A STRATEGY TOWARDS IMPROVED FISH HATCHERY MANAGEMENT IN NORTHEAST THAILAND

by

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ABSTRACT

A strategy towards improved fish hatchery management in Northeast Thailand

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This report addresses the problem: how to improve approaches to fish seed production in smallholder aquaculture systems of Northeast Thailand? The work was carried out as a component of the U.K. Government Department for International Development Aquaculture Research Programme funded project, *R7052: Improving freshwater fish seed supply and performance in smallholder aquaculture systems in Asia*. From 1997 to 2003 the project worked in collaboration with regional partners in Bangladesh, Laos P.D.R., Thailand and Vietnam on constraints to seed production and distribution. The research problem called for improvement, implying that change was required in the way that seed was produced. The hypothesis that active collaboration in research by seed producers and institutional partners, facilitated by project staff would enable all participants to extend their understanding of the situation, contribute to the knowledge base and that resulting accommodations would lead to a continuous process of planning, action and reflection toward changes required for improvement.

Reflection on the project outputs indicated that quality of fish seed was variable but there was no agreement on the nature of the problem among stakeholders. The decision was made to shift the research focus away from looking for technical problems and to focus instead on examining ways that existing knowledge could be integrated in a learning process with key stakeholders. The research problem then became to find an appropriate, effective and efficient methodology to achieve this; participatory action research was chosen for evaluation.

Participatory action research is a collaborative approach involving the researcher in a facilitative role working with stakeholder groups to enable systematic investigation of issues, planning and action to resolve the issues. Outcomes should be action and public knowledge that feed in to further reflection and action in an ongoing learning cycle.

Implementation of the methodology was carried out over two stages; the first planned set of activities involved extension of the existing collaborative arrangement with the Thai Government Department of Fisheries (DoF) and the Asian Institute of Technology Aqua Outreach Programme (AOP) in order to prepare a field research team and plan for field activities. The second stage was participatory action research field work which involved invitations to collaborate being extended to four formal groups and one informal group of hatchery operators in two Provinces of Northeast Thailand. Research facilitated by the research team used a range of participatory methods for identification and prioritisation issues, analysis, action planning, monitoring and evaluation. Actions were supported by the project logistically and financially. The exploratory approach to project planning meant that monitoring processes was as important as monitoring specific indicators.

The output of the first set of activities was a formal agreement to collaborate however the strength of the collaboration was indicated by the low level of commitment shown by the DoF and AOP representatives in planning and team building. The lack of commitment had important implications for impact and sustainability of the research. Greater attention to the partnership process was an important lesson. Four of the hatchery operators' groups approached accepted the invitation to collaborate with the project. This collaboration resulted in a range of knowledge outcomes, the development of social relations horizontally within the hatchery groups and vertically to include

individuals from service providing agencies in the local administration. Participatory evaluation by participants and the DoF partners was positive.

Evaluation of the project indicated that the approach was; appropriate in terms of the needs of primary stakeholders, the requirements of the donor and the circumstances under which it was carried out; effective in achieving knowledge outcomes that contributed to gains in livelihood assets for participants but ineffective in influencing the policies, institutions and processes that would have ensured sustainable impact from the collaboration as a result of the shortcomings in the institutional partnership arrangements; efficient in terms of resource use to obtain outputs and also in emergence of lessons to inform future practice.

Keywords: aquaculture, participatory action research, participation, development, fish seed, hatchery management, facilitation, empowerment, producer organisations, mobile traders, evaluation, sustainable livelihoods.

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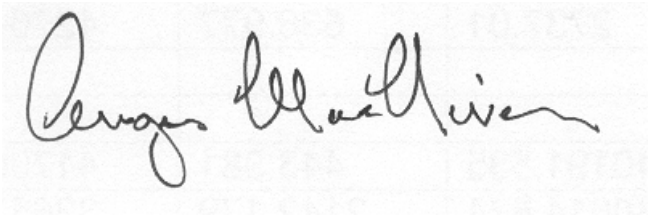
Glossary of Abbreviations and Terms

AARM	Aquaculture & Aquatic Resources Managament (AIT)
AFGRP	Aquaculture & Fish Genetics Research Programme
AIT	Asian Institute of Technology
Ajaan	Tertiary education teacher/lecturer
Ampur	District
Ampur Muang	Provincial Capital District
AOP	Aquaculture Outreach Programme (AIT)
ARP	Aquaculture Research Programme
BNAOFG	Ban Nongtao Aquaculture & Aquatic Farmers Group
CBO	Community based organisation
DFID	Department for International Development (U.K. Government)
DoAE	Department of Agriculture Extension
DoF	Department of Fisheries (Royal Thai Government)
FSQ	Fish Seed Quality in Asia Project
IFD	Inland Fisheries rch Division (Thai DoF)
KAC	Kosumpisai Aquaculture Cooperative
Moo Ban	Village
PAC	Programme Advisory Committee
PI	Principle Investigator
PO	Producer Organization
RLD	Rural Livelihoods Department
RLED	Rural Livelihoods & Environment Division
RNRRS	Renewable Natural Resources Research Strategy
SIDA	Swedish International Development Agency (Now Sida)
SFC	Surin Fisheries Cooperative
SL	Sustainable Livelihoods
Tambon	Sub-district
UK	United Kingdom of Great Britain & Northern Ireland

Statement of original authorship

I hereby declare that this thesis was composed entirely by me and has not been submitted in any previous application for a degree. The work it embodies has been done by me. The nature and extent of any work carried out by, or in conjunction with others has been specifically acknowledged by reference.



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1. Introduction

1.1. Background to the research

'Aquaculture systems', across a range from high-tech, intensive operations to extensive, 'backyard' ponds, ditches or rice fields, require a supply of eggs and/or juvenile fish in quantities and of sufficient quality to meet their production requirements whether those requirements represent year-round continuous production to meet demand from extensive markets (Bromage, 1992) or for seasonal increases in food-security or income for the rural poor (Jolly & Clonts, 1993). The quality of fish seed that is available to farmers can be a major constraint on the development of the aquaculture sector (Bromage, 1995). Articles 9.3 and 9.4 of the *Code of Conduct for Responsible Fisheries* (FAO, 1995), Articles 3.12 and 3.13 of *the Bangkok Declaration and Strategy* (NACA/FAO, 2000) and the ASEAN-SEAFDEC, "*Fish for the People 2001*" Resolution 12 (SEAFDEC, 2001) are key documents that specifically recognise the importance of seed issues and the associated responsibility of the international community in addressing this aspect of aquaculture development. In Asia, losses to farmers and small-holders and discouragement of new entrants to the potentially beneficial enterprise of aquaculture were reported to have resulted from a decline in the quality of freshwater seed available in the private sector (Little, Satapornvanit & Edwards, 2002), investigation of this issue was the field under which the research reported here was carried out.

Research into improvements in seed production has traditionally taken a disciplinary approach, predominantly in the field of genetics. *The Bibliography of DFID Fisheries Research Programmes from 1990 to 2001* (Beddington, Sanchez & Muir, 2002) shows that of the 400 publications produced by the Aquaculture and Fish

Genetics Research Programme[1], 162 (40%) reported work mostly related to genetic sex determination, stock improvement and transgenic manipulation. In the same period only three (0.75%) of the publications were practical manuals for seed production. While the scope of research was obviously related to programme objectives, identified needs and the interests and expertise of the investigators who applied for funding from the programme the lack of practical outputs such as training and/or extension resources raises the issue of a lack of attention to human resources/capacity issues either in research or in the dissemination of research outputs. This was reflected in the conclusions of an FAO/NACA (Network of Aquaculture Centres Asia) expert consultation *'Focussing small-scale aquaculture and aquatic resources management on poverty alleviation'* (Friend & Funge-Smith, 2002), where it was recognised that there was considerable potential for aquaculture to contribute to poverty alleviation. However it was stressed that appropriate aquaculture technologies for poor people were already in place and that efforts should be directed from technical research to effective extension of the technologies and management practices to poor people as well as enabling the poor to access and secure rights to aquatic resources.

The study reported in this thesis was carried out as a component of the U.K. Government Department for International Development (DFID) Aquaculture Research Programme (ARP) funded project, *R7052: Improving freshwater fish seed supply and performance in smallholder aquaculture systems in Asia*, referred to in this report by its' short title *Fish Seed Quality in Asia* (FSQ). From 1997 to 2001 the project worked in collaboration with government partners in Bangladesh, Laos P.D.R., Thailand and Vietnam through two phases of a project involving situation appraisal, identification of researchable issues and investigations by regional partner institutions of a number of

[1] The ARP was merged with the Fish Genetics Research Programme in 2001 to form the Aquaculture and

technical aspects of seed production and distribution (AIT Aqua Outreach 2000[a], AIT Aqua Outreach 2000[b], AIT Aqua Outreach 2000[c], AIT Aqua Outreach 2000 [d], Little, Edwards, Barman & MacNiven, 2004). Review and reflection on the process and outputs of the project in the light of recommendations from the AFGRP indicated the need for a further phase of work which focussed on processes of achieving the change intended in the project purpose and was, furthermore, responsive to guidance from DFID and the programme management by engaging with hatchery operators in an investigation of the issues that were important to them. The thesis presents the practical and theoretical research context and the identification, implementation and evaluation of the methodology that was used in working with groups of hatchery operators in Northeast Thailand from September 2001 to August 2002.

1.2. Research problem

The problem addressed by the research reported in this thesis was:

How to improve approaches to fish seed production in smallholder aquaculture systems of Northeast Thailand?

As a component of a DFID/ARP project the research activity had to be nested within and contribute to a hierarchy of objectives at the wider project, programme and strategy level, therefore the problem addressed here was derived from the wider project objective. DFID is the UK government department responsible for activities which are intended to meet the aims of reduction in global poverty and promotion of sustainable development (DFID, 2003). DFID's Renewable Natural Resources Research Strategy (RNRRS) was a ten year plan (1995-2005) intended to contribute to the governments development aims by generating and promoting the use of new knowledge to improve the management of natural resources and the livelihoods of poor people dependent on

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Fish Genetics Research Programme (AFGRP).

these resources (DFID, 1999). Under the bilateral component of the RNRRS the ARP, managed by the Institute of Aquaculture, University of Stirling, aimed, at the time the project was originally proposed, to address key issues constraining sustainable aquaculture production in poor rural communities. Since the inception of the RNRRS in 1995 DFID (known at that time as the Overseas Development Agency) required that logical frameworks were used from the strategy level to project level with a clear hierarchy of objectives. This structured approach was intended to ensure that research projects were relevant by contributing to achievement of the programme purpose and that programme activities were relevant to the RNRRS. What this meant was that there should be a clear relationship between problems and objectives addressed by research from the project activity level up to the strategic level. The project activity reported here addressed the problem of improvement in approaches to seed production in Northeast Thailand as a component of the wider project which aimed to address problems in seed production in Asia, this in turn was a component of the ARP programme which addressed improvement in the management of small-scale, semi-intensive and extensive aquaculture.

The research problem was defined following reflection on the wider project outputs and experience. The following section gives a detailed account of the FSQ project context and emergent issues that prompted further work.

1.3. Context

This section is a review of the project from the point of view of the project coordinator; the views expressed are not necessarily those of the Principal Investigators or collaborating partners[2]. The description includes the organisational setting, project

[2] Outputs from the project and other information about the Aquaculture and Fish Genetics Research Programme can be seen online at http://www.dfid.stir.ac.uk or by contacting the Programme at afgrp@stir.ac.uk.

background and management plan, a short description of project implementation and outputs. This is not intended as a full evaluation of all project activities but takes a wider view, looking at the background to and history of the project, project logic, achievement of outputs and shows how emergent issues from the earlier phases of the project led to further work.

1.3.1. Background to Fish Seed Quality in Asia Project

The FSQ project had its' origins in the experiences of the projects' Principal Investigators (PIs) Dr David Little and Prof. Peter Edwards, their colleagues and other contacts at the Asian Institute of Technology (AIT), Thailand. The project began 'life' as a concept note submitted to ARP for a project to investigate private sector management and related genetic aspects of tilapia seed production in Thailand and Vietnam; since it was perceived that there were problems of decreasing tilapia seed quality wherever seed was being produced by farmers. This was widely agreed to be an issue wherever tilapia were being produced commercially (D. Little, personal comment). The decline in quality was typically attributed to inbreeding and the response was, universally, to bring in new strains. An on-station scoping trial at AIT where seed from a small-scale hatchery in Northeast Thailand produced from an inbred strain were grown-out under identical conditions with an 'improved' strain indicated that inbreeding, in that case, was not a problem. The concept note was subject to several revisions following recommendations from the Programme Manager and the PAC (Programme Advisory Committee) before its' finally accepted form which had a broader regional focus including Laos and Bangladesh and also included investigation of other species of fish in addition to tilapia.

The problem identified in the proposal (see Box 1.1 for the details specified in the funding proposal to DFID) was, that the fish seed available to grow-out farmers, particularly for carp and tilapia, in the project area was often of poor quality. The

implications of this variability were described as unpredictable returns to producers potentially leading to reduced interest in aquaculture by smallholders. Beneficiaries were to be the seed producers, intermediaries and consumers of fish in the countries in which the project was active. The project contribution to solving the problem was summarised as development of improved understanding leading to action by partners to improve the situation using tools developed through research.

Box 1.1 Problems and evidence from the original project proposal (Form RD1) to DFID

1. What developmental problem is the project aimed at?

The project aims to address the problem of poor quality fish seed, particularly of carp and tilapia, and its negative impact on smallholder fish culture. The nature of the problem appears to be both situation and species specific; farmers in Bangladesh may find over-wintered or hatchery carp fry perform poorly compared to new season or wild captured seed, respectively. Farmers raising tilapia in Thailand may find deterioration in quality over time. In all countries the importance of minor carps and wild swamp fish species within stocked culture systems will be assessed. Variability in the performance of stocked seed can make returns, both financial and nutritional, unpredictable, reducing the attraction and value of aquaculture to resource-poor farmers.

2. What is the evidence for the demand for the research?

Regional and national fora for hatchery operators (e.g. Jessore) have raised quality as a serious issue affecting their business. Commercial hatcheries in both Thailand and Vietnam, and district-level officials in Lao PDR have all identified the monitoring of seed quality to be of importance to the continued growth of fish culture. The College of Agriculture and Forestry, Ho Chi Minh City recently produced a State of the System report in which seed quality was raised as a policy issue. The complexity of fry production and trading networks have obscured the underlying reasons for poor seed quality but Governments in each of the countries concerned have highlighted the issue as one major concern.

3. What will the project contribute to resolving these problems or needs and over what time-scale?

A better understanding of the factors affecting fish seed quality in the targeted areas will be an essential step, allowing partner institutions to use their scarce resources more effectively to improve the situation. Simple tools to monitor seed quality developed in the research period, and modified and improved in a follow-up project, should make quantitative assessment possible and practical under local conditions.

4. Who will the beneficiaries be?

Improved quality fish seed will bring direct and indirect benefits to all producers, intermediaries and consumers of fish in the countries in which the project is active. Higher quality seed will benefit the growers and consumers of food fish by reducing production and subsequently purchase costs. Poorer marginal people who often dominate fish seed trading networks will benefit if seed is of better quality or if they have access to methods/technologies that allow them to monitor condition.

1.3.2. Project logic

Use of the logical framework enabled a clear statement of the hierarchy of objectives for the project; see Figure 1.1 for the objective orientation and Appendix 2 for the logical framework submitted with the proposal. Since this was an ARP activity, the project goal (ARP purpose) was already given. The project purpose is the specific statement of what the project should achieve as a result of the Outputs produced, in this case; *Asian*

freshwater fish production sustained and developed through improved approaches to small-holder seed production, based on identified constraints in output, quality and supply. Discussion to clarify ambiguous terms in this objective revealed that 'output' referred to seed production, 'quality' was related to potential for survival and growth and 'supply' was used in the sense of the quantities available for sale or use at a particular time (D. Little, personal comment). The three anticipated outputs in the original proposal were specific statements of what should be achieved during the project from September 1997 until March 1999. These were;

1. a comparative analysis of constraints to seed availability and quality in the project areas,
2. reports of findings disseminated to stakeholders and
3. project memoranda for further collaborative work on researchable constraints.

Note that development of simple qualitative methods for assessing seed quality described as a project contribution in Section 1.3.1 was not included as an output in the logframe and was an activity under the first output. This plan was intended to cover the first phase of the project until March 1999 by which time, it was anticipated, a plan for a further phase of work would have been prepared. However the first plan remained in place till the end of the planned second phase of the project in March 2001 as will be explained in the next section on implementation of the Fish Seed Quality project.

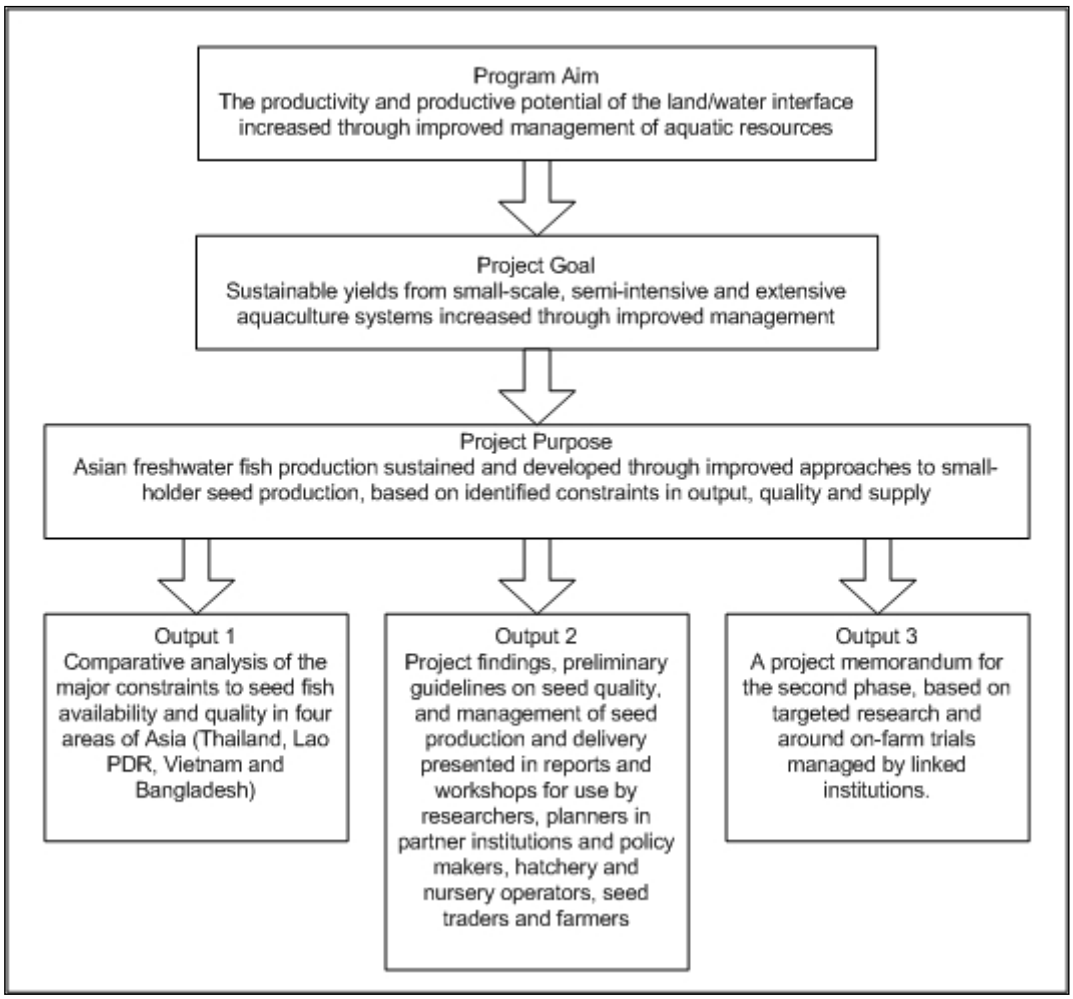

Figure 1.1 Hierarchy of objectives for Fish Seed Quality in Asia Project

1.3.3. Implementation of the Fish Seed Quality in Asia Project

Two dimensions of implementation are covered here; first the organisational aspects are explained followed by details of the activities that were carried out.

Organisational aspects

The project was managed through the Aquaculture and Aquatic Resources Management Program (AARM) of AIT, Thailand with two PIs involved on a part-time basis and coordination by a full-time Research Associate. Collaborating partners involved in the project were; Department of Fisheries (DoF), Thailand, Northwest Fisheries Extension Project (NFEP), Bangladesh, the Regional Development Committee for Livestock and Fisheries (RDC), Laos PDR, the Research Institute for Aquaculture No. 1 (RIA1) and University of Agriculture and Forestry (UAF) located, respectively in Hanoi and Ho Chi

Minh City, Vietnam. The main structure for collaboration, with the exception of NFEP, was membership of the organisations in the AIT Aqua Outreach Program (AOP). AOP was set up in 1988 under DFID support to AARM to field-test and disseminate technologies for aquaculture development, since then it had moved into capacity building for provincial and district-level government staff in aquaculture and aquatic resources management in the region and in addition had facilitated several specific research projects from external agencies such as the AFGRP. The NFEP involvement arose from the close linkages of this project with AARM. Budget was managed by AIT using the same procedures as the AOP; payment to collaborators was made upon receipt of claims for expenses incurred under project activities. NFEP, a joint Bangladesh Government/DFID development initiative, covered the costs of work in Bangladesh.

Project activities

Implementation of the project was planned to take place over two phases, a situation appraisal phase from September 1997 to March 1999 and a targeted research phase from April 1999 to March 2001. Figure 1.2 illustrates the timeline, plotting the key activities over these two phases, stakeholder surveys and workshops, and indicating the point at which the author joined the project.

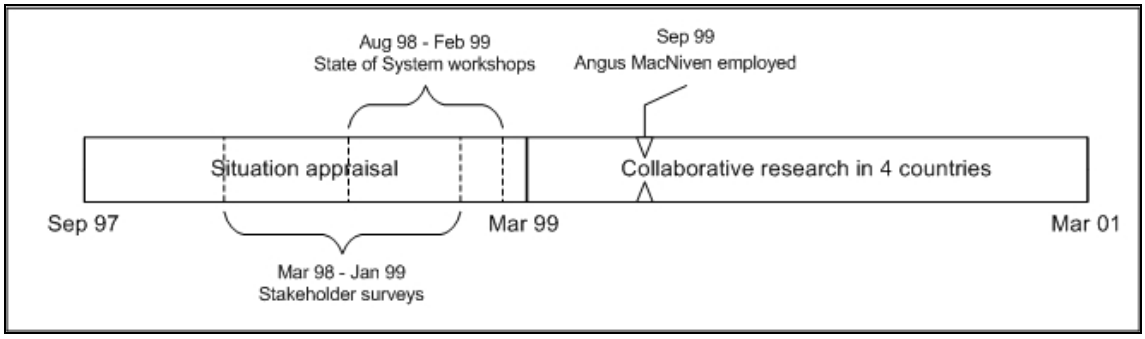

Figure 1.2 Timeline for the first two phases of the Fish Seed Quality in Asia Project.

Anticipated outputs from the situation appraisal phase were defined in Figure 1.1; a comparative analysis of constraints to seed availability and quality in the project areas, reports of findings disseminated to stakeholders and project memoranda for

further collaborative work on researchable constraints. The activities that were planned to achieve the outputs are summarised against the corresponding outputs in Table 1.1.

Actual activities in that period were broadly similar in selected areas of northern and southern Vietnam, Northeast Thailand and Northwest Bangladesh and followed the process described in bullet points (a)-(d) below;

(a) Surveys of current practices and perceptions among hatchery and nursery operators, traders and grow-out farmers using semi-structured questionnaires.

(b) Data processing by research team members to produce descriptive statistics.

(c) Presentation of descriptive statistics to selected representatives of the stakeholder groups and government officers[3] in a two day workshop. The resulting discussions informed recommendations for policy and further research which were drafted by the end of the workshop.

(d) Publication of the outputs from this process as synthesis reports for each country, written in both English and the local language and titled 'State of the System' reports for each of the research areas (AIT Aqua Outreach 2000[a,] 2000 [b,] 2000 [c] & 2000[d]). The content of these reports comprised the processed survey data and the recommendations from the workshops.

An AIT student had carried out a similar exercise in the project area in southern Lao PDR for his Master's degree research project (Haitook, 1997). In addition the collaborating partners; the Regional Development Committee for Livestock and Fisheries (RDC) had other priorities; they felt that they had a very good picture of the seed supply system in their command area largely because development of a seed production and supply network was an ongoing project of theirs and as a result there was no appraisal in Southern Laos PDR. Instead a set of practical guidelines for

production of Silver Barb (*Barbonymus gonionotus*, Bleeker, 1850) were produced during a workshop involving government and private sector stakeholders, this was later published as a manual by the research partner organisation (Vongpachan & Kosey, 1999).

Table 1.1 Outputs and activities of the DFID/ARP Fish Seed Quality in Asia project. R7052

Output	*Activities*
1. Comparative analysis of the major constraints to seed fish availability and quality in four areas of Asia	1. survey to describe seed supply context, identify problems and significance locate communities/areas where fish seed quality is a constraint 2. local workshops, partner institutions, seed networks and farmers. Describe current practices and constraints for quality of smallholder fish seed 3. using farmers performance criteria, trials comparing seed quality; may include: Thailand: tilapias on-farm *cf* introduced stocks; silver barb from local commercial hatcheries cf seed from government stations Lao PDR: carps and tilapias at district level *cf* Provincial hatchery seed and imported Thai seed. Vietnam: seed from itinerant traders *cf* Government hatchery, over-wintered carp and tilapia *cf* new season seed. Bangladesh: carp, tilapia seed from improved, introduced stock *cf* local/distant commercial hatchery seed, over-wintered carp and tilapia *cf* new season seed 4. on-station research for methodologies to monitor larvae of a variety of species, including challenge test protocols using simple available consumables and hapa-based nursing trials
2. Project findings, preliminary guidelines on seed quality and management of seed production and delivery presented in reports and workshops for use by researchers, planners in partner institutions and policy makers, hatchery and nursery operators, seed traders and farmers	1. produce project findings and reports, conduct local workshops on implications for technical and organisational change for researchers and planners in partner institutions 2. produce preliminary guidelines for policy makers, hatchery and nursery operators, seed traders and farmers on seed quality and on appropriate management of seed production and delivery
3. A project memorandum for the second phase, based on targeted research and around on-farm trials managed by linked institutions.	1. with partner institutions, plan priorities and approaches for further research to address constraints in fry production and quality, and to develop uptake pathways and indicators 2. prepare project memoranda for the second phase.

Much of the collaborative research in the second phase of the project consisted of the trials listed under Activity 3 of Output 1 in Table 1.1; limited mostly to comparisons of seed quality available in the regions from both private and government sector sources. This work was carried out by government research staff on-station in Thailand and Vietnam. In Lao PDR and Bangladesh on-farm research was also carried out though farmers' participation was restricted only to provision of pond space and

[3] In Vietnam the government officers included provincial authorities, officials and researchers from Ministry

husbandry of experimental fish[4]. Several research projects were carried out by undergraduate and postgraduate students from the University of Stirling on the use of stress challenge tests as a possible quantitative test of seed quality.

1.3.4. Summary of outputs

This section does not go into the specific details of individual outputs from project activities instead it presents an overview of the process and main trends in activities which were carried out. Details are unnecessary because the research findings under the original 3 Outputs had very little bearing on the decision to adopt action research; however engagement in the project and experience of the research process were important. The activities under Output 1 consisted of surveys and workshops which were written up as *State of the System* (SoS) *Reports.* The anticipated guidelines on seed quality and management of seed production were only produced in Lao PDR. The project memoranda anticipated in Output 3 were prepared, though the research that was carried out under the memoranda largely consisted of the trials suggested as potential activities toward achieving Output 1 in the original project proposal form. All the activities carried out under the collaborative research arrangement coordinated by AIT-based researchers from 1997 to 2001 are listed by country in table 2 below.

The SoS reporting process produced a considerable amount of descriptive information and recommendations. However the value of the information in the reports depended on the usefulness to stakeholders; efforts were made to get feedback on the reports by attaching a questionnaire and covering letter to copies of the report that were distributed to key stakeholders by the partners. The response was said by the partners to be extremely poor and as a result there was no feedback from the wider stakeholder

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of Fisheries, in the Thai workshop they were Department of Fisheries Inland Fisheries Research Division biologists. In Bangladesh they included planners, researchers and extension officers.

[4] In Laos PDR the experiments were run with new entrants to an ongoing Regional Development Committee project aimed at developing a network of seed nurseries in several districts; seed and hapas were provided

community. The only documented feedback on the project was received in the final workshop which was only attended by participants from the partner organisations. The final assessment of the SoS process by the partners (Little & MacNiven, 2001) was that they appreciated the use of participatory methods, though it was a new experience for some and could be improved on. The format and content of the report was also criticised; local language was preferred for local use as the bilingual format slowed the publication process and content should have been targeted at specific readership using appropriate media.

Table 1.2 Summary of documented outputs of the collaborative research project from September 1997 to June 2001.

Location	*Documented output*
Bangladesh	SoS report
	Government hatchery monitoring trial
	Over-wintered Silver Carp field trial
	Improved vs. local Silver Carp strain comparison trial
Lao PDR	Silver Barb hatchery manual and trial monitoring system
	MoU for further work
	General guidelines for broodstock management
	Seed Quality images information sheet
	Silver Barb seed comparison between provincial hatchery, district farmers and Thai seed.
	Support to two provincial hatchery managers meetings.
Thailand	SoS report
	MoU for further work
	Private sector vs. government produced Silver Barb quality comparison
	Final project review workshop attended by representatives from each partner organisation.
Vietnam RIA1	SoS report
	MoU for further work
	Comparison of impacts of two different hypophysation hormones on seed quality.
	Introduced vs. local Silver Carp strains comparison
	Private sector vs. government produced Grass carp and Mrigal seed trials
	Impacts of transport time on survival and growth of seed bought from traders
Vietnam CAF	SoS report
	MoU for further work
	Tilapia from sewage-fed system quality comparison trial and farm management survey.

SoS = State of the System; comprised descriptive statistics from stakeholder survey data and recommendations for research and policy that were developed in workshops. MoU = Memorandum of Understanding; an agreement to collaborate for further work after the situation appraisal phase..

free. In Bangladesh participants who participated in the research into over-wintering of Silver Carp also received free seed and cages.

In terms of the knowledge outputs the partners reflected that the information collected was interesting, though not new information, further it was difficult to identify a means of applying this general information provided in the descriptive statistics. Table 1.3 summarises the perceptions regarding the SoS reporting process from the point of view of the workshop participants.

From the limited amount of fish seed sampled in the research trials there was an indication that variability in seed quality, in terms of growth and survival, may have been important, and furthermore this variability was not just confined to the private sector but was found in the government hatchery produced seed too. However, serious flaws in the practical implementation of the research trials meant that almost none of the research had any external validity *i.e.* that it was impossible to generalise from any of the 'systems' sampled therefore the results could not be said to provide a sound basis for any decision-making. None of the experiments were designed to identify the factors that might be constraining the 'output, quality and supply' of seed. One positive outcome was that all partners reported in the workshop that their capacity for research had been enhanced as a result of the experience.

The research into simple quantitative tests to evaluate seed quality which involved adaptation of toxicity testing procedures to develop acute stress challenge tests for tilapia fry using reference toxicants showed that while the tests were simple they were impractical for use in the field (MacNiven & Little, 2000) mainly due to their sensitivity. It was concluded that any testing would require a battery of assessments for different aspects or quality characteristics. Furthermore the use of such a system could provide the opportunity for 'rent-seeking' by local government officials involved in regulation and/or could be used against the most vulnerable people in the 'seed production and delivery system' such as traders and middlemen.

Table 1.3 Summary of perceptions regarding the SoS reporting process from the point of view of participants in the project final workshop at AIT, June 2001

Advantages	*Disadvantages, problems & constraints*	*Improvements (numbered to address the corresponding issues in the middle column)*
1. Participatory methodology 2. Enables better understanding of the system by describing the networks, some of the practices, and the role of stakeholders within the system. 3. Sharing of ideas and information 4. Report useful to present information to stakeholders, overseas donors. 5. Bilingual format is appreciated by local readership who do not have good English. 6. Improved relations between stakeholders with awareness raised all round 7. Identifies improvements to the system, practical recommendations for research and policy decision-makers. Positive, thorough method. 8. A lot of information was collected to update existing knowledge. 9. Methods may be applied to other areas (after modification)	1. Some stakeholders not adequately represented in data collection & checking. 2. Collecting data from poorly educated households was difficult 3. From data collection through to reporting was complex and lengthy process. 4. Report not useful to most farmers, nursers or traders 5. Bilingual format not necessary since most people will only read their own language 6. Format of the report not logical, cover page difficult to read, typesetting not good, some editorial work needed 7. Information too general 8. Too much information, very difficult to interpret the complex system. Is seed quality a problem? 9. No channel or provision for uptake of recommendations.	1. More participation through development of relationships in a network 2. Improved participatory methods, perhaps focus on less 'technical' issues. 3. Full-time, local coordinator/ implementer would speed the process and ensure quality of output 4. Follow-up with targeted reports/ meetings rather than one general document 5. Produce local language versions relevant to specific stakeholders and English version for foreign agencies 6. Should be helped by targeting reports and not using bilingual formatting plus local, dedicated coordination 7. Narrower focus/more depth 8. As 7. Above (reduce generalisation, deal with specific problems). 9. Better identification & targeting of users and appropriate kinds of media for the different stakeholders should be included in the planning stages.

Source; workshop report by Little & MacNiven, 2001

1.3.5. Evaluation & emergent issues

The evaluation of the project presented in this section was not a specific project activity; rather it is a summary of the ongoing reflective process over the course of the project from September 1999 to June 2001. The reason for critical reflection at this point was to find an improved focus for further research under the project which could be used for submission as a PhD. A suitable starting point was the issue of project logic, moving on to evaluation of outputs and including appropriateness, effectiveness and efficiency of the processes that were used.

Evaluation of Project Logic

The project logframe (logical framework), the main management tool required for use in ARP projects, should consist of a matrix which clearly states project objectives, indicators, means of verification and assumptions. It is the main means of communicating information about the project for purposes of implementation,

monitoring, evaluation and general understanding. A critical analysis of the logframe revealed important weaknesses in the plan.

Examination of the project purpose showed that it was composed of, at least, three objectives; 'Asian freshwater fish production sustained and developed' to be achieved 'through improved approaches to smallholder seed production' which would be 'based on identified constraints in output (seed production), the quality of the seed and its' supply (quantities available for sale and use)'. It is a convention of logframes that in order to maintain clarity, prevent ambiguity and possible trade-offs which may result, the statement of a project's Purpose in a logical framework must be a single objective and furthermore that purpose should be out-with the control of the project implementers (IADB, 2001). The original Purpose statement implied a clear hierarchy of the three objectives of which it was composed; in order to make the statement clear and useful in terms of specific meaning it needed to be redefined by removing the parts that pertain to the project goal and output levels. Figure 1.3 illustrates how this deconstruction was achieved.

The 'fish production' in the purpose was covered by 'aquaculture' in the goal and 'sustained and developed' was covered by 'sustainable yields… increased'. The objective 'identified constraints in output, quality and supply' clearly belonged at the output level as it was assumed under Output 1 and furthermore is an action within the control of the project management. This left a project purpose;

'To improve approaches to smallholder freshwater fish seed production in Asia'

This clarification of purpose sharpened the focus on what the project should be trying to achieve through research activities and thus provided the research problem identified in Section 1.2.

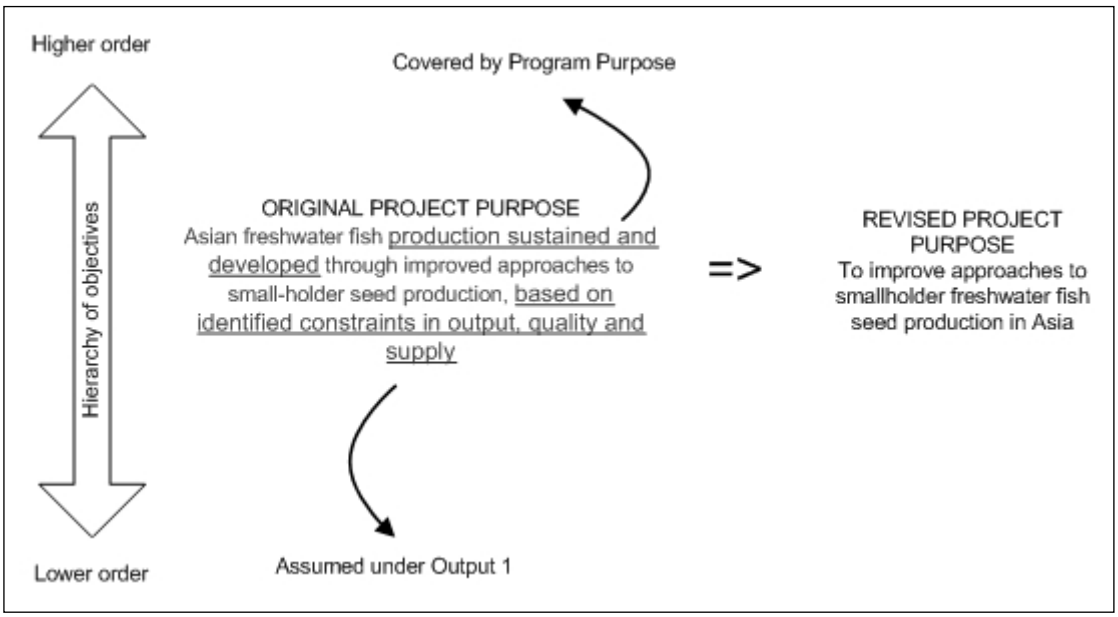

Figure 1.3 Illustration representing the deconstruction of the original statement of the purpose of the project.

Having clarified the purpose the next stage was to look at the causal links between objectives, generally these are evaluated from the lower order objectives to the immediate higher order objectives (Woodhill & Robbins, 1998). On the logframe this means working from the bottom to the top of the table. Examination of the FSQ logframe showed that the Activities were necessary to produce the corresponding Outputs, the Outputs were necessary to achievement of the Purpose and if the Purpose had been achieved then it would have contributed to attainment of the project Goal.

However, another convention of logframes is that project design should be such that no Output necessary to achieving the Purpose is missing; closer scrutiny of the Output to Purpose objectives showed that even successful production of the three Outputs alone was unlikely to lead to the structural change of improved approaches to seed production required by the Purpose. Underlying the hierarchy of objectives in a project are a series of assumptions related to cause and effect, when these assumptions do not hold then the project will fail (Woodhill & Robbins, 1998). The major assumption appeared to be that identification of constraints in 'output, quality and

supply' and packaging the information in reports and workshop materials would lead to improved approaches to seed supply. Clearly achievement of the Purpose was a complex matter which would require a number of other Outputs perhaps more suited to a programme-level approach.

