumed more than one hour. After completion of the piloting, records of difficulties and associated comments were sent to AIT and University of Stirling, in order that the further necessary modifications could be carried out.

4. Baseline Interview (May – June 2004)

After the questionnaires were finalized in their local versions under supervision of Mr. Albert Salamanca (University of Durham) and Ms Wanwisa Saelee (Asian Institute of Technology), the team started the baseline survey in early May in Boueng Cheng Ek area (Tnout Chrum and Kbal Tom Nub village), with 60 and 74 households in Tnout Chrum and Kbal Tom Nub villages respectively. These household respondents in this area were morning

glory producers. In Boeung Kok (net pen culture of Pangasius), 14 households were interviewed. In Duong village (pond culture of pangasius and clarias) located in Prek Phnov area, 28 households were interviewed. The overall number of morning glory producers selected were noticed as being more then the chosen fish farmers, thus in order to make our survey sites/households more balanced, the team decided to add another village (Buon village) located 8 kilometers to the north of the city, where 25 Pangasius farmers were chosen to be interviewed.

5. First Monitoring Interview (June – July 2004)

The first household monitoring survey was carried out between July to September 2004 with interviews being made with the same 200 households who were chosen previously for the baseline survey. This first monitoring survey was carried out together with a more specialized health survey questionnaire which was led by Mrs. Phan Thu Phuong (NIHE). Household members who affected by skin diseases were issued a card for free treatment in National clinics for Dermatology & STD unit, Phnom Penh.

6. Questionnaire response coding for Baseline and First Monitoring (August 2004)

After the baseline and first monitoring were successfully completed, the team started immediately coding for the 200-questionnaire responses in order to make it easier for access database entry and subsequent analysis. New codes were added and recorded to send for database amendment by Dr Francis Murray (UoS) and Albert Salamanca (UoD).

7. **T-shirt printing (October 2004)**

Relating to potential incentives for the household interviews as well as promotion of our overall project work, Phnom Penh team under advice from Mr William Leschen (UoS) and Prof. Chang Kwei Lin (AIT) produced 250 T-shirts which were designed with pictures of Phnom Penh map, fish and aquatic vegetables as well as slogan illustrating the project work (See Annex). The T-shirts were distributed and received as a gift for respondents during the second morning survey, with favourable responses.

8. 2nd Monitoring Survey and its response coding (15th November -15 December 2004)

The 2nd Monitoring started on November 5th and finished in early December. This activity was later than originally scheduled as it was planned to be started in September. This was due to heavy rain and flooding in Phnom Penh which made access for our field staff to a number of the households either impossible or dangerous. During October and November it was also noticed that there were many religious ceremonies and national festivals which made it difficult for people to be interviewed. Checking of Questionnaires and coding were carried out following the interviews.

9. Water quality monitoring protocol (20-22nd October 2004)

During the visit of Prof. Chang Kwei Lin (AIT), 20-22nd October, logistics and methodology for water quality monitoring were discussed with the Phnom Penh project team. Site selection and visits to the proposed sampling sites were done under supervision of

Prof. Lin. A specific team was delegated and set up in order to accommodate the task for this water quality monitoring.

10. Database training and Entry (20-25th October 2004)

A standardized Access Database was sent together with some instructions by Stirling University/University of Durham to all partners for preliminary data entry. Errors and difficulties encountered during data entry were noted down and sent to the programmer (Dr Francis Murray) for amendment. Technical assistance and training for data entry was given during the visit of Mr. Francis Murray and Mr. Albert Salamanca to Phnom Penh on 20th - 25th October. The purpose of visit was to train the Phnom Penh team on how to efficiently and correctly enter data and also preliminary methodology towards data analysis. As a number of errors were found, database amendment was also made by Dr Murray at the time of entry.

11. Data analysis and preparation for 7th Asian Fisheries Forum and Papussa Progress and Planning (P and P) meeting in Penang.

Between the 27th - 30th October , Mr. William Leschen followed on from the database training group to visit each partner for additional comment and correction upon problems encountered whilst continuing data entry. Another purpose of his visit was to guide the local team for preparation of presentations for the P and P meeting as well as the 7th Asian Fisheries Forum in Penang. Phnom Penh Team only completed Baseline data entry as we experienced some critical problems which led us to get stuck for certain periods of time and required these problems to be fixed by the database programmers. Preliminary analysis of baseline survey was carried out immediately after completion of the baseline data entry in order to present these initial findings to the P and P meeting. Another presentation based on an overview of Papussa's first years work in Phnom Penh was put together for a special peri-urban aquaculture session at the 7th Asian Fisheries Forum in Penang, on 3rd December 2004..

12. 7th Asian Fisheries Forum (30th -3rd December 2004)

The 7th Asian Fisheries Forum was held on 30th November-03thDecember 2004. Mr Borin representing RUA team presented an Overview of Peri-Urban Aquatic Food Production Systems in Phnom Penh at the well attended special session for Peri-urban Aquaculture.

13. Progress and Planning Meeting in Penang, Malaysia (4-5th December 2004)

The meeting was held between the 4-5th December in Penang with the objective of each partner (Mr Srey Sam An for RUA) presenting the findings and outcomes from the years work, focusing on the findings from the preliminary analysis of the baseline survey and proposed interventions for year 3's work. This was followed up with discussions leading on to address and formulate a joint work plan for year 3. Year 3's workplan involved proposals and discussions concerning possible interventions which were to be carried out by each partner in the following year. Mr. Chhouk Borin, local coordinator, and Mr. Srey Sam An, research assistant attended the meeting.

OTHER ACTIVITIES

1. PHD student field work

Helle Marcussen was working for her PhD thesis during December 2004 in Phnom Penh. Plants, water, soil have been sampled during the visit for heavy metal analysis.

Charlie Price was collecting morning glory in Phnom Penh from markets and production sites for heavy metal analysis as he has been doing his PhD.

The RUA Papussa staff gave considerable assistance in both the field and laboratory to the two PhD students.

2. Staff leaving and recruitment

- **Mr. Khov Kuong** (Research Associate) was recruited on 15 August 2004 to function in the Phnom Penh team as research scientist and team leader which replaced Mr. Thak Kuntheang who left the project for his Masters study at Asian Institute of Technology (AIT), Thailand.
- **Miss Chhin Rumunny** left also left the project to fulfill a new job required by her minister as she was recruited to be a government official. A new staff, **Mr. Sok Seyha** who used to be involved in a health team was selected to be project team member replacing Rumuny.

To fulfill the need for staff responsible for water quality sampling and analysis, the following staff have been recruited on part-time basis:

- Mr. Men Sokha, lab manager
- Mr. Kong Sovansay, lecturer
- Mr. Pan Ra, volunteer staff
- Mr. Van Sangvath, volunteer staff

3. Editing report

SOS reports were edited and reviewed by the Phnom Penh team and Ms Arlene Nietes-Satapornvanit (AIT) during October. The report was finalized and sent to Bangkok for publication. PCA reports from each four villages (Kbal Tumnub, Tnout Chrum, Muoy, and Duong), Marketing analysis and Institutional analysis reports has been edited since September and expected to be finished by March 2005.

RESULTS

1. Completion of Activities

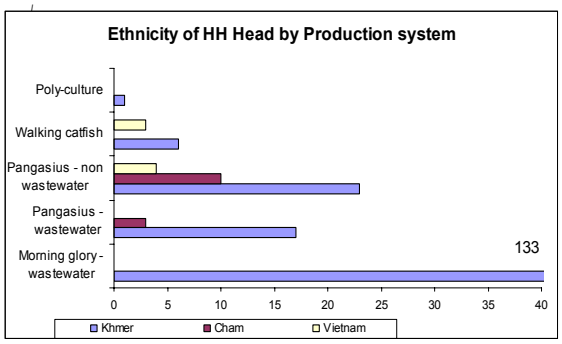
The team completed 200 household questionnaires for Baseline in Tnout Chrum, Kbal Tom Nub, Mouy, Duong and Chrang Cham Resh villages. Each baseline questionnaire on average took 45 minutes to carry out. Questionnaire response coding and baseline data entry

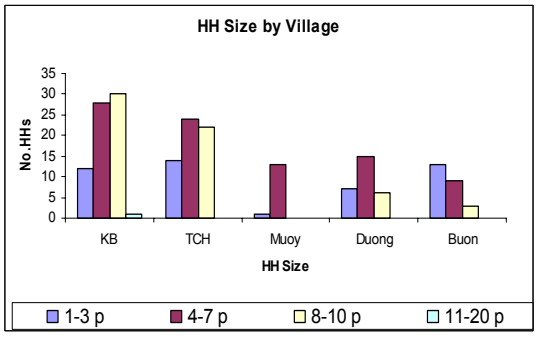
were already successfully incorporated into the database with the 1st monitoring survey and questionnaire coding being completed by July. The second monitoring survey was conducted

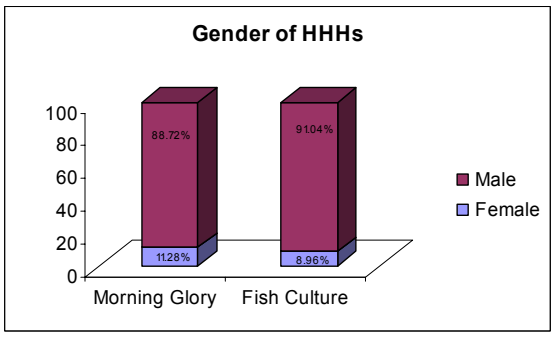
and finished in early December. 250 t-shirts were published and distributed during the second monitoring.