Evaluation of (process to achieve) Outputs

A common model for evaluation (Woodhill & Robbins, 1998) examines the appropriateness, effectiveness and efficiency of a project i.e. was the project a good idea? Did it work? And was it done in the best way possible? Given that the planned outputs for the project were not sufficient on their own to lead to change in the approaches to seed production by smallholders there was no need to look closely at the indicators that were originally established for the project; what is presented here is a general picture of the overall value of the project and the emergent issues that had bearing on the project development after June 2001.

Appropriateness. One of the ways in which appropriateness must be judged is in the light of the problems or needs of the beneficiaries and this was one of the main criteria that had to be met by a proposal for funding submitted to the ARP. However there was one important issue; up to 2001 primary stakeholders had not been asked specifically about the nature of their problems. The original research problem had been accepted as a constraint without consultation; surveys and workshops had been carried out within the frame of reference of the problem identified by the PIs and research partners. This is illustrated by a schematic of the situation appraisal phase in Figure 1.4.

The first signs that quality was not an issue for all stakeholders were documented in the SoS reports (AIT AquaOutreach 2000[a], 2000[b], 2000[c] & 2000[d]); perceptions were that seed quality was acceptable, even improving.

Revision of the project purpose strengthened the case for appropriateness of the project, improvement within seed production without being specific about the nature of the problem. This reflection led to identification of the necessity of understanding the nature of primary stakeholders' problems to carry out appropriate research.

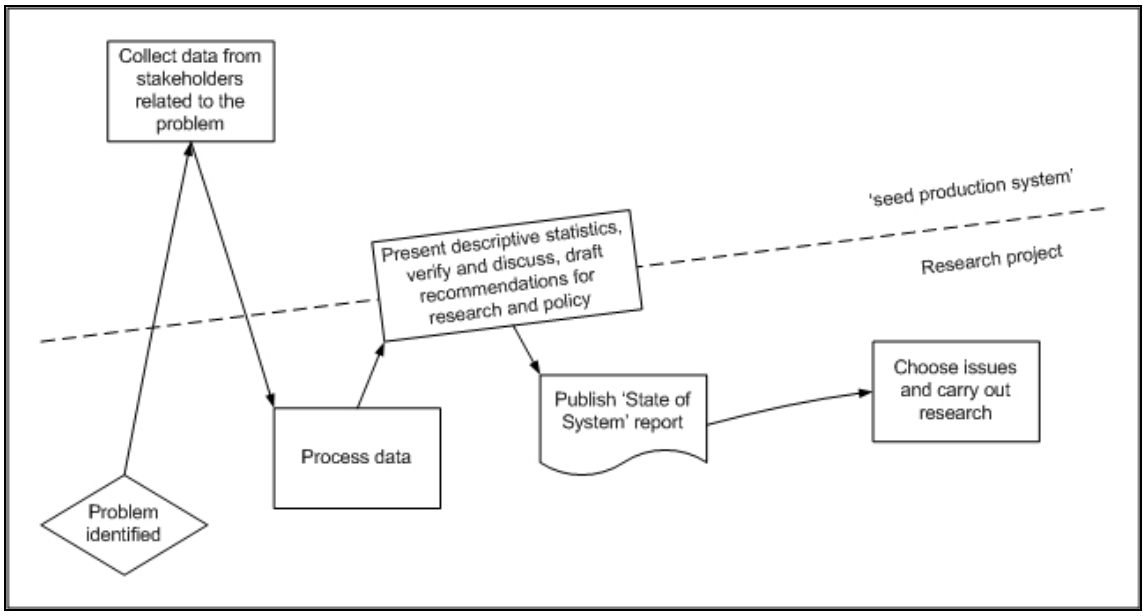

Figure 1.4 Schematic of the earlier phases of the project process

Effectiveness. Did the project work? Or more appropriately at this point 'was the project working?' Or better at this review stage was the question 'how to improve effectiveness?' It has already been established that even if all outputs had been produced as expected that there was little chance of achieving the desired outcome of improved approaches to seed production. Expected outputs were not achieved as planned, however the lessons learned from project implementation were useful in terms of improved capacity of participants and the useful information that came from the project activities, *i.e*.

(a) There was to be no simple test to quantify fish seed quality and

(b) that there was no agreement about the nature of the problem.

Efficiency. The question of efficiency broadly asks 'was this the best possible way to carry out the research?' and with no standards for comparison evaluation was not

straightforward. The efficiency of output production varied between countries in terms of both human resources and cost (inputs to outputs); there were no guidelines for efficiency indicators. Taking a wider view there was an issue that while the project purpose was to achieve improvement in seed production and supply the research approach which had been taken was of a 'fire fighting' nature rather than attempting to find ways to make things 'fire resistant', the approach had been to look for problems rather than look at ways to improve things. In this regard the evaluation is; that as a first step in the research process the earlier phases of the project provided some useful lessons.

Emergent issues

In summary, the emergent issues from the project up to June 2001 were;

- The project purpose statement was revised to the objective of improving approaches to freshwater fish seed production in Asia. Working towards this objective became the research problem for the PhD research presented in this thesis.
- More outputs were required to meet a revised project Purpose,
- There was no agreement about the nature of the problem; declining fish seed quality had been assumed without fully consulting the stakeholders.
- Focus should shift to improvement rather than finding fault in order to better address the project purpose.

These issues were the main drivers in revising the project plan, though they did not directly lead to identification of the methodology they informed the choice by clarifying a useful research purpose and the recognition that further work should involve a better understanding of the different perspectives held by stakeholders.

1.4. Theory

Study of theory is necessary to develop guiding principles for action (Webber, 2000); at this stage the theoretical basis was needed to conceptualise the problem situation and

enable development of a framework for analysis. There were two key factors, in parallel with the experience of the project, which led to the choice of research framework. The first and most influential factor was a survey of the literature on systems approaches. The second factor was participation in an AFGRP workshop in November 2000.

1.4.1. Systems

In the job advertisement for the research position on the FSQ project it was indicated that the focus for thesis research would be 'the development of an overall model for quality fish seed production and delivery to expanding rural markets'. This model was to combine experience from production and marketing of highly perishable agricultural products, economic models relating to production, consumption and marketing. While development of such a bio-economic model would be a challenging and interesting academic exercise, reading and reflection around the subject raised several issues which indicated that it was not a suitable option for further work under the project. These issues were:

- Typically models used in aquaculture have been simplified representations of reality which have been used for a range of purposes including attempts to predict economic feasibility, optimise system design and/or operating conditions, deduction of otherwise immeasurable parameters and testing of hypotheses (Leung 1986, Cacho 1997). The purpose of simplifying reality can be defeated in 'all-encompassing models' which tend to become as complex as the real system (Cacho, 1997).
- People were already producing a diversity of species and the fish were being delivered to a broad range of middlemen and producers all over the region with varying degrees of technical sophistication and levels of satisfaction with the quality. What could a model offer in the face of such complexity and diverse opinion? No single

perspective, such as an ‘overall model’ can comprehensively or adequately capture the complexity of real world problem situations where the objectives are not agreed (Checkland 1981, Funtowicz & Ravetz, 1994)

- Best-practice, technical information for the production and delivery of fish seed was already available; see for example the collections in Bromage & Roberts (1995), Beveridge & McAndrew (2000) and practical manuals such as Haylor & Muir (1998). Although these were published relatively recently, similar high quality technical materials have been available as a basis for curriculum development and training by education and research organisations throughout the region since at least the 1970’s, possibly earlier (P. Edwards personal comment). Any model for production and delivery of fish seed would likely constitute a re-packaging of existing information. The important issue, from the point of view of external agencies such as the FSQ project, was whether the information was reaching the seed producers and actors involved in delivery in a format that they could use and learn from.
- How would a model contribute to achieving the project purpose? A model that could achieve improvement of approaches to seed production would need to incorporate dimensions of process and attitude change among stakeholders while characterising and facilitating the enabling environment for change (Checkland, 1999).

The complexity of developing an ‘overall model’ which appeared to entail combining system dynamics modelling, social network models, economic models of input and output markets, social engineering, policy analysis and resource flows was a formidable challenge. The insight gained from the systems literature, and particularly Checkland’s (1981) Soft Systems Methodology, provided a means to conceptualize the overall problem, rationalize the problem of modelling, identify gaps in the process and furthermore it introduced the field of action research, the main component of Soft

Systems Methodology (Checkland, 1981), which became significant in investigating the problem.

Soft Systems

Systems ideas emerged early in the twentieth century through dissatisfaction with the limitations of reductionist science in dealing with complexity (Checkland 1981, Flood, 2001). The principle of reductionism, dividing problems into manageable parts, can be traced back to Descartes rules for 'properly conducting one's reason' and has been a defining characteristic of science for over three hundred years. Knowledge about complex phenomena is generated using this principle by explaining them in terms of cause and effect from a lower level of organisation; an example given by Checkland (1981) is the explanation of biological phenomena in terms of physics and chemistry. The fact that the principle has been around, unchanged for so long is testament to its effectiveness. Reductions of the world and our knowledge of it into subjects or disciplines are a rational extension of the principle and have contributed significantly, through the understanding gained and the exploitation of science in technology, to the accelerating change transforming the world. However, as Sterman (2001) points out; 'as wonderful as the human mind is, the complexity of the world dwarfs our understanding. Our mental models are limited, internally inconsistent and unreliable. Our ability to understand the unfolding impacts of our decisions is poor. We take actions that make sense from our short-term and parochial perspectives, but due to our imperfect appreciation of complexity, these decisions often return to hurt us in the long run.' Examples of this 'policy resistance', where interventions are defeated by the response of the 'system' to the intervention, are the appearance of drug-resistant pathogens and pesticide-resistant plant pests (Sterman, 2001).

Checkland (1981) described three problem areas for conventional science which led to the development of systems thinking and the systems movement; problems in

dealing with complexity in general, application of science to social phenomena and usefulness of scientific methodology in the management of 'real-world' problem situations. An operational definition of 'complexity' is 'where understanding requires the insights of different disciplines operating at different scales; where there is irreducible uncertainty; and, where there are multiple likely future states' (Foster, Kay & Roe, 2001). Social phenomena and the subset of 'real-world' problem situations are the result of a further dimension of complexity in that systems involving humans are reflexively complex; they exhibit 'awareness' and 'purpose' which means that they learn and are liable to dynamic change and/or adaptation (Munda, 2004). The response to these problems in the development of systems thinking has been to look at the whole picture of phenomena as a system in terms of its functions and relationships to other systems rather than just examining the component parts (Flood, 2001). The origins of this alternative position to reductionism were developed in the field of evolutionary biology, principally in the work of Ludwig von Bertalanffy (1968, quoted in Checkland, 1981; Flood, 2001))who demonstrated that organisms are more than a 'sum of their parts' and proposed that this concept could be generalized for other fields of study in his Open Systems Theory.

The concept of synergy whereby the whole is greater than the sum of its parts or put another way, a characteristic of a whole entity which is created by the interaction and influence of its component parts but cannot be reduced to those parts is known as *emergence* and such characteristics are known as *emergent properties.* Examples of emergent properties are the *smell* of ammonia, the *wetness* of water and human *behaviour*, none of which can be explained through knowledge of the properties of the components. This concept is coupled with the idea of *hierarchy*; the existence of different levels of organization which exhibit differing emergent properties; every

ecosystem and human system is a component of another system and is itself made up of component systems (Kay, 2001). The other significant strand in the development of systems thinking came from the field of cybernetics, the science of communication and control in organisms and machines, which contributed the concepts of control by feedback or the communication of information between the interrelated parts or systems.

Systems approaches consist of two main strands, systems thinking and systemic thinking, stemming from the same tradition but with the former taking an objective stance which sees the world as systemic, made up of real systems and the latter assuming a subjective stance which uses a systemic process of enquiry to deal with the complexities of the real world. The distinction between the two systems is best understood from a diagram contrasting the two 'world views', see Fig 2.4. The distinction is clearly the way that 'systemic', defined by Checkland (1990) as 'of or concerning a system as a whole', is used. To view the world as systemic, as in the hard systems approach, is to assume that the world is made up of real systems with well defined membership, boundaries and goals. In soft systems goals and boundaries are not given but socially constructed, *i.e.* they must be agreed through negotiation/contestation of the stakeholders/members. Hard systems approaches, which have a problem-solving focus on finding the best technical means to reach a specified goal, can usefully be applied to natural systems such as a diseased fish, or designed systems such as pumps. Soft systems thinking is appropriate when dealing with human activity systems such as organizations or groups of stakeholders where the problem solving process may include negotiation of goals as part of the learning process (Röling & Wagemakers, 1998).

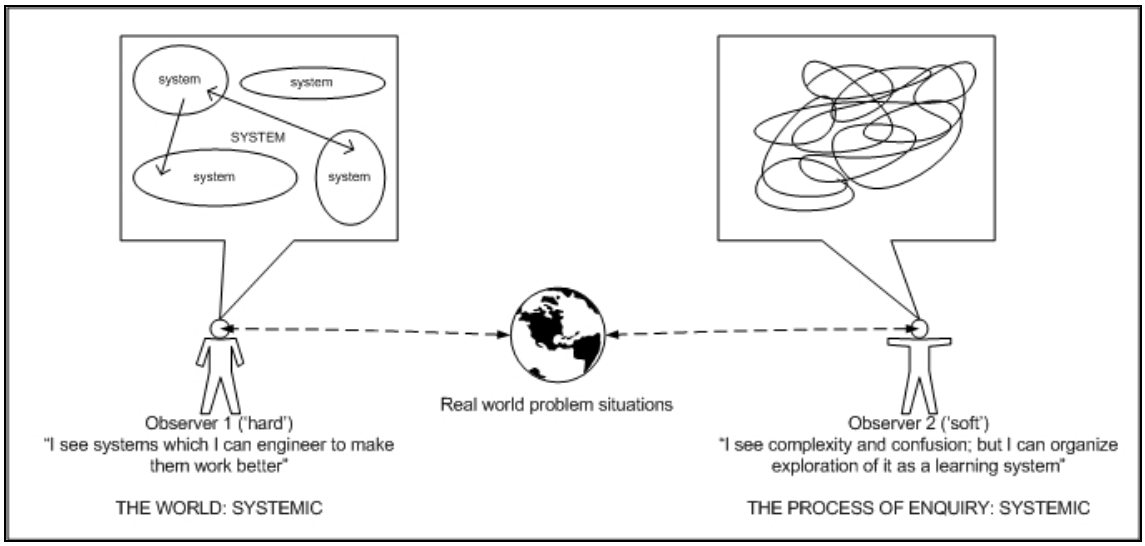

Figure 1.5 Distinction between hard and soft systems stances (after Checkland, 1999)

The perception of the real world problem situation by Observer 2 'I see complexity and confusion' depicted in Figure 1.5 sums up the personal impression held by the author when trying to think about the task of developing the expected 'overall model of quality seed production and delivery'. This type of overall model has been described by Checkland, in his in-depth history of systems thinking (Checkland, 1981) as characteristic of the modelling approach that is the focus of activities in the field of 'classical' Operational Research (OR) where the purpose is to enable policy and action decisions to be made 'scientifically'. OR strategy consists of modelling processes, incorporating technical, economic, chance and risk factors to produce predictions of the outcomes of alternative management actions. Performance is measured typically using a single, usually economic, parameter which may be optimized by manipulation of the model parameters. While this may be useful in 'a well-defined production process' Checkland (1981) observed that such a situation is rare and that 'no single performance criterion can possibly unite within itself the myriad considerations which actually affect decisions in social systems'. In relation to the expected overall model the performance characteristic was to be 'quality fish seed', but what quality fish seed might be was a complex issue in itself.

Fish Seed Quality

All ARP projects have an abbreviated title, in the case of R7052 this title was *Fish Seed Quality in Asia*, and this was shortened further by all the partners and associates who knew it simply as "the Seed Quality project". This name apparently became the identity for the project in the eyes of the people involved; the perception was that the project was about seed quality, specifically comparisons of, and ways to assess or measure seed quality and not about improving approaches to seed production and delivery. Use of the term "quality" seemed to raise the expectation that the research project was going to arrive at quality standards ideally with some kind of regulatory instrument/scheme which could be administered by local authorities. Most of the research partners had some connection with AIT and were aware that the aquaculture field unit provided a commercial service to check the success rate of hormonal sex-reversal of tilapia fry which was used as a kind of quality certification adding value to private sector hatchery seed (commercial tilapia farmers generally want to prevent fish from breeding in the pond and require at least 99% of fry to be male). In addition an awareness of the global trend towards establishing grades and standards across all areas of food production and associated industries in developing agricultural markets (Giovannucci & Reardon, 2000) ensured that, at least among people working in food production-related fields, the concept was at least interesting, if not attractive. As a topic for further research the investigation of quality measurement and control had a strong appeal; it seemed to be a major focus of interest by all parties concerned with the project, possibly because it was a simple idea and would represent a nice reduction of a problem using the scientific method. However with hindsight the enthusiasm of the research team may have been due to misconception of what quality control and management is all about. This section attempts to explain how the confusion may have arisen, discusses some important

aspects of quality management and explains how the concept is parallel to the learning process which the action research was engaged in facilitating.

Quality assurance, standards, auditing and related quality management approaches have developed from concepts of auditing in the 1920s by the UK Aeronautical Inspection Directorate (Drew, 1969 and Souch, 1976 cited in Swift, Humphrey & Gor, 2000) and quality control in post-World War II Japanese manufacturing industries (Boaden, 1996), The agreed intellectual foundation, based on use of scientific method of observation, experimentation and the use of statistics to control and improve quality was set out by Shewhart (1931 cited in Bisgaard, 2000). Initially quality control systems were developed by private sector defence contractors in order to win or maintain contracts with the government agencies that set the standards, and were based on statistical controls.

From the FSQ point of view initially the literature appeared to have a lot to offer; a scientific foundation, using familiar, rigorous methods; however it became apparent that the contemporary approaches to issues of quality in industry were different from the simple notion of control which was envisaged by the project partners and associates and furthermore that there were a number of constraints to adoption of these approaches in the primary production sectors.

By the 1980's quality assurance schemes were widespread prompting the establishment of international standards and resulting in a proliferation of external, third party registration and certification. The approaches which have been successful and proliferated however were not based on quality control by product inspection, the method of assessing fish seed quality which had been pursued by the project in the experiments with stress challenge tests (MacNiven & Little, 2001) and condition indexes (Little *et al*, 2004), but used methods of process control or management (Swift

et al, 2000). The idea that the quality of a product can be measured misunderstands the principles behind management of quality which is that it is a process of organisational change; a claim of quality refers to the production process not to the product (Perry, 1997), quality is a process claim not a product claim. Reduction in quality of a product can be due to variation within a production process, the sources of which can include the differences in materials, equipment and operation by people involved in production. Some current definitions of quality improvement are,

"the reduction of variability in processes and products" Montgomery (1991)

"..the never-ending improvement of a firm's extended process[5] with the ultimate goal of customer satisfaction". (Gitlow, Gitlow, Oppenheim & Oppenheim,1989).

However while the definitions indicated that there was convergence of the aims of the quality management/assurance approach with meeting the needs of the project beneficiaries in terms of having a focus on improvement and consequent customer satisfaction, there are a number of constraints in applying such an approach to small-scale aquaculture.

Quality management approaches are acceptable in the manufacturing and service sectors but there has been negligible adoption by the primary sector due to the variability in 'natural' product production and the relatively low control over the production environment (Perry 1997). In general terms this means that a large part of what goes in to, and out of primary production processes is uncontrollable and unpredictable. Establishing what the quality related metrics were and how to measure them would present a further set of difficulties, an example related to hatchery operation would be to determine the value of 'good' broodstock and establishing the return on

5 This term refers to an expanded view of the organization to include suppliers, customers, investors, employees and the community.

investing and maintaining these stocks. This also assumes that the approach would be acceptable and useful to the people involved in the production and supply of seed.

Though it was apparent that the field of quality management had little to offer directly to the project, there were some underpinning features of the quality management approach that informed the reflective process. These were the 'soft' features of the approach which were merged with earlier statistically-based, production control methods by Juran (1980) and Deming (1983) inspired by the Industrial Democracy Project, an action research project which identified the positive effects of participative approaches in linking industrial production technologies with work organization (Emery & Thorsrud, 1976)

1. The affirmation that a product inspection approach was not the magic bullet imagined at the outset. It should only be used as one of a number of indicators of improvements in the management of production processes (Montgomery, 1991).
2. The principle that improvement comes about through learning more about the product, the processes and the customers (Box, 1994). It is a learning process which can be facilitated.
3. Focus on the processes through the use of monitoring data and process documentation towards
4. The promotion of continuous improvement.
5. Cooperation in maintaining the flow of information
6. Group based problem solving involving representatives of all parts of the production system; an activity first seen in 'quality circles' in Japanese industry (Ishikawa, 1976).

Defining 'seed quality' in absolute terms was difficult since quality is something that should refer to the production process and cannot be measured directly and clearly fish seed quality meant different things to different people. Box 1.2 summarises some of

the ideas that people had about the nature of fish seed quality which was prepared by pulling out information from project documents and discussions at various levels that took place around the issue over the course of the project. From the perceptions listed in Box 1.2 it was apparent that quality is a complex issue incorporating multiple factors on a range of dimensions including performance, appearance, reproductive capacity and marketability. The relativity of the concept was apparent in the different, often contradictory perceptions between people, places and across time. Individual aspects could be quantified and optimized but overall quality is another matter, and naturally enough, the focus is largely on product and its fitness for purpose.

Box 1.2 Some perceptions of what good quality fish seed is, as expressed by a range of stakeholders.

Good quality fish seed;

- ✓ grows well, reaches market size quickly, converts feed efficiently
- ✓ has high survival rate,
- ✓ is healthy/disease-free,
- ✓ schools (swims with the group) well,
- ✓ swims actively
- ✓ is big enough for stocking without risk of predation
- ✓ is small enough to be transported in large numbers without risk of losses
- ✓ well-bred, improved genetic stock, not inbred
- ✓ correct species, cheating on species is common particularly when small fry or hatchlings are being sold
- ✓ good colour, colour change can be a sign of ill health and homogeneity of colour is important in marketing fish such as the red tilapia
- ✓ is an indigenous species,
- ✓ fair price,
- ✓ is a species in demand in the market
- ✓ can eat natural food such as algae or insects thus reducing input costs
- ✓ can eat formulated feed, 'weaning' wild caught seed onto manufactured feeds can be difficult
- ✓ breeds under culture conditions
- ✓ doesn't breed under culture conditions
- ✓ is available when the farmer wants it, *e.g.* at the start of the rainy season.
- ✓ is delivered to the farm; farmers may have no transport or be engaged in other important activities
- ✓ is sold by people who provide food and accommodation for traders at the hatchery or nursery,
- ✓ is available on credit
- ✓ is sold on the condition than some 'rent' is available to officials who buy it or act as agents in the sale.

The FSQ project from a systems perspective

By looking at the situation from a 'soft systems' point of view a systemic account was developed; the problem situation was how to improve the ways that fish seed was being produced and delivered within the range of production and delivery systems. Up to this point the FSQ project had not addressed the issue of improvement but had mostly focussed on situation appraisal, attempts to characterise issues in the early growth and survival of seed and attempts to develop tests that could be used to assess the condition of fish seed through on-station experiments. The emphasis on technical issues was to be expected given the backgrounds of the researchers and the programme advisory committee which consulted on and agreed the plan; understanding the historical and theoretical context of this mode of research was important in conceptualizing the situation.

The principal ideas driving the dominant tradition in agricultural (including aquaculture) research and development (R&D) for rural communities belong to the 'hard systems approach' (Checkland, 1984, Checkland & Scholes, 1990), what Russell and Ison (2000) call the 'first order R&D' tradition or the 'instrumental rationality' of Habermas (1984). These concepts are characterised by a 'fix' mentality (Russell & Ison, 2000); disciplinary approaches to producing new information or knowledge which can be transferred to the end-users in response to production problems that have been determined by concerned, objective outsiders. The origins of this approach have been traced to the Cartesian, positivist/rationalist paradigm which emerged around the 17th century (Pretty, 1995). Other titles for the paradigm are realist-positivist and logical empiricist (Tacconi, 1998). The central features of this are the belief that an objective reality driven by immutable laws exists 'out there' in the bio-physical world and that scientific research reveals the nature of the reality through reductionism, adding to the bank of objective knowledge. The purpose of the activity is to use the discovered

knowledge to predict and control outcomes (Guba, 1990; Pretty, 1995; Röling & Wagemakers, 1998).

Positivist science and its application in technology has been credited with huge successes in healthcare, industrial production and food production and many other positive features of life particularly in the developed world and increasingly in the developing world (Pretty, 1995). Scientific knowledge has often been referred to as scientific truth/s and is traditionally 'discovered' and stored by specialists working within bureaucratic expert institutions such as health and education systems where it is privileged over the values and beliefs of lay people to the extent that citizens become disempowered and interventions by experts often go unquestioned (Woodhill & Röling, 1998). Consequently this logically consistent approach is the paradigm 'drilled into' most research and development professionals in both technical and social fields during their formal education and subsequent training (Röling & Wagemakers, 1998).

Woodhill & Röling (1998) list eight characteristics (Box 1.3 below) of instrumental reasoning that underpin positivism; all of which were demonstrated either in the planning or implementation of the project from 1997 – 2001 and discussed in Section 1.3.5 above. However it should be noted that most of the characteristics also correspond to the expectations from DFID research expressed through the framework for funding applications in Form RD1 in Appendix 1. First was the requirement for detailed information prior to funding, second the requirement for a logical framework and the assumptions of linear cause-effect relationships between objectives, activities, outputs and impact and third, the faith in and focus on specific technical and material outcomes to solve the problem. Having developed an understanding of these conditions it became clear that it was grounding in positivist tradition which led to the emphasis on technical issues in the earlier stages of the project.

Box 1.3 Characteristics of Instrumental Reasoning listed by Woodhill & Röling (1998)

- Dealing with complexity by reductionism
- Assuming that all information relevant to the problem situation can, and should be accumulated prior to making decisions or taking action.
- Linear approach to problem solving
- Assuming linear cause-effect relationships between phenomena in both the natural and social worlds
- Focussing on the achievement of specific and quantifiable technical or material outcomes
- Placing reliance on the utility of science and technology in problematic situations
- Assuming that knowledge can be separated from human values and political power and paying little regard to ethical or moral implications in its use
- Attempting to deal with all aspects of social life according to the rules of instrumental reason

The original end-point of the project for the researchers, in common with other projects under the RNRRS was the production of knowledge and the promotion of transfer and adoption of that knowledge by target institutions defined as 'those formal or informal institutions which will take up the products of research and transfer knowledge', furthermore 'responsibility for delivery of developmental impact (of knowledge products) is left to the target institutions' (DFID, 1999). This approach is typical of realist-positivist projects in the natural resources sector with science seen as the source of innovation which is realized by the transfer of knowledge to the users (Röling, 1994; Röling & Wagemakers, 1998), and is expressed in the linear extension model (Russell & Ison, 2000);

Research → knowledge → transfer → adoption → diffusion

Criticism of the theory and practice associated with this model have included; that innovations are not commodities which pass unchanged in a process of diffusion from one user to the next rather it is been demonstrated that technologies are actively re-invented by the users (Rogers, 1983). Research outputs are often only viable strategies for agricultural improvement for a minority of farmers (Russell & Ison, 2000), most new ideas arise from practice rather than from formal research (Kline & Rosenberg,

1986) stemming from local knowledge, farmer experimentation and creativity with market forces, social, institutional and economic contexts providing the motivating and/or enabling conditions for innovation (Chambers, 1983; Rogers, 1983; Kline & Rosenberg, 1986; Chambers *et al*, 1989). The model has persisted in agricultural research, as evidenced by the objectives of the RNRRS (DFID, 1999), because it is simple, logical and coherent (Röling, 1995). According to this analysis, regardless of whether or not the FSQ research activities had achieved useful research outputs, the assumption, based on the linear diffusion model, that the resulting 'knowledge' would lead to changes was unlikely to be upheld.

Questioning of the position of positivist science has stemmed from dissatisfaction with the paradigm when dealing with a range of issues and situations; such as the inconsistency of the linear extension model described above. Most of the situations where dissatisfaction occur are where the problem situation cannot be solely technically defined (Checkland, 1999), where multiple objectives exist *e.g.* in agriculture where there is constant trade-off between objectives such as productivity and sustainability (Conway, 1994). Fundamentally the problem is that complex phenomena involve too many interacting variables to be controlled in traditional experiments (Checkland, 1999), the response, aided by developments in Information Technology, has been to build simulation models which can only provide partial perspectives at best (Röling, 1994). Introducing people or social systems into a problem situation brings extreme complexity through a multiplication of objectives and the inherent reflexivity characteristic of human behaviour (Munda, 2004). Typically 'people' are not factored into bio-physical models, their needs are met by policy or other instruments used by the politicians or administrators responsible for communication knowledge or transferring technology developed by science (Röling, 1994).

Although positivist science is clearly a powerful tool particularly where uncertainty is low and there is a high degree of control over the system under examination (Pretty 1995), the arguments above, supported by the project experience led to the recognition that the positivist approach was not appropriate in all problem situations generally (Röling & Wagemakers, 1998) and as a model for further work under the FSQ project specifically. Much of the conflicting evidence in relation to positivism described in the preceding paragraphs came from work carried out from a constructionist perspective.

1.4.2. The constructionist perspective

Constructionism, which is also known as constructivism or social constructivism/constructionism (Latour & Woolgar, 1986; Hacking, 1999) holds that reality is socially constructed (Berger & Luckmann, 1967). Hacking (1999) gave a broad definition of constructivism; 'various sociological, historical, and philosophical projects that aim at displaying or analyzing actual, historically situated, social interactions or causal routes that led to, or were involved in, the coming into being or establishing of some present entity or fact', and cites the philosopher Kant as the 'great pioneer' of the perspective through his critique of basic categories of knowledge (Hacking, 1999). Gergen (2001) traced the genealogy of constructionism to multidisciplinary sources, linking phenomenology's endogenic perspective, which states that knowledge depends on processes 'endemic to the organism', developmental and cognitive psychology, Marxism, sociology (Berger & Luckmann, 1967; Maines, 2000), literary studies, postmodern analysis (Derrida, Foucault, 1970) and science studies (Kuhn, 1970; Latour & Woolgar 1986).

What emerged from the multidisciplinary studies is a perspective that proposes that individuals construct the world of experience through cognitive processes *i.e.* the world is not directly known in the objective sense, but that the individual's perception

occurs through constructions imposed by the mind. This proposal has gained considerable support from work based on empirical findings from neurobiology on the biological basis of knowing (Maturana & Varela, 1987). Based on the model of the autopoietic cell (Maturana & Varela, 1980) this work proposed that the network of interacting neurons which constitute the nervous system is, operationally, a closed system, with structure, function and organisation moderated at a sub-cellular level *i.e.* it is structurally-determined. Biologically, there are no direct inputs from the environment only triggers that elicit a response; perception and processing are determined by the physiological structure and cannot be directed through external stimuli. The implication of this is that perception of reality is determined by the organism not an external 'reality'; cognition will be determined by existing ideas and theories that have been learnt over time. The structures associated with response and processing in the human nervous system are structurally plastic which means that there is potential for change that doesn't disrupt the defining organisation (Woodhill & Röling, 1998) and it is this potential for structural change that gives rise to cognition and reflexive behaviour although the physiological mechanism remains a mystery . Maturana & Varela (1987) proposed that the mechanism of learning arises from 'structural coupling' between the organism and the external environment which they define as the 'history of recurrent interactions leading to the structural congruence between two systems'. With this understanding knowledge and action are essentially linked.

With regard to wider social phenomena, constructionism has been described as taking the view that knowledge is 'the product of our social practices and institutions, or of the interactions and negotiations between relevant social groups' (Gasper, 1999. Constructionist epistemology holds that knowledge is specifically related to historical and cultural contexts, language constitutes reality and is both a form of social action and

a pre-condition for thought (Gergen, 2001). The focus of constructionist enquiry includes social interaction, social practices, contextualization and the process of enquiry itself, not only its products (Burr, 1995; Mosse *et al,* 1998, Gergen 2001). Constructionist scholarship is generally critical, challenging assumptions and claims of knowledge, truth, and objectivity of positivist science as well as claims from within constructionism and places importance on the role of discourse in constructing the assumptions and claims (Gergen, 2001). There are a spectrum of views within constructionism from mild/conservative constructionism, where social factors are held to shape interpretations, objects and ideas, to radical, which actively opposes an irrelevant realist positivism (Hacking, 1999). However although constructionism overtly challenges positivist assumptions (see Kuhn 1970; Phillips, 1987) it can also usefully be aimed towards informing and extending the application of scientific endeavour, rather than negation or replacement (Röling, 1994; Woodhill & Röling, 1998). For example, contributing to understanding of the way that funding sources impact the directions of research (Hacking, 1999) or in the major contributions to the practice of the social sciences through the development of narrative, collaborative, ethnographic methods (Gergen, 2001). The main point, with regard to identifying a direction for further research under the FSQ project was the central focus on the knowledge/learning duality in this perspective, given that at this point it appeared that the problem was related to a capacity gap between what was known and technically possible in relation to seed production and deliver, and what may have been happening in the field.

1.4.3. Systems for learning

In summing up the influence of constructionism Matthews (2000) stated that what began as a theory of learning expanded to become a theory of teaching, a theory of education, a theory of the origin of ideas and a theory of both personal and scientific knowledge, and had become education's 'grand unified theory'. What this has meant is

a shift in the prevailing theory of cognition from the representational theory of mind, which held that knowledge consists of symbolic mental representations which can be 'acquired' in learning, towards a participatory metaphor in which knowledge is best developed through participation in action (Barab & Duffy, 2000). This shift has also taken place outside mainstream education in agriculture research for development (Gonsalves *et al*, 2005) and in the wider field of rural development policy (Ellis & Biggs, 2001).

As Ellis & Biggs (2001) point out an attempt to show the evolution of ideas in rural development over the past 50 years risks oversimplification, however in order to establish context it is useful to sketch a brief account of the evolution of ideas in policy and practice. In the 1950s and '60s the transfer of technology model predominated; initially in support of the dual-economy model where modern methods of production were promoted in the belief that eventually a modern agriculture sector would expand to replace existing, inefficient, small-scale systems, and then later in support of increasing efficiency in the small farm sector (Ellis & Biggs, 2001). This activity peaked with the 'Green Revolution' of the 1970s. Green Revolution technology packages which although successful in enabling increased food production globally were suitable for stable, low-risk social and agro-ecological environments, were amenable to transfer of technology extension approaches and hence failed to meet the needs and/or fit the farming systems of the majority of poor, small-scale farmers who typically don't occupy these environments (Probst *et al*, 2003). In order to reach down to the small-scale farmers it was deemed necessary to develop an approach that could cope with the complexity of their farm systems where the complexity was held to be due to the flux of resource flows between production activities and competing, multiple objectives at the household level (Biggs, 1989).This led to the development of Farming Systems

Research which aimed to identify and remove constraints to adoption of technologies and develop adapted technologies through consultative and contractual participation of farmers (Chambers *et al*, 1989; Probst *et al*, 2003; Probst & Hagmann, 2005). Participation of this type is a positivist approach in which participatory methods are used to extract data for use by the expert decision making processes and have seldom resulted in sustainable impacts (Pretty, 1995); this consultative approach to stakeholder participation was used in the situation analysis phases of the FSQ project (see Fig 1.4). Recognition of the utility of participation combined with reflection on the experience of extension and questioning of the transfer of technology model in the 1980s led to the development of 'farmer participatory research' (Chambers *et al*, 1989; Ellis & Biggs, 2001); a major switch in thinking about rural development issues.

In the mid- to late 1980s and 1990s came increasing support for the belief that farmers were not the problem, rather it was the inappropriate technologies that they were presented with that prevented agricultural yield increases (Selener, 2005). Farmer participatory research (Farrington & Martin, 1987), also know as farmer first (Chambers *et al*, 1989), farmer-first-and-last, participatory technology development, farmer-back-to-farmer approaches (Probst & Hagmann, 2005) emerged as a response with the aim of developing agricultural technology to meet needs which the farmers themselves identified (Selener, 1997; 2005). The development in terms of participation is that farmers, in theory, actively collaborate in the research process as researchers, experimenters and evaluators and work within their own systems. This approach goes some way towards taking account of the importance of not only the bio-physical constraints but also economic, social and political factors that influence decision making by farmers (Okali *et al*, 1994) though often the consultative, positivist attitude has prevailed with farmers acting as respondents and being involved in the planning and

implementation of on-farm experiments under formal research conditions (Probst & Hagmann, 2005).

A combination of factors contributed to the next stage in the move towards a more fully bottom-up/grassroots approach including; the need to widen the development focus from agricultural productivity alone to address and respond to complex and evolving social and institutional issues and increasing concerns regarding the state of the environment and sustainability of natural resources use (Ison *et al*, 1997), the ongoing development and application of participatory methods (Chambers, 1997), increased influence of post-modern/constructionist ideas (Ellis & Briggs, 2001) such as the actor-oriented approach (Long & Long, 1992) and the transformation of public and private sector agricultural information systems following structural adjustment, reduction in state control and the rise of private agents such as NGO's (Non-governmental organisations) (Rivera, 2000; Ellis & Biggs, 2001). The policy response was widespread adoption of the Sustainable Livelihoods framework (Carney, 1998). Within policy and practice in research for development the emergent responses were systemic learning approaches (Ison *et al*, 1997).

Systemic learning approaches include Participatory Learning and Action (Scoones & Thompson, 1994), Participatory Rural Appraisal (Chambers, 1994), Systemic Development (Bawden, 1995), Agricultural Knowledge and Information Systems (Röling & Engel, 1991) and second-order science/research and development (Funtowicz & Ravetz, 1991, Ison & Russell, 2000). These approaches are based around systems thinking and action research principles of critical reflection, experiential learning and the recognition of both complex, dynamic reality and that there will be a range of, often conflicting, points of view in any human activity situation and that these should be taken into account and, whenever possible, decisions should be based on

negotiation, understanding and agreement among stakeholders. Furthermore since learning, change and adaptation are believed to occur through experience and social interaction resulting from the dialectic of structural coupling between people and their environment (Russell & Ison, 2000), these approaches aim to develop contexts or 'systems for learning' (Bawden, 1995) in which improvements or development are emergent properties. The underlying epistemology of these approaches is constructionism though this does not preclude the use of positivist inquiry methods or methodologies in generating empirical knowledge (Woodhill & Röling, 1998); all perspectives should be considered with validity determined by critical awareness of any assumptions being made within a particular perspective (Woodhill & Röling, 1998).