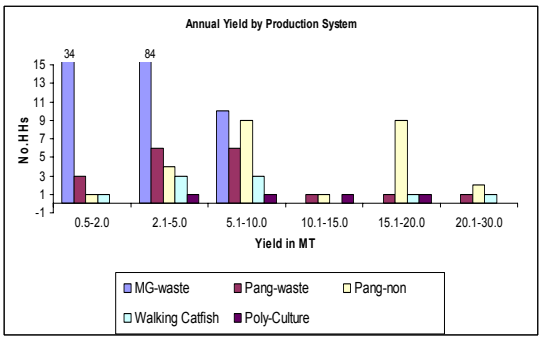
2. Initial Results and Findings of Baseline Survey Analysis

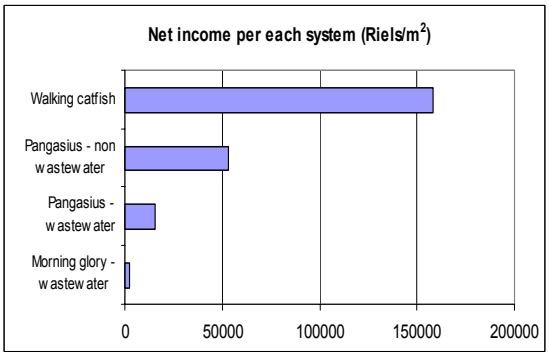
- √ Respondents were more likely to be women than men in aquatic plant production communities (83 of 133 respondents). This might be due to men being out working on their plots during the day thus they were not so often available in the household during the time of the interviews.
- √ The sources of income in the communities of waste water morning glory were found more diverse than for the fish farming communities due to production being more seasonal.
- √ Only Khmer ethnicity was found in Morning glory waste-water system. In contrast, Chaam and Vietnamese were also found in fish production, the relative proportions depending on the particular type of culture system and distance from the centre of the city ie urban and peri-urban..
- √ Larger household membership size (8 to10 members in each family) were found, in Morning glory production systems compared to fish culture households.
- √ There was a higher proportion of women as household heads for morning glory production, this possibly being due to their status as widows.
- √ Pangasius and walking catfish production in non-waste water were indicated as high in yields and annual production, compared to morning glory production in waste water.
- √ The relative income or value from culturing walking catfish in non waste water ranked the highest for all of the production systems (158470 riels/ m2) , followed by Pangasius-non waste water. However, concerning the productivity of the system eg kg/m sq, Pangasius culture in non waste water produced the highest productivity.