Examples of systemic learning practice addressing environmental problems and resource management include the development of integrated pest management (IPM) in Asia incorporating the farmer field school (FFS) (Kenmore, 1996) and the Landcare Programme in Australia (Campbell, 1998). IPM is based on decision rules and economic thresholds to guide pest control practices (Tripp, 2001) delivered through the FFS component which uses participatory methods, field experimentation and group interaction to empower farmers through development of their capacity for learning leadership, communication and management skills (van de Fliert, 1993), though it can be expensive and consequently difficult to scale up (Quizon *et al*, 2004). Landcare stems from a partnership developed in the 1980s between the main farmers' organization and the main NGO involved in conservation, and was convened to deal with land and water degradation, Australia's biggest environmental problem at that time (Webb & Cary, 2004). Since then, the resulting state-funded programme has expanded to mobilize landholders and non-farming communities in raising awareness and tackling significant aspects of the issues. Key to this has been role of facilitation agents who

attempt to develop shared problem appreciation, resolve conflict and build agreement (Campbell, 1998).

Connecting these concepts with the FSQ project was achieved through a definition of the elusive 'fish seed quality' in terms of learning.

What is fish seed quality?

Paraphrasing a definition of sustainability used by Röling & Wagemakers (1998) in relation to the facilitation of sustainable agriculture; substitution of 'seed quality' for 'sustainability' gave a practical definition which covered both hard and soft elements of the issue and in a practical sense conceptualises the issue. The definition is as follows;

Fish seed quality is an emergent property of a 'soft system'. It is the collective outcome of the decision-making that arises from interaction among stakeholders.

The stakeholders are actors in the fish seed production and delivery system including users/customers, seed producers, traders and the extended process of policy makers, research, extension and education at local, regional, national and international levels. The implications of this definition are

- Quality refers to a process of action
- The quality of fish seed in any given situation is the result of the activities of a range of people engaged in purposeful activity,\
- 'Quality' is dynamic and subject to change over time depending on the flux of events and ideas (Vickers, 1965) leading to learning outcomes and effective action.
- That understanding of this concept can be informed but not understood by examination of the individual factors that may be involved.
- Improvement would be based on accommodations being made among a range of stakeholders which would require learning.

The definition does not take account of the uncontrollable factors which might impact on seed quality such as adverse climatic conditions, natural disaster or infrastructure problems such as might affect seed transport or hatchery operation. However given that these problems are uncontrollable and largely unknowable and that in the face of uncertainty the only response can be mitigation and/or preparedness for the effects of these factors in day-to-day management, risk assessment or contingency planning *i.e.* human responses to the situation by stakeholders then as a working definition it is appropriate.

In summary, systems theory (Checkland, 1981) enabled a conceptualisation of a problem situation which required improvement rather than a specific problem that required solving. The situation involves a broad range of stakeholders with differing perceptions of the situation, engaged in purposeful activity. Any improvement in the situation would require learning and change by the stakeholders, something which the systems learning approach holds may be facilitated by external change agents. Two central features of the systemic learning approach which require elaboration are 'process monitoring and evaluation' and 'participation'; these concepts represent key elements of the structure of a system for learning.

1.4.4. Process and Participation

The systems perspective makes a distinction between *structures* and *organisation* of a system; the *organisation* refers to the set of dynamic or static relationships between components of the system, and the *structures* are the set of components and relationships from which the organisation emerges in particular surroundings (Ison, 2000). An example of organisational relationships from research and development might include those relationships between the researchers, farmers, the physical environment, input suppliers, customers, politicians and extension practitioners. The structures in this case would include the people, policies, practices and infrastructure.

This perspective extends the New Institutional Economics (NIE) model (Dorward & Kydd, 2000), which defines organisations as groups of individuals interacting in transactional partnerships that are assumed to emerge from a common purpose of reduced transaction costs and operating within institutional frameworks (Swift, 1995), by recognising that there are often diverse complex relationships that arise from multiple competing objectives and/or traditions that go beyond simple goal-seeking within the organisation of a system (Ison, 2000). Institutions, institutional arrangements and the institutional framework defined as the 'rules of the game', 'forms of contract or agreement' and 'legislation, legislative structure, norms' respectively (North, 1990; Dorward & Kydd, 2000) are structural elements in the systems perspective together with the organizations and individuals who are 'the players in the game'. Two key structures in the systemic development approach are process monitoring and evaluation, and participatory practice.

Process monitoring & evaluation

To monitor a research or development process means reflecting on the progress of an activity or set of activities which are part of a planned intervention and/or collecting information about the response of the system to changes in the wider environment or changes in response to the intervention. This provides the raw qualitative and/or quantitative data for evaluation; the assessment of progress, change or impact. This monitoring and evaluation activity is also referred to as the process approach (Mosse, 1998), learning process (Rew & Brustinow, 1998), process documentation, process monitoring (Mosse 1998, Baumann, 1999), process documentation research (Baumann, 1999) and generally as evaluation (Woodhill & Robins, 1998; Davies, 2003); hereafter, for the purposes of brevity, the approach will be referred to as evaluation, using the term

in an inclusive sense to cover gathering of information, its' processing and valuing. Mosse (1998) has distinguished three ways in which 'the process approach' to research and development contrasts with the instrumental 'blueprint' approach which assumes linear cause-effect relationships, fixed and controllable inputs, outputs, activities, timeframes and costs.

1. The process approach has a flexible, responsive design which accommodates change as a result of learning rather than a rigid protocol.
2. Relationships and context are recognised to be important rather than a source of problems.
3. Dynamic, unpredictable and idiosyncratic features of a system which may be influential but uncontrollable can be accommodated.

The purpose and meaning of evaluation is dependent on the point of view or role of the evaluator (Mosse, 1998) but essentially can be regarded as practices for information management; comprising systems and processes for gathering, organising, assessing, summarising and packaging information (Allen, 2001). From the systems perspective, evaluation is a feedback structure (Checkland, 1981, Checkland & Scholes, 1990). The main functions of the information that emerges from evaluation are to inform impact assessment, project management and planning, public and donor accountability, understanding and negotiating stakeholder perspectives (Estrella & Gaventa, 1998), organizational capacity development (Horton *et al*, 2003) and collective knowledge production (Jackson & Kassam, 1998). Historically the change from simplistic output-oriented evaluation has been linked to the broadening in development policy goals beyond expensive, centrally-planned, technology-led projects with a solely production focus, to encompass projects and programmes with wider goals such as capacity development, good governance and accountability and which address

cross-sectoral issues such as gender inequality and access to resources (Mosse, 1998). This, in parallel with the trend towards participation and collaboration with a range of participants and partners *e.g.* individuals, households, communities, business, academic institutions and the various levels of government administration (Estrella & Gaventa, 1998;Mosse, 1998), has led to a recognition that solutions, improvements or accommodations in complex development contexts often emerge from processes such as negotiation and learning when they could not be arrived at by design (Woodhill & Röling, 1998).

Evaluation in education (Guba & Lincoln, 1989) and organisational development (Guijt & Gaventa, 1998; Horton *et al*, 2003) has increasingly involved participation by individuals, groups and organisations previously regarded as subjects. This trend has also been reflected in the strategies of development organisations. The key issues in the evolution of this response were:

- General dissatisfaction with conventional summative evaluation processes which report on a project or programme based on needs or indicators identified by non-stakeholders (Scriven, 1994).
- Broadened nature of project outputs from tangible technical solutions to include attempts to influence and/or promote sustained behavioural change, which cannot be judged solely from an external point of view (Mosse, 1998).
- The growing level of stakeholder participation and recognition of the worth of involving stakeholders in identifying and evaluating change (Guijt & Gaventa, 1998) coupled with the recognition that there is usually a distinction in the evaluation and information needs of the various stakeholders (McAllister, 2001).

- Recognition that evaluation is never a value free activity since it will reflect the interests of the evaluator, and therefore the diversity of values involved in a situation should be represented and understood (Deshler, 1997).

Estrella & Gaventa (1998) add the following terms to the list from participatory approaches to evaluation; participatory monitoring, participatory evaluation, participatory monitoring and evaluation, participatory impact monitoring, self-evaluation, auto-evaluation, stakeholder-based evaluation/stakeholder assessment, community monitoring/citizens monitoring. There is no single, coherent conceptual definition (Estrella & Gaventa, 1998), and a wide scope of interpretations of participatory evaluation, furthermore, given that evaluation is a large field of academic study and professional practice (Greenwood & Levin, 1998) it is not practical to attempt to review the broad spectrum of approaches in use. The key role of evaluation in development can be seen in the convening of international agencies such as the OECD/DAC Working Party on Aid Evaluation (OECD/DAC, 2001) and the central role of M&E in capacity development efforts worldwide.

Resistance to evaluation

Evaluation and auditing processes can be 'a common site of some of the most authoritarian, coercive behaviour in organizational life' (Greenwood and Levin, 1998). Though referring to conventional, 'objective', external evaluations focussed on measuring and reporting performance, the statement serves to highlight the issue of the interrelationships with information, knowledge and power which have shaped thinking about evaluation and projects. The negative connotations stemming from past perceptions of evaluation as an enforced activity carried out to satisfy the needs of 'others' such as donors and government are to some extent now supported by negative connotations or derision of evaluation as a feature of so-called "management speak".

Resistance to evaluation, principally among individuals or groups of stakeholders, can occur throughout the evaluation process for a range of reasons/prejudices such as negative attitudes, desire to maintain the status quo in the face of pressure for change, power differentials, perceived loss of control or in response to perceived threat to freedom, reputation or personal authority (Taut & Brauns, 2003). Where process information documents the shortfall between intention and action and exposes the failure of models to capture complexity in organizational cultures which operate on imperatives of reporting results and success, problems such as these can arise (Mosse, 1998).

Strategies identified by Taut & Brauns (2003) to address resistance to evaluation included;

- Maintaining a high level of communication to promote understanding, trust and motivation.
- Effective communication of possible benefits while being explicit about and dealing with anxieties related to the process and outcome.
- Broad participation and collaboration with existing organizational structures to promote ownership, cooperation and improved acceptance.
- Awareness of context to anticipate conflicts of interest, pre-empt conflict and thus enable focus on problem solving, adapt evaluation strategies and improve implementation and utilization of results.
- Stress that the focus is on the programme/project rather than the people involved can reduce anxiety related to negative performance feedback.

Resistance notwithstanding, Forss et al (2006) found it 'almost impossible to imagine' a modern organization that didn't have an evaluation system to support an image of rationality and control. In public sector management the development of an

'evaluation culture' has been described as a key to improvement of the quality, quantity and targeting of goods and services produced by government (Mackay, 2006). This linkage to governance, the process of government, has been emphasised at local, regional, national and international levels, with efforts to improve feedback in the policy process exemplified in the development of high profile initiatives such as the UK governments' Public Service Agreements and the Millennium Development Goals which underpin global development efforts. Evaluation has been described as providing the "fourth leg of the to the governance chair" (Kusek *et al*, 2005) providing the necessary feedback on the other three "legs" of budget systems, human resource systems and auditing systems in support of rising public demands for transparency and accountability and the expectation of stakeholders that they should be consulted and participate in policy-making (OECD, 2001). Pollitt (2006) has pointed out that in contrast to the considerable literature on the enabling of stakeholder participation in political processes there has been very little research on the uptake and utilisation by government or any other stakeholders of the wealth of performance information now available to them largely arising from the participatory processes. Although holding government, other organizations, groups or individuals accountable is a fundamental and attractive reason for evaluation, the key reason from a research point of view is for learning.

Shifting the emphasis in development cooperation from capital-intensive development projects involving the transfer of resources, technologies and specialized knowledge to learning-based capacity development to strengthen local organizations reflects a 'paradigm shift' (OECD, 1997). Capacity development, defined by Morgan (1997, cited in Horton, 2002) as the process by which individuals, groups and organizations improve their ability to carry out their functions and achieve desired

results over time, and specifically development of capacity for evaluation have become a research focus because evaluations are necessary to test the theories and assumptions underpinning capacity development programs (Horton *et al,* 2000). Recognition that capacity development is a complex process based more on ongoing social experimentation than social engineering and that the process is about change and growth from within an organisation warrants the adoption of the 'learning by doing' approach with development of the capacity to evaluate as a central element of the approach . Evaluation is seen as the means to achieve the 'learning organization' (Preskill & Torres, 1999) but two important issues are whose learning are we talking about and to what purposes (Engel & Carlsson, 2002).

Three approaches to learning in development were identified by Engel & Carlsson (2002); the first and simplest was the learning associated with feedback to the policy and programme processes where stakeholder participation tended to be consultative and the learning mainly confined to donors and policy-makers. Second was collective learning which recognises the need to involve all stakeholders in the learning process and accepts that single and double loop learning may be involved. The role of evaluator in this approach becomes more facilitative. A third approach of societal learning relates to societal change and performance in relation to resource dilemmas, essentially similar to collective learning but with greater participation and linked to adaptive management (Holling, 1995) and action by stakeholders and represents the evaluative component of systems for learning approaches. The ongoing evaluation by the wider community of development professionals of development efforts has led to participation becoming a central feature in the work of most development agencies globally

Participation

Where evaluation represents the information management structure of the systems for learning approach, participation represents the knowledge management structure in that it is about processes involved in the creation, sharing and negotiation of knowledge among stakeholders. Of course participatory evaluation fits both structures. In its simplest sense participatory research aims to involve the intended beneficiaries in the research process (Okali *et al*, 1994) however the term is ambiguous, meaning different things to different people and because of its multiple uses defies definition (Oakley & Marsden, 1994). Consequently the purposes of participation are also difficult to pin down; Pretty (1998a) has identified two broad, overlapping schools of thought; the first encourages participation based on the assumption that involving people in development activities will mean that they are more likely to agree with and support any outcomes, thereby improving the efficiency of the development process. The second school regards participation as a fundamental right which will enable peoples' mobilization for collective action, empowerment and strengthened institutions. These two categories correspond respectively with the distinction between 'community participation' and 'citizen participation' described by Pozzoni & Kumar (2005) in relation to World Bank projects. Though usually held to be a positive feature of development interventions there are often contradictions such as where the purposes of participation have included extending control by the state as well as building local capacity, justification of external decisions as well as devolving power (Pretty, 1998a), or consciousness raising as well as coercive consciousness changing (Cooke, 1998). Participatory research methods can be used to empower people but also may be 'tagged on' to project plans to secure funding, co-opt local people into falling in with plans and agendas of outsiders or to justify inadequate research within traditional top-down processes (Cornwall & Jewkes,1995)..

Participation in research by "non-researchers" takes place on a spectrum of input/activity levels from taking part in an activity such as attending a meeting through to situations where citizens pro-actively seek solutions to issues in their environment. Campbell & Salagrama (2000) proposed a comprehensive typology which combined Biggs (1989) model for four levels of participation in agricultural research with Prettys' (1995) seven level model and elaborated on the community-led dimension to produce a comprehensive model for analysis of the balance of participation and control in fisheries research (Table 1.4). Rahnema (1992) has shown that participation of the types A-C leads to outcomes that are unlikely to be sustained after the end of the project and therefore are unlikely to have any lasting, positive effect on the lives of participants.

Table 1.4 Typology of participation and control in fisheries research.

Type		*Characteristics*
A	Professional exclusive	Only professional researchers involved. Fishers may be informed about technology, legislation, etc.
B	Professional-led contract	Professionals 'buy-in' skills and resources of fishers.
C	Professional-led consultative	Professionals utilise the indigenous knowledge of the fishers for their own purposes.
D	Professional-led collaborative	Professionals allowing the involvement of fishers in the research activities of the professional under prescribed conditions.
E	Collegial	Professionals and community researchers work equally to generate knowledge on a constraint of mutual importance
F	Community-led collaborative	Fishers allowing the involvement of outsiders in the research activities of the community under prescribed conditions
G	Community-led consultative	Fishers utilize the knowledge base of the professional researchers for their own purposes
H	Community-led contract	Fishers 'buy-in' research support from outside to address their needs.
I	Community exclusive	Only community based researchers involved.

Source. Campbell & Salagrama (2000)

A number of other, broadly similar typologies have been published (Arnstein, 1969; Jiggins, 1993; Cornwall, 1995) and all can be useful tools bearing in mind that they are models and therefore simplifications of reality that don't take into account

changing levels of participation during the project cycle (Guijt & Kaul Shah, 1998), frequent ambiguity of 'insider/outsider' perspectives (Herr & Anderson, 2005) and changing levels of participation among individuals and groups (Cornwall & Jewkes, 1995).

A common problem is the assumption that more participation is necessarily a good thing; Murthly (1998) has argued that devolving power may be neither feasible nor desirable and that greater participation does not necessarily lead to greater empowerment.

There are a broad range of approaches in use for participatory research and development, agricultural innovation and natural resources management; Pretty (1998) has estimated the number at more than 30. The approaches show convergent ideologies with, usually, the following common features identified by Pretty (1998a);

- A defined methodology and (often) a systematic learning process, focussing on cumulative learning by participants at all levels.
- Seeking multiple perspectives; recognising that different groups and individuals evaluate issues in different ways.
- Incorporation of group learning processes
- Context specific and flexible to adapt to unique local conditions.
- improvements in situations from the points of view of stakeholders enabled by facilitation (usually by the external change agent)
- Change oriented. The approach should lead to action, learning, accommodation of conflicting views and change.

The methods, also known as tools, used in the approaches are categorized into four classes (Pretty, 1998); methods for team and group dynamics, sampling methods, interview and dialogue methods and visualisation/diagramming methods. Typically it is

the way that individual methods are combined that constitutes a particular 'brand' of participatory methodology. The use of participatory methodologies of Types D-I differ from conventional research most obviously in who identifies the research problems, who analyzes, reflects on, owns and uses the information from the research process (Cornwall & Jewkes, 1995).

Differences in the location of power and control and the interaction with learning are central to the distinction between much participatory research (Types D-I) and conventional approaches. Forms of learning that emerge from participation in research have included; learning for empowerment, increased awareness, improved skills, acquisition of technological 'know-how', new information, feedback to organizations from communities, local communities learning from each other and from other communities (Kelly, 2001). The power associated with learning can have both positive and negative impacts and this issue along with other features linked to an uncritical promotion of participatory methods in development described as 'fashion' (Chambers & Blackburn, 1996) and even as the 'new orthodoxy' (Henkel & Stirrat, 2001), has contributed to a critical backlash against participation (Hickey & Mohan, 2005).

Participation in research and development interventions has, in its broadest sense, been around as long as external agents have attempted to make interventions; however the deliberate process use of participation has arisen more recently, influenced by Marxism, social psychology, phenomenology and the philosophical work of Rousseau, Owen and Mill (Fals Borda, 2001) through radical critiques of social theory and practice, particularly in Latin American education systems (Freire, 1970). The late 1980's and 1990s saw the mainstreaming of the concept with resulting growth and spread of the practice to virtually all organizations involved in research and social

development (Cornwall & Pratt, 2003) . Methods which had started out as instruments that enabled the powerless to generate knowledge, make their voices heard and organize themselves were being increasingly adopted by powerful international organisations and governments departments (Gaventa & Cornwall, 2001). Concerns started to emerge early in the 'roll-out' of participatory methods that the methodology was being co-opted by the state and/or international development agencies as an instrumental tool for management of social change (Adnan et al, 1992, Redclift, 1992) and that people were often encouraged or forced into participating in activities that were of no interest to them (Rahnema, 1992). Further issues that were arising with the wider 'participatory project' (Parfitt, 2004) were based around questions of 'who participates?' (Scoones & Thompson, 1994); bias existed towards conceptualizing culture and society as 'unified, cohesive wholes', when participating communities are 'defined as much by their conflicts, factions, and divisions as they are by their commonalities.' (Angrosino & Mays de Pérez, 2000) and are unlikely to be working harmoniously for the common good (Eyben & Ledbury, 1995). Furthermore participation may depend on factors such as gender, income level, social status, local power relations, access to resources, seasonal environmental factors, skills and interests and satisfaction with the process both from the point of view of the intended beneficiaries, governing their access to the process and motivation to participate and continue participating (Okali *et al*, 1994, Cornwall & Jewkes, 1995) and from the external agents point of view where preconceived/tacit ideas regarding suitable participants may exist (Chambers *et al* 1989). Disciplinary conventions, donor funding policies and the personal/professional agendas of researchers may also be significant in determining research areas, priorities and activities (Cornwall & Jewkes, 1995).

The complex political and social contexts within which research takes place has long been recognised however the initial reflective criticism aimed at methodological and theoretical development of the sort mentioned in the preceding paragraphs has been joined by what has been described as a backlash against participation (Hickey & Mohan, 2005) based on issues of ethics and values (Cornwall & Pratt, 2003) specifically, the 'tyranny', in terms of 'illegitimate and/or unjust exercise of power' which can be facilitated through participatory development approaches (Cooke & Kothari, 2001a). The backlash, largely inspired by the apparent failure of the burgeoning participatory development 'industry' to attend to institutional and power-related issues of earlier criticisms (Hickey & Mohan, 2005) and of the associated instrumental use of peoples' participation as the means of achieving externally determined programme, project, political or commercial objectives, rather than intending participation as the main objective or end of the process (Parfitt, 2004).

The arguments supporting the backlash against participation in the edited volume *Participation: the new tyranny?* (Cooke & Kothari, 2001b) represented useful criticism derived from deep analysis of important concerns, however the critique was at certain points couched in terms that one of the contributors would later refer to as 'mere polemic' (Mosse, 2005). Hickey and Mohan (2005) regard the critique, which suggests that participatory development should be abandoned, as a case of 'throwing the baby out with the bath water'; while uncritical use of participatory methods represents bad practice, the potential for empowering participants and informing development means that the use of participation concepts is still valid and useful (Mosse, 2005). Despite the criticisms, moralizing stances (Brown, 2004), de- and re-politicisation (Williams, 2004 obfuscation (Francis, 2001) and scepticism (Henkel & Stirrat, 2001) featuring in the necessary, healthy dialogue surrounding participation, participatory approaches have

received increasing policy and funding support *e.g.* participation was incorporated as a central concept in the development of PRSPs (poverty reduction strategy papers), the principle, and mandatory, instruments in current strategic planning associated with international aid (World Bank, 2000), and moreover there is evidence of transformation emerging from participation (Hickey & Mohan, 2004) . Cleaver (2004) has clarified the situation by pointing out that we are dealing with duality in participatory social processes; there is potential for tyranny and also transformation, conflict and also solidarity, empowerment and also coercion, and the challenge is to use understanding of the dynamic features and relationships of the duality to achieve change (Cleaver, 2004). Maintaining critical reflection, dialogue and debate are the only realistic options in attempts to influence strategy and policy in the wider participatory project (Cornwall & Pratt, 2003).

The significance of the critique of participation from a thesis project planning and management point of view is that it calls for awareness of the various issues emerging in the debate and attention to the established quality criteria for participatory methods in planning and implementation. For example Adnan et al (1992) identified the following critical features;

1. Transparency – make all project activities publicly visible
2. Timely and adequate access to project information for all.
3. Agencies involved in the project should be procedurally and periodically answerable to the local people as well as the wider population of the country.
4. Participation should be entirely voluntary based on free, meaningful choice.
5. Comprehensive consultation with problem definition by locals prior to any other project activities.

6. People should not feel distanced and alienated from the project management, process and outcomes.

Criticisms of participatory research from traditional research have tended to focus on the issues of rigour and accuracy, subjectivity and bias. The initial response was adaptation of terms to correspond to the four criteria associated with trustworthiness established for conventional research (Guba & Lincoln, 1989);

- *Internal validity*, the 'truth' of research findings, was concomitant to *credibility*
- *External validity*, the basis for generalising from the findings, corresponded to *transferability.*
- *Reliability,* the 'repeatability' of findings, was equivalent to *dependability.*
- *Objectivity*, where findings were said to be determined by impartial observation, was related to *confirmability* in the qualitative approach.

Pretty (1995), drawing on work which aimed to develop 'authenticity' criteria from beyond the positivist paradigm (Lincoln, 1990; Marshall, 1990; Smith 1990; all cited in Pretty 1995) established the following framework for judging trustworthiness of information generated by participatory research which also serves as a guide in planning and management of research.

1. Prolonged and/or intense engagement between the various actors to build trust and rapport
2. Persistent and critical observation to develop understanding of phenomena and context.
3. Parallel investigations and team communications using the same methodology.
4. Triangulation by multiple sources, methods and investigators. Ideally cross-disciplinary teams

5. Analysis and expression of difference ensuring the representation of different actors, unlikely to reach consensus.
6. Negative case analysis for rolling revision of hypotheses
7. Participant checking to ensure accurate representation
8. Peer or colleague checking to aid reflection
9. Reports with working hypotheses, contextual descriptions and visualizations.
10. Reflexive journals
11. Inquiry audit to enable validation by outsiders.
12. Impact on stakeholders' capacity to know and act.

Aquaculture and participation

Aquaculture research has followed a similar pattern as other natural resources research in that conventional research approaches predominated well into the 1980's (Lawrence, 1998) based on one or more of;

- **basic** research to generate knowledge about biological processes
- **strategic** research to solve a specific problem
- **applied** to develop new technology, and
- **adaptive** to adjust the technology to specific environmental conditions.

Outputs from this research would then be 'transferred' to a target group by the ToT approach previously mentioned. In rural development generally the efforts tended to be based on identification of technically feasible packages deemed suitable for local conditions, an approach which often resulted in low adoption and where adoption took place limited sustainability arising from non-technical issues that were not taken into account during planning (Townsley, 1996). Following trends in other areas of international agricultural/natural resources research participatory methods began to be adopted (see Section 1.4.3).

Literature that deals specifically with participatory methods for aquaculture research tends to be focussed on Farming Systems Research (FSR) approaches (see Lightfoot *et al*, 1993; Lawrence, 1998; Sulem & Brummet, 2006). Perhaps because research with a greater level of stakeholder participation would not focus on aquaculture specifically but necessarily deal with aquaculture as a component of a wider complex system (Townsley, 1996), or it may be that FSR, an essentially positivist approach, has been co-opted by the research establishment. In discussing aquaculture research policy and participation in Bangladesh Lewis (1997) identified two tendencies that could constrain researchers and create the conditions for maintenance of a research culture that favours extractive methods; first policies that privilege scientific approaches and second the persistence of top-down bureaucracy which sees its role as control, regulation and education.

Participatory research by Lightfoot (1990) and Lightfoot *et al* (1993) related to aquaculture has principally involved the Farming Systems Research approach in Integrated Resources Management, particularly looking at methodology development. The outputs were a linear, prescriptive approach (Sutherland, 1998) which as Farrington (1997) pointed out tends to be most appropriate when working with well resourced farmers engaged in cash crop production in high potential agro-ecological zones. Issues raised by Townsley (1996) were that although participatory rural appraisal can lead to identification of genuine priorities, self-reliance, mobilisation of local people and resources, some disadvantages were;

- Participatory methods have the potential to raise expectations amongst participants.
- The methods could lead to plans being developed that agencies would be unable to respond to.

- Run the risk of 'capture' of activities or monopolisation of outputs/outcomes by local elites/powerful individuals or groups.
- May fail to take account of social stratification within the target community.

The first attempt to systematise lessons from the use of participatory methods in association with the aquaculture sector was a workshop which examined nine case studies (Martinez-Espinosa, 2000). Six lessons were drawn from this by participants. First, that using participatory approaches can add value to development activities; notably that in the research phase there can be improved understanding of issues and the context in which aquaculture takes place or is being considered. Second, participatory approaches is not appropriate for use in all research situations, *e.g.* basic research should not be carried out in the field as it wastes time and effort, however participation may prove useful in adaptive research. Third, participation can improve the sustainability of development efforts though management of participatory activities may be a problem for existing agents/agencies in aquaculture development such as government bureaucracies and technically focussed universities. Fourth, capacity of local organisations and other stakeholders may be lacking, time should be spent to develop the appropriate skills and knowledge. Fifth, participation is not a 'magic bullet', other methods may be more appropriate, efficient and effective. Sixth, while the focus on building understanding of conditions, problems and issues is important, there is scope for development of the capacity building/learning function of participatory methods in the aquaculture sector.

Another source of reference in identifying a suitable research direction for the thesis research was guidance from the ARP which emerged from a programme development workshop.

1.4.5. Programme Development Workshop

In November 2000 a workshop was organised in Hanoi, Vietnam by two of the four DFID-supported fishery sector research programmes; the Fish Genetics Research Programme and the ARP which was to provide guidance that would inform future research activities under the programme (Hussein, Farrington, Goldman & Townsley, 2001). The aim of the workshop was to identify ways of improving the design, assessment and developmental impact of research on the poor and to offer practical guidance to participants in improving quality and delivery at project and programme level. This activity was part of an ongoing process of reorientation towards the DFID priority strategic focus of direct impact on poverty which had been taking place since the publication of the White Paper in 1997 (DFID, 1997). Participants included programme managers, investigators and collaborating partners from the two programmes, programme management from the other two fishery sector research programmes (Post-harvest and Fisheries Management), DFID staff from London and regional offices with facilitators from the Overseas Development Institute, Khanya–Managing Rural Change and Integrated Marine Management Ltd. The outputs from this workshop provided a set of standards/guidelines or best-practice criteria which represented important guidance from the ARP.

While the outputs of the working groups were informative the key message was an understanding of DFIDs' expectations from the research programmes specifically an improved understanding of the application of Sustainable Livelihoods principles to research and the related issue of achieving complementary partnerships for research and extension.

Sustainable livelihoods approach

The foundations for this approach were laid in the late eighties/early nineties, with origins in the human development approach to poverty which emphasised a more

comprehensive conceptualisation of the issue, incorporating essential human capabilities and opportunities such as literacy, nutritional status, health and freedom to the traditional standard of income poverty (Carney, 1998; Goldman 2000). The approach has been developed through integration of theory and best practice from the analysis of such fields as institutions, economics, gender, governance and farming systems, and continues to evolve as a holistic system of principles and methods currently underpinning approaches used by a number of development organisations such as the UNDP, CARE, Oxfam, IUCN and DFID (Farrington, Carney, Ashley & Turton, 1999, Goldman 2000). The definition of sustainable livelihoods (SL) used by DFID is;

'A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintains or enhances its capabilities and assets both now and in the future, while not undermining the natural resource base.' (Carney, 1998)

The SL approach underpinning much of DFIDS activities incorporates analysis or at least awareness of key contextual factors assumed to cause problems or create opportunities. It aims to provide the user with a comprehensive understanding of the activities, resource use and the natural, social and political environments within which people live their lives. The approach can be implemented in identification and design of programmes, project planning, activity reviews and monitoring and evaluation (DFID, 2003). There are a number of variations of the approach around using the same tools and flexible approach. Since the SL approach is so broad-based and flexible, activities and resources for the workshop centred on incorporation of the core SL principles, summarised in Box 1.5, in aquaculture and fish genetics research.

Box 1.4 Key underlying principles of the Sustainable Livelihoods Approach

Poverty-focused development activities should be:

- **People-centred:** sustainable poverty elimination will be achieved only if external support focuses on what matters to people, understands the differences between groups of people and works with them in a way that fits in with their current livelihood strategies, social environment and ability to adapt.

- **Responsive and participatory:** poor people must be key actors in identifying and addressing livelihood priorities. Outsiders need processes that enable them to listen and respond to the poor.

- **Multi-level:** poverty elimination is an enormous challenge that will only be overcome by working at multiple levels, ensuring that local-level activity informs the development of policy and an effective enabling environment, and that higher-level policies and institutions support people to build upon their own strengths.

- **Conducted in partnership**: with both the public and the private sector.

- **Sustainable:** there are four key dimensions to sustainability - economic, institutional, social and environmental sustainability. All are important - a balance must be found between them.

- **Dynamic:** external support must recognize the dynamic nature of livelihood strategies, respond flexibly to changes in people's situation, and develop longer-term commitments

Source: DFID Sustainable Livelihoods Guidance Sheets (DFID, 2003)

Two of the resource papers presented at the workshop dealt specifically with issues related to the use of SL principles to inform research approaches. Table 1.5 synthesises the main issues which they raised and recommendations for dealing with the issues.

Workshop outputs

The documented outputs of the workshop reflected the range of issues identified in the resources above, informed by the experience of the participants and are summarised below in the eleven key lessons that were drawn out (Hussein *et al*, 2001);

1. The need to understand the context in which research takes place and the way in which different research approaches can lead to contributions to DFID's objectives.
2. The need for a practical balance of knowledge generation, dissemination, uptake and strengthening partners' capacities at programme and project levels.

3. Taking account of the diverse aspects of people's livelihoods can improve research project design.
4. Partnerships should have a 'developmental' perspective with consideration of a wider range of partners (than traditional research organisations) from private as well as public sectors and leading to establishment of stakeholder networks.
5. Need to develop a suitable balance regarding responsibilities at programme and project levels and the development of linkages with DFID bilateral country programmes.
6. Recognise that a range of partnership may be required at the different stages of a projects' cycle. Processes for selection and working with partners need to be developed.
7. Policy and social/institutional context is important particularly with regard to understanding the ways in which research can lead to influence on policy.
8. Improve communication channels between DFID Natural Resources research and country programmes.
9. Treat the project as a 'process' and maintain the flow of information throughout that process.
10. Think 'impact' from design stage and throughout the process.
11. Build in participatory monitoring and evaluation systems for use by and to inform stakeholders.

Table 1.5 Issues related to the application of the SL approach to research and recommendations for resolution of these issues

Guiding principle	Issues	How to address issues
People-centred	• Research typically focused on technical or scientific factors rather than issues raised by intended beneficiaries • Research context very different from that of intended beneficiaries	Research, carried out in the particular contexts of beneficiaries, addressing their specific needs.
Responsive & participatory	• As above; research agendas may not reflect specific needs and methods do not encourage useful participation. • Research agenda based on researchers' specialisation not taking indigenous skills and knowledge of end-users on board.	• As above; Inclusion of participatory methods and mechanism for collaboration and feedback with the broader community in research methodology. • End-user constraints researched in their own terms
Multi-level	Limited channels for contact between researchers and end-users	Understanding of research context, identification of pathways for research implementation and dissemination of results to different levels. Establishment of linkages and feedback mechanisms between levels
Conducted in partnership	What type of partnership may be required to impact livelihoods?	Beneficiaries and service providers should be the main sources for identification of research needs.
Sustainable	Are there trade-offs between economic, institutional, social and environmental sustainability of research products and/or their use by beneficiaries?	Interdisciplinary research, monitoring and evaluation of use of research outputs.
Dynamic	Research unable to keep up with changes in the field.	Adaptive, field-based research, close collaboration with field programmes.

Sources: Goldman, 2000 and Townsley & Campbell, 2000

Workshop Synthesis

The resources and workshop outputs, together, formed a comprehensive set of guidelines for research under the ARP incorporating the expectations/requirements of the donor with the experiences of development practitioners, programme managers and researchers. An appropriate research approach informed by the workshop outputs would be based on needs identified by the beneficiaries or service providers carried out in their own terms, using participatory methods where appropriate (including situation analysis, problem prioritisation, planning, monitoring and evaluation) and utilising the complementary strengths of a range of partners. Furthermore it was recognised that the overall objectives for change may be agreed but the means to achieve them may not be clear and may require an iterative approach.

1.5. Research issues

This chapter was about documenting the learning process involved in arriving at the research issues and choice of methodology reported in the thesis. The process involved engagement in a collaborative research project, personal reflection, participation in a research programme development exercise and literature review. From the project we

had indications of variability in growth and survival of fish seed although the inconclusive results of the strategic research gave no direction for further research toward improvement of approaches to seed production. Guidelines for appropriate approaches to research under the ARP were provided in a programme development workshop and the soft systems literature enabled conceptualisation of the situation. Synthesis of the issues that were raised in reflection on project context and systems theory resulted in identification of four research issues which informed the decision to adopt a participatory research methodology for the next phase of work;

1. The project purpose remained valid, though a range of outputs beyond the scope of the work reported here would be required to achieve the required impact.
2. An approach was required for a new phase of work that could take into account the different perspectives of stakeholders that had emerged.
3. Research should be informed by the principles of the Sustainable Livelihoods approach and the experiences of field researchers and development practitioners from within the AFGRP.
4. The nature of the problem was conceptualised within a soft systems definition which implied that a learning systems approach to research which would involve stakeholders in learning and change processes should lead to improvement.

The choice of methodology arose more or less inevitably from this process; however it is necessary to discuss why some other approaches were not chosen. Further technical research was ruled out mainly because it had become apparent that it was not a suitable approach to dealing with a complex problem rooted in the management of extension, research and production systems; the management of existing technical knowledge resources was a more pressing issue.

Another more likely alternative would have been a social science research approach to study, for example, organisational culture, markets, social networks and patterns of innovation, *etc*; however this approach was rejected for two reasons. First because of the authors' lack of experience in social science methods and the limited timeframe in which to develop the necessary skills and experience in a context where the author was expected to function as a competent professional researcher. Second, the rhetoric from the participatory methods field had suggested that conventional social science methodology is typically extractive and therefore unlikely to result in the sustained change required by the project purpose. While it would have been ideal to integrate conventional social research with the action research activities (Cooke, 2001; Henkel & Stirrat, 2001; Biggs & Smith, 2003) a limited budget prevented an additional, suitably-qualified researcher being engaged on the project and as Mosse (1995) pointed out, a field researcher cannot deal with the question 'what is this thing, and how does it work?' at the same time as providing the answer to the question, 'how can we make it work better?' An important distinction has been made between the participatory action-oriented approach reported here and the critical analysis approach of participant observation (Wright & Nelson, 1995). Participatory approaches are aimed at generation of knowledge and innovation through collaboration with stakeholders towards consensus and action (Campbell & Salagrama, 2000), while participant observation research analyses the social relationships and patterns of dominance that provide the context within which knowledge and innovation are generated (Mosse, 1998). This distinction clearly implies that the outputs of the research process and the way in which it is reported are also distinct.

Research objectives

Two specific, phased, objectives were set out in order to meet the project purpose of improved approaches to freshwater fish seed production. Though the objectives as stated have an action orientation and might be mistaken simply as project activities, the research, defined here as 'systematic and rigorous enquiry or investigation that enables people to understand the nature of problematic events or phenomena' (Stringer, 1996), is in evaluation of the process of each.

1. *Extension of the existing research collaboration with the Royal Thai government Department of Fisheries (DoF) and Asian Institute of Technology Aqua Outreach*
2. *Implementation of a participatory action research project with groups of hatchery operators.*

2. Methodology

2.1. Introduction

This chapter introduces and justifies the use of the action research methodology on a practical level in terms of the need for further research responding to issues identified following the first two phases of the project and the recommendations for development activities based on the DFID livelihoods approach. In order to set the stage it is necessary to provide some background on action research and the features which made it an appropriate methodology in this situation. This is followed by justification for the methodology, for the choice of location and participants. Finally the implementation of the methodology is described in detail.

2.2. Participatory Action Research

2.2.1. Overview

This section gives an introductory overview of participatory action research (PAR), the main methodology of this thesis. The overview consists of a definition of PAR, description of the research framework and data analysis methods.

PAR is both a description of, and a label for a social research process that aims to produce practical knowledge outcomes through cycles of reflection, planning, action, review and reflection. Figure 2.1(a) shows a representation of a process cycle, which in the case of prolonged engagement with a problem situation would extend to form the interacting spiral described by Kemmis & McTaggart (1990), Stringer (1996) and Wadsworth (1998) and outlined in Figure 2.1(b). The PAR process has three key features;

(i) it starts with an interest in resolving practical issues through practical knowledge outcomes. In a sense the project was working on two levels; at the project level was the issue of ‘improving approaches to seed supply’ and nested within this

issue were the fieldwork issues of dealing with 'problems encountered by hatchery operators.'