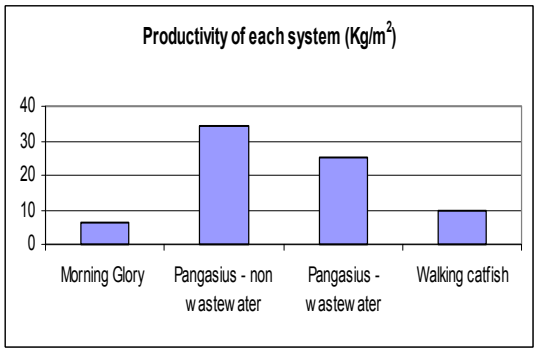








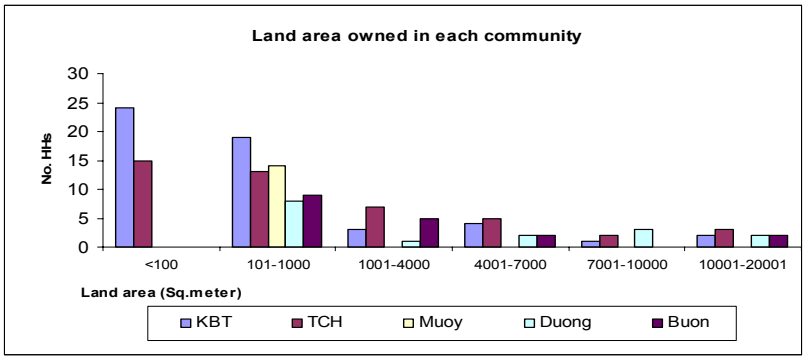


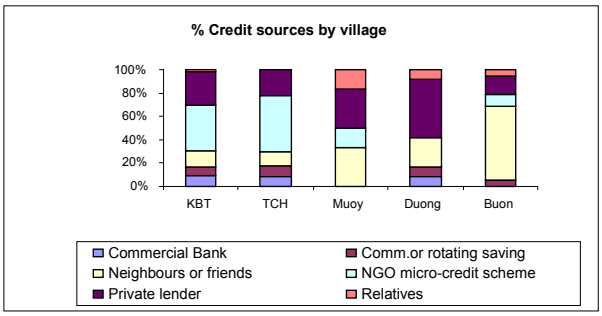


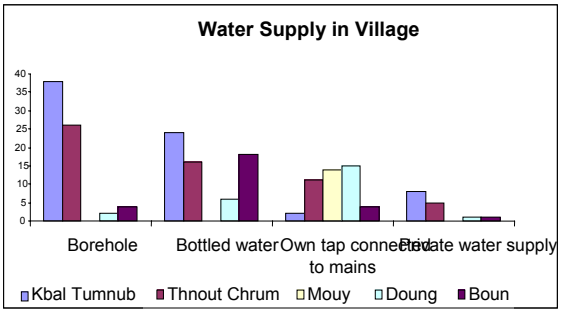
- √ A larger proportion of morning glory producers were indicated as having migrated from other provinces due to looking for work compared to the fish farmers.
- √ For both fish and aquatic plant producers interviewed, our analysis showed a very low percentage (about 10%) who had experienced any technical training offered by government, non-government or private institutions.
- √ Farmers in morning glory production systems tended to own smaller plots of land compared to other systems.
- √ Morning glory producers in both villages (Kbal Tumnub and Tnout Chrum) indicated their source of everyday household water as mainly originating from boreholes. Whereas in Muoy village, the resident fish farmers got their domestic water supply by connection to mains water since it was located close to the central of the city. Duong village involved in the culture of pangasius and walking cat fish also consumed water as supplied by connection to the mains system. However bottled water was found to

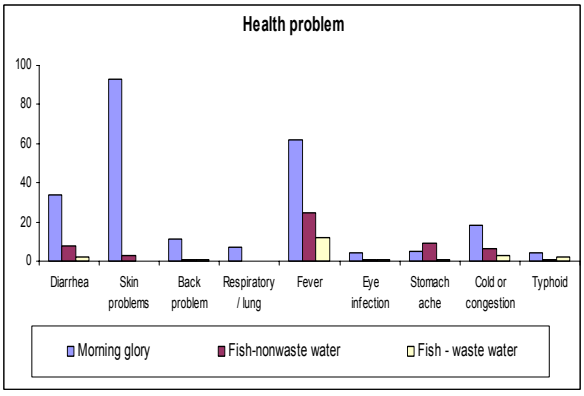
be popular for all selected communities due to safety and convenience for consumption without treatment.

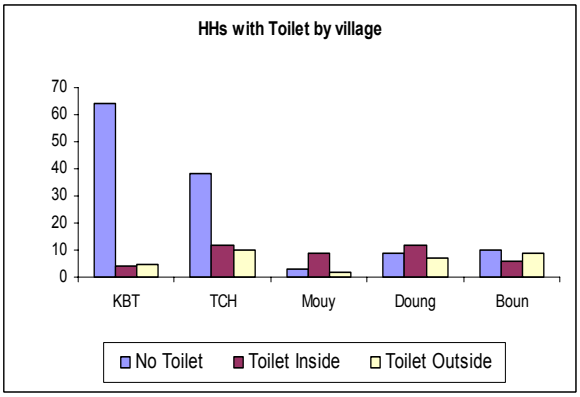
- √ Credit was necessarily needed by communities producing morning glory in waste-water. They tend to take credit in the beginning of their production cycle as more money was needed to be invested for renting the land and buying inputs for production. A number of credit sources used were described - commercial bank, community or rotating saving, neighbors 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 neighbors or friends were indicated as a source of credit in communities of fish production.
- √ Health problems were found more frequently in morning glory production communities rather than others. Skin problems were the most common since they were more exposed to waste water in their production activities. Diarrhea and fever also emerged as important within their families and livelihoods.
- √ The results also indicated a large amount of households with absence of toilets in the morning glory communities. Households without any toilet compared with a toilet inside and outside seem to be in equal proportions in non-waste water fish farming communities.











Note::

KBT = Kbal Tumnub Village , TCH = Thnout Chrum,

3. Proposed Interventions

A number of interventions were brought out by the Phnom Penh team and in discussions at the P and P meeting through overall reviews of PCA, Institutional Analysis, Market Analysis, SOS and preliminary baseline survey analysis. They were as follows:

- ***Manual for growing morning glory and fish culture***

The manual will be made in a way that less educated people would 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 afield in the literature and on the internet.

- ***Infrastructure development- toilets and boreholes***

This kind of intervention would be possible as long as a considerable amount of funding was made available. Toilets and boreholes are in prior need. A concept of contribution would be appropriate to be applied in order to raise villagers' attention in taking care and a sense of ownership. Assessment has to be conducted first to identify number of households in need and find out an appropriate contribution method. A number of toilets and borehole could be shared amongst certain households.

- ***Introducing new production system***

As our findings very much indicated seasonality and changes of environment for the existing production systems, there is the possibility of introducing certain new types of production systems eg water dropwort and water cress which is commonly grown seasonally in rotation in Ha Noi. Following on from initial trials this would help lower income households to better accommodate environmental and seasonal reductions in their income whilst also having the potential for diversifying their production and increasing their overall incomes annually.

- ***Alternative livelihoods***

Certain kinds of alternative such as poultry, pigs or fish farming should be encouraged and supported as it would help them to generate more income for improvement of livelihood.

4. Output of the year

- ***SOS Reports***

The reports were published at the end of the year and distributed to each partner at Progress and Planning meeting in Penang. The report was made based on participatory community appraisal (PCA), marketing and institutional surveys conducted in 4 communities, 13 markets and 7 institutions, respectively in and around Phnom Penh (cover of SOS report attached in Annex).

- ***Community Maps***

These maps were drawn by the survey team during baseline interview. The maps were made to describe the community environment, resources as well as residential structure. The maps also implied the living status of communities such as Wealth, business, etc.