(ii) The knowledge is derived from the action itself and conscious review and reflection on the action.

(iii) Central to the process is the collaborative participation of stakeholders in identification of issues, analysis of the situation and taking action.

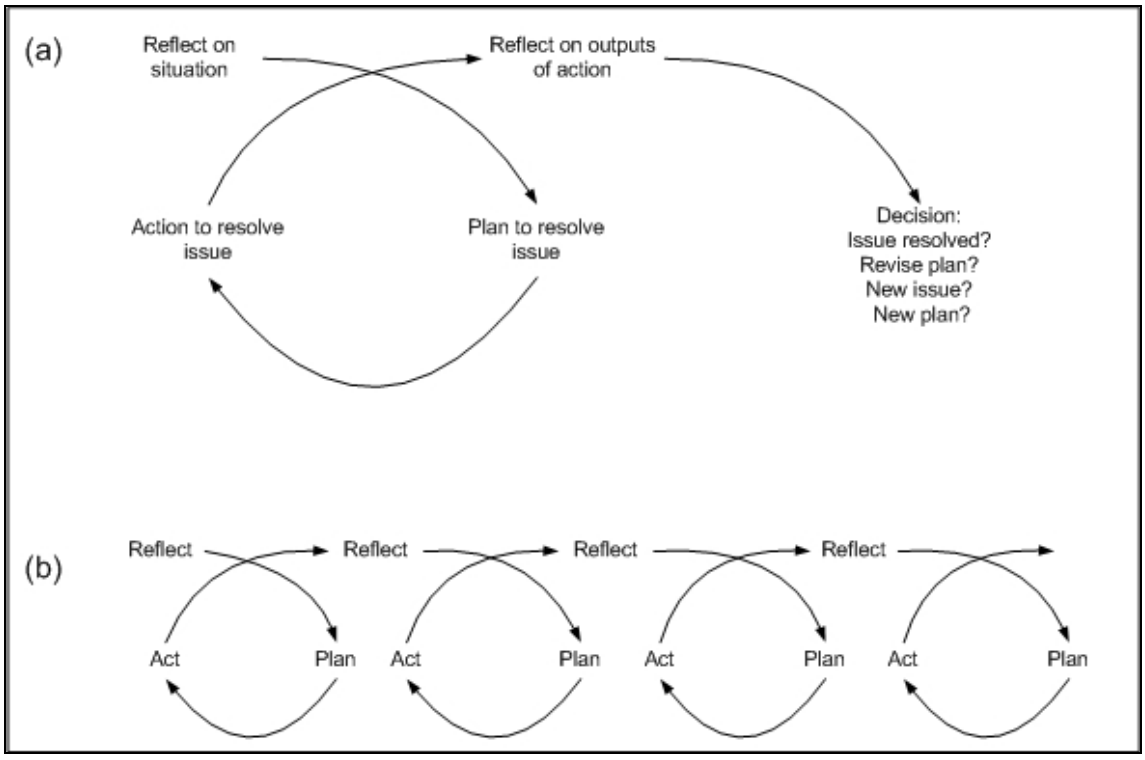

Figure 2.1 Representations of the action research cycle (a) shows a full, individual research cycle, (b) shows a stretched helical pattern of continually cycling sets of activities (after Stringer, 1996)

There were two, phased stages of activity guiding the research framework; the preparatory step involved actions to meet the objective of *extending the existing research collaboration with DoF and Asian Institute of Technology Aqua Outreach Program*. These were; collaboration in development of a work plan and building and training of a field team. This required a dialogue between the project and research partners and was concluded by a short training in rapid appraisal techniques.

The second step comprised the fieldwork activities with the objective *implementation of a participatory action research project with groups of hatchery*

operators. This involved approaches to producer groups to introduce the project and invite collaboration. Where the invitation was accepted there followed a process of situation appraisal, problem identification, prioritisation and analysis, participatory action planning, action, review and reflection. These activities were facilitated by members of the field team using participatory techniques mostly in a group situation but involving some work with key resource people individually.

Participatory evaluation was an ongoing part of the work, carried out on a regular basis with participants to verify levels of expectation, understanding and for feedback about the process. There was a final evaluation meeting with each group where issues of efficiency, effectiveness and change were discussed.

Inputs, actions and outputs were examined using objective-based and open-ended evaluation *i.e.* by looking at indicators related to achievement of objectives and also including broader process elements. Conclusions were drawn from the evaluation and reflection on the emergent issues in the light of issues raised in the literature review identified in Chapter 1.

2.2.2. Contextualisation of Action Research

The origins of PAR are typically traced to work first published in the field of education by John Dewey and later in the work of John Collier on race relations and Kurt Lewin in psychology (Greenwood & Levin, 1998; McNiff & Whitehead, 2006; Pasmore, 2001). Dewey was among the first to apply the scientific method to solving practical social problems (Pasmore, 2001) and was committed to issues of participative democracy and specifically the democratization of education and knowledge creation, urging educators not only to teach facts but to teach students how to think and actively collaborate in personal knowledge creation (Levin & Greenwood, 2001; Pasmore, 2001). Dewey's five phases of reflective thinking to deal with practical problems

(Dewey 1933 cited in Pasmore, 2001), suggestion – intellectualization – hypothesizing - reasoning -experimentation, clearly fit the pattern of the action research process.

It was John Collier, a community development activist who became Commissioner in the United States Bureau of Indian Affairs (BIA) from 1933 to 1945, who first coined the term 'action research' in his work to improve race relations between native and non-native Americans (Cooke, 1999; Pasmore, 2001). He reasoned that it was unlikely that the interesting observations produced by traditional research into ethnic relations would lead to changes in the beliefs of study participants, nor would legislation resolve issues. Collier advocated engaging members of the affected communities in research towards acceptable solutions (Pasmore, 2001). In 1945 Collier established and became the President of the Institute for Ethnic Affairs in 1945 whose charter proposed that social scientist engage in action research, which he described as having been the key organising principle of the BIA since 1933, in it's work to address international race relations (Cooke, 1999). One of the directors of the IEA was Collier's friend Kurt Lewin, a Gestalt psychologist who had fled Nazi Germany to settle in the USA.

Described by Schein (1980 quoted in Cooke, 1999) as "the intellectual father of contemporary theories of applied behavioural science, action research and planned change", Lewins' construction of a theory of action research (Lewin, 1951), which first described the research process as a cycle of planning, action and evaluation (see Figure 2.1) made action research an acceptable and legitimate approach to inquiry (McKernan, 1991). Lewins' field theory, based in large part on extensive action research on a range of social issues, held that behaviour was a function of both personality and environment which challenged the prevailing Freudian orthodoxy where all behaviour was said to be governed by the personality (Pasmore, 2001). The theory has become the basis for most

contemporary thinking on learning and behaviour. Another significant legacy of Lewins' influence has been in the field of management where participatory management, organization development, group dynamics, change management and any of the range of 'quality management' and 'business process' proprietary business models and techniques are based around the cycle of planning of action to improve a situation, action to implement the plan, observation of effects and reflection on the outcome to inform further planning (Anderson & Herr, 2005; Cooke, 1999).

From groundings in the philosophy and psychology of participatory democracy action research, as a practice, has been adopted in a range of disciplines including business studies, organizational studies, community development, education, psychology, healthcare, social work and social sciences (Reason & Bradbury, 2001). The 'family' of participatory research approaches or methodologies are characterised by cyclical inquiry with practical knowledge and action outcomes (Dick, 2000; Reason & Bradbury, 2001). Underpinning the approach is the principal that people are more likely to modify their behaviour when they have understood the situation through participating in the identification and analysis of problems, and furthermore they are more likely to respond to decisions that they have been involved in making (Schein, 1995).

Reason & Bradbury (2001) state that a 'primary purpose of action research is to produce practical knowledge that is useful to people in the everyday conduct of their lives', Allen (2001) includes two additional aims; development of public knowledge and development of the self-help competencies of people faced with problems.

Community based action research principles according to Stringers' (1996) handbook, an important reference for the work reported in this thesis, are that it is a collaborative, approach to inquiry/investigation which enables participants to;

(1) systematically investigate problems and issues that are important to them

(2) to develop powerful accounts of their situation and

(3) to plan and take action to deal with the problems at hand.

Characteristics of PAR are that it is democratic, equitable, liberating and life enhancing (Reason & Bradbury, 2001). Masters (2000) identified four main themes within the range of definitions and forms of action research: empowerment of participants; collaboration through participation; acquisition of knowledge; and social change.

In practice the general pattern of research starts with a social situation of concern to at least one group of stakeholders; participants are facilitated through cycles of planning, action and conscious reflection ideally involving other stakeholders in the dialogue as the enquiry progresses (Stringer, 1996). The traditional role of external researcher determining objective truths in a well-defined problem situation must be changed under conditions where there is no agreement about the nature of the problem; the researcher must become a facilitator or co-researcher in the stakeholders' pursuit of understanding and consensus for action to improve a complex situation (Röling & Wagemakers, 1998). However the *positionality* of the researcher, in terms of being an 'insider' or 'outsider' in the action research situation under examination, occurs along a continuum (Herr & Anderson, 2005) from insiders studying their own practice (Anderson & Herr, 1999) through insiders collaborating with other insiders, insiders collaborating with outsiders, reciprocal arrangements, outsiders collaborating with insiders and outsiders studying insiders. This continuum showing the different contributions and traditions for each approach is presented in table 2.1 and can be compared with the typology for participation in Section 1.4.4. The research approach reported in this thesis is 'outsiders in collaboration with insiders' though in order to meet the expectations of academic tradition the thesis itself is required to present a more objective stance.

Table 2.1 Continuum of researcher positionality and implications. Source Herr & Anderson 2005.

Positionality of researcher	*Contributes to:*	*Traditions*
Insider researches self/own practice	Knowledge base, improved/critiqued practice, self/professional transformation	Practitioner research, narrative research, self-study, autobiography
Insider in collaboration with other insiders	Knowledge base, improved/critiqued practice, professional/organizational transformation	Feminist consciousness raising groups, inquiry/study groups, teams.
Insider in collaboration with outsider(s)	Knowledge base, improved/critiqued practice, professional/organizational transformation	Inquiry/study groups
Reciprocal collaboration (insider-outsider teams)	Knowledge base, improved/critiqued practice, professional/organizational transformation	Collaborative forms of participatory action research that achieve equitable power relations
Outsider(s) in collaboration with insider(s)	Knowledge base, improved/critiqued practice, organizational development/ transformation	Mainstream change agency, consultancies, industrial democracy, organizational learning, radical change, community empowerment
Outsider(s) studies insider(s)	Knowledge base	University-based academic research on methods or projects

There are an increasing number of 'action-research-like processes' infiltrating diverse disciplines and professions (Dick, 2004) including Appreciative Inquiry, Soft Systems Methodology, Action Science, Participatory Rural Appraisal and Constructivist Research as some of the main 'schools' within the thirty or so identified by Fals Borda (2001). Growing convergence is anticipated in the developing 'community' of action researchers interacting through several action research-dedicated journals and an annual World Congress (Dick, 2004). As discussed in Section 1.4.4 there is a growing body of work within international development and research for development based around participatory principles much of which would fit under the action research umbrella; from this body of work several projects which specifically used participatory action research have been published.

Clark *et al* (2003) reported the success of a learning systems approach that integrated research and intervention within innovation systems for post-harvest technology development in India. In Kenya and Uganda a facilitated learning approach into a widespread problem of soil nutrient depletion involved long-term, intensive

collaboration between government service providers and community based organisations to arrive at a sustainable solution which emphasised low external input combined with maximal use of locally available nutrients (Jager *et al*, 2004). Institutionalising of basic monitoring and evaluation systems to make tacit learning more explicit and facilitation of trust among stakeholders to promote information sharing and joint learning for technology development were identified as important strategies in capacity and capability development for poor peoples' businesses in developing countries (Platt & Wilson, 1999. A comparison of three programmes for small farmer capacity development in Africa found that a facilitated learning approach though slower to implement was the only approach with long term positive impacts (Bingen *et al*, 2003). Within the aquaculture sector action research has been reported to be effective by the non-governmental organization CARE in Bangladesh, both in work to promote fish health management (Nandeesha *et al,* 2002) and as one of a range of participatory methodologies to enable empowerment of women through development of skills in fish seed production and grow-out (Debashish *et al*, 2001). A well documented and controversial experiment with PAR took place as a component of the Andhra Pradesh (AP) *Prajateerpu* (peoples' verdict/citizens' jury) process, a programme to enable local people to develop their own vision for food and farming (Pimbert & Wakeford, 2003a, 2003b).

Originally conceptualised to enable research partners from minority groups to share their knowledge and experience of the government "Vision 2020" food and farming policy in a safe and supportive environment. The effectiveness of PAR in the process was attributed to participants forgoing the traditional research position of objective and value-free observers and engaging fully, bringing their personal understanding and ideologies into their research (Pimbert & Wakeford, 2003a).

Furthermore the attempt to increase the accountability of those in power stands in stark contrast to the conventional 'trickle down' research dissemination approach. The authors stated their belief that it is both necessary and possible to use action research in attempts to promote global accountability (Pimbert & Wakefield, 2003b).

Perhaps the best documented action research project in agricultural research was the set of activities reported in *Agricultural extension and rural development* (Ison & Russell, 2000) which documented the process of research commissioned by the Australian Wool Research & Development Corporation into the failure of technology adoption by graziers in New South Wales. Based on the project experience of extended engagement around issues of concern to the graziers the researchers proposed a second-order research and development system as a social system for research, learning and action through a four stage strategy (Russell & Ison, 2000c) as follows:

1. Bringing the system into existence around the main issues of concern to key stakeholders and determining the boundaries.
2. Evaluating the effectiveness of the system to elicit useful understanding of the social and cultural context.
3. Generation of a joint decision making process
4. Evaluating the effectiveness of the decisions and actions

Action research has clearly gained considerable acceptance through its use in applied fields where the production of new knowledge and practical solutions to context-bound issues of concern can lead to transformation in democratic directions (Greenwood & Levin, 1998). However the central importance given to insider knowledge and initiative in the research process, an important distinction between action research and conventional research has raised concerns that must be addressed.

Criticisms

Concerns about action research are the same as described for participatory methods in Section 1.4.4 namely the issue of validity, stemming from a positivist standpoint. This argument/criticism may also be couched in terms of the 'quality' of the research (Herr & Anderson, 2005) based on assertions that the approach is not 'scientific' meaning that it is value laden, subjective and is not generalizable. Publication of the *Handbook of action research* (Reason & Bradbury, 2001) which emerged from the first World Congress of action researchers raised the issue of quality explicitly (Reason & Bradbury, 2001b) and ensured that it remains one of the main aims of action research. It should be borne in mind from the discussion in Section 1.4.4 that 'quality' is a process claim and subject to variation in any research approach regardless of the paradigm and therefore quality can be an issue in all types and forms of research practice and it is managed by attention to and reflection on established methods and procedures and evaluation of outcomes.

Claims about the 'unscientific' nature of action research are contentious and based on the realist-positivist/ constructivist debate discussed in Section 1.4.2. Action research is grounded in a constructivist epistemology which implies that science is a valid form of inquiry under certain circumstances but not in dealing with complex social reality as a whole. In simple terms of validity testing, knowledge outputs from action research are tested in action by the people who have the greatest stake in the problem or issue under investigation which isn't generally the case in conventional approaches to social science (Brydon-Miller *et al*, 2003). Regarding generalizability or transferability, Greenwood & Levin (1998) recommend that judgements could only be made regarding the value of action research knowledge following reflection on similarities and differences in context and historical factors.

Ensuring quality generally entails attention to established criteria such as those identified by Adnan *et al* (1992) and Pretty (1995) listed in Section 1.4.4. Specific quality/validity criteria for action research which have been widely cited and summarized in mainstream research texts are Anderson & Herr's (1999) five validity criteria which correspond to five goals of action research. The goals and corresponding criteria for these criteria which informed the reflective process in the research reported in this thesis are:

1. Generation of new knowledge – Dialogic and process validity
2. Achievement of action-oriented outcomes – Outcome validity
3. Education of both researcher and participants – Catalytic validity
4. Results that are relevant to the local setting – Democratic validity
5. A sound and appropriate research methodology – Process validity

Dialogic validity can be related to the process of peer review which is used to evaluate the 'goodness' of research; a similar process takes place among and within action research communities. Process validity is about the extent that problems are dealt with in ways that enable learning by individuals and groups within the system and involves reflection on underlying assumptions behind problem definition and planning, evaluation of evidence and relationships. Outcome validity asks whether the actions taken led to the problem being resolved. Catalytic validity means looking at how the research process has transformed participants understanding of the situation and their place in it. Democratic validity looks at the levels of stakeholder involvement and/or collaboration.

An important criticism of action research presentation has been about the way that it is reported through narratives, which don't fit the positivist model for data collection and presentation (Stringer, 1996). The reason that narratives predominate in

action research is that the accounts generated must be in narrative form in order to be true to the process (Greenwood & Levin, 1998). However even within conventional social science there has been growing recognition that socially constructed meaning and realities grow out of discourse and narrative in action contexts (Treleaven, 2001) and therefore the narrative provides much of the power in action research (Greenwood & Levin, 1998).

2.2.3. Justification

To recap the research issues which emerged from reflection on context and theory were

1. The project purpose remained valid; though a range of outputs would be required achieve the desired impact.
2. An approach was required for a new phase of work that could take into account the different perspectives of stakeholders that had emerged.
3. Research should be informed by the principles of the Sustainable Livelihoods approach and the experiences of field researchers and development practitioners from within the AFGRP.
4. The nature of the problem was conceptualised within a soft systems definition which implied that a learning systems approach to research which would involve stakeholders in learning and change processes should lead to improvement.

Clearly there was a need for further work that approached the situation in a way that could take account of the different perspectives that emerged. The workshop in Vietnam provided a number of recommendations for improving research design and implementation. These recommendations reiterated the requirement for a research approach based on issues of concern identified by the beneficiaries or service providers, carried out in their own terms, using participatory methods and utilising the complementary strengths of a range of partners. The last point suggested a hypothesis that a learning systems approach would enable improvement and an obvious choice of

methodology to use was action research. The choice of action research was justified on the following practical grounds;

1. It was the methodology underpinning Soft Systems Methodology (Checkland, 1981) which enabled the situation to be conceptualised.
2. As an approach which focuses on achieving improvement in social situations perceived as problematic by some stakeholders (Stringer, 1996) action research responded directly to the project purpose
3. Participatory action research was recognised as an approach to research the enabled research needs and mechanisms to be defined through participation in the AFGRP workshop (Townsley & Campbell, 2000; Campbell & Salagrama, 2000).
4. The themes of action research (Masters, 1995) correspond to the underlying principles of the SL approach (Ashley & Carney, 1999).

Action research emphasises possibility rather than prediction, enabling people to envisage a preferred future and organize effectively to achieve it (Elden & Chisolm, 1993). The project purpose, improved approaches to seed production, was a vision of a preferred future. The research problem was to assess the value of action research in organising towards that vision.

2.2.4. The location and communities invited

The Northeast of Thailand was chosen as the location of the research for three reasons;

1. At the conclusion of the second phase of the project in June 2001 there was a surplus budget remaining from the research in Northeast Thailand and it was agreed by the PIs and Programme Manager that this could be used to support a new phase of research. The funds remained because project activities between AIT and the DoF were frozen from late 1999 until the end of 2000, following changes in the senior administration of the DoF.

2. The renewed interest expressed by the DoF at the end of 2000 in seed quality issues which led to inclusion of project activities in an interim MoU between AIT Aqua Outreach and the DoF signed in 2000.
3. The presence of a team of experienced field workers from the AIT Aqua Outreach office in Udon Thani who were engaged in the activities covered by the MoU.

Checkland (1999) in describing the action-oriented focus of Soft Systems Methodology which is intended to enable 'action to improve' to be taken, such as the desired improvement in approaches to fish seed production, recommended that preliminary thinking should cover three dimensions of change; the structural change desired in this case improvement of seed production and delivery practices, the change in processes required e.g. hatchery management, transport, extension and research policies/strategies, training and the changes in attitude of seed producers, nursery operators, traders, grow-out farmers, researchers and government service providers. Further to this is the requirement for enabling actions to support the changes. To some extent the earlier phases of the project had enabled this preliminary mental model of the situation and provided an entry point through the existing partnership with the DoF and AOP.

The primary producers, hatchery operators, were the obvious group to approach first. We knew that there were three main concentrations of seed production in the Northeast located in Nong Khai, Mahasarakam and Surin Provinces and a fourth, smaller concentration in Amnat Charoen Province. Furthermore we knew that in at least two of these provinces, Nong Khai and Mahasarkam, hatchery operators were organised into officially registered cooperatives. Some members of these organisations had been consulted for the "State of the System" workshops and had also provided fish for the trials run by the DoF in the earlier phase of the project. Producer organisations (POs)

have been reported to have potential as key providers of agricultural services and to give farmers a voice enabling drawing down of services from the public sector, given an enabling political and institutional environment (Hussein, 2000). Furthermore it was recommended that POs should be strengthened in circumstances where they represent farmers own interests and have emerged of their own volition (Farrington & Hussein, 2000). At the time local government in Thailand was beginning a period of transition towards decentralisation under the 1997 (16^{th}) National Constitution with radical changes in support at the district level (Sopchokchai, 2001) that, from an overall structural point of view at least, represented steps towards the appropriate enabling environment.

Initially it was hoped that we could work in each of the four areas of hatchery concentration, assuming that the hatchery operators were interested in collaborating, however prior to that we needed to get the agreement and cooperation of the institutional partners and work out what we could do, and how we were going to go about doing it.

2.3. Delimitation of scope

This section establishes the boundaries for the research with respect to the problem presented in Section 1.2. PAR is an example of what Guba (1996) calls decentralized research; human enquiry emphasizing local context in dealing with local problems. This has specific implications for the way that the outputs from the research can be used; in terms of being able to generalise from them. However implications from the findings may be drawn and the open-ended evaluation should allow more widely useful lessons to be learned in terms of the research processes.

The groups of farmers who were invited to collaborate with the project were not intended to be a representative sample and thus the appraisal outputs have no external validity. PAR was carried out in specific local contexts and outside those contexts the

data from concrete outputs have limited use. However what may be useful is the methodology as a research process and specifically the lessons learned from implementation, as an example of working in other local contexts and problem situations. The broad area of interest covered by the research problem is research methodology for development focussed research. The level of decision making where conclusions could be useful is among researchers, planners and practitioners in private and public sector organizations at both project and programme level.

2.4. Project logic

In the language of the DFID logframe the *Output* from this research was:

An evaluation of participatory action research as a methodology to facilitate improvement of approaches to seed production.

In order to achieve this there were two phased *Activities*:

(1) The preliminary activity to establish effective institutional collaboration followed by

(2) Implementation of participatory action research in the field.

Because of the exploratory nature of the methodology it was impossible to establish detailed indicators in the initial planning stage; the plan had to remain flexible in order to accommodate first the DoF and AOP partners and then the hatchery operators. This 'learning process' or 'process' approach to viewing a project has emerged in situations where plans are open-ended, responsive and subject to change because of the complexity inherent in participatory enquiries and lessons learned from implementation (Mosse, 1998). The following sections give details of the research process including the anticipated outputs for each activity.

2.5. Preparatory activities

The preparatory activities covered the preparations for the participatory action research phase of the project which began in late 2000. We had an existing institutitional arrangement, a Memorandum of Understanding (MoU), with AOP which had enabled

earlier activities with the DoF. This section documents the activities which comprised a series of formal meetings, informal discussions and communications by email, fax and telephone with the following objective;

Extension of the existing research partnership with the Thai DoF and AOP into a phase of participatory action research.

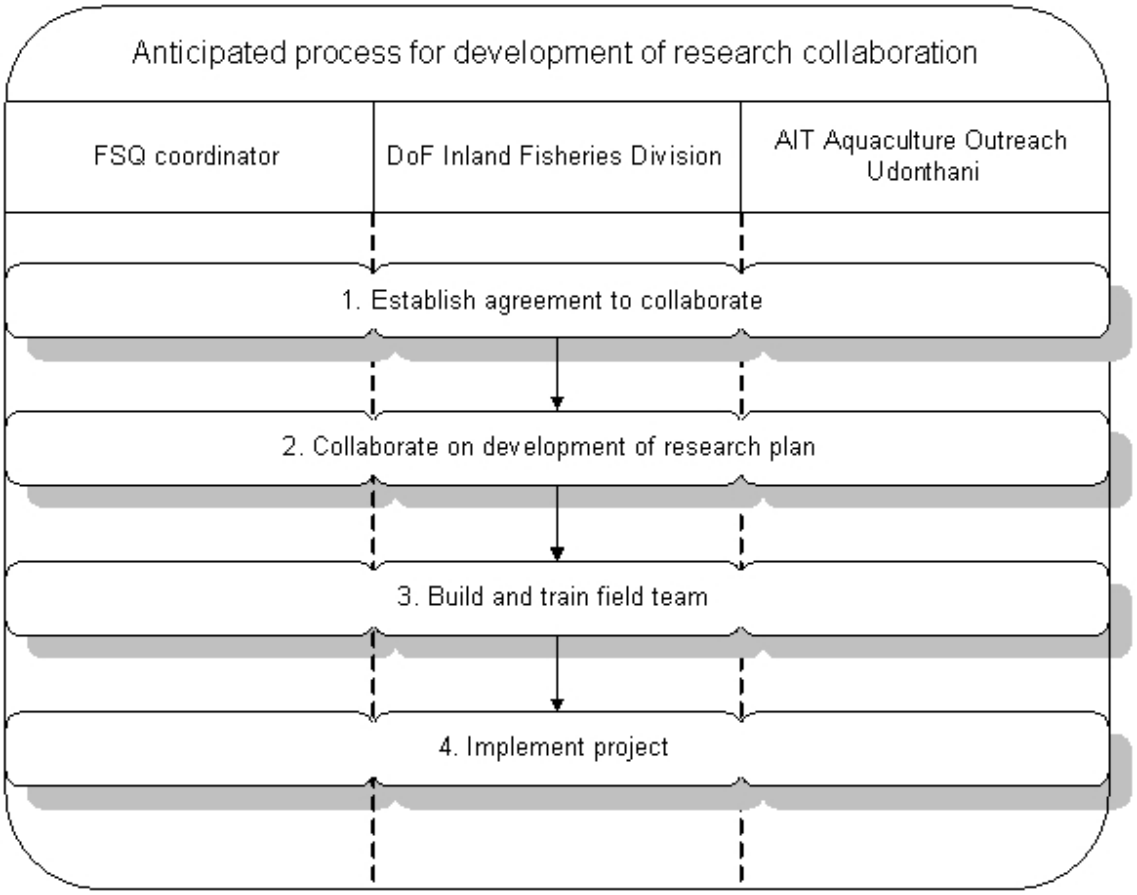

Figure 2.2 Cross-functional flowchart of the envisaged milestones in the process of preparation for field activities.

2.5.1. Preparation processes

Anticipated outputs from the preparation process were;

1. a formal agreement established with the Thai DoF through the AOP to carry out participatory action research with hatchery operators,
2. a work plan developed in collaboration with the DoF and AOP
3. a field research team comprising DoF and AOP staff trained in participatory methods.

The envisioned process of preparation for the project followed the first three steps shown in the linear representation of the process depicted in the flow chart in

figure 3.1; establishment of agreement to collaborate with the DoF and AOP, joint development of a plan and building and training of a field team to implement the project. As the flowchart suggests the process was intended to involve all the parties; the DoF, AOP staff and FSQ staff in a dialogue that would bring about a robust partnership. Details of the activities in steps 1 - 3 are given below.

1. Towards establishing an agreement to collaborate

In October 2000, following the hiatus in the working relationship between AIT and DoF formal relations were re-established. We were informed that if we wished to continue to work with DoF staff then the activity had to be formalized with the DoF; the previous arrangement had been a Memorandum of Understanding (MoU) with AOP Northeast Thailand which only covered activities in the first two phases of the project and was due to end in March 2001. On the DoF side they were unsure how they would deal with the project; the DoF had established new procedures for collaborating with external projects and because the FSQ project was relatively small and the proposed duration was only a year after the expiry of the existing arrangement and their issue was whether we should report to a working group or whether a specific steering committee would be convened. On the AIT side there was some concern over how the project could be fitted into the AOP/DoF activities which were funded under the Sida project, Rural Development through Aquatic Resources Management - Aqua Outreach Program. Phase II of this programme had ended in 2000 and a further phase was planned for 2001 to 2004 though final approval was pending. In October 2000, following the hiatus in the working relationship between AIT and DoF an agreement was reached between Dr Little and Dr Harvey Demaine, the AOP coordinator, whereby the activities could be nested within the AOP support to small-scale aquaculture component of the programme, which led to inclusion in an interim MoU that was approved at the end of 2000. The interim MoU was the basis for a full MoU signed in March 2001 establishing the institutional

arrangements for the seed quality project. The draft MoU can be seen in Appendix 3, wording in the full MoU related to the project was identical.

2. Collaborative planning

The intention was that the existing collaborative arrangement with the DoF IFD (Inland Fisheries Division) could be maintained for a further phase of work and that the relationship might be extended to include DoF planners and extension staff since they, rather than the IFD had the mandate to prepare and implement extension strategies. By the end of the preparatory phase a plan had been developed however the DoF input to the planning process was limited to suggesting that we work in Surin and Mahasarkam Provinces. AOP facilitation of the planning process was limited.

The dialogue began, around October 2000, with informal discussions between the DoF biologist Lek, who had been directly responsible for project activities in the earlier phases, Pae, the AOP Thailand programme manager and me. After resumption of the DoF-AOP partnership in October 2000 both Lek and Pae had informally expressed their interest in being involved in further work during my visits to coordinate analysis and reporting of the research trials which had finished just before the breakdown in relations in 1999. We discussed the lack of an obvious next step and I explained that I was preparing a proposal to AFGRP to use participatory action research and work more closely with the hatchery operators and maybe traders, and would be pleased if they could collaborate in developing the proposal and plan. However I was informed that the appropriate procedure was to draft a proposal myself and submit it to Nok the DoF/AIT liaison officer and Pae the AOP Thailand country programme manager for comment.

Formal dialogue began with a meeting in February 2001 with Nok, Lek and Pae. Prior to the meeting a discussion document (Appendix 4) was circulated to the meeting participants. The document proposed that while many issues had been raised in the SoS

reports and the trials indicated that growth and survival were variable, constraints had not yet been identified. The following options for further work were proposed with some elaboration:

(1) Continue with technical trials to identify the causes of seed quality problem through controlled experiments.

(2) Accept that there was a complex problem (may be several factors combined to effect seed quality), and instead of looking for problems look for ways to improve the situation using existing knowledge.

(3) Do nothing and hope that the situation would improve over time.

It was suggested in the document that further work was in-line with the DoF policy commitment to focussing on poor farmers in small-scale aquaculture and supporting producer organisations, further that the existing technical expertise of the DoF and other local institutions was considerable and that the issue of institutional support to farmers under the ongoing decentralization process at the district level was not yet clear. The suggested outline for further work under the second option above was that it might include;

(a) Examination of existing communication systems using participatory methods.

(b) Institutional analysis

(c) Stakeholder workshops to arrive at practical solutions

Two issues came up in the meeting. The first was agreement that the second option, acknowledging the complexity of the problem and looking for ways to improve the situation, was the best option, and that work of the kind proposed would make a positive contribution to DoF policy aims. The second issue was about the facilitation of the project; in the discussion document I had described my role as *research facilitator* which Pae queried on the grounds that he and his staff were seen by DoF as the

facilitators of AIT collaborative activities. The explanation for this was my need to take a more active part in the research and that he and his staff would continue in their role as project facilitators. I suggested that individual Terms of Reference (ToR) could be drawn up and it was agreed that I would be provided with a set of guidelines/procedures for working with AOP to use as a basis for drafting the ToR. The guidelines were never provided and from this point until the project review workshop in June I was unable to contact Pae.

At the end of February I had a meeting with a planner for the DoF Development and Technology Transfer Division (DTT) to discuss the possibility of their collaboration in the project. The officer was interested and put the proposition to the Divisional Head, however we were unable to develop a collaboration because the MoU only covered activities with the Inland Fisheries Division.

The next meeting was in March ’01 attended by Nok, Lek, Gai a senior AOP staff member and me. In the meeting I was still pushing for a collaborative approach so rather than prepare a work plan I had prepared three suggestions

- A meeting at DoF headquarters to further explain the project and discuss the mechanism for working with DoF.
- That the action research should be carried out by a working party comprised of Lek, Nok, Pae (or his deputy) and me.
- Formalization of this arrangement with Terms of Reference for working party members and a new logframe.

This was agreeable to Nok in principle though everything would hinge on the meeting at DoF and nothing could proceed without the agreement of the DoF/AIT steering committee. An output of this meeting was the proposal to begin work in Mahasarkam and Surin Provinces. According to Nok in Mahasarkam there was a well

organised, registered cooperative whereas the hatchery operators in Surin were an informal group located just outside the provincial capital.

The meeting at Kasetsart, the DoF headquarters went well with strong support for the project from the senior officials present; fish seed quality was a key issue as far as they were concerned and they were pleased that our project was included under the new MoU which was signed in March. All that was required was a detailed work plan explaining the DoF human resources that would be required. In June we got an agreement that I would be put in contact with the station chiefs in Mahasarkam and Surin and that Nok and Pae should be kept informed of all activities. I was able to meet the Mahasarakam station chief at the end of July but changes in the staffing in Surin meant that I could not go there until September. The outline work plan and estimated resources required were summarised in a memo sent prior to the meeting and can be seen in Appendix 5.

3. Building and training a field team

A field team was assembled by hiring externally; DoF commitment was for a biologist from the local Inland Fisheries station to accompany the team in each Province on the conditions that it did not interfere with their normal duties and that we paid *per diem* at the official government rate. No-one from AOP joined the team. A short training session was conducted in Surin and Mahasarakam.

The initial idea was that the field team would be made up of AOP and DoF staff; the AOP office in Udonthani had about 10 full-time staff with experience in working with farmers and who spoke the local dialect. However during this period there was a considerable workload with ongoing Danida and Sida activities and the departure of several senior staff members. Initial discussions revolved around the need for part-time facilitation by senior staff members which required very careful planning given the busy schedule of AOP activities; while this would be possible for the initial appraisals there

was no way of knowing how much time would be required, or when it would be required for later activities When it became clear that AOP did not have sufficient resources to assist we proposed that a suitably qualified graduate could be hired as an AOP staff member, paid from the FSQ budget but we were informed that this did not fit with the established procedure for that office, which was to hire diploma graduates from vocational colleges with no experience and very basic English language skills and therefore unsuitable as research assistants. The AOP Senior Advisor recommended hiring a local consultant; several suitable consultants were contacted to assess costs and availability and they were either too expensive or not available. The practical solution was to hire an experienced field worker. Through the Thai NGO and academic networks a research assistants was hired who had some experience of participatory methods in research, spoke English and was prepared to work 'up-country'. The job description for the research assistant is in Appendix 6.

The training objective was to familiarise inexperienced research partners with the techniques that they would see and, perhaps use in the field though it was anticipated that, at least at first, most of the responsibility would lie with the field assistant. I was keen to start work and although a research assistant had not yet been hired and the DoF technician who had been assigned to work with us had become a monk and would remain in the temple until the end of the Buddhist lent period in mid-October, I had been contacted by the head of the Fishery Department of the local, state-run univesity, RIT (Rajamongkon Institute of Technology), *Ajaan* Prayadt, an AIT alumni, who was keen to work with us.

Having been delayed for several months, and with funding at that time only assured until the end of March 2002, I wanted to start as soon as possible. I ran a two day session introducing participatory tools to the staff and some senior students in the

department, using the tools to conduct an appraisal of their university department. A similar session was carried out over two days in September with the Mahasarkam biologist, his station chief and two extension officers from the Provincial Fisheries Office.

The first research assistant began work at the beginning of September and quit at the end of the month. This meant a further delay while looking for and hiring assistance. I hired two assistants and as a result of the delays decided to engage one of the local consultants that I had spoken to earlier in order to 'jump-start' the process with an intense appraisal period in two provinces. The idea was; that with an experienced facilitator on board the two research assistants would have more time to get to know the people and local contexts and perhaps understand more about the project without the pressure of responsibility for the quality of the initial work. Detailed plans for the appraisals were worked out between the consultant, research assistants and me over two days and we spent a half day explaining and discussing the plan with the partners prior to going to the field.

2.6. Participatory Action Research

This section documents the processes of the field research. It starts with a section that explains the basic routine; general methods and practices that provided the roadmap for activities in the field. Following that there are sections describing in detail the procedures as they were implemented in the field.

2.6.1. General procedures

The basic routine of action research is based on the plan-act-review cycle in Figure 1.1; it may not always be as neat and orderly as the drawing suggests however but as a guide it is useful. This section adds the details of tools that were used and procedures that were followed in the journey round the cycle, starting with the preliminary activities and moving on to the actual PAR.

Preliminary activities

The PAR process started in Surin in September 2001 and continued until the end of August 2002. Before starting the PAR there were activities described by Stringer (1996) as intended to "establish a positive climate of interaction and activity that engages the energy and enthusiasm of all stakeholders." Following Stringer the preliminary activities were a means of (1) making contact/gaining entry, (2) establishing a role which involved clarifying our agenda, our stance and position (3) identifying stakeholder groups and key people and (4) constructing a preliminary (personal) picture. Clarifying our agenda and position took at least one cycle of action research before the methodology became clear to all participants. The preliminary activities enabled us to get a general understanding of the local field contexts and were especially useful for the research assistants who had no experience of the aquaculture sector. Moreover the activities were the foundations for a collaborative research relationship which developed over the course of the field activities.

Making contact took place in a variety of ways that are described in relation to specific groups later in the section. Generally first meetings were held with the group committee members or leaders who were either known to our partners or were identified by group members in field visits. Our main objectives were

- to introduce ourselves and the project and
- to invite them and their group to collaborate
- to get background information on the group and its members

Introduction & Invitation Meeting. The general procedure for the first group meeting is detailed in Box 2.1. A translation of this information was given to all participants along with our contact details and project literature in Thai (SoS reports and at later meetings our newsletter 'Forum for Hatchery Operators') at the end of the meetings.

In summary, objective for the meeting was set as 'getting to know each other'. We introduced ourselves and gave details about the project; donors, management by AIT, history and current activities. We stated our position based on the project purpose and extended an invitation to collaborate in research to improve fish seed supply in the region. Questions and discussion were actively encouraged.

Box 2.1 Information presented at the introduction and invitation meetings

1. Objective of this meeting
- To get to know each other

2. About the project
- We are funded by the British government and managed by the Asian Institute of Technology.
- The project has been running for 4 years in Thailand, Laos, Bangladesh and Vietnam.
- We will be working in the area until the end of August 2002.