- ***Household System Maps***

The maps were drawn during interviews in each household. 4 general maps which represent 4 different communities, were made through standardizing several households system maps in each communities to show the spatial arrangement and components of the production system (See Annex).

- ***T-shirts***

250 T-shirts were produced as gifts for those interviewed households as well as senior stakeholders. The T-shirts were designed with pictures of Phnom Penh map, fish and aquatic vegetables as well as slogan illustrating the project work (See Annex).

PROBLEMS ENCOUNTERED

1. Problem associated with Finance

- Lack of budget might be the most important problem for Phnom Penh team. We experienced some difficulties. eg, limited budget for completing field work, to send project personnel for meetings abroad and facilities for laboratorial analysis.

2. Problem associated with Interview

- At the start of baseline interview, villagers were very difficult to deal for their cooperation due to their feeling of fear associated with political, government oriented work.

- Some households in fish culture communities were completely rejecting the interview. Apparently, this is because they were not happy in revealing their growing methods as well as economic status.

- Household Questionnaire interviews took longer time than was expected. This was due to some morning glory producers being very busy with their businesses.

- Some respondents were not household heads since those household heads were away to their farms, resulting in limiting the information that could be collected.

- Interviews also experiences delay as the survey team sometimes experienced heavy rains disturbing our interviews.

PLANNED ACTIVITIES FOR 2005

1. Third Monitoring Interview

This will be carried out in January next year due to seasonal calendar reason. The lake water level would be expected to drop down which leads to accumulation of waste concentration resulting in poor water quality. The second health survey will be conducted at the same time with 3rd monitoring as it was believed to effectively detect disease/health problems occurring in the households.

2. SOS dissemination and dialogue

250 copies of SOS reports will be disseminated to a comprehensive list of senior stakeholders. A dialogue will be made focusing on senior stakeholders by requesting them to read and fulfill the questionnaire form for their opinion, comments for improvement, especially recommendation on research and action agenda as well as intervention for the project.

3. Data analysis in Stirling

Completed database with Baseline, First Monitoring, Second Monitoring, and Third Monitoring Data will be brought by representatives of each partner for data analysis in University of Stirling, United Kingdom.

4. Editing report

PCA reports, Marketing Analysis report, Institutional Analysis report editing will be finished by March 2005.

5. Intervention

Interventions for the Peri-urban aquatic food production system is the focus of the year 3's work. Implementation, monitoring and evaluation will be carried out during 4 month period from May to October 2005.

Framework INCO-DEV Project: PAPUSSA (Production in Aquatic Peri-Urban Systems in Southeast Asia)

Annual report for Year 2004

Proposal No:ICA4-2001-10072

Partner 8: Faculty of Fisheries, Kasetsart University (KU), Thailand

Personnel involved in project:

Dr. Ruangvit Yoonpundh	Principle Investigator
Dr. Varunthat Dulyapurk	Principle Investigator
Mr. Chumpol Srithong	Principle Investigator
Mr. Thanasorn Rakdontri	Researcher
Ms. Aree Srisaipatanakul	Researcher
Ms. Wanida Sukprasert	Researcher

Work activities of the project carried out by the KU Partner during the second year (2004) are as follows:

1. To inform project activities in the 2nd year to local representatives of the three communities
2. To hold workshops on the preliminary preparation for baseline surveys and monitoring questionnaires and training on Microsoft Access
3. To pretest questionnaires and planning of the survey
4. To conduct the first baseline and monitoring surveys
5. To conduct the second monitoring and individual household mapping
6. To conduct water quality monitoring surveys
7. To prepare data entry and analysis
8. To prepare AFF's Presentations and P&P Meeting in Penang

1. To inform project activities in the 2nd year to local representatives of the three communities

After the P&P meeting in Hanoi during mid-December 2003, field visits to meet the local representatives of three communities (Nongpraongai, Suanprixthai and Lumsai Villages), were made during January 2004. The objective of these visits was to inform the representatives of each community about the 2nd years project activities. The team from KU talked to each community representative on how the project would be conducted in the areas in this year. The project also asked representatives to disseminate this information for conducting activities to participating households in the community.

2. To hold workshops on the preliminary preparation for baseline surveys and monitoring questionnaires and training on Microsoft Access

A workshop meeting was conducted at AIT between 9-13th February 2004 on the preliminary preparation of baseline surveys and monitoring questionnaires and on training in Microsoft Access. The objective of this activity was to brainstorm on the establishment of

standardised Baseline and Monitoring Questionnaires amongst the four representative partners of the project (HCMC, Hanoi, PP and BKK) all of whom had different criteria considerations. These questionnaires were important major tools for data collection from the target communities this year. Three staff of the KU partner including the principal investigators attended this workshop. Drafts of preliminary baseline and monitoring questionnaires had been first prepared by the Project Coordinator (Mr. William Leschen) and his team. They proposed feature guidelines to the four partners to consider first before the brainstorming session to edit/fulfill the requirements of each topic considered. The baseline and monitoring questionnaires were then formulated for further refinement. Training on Microsoft Access was carried out by Mr. Francis Murray in preparing the staff in making a preliminary understanding in the use of Microsoft Access and for data analysis. The training also provided the staff with basic skills and experience in data processing and analysis.

3. To pretest/pilot questionnaires and planning of the survey

Both baseline and monitoring questionnaires were first pre-tested by KU staff during early March 2004. The first objective was to make staff understand details of the existing questionnaires and to gain basic skills and experience in interview techniques. The second was to get feedback from the interviewees on problems relating to the questionnaires such as timing, clarity of the questions etc. All of the resulting feedback were then reported back to the coordinator of project (Mr. William Leschen) and his team to refine and adjust questionnaires again. During this month, planning activity for the household surveys was also set up into three consecutive periods:

First survey - April to June,
Secondly - July-September and
Third - October to December.

4. Implementation of the first baseline and monitoring surveys

Based on the completion of the baseline and monitoring questionnaires ie producing final agreed versions of each questionnaire, the first baseline and monitoring surveys were conducted simultaneously between the end of April to mid June 2004. A total of 212 households of the three communities were surveyed including 110 households in Nongpraongai, 52 households in Suanprixthai and 50 households in Lumsai villages, respectively. The KU partner welcomed Professor Chang Kwei Lin from the Asian Institute of Technology (AIT), Bangkok to join the project during the middle of May as a consultant especially in assisting and monitoring project activities consistently. He and Ms. Wanwisa (also from AIT) have provided assistance in planning, making suggestions and possible solutions to problems encountered during field surveys, data collection techniques, methodologies, analysis, presentations etc.

A green designed T-shirt was also produced with the symbol of PAPUSSA to be used as a gift/donation for participating households in the next 2nd monitoring survey. These T shirts other than being an incentive for participating households also fulfilled the added objective of raising awareness about the project throughout Bangkok.

5. Implementation of the second household monitoring survey and individual household mapping

The second monitoring survey of the three communities was conducted from early July until the middle of September 2004. The same households of Nongpraongai, Suanprixthai and Lumsai villages were monitored during this period. Progress and problems encountered during the survey were also reported in regular meetings with Prof. Lin. Individual household mappings of peri-urban aquatic food production system were also planned and assessed during early to mid-October 2004. An overview of boundary of each community in Nongpraongai, Suanprixthai and Lumsai villages was also developed with detailed locations of aquatic production ponds and water supply to the individual production systems. Individual households/systems mapping was then drawn to present the layout of systems such as household, ponds and water supply.

6. To conduct water quality monitoring surveys

Preliminary water quality in those three communities was also monitored during the end of October 2004. Water quality parameters and sampling locations were decided. Water samples of some parameters of both natural water supply canals and ponds were randomly collected and analysed at the laboratory. Some parameters were analysed directly in the field.

7. To prepare data entry and analysis

The task of data entry from the baseline survey has been undertaken by staff since August 2004. However the data entry and analysis were revised by Mr. Francis Murray from the previous program which had been completely developed by the end of October 2004. Between November 1-3, 2004, the project coordinator visited the KU partner. The purposes of his visit were to understand and assess the current status of the project as regards to the KU partner, and to make an effective plan for the rest of the work during the limited remaining time of the year, especially in the preparation of the presentations for the 7th Asian Fisheries Forum and P&P Meeting in Penang, Malaysia in December. Important topics were proposed and prepared to be presented either in areas of individual communities or the aquatic food production systems themselves. Therefore data entry and preliminary analysis of baseline surveys of the three targeted communities were then the major tasks of staff throughout November 2004. Whilst the presentations were finalized and rehearsed for both the AFF and P&P meeting was rehersed before being finalised with comments made by Prof. Lin.

8. Participation and Presentations at the 7th Asian Fisheries Forum's and Progress and Planning (P&P) Meeting in Penang

Both Dr. Ruangvit Yoonpundh and Dr. Varunthat Dulyapurk participated in the 7th Asian Fisheries Forum held in Penang, Malaysia. A presentation entitled "The status of peri-urban aquatic food production systems in and around Bangkok" which was based on the results obtained in the 1st year of the project was presented by Dr. Varunthat Dulyapurk on the 3rd December 2004. On the 4th December, Dr. Ruangvit Yoonpundh and Dr. Varunthat Dulyapurk presented a progress report to the P and P meeting on the initial analysis of the baseline survey of the 2nd year of project. Other areas discussed and clarified among the

partners included the purpose and protocols for the water quality monitoring, also possible interventions as the major task of the project in 2005 were then proposed by each partner during a brainstorming session amongst team members and the consultant. The organic farming of morning glory and integration of hybrid catfish culture with morning glory were initially proposed as ideas by KU. However it is possible that these project interventions and resulting protocols will be revised based on budgets available and meetings with the local communities. The timing of the 3rd monitoring survey was proposed to be changed from the end of the year 2004 to early January 2005 in order to cover seasonality of the cropping patterns based on the climate patterns in Bangkok.