3. Our position
- The project is concerned with improving the quality of fish seed in Northeast Thailand.
- We want to invite you (the hatchery operators) to help us carry out the research, because as a group you supply a large amount of seed that is grown in the area, especially by small farmers.
- We value your knowledge and experience.
- We cannot promise anything, but we can say that we are prepared and happy to work with you.

Participatory Action Research Routine

The preliminary activities had enabled entry to the 'system', introduced the project and enabled the research team to get a general understanding of the local context. This section describes the methods used in our efforts to assist the community members to systematically define the problems which they perceived in the production and delivery of fish seed, to make plans and take action to resolve the problems.

A general procedure, set out in Box 2.2, was established for every group meeting. Meetings were held at times and places that were convenient for the participants and where they felt comfortable. The final details were confirmed with group leaders and key members in person or by telephone one week before with a final reminder the day

before. Meals[6] and/or beverages and snacks were provided as were paper and pencils. The objectives for the meeting and an agenda were displayed in a prominent location and distributed to participants along with written outputs of any preceding meetings and reports of any previous activities. At the close of the meeting outputs would be summarised and any action plans or further steps were discussed and finalised.

Box 2.2 General procedure for PAR meetings

Organisational procedures

- Meetings held at times and locations specified by hatchery operators.
- Research team coordinated with group leaders and key members several days prior to the meeting.
- Beverages, snacks and meals provided depending on the time of day.
- Writing materials provided

Operational procedures

- Objectives of the meeting on display
- Agenda on display– so that people know how much time the meeting would take. If for any reason we over-ran this was only with the agreement of the participants.
- Meetings were kept relatively short at around two hours
- Participants asked to write down their expectations for the meeting for three reasons (1) to check whether the objectives stated were clear, any misunderstandings could be cleared up at the beginning (2) to provide a basis for measuring achievement at the end of a meeting (3) facilitators would be able to determine levels of literacy and provide support to anyone who required it throughout the meeting.
- Feedback of any previous meetings
- Open to questions
- Feedback of meeting outputs
- Clarification of any actions and next steps
- Ask for written statements of achievement at the end of the meeting.

Routine meetings. For every cycle of research there would be at least three meetings; an appraisal meeting with the group, a meeting to analyse priority issues and develop action plans and a review meeting where the outputs of the action taken were presented to the group for reflection and decision making. Figure 2.3 shows where the meetings were located in the action research routine. For each meeting there was a set of participatory methods that were used to facilitate the process; their use in the field was

[6] Meals during meetings were occasionally provided free by group members though typically the project paid

based on recommendations for practice in Townsley (1996), Borrini-Feyerabend *et al* (2000) and Woodhill & Robins (1998). Protocols for all participatory tools and procedures used appear in the text below in italics, are in Appendix 7.

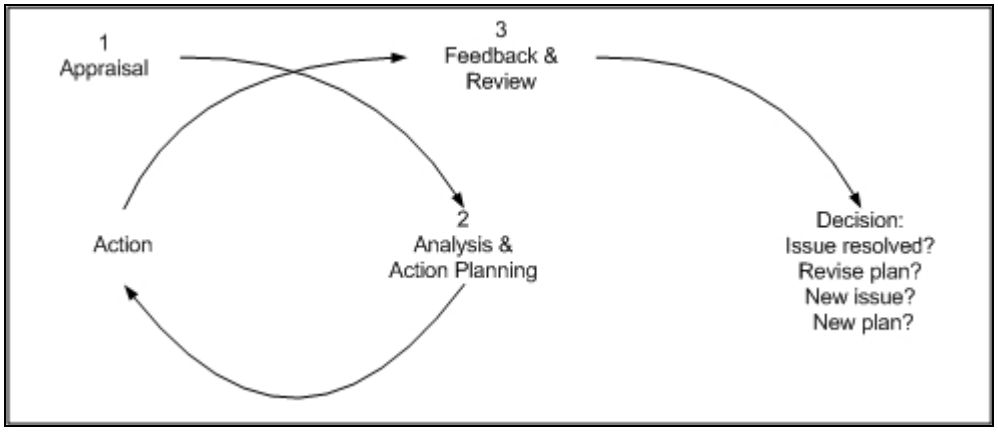

Figure 2.3 The position of the routine meetings in the participatory action research cycle

1. Appraisal Meeting. The first appraisals in Surin and Mahasarkam were held with the co-op committee members and were an extension of the preliminary stage that allowed us to build a personal picture of the local context. To this end we used *mapping*, *seasonal calendar* and *stakeholder analysis* tools.

The first meetings in the PAR process, to which all group members were invited had the objectives of (1) finding out about problems, which was done by *brainstorming* the issue 'What are the problems in seed production?' (2) Identifying stakeholders using *stakeholder analysis*.

2. Analysis & Action Planning. Following the first meeting the research team prepared a poster based on the problems identified by hatchery operators for 'mirroring' issues in the appraisal (Webber, 2000). These posters used the participants' own words but categorised the problems visually according to themes e.g. technical problems of production, personal problems, problems related to the market, problems with inputs

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members of the community to prepare meals for the group to share.

etc. Figure 2.4 shows a poster illustrating the types of problems listed above. These were presented in the meeting in order to demonstrate that we had been listening and thinking about what the participants had told us earlier, and to 'trigger' reflection and facilitate identification of priorities (Webber, 2000, Russell & Ison, 2000[b]). However we did not link issues in the way that Webber described as this would have imposed our analysis of the hatchery operators' situation. The poster always stimulated discussion and issues were added, removed or changed as required.

The team would explain that we would not be able to deal with all the problems and needed to prioritise and deal with the most important issues. Ranking of problems was done using *Nominal Group Technique*.

When ranking was completed participants were asked to form groups based on their interest in analysing either of the first and second ranked issues. The analysis was limited to two issues because there were only two facilitators. After groups formed the facilitators stimulated reflection with a series of quick questions to the group; why is the issue a problem? What are the main features of this problem? Who is affected? How does it affect them? Where and when? Has anything been done about this issue in the past? Who, and what did they do? Was it effective? Analysis of the issues was done using *Concept maps.* Concept maps are useful in three ways; first to enable participants to visualize the interconnectedness of different elements of their situation and hopefully to understand that because of this they may need to approach problems from a number of directions to achieve a lasting solution, this was achieved by facilitated discussion during the concept mapping and after completion. Secondly the importance of other stakeholders or stake-holding groups may become apparent. Finally the concept map provides a simple and effective means of systematically translating the problems and associated issues into objectives (Stringer, 1996).

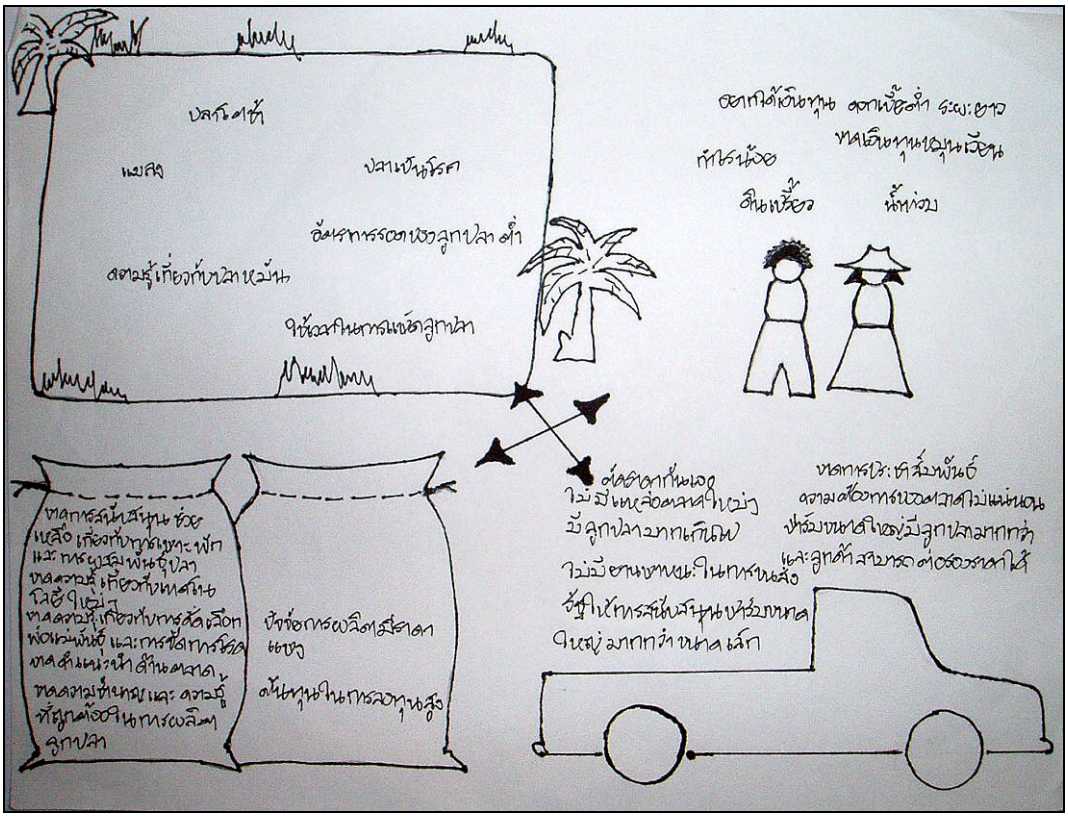

Figure 2.4 Poster used for mirroring the issues identified by hatchery operators in Surin, used during the analysis and action planning meeting.

When the concept maps were finalised by participants and discussions were concluded, the facilitators gave an example of translating the problems into objectives using the central problem on the concept map. For example the problem 'cash flow' became the research goal 'to improve cash flow' and transformation of surrounding issues allowed research objectives to be set by participants. This procedure is presented with contextual details in Section 2.6.2.

Action plans were developed using a simple framework of asking why, what, how, when and where (Stringer, 1996). Why: is the goal statement, what: is the objective, How: is the sequence of steps to reach the objective, Who: assigns responsibility, Where: gives a location and When: sets the times for starting and completion. A sample of the matrix that was used for the completed plans is shown in Figure 2.5

Goal:		
Objective:		
Steps	**People responsible**	**Dates**
1. **2.** **3.** **etc**		

Figure 2.5 Sample matrix for action plans

At this point it is appropriate to give details of the procedure for **implementing the action plan,** although it was not part of a formal meeting. The role of the research team in implementation of the actions was to;

(a) Provide practical support and encouragement during the organization phase, regularly visiting the responsible farmers, sitting in on their preparation meetings and helping them to coordinate their efforts.

(b) Provide resources necessary for carrying out the actions; these were communication costs (mostly telephone), transport costs, and cost of food for participants who had to take action outside the community.

(c) Logistical support in liaising with hatcheries in the central region and acting as intermediaries to arrange the meetings with local government officials if requested to do so by the participants.

(d) Promoting evaluation by encouraging participants taking action to document their expectations and achievements.

3. Feedback & Review. There were typically two objectives for this meeting

- To review the results of the previous action plan for group members who had not participated in the action
- Group reflection on the issues and decide on the next steps.

Group members who had taken action were responsible for presenting the information to the group. Facilitators were able to support them from notes they had taken during the activities. The reflection was guided by facilitators typically using the

action plan and the list of objectives as a reference to evaluate achievements. Decisions about the next steps, whether to take follow-up action, new steps towards the same objective or analyse issues further were based on consensus.

Monitoring and evaluation was a participatory process integrated with the PAR; participants were asked to state their expectations after hearing the objectives of the meeting and record what they felt the achievements had been at the end of meetings and other activities. In addition to giving the participants a basis for measuring achievement this provided feedback to the research team on the level of understanding and satisfaction of participants. There was an additional final evaluation meeting at the end of the field work which used a *focus group* approach with participants addressing the issues of successes, problems, effectiveness, appropriateness, changes, advantages, disadvantages. DoF staff were also debriefed to establish their opinions on the same issues.

2.6.2. Surin

Preliminary activities

The **first meeting**, with the hatchery operators was set up through *Ajarn* Prayadt. We had already found out from the *Ajarn* that the hatchery operators in Surin had been organised into a government registered cooperative with nearly 300 members including himself. The meeting, on 19/9/01, was informal, at a hatchery which belonged to one of the committee members and was attended by three other committee members including the chairman, Neung After the introductions we explained the project activities up to that point and gave them each a copy of the Thai language SoS report for Northeast Thailand. I explained that the purpose of the project was to improve seed production and that we would like to invite the members of the cooperative to help us to research this. We made a point of encouraging questions which were

What is AIT? Answer: An independent, international institution of higher learning which is supported by a number of governments including the Thai government. I also explained a bit about the AOP and the MoU with DoF

Where was the money coming from? Answer: The aquaculture research programme funded by UK government DFID had given budget support to AIT to carry out research on fish seed quality.

Could we give them any money? Answer: We are unable to give money and cannot guarantee any benefit, but if they choose to collaborate then it will only cost them their time.

They said that they were interested and we planned a meeting with all committee members in order to share information.

The second round of meetings took place over three consecutive days, the 21st – 23rd October with morning meetings of about three hours on each day; the first two sessions were at the Surin Fisheries Cooperative (SFC) office/shop, Ban La-aw, with all six committee members attending plus two former committee members, *Ajarn* Prayadt and one of his colleagues. The third session was a morning meeting at the co-op secretary Chai's hatchery in the next village, Ban Nongtao. Chai was the chairman of another group, the Village 13[7] Aquaculture Group and twelve of the group members had convened at his farm for the meeting. All members of the Village 13 group were members of SFC and we were joined by Neung who was from Ban La-aw. This meeting took place just after the first research assistant had quit and before the others were hired. The meeting had been scheduled prior to his leaving and the *Ajarn* and one of his senior

[7] Every village in the district has a number for administrative purposes; boundaries may also include some households outside the physical village.

staff persuaded me that they would be able to facilitate the discussion and that the meeting should go ahead as planned.[8]

After the introductions we opened the meeting with an introduction to the project, see Box 2.1. When comments or questions were invited, the only concern was that no-one was sure what was required of them. They also asked what resources were available and were told that there was about 600,000 Baht budget for the project at that time.

On the first two half days at the SFC building we carried out mapping and stakeholder analysis exercises and discussed the history of the co-op and the nature of its activities to develop an overview of the situation. The protocols for the tools used are in Appendix 7. The meeting on the third morning involved a presentation on the activities of the Village 13 group.

There was a third meeting on 19th November with the committee members before the action research began. The objectives were to introduce the consultant and research assistants to the committee, to organize a meeting of the co-op members and to gain an understanding of what the committee members understood about the project and what they expected from it. This was done by asking the participants individually about their expectations and using the responses as a starting point for further clarification and discussion of our position.

Members of the co-op were personally invited to an open meeting by a research assistant, Boo, who, over a period of three days, visited most of the hatcheries in the community accompanied by the chairman, the secretary or the DoF biologist, Wat, who had returned from the temple. They distributed a written invitation to the meeting, a

[8] The *Ajarn* and his staff were paid for their time. We were considering that following the departure of the RA we would be able to carry on with their paid support for field work. However the need for full-time assistance quickly became apparent.

copy of the statement about the project and took time to answer any questions which people had. She was invited and chose to stay at Chais' farm over this period, getting to know the people, joining their social activities and observing. Meanwhile the other members of the team were in Mahasarakam.

PAR process in Surin

The project activities in Surin were the most extensive with three cycles of activity from November 2001 to August 2002. The first two open meetings took place at the SFC shop and Chais' hatchery; the team had observed that there was some rivalry between the members from Village 13 and their neighbours from Ban La-aw who were the majority on the SFC committee and furthermore it was more convenient for the Village 13 group members to meet in their usual meeting place. Meetings took place on the 24th and 25th November and were fairly short as they coincided with the start of the rice harvest and people did not have a lot of free time. At the SFC twenty-one members took part including three committee members and in Village 13 eighteen people took part.

The open meetings began with personal introductions by all participants and the introduction to the project summarised in Box 2.1, with a call for any questions about the project or team which were answered. The following objectives were set for the meeting;

- To introduce the project and meet the SFC members
- To understand the problems that the participants had in operating their hatcheries.

At the SFC meeting there was a check over the list of stakeholders by participants to correct any omissions by the committee members. We led into discussion of problems by explaining the FSQ project purpose and its foundation in the rumoured decline in seed quality Based on the question 'what problems do you have with seed production?' the participants went on to brainstorm and categorise a list of problems.

Establishing our position with local service providers. In the period between this meeting and the next there were a series of meetings with service providing agencies that had been identified in the stakeholder analysis. The objectives of this were to establish our position and thus limit any perceived threat related to their relationships with the SFC, develop local contacts and to broaden our own understanding of the local situation.

Problem with the co-op. Meetings with local government stakeholders and informal discussions with members of the co-op led to the decision to dissociate the project from the SFC. Briefly, we were asked by the committee to make a presentation at their annual meeting in early February 2002 and prepared a synthesis of project outputs up to that point; the full report is in Appendix 8. We had found that the SFC was not operating as a cooperative and could not be said to represent hatchery operators. We wanted to continue to work with all the hatchery operators in the area but not in a formal collaborative relationship with the SFC. Draft copies of the report were given to the committee members a fortnight before the meeting and we met them to discuss the findings one week before the meeting. The committee members agreed that this was the best course of action and presented a summary of some parts of the report to the annual meeting.

Analysis and action planning

The next step was to facilitate prioritization and analysis of the problems and to help develop an action plan or plans to deal with the problems. Meetings from this point onward were held in a community 'owned' venue chosen by the participants, the first in the local Temple, on 24th February and after that all meetings were held in the district primary school. The following objectives were set for the meeting;

- To present the findings of our research into problems which exist in seed production and supply.

- To get agreement about the issues, to add anything that is missing and to prioritize the issues.
- To analyse the important problems and/or needs, and develop a plan for action to co-research these issues.

We used a thematic poster, after Webber (2000) as a means to trigger reflection by the participants. Facilitators invited comments and discussion by asking if this was an accurate representation of the situation with regard to their problems.

When the issues had been agreed nominal group technique was used to rank the issues. Participants gave scores to the five most important issues from a total of fifteen issues. Eight problems made up the top ranked problems of the community. Table 2.2 shows the results of this exercise.

Table 2.2 The 'top five' issues identified by hatchery operators in Surin

Issue	*Rank**
Cash flow	1
Lack of broodstock	2
High cost of inputs	3
Low price of seed	4
Marketing	5
Need knowledge about sex-reversed tilapia production	5
Lack of knowledge about disease management	5
High mortality rate of seed	5

*1 = most important

Concept mapping. Participants were invited to analyse the issues using concept mapping; a concept map is an explanatory framework which should assist to clarify complex situations (Stringer, 1996), see procedure in Appendix 7. The concept maps of the 'cash flow' and 'lack of broodstock' issues are shown in figures 2.6 and 2.7 respectively.

Setting research objectives When the concept maps were finalised by participants the facilitators gave an example of translating the problems into objectives using the central problem on the concept map; the 'cash flow' problem became the goal

‘to improve cash flow’ and prompted the participants to develop objectives necessary to achieve the goal using the elements from the analysis on the concept map. The concept map of the cash flow problem revealed the influence of the low sales volume on the situation and following some discussion the participants decided that this should be the focus of research. The goal was refocused in the other issue on ‘to get more broodstock’. After objectives had been agreed the groups were asked to rank the priority objectives using nominal group technique again to establish the order in which objectives would be addressed by the group. The results of the exercise are in Table 2.3, objectives are presented in the order in which the participants proposed to deal with them

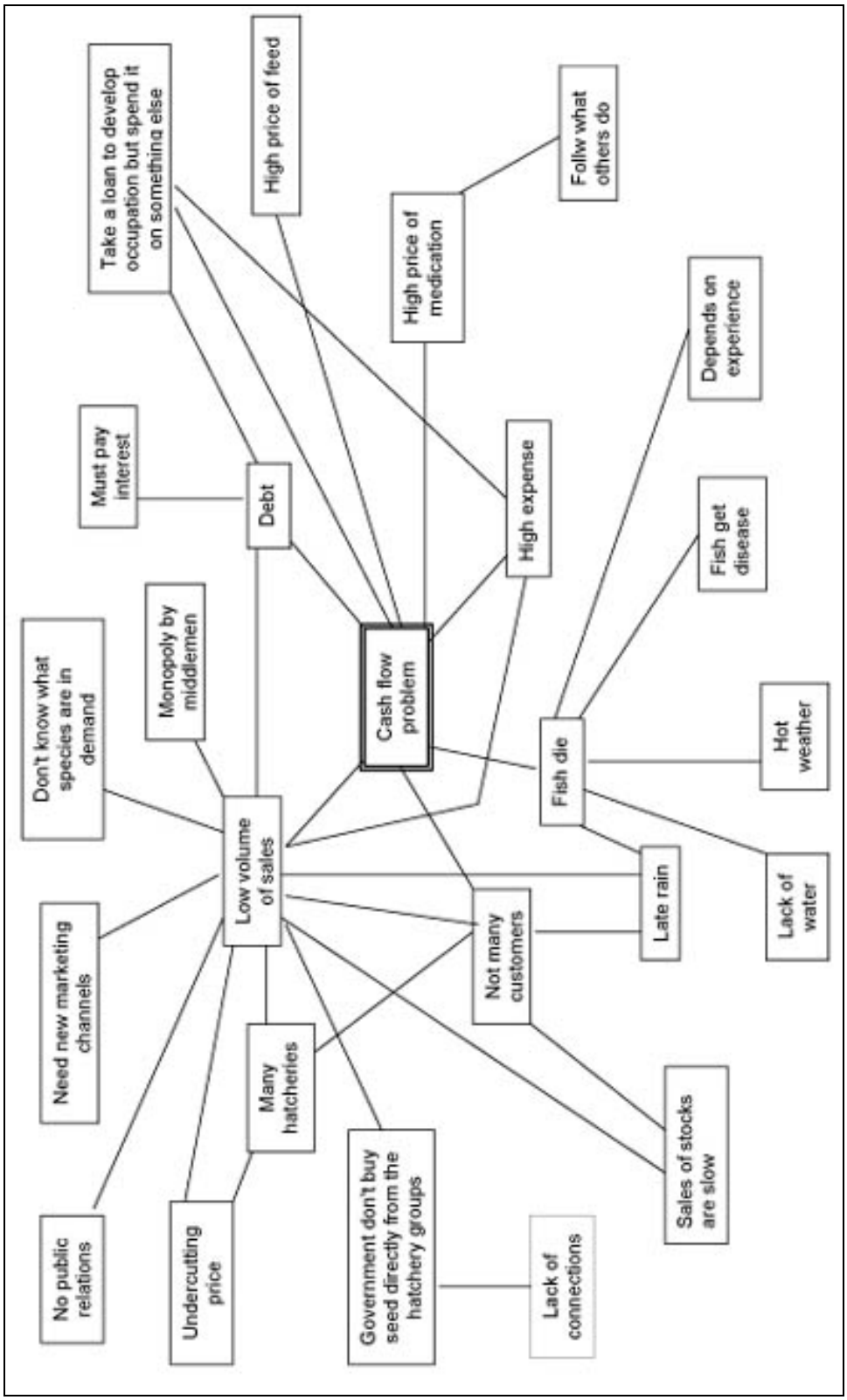

Figure 2.6 Concept map developed around the issue of the 'cash flow' problem identified by hatchery operators in Surin during the analysis and action planning meeting, February 2001.

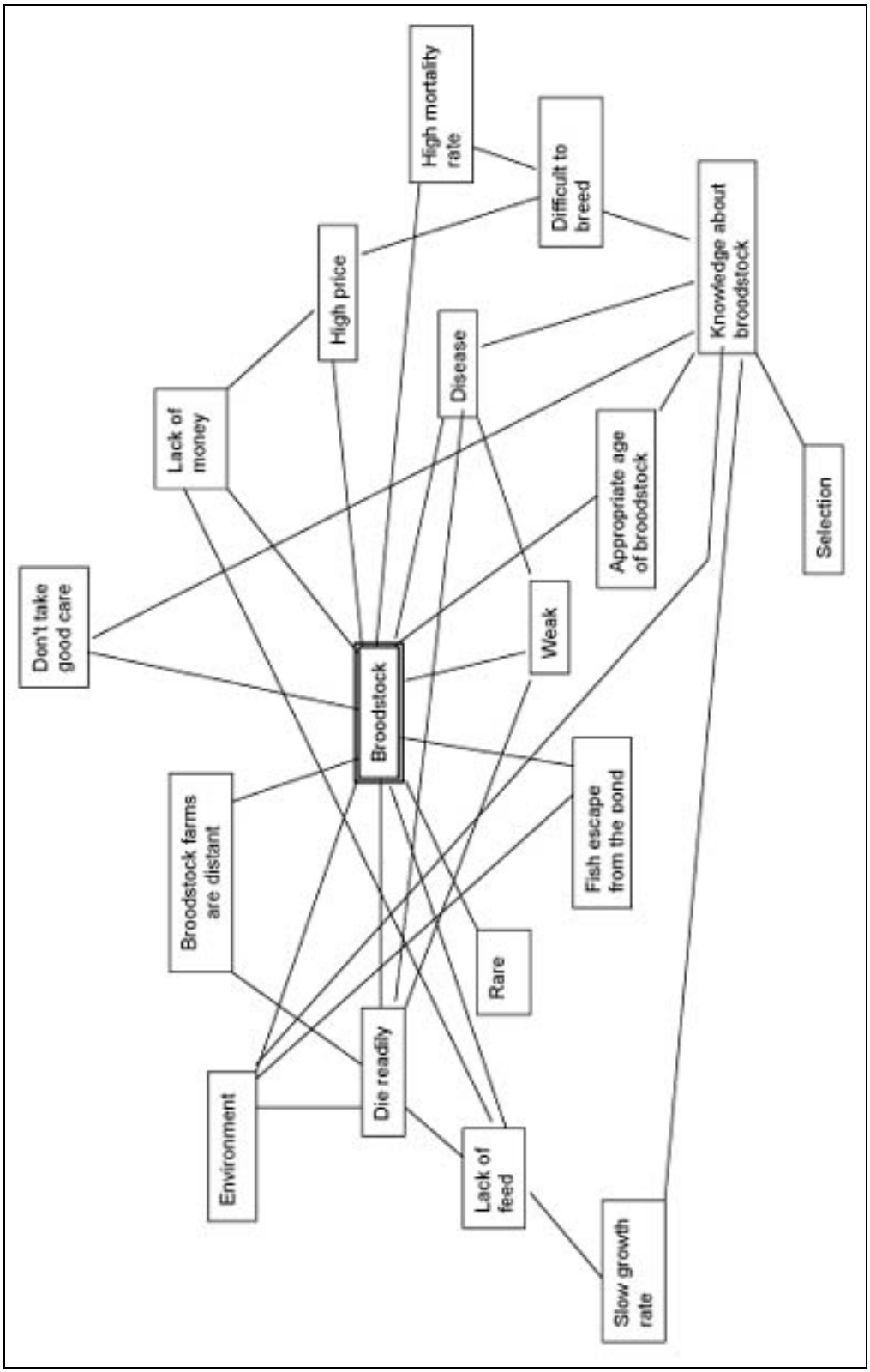

Figure 2.7 Concept map developed around the priority issue of 'lack of broodstock' by hatchery operators in Surin during the analysis and action planning meeting, February 2001.

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Table 2.3 Research issues, goals and objectives identified from analysis by hatchery operators in Surin

Issue	*Goal*	*Objectives*
Low sales volume	To improve sales	Found out about government policy on buying fish seed Find out which species are in demand Improve public relations Develop production and marketing plans Expand the market Fix standard price
Lack oodstock	To get more broodstock	Increase knowledge about disease prevention Increase knowledge about breeding Increase knowledge about husbandry Increase knowledge about environment for broodstock Increase knowledge about selection.

Action Planning. Development of action plans used a simple framework of asking why? What? How? When? and where? Why: is the goal statement, what: is the objective, How: is the sequence of steps to reach the objective, Who: assigns responsibility, Where: gives a location and When: sets the times for starting and completion. A grid was drawn up for each goal and facilitators helped the groups to set down their action plans. The key parts are summarised in Table 2.4.

Table 2.4 First action plan established by the hatchery operators in Surin

Goal: To improve sales	
Objective: Find out about government policy on buying fish seed	
Task	Steps
Meet officers from Provincial Administration, Agriculture, Fisheries Offices and District Administration Office	1. Hatchery operators prepare their case 2. AIT researchers make appointments for meetings.
Goal: To get more broodstock	
Objective: Increase knowledge about disease prevention, breeding and husbandry	
Task	Steps
Study tour to catfish and tilapia hatcheries in Central region to discuss with experienced farmers.	1. AIT researchers contact hatcheries 2. Arrange transport.

Review meeting 1. The first review meeting took place on 6th April. One week before the meeting we had travelled around the district inviting people to the meeting and, in the case that no-one was available to talk to at the hatchery, leaving invitation leaflets

to a 'Forum for Hatchery Operators' meeting in the Nongtao primary school. This name came about as we wanted to establish that it was not a SFC meeting. There were 35 participants at the half day meeting. The meeting objectives were;

- To review the results of the previous action plan; discussions with government officers and the study tour
- To discuss the issues and make a plan for further action.

Chai and Neung gave a detailed summary of the main points of the meetings with government officers. They also led the review of the study tour though several of the other fifteen 'study tourists' made contributions. Discussions were lively and positive about the outputs from the activities and the consensus was that the next steps should be to follow up on the first set of actions. There were five action points; all involved contacting the government officials again to finalise details of proposals that had been made in the initial meetings.

1. Contact the Provincial Fisheries Officer about (a) the requirements for seed under the debt moratorium project[9] and (b) their role as trainers under the occupation development project.
2. Contact the Provincial Agriculture Officer about (a) their proposed role as trainers for farmers under the debt moratorium project and (b) support to produce a promotional leaflet.
3. Make a list of names of people interested in receiving the 'Chitralada 3' Tilapia broodstock which had been offered by DoF station chief during the meeting there.
4. Contact the DoF station in order to start the process of getting support from the DoF public relations department.

[9] The debt moratorium project was a new project which had been brought in by the Thai Rak Thai party and had been a feature of their election campaign.

5. Prepare a promotional leaflet giving details of the species and times of year that they are available as requested by the planning officer from the Provincial Administration Office.

Review meeting 2

The second review meeting took place on 11th May. Thirty hatchery operators attended the meeting in Nontao Primary School with the following objectives;

- To get an up-date on the progress of the discussions with the government officers
- To review the situation and develop an action plan

Neung explained the arrangements that had been made with the DoF station to give 1000 tilapia broodstock to thirty hatchery operators and provide some training at the station on husbandry. The DoF wanted to liaise with the farmers who received the broodstock to get field data on the hatchery production from this strain. They also intended to provide seed to individual households for grow out; they would give 200 SRT to an unlimited number of households to collect data on production.

With regard to promotional activities they had been given the addresses of each district office in the province and had visited some and sent a letter with a leaflet promoting their fish seed to the others.

Several of the group had been involved in training farmers in Samrongtap District about fish culture as a component of integrated farming. This also gave them an opportunity to make direct contact with farmers to promote their seed.

The co-op committee shared the news that they had a meeting with the new Provincial Fisheries Officer and were told that DoF wanted to buy hormonally sex-reversed tilapia (SRT) and hybrid catfish for the debt moratorium project, with a budget of three million Baht. He had specified that the seed must be good quality. This sparked a discussion on how they could get a share of the business. The study tour had convinced most members that they did not have the capacity or resources to produce

SRT and they had previously bemoaned the lack of broodstock for hybrid catfish production.

Contact with the PAO had been suspended after Neung had been asked to provide a list of co-op members' names and addresses which had raised their suspicions.

The DoF biologist was asked to explain a number of technical matters

- the research with the station – he gave a detailed account of the history of the strain and the research project that had been proposed.
- What about training in SRT production – he answered that it would take a week and they needed to make a formal request with a list of participants.
- Can the station provide catfish broodstock – He suggested that they buy seed and rear it for breeding.

After a coffee break the issues and resulting objectives from the first meeting were posted for review by the group. They were asked how they felt about progress and what should be the next step. Participants felt that they have met the objective of finding out about government seed purchasing. However at this time, following the message from the PFO, it was clear that they would have to look at the issue of lack of broodstock, specifically female *Clarias* Catfish. The group carried out a concept mapping exercise with the central issue of lack female catfish and developed an action plan, key points of the action plan are in Table 2.5. They decided that the co-op could use some money to buy the fish and distribute to the members.

Table 2.5 Second action plan developed by hatchery operators in Surin

Goal: To get female broodstock for hybrid catfish production	
1. Objective: Get capital to buy the female stocks	
Task	Steps
The co-op buy the female broodstock and provide to the members.	1. Examine co-op budget to see how much they can afford 2. Members may have to pay some extra cash
Contact Chaniang District Administration	Ask for supporting budget to buy broodstock from one of the village funds.

Review Meeting 3

The third review meeting took place on the 5th of July with thirty six participants. The objectives were

- To review the activities to date
- To discuss the issues, and plan further action.

A summary of all the outputs generated up this point were presented for review on posters, participants were given a hard copy and the facilitators talked through the poster. The participants decided that their next objective was to take more action on finding out about fish disease. Training at the station had been mentioned in the meeting that they had at the station and they decided that they should follow-up on it. They had already been told about the procedure for making requests to the station and this made up the steps in the action plan shown in summary in Table 2.6.

Table 2.6 Third action plan by hatchery operators in Surin.

Goal: To improve knowledge about broodstock	
Objective: Increase knowledge about disease prevention, breeding and husbandry	
Task	Steps
Training in disease management at the Inland Fisheries Station, Surin	1. Group leaders to make a list of interested persons 2. Submit the list to the Station Chief

This was the final review meeting and we concluded by agreeing to have an evaluation meeting followed by a party within the next month. The final evaluation with both the hatchery operators and Wat took place on the 7th August 2001.

2.6.3. Mahasarakam

Preliminary activities

The first meeting in Mahasarakam was arranged by the provincial fishery station chief who introduced the team to the Kosumpisai Aquaculture Co-op committee on 22nd November 2001. The committee quickly agreed to collaborate and suggested that we start work immediately. The appraisal took place over two half days with ten current and two previous committee members participating. The research team consisted of the consultant, a research assistant, a DoF biologist and me. The appraisal followed the format described in the previous section for the early meetings with the committee members of SFC *i.e.* establish the background to the organisation and aquaculture activity in the area, seasonal activities and stakeholder analysis. Because we intended to complete the first stages of the action research cycle in Surin before bringing the process to Mahasarakam we made no firm plans for starting the PAR process though we did discuss this next step with the co-op committee and spent some time travelling around Ban Yang Noy talking to hatchery operators and received a positive response to the idea. We left having explained that we would return in a month.

Participatory Action Research in Mahasarakam

The process of working with the co-op in Kosumpisai district, Mahasarkam had started very well but came to an abrupt halt when we returned to hold a meeting with all the members of the co-op and were told that no one was interested. We returned again nearly five months later and started to work in the district this time inviting another three groups from the villages neighbouring the co-op headquarters in Ban Yang Noy. We were able to complete one cycle of the process and an evaluation with each of these groups before the close of the project.

Following the initial contact with the KAC we had fairly regular contact with chairman to maintain the relationship that had been established. We made an

arrangement with him to start the process with meetings on the 8th and 9th of December. While travelling to the Province the day before the meeting, however, he called to say that the members were not interested in participating further for two reasons, the first was that 'they were sick of researchers who came to collect information and never returned to give them any information or even to tell them what had been done with the information,' the second reason was that some people would rather spend their time carrying out their own work. We visited a few hatcheries in the area and found that some people were actually interested to have the meeting and we also heard about some peoples' dissatisfaction with the co-op and particularly the committees' monopoly of the government seed 'quota'. The consultant and research assistants advised that we should not just go ahead with a meeting when the chairman, *Khun* Sit, who was also the chairman of the District Administration and his brother-in-law, Daeng, a former co-op chairman and a Representative in the Provincial Administration had said that no one was interested. The decision was to return to Surin and carry on work there and come back to Kosumpisai at a later date when, we believed we would be able to demonstrate that we were not just there to extract information.

We returned to talk to the local service providing stakeholders that had been identified in the first appraisals in March and to renew the dialogue with the co-op. By this point we were able to give them a copy of the first newsletter which documented the activities in Surin. The response was not good with both the Sit and Daeng objecting to our proposal of holding meetings open to all hatchery operators in the area.

In May we approached the leaders of a farmers group in Ban Hae Tai and a number of hatchery operators including the village headman in Ban Don Suriyet, villages located about 2km to the East and West of Ban Yang Noy, respectively. We

were approached by villagers from Ban Hua Chang, a village about 1km from Yang Noy, who asked us to work with their village group.

Ban Hae Tai Aquaculture Farmers Group

The first meeting was with the group leader and three of the committee members on 30th May. They were able to give a detailed background of the group and suggested that we make a written invitation to the members, signed by both the chairman and me and hand delivered.

The meeting was held in the village temple on 11th June with 26 of the 40 members participating. The meeting objectives were;

1. To introduce the project, and

2. To understand the problems that the participants have in operating their hatcheries.

The participants were split into groups to brainstorm issues/problems and stakeholders. The stakeholder identification was carried out for use as an aid in the participatory action planning later. All participants were asked to prioritize the problems; results were scored and ranked as before and are shown in Table 2.7. The facilitators had dispensed with the mirroring exercise as they found it time consuming and thought it unnecessary since participants didn't need to reflect long to identify their main concerns. This was the start of the busiest time of year for hatchery operators so their time was particularly valuable.

Table 2.7 Ranking of problems identified by members of the Ban Hae Tai Aquaculture group

Issue	*Rank**
Marketing	1
Not enough money	1
High cost of inputs	3
Lack sufficient broodstock	4
Lack of knowledge about spawning	5
No continuous connections with government organisations	6
Fish die	7
Water supply	8

*1 = most important

We explained that the next stage would be to analyse and develop a plan to deal with at least two of the problems. The meeting was deemed to be useful by participants and we planned another meeting

Analysis and action planning

The next meeting was on 20th June with 24 participants. Participants were asked to choose which of the two main problems they wanted to analyse and split into two groups based on their interest. As previously the facilitators encouraged some discussion then commenced the concept mapping exercises.

Goals and objectives that were identified from the concept maps are detailed in Table 2.8 Developing an action plan for the first issue, 'not enough money' required some prompting as participants felt that there was not much they could do about it. The second issue, 'to improve the market', which was very much on participants' minds at this time of year was quickly established. Summaries of the main points of the plans are in Table 2.9.

Table 2.8 Research issues, goals and objectives identified by hatchery operators from the Ban Hae Tai Aquaculture group.