Results of Baseline Analysis

Some important results of baseline analysis of the three communities were shown as following:

- Most of those interviewed were household head and their spouses.
- Over 50% of respondents finished only primary school.
- Aquatic food production affecting their livelihoods as they were important sources of both their main and minor incomes especially the hybrid catfish farm in Lumsai village which generated income of nearly 80 million baht a year (Figure 1) while morning glory grown intensively in converted ricefields in Nongpraongai village produced more than 14 million baht a year (Figure 2).

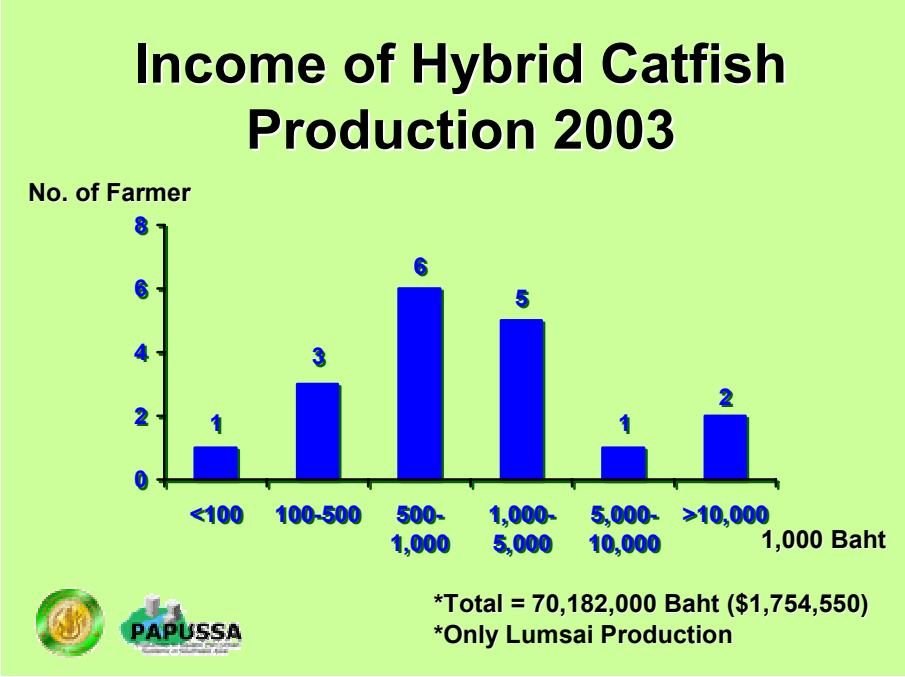


Figure 1 Estimation of income generated by hybrid catfish production in Lumsai village based on Baseline data analysis.

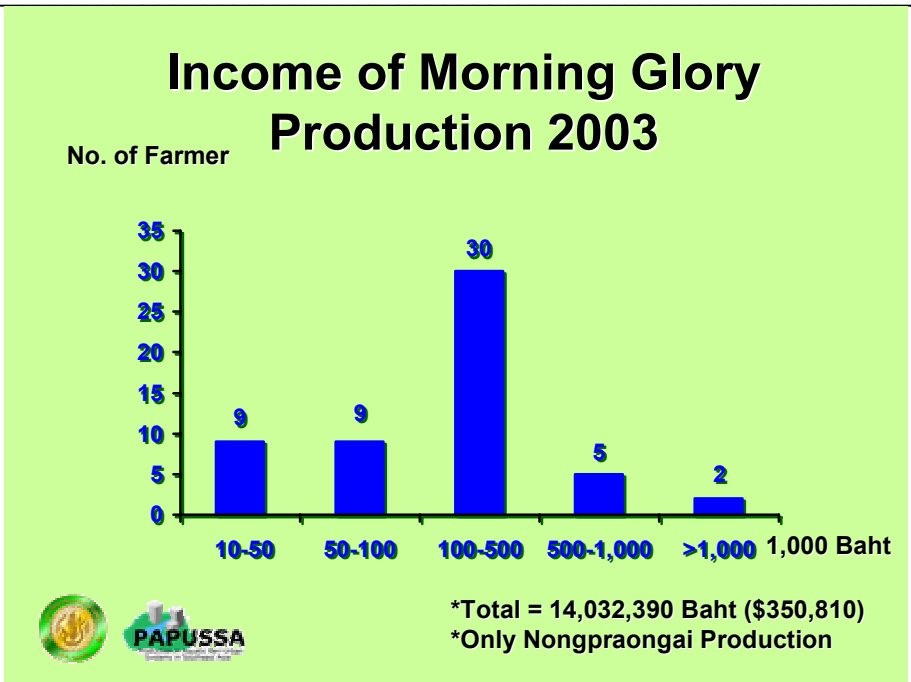


Figure 2 Estimation of income generated by morning glory production in Nongpraongai village based on Baseline data analysis.