Issue	*Goal*	*Objectives*
Not enough money	To find sources of money	To locate sources of low interest credit To access funding for the group in order to provide loans to members
The market	To improve the market	To access government-funded markets

Review meeting

The Action plans were implemented in mid-July and the group reconvened on 27th July. There were 26 participants and the objectives for the meeting were

1. To present the information that was collected from the government officers by the representatives

2. To discuss the information and plan for the future

Table 2.9 Action plans developed by members of the Ban Hae Tai Aquaculture group

Goal: To find sources of money	
Objective: To locate sources of low interest credit & To access funding for the group in order to provide loans to members.	
Task	Steps
Talk to Provincial Cooperatives Department	1. AIT researchers contact the office to make an appointment 2. Group committee visit and discuss the issue
Talk to Bank of Agriculture and Agricultural Cooperatives	1. AIT researchers contact the office to make an appointment 2. Group committee visit and discuss the issue
Goal: To improve the market	
Objective: To access government-funded markets	
Task	Steps
Meet PFO, PAO representatives, District Agriculture Officer and local Member of Parliament to discuss available budgets.	1. AIT researchers contact PFO, District Agriculture office to make an appointment. 2. Group chairman will contact PAO representative and MP to make an appointment 3. Group committee and some members will meet and discuss the issues

The committee members who had been involved in the discussions with the officials gave summary reports to the participants. They had met all the intended officials apart from the MP who had not been back in the Province for some time. The meeting with the PFO had taken place without the facilitators by request of the group. The main point for them was that they found out that they could form a co-op and would then be able to access a low-interest loan scheme provided by the Provincial Co-operatives Extension Department and have more weight in the bidding system for government purchases of fish seed.

We had previously made it clear that this would be the last meeting that we could attend apart from an evaluation meeting in August but we offered to help them to make a plan for further action. The chairman and a committee member said that they had enough to do at the moment in planning the process of becoming a co-op. They were not in a rush to do this, and at the moment were satisfied to know that it was an option.

Ban Don Suriyet

There was no formal aquaculture group in Ban Don Suriyet but all the hatchery operators we approached were interested in talking to us about research. We approached the village headman and he was keen to help organise a meeting. We personally invited people from all the hatcheries in the village and two announcements were made on the village public address system on the day of the meeting. All meetings were held in the village temple. At the first meeting on 14th June there were 24 participants. Objectives for the meeting were the usual;

1. To introduce the project and meet the hatchery operators from Don Suriyet
2. To understand the problems that the participants had in operating their hatcheries.

Following the usual introductions two groups were formed to brainstorm issues/problems and stakeholders. By the time that the group work was reported back to the wider group it was very late so we planned to come back in order to prioritize and analyse the issues and to develop an action plan toward resolving them. Participants were in favour of this we and we arranged to hold another meeting.

Problem analysis and action planning

Twelve participants turned up for the second meeting on 23rd June. Objectives that were set for the meeting were;

1. To present the findings of our research into the problems which exist in seed production and supply in Don Suriyet.
2. To get agreement about the issues, to add anything that is missing and to prioritize the issues.
3. To analyse the important problems and/or needs, and develop a plan for action to address these issues.

Using the nominal group technique the issues raised in the previous meeting were ranked. Results are in Table 2.10; in order of rank from the highest to the lowest they were high price of fish feed, lack of capital, uncertain market, fish disease and cost of treatment, low price of seed, low survival rate, lack of broodstock and slow growth of seed.

Table 2.10 Ranking of problems faced by hatchery operators in Ban Don Suriyet

Issue	*Rank**
High price of fish feed	1
Lack of capital	2
Uncertain market	3
Fish disease and the cost of medicine and hormones	4
Low price of seed	5
Low survival rate	6
Lack of broodstock	7
Slow growth	8

*1 = most important

When asked if they wanted to break into groups to analyse the main two issues the farmers were emphatic that they were only interested in dealing with the issue of expensive feed; they felt the other issues were beyond their capacity to resolve. And without any analysis they said that their objective was to learn how to make fish feed themselves. The action plan that they worked out is summarised in Table 2.11. Their plan was to go to talk to the staff at the DoF station in Mahasarakam.

Table 2.11 First action plan developed by the hatchery operators from Ban Don Suriyet

Goal: To reduce the cost of feeding fish	
Objective: To learn how to make fish feed	
Task	Steps
To find people to give advice on making feed, its cost and feasibility.	1. AIT researchers should contact the DoF station and PFO to arrange a meeting 2. Representatives from the village should meet and discuss the issue.

First review meeting

The review meeting took place on the 22nd July. There were nine participants who came to;

1. Review the information that was collected by the representatives from the DoF
2. To discuss the information and plan for the future

The headman reported on the information received from the station about the potential for producing feed on-farm. The DoF biologist supported his information and the facilitators described the low-tech feed production operation we had visited in the neighbouring Province the previous week and it was decided that a visit to this operation should be the next task in their action plan, see Table 2.12.

Table 2.12 Second action plan produced by hatchery operators in Ban Don Suriyet

Goal: To reduce the cost of feeding fish	
Objective: To learn how to make fish feed	
Task	Steps
To find people to give advice on making feed, its cost and feasibility.	3. AIT researchers should contact the Por Peng to arrange a visit 4. Representatives from the village should meet Por Peng, observe his work and discuss the issue.

Second Review Meeting

Following the visit to Por Peng where they had some hands-on experience the participants were very enthusiastic and requested the AIT to assist in arranging training and this was added to the action plan summarised in Table 2.13. The DoF biologist explained that staff from the DoF were not qualified to train people and recommended an academic who had been working with the DoF to train farmers.

Table 2.13 Third action plan developed by hatchery operators from Ban Don Suriyet

Goal: To reduce the cost of feeding fish	
Objective: To learn how to make fish feed	
Task	Steps
To find people to give advice on making feed, its cost and feasibility.	5. AIT researchers should contact the DoF and PFO to find out about training 6. Representatives from the village should meet and discuss the issue.

The final review meeting was integrated with the final evaluation which took place on the 24th August 2001 immediately after the training in feed production. Participants were satisfied and didn't make another action plan at this stage.

Ban Hua Chang

We held two open meetings in Ban Yang Noy, one person turned up for the first meeting and four people turned up at the second. The participants were from Ban Hua Chang, the immediate neighbouring village. They started to work with the facilitators then recommended that the meeting be moved to their village so that more people could contribute to the analysis. The first meeting in Hua Chang took place on 28th June 2001 with the following objectives

- To introduce the project and to meet the (other) members of the Hua Chang group
- To understand the problems that the participants had in operating their hatcheries.

There were 16 participants, some were members of the KAC, one was the only woman on the committee. They explained that people from Yang Noy didn't think that they could learn anything and didn't want to waste their time because there was nothing to be gained from attending our meeting.

Groups were formed to brainstorm problems and identify stakeholders. Issues were prioritised using nominal group technique. Insect predation was the biggest problem followed by the high cost of feed, participants wanted to get new species because everyone produced the same and competition was high, there was no access to cheap credit, disease and an uncertain market. A summary is shown in Table 2.14.

Table 2.14 Problems identified by hatchery operators from Ban Hua Chang

Issue	*Rank**
Insect predation in nursery	1
High cost of feed	2
Need new species/strains	3
No low interest credit	4
Disease	5
Market	6

*1=most important

The group chose to address the insect predation issue and to find out about new species of fish that they could produce. After a short discussion the consensus was that there

was no need to analyse the issues because they knew what they wanted to do already; their goals were to find better ways to kill the insects and to find out about spawning other species of fish, see Table 2.15. Their first steps were to be a visit to the DoF at the station to talk about both these issues; Table 2.16 presents a summary of the action plan.

Table 2.15 Research issues, goals and objectives identified by participants from Ban Hua Chang

Issue	*Goal*	*Objectives*
Insect predation	To reduce insect predation in nursery ponds	To lean how to kill insects
Need new species	To get new types of fish	To learn about spawning new types of fish

Table 2.16 Action plans to address issues developed by participants from Ban Hua Chang

Goal: To reduce insect predation in nursery ponds	
Objective: To learn how to kill insects	
Task	Steps
Talk to staff at IFS Mahasarakam	1. AIT researchers contact the office to make an appointment 2. Representative visit and discuss the issue
Goal: To get new species/strains of fish	
Objective: To learn about spawning new species/strains of fish	
Task	Steps
Talk to staff at IFS Mahasarakam	1. AIT researchers contact the office to make an appointment 2. Representative visit and discuss the issue

First review meeting

Following the visit to the station the group found that they were already doing everything that was recommended by the biologist. They expected that the DoF might have had a powerful chemical solution and were disappointed to hear that they didn't. Consensus was that they would carry on with the methods they used already. One farmer suggested that they catch them and sell them because they could get 100 Baht/kg.

On the other issue they were going to take up the offer of training in *Pangasius* spawning at Kalasin station. The action plan was to visit the station and coordinate with the staff there.

Table 2.17 Second action plan developed by participants from Ban Hua Chang

Goal: To get new species/strains of fish	
Objective: To learn about spawning new species/strains of fish	
Task	Steps
To learn how to spawn *Pangasius* catfish at IFS Kalasin	1. AIT researchers contact the office to make an appointment 2. Representative visit and discuss the issue 3. Group members go for training

Second review meeting

This meeting was held on the 1st August. Participants were very happy with the training, and had bought some *Pangasius* seed to raise as broodstock. There was no new action plan. The final evaluation and party was planned for 10th August.

2.7. Summary

Participatory action research was justified on practical grounds that it was a proven methodology in soft systems approaches to complex problem situations and in povert-focussed development research, the methodology responded directly to the project purpose of improvement. Furthermore in theory it took account of the research issues that emerged in Chapter 1. In order to carry out the field research an institutional research agreement was put in place with the DoF, a plan based on broad goals was developed and a research team convened. Invitations were extended to five groups of hatchery operators to collaborate in research to improved the quality of seed produced. The methodology was successfully implemented in the field with four of the five groups through the use of a range of participatory methods.

3. Results

3.1. Input Indicators

The indicators of inputs were the resources used by the project for the period July '01 to September '02; covering the preparatory activities from July to September '01 and the field work activities which made up the rest of the period. This section details the financial and human resources effort expended over that period.

3.1.1. Financial resources

The project finances detailed here are for the actual project expenses and do not include the AIT overhead of 20% as this charge had no bearing on the research problem addressed. Table 3.1 breaks the costs into six line items. Expenditure on project staff for salary, living costs and transport were the main items that made up the bulk of the expenditure (93.87%), the remainder (6.13%) was the cost of the meetings and other activities.

A useful distinction was the cost of keeping a research team in the field and the actual cost of field work. Clearly Items 1 and 2 were costs of keeping a team in the field; the research team spent most of the year living in the Northeast. Transport costs must be divided between the two categories of cost, ideally local transport would have been itemised separately but this was not monitored at the time, therefore it is assumed that one third of the transport costs (47,997 baht) came from the short local journeys to the field sites[10]. Therefore the cost of keeping a research team in the field with DoF support was 1,435,993 baht and the cost of fieldwork activities was 144,919 baht; respectively, 91% and 9% of the total expenditure.

[10] When we paid for the cost of farmers' transport it was covered under Item 4 Materials or Item 6 Actions

Table 3.1 Projects expenses from July 2001 to the end of September 2002

Item	*Cost (Thai baht)*	*% of total*
1. Salaries, consultancy fee[a] & *per diem*[b]	1,165,581	73.73
2. Living costs (staff food and accommodation)	174,419	11.03
3. Transport	143,990	9.11
4. Materials	41,853	2.65
5. Actions (all costs in carrying out action plans)	29,114	1.84
6. Communications (telephone, newsletter, email)	25,955	1.64
Total	1,580,912	

[a] consultancy fee was a one-time payment at the start of the field work of 30,000 baht.
[b] paid to DoF staff at the official rate of 180 baht/day

3.1.2. Time spent

The time spent by the research team, 38 man months, has been accounted for in economic terms in Item 1 of Table 3.1, DoF contribution will be covered in Section 3.3.1. This section details the amount of time contributed by the participating farmers. There was no economic cost attributed to this; opportunity cost was not considered appropriate since the farmers attended in their free time and told us that when they had their own work to do they would do it rather than join meetings and activities. The exact amount of time spent on the project by the farmers was not logged; it was considered that the number of people attending meetings and activities was a sufficiently good indicator of commitment to the project. Table 3.2 presents the attendance at project activities for each group.

Levels of attendance at meetings with the groups from Surin, Ban Hae Tai and Ban Hua Chang were maintained throughout the collaboration, though there was a fall in the number of participants attending the evaluation meeting in Ban Hae Tai; attendance was nearly one fifth (37.5%) lower than the overall average meeting attendance. The Kosumpisai group never engaged with the research team after the initial

Table 3.2 List of activities and participant attendance by date from the field work carried out with five groups of hatchery operators in Northeast Thailand

Dates	*Activity*	*No. of participants*
	Surin meetings with group leaders	
19/9/01	Informal meeting with co-op committee members	4
21/10/01	Appraisal with committee members – day 1	9
22/10/01	Appraisal with committee members – day 2	12
19/11/01	Follow-up meeting with committee	6
	Surin open meetings	
24/11/01	Appraisal with ordinary members	39
24/02/02	Problem analysis and action planning	23
6/4/02	Review & Action Planning	35
11/05/02	Review & Action Planning	30
5/7/02	Review & Action Planning	36
7/8/02	Evaluation	30
	Average attendance	*32*
	Surin actions[a]	
21/3/02	Meeting with Provincial Fisheries, Agriculture and IFS	4
22/3/02	SFC meeting with Community Development Office and PAO	4
23/3/02	Study tour to hatcheries in central region	18
	Kosumpisai Aquaculture co-op	
22/11/01	Appraisal with committee – day 1	12
23/11/01	Appraisal with committee – day 2	11
17/6/02	Appraisal in Ban Yang Noy open to community	4[b]
	Ban Hae Tai meetings	
30/5/02	Meet committee officers Ban Hae Tai group	4
11/6/02	Appraisal with group members	26
20/6/02	Problem analysis and Action Planning	27
21/7/02	Review	26
11/8/02	Evaluation	15
	Average group meeting attendance	*24*
	Ban Hae Tai actions	
26/6/02	Meet Provincial Co-op officer and BAAC Kosum	4
12/7/02	Meet District and Provincial Agriculture Extension and PAO rep	4
	Ban Don Suriyet	
14/6/02	Appraisal with informal group	27
23/6/02	Problem analysis and Action Planning	12
22/7/02	Review	10
29/7/02	Review	9
24/8/02	Evaluation	6
	Average attendance	*13*
	Don Suriyet actions	
17/7/02	Meeting at DoF station	3
23/7/02	Visit to on-farm feed producer, Por Peng	3
24/8/02	Feed making training	6
	Ban Hua Chang	
28/6/02	Appraisal	16
2/7/02	Problem analysis and action planning	12
21/7/02	Review	18
1/8/02	Review	16
10/8/02	Evaluation	14
	Average attendance	*15*
	Hua Chang actions	
17/7/02	Meeting at IFS Mahasarkam	2
23/7/02	Meeting at IFS Kalasin	5
30/7/02	Training at Kalasin IFS	12

[a] There were other actions in Surin which followed-up on these actions but were carried out without facilitation and support from the research team. [b] Participants at this meeting came from Ban Hua Chang and they invited the research team to hold subsequent meetings in their village.

appraisal with the committee. Attendance from the villagers of Don Suriyet dropped by more than half after the first meeting to less than one third of the number that attended the opening meeting by the final evaluation. Some problems arose in Don Suriyet between the second and third meetings with conflict between the village headman, who took responsibility for organising project activities in the village, and the son of a former headman. Although the matter was not in any way related to the project the headman told us that some of the active participants from the earlier meetings would not join us any more as they supported the other party in the conflict.

Participation in the actions varied according to the nature of the action being taken. Meetings with government officers were attended only by group leaders. Study tours/visits were by interested, available persons. All the findings of the meetings and visits were reported back to wider groups and published in the newsletters that were distributed free to all hatchery operators and government officers on our mailing list[11].

3.2. Output Indicators

The results presented here are the outputs of activities and were the indicators of progress and main topics for reflection during the project implementation. They are presented here in sub-sections covering the main activities of extending the research agreement, and implementing PAR with hatchery operators.

3.2.1. Extending the collaborative research arrangement.

There were three anticipated outputs from this activity, and in addition to reporting the level of achievement of the outputs this subsection also reports the results that emerged from the relationship with DoF and AOP over the course of the project. Figure 3.1 is a

[11] Contact details were held for all participants, other group members and government officers we met. We also obtained the mailing addresses for all the members of the SFC and KAC.

cross-functional flowchart representing the process followed in this activity which may be contrasted with the anticipated process in Figure 2.2.

A formal agreement established with the Thai DoF through the AOP to carry out participatory action research with hatchery operators.

The matter was resolved through informal discussions between Dr Little and Dr Demaine, the AOP Senior Advisor in October 2000 and a formal meeting with the DoF/AIT steering committee at the end of 2000. FSQ activities were nested within the AOP 'support to small-scale aquaculture' component of the SIDA-funded 'rural development through aquatic resources management' programme,in an interim MoU that was approved and signed at the end of 2000. The interim MoU was the basis for a full MoU signed in March 2001 establishing the institutional arrangements for the seed quality project.

A work plan developed in collaboration with the DoF and AOP research partners

The DoF/AOP coordinator, Nok, and AOP country programme manager, Pae, were engaged in the process for the early discussions but rapidly withdrew any constructive effort and did not delegate responsibility to anyone else from their organisation. Pae, withdrew completely and Noks' contribution to the planning process was limited to identification of field sites and coordination of introductory meetings with the IFS station chiefs prior to commencing the field work.

A field research team comprising DoF and AOP staff trained in participatory methods.

No AOP staff members were available to join the research team on a full-time basis. The DoF commitment was established with the station chiefs who allowed nominated staff members to join our activities for two days in every month. Many of the activities were outside normal DoF working hours and the biologists were pleased to accompany is in the field. There was no training of DoF staff in Surin but in Mahasarkam four DoF

staff, two Provincial Fisheries officers and two from the IFS, joined the one day training course.

Emergent Results from the research collaboration

There was no further direct interaction with AOP after the preparatory activities other than quarterly progress reporting to AOP coordinator and senior coordinator by email. The DoF partnership was maintained by the attendance at meetings of the two DoF staff, inputs to the process, participation in the action taken by hatchery operators and in evaluation of the project. There were also several aspects of the relationship that did not go as planned.

Attendance at meetings. From 29 formal meetings in the field to which they were invited, DoF officers were able to join the project team on 17 occasions (59% of the time). Many of these meetings were in the evening or at weekends at times that were convenient for the farmers but outside DoF office hours.

Participation in action. Visits to DoF stations in Surin, Kalasin and Mahasarkam were activities under action plans by the hatchery operators; results will be dealt with in greater depth in the section 3.2.4.

Evaluation. The two biologists gave an evaluation interview at the end of the project field activities details of which are presented in section 3.2.5.

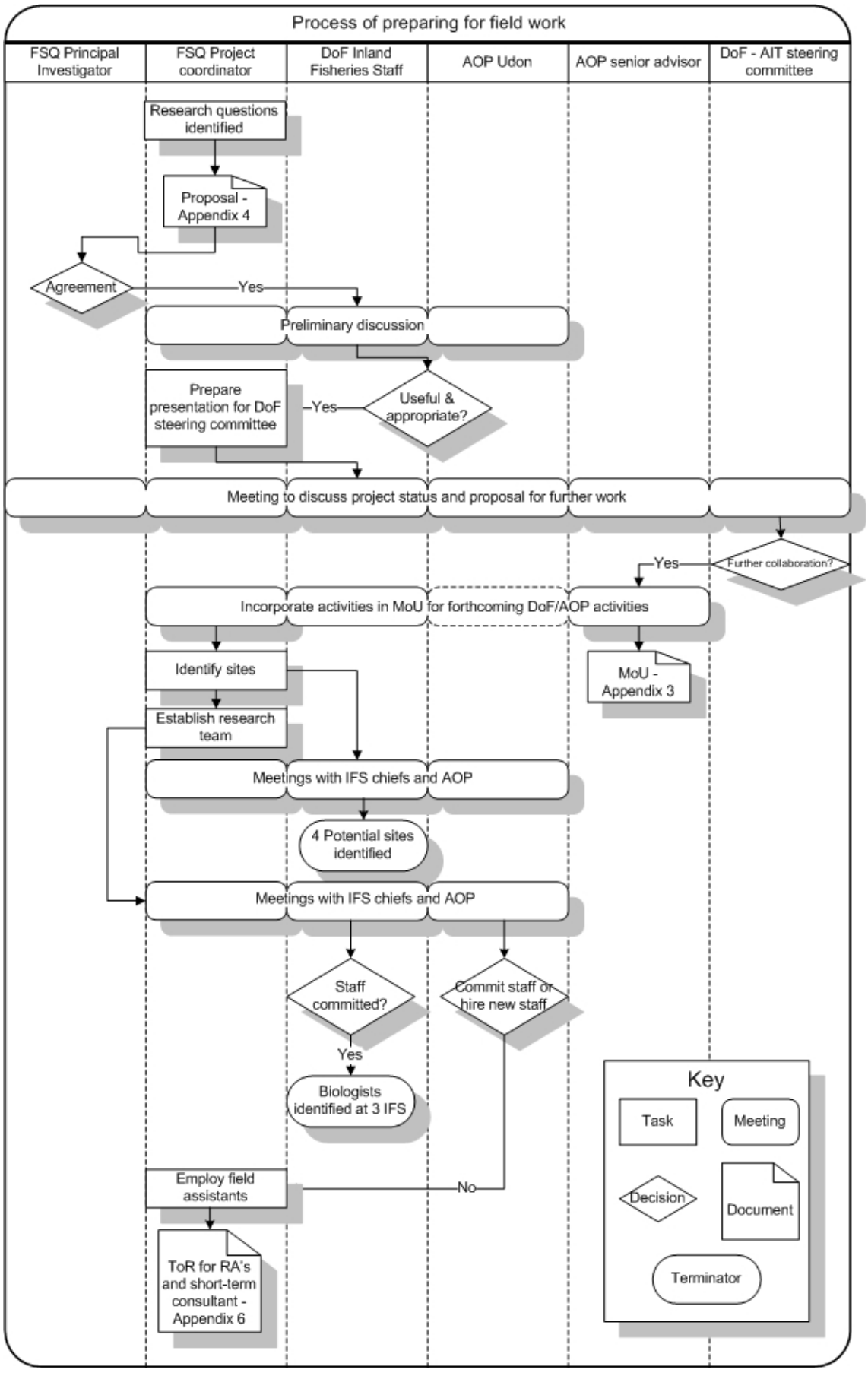

Figure 3.1 Cross-functional flowchart of the process of preparation for fieldwork

Things that didn't work out. There were three opportunities to develop the relationship with DoF which didn't go as anticipated. The first was the attempt at involving the Development and Technology Transfer Division in the project. The planning officer, who had been in favour of the proposition following an informal meeting with me, told me that the idea was rejected by the division chief on the grounds that the official partnership arrangement was between AIT and the Inland Fisheries Division. Second was an attempt to involve the provincial fisheries officers, particularly in Mahasarakam where two of them joined the training exercise in participatory methods. However they were unable to join any field activities due to time constraints in both Provinces. Third was the failure to follow-up on a workshop that was called for in June 2001 by the DoF DDG (Deputy Director General) responsible for inland fisheries where it was suggested that we present the findings and details of the process in a national workshop for research and extension staff. Offers to assist in organizing the workshop even with a share of the funding assured from the AOP central fund were ignored by Nok. These attempts continued until the DDG retired in October 2001.

In summary we got the extended official agreement but with little collaboration in planning and team building.

3.2.2. Invitation to collaborate

The first step in the field was to approach groups of hatchery operators to extend an invitation to collaborate. From the five groups that were approached active collaboration was established with four of them. We first approached two registered cooperative groups followed later by a sub-district level group and two village level groups.

As mentioned in Section 2.6.2 the collaboration that arose from the approach to the first co-op in Surin was changed to dissociate the project from the co-op because of problems in the way that the co-op was being run, though we continued to work with its

members in what we called a Forum for Hatchery Operators. The other co-op, KAC, was the group that declined the invitation to work with us. This was a successful cooperative which operated in an elitist fashion; membership was limited to farmers who had a large operation, money in the bank and a clean credit record. This group was well connected and dominated the local trade in fish seed with government departments. Our initial approach had gone well with an apparently good rapport developing; however this vanished when we insisted on working with all hatchery operators in the district. Their argument was that any benefits of our collaboration would trickle down to the other hatchery operators eventually in the same way that the techniques required for running hatcheries had spread through the district. The leaders of the group professed to be the original hatchery operators in the district. Some KAC members attended meetings in Ban Hua Chang where they were also members of the village group that collaborated with us.

3.2.3. Problem identification, prioritization and analysis

Identification of problems and dealing with them in a systematic way was a pivotal element of the process. Responses to problems tend to be at the event level; the tools used here enabled people to make sense of the problems themselves in a systematic way that revealed the complex interlinking of factors that characterize real world problem situations and led to the recognition that event-level action would be unlikely to result in sustainable solutions.

The ‘top five’ problems of the individual groups of hatchery operators are summarised under categories in Table 3.3. Using the same ranking technique that we used in the field a summary ranking of these problems was prepared. Though this manipulation of the outputs could not be said to represent the opinion of hatchery operators in the region the overall top five issues includes the top three problems of three of the groups and the top two issues of the remaining group. In addition to being a

step towards resolving a research issue this was potentially useful information for researchers, planners and policymakers interested in basing their work around real problem issues in the sector. However extracting this information was not our only objective.

The importance of the money/credit issue and the high cost of inputs is emphasised by the priority given by all groups. Money and credit were lumped together as a single category because the two issues were always linked in the discussions; cash flow, shortage of money was always discussed in association with the lack of access to cheap credit.

Table 3.3 The 'top five' issues reported by the hatchery groups with a summary column of weighted rank across all groups

Category of Issue	*Surin*	*Hae Tai*	*Don Suriyet*	*Hua Chang*	*Overall rank**
Money/Credit	1	1	2	4	1
High cost of inputs	3	3	1	2	2
Uncertain Market	5	1	3		3
Lack sufficient broodstock	2	4			4
Nursing mortality	5			1	4
Disease management	5		4	5	6
Need new species/strains/techniques	5			3	6
Low price of seed	4		5		8
Lack of knowledge about spawning		5			9

* calculated by assigning weights to the rankings in the previous columns.

Of the other issues that concerned the seed producers the uncertainty of the seed market and disease management were issues raised as important by three groups though the priority of the disease issue was relatively low. Identification and prioritization of the issues was only the start of the action research work. The next stage showed how although individual issues could be drawn out many of the issues were related to each other.

After the problems were prioritized the group were asked which issues they would like to analyse and take action on; the limit was two issues per session because there were only two facilitators. Typically it was the first and second priority issues that were taken as the starting points for analysis. In Ban Don Suriyet they chose only the

second priority issue for action and in Ban Hua Chang they chose the first and third priority issues. This may have been because the choice was in an open forum where dominant participants may have been able to influence the group consensus. Two groups used concept maps and two did not; villagers from Don Suriyet and Hua Chang quickly developed their research objectives through discussion rather than using concept mapping. the concept maps as outputs are not really useful for non-participants, as a part of the process however they were useful in the reflection process helping participants to visualize the connectedness of issues in the situation and ideally to help in consideration of the action that needs to be taken in that a narrow focussed effort on one aspect of the problem is unlikely to be sufficient and that complex problems require approaches from several directions. Examples of a concept map from the analysis in Surin are shown in Figures 2.6 & 2.7, others are not included in the thesis because it is sufficient to know that the participants used this tool themselves; there is no 'right' or 'wrong' analysis the output is something that makes sense, or can be accommodated by the participants (Stringer, 1996).

3.2.4. Action planning and action

Following the concept mapping and discussion the planning exercise began with identification of research goals which were developed from the issues chosen for analysis. Objectives were identified from the nodes in the concept maps and action plans detailed the steps involved in achieving the goals.

The goals and objectives were readily derived by the participants from the main issues and analysis; Table 3.4 lists the seven research goals and twenty related objectives that were set by the groups. In addition to providing the basis for the next stage of action planning the lists of goals and objectives were used for reference in review and evaluation meetings.

Table 3.4 Goals and objectives derived from the analysis of priority issues by groups of hatchery operators

Group	*Goals*	*Objectives*
Surin	• To improve sales	• Find out about government policy on buying fish seed • Find out which species are in demand • Improve public relations • Develop production and marketing plans • Expand the market • Fix standard price
	• To get more broodstock	• Increase knowledge about disease prevention • Increase knowledge about breeding • Increase knowledge about husbandry • Increase knowledge about environment for broodstock • Increase knowledge about selection. • Get funds to buy female *Clarias* catfish*
Hae Tai	• To find sources of money	• To locate sources of low interest credit • To access funding for the group in order to provide loans to members
	• To improve the market	• To access government-funded markets • Find new markets • Find out about other species
Don Suriyet	To reduce the cost of feeding fish	To find out about making fish feed on-farm
Hua Chang	• To reduce insect predation in nursery ponds	• To lean how to kill insects
	• To get new types of fish	• To learn about spawning new types of fish

*This objective was identified after analysis in the third review meeting.

The actions planned by the four groups are sorted here into two categories the first for those actions related to socio-economic issues the second for the 'technical' aquaculture issues and are listed in Table 3.5. The actions listed were the basis of fourteen action plans to address nine objectives, five of which were socioeconomic issues with the other four being technical aquaculture issues. The action plans directly resulted in groups of farmers having meaningful, face to face discussions with relevant officers in fifteen government offices. Groups visited two catfish hatcheries, one tilapia hatchery and a commercial small-scale shrimp feed producer. There were two training sessions; one in *Pangasius* hatchery techniques the other in on-farm feed production.

Table 3.5 Objectives and summary of actions derived from the action plans developed by four groups of hatchery operators

Group	*Objectives*	*Actions*
	Socioeconomic Issues	
Surin	• Find out about government policy on buying fish seed	• Meet officers from Provincial Administration, Agriculture, PFO, IFS, Community Development and District Administration Office • Follow up on previous meetings with government officens[a]
	• Get capital to buy the female broodstock[b]	• Contact District Administration to request support from village funds • The co-op buy broodstock and provide to the members.
Hae Tai	• To locate sources of low interest credit • To access funding for the group in order to provide loans to members	• Meet Provincial Co-ops Officers and the Kosumpisai branch of Bank of Agriculture and Agricultural Co-ops.
	• To access government-funded markets	• Meet PFO, PAO representatives, District Agriculture Officer and local MP to discuss available budgets.
	Technical Issues	
Surin	• Increase knowledge about disease prevention, breeding and husbandry	• Study tour to catfish and tilapia hatcheries in Central region to talk to experienced farmers. • Arrange training in disease management at the DoF Station, Surin[c]
Don Suriyet	To learn how to make fish feed themselves	• Meeting with DoF at IFS to get advice on cost and feasibility • Study tour to on-farm shrimp feed manufacturer in Kalasin. • Join training session
Hua Chang	• To find out about reducing insect predation in nursery	• Meeting with DoF Mahasarkaam
	• To find out about spawning new species	• Meeting with DoF to discuss possibilities • Training with DoF Kalasin Province

[a] This action was the output from the second review meeting
[b] This action was identified after analysis in the third review meeting
[c] This objective was the output from fourth and final review meeting.

3.2.5. Review and participatory evaluation

Review meetings took place after every action for two reasons, first, in order that the information could be shared and discussed with the wider group and, second, for group reflection on the achievements and progress as part of the evaluation process which informed the next stage of planning. Additional evaluation by participants was integrated in the process of meetings and activities and the final activity with each group was a meeting dedicated to evaluation of the whole process.

Sharing information with the group was important since only representatives from the groups met the government officers. The results of all meetings were clearly

reported back to the group apart from the outcome of one meeting in Mahasarakam PAO. The Provincial Representative had agreed to buy fish seed from the Hae Tai group however, because the group had to make a formal application in order to access a budget which had not yet been allocated by the administration, the Representative asked the meeting participants to keep quiet about the agreement. In Surin, there were three review meetings whereas there was only one review meeting with each of the groups in Mahasarkam because we started work there later. During the final review all groups made a plan for further action. In Surin this was for training in disease management at the IFS Surin early in the new year. The Hae Tai group decided that they would form their own co-op at a convenient time; the Provincial Fisheries Officer had previously told them that it wasn't possible. Their plan was to continue as a group in the meantime, the group already had some business in progress and forming a co-op would require them to officially dissolve the group. They were happy to wait and see what developed in 'the local market', confident that they could if necessary form their own co-op to sell seed and access cheap credit. In Hua Chang and Don Suriyet their plan was for training in *Pangasius* seed production and on-farm manufacture of fish feed respectively which the project supported.

Routine Evaluation.

From the routine evaluation that was carried out at the end of all activities most feedback received was positive (97%). Negative comments were specific, for example inappropriate meeting times and locations, misunderstandings about our role or lack of understanding of objectives, all these issues were dealt with by the facilitators before the participants left the meeting. Positive feedback was organised into five indicator categories, which can be seen in Table 3.6. Most of the comments (44% of positive feedback) came under the knowledge gained category; comments such as 'gained

knowledge about forming a co-op', 'now I know the correct hormone use for spawning catfish' or 'we understand how the research team are working' are typical of the feedback received. The importance of sharing problems and working together, in 22% of positive comments, were clear in comments like 'good to know the problems of group members from their point of view', 'very good because I can raise my problems', 'good to join the activity together, thinking together' and 'expressed my feelings about problems that I have held for so long and can see that others have the seem problem'. The role of the research team was recognized in 9% of the responses in comments such as 'very good to have someone to guide the group', 'I am pleased that the research team can coordinate with us' and 'grateful that the team can mediate between some government officers and us'. Explicit expressions of satisfaction about the meetings or activities made up 8% of the positive responses with general positive feedback such as 'good meeting', 'had fun', 'lunch was good' and 'good, but we need more meetings' making up the remaining 17% of the comments.

Table 3.6 Percentage of positive feedback received in the routine monitoring of all project activities by category of feedback

Category	*Percentage of positive feedback*
Knowledge gained	44
Active participation in problem resolution process	22
Importance of external facilitation	9
Satisfaction	8
Generally positive	17

Final evaluation

There were four final evaluation meetings with the hatchery groups and two final evaluation interviews with the DoF staff. The framework was to ask participants to give their opinions on the successes of the research, problems that affected the research, effectiveness, appropriateness, to list any changes that had come about as a result of the research activity and the advantages and disadvantages of the process.

Successes. All groups reported the knowledge that they had gained and the contact with government officers as successes. Generally knowledge was developed through the process of working with the project, participants felt that they had learned a lot and they recognised the specific knowledge outputs from their research. In Surin the participants felt their main success came about through meeting and becoming known to government officers which led to their being invited as demonstrators on several projects enabling their group to become more widely known in rural communities and thus to sell more seed. There was greater satisfaction about the allocation of 'quota' in government purchases of seed since the research had, at least at the time, increased transparency. They had also been given seed of an improved strain of tilapia. The Hae Tai group reported the information that they could form a co-op as their main success. Don Suriyet villagers appreciated the training they had received as did the Ban Hua Chang group. Surin and Hae Tai groups reported that their groups had become stronger through the relatively frequent meetings where problems were discussed by everyone.

The DoF staff evaluation reiterated the successes that had been reported by the farmers with the added observation that the farmers became more confident in dealing with the authorities. The technician from Surin felt that the way that some of the group were working as demonstrators was a benefit in itself; farmers were learning from farmers and furthermore this relationship had developed further with the farmers contacting the hatchery operators later to buy seed which he felt would encourage the farmers to think about service and quality. Another notable success he felt was that the co-op committee were sharing the 'quota' more equitably among the members.

Problems. The main problem cited was time; participants didn't have a lot of free time and often had other work that was more pressing or needed to rest after work, which prevented them from attending all the activities. They said that this may also have been

a factor for other community members who chose not to become involved. Three of the groups pointed out that not knowing at the beginning of the process what they would get out of it had been a problem, though they understood the reason for this after participating. They explained that a lot of people think that researchers and other outside agencies come to take advantage of villagers for their own benefit without even reporting back any of the results. This makes them wary and would also have impacted on the number of people interested in attending meetings with a research team.

There were no problems with the project according to the DoF participants, though the Surin officer pointed out that it would be better if the process could have been continued over a longer period.

Effectiveness. All participants found that the process was effective in resolving some of the issues that they had raised. They were satisfied with the results, gaining practical and theoretical knowledge, and, in some cases, seed and acquiring new business in return for spending their own time.

The DoF found that the process was effective in resolving the issues faced by the farmers furthermore they both noted that the many of the hatchery operators who previously were satisfied with their knowledge realised after discussing with other farmers and taking part in the various activities that their level of knowledge was low. Both officers mentioned the newsletter as an effective tool to disseminate the research findings and to provide technical knowledge.

Appropriateness. The process was judged to be very appropriate by the Hua Chang and Hae Tai groups and appropriate by the other two groups, on the basis that it was a systematic approach that was open and clear and participatory in that the issues, analysis, action and reflection were all their own. Informality was also appreciated by

the groups from Hae Tai and Hua Chang and the villagers from Don Suriyet found that the method, particularly the training to be practical.

Again the government officers reiterated what the farmers had stated. The officer from Surin felt that a strong point was that it was a locally focussed approach working on local solutions to local problems.

Changes. The groups reported that the changes were the same as successes that they had listed earlier. The knowledge gained had given them a different view of the situation in many ways. The Hua Chang group mentioned that their perceptions had changed about research, having had a positive experience in terms of the research that was done and the way it was done. Group leaders in Surin said that they were much busier travelling as demonstrators for government projects with very little time actually on their own farms, but that this new approach was benefiting the seed sales and reputation of the group both with their customers and the government officers. The Don Suriyet group felt that whereas previously they had only learned about aquaculture from their relatives they were now taking a wider view of the situation.

Both DoF staff said that there was a change in that the hatchery operators were not ‘afraid’ to talk to government officers and had made contacts with government offices other than the DoF. The biologist from Mahasarkam felt that the groups were stronger and that even in the general discussions the group were sharing knowledge and information. In Surin the role of some of the hatchery operators as trainers for government projects was a positive change that was noted.

Advantages. Again the advantages were expressed in terms of the participation and knowledge gained and acknowledging the role of the project in facilitation. Participants were satisfied that they had done research on the issues that concerned them in a

friendly and relaxed way that suited them in close cooperation with a sincere and open research team which supported them.

The DoF appreciated the systematic, learning process, the use of participatory group process in problem identification, analysis, planning and evaluation of outputs. They recognised that farmer to farmer communication in the meetings and in some of the activities created real enthusiasm to learn. The process was different from government projects which typically tell farmers what to do whether they need to do it or not, Wat used a metaphor of information being stuffed into people like goods into a bag.

Disadvantages. All groups felt that there was not enough time and many issues remained to be resolved. Hua Chang and Hae Tai participants would have preferred to work together at a less busy time of year. In Surin they reiterated the point that in the early stages the participants and their neighbours were put off by not knowing what they would get out of the project or whether their time was being wasted as it had by research projects in the past.