- It was found that credit for aquatic production was much higher in farmers producing hybrid catfish and fish polyculture than those of morning glory and water mimosa. This might probably be due to the high investment cost of producing these fish.
- The Community fund was found to be a major source of aquatic vegetable production investment whereas commercial banks provided funds mainly for hybrid catfish farmers.
- Most aquatic production areas were rented by households, with only a small proportion of land being owned by the farmers themselves.
- Most households still relied on the rainwater for their domestic household supply. .
- Back, skin and fevers were found as common problems facing farmers in the three communities. This probably resulted from the daily work activities on their farms.
- Plant diseases and pests such as a gold cherry snail and insects were common problems for aquatic food production. In addition, the increasing trend in cost of feed for hybrid catfish and fish polyculture was more likely to be a serious problem for fish farmers than those producing aquatic vegetables.
- Expected future production trends of the three communities are summarized in the Figure 3. Peri-urban areas of hybrid catfish farming was expected to be in a decline. This probably resulted from most land cultivated being rented by farmers and uncertainty of the land owners to sell it off in the future for other purposes such as housing estates. This position was relatively similar for Nongpraongai village.. Whilst water mimosa cultivation in a canal in Suanprixthai village was still expected to continue due to the canal being common property.

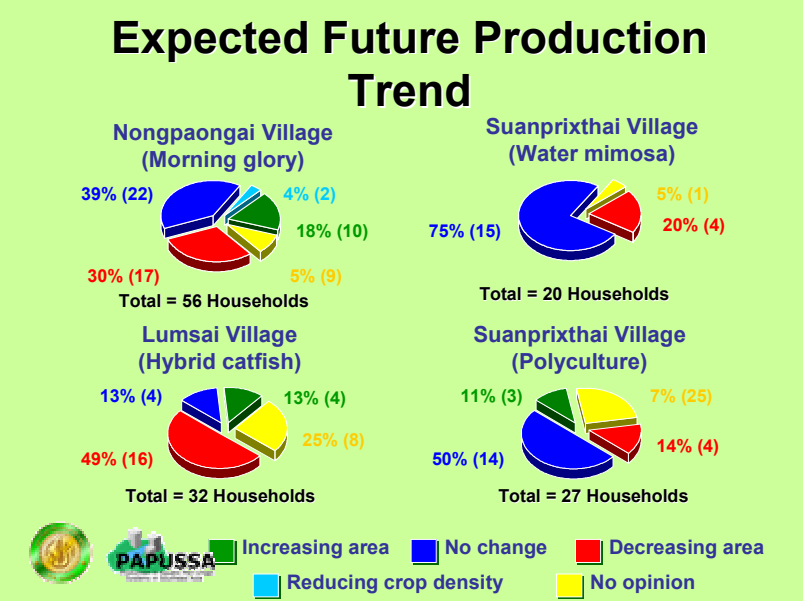


Figure 3 Expected future production trends of the three communities.

PROJECT OUTPUTS IN 2004

In summary, project outputs completed by the KU Partner during 2004 are listed below as follows:

- SoS report was produced based on the results obtained from the first year of project.
- Both market and institution analysis reports were published already on the PAPUSSA website.
- Individual layout of household maps were drawn for each community.
- Water Quality surveys in both ponds and irrigation canals were initially carried out during the end of the rainy season (October) of Thailand for each community.
- A green designed T-shirt was produced with the symbol of PAPUSSA to be used as a gift/ donation for participating households.
- Attending the 7th Asian Fisheries Forum held in Penang, Malaysia on 3rd December 2004 by both principle investigators (Dr. Ruangvit Yoonpundh and Dr. Varunthat Dulyapurk) and a presentation entitled "The status of peri-urban aquatic food production systems in and around Bangkok" based on the results obtained in the 1st year of the project was given.
- First draft of baseline results was summarized and reported to the annual PAPUSSA meeting held in Penang, Malaysia. on 4th December 2004.

PROBLEMS ENCOUNTERED IN THE PROJECT IN 2004

Problems encountered the project during 2004 were concluded as following:

- Delay of completed baseline and monitoring questionnaires affecting the late collection of data in the field survey and also caused the delay of of the subsequent database analysis.
- Late arrival of budgets was also a big problem for the management of field work plan based on available budgets in hand.
- One staff left the project during early October probably due to a lack of incentive with their salary.
- Problem with aggressive dogs in some households causing high risk and inconvenience for field staff.

PROPOSED WORKPLAN FOR NEXT YEAR 2005

- A wide range of senior stakeholders, including government and non-government sectors will be searched and aggregated into a comprehensive list which will be used to disseminate the SoS reports in January to February, 2005.
- The 3rd monitoring survey will be conducted from January to mid February, 2005.
- Water quality sampling will be planned and monitored again based on available representative farms during the early year 2005 following protocol agreement from the annual P and P meeting in Penang.
- Concentrated database analysis of baseline and monitoring will be carried out by a representative staff during April to May 2005 at University of Stirling, U.K.
- Project interventions as the major task in 2005 will be proposed by the end of February 2005 and conducted on farm trial by April, 2005.
- The intervention will be followed up based on technology transfer to the community and be evaluated by the rest of year 2005.