The officers agreed with the farmers that ideally the project would have continued for a greater time. In Surin the biologist felt that wider participation had been prevented by distrust of outsiders, disinterest because people thought that meetings could not help them, conflict and competition in the wider community particularly over the issue of government-funded purchases of seed.

Box 3.1 A sample of feedback from the evaluation by hatchery operators groups and DoF staff.

Successes:

- The project introduced us to several government officers and institutions. Some of these were 'new' to us, we had never contacted them before. - *Surin*
- Got knowledge about fish spawning, hormone mixing, feed making and contacting the government institutions that are involved in our hatchery occupation. - *Hua Chang*
- The group has become stronger because we had more meeting and we understand each others' problems. - *Hae Tai*
- Learned how to make fish feed both knowledge of the theory and practice. - *Don Suriyet*
- Project help to catalyse hatchery operators stirring them up to participate in activities – *DoF Surin*
- Hatchery operators have had their eyes and ears opened – *DoF Mahasarakam*

Problems.

- At the beginning there was uncertainty whether the project can help us and if when the project was finished and the data had been collected the project will disappear in the same way that the government projects work. The government officers normally come to collect information for their own benefit, such as to get promotion, then when they get promoted a new officer will come and start a new project for their own benefit.- *Surin*
- Sometime we are busy, even if we are very interested we cannot always go for the meeting. - *Hua Chang*.
- We did not find any problems, no problem even the meeting time was organised by us. - *Hae Tai*
- Some villagers who didn't join the meetings asked what we got from the meeting, but we understand about this project and were exchanging our knowledge. - *Don Suriyet*

Effectiveness.

- We have received support from government officers such as agriculture, PFO and fishery station. - *Surin*
- We learnt how to solve problems about fish spawning but for insect we think that we can not solve this problem - *Hua Chang*
- Satisfied, very good result to know the government officers and the proper process to contact them - *Hae Tai*
- Knew how to make feed and we will do it 100% - *Don Suriyet*
- Group meetings like the project held is good because farmers sat together and discussed their problems or exchanged knowledge, in a form of technology transfer between farmers and farmers and they were able to agree common problems. Some of them thought that they know

everything already, but after discussion with other farmers they sometimes realised that their level of knowledge is still low.- *DoF Mahasarakam*

- Newsletter is very good, I would like it to continue because it has information from the IFS and about the research – *DoF Surin*

Appropriateness.

- The project deals with every institution. Normally projects with fishery only deal with fishery department, agriculture with agriculture department but this project went to all the institutions that they deal with. - *Surin*
- Very appropriate because we can give our own opinion, there is regular follow up for every meeting. Very informal, the meeting place is a friendly place. - *Hua Chang*
- Very appropriate, because we had informal discussion, no boss or officer and we are open about everything, we work like villagers working together friendly and informal. - *Hae Tai*
- It is appropriate because it is a method that has training and practical experience,…the method allowed us to exchange our knowledge and opinions - *Don Suriyet*
- Farmers raised their own problems because in different areas there are different problems. When all parties work together the solution will be good because we each have different knowledge that we can apply to the situation. – *DoF Surin*

Changes.

- Know government institutions and officers. Such as the officer, Wat, from the station who has been giving us advice at some meetings. - *Surin*
- Different from others because the research team can understand our occupation and our way of life here. Other teams just come and we have to prepare for their visit and welcome them, they come and we have to give them our pillow and mat. - *Hua Chang*
- Various government organisations now know more about our group. - *Hae Tai*
- I can use my machine again, I was thinking 'what should I do with this machine?' - (person who had a feed grinder) *Don Suriyet*
- Hatchery operators are not afraid to contact government offices or talk to government officers. Previously they only dealt with the PFO and station. – *DoF Surin*
- They transfer their knowledge because when they are in group they have time to chat or to discuss issues related to their occupation – *DoF Mahasarakam*

Advantages.

- We got knowledge and advice from our research. We participated and gave our opinions even if we disagree with each other. We are not afraid to show what we are thinking. The research team don't put pressure on us and we were not stressed in meetings. The research team were very good at contacting us and distributing information, letting us know what was happening. We went to get information from the government organisations and met the officers

in their offices. This was very good, and it will be our duty to maintain the connection with them. - *Surin*

- Research team work seriously, sincerely and show responsibility for the job - *Hua Chang*
- We can discuss more open, do not feel constrained to be formally polite . In some other meetings we may only be listening. Co-operated in research together with the research team, the result that we got we can use to solve our problems or to develop our group. - *Hae Tai*
- Got knowledge and exchanged knowledge by meeting other hatchery operators - *Don Suriyet*
- It is a learning process because hatchery operators raised their problems and tried to develop their own solutions related to the problems. This is a harmonious approach. – *DoF Surin*
- It is a group activity, some farmers came to join and discuss issues together raise their own problems, think and solve their own problems. They talk the same language and when they had activities they saw with their own eyes. – *DoF Mahasarakam*

Disadvantages.

- The time is too short, it seems that we are just at the beginning. - *Surin*
- Did not solve market problem or money problem, time is too short (like we are enjoying dancing and suddenly the music is stopped) - *Hua Chang*
- Have a lot of things to do now because it is the fish spawning season and now the project is over while we are still busy - *Hae Tai*
- Should come to do research during January or February when we are not so busy. - *Don Suriyet*
- Some farmers do not join the group or like to work in a group, they prefer to be individual because they think that no one can help except themselves or they worry about losing business by sharing information. There may even be conflict in their village. – *DoF Mahasarkam*.

3.3. Outcomes Indicators

The outcomes of a project are the indicators of effect, showing what happened as a result of the project activities. Outcomes can be categorised as anticipated and unintended and with positive or negative effects. Unlike the outputs, which happened over the course of the project, outcomes, if they occur at all, can take longer to become evident. However by the time the field work was concluded there were several general outcomes which had been anticipated, and several unintended outcomes. Most

outcomes emerged from activities in Surin where we were working over a longer period and were pulled out from the participatory evaluation. They are presented here in a list form since they contribute to discussion in the final chapter.

It should be pointed out that the outcomes were determined using qualitative methods (guided discussion) and are presented in a narrative form consistent with the methodology used.

3.3.1. Anticipated

Anticipation of certain outcomes stemmed from the literature on action research, namely that provided the process was adequately implemented, collaborative relationships would develop, action would be taken into issues of concern and knowledge would be gained (Kemmis & McTaggart, 2000, Stringer, 1996). Outcomes were;

- Improved mutual relations reported between the hatchery operators from all participating groups and the staff from the IFS
- Hatchery operators satisfied with the process and knowledge gained as a result of their research activities.
- DoF research team members experience broadened through exposure to participatory research methodology and working with an external research project.

3.3.2. Unintended

Outcomes that were not anticipated were categorised as either positive or negative.

Positive. These outcomes came about as a result of activities early in the research with the Surin group. The first three outcomes arose out of actions taken by the farmers; the last two came about as a result of project activities that led the groups to work closely together in a transparent way with information being shared among all group members.

- Five of the Surin hatchery operators were employed as demonstrators for farmer training by agriculture extension officers

- Increase in business for Surin hatchery operators through their wider contact with farmers around the Province.[12]
- 30 hatchery operators in Surin each received 200 fingerlings of an improved strain of tilapia to raise with oversight by local DoF . Total seed distributed = 6000.
- More equitable sharing of the quota for government funded seed purchases in Surin; in that the group leaders who typically acted as middlemen and profited from the sale of their members seed, had agreed that the members would receive a larger, though unspecified, share.
- Loans disbursed to co-op members in Surin rather than funding being used for personal business ventures by members of the committee.

Negative

The only negative outcome of the project, that I was aware of, was the breakdown in the working relationship with the DoF/AIT coordinator, Nok and the AOP country programme manager. This compromised the potential for leveraging the knowledge and information that emerged from the project with the key service providers in the country.

3.4. Emergent Issues

The issues detailed here emerged and are categorised from personal reflection on the inputs, outputs, outcomes and methodology of the project.

3.4.1. Inputs Issues

There were two issues associated with the resource use by the project;

1. The actual cost of carrying out the field work was low; about 9% of the total project expense and about 10% of the value of personnel costs of salaries, food, accommodation and personal transport. Indicating that it should represent a cost-effective extension methodology.

[12] This was not quantified, the farmers did not keep sales records and would be unlikely to divulge accurate information if pressed particularly when a government official was present.

2. Farmer commitment to the collaborative project was good in three of the five groups that were approached; the Surin, Hae Tai and Hua Chang groups maintained a consistent level of attendance at project activities. One group withdrew from the process and the attendance by villagers from Ban Don Suriyet, the only informal group approached, fell dramatically though feedback from the continuing participants was positive.

3.4.2. Outputs Issues

The outputs speak for themselves and related issues are more to do with outcomes and methodology however some points did arise

Research agreement with DoF

The output was achieved, a research agreement was signed and DoF partners were present in the field who proved to be very competent and relatively engaged resource people. However by failing to establish a link with the Development and Extension Division and receiving limited input during the planning stage the value of this output was reduced. A major shortcoming was the lack of agreed strategy, procedure or responsibilities for utilising any research outputs from the collaboration.

Invitation to collaborate

The invitation to collaborate was accepted by four out of five groups approached, members of the group that dropped out of the process after the initial appraisal gave the reason that they felt there was nothing to gain since they were already, in their opinion, competent hatchery operators. One issue was that because it took so long to get back to them after the initial appraisal that this created the impression that we were no different to the other extractive research teams they had encountered in the past. Another issue is that it was never established whether refusal to allow them to monopolize the process had any influence on the decision.

Problem identification, prioritization and analysis and Action

Who identifies problems was an issue that emerged from the work up to June 2001. The nature of some of the problems that were identified by the hatchery operators was an issue since it could be argued that there was no obvious relationship between concerns such as ‘lack of access to cheap credit’ or ‘lack of money’ and the quality of fish seed produced. The perceived validity of this approach hinged on acceptance of three points. First, that the issues were connected in the complex system of events and conditions lived by the participants and that this was drawn out by the problem analysis. Second, change requires learning and people will learn what they feel to be useful and important which means they will take action on issues that concern them. Finally working in this way developed the collaborative relationship that over time could lead to changes in attitude and processes and thus more lasting changes in hatchery operation.

3.4.3. Outcomes Issues

An important issue related to the outcomes of the work was the lack of an outcome from the collaboration with the DoF in terms of dissemination of the outputs. There were some issues related to the methodology which might have improved the chances of impact but the simple fact was that although the worth of the work was recognised by hatchery operators, senior DoF staff, the AOP senior advisor and further tha a dissemination meeting was called for, some supporting funding was assured from the AOP budget and persistent offers to participate as resource persons or in any other role were made by the research team the meeting was never held.

3.4.4. Methodology Issues

In terms of the wider project process a number of issues emerged from tensions between doing a student project as a component of a collaborative research project and these are dealt with in the first part of this section. Following that the issues emerging from reflection on the participatory action research project process are presented as they occurred over the implementation of the project

Wider project process

The objective of conducting original investigations that would contribute toward a goal of getting a research degree were not included in the project plans but impacted the relationship with the DoF and AOP partners. The effects stemmed from the initial conceptualisation through planning and contributed to a reduction in the potential for impact.

C**onceptualisation.** My opinion of what should be done was different from the partners; the DoF/AOP coordinator and the AOP country advisor wanted more technical research but did not propose it until June 2001 by which time I had already rejected that idea and had settled on the idea of a participatory approach by the time that the DoF/AOP relationship restarted at the end of 2000.

Planning. From the start of the dialogue about the next phase of work there were problems with what was proposed; the reasons were never expressed but some factors that may have influenced this were;

- that I was younger than the other partners whose culture recognises age as an indicator of status (Mulder, 2000),
- the research was to be the basis for PhD field work, and to some extent they felt that I would be capturing benefit from their effort.
- I proposed to take an active part in the field both coordinating the research and managing the budget taking responsibilities that had previously been the AOP advisors',
- the flexible approach did not fit normal DoF working practices where work plans and their outputs should be clearly defined in advance, and
- other than contributing towards their organizations' wider objectives and developing staff capacity in non-technical research there were no obvious gains or concrete benefits for either the DoF or the AOP and their staff. In short not a good basis for collaborative partnership.

3.5. Summary

Summing up the participatory action research received positive evaluation from members of the hatchery operators' groups and the DoF staff who accompanied the research team to the field. A range of practical knowledge outputs and outcomes were reported and the development of social networks was recognised by participants both horizontally with groups working together better and more equitably and vertically through contacts with local government agencies. Capacity was developed by all participants in the process. The final chapter deals with a practical evaluation of the research and looks at implications of the work.

4. Evaluation

4.1. Introduction

This chapter addresses the research problem of:

How to improve approaches to fish seed production in smallholder aquaculture systems of Northeast Thailand?

Evaluation is the test of the conceptualisation behind the theory-of-change of the methodology (Davies, 2003), in practical terms, was the project useful in addressing the research problem? In Chapter 1 the following research issues emerged from reflection on the project experience including participation in a programme development workshop and review of systems theory;

1. The project purpose remained valid, though a range of outputs beyond the scope of the work reported here would be required to achieve the required impact.
2. An approach was required for a new phase of work that could take into account the different perspectives of stakeholders that had emerged.
3. Research should be informed by the principles of the Sustainable Livelihoods approach and the experiences of field researchers and development practitioners from within the AFGRP.
4. The nature of the problem was conceptualised within a soft systems definition which implied that a learning systems approach to research which would involve stakeholders in learning and change processes should lead to improvement.

Chapter 2 justified the use of participatory action research as a methodology that responded to the research issues and documented the process and methods of implementation in the field. Indicators of inputs, outputs and outcomes from the process were identified in Chapter 3 and included the project level participatory evaluation of the research carried out by the participants which was positive and essentially affirmed

the value of the research process to them. However there is a duty to evaluate the project from a wider standpoint which is addressed here using the three key dimensions of appropriateness, effectiveness and efficiency.

4.2. Appropriateness

Appropriateness must be judged by looking at the project objective and activities against the project purpose and asking, given the problems or needs of the stakeholders, the guidelines from the programme and the context in which it was carried out, 'was the project a good idea?' (Woodhill & Robins, 1998). The answer is 'yes, it was a good idea' *i.e.* it was appropriate. This section discusses the contribution of each of the phased activities in relation to the key factors mentioned and towards the purpose of improving approaches to seed production and the reflection that led to the judgement on appropriateness.

4.2.1. Activity 1: Extension of the research arrangement with DoF and AOP

Stakeholders' problems

While several participants had received training from the DoF at some time, at the outset of the research hatchery operators mostly had concerns that the DoF stations were a source of unfair competition and had little to offer, Provincial Fisheries Offices were a source of discontent through their rent-seeking activities related to government purchases of seed. However the three groups of hatchery operators that interacted with the DoF as components of the action taken to resolve their problems clearly acknowledged the benefit in terms of the knowledge that they gained through discussion and training, the personal relationships that developed and in Surin the research collaboration which involved farmers receiving tilapia seed to grow out on the condition that they monitored growth. The evaluation by hatchery operators showed that, after getting to know some of the staff personally, appreciating their expertise and learning the procedure for approaching them with formal requests for assistance, they would not

hesitate to contact them in the future; the Surin group had a plan for training in disease management early the following year. Both of the DoF staff members confirmed the positive change in attitude towards them and other government officers that they had seen take place in the participants.

Although the DoF and AOP were stakeholders themselves we never attempted to find out what their needs or problems were because the focus was on primary stakeholders' issues. Research into the sensitive area of the organizations' capacities to deliver services would have been useful but was beyond the scope of this project.

Programme guidelines

The programme guidelines for partnership were based on the underlying principles of Sustainable Livelihoods which emphasize the importance of partnership at all levels. Critical partnerships that have been identified (Hussein *et al*, 2001) include beneficiaries, discussed in section 3.1.2, knowledge partners such as the DoF Inland Fisheries Research (IFR) who were responsible for the IFS, the AOP and multipliers such as the Provincial Fisheries Officers (PFO) and the DoF Development and Technology Transfer Division (DTT). The objective was to extend a formal arrangement with the DoF through the AOP ideally involving the DTT and PFO in each Province. The output was that the existing arrangement was extended without inclusion of the DTT and PFO which meant that although we had partners with complementary knowledge and skills accompanying the field research team the partnerships with potential to enable uptake of knowledge stemming from the research process were not developed. A key factor in the partnership was the organisational context of the project.

Context

The circumstances under which the research had to be carried out were established in the original proposal; earlier phases of work in Thailand were carried out under a MoU with the AOP who facilitated the participation of DoF staff, the need for a new MoU

with the DoF was required by DoF policy. The agreement was signed on behalf of the DoF but only covered work with the Inland Fisheries Division specifically and was based on Sida's ongoing strategy, with the DFID work 'piggy-backed' as a convenient stop-gap that allowed work to continue with official sanction . There was little alternative given the relatively small scale of the DFID projects however this left no scope for further official partnership within the DoF such as with the DTT.

In the field the letters of introduction from the IFS chiefs facilitated contact with other provincial and district government offices particularly in getting access to the senior officials which would have been very difficult without an official reference. The partnership with the IFS in Mahasarakam enabled the research team and farmers to access considerable technical expertise at the IFS in Kalasin when it was required.

4.2.2. Activity 2: Participatory action research fieldwork

Stakeholders' problems

Given that a fundamental part of the methodology was identification and analysis of stakeholders' problems and action to resolve them, the only criticism might be that only the main issues that concerned participants were addressed over the period of the field work. Hatchery operators' evaluation showed that they judged the approach to be appropriate.

There were other stakeholders such as the traders and grow-out farmers whose problems were beyond the scope of the enquiry. The impact of the action that was carried out on the other stakeholders was not determined.

Programme guidelines

The research methodology was in line with the core principles of SL approach which underpinned the recommendations for improving impact. The workshop recognised four key SL principles that were of practical relevance to planning and conducting aquatic research (Hussein *et al*, 2001) and against which the project was examined.

- **People centred.** The methodology allowed primary stakeholders to express themselves and their needs. The research context, themes and process started with and belonged to participants and was based on their existing assets and vulnerabilities.
- **Holistic.** Participants were engaged in extending their understanding of issues through local/group analysis, engaging with wider institutional and political contexts and reflecting on the experience. The process was facilitated by a research team with complementary skills and knowledge in participatory research and technical fields. The research process ensured that participants recognised the integration of issues within the complex system of events and conditions of life in the household, community or region including the production system, technical knowledge issues, resource access issues (including knowledge), markets, value systems and service provision.
- **Responsive and participatory.** The participatory nature of the research ensured that all work built on the existing knowledge, skills and information bases. Participatory evaluation of all activities as they were happening, through conscious examination of expectations and achievements, feedback and review meetings and dissemination of outputs and information about activities through a newsletter to the wider hatchery community provided the participants with the means to measure progress and impact of the research.
- **Multi-level.** The project worked with informal and formal producer groups at village and district levels with provincial level government researchers collaborating under a national research agreement for rural development through aquatic resources management on an area of international policy concern. Although the partnership with DoF was not ideal the mechanism was in place, through the AOP review process, that allowed the issues raised by the hatchery research to be brought to senior government level. In addition activities under their action plans brought hatchery operators into

direct contact with local government officers and enabled them to personally raise issues with both the executive and administrative representatives.

Furthermore the research approach responded to two other SL principles;

- **Working with partners.** Partners in the research were village and district level producer groups, the DoF Thailand and AOP a regional programme concerned with rural development through aquatic resources management with a formalised institutional network involving governments of Vietnam, Laos PDR, Cambodia and Thailand and several key NGOs in the region.
- **A wide view of sustainability.** The issues raised by participants covered the range of sustainability dimensions. The sustainability of their livelihoods in terms of economic, social, institutional and environmental sustainability were emphasized in the issues of vulnerability to uncertain markets, lack of access to reasonable credit, unfair competition, misinformation by service providers and lack of knowledge regarding appropriate production system management.

Context

The context for project implementation was discussed in relation to the institutional arrangements for partnership for the first objective. The policy and institutional context in which the research was situated was of central importance in appreciating the appropriateness of the research. These factors and the associated processes are a key component in the SL framework; the PIPs (Policies, Institutions and Procedures) dimension which represents the social and institutional context within which livelihoods are constructed and adapted. Crucially PIPs determine access to the various types of capital, livelihood strategies and decision making bodies and the returns to capital and livelihood strategies (DFID, 2003).

In relation to the institutional environment for hatchery operators a key issue were the changes in agricultural extension service provision resulting from restructuring

of local government. Local government in Thailand has been characterised by deconcentration, little access or control over political power or resources for most local people and resistance to transfer of power from the centre to local administrations (Sopchokchai, 2001). At the policy level decentralization has been accelerating since 1994 when the *Tambon* (Sub-district) Council and *Tambon* Administration Organization (TAO) Act fully committed government to a process of decentralisation, this was built on under the 16th Constitution of 1997 and the Decentralization Plan and Process Act of 1999. On paper this meant a change from a directive approach by central government to a developmental approach emphasizing the role of local organizations and community-based organizations as key decision makers who would have the opportunity to plan and implement activities by themselves. Establishment of good governance at the sub-district level under this ambitious programme is an iterative process which has been hampered by local capacity issues, lack of coordination between government agencies and local authorities, absence of a culture of transparency and participation (Sopchokchai, 2001), faltering support from government, and inconsistencies in the legal and administrative frameworks (Cuachon, 2002) and lack of clear division of labour between the local government and line agencies (Dupar & Badenoch, 2002).

The TAO became legally responsible for economic, social, cultural and environmental development within its jurisdiction and from 2002 this responsibility included administration of a Technology Transfer Center (TTC); a 'one-stop service' for agricultural livelihood development and promotion provided by the Department of Agriculture Extension (DoAE) with the official aim of increasing farmer's capacity to compete in the market through transfer of technology. The remit of the TTC is to coordinate extension for livestock, fisheries, aquaculture, commercial forestry, post-harvest processing, crop production, water and land usage, cooperative development,

marketing and other relevant information, bringing in specialists from other Departments as required to meet the needs of farmers (Sinchaipanich, 2003). From the year 2000 District Fishery Offices were closed down in preparation for the change in service provision with interim responsibility passing to the DoAE in the new TTCs, however by 2002 the TTCs, by then in the hands of the TAO, were still not operational at least as far as provision of aquaculture extension support was concerned (Sinchaipanich, 2003). This was the environment in which access to knowledge resources for aquaculture development was mediated.

The report by Sinchaipanich, a senior planner in the DoF Development and Technology Transfer Division, cited two major shortfalls in aquaculture extension service provision in Thailand; first, a key constraint to aquaculture extension was the lack of suitable manpower - most staff in Provincial Fisheries had no expertise in aquaculture techniques or management and second, there was no formal link between research and extension divisions in the Department of Fisheries. The implications of this were that not only was there no functioning extension service, the people who might be called on to provide a service were not qualified to support aquaculture development beyond basic skills, and furthermore there was neither a mechanism for communication of practical needs from the field to researchers nor even the traditional relationship whereby the results of research were packaged for technology transfer to farmers.

Of course research and extension are only factors in the socially constructed process of innovation where markets, systems of government, social norms and many other factors contribute to farmers' decisions to change the way that they operate (Berdegué & Escobar, 2001) but they are important factors and the need for the state and donors to build capacity both for producers to demand support, and for the

extension services to respond to the demands has been recognised (Farrington, Christoplos, Kidd and Beckman, 2002) Within this context the project

1. Enabled hatchery operators to access diverse knowledge resources at a time when local extension services were unavailable.
2. Collaborated with community-based groups in a democratic, participatory process appropriate to the developing context for local service provision and governance.
3. Facilitated the engagement of DoF staff, both government scientists and technically skilled and knowledgeable aquaculture practitioners, in a research process that allowed extraction of information related to needs of farmers and practical contributions to local service provision.

4.3. Effectiveness

From a project evaluation point of view effectiveness of research will be judged on the extent to which the stated objectives of the project were achieved or delivered in the production of planned outputs, this is particularly the case when research involves looking at the best technical means to deal with well-defined technical problems (Checkland 1999, Röling & Wagemakers, 1998). However research in human activity situations with uncertain issues, complex problems and cultural considerations where a learning process approach has been taken requires evaluation that acknowledges that planned outputs were limited because of the exploratory approach. This means also looking at whether the actions lead to outcomes. Evaluation of appropriateness described how participatory action research shares common principles with the SL approach, in this section the SL framework (DFID, 2003) is used to provide the structure for the evaluation of effectiveness.

In order to achieve change in the way that seed was produced the research collaboration involved partners from the key government agency, the DoF, and primary

stakeholders. The livelihood outcomes from the research activity were; first, enhancement of capital assets, particularly human capital (skills, knowledge, capacity to work) but also social capital and some small impacts on physical and financial capital, second, influence on the PIPs context, through participation, development of networks, improved information flows and impact on policy, and. The research activities also touched on some aspects of the vulnerability context.

4.3.1. Livelihood assets

The main anticipated return to the research was in enhancement of livelihood assets, the multidimensional capital on which people build their livelihoods. Participatory action research has practical knowledge and action outcomes which meant that expected impact was in gains to the human capital of participants i.e. the skills, knowledge, capacity to work and good health that people draw on in all their activities and that inform the choices they make. Human capital is also necessary to utilise the four other forms of capital; natural, social, financial and physical (DFID, 2003) of which all, apart from natural capital, were impacted to some extent by the activities of participants.

Human capital

The training received and knowledge perceived by participants comprised the main enhancement of this dimension, demonstrated by both the outputs and evaluation. Gains reported covered training in on-farm feed production, spawning *Pangasius* catfish, understanding of the policies, roles, activities and procedure for contacting various local government officers and departments and appreciation of hatchery management practices in other areas. These benefits came about through the group activities and dialogue with local institutions which contributed to gains in;

Social capital

Social capital is closely related to human capital with many people drawing on the skills and knowledge of friends, relations or community members (Schilderman, 2002); discussions with hatchery operators revealed that this was the mechanism for diffusion

of hatchery technology in the project areas. Social capital is defined by DFID (2003) as 'the social resources upon which people draw, in pursuit of their livelihood objectives.' As a result of project activities resources were developed through;

1. Interactions, particularly within the group but with external agencies too, which increased people's ability to work together. Sharing of issues and the sociable and informal nature of the activities were appreciated as important aspects of the approach;
2. developed relationships of trust 'horizontally' within the groups and in some cases 'vertically' with the government officers which facilitated co-operation, for example, enabling appropriate aquaculture extension, development of the market for seed and linkages to service providers.

Physical capital

Comprises the basic infrastructure and physical goods that support livelihoods. Physical capital gains were fish seed of an improved strain of tilapia that the hatchery operators in Surin received from the DoF. This was tied into the development of a collaborative linkage with the DoF to monitor the growth and production of the strain under hatchery and grow-out conditions. The group from Ban Hua Chang also received a bag of *Pangasius* seed each on their first visit to the station at Kalasin to discuss training. Following the training session they bought several more bags to rear as broodstock.

Financial capital

Demand for seed from hatchery operators in Surin increased through their contacts with farmers in the debt relief project. There was also a more equitable share of government quota at premium prices with sales made through the SFC. The Hae Tai group secured information that would enable them to access funding from the government to provide low interest loans to group members.

4.3.2. Policies, Institutions and Processes

It was anticipated that through the research collaboration with the DoF the outputs and outcomes of research project might inform both the planning of strategies for extension

service provision and institutional research processes. There were impacts of the research on local groups and institutions resulting from actions taken.

Service provision strategies and institutional research processes

The potential for impact on these two features of the PIPs context was negated by weaknesses in the partnership. The weaknesses were due to the combination of an arrangement to collaborate which did not include the implementing agencies within the DoF and did not establish clear roles and responsibilities, lack of ownership of the research within DoF and deterioration of the personal relationship with the DoF coordinator.

The formal agreement only covered collaboration with the Inland Fisheries Division and because of that we were unable to involve the Development and Technology Transfer Division. The only way that we were able to work was 'piggy-backing' the AOP agreement so there was no chance of developing a completely new MoU to work with the DTT. At the time this was not seen as being too big a problem, the assumption was that inter-divisional communication would take place given the DoF reputation for monolithic tradition and particularly since the name of the extension division indicated an organisational culture that maintained the criticised (Chambers, 1983; Russell & Ison, 2000) tradition of 'transfer of technology' (ToT) model whereby the outputs of research are delivered to farmers. Sinchaipanich later reported that even this basic relationship did not exist formally within the DoF (Sinchaipanich, 2003).

The other disadvantage of the MoU was that it represented a compromise that enabled work to continue rather than an agreement to work together on issues of mutual concern. We were 'tagged onto' an existing inter-agency collaboration (DoF and AOP) which had broadly similar objectives and we only had human resources and an idea about an approach to research to bring to the relationship. This might have worked if we had a true collaboration but the idea for research was mine and we were trying to

impose it on the DoF. We had adopted the ToT approach in dealing with our institutional partners neglecting their different appreciation of the same context (Ison *et al* , 1997). Lack of ownership of the research was demonstrated by the minimal engagement by DoF in the planning phase.

One of the eleven key lessons from the Hanoi workshop (Hussein *et al*,2001) recognised the need to identify appropriate partnerships for the dissemination and uptake stages of the project and the need for clarification of the strategy and process of working with partners. Contributions to a strategy suggested by experience were; evaluate capacity of the institutional partners particularly with regard to dissemination processes but also with regard to both intra-agency and inter-agency cooperation and communication. Roles and responsibilities should be negotiated openly, explicit and subject to monitoring and evaluation. Partnerships should be based on common concerns, complementarities and respect not personal relationships or traditions.

Partnership in the participatory action research fieldwork was more effective with impacts on the PIPs through strengthened local networks and producer groups demonstrated by the indicators of research outputs, action plans, records of activities most notably the contacts developed between the hatchery operators and public institutions. Indicators were backed up by the participatory evaluations. The significance of this is that activities in the field carried out under the research project led to engagement with agencies that have the capacity to influence their livelihood prospects and choices (Ellis, 2000) and participation in the processes that impact livelihoods. The groups were able to articulate their needs successfully, the response from the supply side was generally good and members reported that their groups were stronger as a result of the activities. Furthermore both the hatchery operators and the participating DoF officers felt that the linkages would be maintained though whether

future interaction without the acknowledged benefit of external facilitation would involve representation by the group as the voice of its members was not certain. Farrington & Hussein (2000) identified a number of actions that would be required to strengthen linkages including; specific initiatives addressing technical, economic and management capacity building for the farmers' organisations, changes in structures and processes in supply-side research and extension agencies in order that they can respond to farmer needs, material and professional incentives for researchers to respond to the needs and demands, supportive institutional environment with funding and capacity building support for the use of participatory methodologies and clear contractual agreements between the groups and research and extension agencies.

4.3.3. Vulnerability context

The shocks, trends and seasonality that impact peoples livelihoods, both positively and negatively, and over which they have no control are the factors contributing to vulnerability context in the livelihoods framework. Shocks have been classified (DFID, 2003) into; human shocks such as illness, natural shocks such as floods, economic shocks such as price fluctuations, conflict and crop/livestock health shocks. Trends involve changes over a period of time for example trends in population, resource use/degradation/development, economic trends, political/governance changes and technology trends. Seasonality refers to seasonal changes in, for example, production, employment opportunities, prices and market demand.

The results of project activities were linked to both the shocks and trends factors of the context. Improved marketing, expanded markets, diversification of species produced, reduced inputs cost and access to cheap credit reduced vulnerability to economic shocks and trends. Discussion with other farmers and DoF biologists about disease and predation and the planned training in disease management addressed vulnerability to fish disease. The participatory action oriented research responded to

positive trends in local governance which should lead to greater accountability and service.

4.4. Efficiency

Efficiency is evaluated by asking 'was the project carried out in the best possible way?' (Woodhill & Robins, 1998) referring to way that resources were used in achieving outputs. Efficiencies associated with collegial participation with fishers reported by Campbell and Salagrama (2000) were for the professional researcher; quick and cheap access to the indigenous knowledge base. For the fishers the advantages were a more reliable and faster method of research and a wider perspective on problems and possible solutions. Broadly similar efficiencies were experienced in the project reported here; information about hatchery operators emerged from the research relatively quickly and cheaply and participating hatchery operators reported that they found the project to be efficient. Therefore on a functional level it could be said that the project was efficient. However, in a wider sense the question of efficiency calls for reflection on methodology.

1. Practically, implementation of the project by a team that was experienced in action research would have reduced delays that occurred while the team gained experience and potentially resulted in more outputs and thus benefits for the participants. There was an associated ethical issue as to the advisability of an inexperienced team becoming involved in participants' lives using a methodology that had at times been associated with radical activism (Stringer, 1996). The potential for emergence of conflict was apparent at times and though the Thai norm of avoiding conflict (Mulder, 2000) always prevailed conflict management training would have been an appropriate contingency.
2. The issue with institutional partnership has been discussed already. In short the process of developing appropriate partnership should have involved evaluation of capacity particularly with regard to uptake and dissemination, ideally use of the same

participatory principles in project planning and development as were planned for the fieldwork, clear communications and specific formal agreements. At a personal level greater sensitivity and people skills were required.

3. The exploratory nature of the process meant taking a flexible view of results and time-frame which concerned both the DoF, because they needed to prepare rigorous activity plans as a matter of bureaucratic routine, and hatchery operators who wanted to know what they would get out of collaboration. For institutional partners appropriate capacity building would have improved the situation but for the participating farmers it was a case of 'learning by doing'.

5. Conclusions

5.1. Conclusion about appropriateness

The project purpose referred to improvement of smallholder, freshwater fish seed production and the project objective was to evaluate participatory action research as a methodology to facilitate the changes required for improvement through two phased activities. In terms of carrying out an appropriate set of activities to meet the project purpose given the needs of stakeholders, research programme guidelines and project context, the reflection in Sections 4.2.1 and 4.2.2 suggested that the objectives were appropriate though it was recognised that the needs and perspectives of other stakeholders such as traders and grow-out farmers (though some participating hatchery operators were traders and/or grow-out farmers), which were likely to be equally rational and relevant to a broader synthesis or problem formulation (Ison, Maiteny and Carr, 1997), were not taken into account. Furthermore the institutional partnership would have benefited from a more specific formal agreement which included the involvement of agents from the organisation that could have ensured uptake and dissemination. Both of these issues are more relevant to evaluation of effectiveness of the approach.

5.2. Conclusions about effectiveness

The examination of effectiveness in this section has taken a broad view of how indicators from the fieldwork relate to the SL framework; the study was not designed within a livelihoods framework though it was influenced by the guiding principles of the approach. The SL framework is a model reducing the enormous complexity of people's lives to main factors and key linkages and its use for evaluation was not to quantify these factors by attaching values to indicators but more about looking at trends; whether the livelihoods are evolving in the right direction (SFLP, 2003). In terms of project results there was a clear indication that assets were developed and some links

were drawn to potential for reducing vulnerability. The sustainability in the long term was uncertain since the impact on PIP context was negligible.

A functional benefit of collegial research collaborations in fisheries and small-scale aquaculture, those which involved professional and community researchers collaborating to generate knowledge on a constraint of mutual importance was the validity of results in terms of the socio-economic and institutional situation (Campbell & Salagrama, 2000). Collegial collaboration corresponds to the 'interactive participation' in Prettys' (1995) typology and describes the level of participation achieved in the project. The knowledge generated by the project was valid and useful to participants and showed benefits under the analytical framework favoured by the donor, and in this respect the methodology was effective. Lack of knowledge, for example not knowing about rights or services available to them put people at a disadvantage and increased their vulnerability (Schilderman, 2002), participatory action research countered that by empowering participants not only to develop practical knowledge but also built solidarity and confidence to engage in change activities. Knowledge and power are closely linked, hence the aphorism 'knowledge is power'; in this empowering research process participants developed power of competence, connection and confidence through acquisition of, respective to the three types of power; representational knowledge, the knowledge needed to resolve their issues, in the process they developed relational knowledge, the knowledge that they were not alone and, reflective knowledge, the experience based knowledge arising from engaging in meaningful action (Park, 2001).

Given the lack of ownership of the research by the DoF and the institutional capacity issues reported by Sinchaipanich (2003) the empowering approach taken was probably the most effective option for the hatchery operators; change can happen

because of policies or it can be due to process factors such as participation and its effects (DFID, 2003). All the groups recognised the importance of external facilitation and ideally this support would have been extended at least until the group felt that there was no more need. Although the response from, and to the DoF staff from the stations was very good, long-term outcomes from the institutional partnership did not happen. In order that the outputs of research could inform policies and strategies there would need to have been a mechanism that could feed the information into the planning process; such a mechanism was not established.

In summary the short-term benefits for participants were clear and indicated that the research process was effective in enhancing assets with potential to impact vulnerability for a range of participants. However in terms of impact on policy and wider uptake, as a result of shortcomings in the institutional partnership arrangements and problems in the interpersonal relationships within the partnership the project was ineffective.

5.3. Reflections on methodology

The main issue with regard to methodology was in reconciling the knowledge outputs, which were primarily experiential knowledge for both farmers and researchers, within the apparent expectations for a traditional academic thesis framework;

- Participatory action research is action-oriented, the answers to 'why' questions in this investigation could only come from literature, as 'how can we improve things?' was the question in the field and not 'how does this work?' (Mosse, 1998). The major goal of action research is to generate local knowledge that is fed back into the research setting whereas dissertations require public knowledge that is transferable to other settings and is presented in such a way that readers can see the potential for application to their situation (Herr & Anderson, 2005).

- In order to maintain a productive collaborative arrangement with the hatchery operators, data extraction was, rightly, extremely limited and therefore outputs were qualitative. This situation might have been improved had there been time to develop advanced language skills or resources to obtain professional translations of field outputs for a more thorough textual analysis. This confirms Rule 4 of Cookes' (2004) rules of thumb for participatory change agents; 'work only in languages you understand as well as your first'.

In terms of general criticisms of participatory research methods the fieldwork met all of the quality criteria set out for assessing participatory activities by Adnan, et al (1992), Pretty (1995) and Anderson & Herr (1999). Furthermore the action research project also took informed discussion of the problems of PRA cited by Townsley (1996) by consciously monitoring and correcting expectations of the project, all plans developed by participants were realistic and actionable, the project team deliberately avoided attempts to 'capture' activities by a local elite group in Mahasarakam.

The relatively short period of engagement and lack of follow-up was a significant shortcoming. Personal efforts to obtain funding support for further work and evaluation with the hatchery groups were unsuccessful. Action research facilitation requires a combination of theoretical knowing and know-how and an ongoing process of acquisition of skills to develop greater competence would certainly have improved the outcomes both for the participants and researchers and in terms of academic quality.

Ultimately as Checkland (1972) has pointed out methodology is undecidable *i.e.* it can be neither proven nor disproved and the process of learning about methodology will lead to the conclusion that the key questions 'does it work?' or 'is it any good?' have no clear answer. Therefore it is up to would-be users to decide whether the methodology would be appropriate for use in any particular context.

5.4. Conclusions about the research problem

The conclusions from evaluation have covered all aspects of the way that the research addressed the research problem. The project has the potential to contribute to ongoing dialogue about rural development policy and practice with particular reference to contexts where aquaculture is a feature. Martinez-Espinosa (2000) and Campbell & Salagrama (2000) have specifically called for further examples of experience of participation in fisheries and aquaculture research.

5.5. Policy implications

Issues arising with regard to research policy are; that programme management should question the need for more technical research unless suitable preliminary research has enabled stakeholders to identify that need. Greater efforts should be made in institutional capacity appraisal, including self-appraisal, with a view to establishing more effective partnership that integrates capacity development with the research activities.

The shift in international development policy towards a focus on learning and capacity building means that the distinction between research and general development activities is becoming irrelevant (Hall, 2002) and therefore there is a need for approaches that have both and action and research orientation such as participatory action research. There is an important implication from a donor/government administrative point of view in that through adoption of action research approaches there should be improved efficiency through the integration of the 'research' and 'development' functions (Clark *et al*, 2003).

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Glossary

Definitions of certain key terms, which have been adopted for this research, are provided below.

Aquaculture
An activity carried out primarily to produce food and fibre by the deliberate and controlled use of aquatic plants and animals. As a subject it is multi-disciplinary in nature consisting of a purposeful blend of science and non-science (adapted from Speddings' (1988). definition of agriculture).

Emergent property
A characteristic of an entity that could not be predicted by reducing it to its constituent parts. Implied in the phrase “the whole is greater than the sum of its parts”.

Evaluation
An assessment of the overall progress and worth of a project (Woodhill & Robins, 1998)

Fish seed
The hatchling or juvenile fish traded for stocking in ‘aquaculture systems’.

Fish seed quality
An emergent property of the 'seed production system' in aquaculture it is the cumulative result of the decision-making that arises from interaction among stakeholders.

Knowledge ‘Information and skills that we can use to develop our farming practice’; a translation of a definition agreed by hatchery operators in Surin when questioned about the meaning of knowledge gained which they reported in routine evaluation. The definition was accepted by hatchery operators from other groups and corresponds to the definition by Drucker (1994) in relation to the knowledge-based economy where knowledge is information that changes people or things either through providing the

grounds for actions or enabling people or organisation to take different or more effective action.

Outputs
Completed activities, products made and/or abstract achievements (e.g. satisfaction) that are produced during project activities.

Small-scale farmers/hatchery, Smallholders
This refers to households which do not rely on paid, external labour in the day-to-day operation of their farm.

Systems
Intellectual constructs that help us understand the complexity of human experience Following Woodhill & Röling (1998) who emphasise that 'systems' are constructs and not 'real' entities, any terms to identify 'systems' described in the report will be placed in quotation marks.

Appendix 1: Key parts of the original application for project funding to the Aquaculture Research Programme, taken from the form RD1.

1. **What developmental problems or needs is the project aimed at?**

The project aims to address the problem of poor quality fish seed, particularly of carp and tilapia, and its negative impact on smallholder fish culture. The nature of the problem appears to be both situation and species specific; farmers in Bangladesh may find over-wintered or hatchery carp fry perform poorly compared to new season or wild captured seed, respectively. Farmers raising tilapia in Thailand may find deterioration in quality over time. In all countries the importance of minor carps and wild swamp fish species within stocked culture systems will be assessed. Variability in the performance of stocked seed can make returns, both financial and nutritional, unpredictable, reducing the attraction and value of aquaculture to resource-poor farmers.

2. **What is the evidence for the demand for the research?**

Regional and national for a for hatchery operators (e.g. Jessore) have raised quality as a serious issue affecting their business. Commercial hatcheries in both Thailand and Vietnam, and district-level officials in Lao PDR have all identified the monitoring of seed quality to be of importance to the continued growth of fish culture. The College of Agriculture and Forestry, Ho Chi Minh City recently produced a State of the System report in which seed quality was raised as a policy issue. The complexity of fry production and trading networks have obscured the underlying reasons for poor seed quality but Governments in each of the countries concerned have highlighted the issue as one major concern.

3. **What will the project contribute to resolving these problems or needs and over what time-scale?**

A better understanding of the factors affecting fish seed quality in the targeted areas will be an essential step, allowing partner institutions to use their scarce resources more effectively to improve the situation. Simple tools to monitor seed quality developed in the research period, and modified and improved in a follow-up project, should make quantitative assessment possible and practical under local conditions.

4. **What is the geographical focus of the project?**

Fish is of major dietary importance and aquaculture has been identified as an important part of rural development in all the following proposed project areas

- **(i)** Dinajpur Province, Bangladesh
- **(ii)** Savannakhet Province, Lao PDR
- **(iii)** Udonthani Province, Thailand
- **(iv)** Song Be Province Southern Vietnam
- **(v)** Red River Delta, Northern Vietnam.

5. **Which are the identified target institutions?**

- **(vi)** Northwest Bangladesh Aquaculture Extension Project, Dinajpur, Bangladesh
- **(vii)** Department of Livestock and Fisheries, Savannakhet, Lao PDR
- **(viii)** Centre for Fisheries Research and Development, Udonthani, Thailand
- **(ix)** College of agriculture and forestry, Ho Chi Minh city, Vietnam
- **(x)** Research Institute for Aquaculture Number 1, Hanoi, Vietnam

6. What are the proposed promotion pathways for the uptake of the project outputs?

- **(xi) Market studies carried out for project outputs:**

No formal market studies have been undertaken to establish demand for improved fish seed. However the growth in demand for improved tilapia seed inboth Thailand and

Vietnam has outstipped supplies resulting in intense commercial and Government interest in processes/methodologies for producing and monitoring seed quality.

(xii) How outputs will be made available to intended users:

The outputs will be produced and tested together with the partner institutions which will be the primary users.

(xiii) Further stages needed to develop outputs:

Further work to improve fish seed will depend on the nature of the underlying reasons for poor quality, but it is envisaged that the initial proposed phase of 18 months will require a follow-up period of a further 2 years.

(xiv) How will further stages be carried out and paid for?

Depending on the nature of the further stages, it is hoped that the partner institutions and AIT Outreach project would continue their financial support. Local producers should be able to self-finance quality control, as benefits become mores established.

(xv) Dissemination mechanisms:

The initial workshops will b e managed to ensure ownership by the partner institutions and will produce 'State of the System" reports. Depending on the situation, simple leaflets/manuals in local languages will be developed to disseminate information about seed quality relevant to the locality. Personal professional contact and reporting will also stimulate exchange of information, culminating in a regional workshop to be held at AIT in which participants will be drawn form each project site. The need for a holistic approach to ensure sustainable availability of high quality seed will be promoted locally through local language scientific articles and internationally, through a peer-reviewed journal article, based on the projects findings.

7. Who will the beneficiaries be and are there any groups who will be disadvantaged by the application of the research findings?

Improved quality fish seed will bring direct and indirect benefits to all producers, intermediaries and consumers of fish in the countries in which the project is active. Higher quality seed will benefit the growers and consumers of food fish by reducing production and subsequently purchase costs. Poorer marginal people who often dominate fish seed trading networks will benefit if seed is of better quality or if they have access to methods/technologies that allow them to monitor condition.

8. Is this proposal a continuation or extension of work already funded by DFID?

DFID has funded research to improve the performance of food fish in Asia, mainly through the genetic improvement of carps and tilapias e.g. R6938. Improvement and regional evaluation of the YY male technology. Improving the quality of fish seed has also been a component of the DFID supported Northwest Bangladesh Aquaculture Project. An overview of hatchery development in selected parts of Asia was also a component of a DFID-funded project (ODA Support for Aquaculture at the Asian Institute of Technology, SEADD regional budget).

Appendix 2: Project Logical Framework from the project proposal form RD1.

Objectives	Indicators	Means of verification	Assumptions
Goal Sustainable yields from small-scale extensive and sem-intensive aquaculture production increased	Number of small-holder fish farmers seeking to adopt improved quality seed increased by 20% over baseline	Reports of target institutions; national statistics	-Continued suitability of cultural, environmental and climatic conditions -Favourable institutional environment and effective relationship between partner institutions and implementers
Purpose Asian freshwater fish production sustained and developed through improved approaches to small-holder seed production, based on identified constraints in output, quality and supply	by 1999 quality and yield of seed and food fish improved under a variety of physical, social and economic conditions monitoring of fish seed quality using project methodologies	results of experimental trials reports of target institutions	freshwater fish are important to farmers and institutions off-farm factors remain favourable
Output a comparative analysis of constraints to seed availability and quality in the project areas, reports of findings disseminated to stakeholders and project memoranda for further collaborative work on researchable constraints	background reviews, discussions, hatchery and field based assessments being conducted, locations identified workshops at each location picking up and examining key issues Production and dissemination of materials Workshops disseminating and adapting project findings Hatchery, nursery operator, trader or farmer adoption off recommendations and methodologies Involvement and discussions with participating institutions Project memorandum document	project reports, assessments, published papers workshop proceedings reporting of target institutions Workshop proceedings Reporting of target institutions Surveys of farmer/trader practice Meeting/institution reports Document copies	target institutions able to maintain co-operation and invest resources in uptake and application of research end-user linkages identified and developed
Activities 1.1 survey to describe seed supply context, identify problems and significance locate communities/areas where fish seed quality is a constraint 1.2 local workshops, partner institutions, seed networks and farmers. Describe current practices and constraints for quality of smallholder fish seed 1.3 using farmers performance criteria, trials comparing seed quality; may include: *Thailand*: tilapias on-farm cf introduced stocks; silver barb from local commercial hatcheries cf seed from government stations *Lao PDR*: carps and tilapias at district level cf Provincial hatchery seed and imported Thai seed. *Vietnam*: seed from itinerant traders cf Government hatchery, over-wintered carp and tilapia cf new season seed. *Bangladesh*: carp, tilapia seed from improved, introduced stock cf local/distant commercial hatchery seed,			

Objectives	Indicators	Means of verification	Assumptions
over-wintered carp and tilapia cf new season seed 1.4 on-station research for methodologies to monitor larvae of a variety of species, including challenge test protocols using simple available consumables and hapa-based nursing trials			
2.1 produce project findings and reports, conduct local workshops on implications for technical and organisational change for researchers and planners in partner institutions 2.2 produce preliminary guidelines for policy makers, hatchery and nursery operators, seed traders and farmers on seed quality and on appropriate management of seed production and delivery			
3.1 with partner institutions, plan priorities and approaches for further research to address constraints in fry production and quality, and to develop uptake pathways and indicators 3.2 prepare project memoranda for the second phase.			

Appendix 3: Content of the Interim Memorandum of Understanding for AIT-DoF Project Cooperation, March 2001.

1. Introduction

The Department of Fisheries (DoF) of the Royal Thai Government and the Aquaculture and Aquatic Resources Management (AARM) program of the Asian Institute of Technology (AIT) have long cooperated in the development of small-scale aquaculture for rural poor people in Northeast Thailand. In particular, since 1988, there has been successful co-operation under the Aqua Outreach program, funded by the Department for International Development (DFID) of the UK Government. This program successfully tested low-cost technologies for aquaculture development and assisted in the dissemination of these technologies through innovative extension methods and capacity building with the local staff of DoF. This Project ended in December 1999 and the final report and formal closure was at the end of June 2000. In addition to the DFID funding directly to AIT, the Project facilitated several specific research projects: from USAID under the Collaborative Research Support Program (CRSP) in Pond Dynamics, from the Marine Resources Advisory Group of Imperial College, London on Communal Fisheries, and from the Institute of Aquaculture, University of Stirling in Fish Seed Quality.

Since early 2000, AIT has been negotiating with the Swedish International Development Cooperation (Sida) to extend its existing support to the AIT Aqua Outreach program to Northeast Thailand. The Sida support to AIT has supplemented DFID support to AIT in the development of small-scale, low-cost aquaculture, but it has emphasized also the development and management of small-scale, community-level aquatic resources, since this focus is perceived to offer particular benefits to the poorest groups in rural areas.

At the beginning of July 2000, an initial meeting of DoF and AIT in Udorn Thani confirmed that DoF was indeed interested in cooperation around such a focus and three topics of cooperation were identified for a possible project, namely:

(a) Improved strategies for the development and management of Village Fish Ponds.

(b) Strategies for the development and management of Community Fisheries

(c) Technical backstopping for small-scale aquaculture particularly oriented towards poorer groups.

AIT has already included these ideas for a component in Thailand in its revised proposal to Sida for support over the period 2001-2003. In this proposal, it has requested that further time be given to the development of the proposal in Thailand, because of the complexity of the new institutional context for natural resources development in the country and the need to carry out thorough consultations with all possible stakeholders. Sida has responded positively to the idea of an inception period during which a more detailed proposal can be developed.

2. Content

The DoF and AARM program of AIT agree to develop a cooperative project in the following fields:

(a) Improved strategies for the development and management of Village Fish Ponds

(b) Strategies for the development and management of Community Fisheries

(c) Development of small-scale aquaculture, particularly oriented towards poorer groups.

In signing this Interim Memorandum, the two parties agree to work towards the signature of a full Memorandum of Understanding (MoU) by March 31st, 2001. Apart from the cooperation under the Sida funded Project, this MoU will include provision for continuing activities under the Fish Seed Quality Project with funding from the Institute of Aquaculture, University of Stirling.

In preparation of this full MoU, the parties agree to undertake the following activities:

(a) Jointly collect and analyse through informal workshops existing information on community fisheries[13] in a minimum of two pilot provinces in Northeast Thailand (Udonthani and Roi-et have been provisionally selected) and in the fish seed production and delivery system in the region;

(b) Jointly develop criteria for the selection of study sites representative of the different community fishery and small-scale aquaculture contexts in the region.

(c) Jointly conduct participatory assessments of selected community fisheries and small-scale aquaculture systems, with a view to identifying possible management interventions.

(d) Conduct workshops and key informant interviews with relevant provincial authorities and local governments (Tambon Administrative Organizations) to explain project objectives, to understand the current institutional context and to develop agreements on an implementation plan of pilot research and development projects for the improved management of the local fisheries and aquaculture systems; and

(e) Develop the full MoU, including an appropriate organization structure for project implementation and management, a project operational plan and

[13] Including Village Fish Ponds

appointment of a project co-director/coordinator (to be completed and MoU signed by end March 2001).

In support of these activities,

AIT will provide

- The services of its advisory staff and technical field staff in support of DoF provincial and district officers and fisheries centres/stations;
- Operational expenses for travel and *per diem* of AIT staff and/or DoF staff, if necessary, office running costs and all necessary materials and supplies;
- Expenses for workshops and provincial meetings (operational expenses, including travel and per diems, as necessary);
- And, activities under the Fish Seed Quality Project, such as workshops and copies of the State of the System Report on Northeast Thailand.

DoF will

- Facilitate the participation of its staff in target provinces in information collection, provincial workshops and participatory assessments of community fisheries;
- Disseminate the State of The System reports from the Fish Seed Quality Project to provincial fisheries offices and research stations and through them to seed producers and transfer of technology centres
- Allow continued use by AIT staff of existing office facilities at the Udonthani Freshwater Fisheries Development Centre and, if necessary, use of office space and accommodation at the Roi-et Fisheries Development Centre;

- Appoint a project coordinator responsible for coordinating the above activities and the development of the full MoU.

Overall responsibility for the implementation of this Interim MoU will rest with the Deputy Director General of DoF (Dr Upatham Pawaputhanon na Mahasarakam) and the AARM Outreach Senior Advisor (Dr Harvey Demaine). Day-to-day management of activities will be carried out by the DoF Project coordinator and the AIT Program Advisor for Northeast Thailand (Mr Danai Turongruang).

Appendix 4: Outline work plan; a discussion document for a meeting at AOP regarding the next phase of Fish Seed Quality in Asia project,12th February 2001

Project Objective/Purpose (from the original logframe): to develop sustained freshwater fish culture through **improved** approaches to seed production based on the **identified constraints** in output, quality and supply.

The SoS report raised many issues.

Trials carried out by DoF have confirmed the belief that seed quality is a real problem. Variability existed in both public and private sectors. **No real indication of likely causes for the variability in quality was** possible.

Options;

(1) Continue with technical trials to identify the causes of seed quality problem through controlled experiments. This process would take a lot of time and resources and it is likely to confirm that the specific problems, if they could be separated were the typical seed production problems which are already known (a complex mixture of genetic, nutrition, health and handling factors, for example)

(2) Accept that there is a complex problem (may be several factors combined to effect seed quality), and instead of looking for problems look for ways to improve the situation using existing knowledge.

(3) Do nothing and hope that the situation will improve over time.

I believe that the key to this issue is information and the way it flows in the system. There is a place for technical research but once you have the results from an experiment, what do you do with them? Without a mechanism for uptake what is the use of

recommendations? Before you begin how do you know that you are researching the right thing? When you are finished how do you know if your results are having any impact on the target group?

What we know already;

- There is variability in fish seed quality, this effects farmers even if they don't know it.
- A large number of 'actors' are involved in the seed delivery system. Informal dialogue already exists between these groups.
- DoF have committed themselves to focussing on poor farmers in small-scale aquaculture (and community fisheries) and working with producer organisations (such as the hatchery operators).
- DoF has considerable technical expertise in fisheries research, genetics, health, extension and general husbandry.
- Other institutions are also involved in the aquaculture sector in this area; DOVE, universities, projects/ngo's
- The Thai government is committed to a process of decentralisation. What this will mean for the existing services they provide at provincial and district level is uncertain (to me).

What to do about it;

I propose to work in collaboration with the DoF to

(d) Examine existing communication system using participatory methods. Specifically to get information on the 'service' that actors within the system would like in terms

of seed quality. What is quality to them? This will involve key informant interviews, focus groups and survey work.

(e) Institutional analysis within the system, what are the institutions and linkages currently, are they adequate? How could they be improved? This will take place at the same time, and with the same subjects as (1) above.

(f) Stakeholder workshops using the information to arrive at practical solutions.

My role - research facilitator. My focus will be on the *process,* i.e. the way things are done **not** what is achieved. This should be along the lines of; Plan > Act > Review > Plan > Act > Review > at each stage looking both at the problem that is being researched and at the way in which it is being investigated. The key is to enable the stakeholders to analyze the issues themselves.

This process is iterative which means that specific planning is not possible. It is a circular, learning process.

Immediate Activities;

(1) Discuss the details above, what further information is required

(2) Discuss need for a formal agreement/MoU and logframe.

(3) Identify where and with whom we should hold preliminary meetings.

Appendix 5: Memo summarising workplan and human resources requirements

MEMORANDUM

To: Khun Nappaporn, Station Chief Mahasarakham Inland Fisheries Research Station, Supawat Komolmarl, Noppanun Yoorong (both DoF/AARMAARM liaison persons) and Danai Turongruang.

From: Angus MacNiven, AARM/SERD, Asian Institute of Technology, PO Box 4 Klong Luang, Pathumthani 12120.

Location/Date:Udonthani, 25/07/01

Subject: Mahasarakham Case Study Proposal - DoF/AARM Research collaboration under Fish seed quality in Asia project.

For your comments:

The following are the initial four stages of a case study to be carried out with the hatchery operators' cooperative in Kosumpisai, Mahasarakham province. The methodology that will be used is a valid form of research. There is a lot of scope for flexibility within this framework.

1. Training/orientation of research team.

The core research team will consist of AM and a Thai Research Assistant joined by a member of the local DoF, staff from AARM Outreach and DoF/AARM liaison. This stage should take one week.

2. Hatchery operators' appraisal

This will take about one week for the appraisal (stage 2a) with one week to synthesize and analyze outputs (stage 2b). Ideally the research team of 3-4 persons will do both stages 2a and 2b.

3. Key informant interviews.

Talking to the stakeholders identified in the appraisal stage to triangulate information (3a) followed by synthesis to build up the picture of the system (3b). Depending on the availability and cooperation of stakeholders this may take from 3-4 weeks.

4. Meeting/workshop with stakeholders to feedback analysis and develop an action plan for further activities. All of the research team should be involved. The workshop should take 2-3 days but allow one week for organisation and synthesis of outputs. The activities are impossible to know in advance but may include research, training or more workshops on specific issues and at least 2 more weeks of staff time could be scheduled.

The project will cover normal expenses incurred and *per diem* for DoF staff.

We will try to settle as much of the details as possible in the informal discussion today. However it is likely that further issues will come to mind later. In this case, I would be pleased if you contact me by telephone, fax, email, letter or in person by August 3rd to add any comments.

Appendix 6: Job description for Research Assistant in Fish Seed Quality in Asia project.

Position Purpose

The Research Assistant (RA) is responsible for assisting the Research Specialist (RS) in undertaking and processing the field research work for the Fish Seed Quality in Asia project, under the Aquaculture & Aquatic Resources Management (AARM) Programme at the Asian Institute of Technology (AIT). This project is facilitating research in the fish seed supply system in the Northeast of Thailand with a view to improvement of smallholder seed production and trade.

General Job Description and Responsibilities

The RA will probably be based in the Northeast of Thailand working under the direct supervision of the RS, and at certain times under local supervision by staff from AARM Outreach in Udonthani. The project is funded by the U. K. Department for International Development, Aquaculture Research Programme and managed by AIT. Principal Investigators are Dr David Little and Prof. Peter Edwards.

The research, which will follow in-depth orientation and training, will involve a mixture of qualitative and quantitative methodologies to work within the networks of fish hatchery operators in at least three provinces looking at issues of information flow, institutional support and development of practical problem-solving ability among the client group.

Major activities will be undertaken as a member of a research team and will include inputs into the development and delivery of presentations about the project during

workshops and meetings. Social survey, investigative interview, synthesis of results and the translation/interpretation of outputs will also be carried out.

Specific duties

- Translation/interpretation of project materials, including aims and objectives, methods, progress and findings for presentation during appraisal meetings, interviews and workshops.
- Synthesis of meeting minutes and other outputs.
- Liaising with and interviewing key stakeholders.
- Participation in join-interpretation of results and findings
- Other project activities as required.

Requirements

- Experience of working with people (confident and patient with good communication skills, especially listening).
- Willing to travel and prepared for flexible working hours
- Thai national. Lao/Isaan speaker preferred.
- Good standard of English language, spoken and written.
- Minimum qualification; Bachelors degree in Social Sciences, Rural Development, Natural Resources Management, Agriculture/Aquaculture or Fisheries.
- Computer literacy would be an advantage.

Conditions

The position is available immediately and is initially for a period of eight months, subject to review. Salary is dependent on qualifications and experience and is in the range Thai Baht 11,960 -29,115.

Terms of Reference for a consultant to support the Fish Seed Quality in Asia Project

1. Project Purpose:

Asian[i] freshwater fish production sustained and developed through improved approaches to smallholder seed production, based on identified constraints in output, quality and supply.

2. Statement of Research Problem:

The problem addressed by this project is how are we to meet the project objective? Specifically;

How to improve the quality of fish seed supply and performance in smallholder aquaculture systems in Northeast Thailand through improved approaches to seed production, based on identified constraints in output, quality and supply?

Further details of the scope of the project can be seen in the Seed Quality Project Terms of Reference.

It has been recognized that knowledge of participatory methods in the partner institutions are limited and following the resignation of the project Research Assistant, there is a need to engage a consultant to carry out some Participatory Rural Appraisals with the farmer groups, in order that the deadline, set for the end of March, can be met.

3. Boundaries:

- The system to be investigated is the knowledge and information systems of the private hatchery sector in Northeast Thailand, specifically those operators who are organized into cooperatives in Surin and Mahasarakam

- The research starts with an interest in the problems of the hatchery operators and traders. The objective is to assist them to understand the situation and resolve problems that confront them.
- The research focus has two elements, which is characteristic of action research; (a) practical planning, action and review with the farmers, and (b) development of the research methodology as a process.

4. Specific Issues to be addressed by the consultant:

- Participate in preparation meetings with the research team before the fieldwork.
- Facilitation of meetings with farmers. Clarification of the project objectives and promotion of partnership with the cooperative.
- Assist the research group in interpretation of outputs.

5. Desired Outcomes/Outputs:

- Information about the problems and knowledge networks of the hatchery co-op members.
- Understanding of the project process by the farmers and promotion of the concept of partnership with the co-op to deal with problems.
- Improvement of the research groups' understanding of participatory methods.

6. Persons Involved:

Principal Investigators are Dr David C. Little, Institute of Aquaculture, University of Stirling, U.K. and Professor Peter Edwards, AARM. Prayadt Wangpen and his staff are the key local research team members. Supawat Komolmarl is the main DoF liaison officer. Khun Ravee from the Surin Inland Fisheries Station will be the local DoF

representative in Surin, Khun Jirapong and Seksan will be the main DoF staff in Mahasarakam. Project coordinator with main responsibility for research design and facilitation is Angus MacNiven.

7. Project Administration issues:

7.1 Timeframe

This phase of the project has been underway since April 2001, and should be completed by March 31st 2002. The consultant will be required for 8 - 20 days in November and early December 2001. A more exact timeframe and timetable for consultation can be planned as the project develops.

7.2 Meetings

The consultant will meet with the research team and other stakeholders to a pre-planned schedule

7.3 Resources

The consultant will receive THB 3,000 per day for services to the project. Records to be kept by the consultant and submitted to the project coordinator.

7.4 Reporting

Project documents will be produced as required to which the consultant will contribute. This will be coordinated by Angus MacNiven. Knowledge generated remains the property of the project and may only be published independently with the consent of the Principal Investigators.

Appendix 7: Participatory methods used in the field work

1. Mapping was chosen as a rapid means of developing an overview of the situation with regard to physical/environmental, social and infrastructure features. The process was

(1) Explain and discuss the purpose of preparing the map with the participants.

(2) Establish the boundaries of the map; in this case we agreed that it should be the area where the hatchery activity took place

(3) Ask one of the participants to be responsible for drawing the map based on guidance from the group.

(4) External researcher promotes participation through questioning about local resources, infrastructure and community institutions and facilitates discussion.

2. Seasonal calendar provides a means to quickly understand patterns in human activity and resource use.

(a) Using poster paper or white board facilitators make a large matrix with a calendar across the top and plenty of space for events down the side.

(b) Participants are asked to fill in details of annual events and patterns of activity by writing, using symbols or colour. This can be facilitated by prompting participants to begin with important local festivals, holidays, etc as reference points.

(c) The calendar can be targeted to particular sets of activities or resource use patterns. An example is show below

(d)

Events	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Festivals												
Crop cycle		planting										
Weather		Hot season			Wet season							
Migration												

3. Stakeholder analysis begins with brainstorming then leads into discussion and categorising. The process was as follows;

(a) Facilitator asked the following question "Whose life or job affects or is affected in any way by hatchery activities?" This question was also written down at the top of the flipchart page.

(b) It was emphasised that there are no wrong answers and all responses were written down.

(c) After all recognised stakeholders were listed participants were asked to categorize the list.

(d) Stakeholders were ranked according to their importance in the particular category.

(e) If possible names were added when only job titles were given.

4. Brainstorming allows the group to quickly generate a lot of ideas without getting bogged down in discussions.

(a) Facilitators ask the group to think of as many aspects of an issue or ideas on a topic as they can.

(b) A rule is agreed that there will be no argument or discussion during the next stage

(c) Each group member is asked to briefly state an issue or idea which is noted on flipchart for all to see. All group members participate until there are no more issues or ideas.

(d) Analysis or ranking or discussion can take place

5. Nominal group technique aims to enable a group to quickly develop a ranked list of issues.

(a) Issues are counted to establish a list of scores e.g. if there are 15 issues there will be 15 possible scores from 1 to 15

(b) Participants are asked to give a score to each issues, the more important the issue the higher the score i.e. the score for most important issue = 15, least important =1.

(c) Scoring can be done using a matrix on poster paper, on a score card or if necessary using nuts or beans on a matrix drawn on the ground.

(d) Individual scores are tallied and the issue with the highest total score is ranked most important.

6. Concept mapping followed the guidelines in Stringer (1996)

(a) The facilitator starts the process by printing the central problem or issue in the centre of a poster visible to all group members.

(b) Participants are asked what elements might be associated with the problem or issue (facilitator can remind them of the earlier discussion if necessary) a word or phrase characterising this is then added to the poster. This continues until participants are satisfied that all elements have been included.

(c) Participants are asked to link the elements that are related to each other by drawing lines on the poster.

7. Focus groups are used to collect general information about issues through facilitated group discussions. Requires two people; one to facilitate the other to take notes (unless the activity is filmed or recorded)

(a) An issue is raised by the facilitator, perhaps written on flipchart and participants invited to comment

(b) Notes are taken from the resulting discussion,

(c) key points are put up on the flipchart as the discussion progresses

(d) Facilitator summarises discussion from the key points with input from the note-taker for verification from the group. Any additional information is noted.

Appendix 8: Report of Research Findings related to the Operation and Function of Surin Fisheries Cooperative: A participatory consultation with members and Local Government Officers.

Submitted to the committee of the Surin Fisheries Cooperative on 15th February 2002 by: Angus MacNiven, Sumon Sangkaew & Nanta Sittirach, Aquaculture & Aquatic Resources Management, School of Environment, Resources & Development, Asian Institute of Technology, P.O. Box 4 Klong Luang, Pathumthani 12120

Introduction

The purpose of this report is to give written feedback on some of the findings of the participatory appraisal that was carried out with members of the Surin Fisheries Cooperative (SFC) and local government service officers, to the members of the committee. A summary of this information was already presented in a poster format, with commentary by the SFC Chair (Somchart Gaysonbua) and Auditing Officer (Narongsak Soypet), to a special meeting of SFC members that was held on the 8th of February 2002 at the SFC office in Tambon Chaniang, Ampeur Muang, Surin.

The findings from fieldwork that are included in this report are only related to the organisation and functions of the SFC as seen by the people who are involved. Other information that we (the project team) have collected is specifically about seed production and selling, and since most of the SFC members are not seed producers or distributors we have not included it in this report. This other information will be reported later in a meeting attended only by hatchery operators.

The information is presented as it was told to us, there has been no analysis except to organise it into categories that make it easier to read. Some interpretation has been included in the discussion section, which is obviously our point of view and not from any of the people interviewed. Our project approach is to work with people to help them solve their own problems. This information is a starting point to help everyone to see the situation more clearly and to give an understanding of what is needed to improve the situation. We feel that the information should be used in planning for the future and in trying to move towards improving the situation at the SFC.

The report includes a short description of the way that the work was carried out. This is followed by a presentation of the data grouped into several themes (similar to the format used on the posters presented at the meeting on the 8th). The themes are *'What is the SFC?'* and *'what do people think of the SFC?* 'There is a summary including interpretation of the significance. The report ends by making recommendations for further action.

Methods used to get information

The research team used participatory tools to 'dig' for information. This style of research requires that the subjects do most of the talking, explaining the situation in their own words. We started by getting general background information from some of the committee members about the history of SFC, the local environment, problems and important organisations. From there we went on to talk to groups of members in Ban La-aw and Ban Nongtao focussing on their experiences, problems, expectations and networks.

Based on what the members told us we were able to carry out semi-structured interviews with the relevant government departments. This kind of interview is like a conversation based around a common set of issues. The government officers told us about their experience and feeling about the SFC, their activities in the local area and the departmental policy at national level.

The final stage was to talk to some of the members who are not hatchery operators from Ban Sano, Ban Kotaloon, Ban Chuaploeng, Ban Tenmee and Ban Samrong. This involved going to the villages and talking to small groups of members there about the same issues as were discussed in the villages in Tambon Chaniang. We were unfortunately not able to visit all the villages where members live but hope that we managed to get a good representation of the feelings, experience and opinions of the membership.

Results

Results are presented, as for as possible, using the words of the people who gave the information.

The first theme that the data can be usefully gathered under is the nature of cooperation, or the question that seemed to need answering;

What is a cooperative?

The following came from government sources though some members also shared these ideas shown in Box 1, below.

Box 1. Co-op Philosophy

- A cooperative should be committed to making benefit FOR the members, not FROM the members
- The co-op belongs to the members
- A co-op should make members happy not make more profits
- Co-ops will progress through faith and unity

The sample of quotes in Box 2 shows the diversity of expectation that members have from their co-op. We did not ask them what they think the co-op does but rather what it is that they expect from their co-op.

Box 2. Members' expectations

- Make a profit and pay them dividend (most people have never received anything)
- Provide loans to members
- Provide goods to members on credit
- Develop new markets
- Promotion of activities
- Buy more fish seed from members
- Provide fish seed to members on credit
- Members should sell seed through the co-op
- Promote cooperative activities
- Dig ponds (many members joined because they were told that they would get ponds dug at cost if they did so)

- Provide information to customers and other organisations (such as extension materials)
- Would like to have more knowledge about fish culture
- Be better known (get on television!)
- Increase the membership
- More members should participate in activities
- Open the shop 24 hours like a minimart
- Provide inputs at a cheap price
- Increase the range of goods available
- Buy goods directly from producers (and get a lower price)

Our research gathered a lot of opinion and experience that we feel should be presented together as a whole theme.

What do people think of the SFC?

The following are quotes about the experience and feelings of members. Obviously there were many comments on the co-op and we only present here the ones that sum up what everyone told us. We have organised the comments into categories based on our own judgement.

Category	Specific comment
Management	Committee don't inform members about activities The committee should be strengthened
Services	Only occasionally provide quota Prices in the shop are higher than other suppliers

	Not convenient business hours No delivery No credit Don't have a good stock of inputs
General Feeling	Want the co-op to continue & grow Life would be the same without the co-op Other members should provide support Gives a feeling of unity I am glad that the co-op are trying to work together but they are still not strong enough Now the co-op is more systematic Will withdraw money because they get no benefit and never hear anything from the co-op The co-op is not good enough….needs support
Reason for joining	Joined in order to get dividend Joined in order to get ponds dug Joined in order to get cheap or free seed

Government officers were able to spare a little of their valuable time to give the following comments. They actually had a lot to say about the situation. Again we have organised the comments into broad categories ourselves.

Category	Comments
Management	• The co-op is functioning better than previously under the new committee.

	• Strengths are the potential in the member farmers; they are willing to work hard. Weaknesses are in the management, lack of capital and internal conflict. • It is difficult to find people who can devote their own time and energy to work for the good of the whole group. • There is a lack of continuity in the management; even though the same people remain on the committee they change their roles (by law). • Co-op is strong because they can organise their own meetings and put money together without support from the government office.
Problems	• Problems at the co-op arise from internal politics that prevent it from operating as a real co-op. As a result very few members get any benefits. • The members are not united, they are a group but act individually • Members have no faith in the co-op • Problems are cheating by co-op members • Membership is scattered so it is difficult for many to join activities • Members of the co-op remain weak and dominated by the committee • Some members believe (wrongly) that the co-op belongs to the government and not to the members • The shop is not competitive with shops in Surin
General comments	• The co-op will continue because they can still sell fish seed • Co-op should provide budget to train its' members • The future of the co-op is in the hands of the committee

The final set of comments came from the first meetings with some of the committee members who told us that their problems included the following (in order of importance).

Categories	**Specific Problems**
Lack of capital	Capital only comes from membership fees No government support or subsidies
Management	Lack of cooperation The operation does not meet the goals There is no continuity No master plan or vision Committee lack experience of management and coordination (no public relations to disseminate SFC information)
Members	Members don't follow the rules No sense of ownership of co-op by members Lack training and knowledge in technical and marketing issues Don't understand their role/duty Lack confidence in the co-op Don't buy goods from the shop
Other related problems	Lack of co-ordination and networking/collaboration Corruption Poor image (profile) of the co-op High cost of inputs

Discussion - What does it all mean?

We thought it was important to begin the presentation of information collected with some idea of the thinking or philosophy behind cooperative enterprises. Without some attention to this there is no co-op. The only real reason to set up or join a co-op is that it can create extra benefit over and above what can be obtained by a farmer working on his own. The information presented above indicates that for the SFC this benefit is not being obtained. How this is happening is not clear but it is hoped that discussion of the results can at least suggest a way to look for answers. Ideally we would prefer to talk about the issues with the committee and members and I hope that this report will persuade you that something needs to be done.

The diversity of expectations shown by the members show that they are not clear about what it is that the SFC does.

- Some of them think that the co-op is a buying group that can get them cheap inputs through an economy of scale, but it cannot be that because the cost of inputs available from the co-op is higher than in other shops.
- Others think that it is a marketing co-op for fish seed, most people have not benefited from this service.
- Maybe it is a credit union? Recent activity suggests that loans are available.
- Perhaps it is a government land development project that can get them new ponds and free or cheap fish seed? We heard that some people got ponds and fish, but a long time ago, most are still waiting.
- Could it be an information or extension service? Many people are interested in fish culture.

It appears that a useful service would be to let the members know what the co-op is all about, specifically, what are its' objectives and how does it try to achieve them? Clear objectives and strategy/vision are fundamental to the successful operation of any organisation.

On the subject of the reputation of the SFC, we found that there are mixed opinions. Some members feel let down by the co-op, they obviously never got what they were expecting, and others recognize that there are problems but feel that things are improving. There are many issues that need to be addressed; issues of service, management, the obvious misunderstandings of what the co-op is doing and can do, past mistakes by certain individuals, etc, but that is not the reason we wrote this report. The comments that people have made speak for themselves. As we said before our approach is to work with people on their problems not provide a list of answers, the situation is not so simple and experience has shown that people need to find their own answers. Sometimes all we can do is provide more questions...but answering these further questions should bring us closer to improving the system.

One striking fact is that, the government officers seem to be very aware of the situation; their comments seem to show that they know very well what is happening though they do not make any suggestions for improvement. This brings to mind a question,

"If they know what the problems are, maybe they could give some assistance and perhaps even help to solve the problems?"

The identification of the problems that the committee made at the start of this process shows clearly that there is an understanding of the situation. Identification of the problems can be followed by analysis and attempts to find solutions; it just takes a bit of time, effort and enthusiasm.

Conclusion

This should not be the end of the research process. This work could be a starting point for action to improve the SFC. Our project will be happy to assist the SFC in further activities but it requires the enthusiasm of the members, especially the committee. We will continue to work with the hatchery operators in Surin but not directly through the co-op as we feel that

(1) The committee have enough work to do already without the burden of fitting our activities into their busy schedule, and

(2) Most of the members of this co-op are not hatchery operators, who are our target group.

We know already from our conversations with local government officers that help may be available but you have to ask for it. The specific, important issues that you and the members have identified provide a strong case for requesting assistance. If you would like some help from us to present your case to government authorities who may be able to help, or to analyse the situation further, please let us know; we will be happy to help. As one government officer put it

"the future of the co-op is in the hands of the committee".

Acknowledgements

We would like to thank everyone who has assisted in this research. Especially the committee and members of the SFC, Department of Fisheries Inland Fisheries Station and Provincial Fisheries Office, the staff and students of the Fishery Department, Rajamangala Institute of Technology - Surin. The cooperation of officers from the Provincial Cooperatives Department and Provincial Agriculture Department, Bank of Agriculture & Agricultural Cooperatives - Surin, Chaniang T.A.O., and Community Development Department is greatly appreciated.

[i] The project was previously operating in five parts of Asia, Bangladesh, Lao PDR, Northeast Thailand, Northern and Southern Vietnam. In the current phase activities will be focused in the Northeast of Thailand.